Supplementary

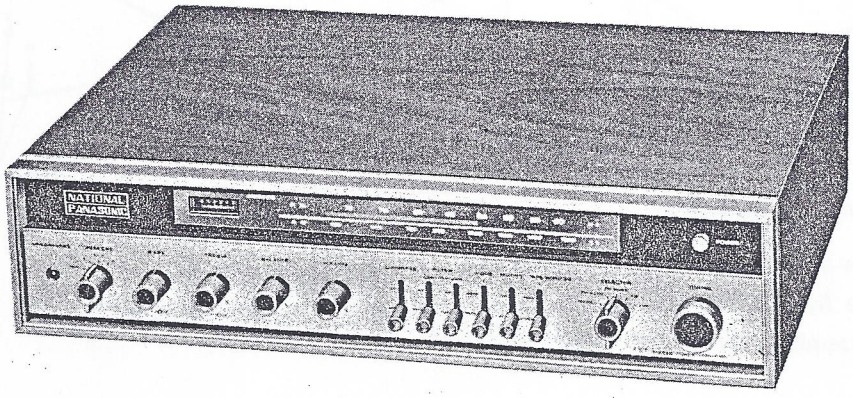
ORDER NO. SD-M 123

NATIONAL Service Manual

90-WATT, FM/AM STEREO TUNER AMPLIFIER

MODEL SA-54

Original



SPECIFICATIONS

AUDIO SECTION

Power Output (IHF):	Total 90W (4Ω) Total 80W (8Ω)
RMS Power:	32W/32W (8Ω)
Total Harmonic Distortion:	0.8%
Power Band Width:	15~70,000Hz−3dB
Frequency Response:	AUX 30~60,000 Hz ±3 dB Main Amp. 30~100,000 Hz +0 dB −3 dB
Signal-to-Noise:	65 dB (PHONO) 75 dB (AUX)
Residual Hum & Noise:	1.5mV
Damping Factor:	25 (4Ω) 50 (8Ω)
Sensitivity & Impedance:	PHONO 3 mV 50 KΩ AUX 160 mV 35 KΩ TAPE MONITOR 160 mV 35 KΩ
Tone Control:	Bass 50 Hz ±10 dB Treble 10 kHz ±10 dB
Low Filter:	70 Hz −12 dB/oct
High Filter:	7 KHz −12 dB/oct

FM TUNER SECTION

Frequency Range:	88~108 MHz
Usable Sensitivity:	1.8μV (IHF)
Image Rejection:	80 dB
IF Rejection:	100 dB
Signal-to-Noise:	60 dB
Total Harmonic Distortion:	0.5%
Capture Ratio:	1 dB (IHF)
Cross Modulation:	100 dB
Antenna Impedance:	300Ω Balanced
FM Multiplex Separation:	40 dB

AM TUNER SECTION

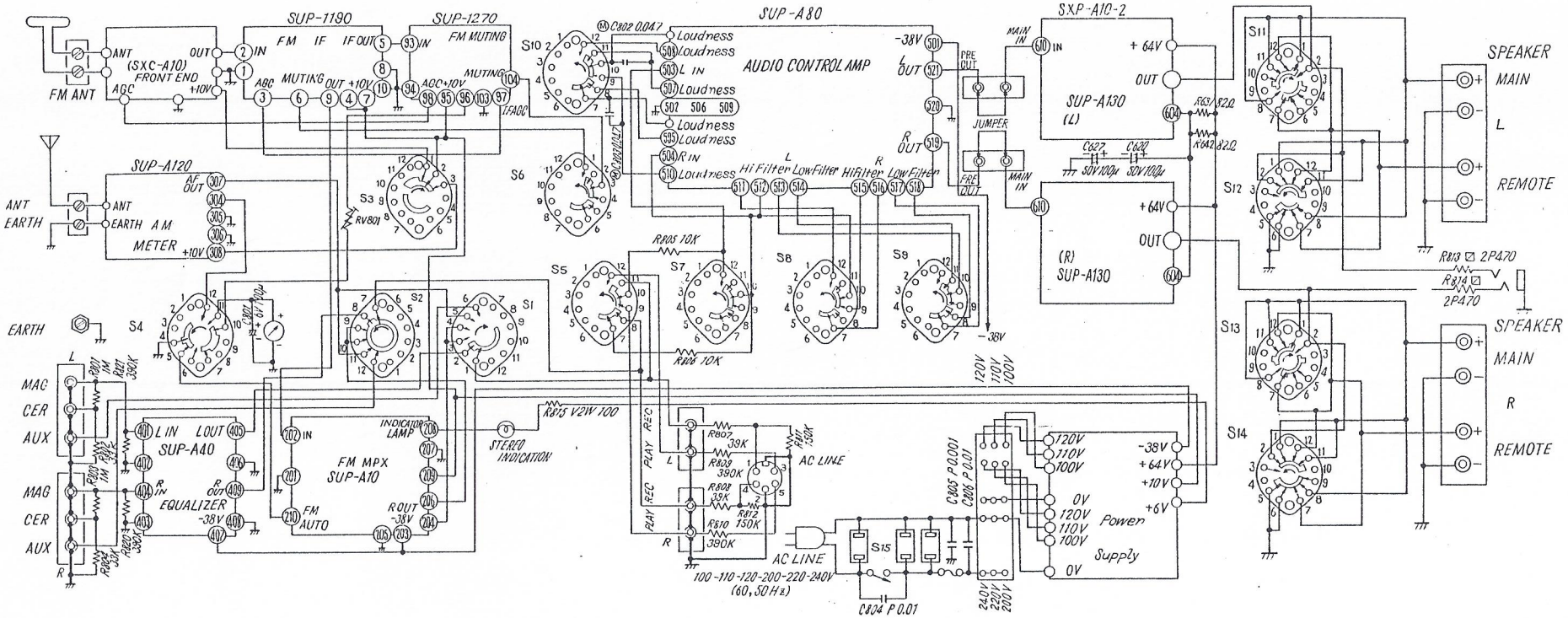
Frequency Range:	525~1605 kHz
Usable Sensitivity:	20μV (IHF)
Image Rejection:	70 dB (at 1 MHz)
IF Rejection:	65 dB (at 1 MHz)
Input Jack:	FM ANT, AM ANT, MAG, CERAMIC, AUX, PLAYBACK (PIN-PLUG & DIN)
Output Jack:	SPEAKERS RECORDING (PINPLUG & DIN) HEAD PHONES, AC OUTLET (2 SWITCHED & 1-UNSWITCHED)
Other Features:	MUTING, LOUDNESS, TUNING INDICATOR, FM STEREO INDICATOR
Power Consumption;	min 25W~max 150W
Power Supply:	100/110/120/200/220/240V
Fuse:	2A
Transistors:	3-FET, 52-TR
Diodes:	29
Dimensions:	19¾″(W)×5⅛″(H)×14″(D)
Weight:	28.5 lb.

• Specifications are subject to change without notice.

<EXPORT DIVISION>
MATSUSHITA ELECTRIC TRADING CO., LTD.
P. O. Box 288 Central, Osaka, Japan

MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.
RADIO and STEREO DIVISION

BLOCK DIAGRAM MODEL SA-54

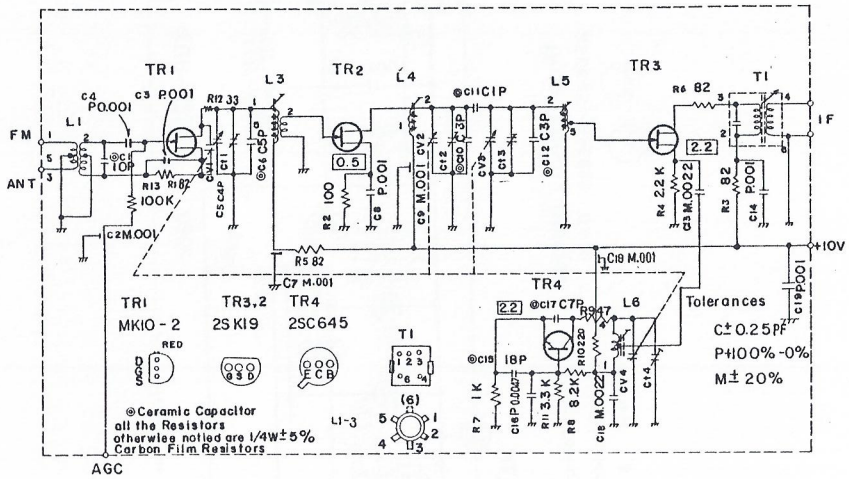


S1~S4	SELECT NOW in (PHONO) Position PHONO-FM AUTO-FM MONO-AM-AUX	S8	HIGH FILTER NEW in (OFF) Position
S5	TAPE MONITOR NOW in (Source) Position	S9	LOW FILTER " (OFF) "
S6	MUTING " (OFF) "	S10	LOUDNESS " (OFF) "
S7	MODE " (STEREO) "	S11~S14	SPEAKERS NOW in (PHONES) Position PHONES—MAIN—REMOTE—MAIN+REMOTE
		S15	POWER NOW in (OFF) Position

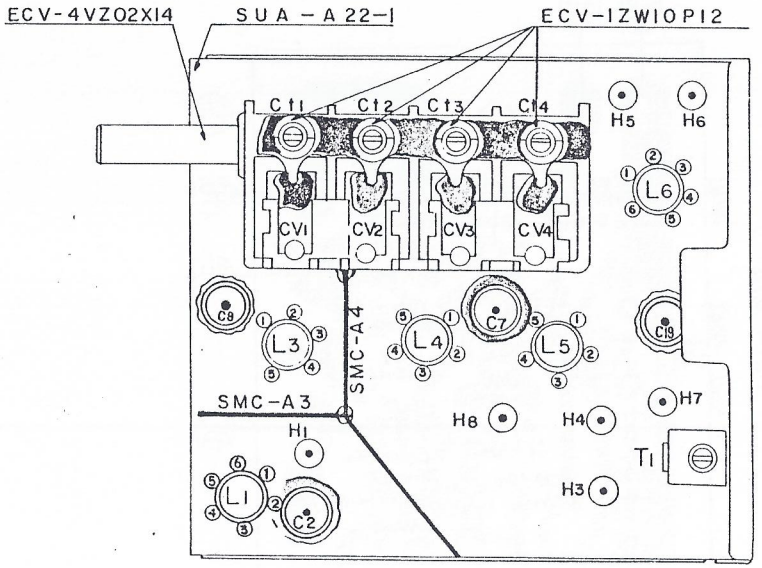
SCHEMATIC DIAGRAM
CIRCUIT BOARD

MODEL SA-54

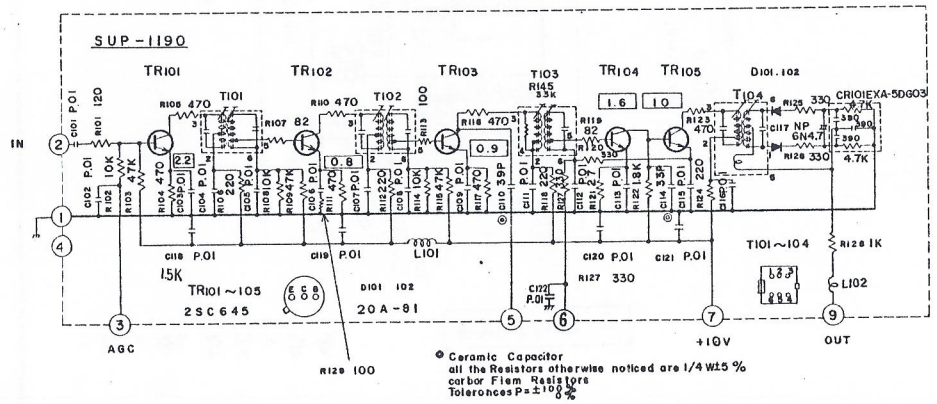
FM Front End



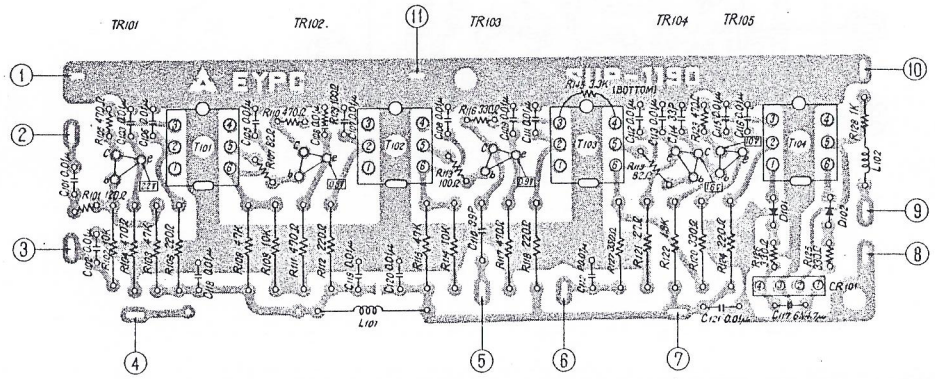
FM Front End



FM IF



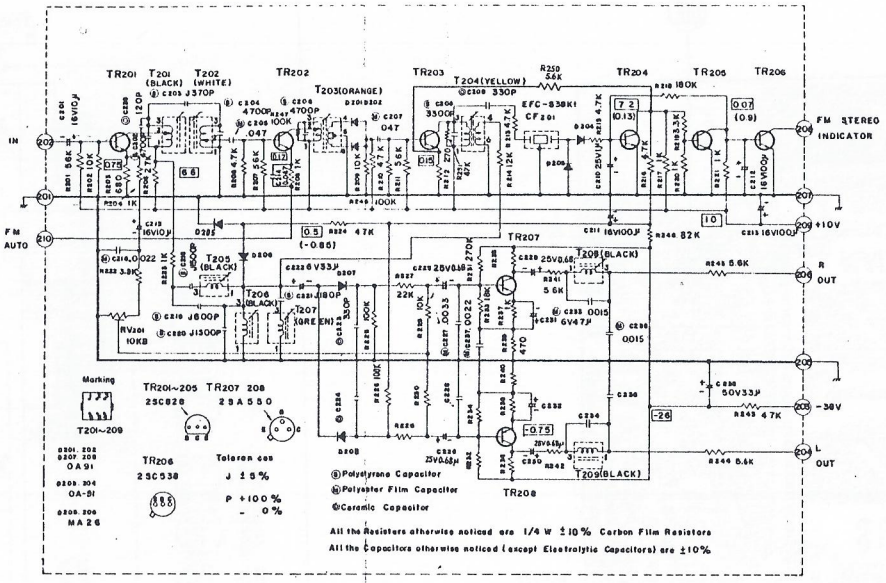
FM IF



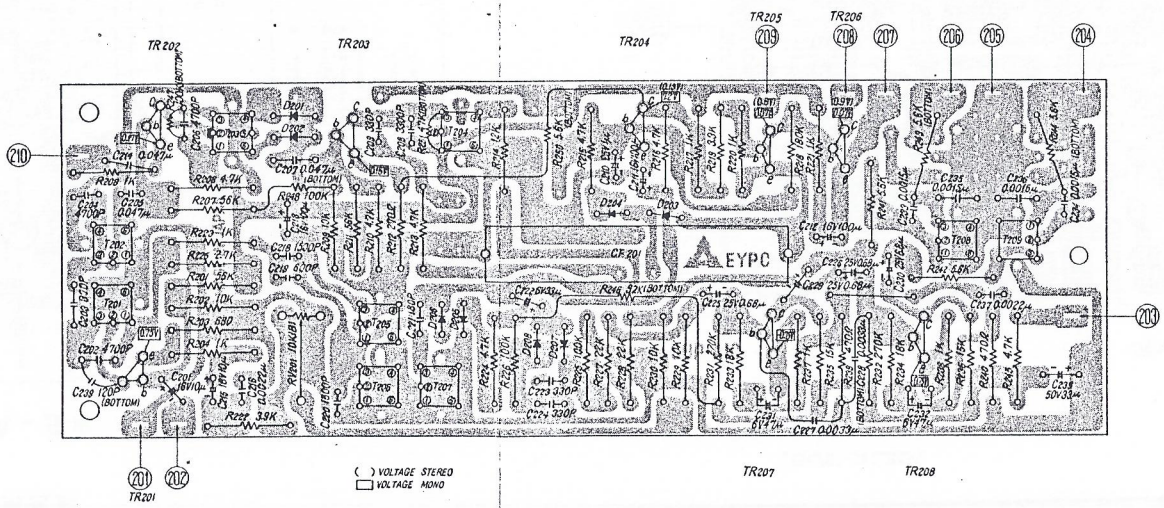
SCHEMATIC DIAGRAM
CIRCUIT BOARD

MODEL SA-54

MPX.



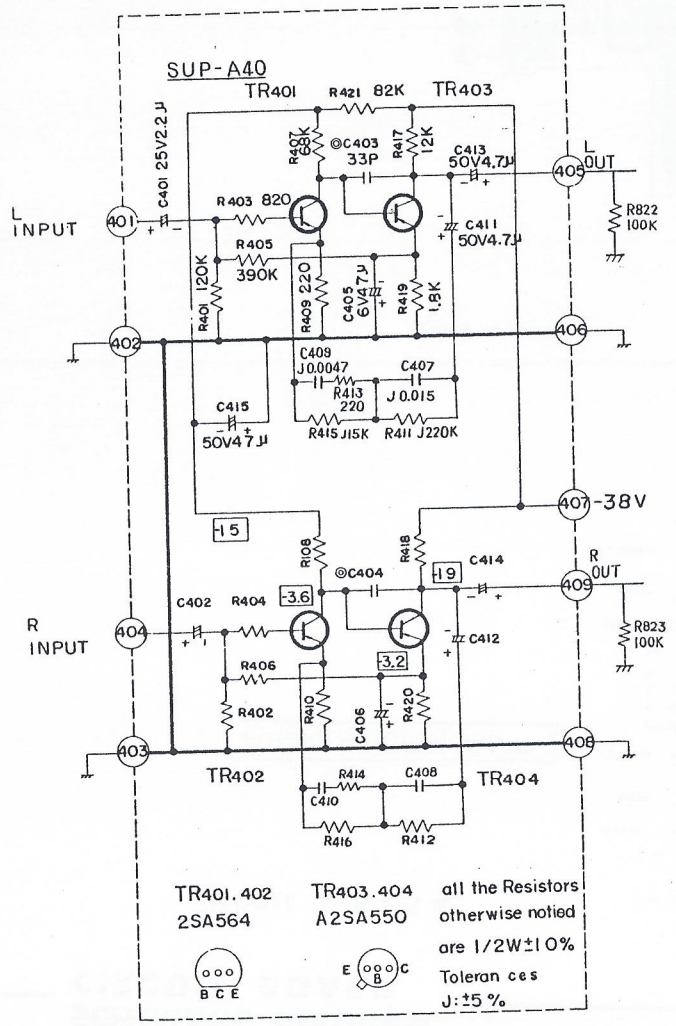
(SUP-A10)



SCHEMATIC DIAGRAM
CIRCUIT BOARD

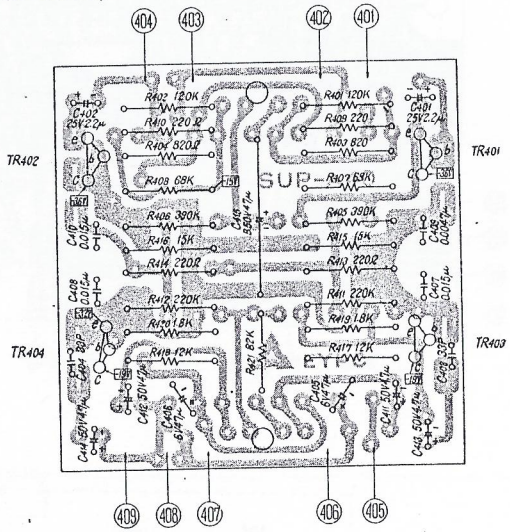
MODEL SA-54

Equalizer

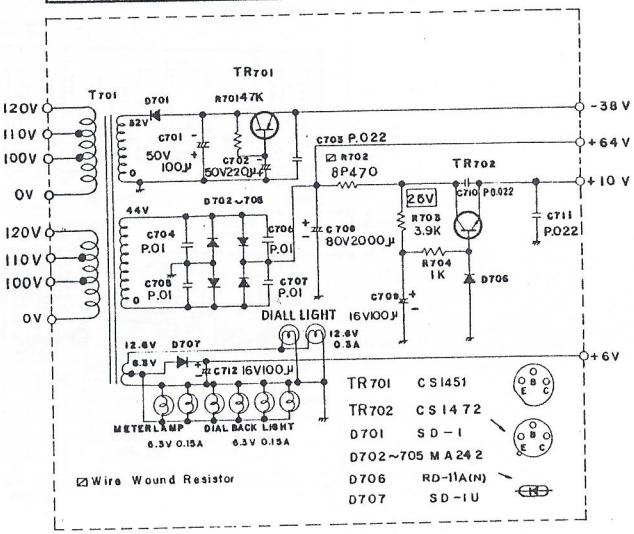


Equalizer

(SUP-A40)



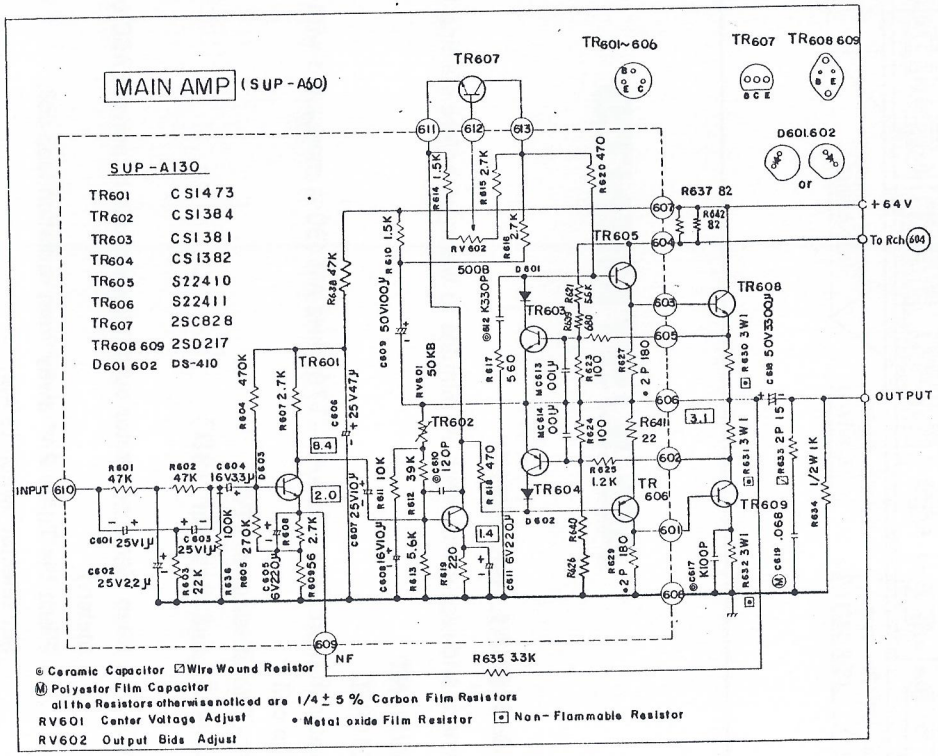
Power Supply

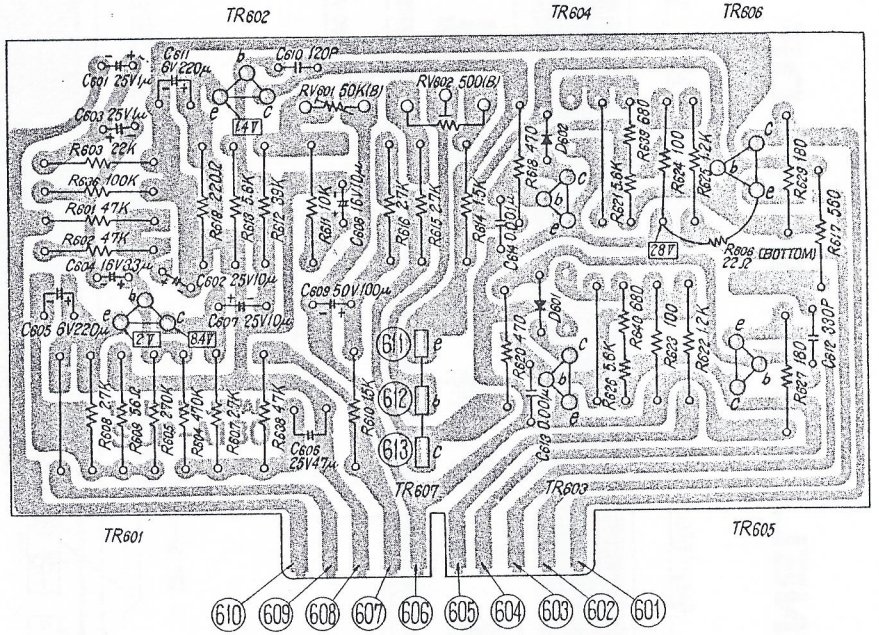


SCHEMATIC DIAGRAM
CIRCUIT BOARD

MODEL SA-54

MAIN AMP.





AM IF, RF ALIGNMENT

Output of signal generator should be no higher than necessary to obtain an output reading.

- Set volume control to maximum.
- Set bass-treble controls to flat (center).
- Set selector switch to AM.
- Set tape monitor switch to SOURCE
- Set speaker switch to MAIN.
- Maintain line Voltage at rated voltage.
- Set balance control to center.
- Set loudness control to OFF.
- Set mode switch to STEREO.

STEP	CIRCUIT	SIGNAL GENERATOR CONNECTION	SIGNAL GENERATOR FREQUENCY	TUNER DIAL SETTING	OUTPUT METER CONNECTION	ADJUSTMENT	REMARKS
1	IF	Connect to SUP-A120 #302 terminal	455 kHz ± 5 kHz (2000 Hz Mod.)	Point of non-interference (on/about 600 kHz)	AF VTVM across speaker terminals (L ch. MAIN)	T_{302} (1st IFT) T_{303} (2nd IFT)	Adjust for maximum output. Keep IF tolerance within 455 kHz ±5 kHz
2	AM RF	Fashion loop of several turns of wire and radiate signal into loop of receiver.	550 kHz (400 Hz Mod.)	550 kHz		L_{302} (AM OSC COIL) T_{301} (AM COLL. COIL) L_{301} (AM ANT COIL)	Adjust for maximum output.
3			1500 kHz (400 Hz Mod.)	1500 kHz		C_{t3} (AM OSC Trimmer) C_{t2} (AM COLL. Trimmer) C_{t1} (AM ANT Trimmer)	Adjust for maximum output. Repeat steps (2) and (3)

Note: Cement antenna bobbin with wax after completing alignment.

2. FM IF ALIGNMENT WITH OSCILLOSCOPE

A EQUIPMENT REQUIRED

Signal generator that provides center frequency marker.

Sweep generator that provides 10.7 MHz center frequency and 400 KHz sweep width.

B OSCILLOSCOPE

Set sweep selector of oscilloscope to External Sweep. apply 60 Hz sweep signal from generator to Horizontal input terminals of oscilloscope.

Set Selector switcn to FM-MONO.

Set Volume control to minimum.

Other controls at optional positions.

Maintain line voltage at rated voltage.

Set Muting switch to OFF.

3. FM RF ALIGNMENT

EQUIPMENT REQUIRED

SIGNAL GENERATOR .....That provides 80 MHz to 110 MHz (30% modulated with 400 Hz FM)

OUTPUT LEVEL .....Keep signal generator output low enough to prevent overload.

- Set volume control to maximum.
- Set selector switch to FM-AUTO.
- Set bass-treble controls to flat. (center)
- Set balance control to center position.
- Maintain line Voltage at rated voltage.
- Set mode switch to STEREO.
- Set loudness switch to OFF.
- Set speakers switch to MAIN.
- Set tape monitor switch to SOURCE.

STEP	SIGNAL GENERATOR CONNECTION	SIGNAL GENERATOR FREQUENCY	TUNER DIAL SETTING	OUTPUT METTER CONNECTION	ADJUSTMENT	REMARKS
1	Connect to FM Antenna terminal through FM Dummy antenna (Refer to Fig.4)	90 MHz (400 Hz Mod.)	90 MHz	AF VTVM across speakers terminal (L ch.)	L_6 (FM OSC Coil) L_4 (FM DET Coil) L_5 (FM DET Coil) L_3 (FM RF Coil)	Adjust for maximum output.
2		106 MHz (400 Hz Mod.)	106 MHz		Ct_4 (FM OSC Trimmer) Ct_3 (FM DET Trimmer) Ct_2 (FM DET Trimmer) Ct_1 (FM RF Trimmer)	Adjust for maximum output. Repeat steps (1) and (2).
3		98 MHz (400 Hz Mod.)	98 MHz		L_1 (FM ANT Coil)	Adjust for maximum output. Repeat steps (1) and (2).

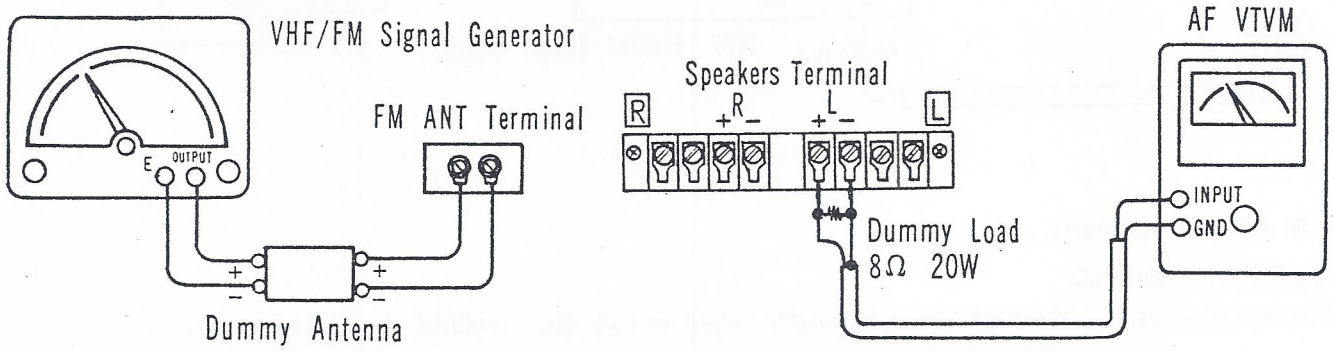


Fig. 4

Fig. 4 Recommended Equipment Connection for FM-RF Alignment.

B) PROCEDURE

RECEIVER.....Selector switch to FM-AUTO, dial setting to approximatery 98 MHz Power Switch...ON.

STEP	ALIGNMENT CIRCUIT	EQUIPMENT CONNECTION	ADJUSTMENT	REMARKS
1	19 kHz Amp.	Refer to Fig. 6	T_{201} (19 kHz Pick up Coil) (P) T_{202} (19 kHz Pick up Coil) (S) T_{203} (19 kHz Doubler Coil) T_{204} (38 kHz Output Coil)	Adjust for maximum oscilloscope pattern. (Refer to Note)
2	19 kHz Amp.		T_{202} (19 kHz Pick up Coil) (S)	Adjust for maximum oscilloscope pattern and VTVM indication. (Refer to Note)

Note: Wave forms may appear while turning T_{204} Yellow upwards; adjust T_{204} Yellow to obtain wave form. Refer to Fig. 7.
(Make adjustments so that the C section of the wave form becomes small and the B section big.)

Fig. 6 Recommended Equipment Connection for 19 kHz Amp. Alignment.

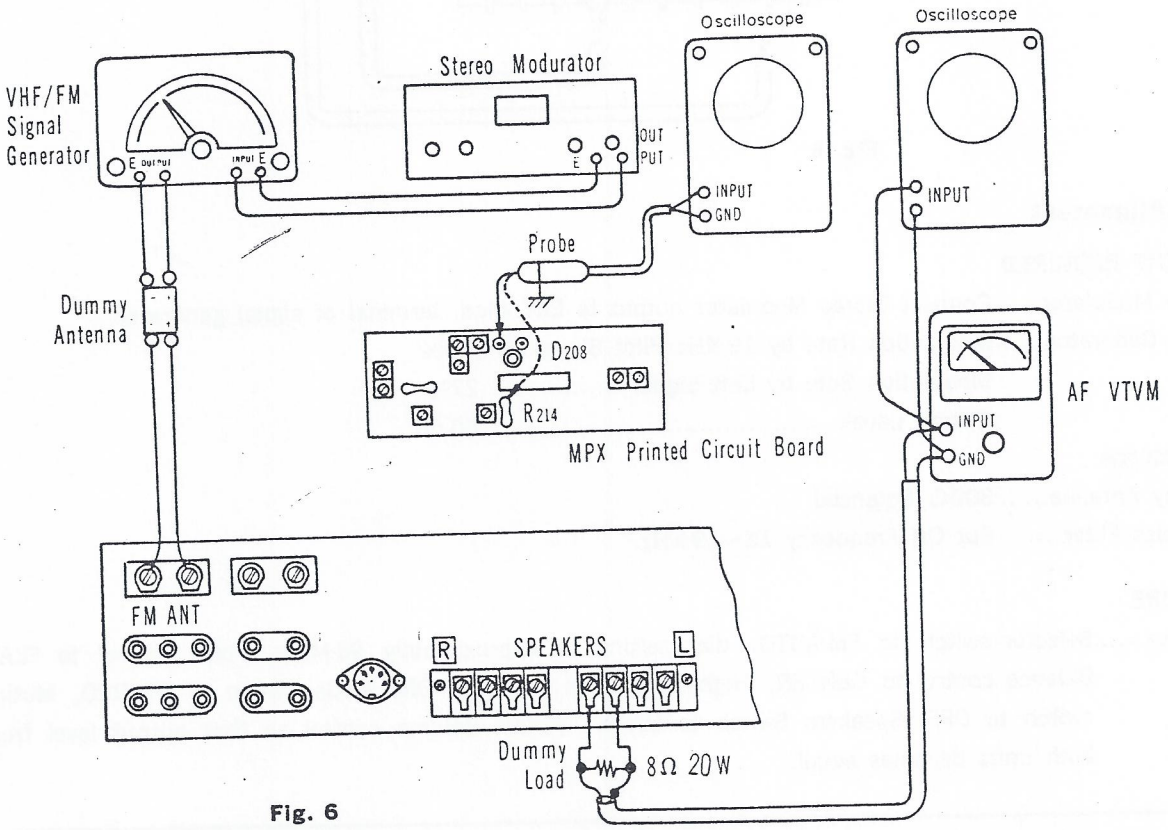


Fig. 6

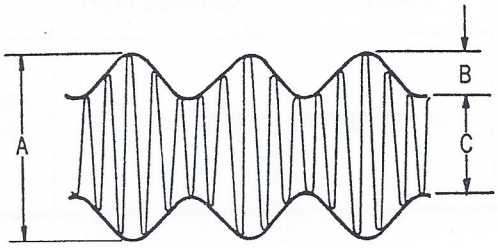


Fig. 7

5. POWER AMP ALIGNMENT

STEP	ALIGNMENT CIRCUIT	EQUIPMENT REQUIRED	ADJUSTMENT	REMARKS
1	DC Balance	Connect tester to speaker terminal.	RV 601 (R ch)	Make adjustments to that the power voltage becomes 0 voltage. Repeat steps (1) and (2).
2			RV 601 (L ch)	
3	ICQ Control	Connect VTVM (for DCmV) to point TP1 and earth.	RV 602 (R ch)	Make adjustments so that the indication on VTVM becomes 20 mV.
4		Connect VTVM (for DCmV) to point TP2 and earth. TP1 → TR609 Emitter (R ch) TP2 → TR659 Emitter (L ch)	RV 602' (L ch)	

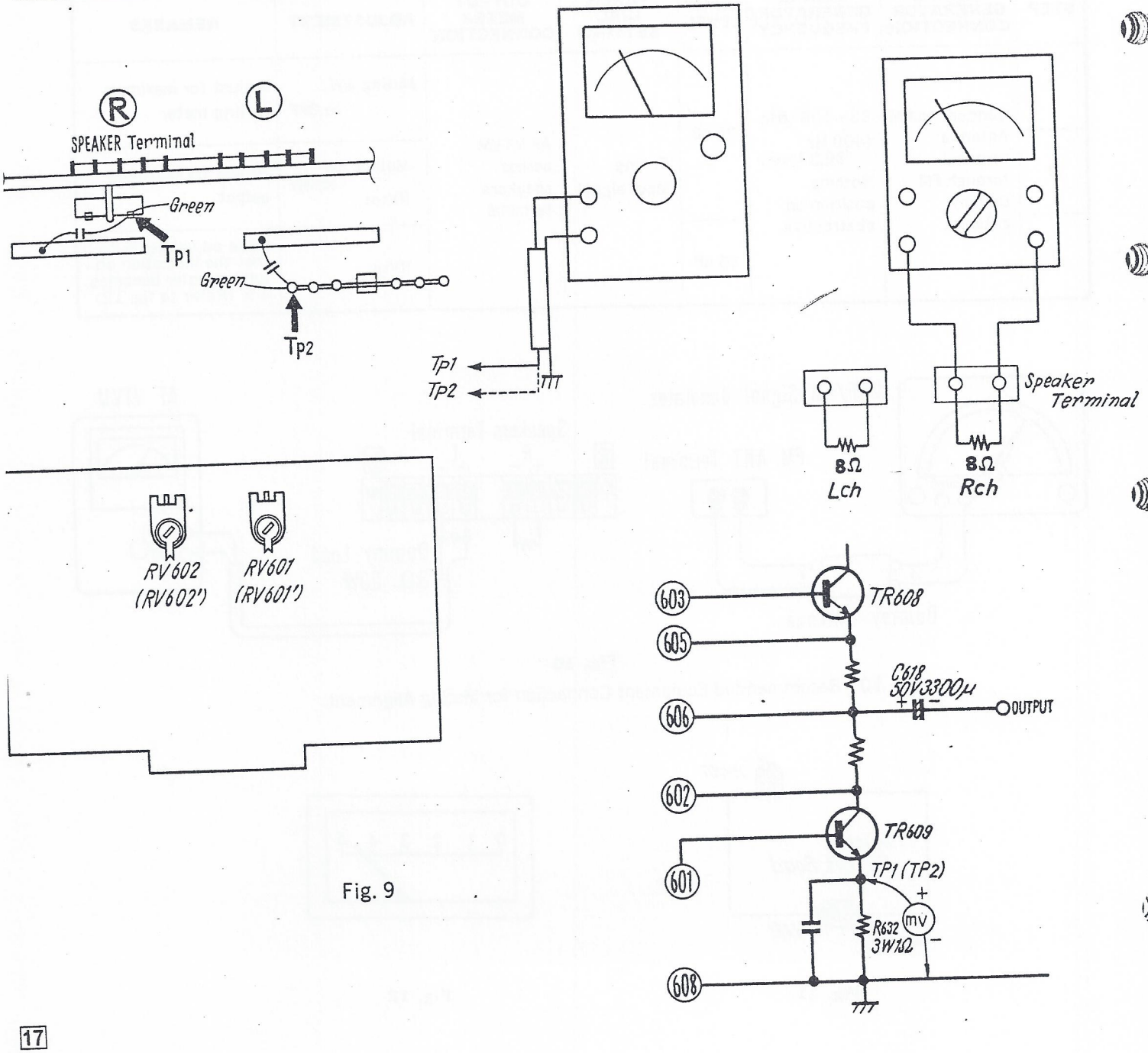


Fig. 9

REPLACEMENT PARTS LIST

SYMBOL NO.	PART NO.	DESCRIPTION
TRANSISTORS AND DIODES		
TR1	MK10-2	FM 1st RF Amp. FET
TR2	2SK19	FM 2nd RF Amp. FET
TR3	2SK19	FM Mixer FET
TR4	2SC645 B.C	FM Local OSC.
TR101 (105	2SC645 B.C	FM 1st IF Amp. / FM 2nd IF Amp. / FM 3rd IF Amp. / FM 4th IF Amp.
TR130	2SC645 B.C	Muting IF Amp.
TR131	2SC828 P.Q.R	Muting Switching Amp.
TR132	2SC828 P.Q.R	Muting Switching Amp.
TR201	2SC828 P.Q.R	MPX 19kHz Amp.
TR202	2SC828 P.Q.R	MPX 19kHz Amp.
TR203	2SC828 P.Q.R	MPX 38kHz Amp.
TR204	2SC828 P.Q.R	MPX Switching Amp.
TR205	2SC828 P.Q.R	MPX Switching Amp.
TR206	2SC538 P.Q.R	MPX Indicator Amp.
TR207	A2SA550 Q.R	MPX AF Amp. (right)
TR208	A2SA550 Q.R	MPX AF Amp. (left)
TR301	2SC562	AM RF Amp.
TR302	2SC645 B.C	AM Conv.
TR303	2SC645 B.C	AM IF Amp.
TR304	2SC645 B.C	AM AGC Amp.
TR305	2SC828 P.Q.R	AM AF Amp.
TR401	2SA564 FR.FQ	Equalizer 1st Amp. (left)
TR402	2SA564 FR.FQ	Equalizer 1st Amp. (right)
TR403	A2SA550 Q.R	Equalizer 2nd Amp. (left)
TR404	A2SA550 Q.R	Equalizer 2nd Amp. (right)
TR501	A2SA550 Q.R	AF Control 1st Amp. (left)
TR502	A2SA550 Q.R	AF Control 1st Amp. (right)
TR503	2SA564 FR.FQ	AF Control 2nd Amp. (left)
TR504	2SA564 FR.FQ	AF Control 2nd Amp. (right)
TR505	2SA564 FR.FQ	AF Control 3rd Amp. (left)
TR506	2SA564 FR.FQ	AF Control 3rd Amp. (right)
TR601 (×2)	CS1473	Main 1st AF Amp. (right & left)
TR602 (×2)	CS1384	Main 2nd AF Amp. (right & left)
TR603 (×2)	CS1381	Main NPN Protection (right & left)
TR604 (×2)	CS1382	Main PNP Protection (right & left)
TR605 (×2)	S22410	NPN Driver (right & left)
TR606 (×2)	S22411	PNP Driver (right & left)
TR607 (×2)	2SC828 P.Q.R	Thermal Control (right & left)
TR608 (×2)	2SD217	Power Amp. (right & left)
TR609 (×2)	2SD217	Power Amp. (right & left)
TR701	CS1451	Ripple Filter
TR702	CS1472	Voltage Regulator (Tuner)
D101, 102	2OA91	FM Detector (pair)
D130, 131, 132	OA91	FM AGC & Tuning Ind. Rect.
D201, 202	OA91	MPX 19kHz Doubler
D203, 204	OA91	MPX 38kHz Rect.
D205, 206	MA26	STEREO-MONO Switching
D207, 208	OA91	MPX Matrix Detector
D301	OA91	AM Detector
D302, 303 304	MA26	AM Bias Regulator
D305	OA91	AM Tuning Ind. Rect.
D601, 602 651, 652	DS-410	Automatic Operation Control
D701	SD-1	Sub Source Rectifier
D702, 703 704, 705	MA-242	Main Source Rectifier
D706	RD-11A(N)	Zener Diode
D707	SD-1U	Stereo Ind. Source Rect.
COILS AND TRANSFORMERS		
L1	SLA-A4Q7	FM Ant Coil
L3	SLA-A4Q2	FM RF Coil
L4, 5	SLD-A4Q1	FM RF & Det. Coil
L6	SLO-A4Q1	FM Osc. Coil
L101, 102, 103	ELQ-250A999	RFC
T201	SLM-A1C9K	MPX 19kHz Pick up Coil
T202	SLM-A1C11K	MPX 19kHz Pick up Coil
T203	SLM-A1C13K	MPX 38kHz Doubler Coil
T204	SLM-A1C15K	MPX 38kHz Out put Coil
T205, 206, 208, 209	SLM-1C17T	MPX Filter
T207	SLM-1C19T	MPX Filter 19kHz Pick up Coil
L301	SLF-A2E1	AM Ant. Coil
L302	SLO-A2P1	AM Osc. Coil
L303	ELQ-393D5999G	RFC
CF201	EFC-S38K1	38kHz Ceramic Eilter
T1	SLI-4C101	FM IFT SLI-40101
T101, 102	SLI-4L201	FM IFT
T104	SLI-4L501	Discri Trans
T103	SL -4L601	FM IFT
T301	SLD-2C1	AM Det. Coi.
T302	SLI-2C105	AM Ceramic IFT
T303	SLI-2C401M	AM IFT
T701	SLT-A5Q1S	Power Transformer
L130, 132 132	SLQ-X151-1Y	MUTING
RESISTORS		
(FM Front End)		
R12	ERD-14TJ330	Carbon 33Ω ±5% 1/4W
R9	ERD-14TJ470	Carbon 47Ω ±5% 1/4W
R1, 3, 5, 6	ERD-14TJ820	Carbon 82Ω ±5% 1/4W
R2	ERD-14TJ101	Carbon 100Ω ±5% 1/4W
R10	ERD-14TJ1221	Carbon 220Ω ±5% 1/4W
R7	ERD-14TJ102	Carbon 1KΩ ±5% 1/4W
R4	ERD-14TJ222	Carbon 2.2KΩ ±5% 1/4W
R8	ERD-14TJ822	Carbon 8.2KΩ ±5% 1/4W
R13	ERD-14TJ104	Carbon 100KΩ ±5% 1/4W
R11	ERD-14TJ332	Carbon 3.3KΩ ±5% 1/4W
(FM IF Circuit Board)		
R121	ERD-14TJ 270	Carbon 27Ω ±5% 1/4W

SYMBOL NO.	PART NO.	DESCRIPTION
R 505, 506	ERD-14TJ184	Carbon 180KΩ ±5% 1/4W
RV503, 504	EVG-68AU25B54-A	Volume (Variable Resistor)
RV501, 502	EVF-68AU25368-B	Balance (Variable Resistor)
RV 505, 506 507, 508	EVF-33AN16B54-B	Tone (Variable Resistor)
	(Main Amp. Circuit Board)	
R 627, 629 (×2)	ERG-2PSK181	Metal Film 180Ω ±20% 2W
R 609 (2×)	ERD-14TJ560	Carbon 56Ω ±5% 1/4W
R 623, 624 (×2)	ERD-14TJ101	Carbon 100Ω ±5% 1/4W
R 619 (×2)	ERD-14TJ221	Carbon 220Ω ±5% 1/4W
R 618, 620 (×2)	ERD-14TJ471	Carbon 470Ω ±5% 1/4W
R617 (×2)	ERD-14TJ561	Carbon 560Ω ±5% 1/4W
R638 (×2)	ERD-14TJ473	Carbon 47KΩ ±5% 1/4W
R622, 625 (×2)	ERD-14TJ122	Carbon 1.2KΩ ±5% 1/4W
R610, 614 (×2)	ERD-14TJ152	Carbon 1.5KΩ ±5% 1/4W
R607, 608, 615, 616 (×2)	ERD-14TJ272	Carbon 2.7KΩ ±5% 1/4W
R613 (×2)	ERD-14TJ562	Carbon 5.6KΩ ±5% 1/4W
R621, 626 (×2)	ERD-14TJ562	Carbon 5.6KΩ ±5% 1/4W
R611 (×2)	ERD-14TJ103	Carbon 10KΩ ±5% 1/4W
R603 (×2)	ERD-14TJ223	Carbon 22KΩ ±5% 1/4W
R612 (×2)	ERD-14TJ393	Carbon 39KΩ ±5% 1/4W
R636 (×2)	ERD-14TJ104	Carbon 100KΩ ±5% 1/4W
R605 (×2)	ERD-14TJ274	Carbon 270KΩ ±5% 1/4W
R604 (×2)	ERD-14TJ474	Carbon 470KΩ ±5% 1/4W
RV601 (×2)	EVL-TOAAOOB54	Variable Resistor DC Balancer
RV602 (×2)	EVL-SOAAOOB52	Variable Resistor ICQ Control
R639, 640 (×2)	ERD-14TJ681	Carbon 680Ω ±5% 1/4W
R641 (×2)	ERD-14TJ220	Carbon 22Ω ±5% 1/4W
R601, 602 (×2)	ERD-14TJ473	Carbon 47KΩ ±5% 1/4W

CHASSIS

R810	REC-12GK394	Solid 390KΩ ±10% 1/2W
R634×2	ERD-12TK102	Carbon 1KΩ ±10% 1/2W
R637,642	ERD-14TJ820	Carbon 82Ω ±5% 1/4W
R805, 806	ERD-12TJ103	Carbon 10KΩ ±5% 1/2W
R811	ERD-14TJ154	Carbon 150KΩ ±5% 1/4W
R635×2	ERD-14TJ332	Carbon 3.3KΩ ±5% 1/4W
R808, 807	ERD-14TJ393	Carbon 39KΩ ±5% 1/4W

SYMBOL NO.	PART NO.	DESCRIPTION
R704	ERD-12TJ102	Carbon 1KΩ ±5% 1/2W
R701	ERD-14TJ473	Carbon 47KΩ ±5% 1/4W
R802, 804	ERD14TJ333	Carbon 33KΩ ±5% 1/4W
R801, 803	ERD-14TJ105	Carbon 1MΩ ±5% 1/4W
R633×2	ERM-2P150	Wire 15Ω 2W
R820, 821	ERD-14TJ394	Carbon 390KΩ ±5% 1/4W
R630, 631, 632 (×2)	ERF-3S1RO	Wire 1Ω 3W (Non-Flammable)
R703	ERD-12TJ392	Carbon 3.9KΩ ±5% 1/2W
R702	ERM-8P471	Wire 470Ω 8W
R813, 814	ERM-2P471	Wire 470Ω 2W
R812	ERD-14TJ154	Carbon 150KΩ ±5% 1/4W
R815	ERD-12TJ101	Carbon 100Ω ±5% 1/2W
R822, 823	ERD-14TJ104	Carbon 100KΩ ±5% 1/4W
RV 801	EVL-TOAA00B24	Meter adjust (Variable Resistor)

CAPACITORS

	(FM Front End)	
C6	ECC-DO5050C	Ceramic 5pF ±0.25pFWV-50V
C13,18	ECK-DO5222MY	Ceramic 0.0022pF ±20% WV-50V
C11	ECC-DO5010C	Ceramic 1pF ±0.25pF WV-50V
C16	ECK-DO5472P	Ceramic 0.0047μF ±20% WV-50V
C15	ECC-DO5180K	Ceramic 18pF±10% WV-50V
C1	ECC-DO5100K	Ceramic 10pF ±10% WV-50V
C12,10	ECC-DO5030C	Ceramic 3pF±0.25pF WV-50V
C5	ECC-DO5040C	Ceramic 4pF±0.25pF WV-50V
C3, 7, 4 8, 14	ECK-DO5102P	Ceramic 0.001μF+100% — 0% WV-50V
C17	ECC-DO5070C	Ceramic 7pF ±0.25pF WV-50V
C2, 7, 19, 9	ECK-Y5102PU2	Cermic 0.001μF +100% — 0% WV-500V
CV1~4	ECV-4VZ02×14	V.C.
Ct1~4	ECV-1ZW10P12	Trimmer
	(FM IF Circuit Board)	
C114	ECC-DO5330K	Ceramic 33pF ±10% WV-50V
C110	ECC-DO5390K	Ceramic 39pF ±10% WV-50V
C101~109 111~113 115, 116 118~122	ECK-DO5103P	Ceramic 0.01μF +100% — 0% WV-50V
C117	ECE-A6N4R7	Electrolytic 4.7μF WV-6V
	(FM Muting Circuit Board)	
C130, 138, 131, 134, 135, 140	ECK-DO5103P	Ceramic 0.01μF ±100% — 0% WV-50V
C132	ECC-DO5070C	Carmic 7pF ±0.25pF WV-50V
C133	ECC-DO5390K	Ceramic 39pF ±10% WV-50V
C136	ECE-A16V3R3	Electrolytic 3.3μF WV-16V
C137	ECE-A16V10N	Electrolytic 10μF WV-16V
C139	ECE-A16V47N	Electrolytic 47μF WV-16V
	(MPX Circuit Board)	
C239	ECC-DO5121K	Ceramic 120pF WV-50V
C209, 223 224	ECC-DO5331K	Ceramic 330pF WV-50V
C222	ECE-A6V33	Electrolytic 33μF WV-6V

SYMBOL NO.	PART NO.	DESCRIPTION
C_{702}	ECE-A50V220	Electrolytic 220μF WV-50V
$C_{618\times2}$	ECE-M50R3300Z	Electrolytic 3300μF WV-50V
C_{708}	ECE-M80R2000T	Electrolytic 2000μF WV-80V
$C_{802,803}$	ECQ-M05473KZ	Polyester 0.047μF WV-50V
$C_{619\times2}$	ECQ-M05683KZ	Polyester 0.068μF WV-50V
COUPLATES		
CR_{101}	EXA-5DG03	IF Det.
CR_{301}	EXA-3HL04471	AM Det.
SWITCHES		
$S_{1\sim4}$	ESR-C255L25B	Select Switch
$S_{5\sim10}$	ESL-149	Lever Switch
$S_{11\sim14}$	ESR-C284L25AE	Speaker Change Switch
S_{15}	SSH-A1-2	Power Switch
MISCELLANEOUS		
	SSM-A5	Meter
	SDE-A1	Black Plate
	SDE-21	Dial Indicator
	SDH-A2-2	Dial Back Plate
	SDH-A4-1	PL Back Plate
	SKD-A18-1	Dial Scale
	SYE-A2-1	Panel
	SGB-A26	Badge
	XAM-43T	12.6V Fuse type Lamp
	SVL-301-1	3V40mA Stereo eye
	RVL-111	6.3V 0.15A
	SJF-105-1	Fuse type PL Holder
	RJV-201	PL Socket
	SBN-A1	Knob (Volume, Balance)
	SBN-A7	Knob (Selector Speaker)
	SBN-A2	Knob (Tuning)
	SBN-A4	Knob (Bass) (Treble) Inside
	SBN-A5-1	Knob (Bass) (Treble) Outside
	SBC-A3	Button (Power)
	SBC-A2-2	Button (Loudness, Filter, Tape Mono Mode, Muting)
	SJF-3301	3-pin Jacks
	RJF-4202	2-pin Screw type terminal plat
	SJF-3201	2-pin Jacks
	SJS-A9202	AC Socket
	SJF-A101	Screw type Fuse Holder
	SSF-A2021	Fuse 125V 2A
	SDP-A1005	Pointer
	RHG-301	Leg
	SKA-A71	Cabinet
	SKU-A10	Bottom board
	RDR-20	Pulley
	SDT-A4191-2	Tuning Shaft
	RDZ-05-4	Dial Cord
	SWE-A2	Headphone Jack
	SJS-A9001	10-Pin Socket
	SJS-9001	Voltage Adjust Socket
	SMN-A75	Rear Panel

SYMBOL NO.	PART NO.	DESCRIPTION
	SJP-96C1	Voltage Adjust Plug
	SJP-A9201	Short Pin
	SMY-A10	Heat think
	SDD-A1	Drum
	SDD-A2027	27φ Drum
	SDG-A701	Drum Gear Spring
	SDG-A1	Drum Gear
	SJA-41	AC-Cord
	SJS-13-1	DiN Socket I
	SJF-A4801S	Speaker Terminal
	SJF-A101	Fuse Holder
	RDS-409	Dial Spring
CARTONS		
	SPP-A7	Soft Cover
	SPH-A6003	Polyetherene Cover
	SPN-A49	Side Pad
	SPN-A50	Bottom Pad
	SPG-A42-1	Packing Case (Outer)
	SPN-A79-1	Packing Case (Inner)

Supplementary

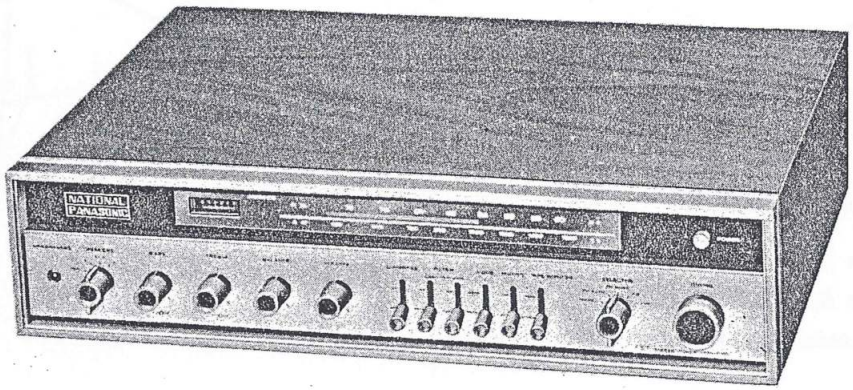
ORDER NO. SD-M 123

NATIONAL Service Manual

90-WATT, FM/AM STEREO TUNER AMPLIFIER

MODEL SA-54

Original



SPECIFICATIONS

AUDIO SECTION

Power Output (IHF):	Total 90W (4Ω) Total 80W (8Ω)
RMS Power:	32W/32W (8Ω)
Total Harmonic Distortion:	0.8%
Power Band Width:	15~70,000Hz−3dB
Frequency Response:	AUX 30~60,000 Hz ±3 dB Main Amp. 30~100,000 Hz +0 dB −3 dB
Signal-to-Noise:	65 dB (PHONO) 75 dB (AUX)
Residual Hum & Noise:	1.5mV
Damping Factor:	25 (4Ω) 50 (8Ω)
Sensitivity & Impedance:	PHONO 3 mV 50 KΩ AUX 160 mV 35 KΩ TAPE MONITOR 160 mV 35 KΩ
Tone Control:	Bass 50 Hz ±10 dB Treble 10 kHz ±10 dB
Low Filter:	70 Hz −12 dB/oct
High Filter:	7 KHz −12 dB/oct

FM TUNER SECTION

Frequency Range:	88~108 MHz
Usable Sensitivity:	1.8μV (IHF)
Image Rejection:	80 dB
IF Rejection:	100 dB
Signal-to-Noise:	60 dB
Total Harmonic Distortion:	0.5%
Capture Ratio:	1 dB (IHF)
Cross Modulation:	100 dB
Antenna Impedance:	300Ω Balanced
FM Multiplex Separation:	40 dB

AM TUNER SECTION

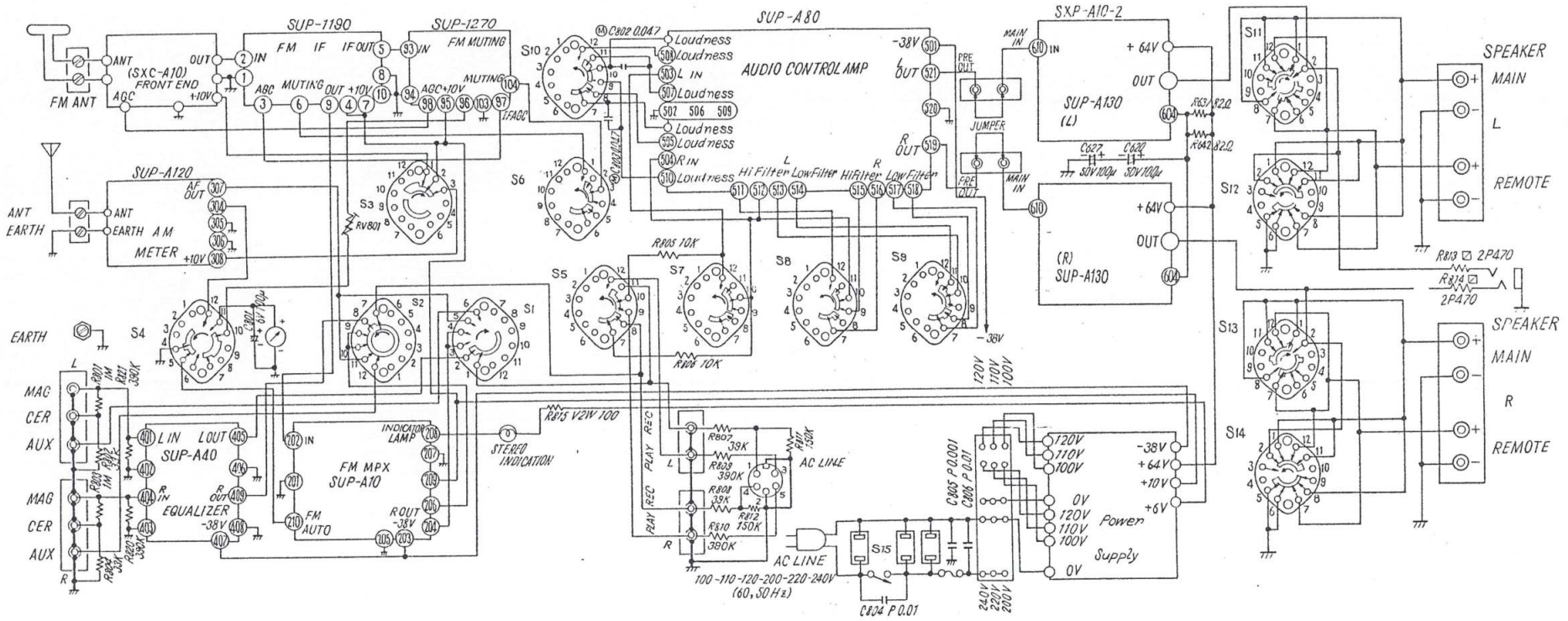
Frequency Range:	525~1605 kHz
Usable Sensitivity:	20μV (IHF)
Image Rejection:	70 dB (at 1 MHz)
IF Rejection:	65 dB (at 1 MHz)
Input Jack:	FM ANT, AM ANT, MAG, CERAMIC, AUX, PLAYBACK (PIN-PLUG & DIN)
Output Jack:	SPEAKERS REC ORDING (PINPLUG & DIN) HEAD PHONES, AC OUTLET (2 SWITCHED & 1-UNSWITCHED)
Other Features:	MUTING, LOUDNESS, TUNING INDICATOR, FM STEREO INDICATOR
Power Consumption;	min 25W~max 150W
Power Supply:	100/110/120/200/220/240V
Fuse:	2A
Transistors:	3-FET, 52-TR
Diodes:	29
Dimensions:	19¾″(W)×5⅛″(H)×14″(D)
Weight:	28.5 lb.

• Specifications are subject to change without notice.

<EXPORT DIVISION>
MATSUSHITA ELECTRIC TRADING CO., LTD.
P. O. Box 288 Central, Osaka, Japan

MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.
RADIO and STEREO DIVISION

BLOCK DIAGRAM MODEL SA-54

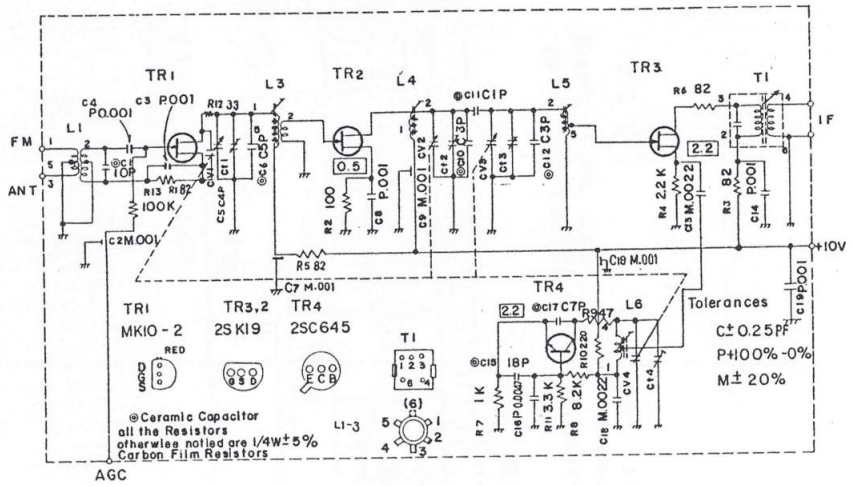


S1~S4	SELECT	NOW in (PHONO) Position	
	PHONO-FM AUTO-FM MONO-AM-AUX		
S5	TAPE MONITOR	NOW in	(Source) Position
S6	MUTING	"	(OFF) "
S7	MODE	"	(STEREO) "
S8	HIGH FILTER	NEW in	(OFF) Position
S9	LOW FILTER	"	(OFF) "
S10	LOUDNESS	"	(OFF) "
S11~S14	SPEAKERS	NOW in	(PHONES) Position
	PHONES—MAIN—REMOTE—MAIN+REMOTE		
S15	POWER	NOW in	(OFF) Position

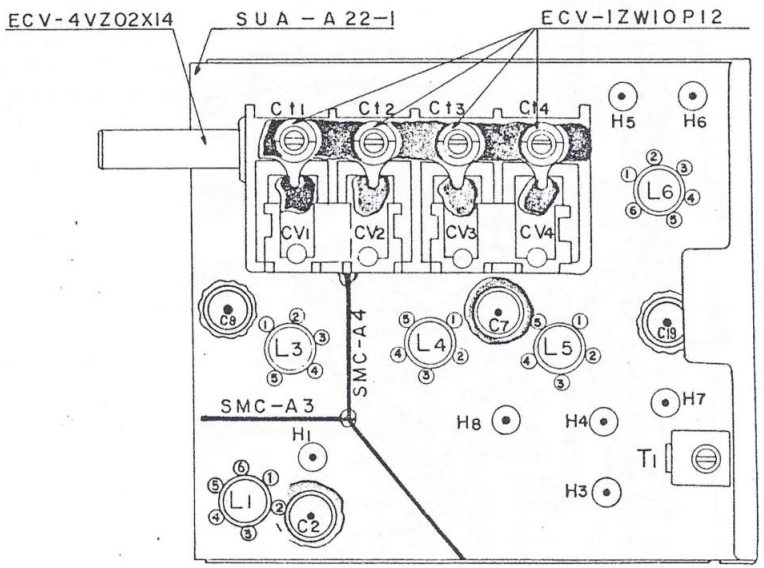
SCHEMATIC DIAGRAM
CIRCUIT BOARD

MODEL SA-54

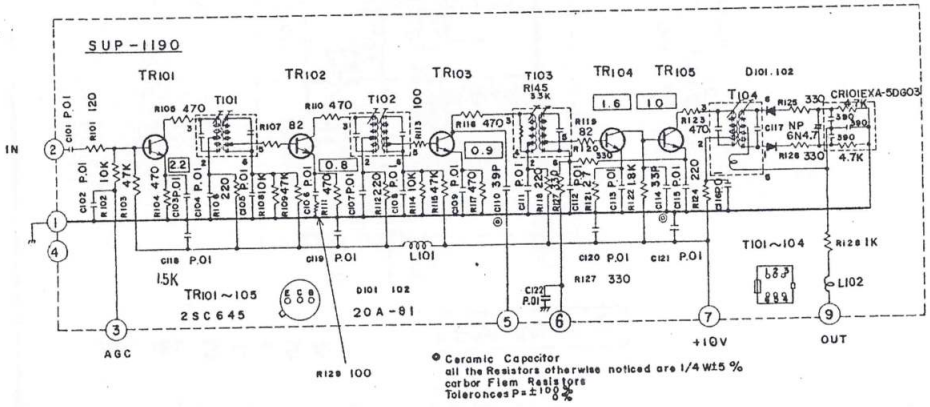
FM Front End



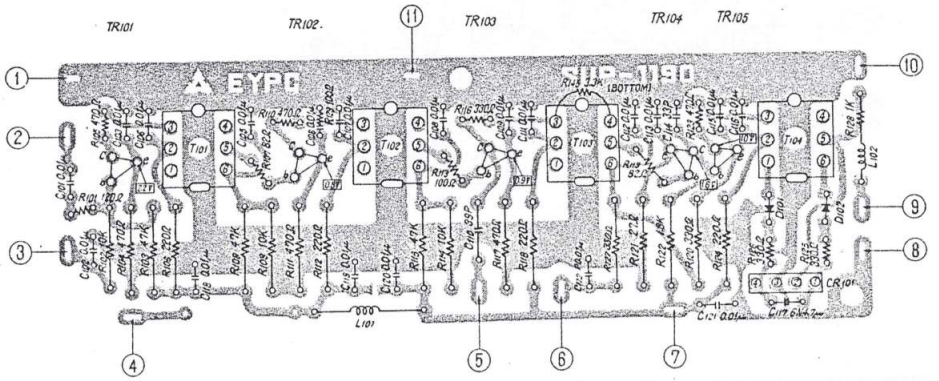
FM Front End



FM IF



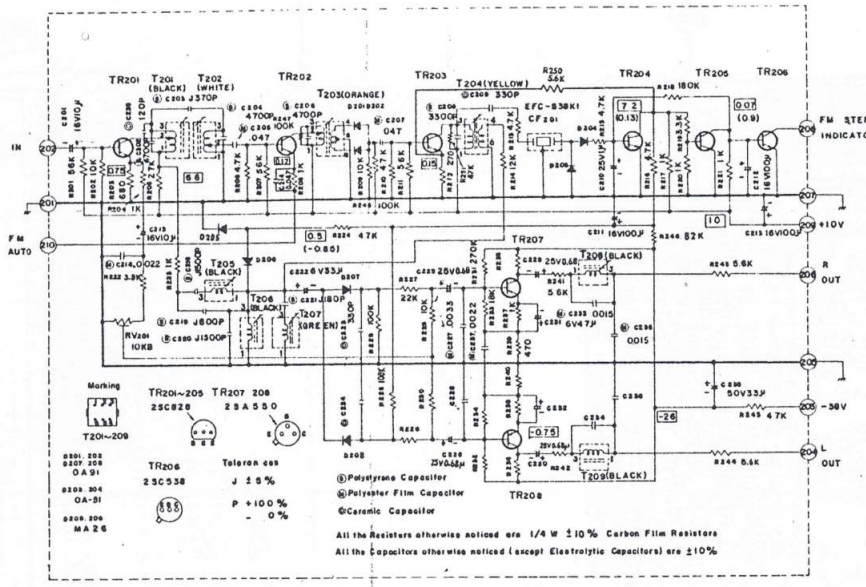
FM IF



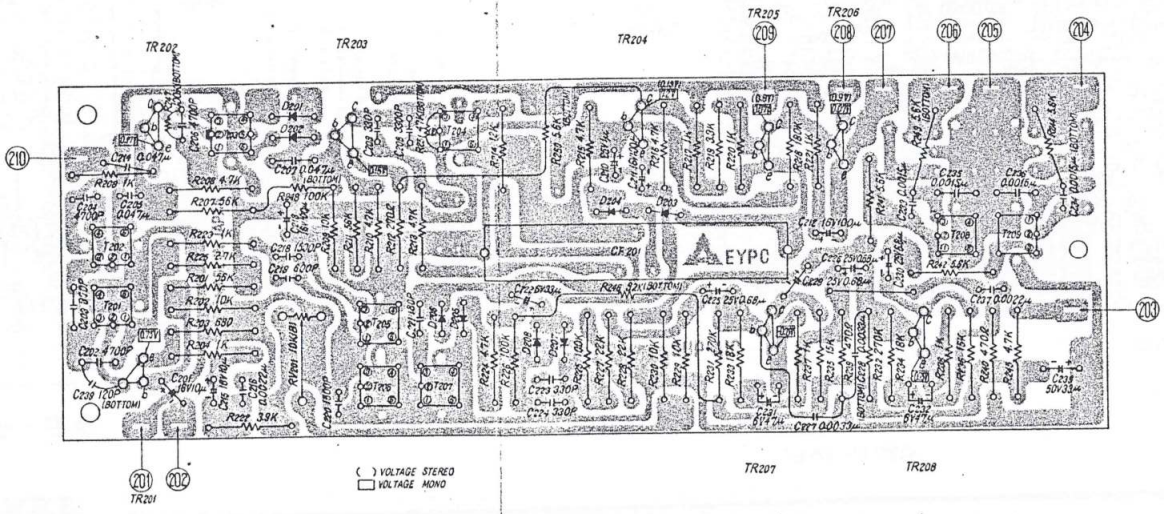
SCHEMATIC DIAGRAM
CIRCUIT BOARD

MODEL SA-54

MPX.



(SUP-A10)

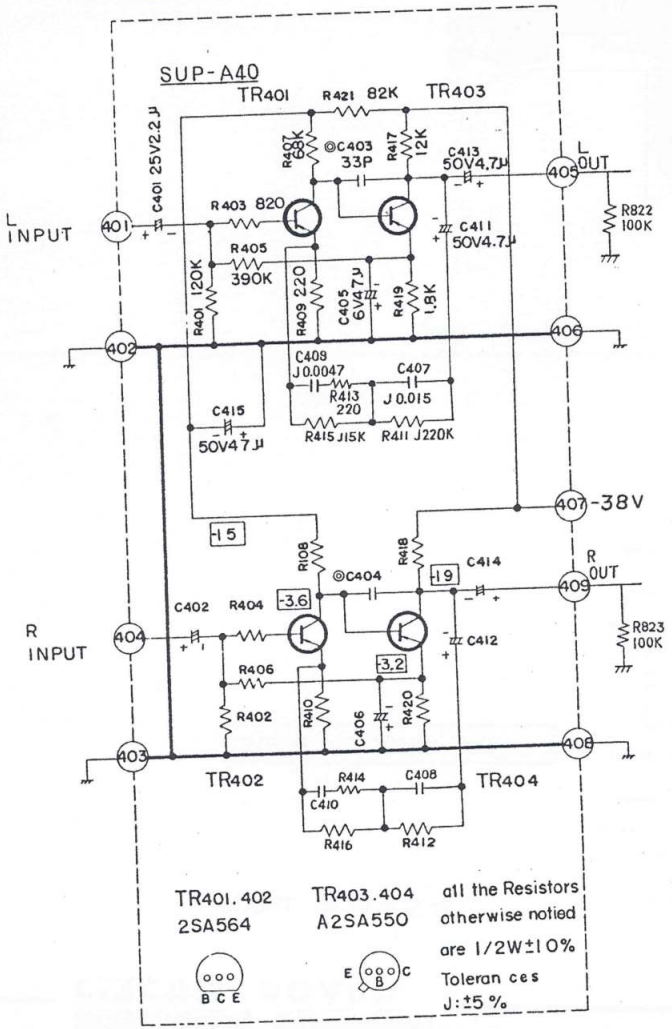


NATIONAL AMPLIFIER

SCHEMATIC DIAGRAM
CIRCUIT BOARD

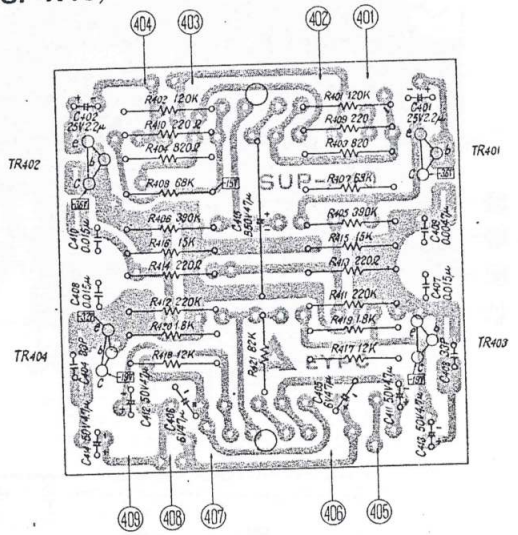
MODEL SA-54

Equalizer

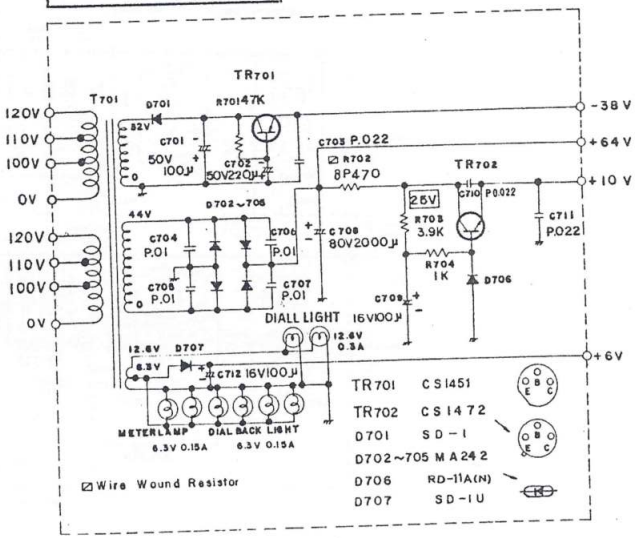


Equalizer

(SUP-A40)



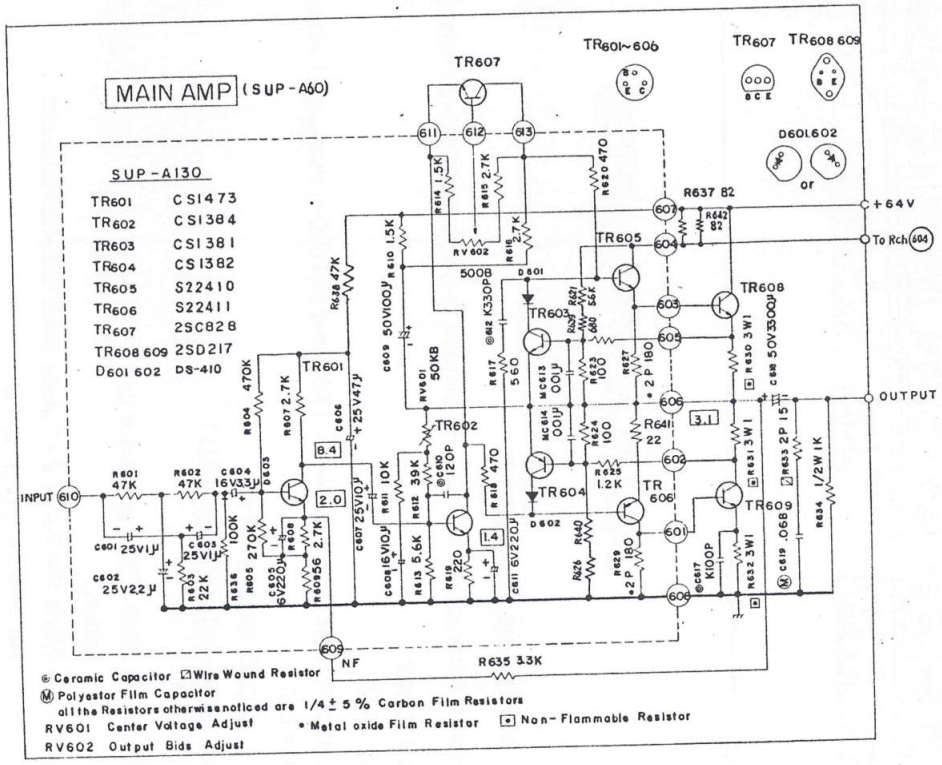
Power Supply

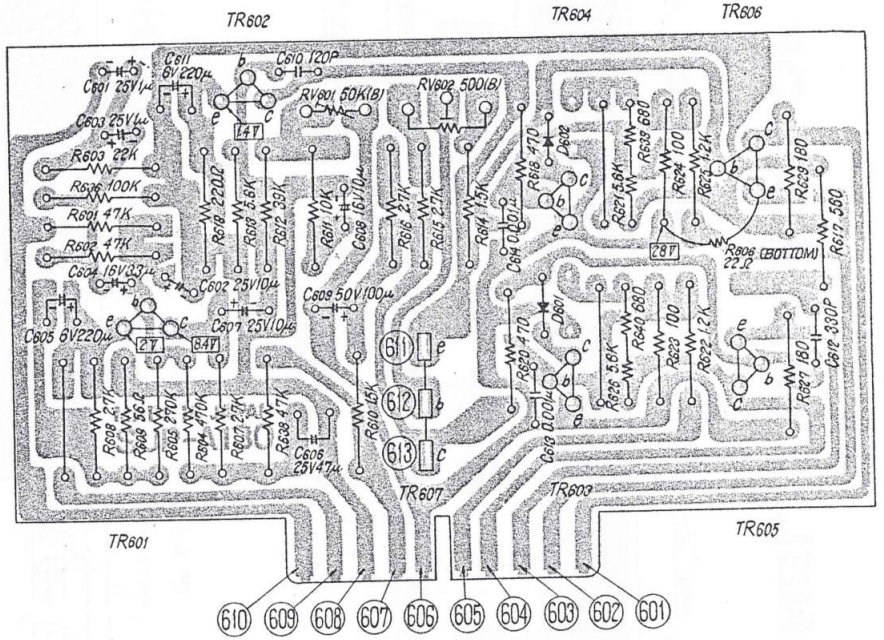


SCHEMATIC DIAGRAM
CIRCUIT BOARD

MODEL SA-54

MAIN AMP.





NATIONAL AMPLIFIER

AM IF, RF ALIGNMENT

Output of signal generator should be no higher than necessary to obtain an output reading.

- Set volume control to maximum.
- Set bass-treble controls to flat (center).
- Set selector switch to AM.
- Set tape monitor switch to SOURCE
- Set speaker switch to MAIN.
- Maintain line Voltage at rated voltage.
- Set balance control to center.
- Set loudness control to OFF.
- Set mode switch to STEREO.

STEP	CIRCUIT	SIGNAL GENERATOR CONNECTION	SIGNAL GENERATOR FREQUENCY	TUNER DIAL SETTING	OUTPUT METER CONNECTION	ADJUSTMENT	REMARKS
1	IF	Connect to SUP-A120 #302 terminal	455 kHz ± 5 kHz (2000 Hz Mod.)	Point of non-interference (on/about 600 kHz)	AF VTVM across speaker terminals (L ch. MAIN)	T_{302} (1st IFT) T_{303} (2nd IFT)	Adjust for maximum output. Keep IF tolerance within 455 kHz ±5 kHz
2	AM RF	Fashion loop of several turns of wire and radiate signal into loop of receiver.	550 kHz (400 Hz Mod.)	550 kHz		L_{302} (AM OSC COIL) T_{301} (AM COLL. COIL) L_{301} (AM ANT COIL)	Adjust for maximum output.
3			1500 kHz (400 Hz Mod.)	1500 kHz		C_{t3} (AM OSC Trimmer) C_{t2} (AM COLL. Trimmer) C_{t1} (AM ANT Trimmer)	Adjust for maximum output. Repeat steps (2) and (3)

Note: Cement antenna bobbin with wax after completing alignment.

2. FM IF ALIGNMENT WITH OSCILLOSCOPE

A EQUIPMENT REQUIRED

Signal generator that provides center frequency marker.

Sweep generator that provides 10.7 MHz center frequency and 400 KHz sweep width.

B OSCILLOSCOPE

Set sweep selector of oscilloscope to External Sweep. apply 60 Hz sweep signal from generator to Horizontal input terminals of oscilloscope.

Set Selector switcn to FM-MONO.

Set Volume control to minimum.

Other controls at optional positions.

Maintain line voltage at rated voltage.

Set Muting switch to OFF.

3. FM RF ALIGNMENT

EQUIPMENT REQUIRED

SIGNAL GENERATOR .....That provides 80 MHz to 110 MHz (30% modulated with 400 Hz FM)

OUTPUT LEVEL .....Keep signal generator output low enough to prevent overload.

- Set volume control to maximum.
- Set selector switch to FM-AUTO.
- Set bass-treble controls to flat. (center)
- Set balance control to center position.
- Maintain line Voltage at rated voltage.
- Set mode switch to STEREO.
- Set loudness switch to OFF.
- Set speakers switch to MAIN.
- Set tape monitor switch to SOURCE.

STEP	SIGNAL GENERATOR CONNECTION	SIGNAL GENERATOR FREQUENCY	TUNER DIAL SETTING	OUTPUT METTER CONNECTION	ADJUSTMENT	REMARKS
1	Connect to FM Antenna terminal through FM Dummy antenna (Refer to Fig.4)	90 MHz (400 Hz Mod.)	90 MHz	AF VTVM across speakers terminal (L ch.)	L_6 (FM OSC Coil) L_4 (FM DET Coil) L_5 (FM DET Coil) L_3 (FM RF Coil)	Adjust for maximum output.
2		106 MHz (400 Hz Mod.)	106 MHz		Ct_4 (FM OSC Trimmer) Ct_3 (FM DET Trimmer) Ct_2 (FM DET Trimmer) Ct_1 (FM RF Trimmer)	Adjust for maximum output. Repeat steps (1) and (2).
3		98 MHz (400 Hz Mod.)	98 MHz		L_1 (FM ANT Coil)	Adjust for maximum output. Repeat steps (1) and (2).

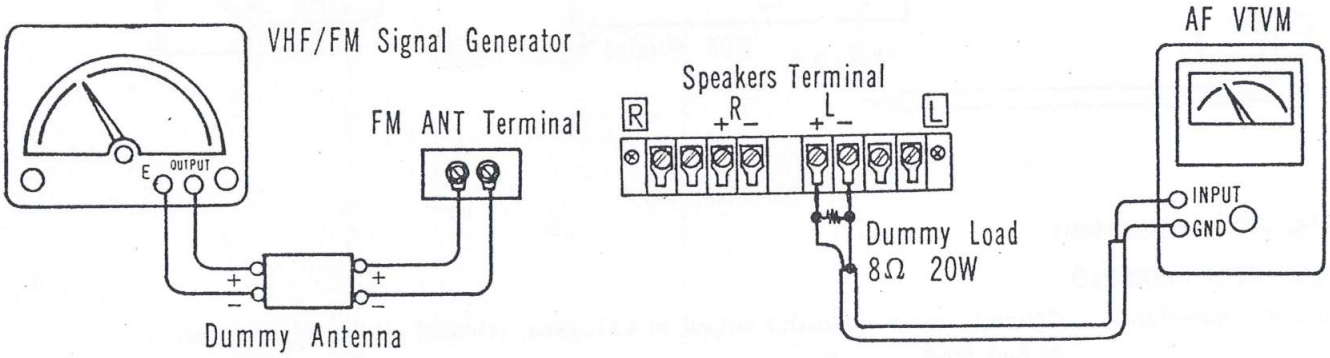


Fig. 4

Fig. 4 Recommended Equipment Connection for FM-RF Alignment.

B) PROCEDURE

RECEIVER.....Selector switch to FM-AUTO, dial setting to approximatery 98 MHz Power Switch...ON.

STEP	ALIGNMENT CIRCUIT	EQUIPMENT CONNECTION	ADJUSTMENT	REMARKS
1	19 kHz Amp.	Refer to Fig. 6	T_{201} (19 kHz Pick up Coil) (P) T_{202} (19 kHz Pick up Coil) (S) T_{203} (19 kHz Doubler Coil) T_{204} (38 kHz Output Coil)	Adjust for maximum oscilloscope pattern. (Refer to Note)
2	19 kHz Amp.		T_{202} (19 kHz Pick up Coil) (S)	Adjust for maximum oscilloscope pattern and VTVM indication. (Refer to Note)

Note: Wave forms may appear while turning T_{204} Yellow upwards; adjust T_{204} Yellow to obtain wave form. Refer to Fig. 7.
(Make adjustments so that the C section of the wave form becomes small and the B section big.)

Fig. 6 Recommended Equipment Connection for 19 kHz Amp. Alignment.

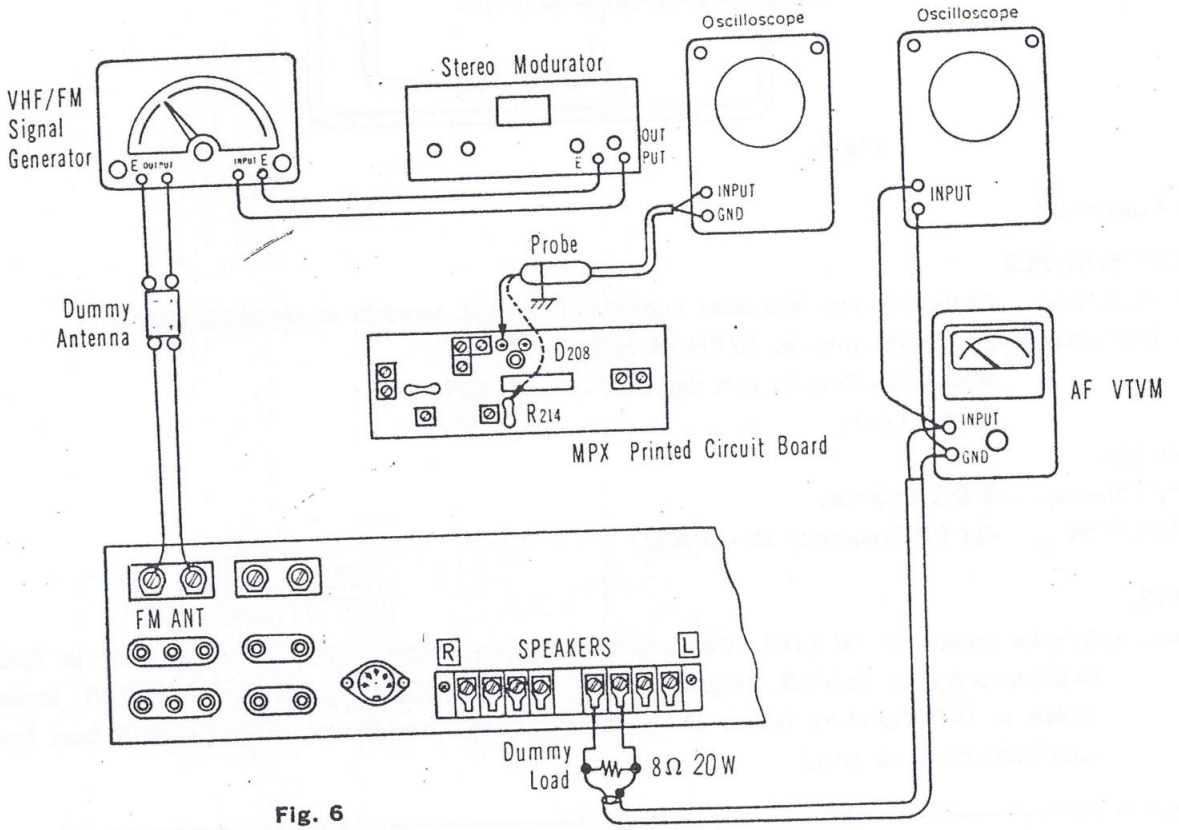


Fig. 6

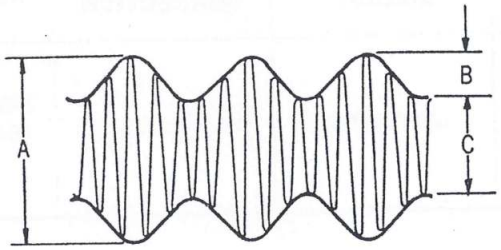
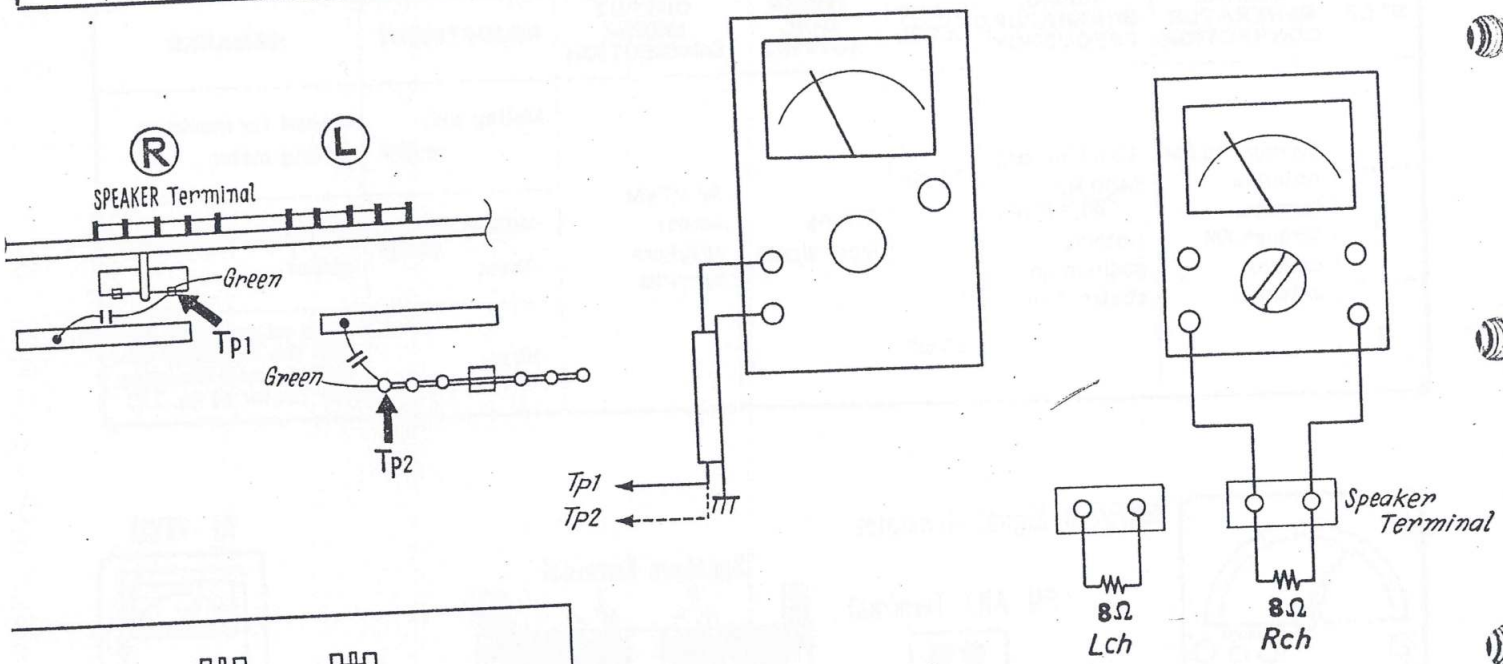
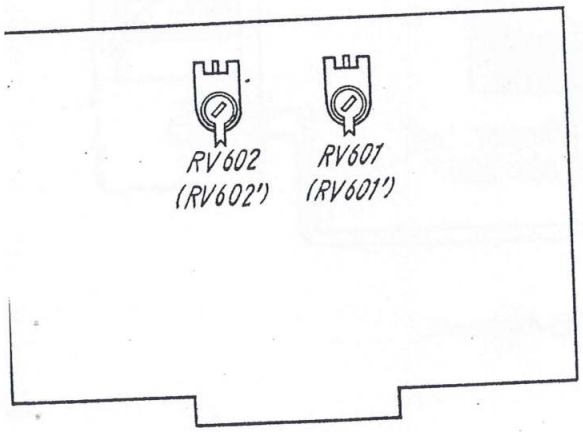


Fig. 7

5. POWER AMP ALIGNMENT

STEP	ALIGNMENT CIRCUIT	EQUIPMENT REQUIRED	ADJUSTMENT	REMARKS
1	DC Balance	Connect tester to speaker terminal.	RV 601 (R ch)	Make adjustments to that the power voltage becomes 0 voltage. Repeat steps (1) and (2).
2			RV 601 (L ch)	
3	ICQ Control	Connect VTVM (for DCmV) to point TP1 and earth.	RV 602 (R ch)	Make adjustments so that the indication on VTVM becomes 20 mV.
4		Connect VTVM (for DCmV) to point TP2 and earth. TP1 → TR609 Emitter (R ch) TP2 → TR659 Emitter (L ch)	RV 602 (L ch)	





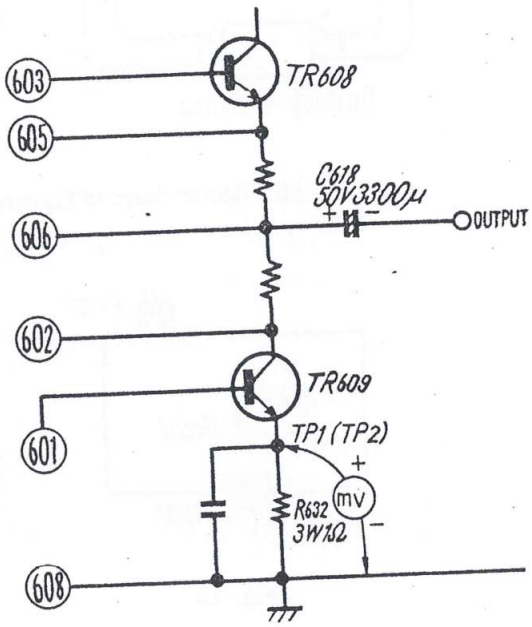


Fig. 9

REPLACEMENT PARTS LIST

SYMBOL NO.	PART NO.	DESCRIPTION
TRANSISTORS AND DIODES		
TR_1	MK10-2	FM 1st RF Amp. FET
TR_2	2SK19	FM 2nd RF Amp. FET
TR_3	2SK19	FM Mixer FET
TR_4	2SC645 B.C	FM Local OSC.
TR_{101}	2SC645 B.C	FM 1st IF Amp.
~		FM 2nd IF Amp.
TR_{105}		FM 3rd IF Amp.
		FM 4th IF Amp.
TR_{130}	2SC645 B.C	Muting IF Amp.
TR_{131}	2SC828 P.Q.R	Muting Switching Amp.
TR_{132}	2SC828 P.Q.R	Muting Switching Amp.
TR_{201}	2SC828 P.Q.R	MPX 19kHz Amp.
TR_{202}	2SC828 P.Q.R	MPX 19kHz Amp.
TR_{203}	2SC828 P.Q.R	MPX 38kHz Amp.
TR_{204}	2SC828 P.Q.R	MPX Switching Amp.
TR_{205}	2SC828 P.Q.R	MPX Switching Amp.
TR_{206}	2SC538 P.Q.R	MPX Indicator Amp.
TR_{207}	A2SA550 Q.R	MPX AF Amp. (right)
TR_{208}	A2SA550 Q.R	MPX AF Amp. (left)
TR_{301}	2SC562	AM RF Amp.
TR_{302}	2SC645 B.C	AM Conv.
TR_{303}	2SC645 B.C	AM IF Amp.
TR_{304}	2SC645 B.C	AM AGC Amp.
TR_{305}	2SC828 P.Q.R	AM AF Amp.
TR_{401}	2SA564 FR.FQ	Equalizer 1st Amp. (left)
TR_{402}	2SA564 FR.FQ	Equalizer 1st Amp. (right)
TR_{403}	A2SA550 Q.R	Equalizer 2nd Amp. (left)
TR_{404}	A2SA550 Q.R	Equalizer 2nd Amp. (right)
TR_{501}	A2SA550 Q.R	AF Control 1st Amp. (left)
TR_{502}	A2SA550 Q.R	AF Control 1st Amp. (right)
TR_{503}	2SA564 FR.FQ	AF Control 2nd Amp. (left)
TR_{504}	2SA564 FR.FQ	AF Control 2nd Amp. (right)
TR_{505}	2SA564 FR.FQ	AF Control 3rd Amp. (left)
TR_{506}	2SA564 FR.FQ	AF Control 3rd Amp. (right)
TR_{601} (×2)	CS1473	Main 1st AF Amp. (right & left)
TR_{602} (×2)	CS1384	Main 2nd AF Amp. (right & left)
TR_{603} (×2)	CS1381	Main NPN Protection (right & left)
TR_{604} (×2)	CS1382	Main PNP Protection (right & left)
TR_{605} (×2)	S22410	NPN Driver (right & left)
TR_{606} (×2)	S22411	PNP Driver (right & left)
TR_{607} (×2)	2SC828 P.Q.R	Thermal Control (right & left)
TR_{608} (×2)	2SD217	Power Amp. (right & left)
TR_{609} (×2)	2SD217	Power Amp. (right & left)
TR_{701}	CS1451	Ripple Filter
TR_{702}	CS1472	Voltage Regulator (Tuner)
$D_{101, 102}$	2OA91	FM Detector (pair)
$D_{130, 131, 132}$	OA91	FM AGC & Tuning Ind. Rect.
$D_{201, 202}$	OA91	MPX 19kHz Doubler
$D_{203, 204}$	OA91	MPX 38kHz Rect.
$D_{205, 206}$	MA26	STEREO-MONO Switching
$D_{207, 208}$	OA91	MPX Matrix Detector
D_{301}	OA91	AM Detector
$D_{302, 303, 304}$	MA26	AM Bias Regulator
D_{305}	OA91	AM Tuning Ind. Rect.
$D_{601, 602, 651, 652}$	DS-410	Automatic Operation Control
D_{701}	SD-1	Sub Source Rectifier
$D_{702, 703, 704, 705}$	MA-242	Main Source Rectifier
D_{706}	RD-11A(N)	Zener Diode
D_{707}	SD-1U	Stereo Ind. Source Rect.
COILS AND TRANSFORMERS		
L_1	SLA-A4Q7	FM Ant Coil
L_3	SLA-A4Q2	FM RF Coil
$L_{4, 5}$	SLD-A4Q1	FM RF & Det. Coil
L_6	SLO-A4Q1	FM Osc. Coil
$L_{101, 102, 103}$	ELQ-250A999	RFC
T_{201}	SLM-A1C9K	MPX 19kHz Pick up Coil
T_{202}	SLM-A1C11K	MPX 19kHz Pick up Coil
T_{203}	SLM-A1C13K	MPX 38kHz Doubler Coil
T_{204}	SLM-A1C15K	MPX 38kHz Out put Coil
$T_{205, 206, 208, 209}$	SLM-1C17T	MPX Filter
T_{207}	SLM-1C19T	MPX Filter 19kHz Pick up Coil
L_{301}	SLF-A2E1	AM Ant. Coil
L_{302}	SLO-A2P1	AM Osc. Coil
L_{303}	ELQ-393D5999G	RFC
CF_{201}	EFC-S38K1	38kHz Ceramic Eilter
T_1	SLI-4C101	FM IFT SLI-40101
$T_{101, 102}$	SLI-4L201	FM IFT
T_{104}	SLI-4L501	Discri Trans
T_{103}	SL -4L601	FM IFT
T_{301}	SLD-2C1	AM Det. Coi,
T_{302}	SLI-2C105	AM Ceramic IFT
T_{303}	SLI-2C401M	AM IFT
T_{701}	SLT-A5Q1S	Power Transformer
$L_{130, 132}$	SLQ-X151-1Y	MUTING
RESISTORS		
(FM Front End)		
R_{12}	ERD-14TJ330	Carbon 33Ω ±5% 1/4W
R_9	ERD-14TJ470	Carbon 47Ω ±5% 1/4W
$R_{1, 3, 5, 6}$	ERD-14TJ820	Carbon 82Ω ±5% 1/4W
R_2	ERD-14TJ101	Carbon 100Ω ±5% 1/4W
R_{10}	ERD-14TJ1221	Carbon 220Ω ±5% 1/4W
R_7	ERD-14TJ102	Carbon 1KΩ ±5% 1/4W
R_4	ERD-14TJ222	Carbon 2.2KΩ ±5% 1/4W
R_8	ERD-14TJ822	Carbon 8.2KΩ ±5% 1/4W
R_{13}	ERD-14TJ104	Carbon 100KΩ ±5% 1/4W
R_{11}	ERD-14TJ332	Carbon 3.3KΩ ±5% 1/4W
(FM IF Circuit Board)		
R_{121}	ERD-14TJ 270	Carbon 27Ω ±5% 1/4W

SYMBOL NO.	PART NO.	DESCRIPTION
R 505, 506	ERD-14TJ184	Carbon 180KΩ ±5% 1/4W
RV503, 504	EVG-68AU25B54-A	Volume (Variable Resistor)
RV501, 502	EVF-68AU25368-B	Balance (Variable Resistor)
RV 505, 506 507, 508	EVF-33AN16B54-B	Tone (Variable Resistor)
	(Main Amp. Circuit Board)	
R 627, 629 (×2)	ERG-2PSK181	Metal Film 180Ω ±20% 2W
R 609 (2×)	ERD-14TJ560	Carbon 56Ω ±5% 1/4W
R 623, 624 (×2)	ERD-14TJ101	Carbon 100Ω ±5% 1/4W
R 619 (×2)	ERD-14TJ221	Carbon 220Ω ±5% 1/4W
R 618, 620 (×2)	ERD-14TJ471	Carbon 470Ω ±5% 1/4W
R617 (×2)	ERD-14TJ561	Carbon 560Ω ±5% 1/4W
R638 (×2)	ERD-14TJ473	Carbon 47KΩ ±5% 1/4W
R622, 625 (×2)	ERD-14TJ122	Carbon 1.2KΩ ±5% 1/4W
R610, 614 (×2)	ERD-14TJ152	Carbon 1.5KΩ ±5% 1/4W
R607, 608, 615, 616 (×2)	ERD-14TJ272	Carbon 2.7KΩ ±5% 1/4W
R613 (×2)	ERD-14TJ562	Carbon 5.6KΩ ±5% 1/4W
R621, 626 (×2)	ERD-14TJ562	Carbon 5.6KΩ ±5% 1/4W
R611 (×2)	ERD-14TJ103	Carbon 10KΩ ±5% 1/4W
R603 (×2)	ERD-14TJ223	Carbon 22KΩ ±5% 1/4W
R612 (×2)	ERD-14TJ393	Carbon 39KΩ ±5% 1/4W
R636 (×2)	ERD-14TJ104	Carbon 100KΩ ±5% 1/4W
R605 (×2)	ERD-14TJ274	Carbon 270KΩ ±5% 1/4W
R604 (×2)	ERD-14TJ474	Carbon 470KΩ ±5% 1/4W
RV601 (×2)	EVL-TOAAOOB54	Variable Resistor DC Balancer
RV602 (×2)	EVL-SOAAOOB52	Variable Resistor ICQ Control
R639, 640 (×2)	ERD-14TJ681	Carbon 680Ω ±5% 1/4W
R641 (×2)	ERD-14TJ220	Carbon 22Ω ±5% 1/4W
R601, 602 (×2)	ERD-14TJ473	Carbon 47KΩ ±5% 1/4W

CHASSIS

R810	REC-12GK394	Solid 390KΩ ±10% 1/2W
R634×2	ERD-12TK102	Carbon 1KΩ ±10% 1/2W
R637,642	ERD-14TJ820	Carbon 82Ω ±5% 1/4W
R805, 806	ERD-12TJ103	Carbon 10KΩ ±5% 1/2W
R811	ERD-14TJ154	Carbon 150KΩ ±5% 1/4W
R635×2	ERD-14TJ332	Carbon 3.3KΩ ±5% 1/4W
R808, 807	ERD-14TJ393	Carbon 39KΩ ±5% 1/4W

SYMBOL NO.	PART NO.	DESCRIPTION
R704	ERD-12TJ102	Carbon 1KΩ ±5% 1/2W
R701	ERD-14TJ473	Carbon 47KΩ ±5% 1/4W
R802, 804	ERD14TJ333	Carbon 33KΩ ±5% 1/4W
R801, 803	ERD-14TJ105	Carbon 1MΩ ±5% 1/4W
R633×2	ERM-2P150	Wire 15Ω 2W
R820, 821	ERD-14TJ394	Carbon 390KΩ ±5% 1/4W
R630, 631, 632 (×2)	ERF-3S1RO	Wire 1Ω 3W (Non-Flammable)
R703	ERD-12TJ392	Carbon 3.9KΩ ±5% 1/2W
R702	ERM-8P471	Wire 470Ω 8W
R813, 814	ERM-2P471	Wire 470Ω 2W
R812	ERD-14TJ154	Carbon 150KΩ ±5% 1/4W
R815	ERD-12TJ101	Carbon 100Ω ±5% 1/2W
R822, 823	ERD-14TJ104	Carbon 100KΩ ±5% 1/4W
RV 801	EVL-TOAA00B24	Meter adjust (Variable Resistor)

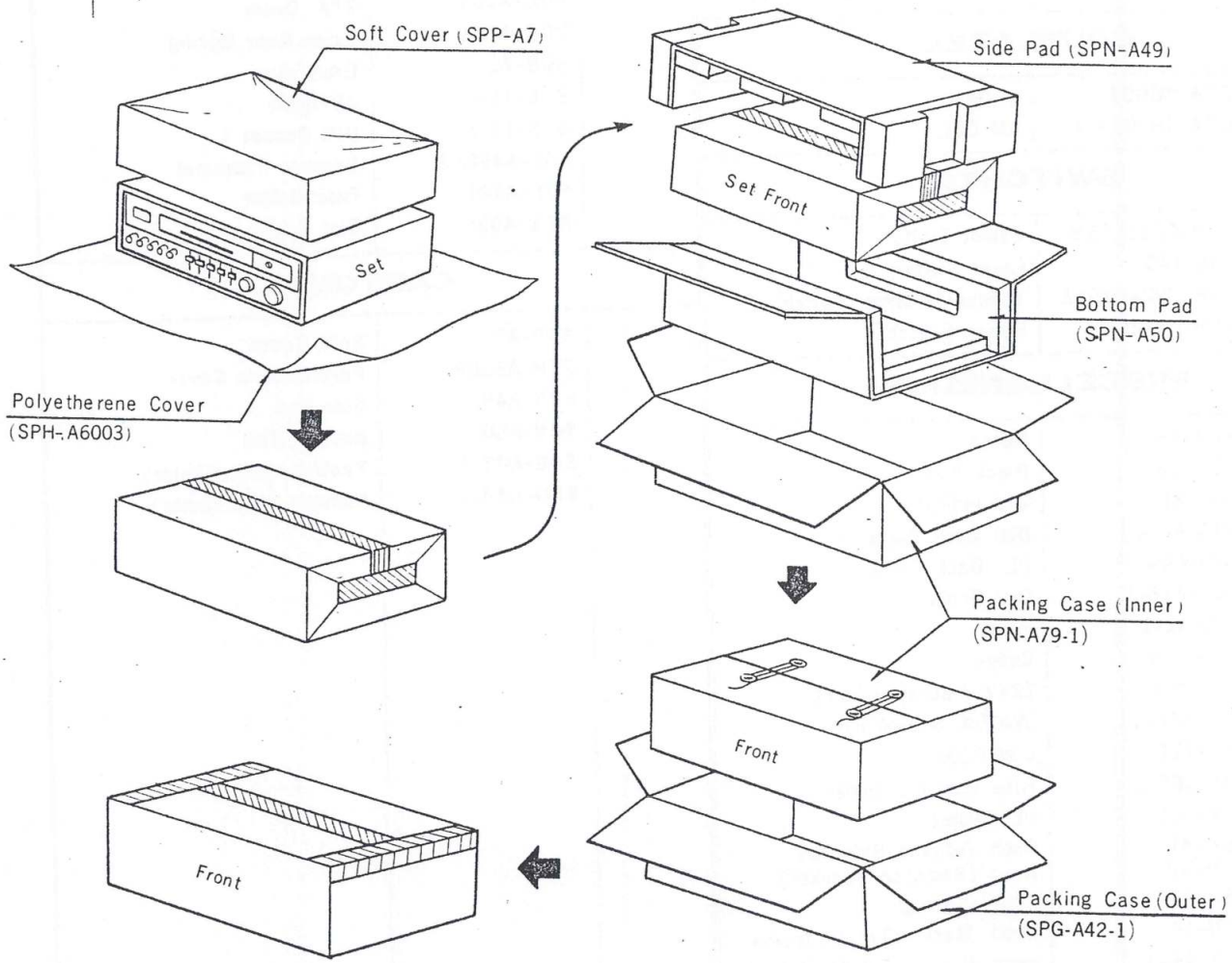
CAPACITORS

	(FM Front End)	
C6	ECC-DO5050C	Ceramic 5pF ±0.25pFWV-50V
C13,18	ECK-DO5222MY	Ceramic 0.0022pF ±20% WV-50V
C11	ECC-DO5010C	Ceramic 1pF ±0.25pF WV-50V
C16	ECK-DO5472P	Ceramic 0.0047μF ±20% WV-50V
C15	ECC-DO5180K	Ceramic 18pF±10% WV-50V
C1	ECC-DO5100K	Ceramic 10pF ±10% WV-50V
C12,10	ECC-DO5030C	Ceramic 3pF±0.25pF WV-50V
C5	ECC-DO5040C	Ceramic 4pF±0.25pF WV-50V
C3, 7, 4 8, 14	ECK-DO5102P	Ceramic 0.001μF+100% — 0% WV-50V
C17	ECC-DO5070C	Ceramic 7pF ±0.25pF WV-50V
C2, 7, 19, 9	ECK-Y5102PU2	Cermic 0.001μF +100% — 0% WV-500V
CV1~4	ECV-4VZ02×14	V.C.
Ct1~4	ECV-1ZW10P12	Trimmer
	(FM IF Circuit Board)	
C114	ECC-DO5330K	Ceramic 33pF ±10% WV-50V
C110	ECC-DO5390K	Ceramic 39pF ±10% WV-50V
C101~109 111~113 115, 116 118~122	ECK-DO5103P	Ceramic 0.01μF +100% — 0% WV-50V
C117	ECE-A6N4R7	Electrolytic 4.7μF WV-6V
	(FM Muting Circuit Board)	
C130, 138, 131, 134, 135, 140	ECK-DO5103P	Ceramic 0.01μF ±100% — 0% WV-50V
C132	ECC-DO5070C	Carmic 7pF ±0.25pF WV-50V
C133	ECC-DO5390K	Ceramic 39pF ±10% WV-50V
C136	ECE-A16V3R3	Electrolytic 3.3μF WV-16V
C137	ECE-A16V10N	Electrolytic 10μF WV-16V
C139	ECE-A16V47N	Electrolytic 47μF WV-16V
	(MPX Circuit Board)	
C239	ECC-DO5121K	Ceramic 120pF WV-50V
C209, 223 224	ECC-DO5331K	Ceramic 330pF WV-50V
C222	ECE-A6V33	Electrolytic 33μF WV-6V

SYMBOL NO.	PART NO.	DESCRIPTION
C_{702}	ECE-A50V220	Electrolytic 220μF WV-50V
$C_{618\times2}$	ECE-M50R3300Z	Electrolytic 3300μF WV-50V
C_{708}	ECE-M80R2000T	Electrolytic 2000μF WV-80V
$C_{802,803}$	ECQ-M05473KZ	Polyester 0.047μF WV-50V
$C_{619\times2}$	ECQ-M05683KZ	Polyester 0.068μF WV-50V
COUPLATES		
CR_{101}	EXA-5DG03	IF Det.
CR_{301}	EXA-3HL04471	AM Det.
SWITCHES		
$S_{1\sim4}$	ESR-C255L25B	Select Switch
$S_{5\sim10}$	ESL-149	Lever Switch
$S_{11\sim14}$	ESR-C284L25AE	Speaker Change Switch
S_{15}	SSH-A1-2	Power Switch
MISCELLANEOUS		
	SSM-A5	Meter
	SDE-A1	Black Plate
	SDE-21	Dial Indicator
	SDH-A2-2	Dial Back Plate
	SDH-A4-1	PL Back Plate
	SKD-A18-1	Dial Scale
	SYE-A2-1	Panel
	SGB-A26	Badge
	XAM-43T	12.6V Fuse type Lamp
	SVL-301-1	3V40mA Stereo eye
	RVL-111	6.3V 0.15A
	SJF-105-1	Fuse type PL Holder
	RJV-201	PL Socket
	SBN-A1	Knob (Volume, Balance)
	SBN-A7	Knob (Selector Speaker)
	SBN-A2	Knob (Tuning)
	SBN-A4	Knob (Bass) (Treble) Inside
	SBN-A5-1	Knob (Bass) (Treble) Outside
	SBC-A3	Button (Power)
	SBC-A2-2	Button (Loudness, Filter, Tape Mono Mode, Muting)
	SJF-3301	3-pin Jacks
	RJF-4202	2-pin Screw type terminal plat
	SJF-3201	2-pin Jacks
	SJS-A9202	AC Socket
	SJF-A101	Screw type Fuse Holder
	SSF-A2021	Fuse 125V 2A
	SDP-A1005	Pointer
	RHG-301	Leg
	SKA-A71	Cabinet
	SKU-A10	Bottom board
	RDR-20	Pulley
	SDT-A4191-2	Tuning Shaft
	RDZ-05-4	Dial Cord
	SWE-A2	Headphone Jack
	SJS-A9001	10-Pin Socket
	SJS-9001	Voltage Adjust Socket
	SMN-A75	Rear Panel

SYMBOL NO.	PART NO.	DESCRIPTION
	SJP-96C1	Voltage Adjust Plug
	SJP-A9201	Short Pin
	SMY-A10	Heat think
	SDD-A1	Drum
	SDD-A2027	27φ Drum
	SDG-A701	Drum Gear Spring
	SDG-A1	Drum Gear
	SJA-41	AC-Cord
	SJS-13-1	DiN Socket I
	SJF-A4801S	Speaker Terminal
	SJF-A101	Fuse Holder
	RDS-409	Dial Spring
CARTONS		
	SPP-A7	Soft Cover
	SPH-A6003	Polyetherene Cover
	SPN-A49	Side Pad
	SPN-A50	Bottom Pad
	SPG-A42-1	Packing Case (Outer)
	SPN-A79-1	Packing Case (Inner)

COMPONENT PACKING PROCEDURE



MEMO

SA-54

SYMBOL NO.	PART NO.	DESCRIPTIN
C231, 232	ECE-A6V47	Electrolytic 47μF WV-6V
C201, 215	ECE-A16V10	Electrolytic 10μF WV-16V
C211, 212, 213	ECE-A16V100	Electrolytic 100μF WV-16V
C238	ECQ-A50V33 E	Electrolytic 33μF WV-50V
C233, 234	ECQ-MO5152KZ	Polyester 1500pF WV-50V
C216, 237	ECQ-MO5222KZ	Polyester 2200pF WV-50V
C227, 228,	ECQ-MO5332KZ	Polyester 3300pF ±10% WV-50V
C235, 236	ECQ-MO5152KZ	Polyester 1500pF ±10% WV-50V
C205, 207 214	ECQ-MO5473KZ	Polyester 0.047μF ±10% WV-50V
C221	ECQ-SO2181JZ	Polystyrene 180pF ±5% WV-25V
C203	ECQ-SO2371JZ	Polystyrene 370pF ±5% WV-25V
C219	ECQ-SO2601JZ	Polystyrene 600pF ±5% WV-25V
C218	ECQ-SO2152JZ	Polystyrene 1500pF ±5% WV-25V
C220	ECQ-SO2152JZ	Polystyrene 1500pF ±5% WV-25V
C208	ECQ-SO2332JZ	Polystyrene 3300pF ±5% WV-25V
C202, 204, 206	ECQ-SO2472JZ	Polystyrene 4700pF ±5% WV-25V
C225, 226, 229, 230	ECA-Y25EF0R68	Electrolytic 0.68μF WV-25V
C210	ECS-Y25EF1	Electrolytic 1μF WV-25V
	(AM Circuit Board)	
C305	ECC-DO5050C	Ceramic 5pF ±0.25pF WV-50V
C302	ECC-O5100K	Ceramic 10pF ±10% WV-50V
C310	ECC-DO5150K	Ceramic 15pF ±15% WV-50V
C315	ECK-D 5471 O	Ceramic 470pF ±10% WV-50V
C301	ECK-DO5103P	Ceramic 0.01μF +100% − 0% WV-50V
C309, 314	ECKDO5103MY	Ceramic 0.01μF ±20% WV-50
C304, 306, 308, 313, 317	ECK-DO5223P	Ceramic 0.022μF +100% − 0% WV-50V
C319	ECE-A16V33	Electrolytic 33μF WV-16V
C303, 307, 316	ECE-A16V100	Electrolytic 100μF WV-16V
C318, 320	ECE-A25V1	Electrolytic 1μF WV-25V
C321	ECO-MO5333KZ	Polyester 0.033μF ±20% WV-50V
C311	ECQ-SO2371JZ	Polystyrene 370pF ±5% WV-25V
C312	ECQ-SO2152JZ	Polystyrene 1500pF ±5% WV-25V
CV 1, 2, 3	ECV-3AN34B12	Variable AM Tuning
	(Equalizer Circuit Board)	
C403, 404	ECC-DO5330K	Ceramic 33pF ±10% WV-50V
C405, 406	ECE-A6V47	Electrolytic 47μF WV-6V
C411, 412 413, 414	ECE-A50V4R7	Electrolytic 4.7μF WV-50V
C407, 408	ECQ-MO5153JZ	Polyester 0.015μF WV-50V
C409, 410	ECQ-MO5472JZ	Polyester 4700pF WV-50V
C401, 402	ECS-Y25EF2R2	Electrolytic 2.2μF WV-25V
C415	ELE-B50V47N	Electrolytic 47μF WV-50V
	(Audio Control Amp. Circuit Board)	

SYMBOL NO.	PART NO.	DESCRIPTION
C521, 522 533, 534 541, 542	ECC-DO5330K	Ceramic 33pF ±10% WV-50V
C501, 502	ECK-D5821K	Ceramic 820pF ±10% WV-500V
C509, 510	ECE-A6V47	Electrolytic 47μF WV-6V
C505, 506 537, 538	ECE-A6V100	Electrolytic 100μF WV-6V
C507, 508, 523, 524	ECE-A16V3R3	Electrolytic 3.3μF WV-16V
C531, 532	ECE-A16V10	Electrolytic 10μF WV-16V
C535, 536, 543, 544	ECE-A25V10	Electrolytic 10μF WV-25V
C540	ECE-A25V100	Electrolytic 100μF WV-25V
C539	ECE-A50V100	Electrolytic 100μF WV-50V
C527, 528	ECQ-MO5222KZ	Polyester 2200pF ±10% WV-50V
C513, 514	ECQ-MO5472KZ	Polyester 4700pF ±10% WV-50V
C511, 512	ECQ-MO5682KZ	Polyester 0.0068μF ±100% WV-50V
C515, 516, 519, 520	ECQ-MO5333KZ	Polyester 0.033μF ±10% WV-50V
C525, 526, 529, 530	ECQ-MO5473KZ	Polyester 0.047μF ±10% WV-50V
C503, 504, 517, 518	ECA-G25EF0R68	Electrolytic 0.68μF WV-25V
	(Main Amp. Circuit Board)	
C610×2	ECC-DO5121K	Ceramic 120pF ±10% WV-50V
C612×2 624×2 625×2	ECC-DO5331K	Ceramic 330pF ±10% WV-50V
C613×2 614×2	ECK-DO5102MY	Ceramic 0.001μF ±20% WV-50V
C605×2 611×2	ECE-A6V220	Electrolytic 220μF WV-6V
C604×2	ECE-A16V3R3	Electrolytic 3.3μF WV-16V
C608×2	ECE-A16V10	Electrolytic 10μF WV-16
C607×2	ECE-A25V10	Electolytic 10μF WV-25V
C606×2	ECE-A25V47	Electrolytic 47μF WV-25V
C609×2	ECE-A50V100	Electrolytic 100μF WV-50V
C601×2 603×2	ECS-Y25EF1	Electrolytic 1μF WV-25V
C602×2	ECS-Y25EF2R2	Electrolytic 2.2μF WV-25V
	(Chassis)	
C617×2	ECC-DO5101K	Ceramic 100pF ±10% WV-50V
C805	ECN-U4A102M	Paper 0.001μF ±20% WV-400V
C804, 806	ECN-U4A103M	Paper 0.01μF ±20% WV-400V
C703, 710, 711	ECK-DO5223P	Ceramic 0.022μF +100% − 0% WV-500V
C704, 705, 706, 707	ECK-D5103P	Ceramic 0.01μF +100% − 0% WV-500V
C801	ECE-A6V100	Electrolytic 100μF WV-6V
C709, 712	ECE-A16V100	Electrolytic 100μF WV-16V
C701, 627, 620	ECE-A50V100	Electrolytic 100μF WV-50V

SYMBOL NO.	PART NO.	DESCRIPTION
R 106, 112 118, 124	ERD-14TJ221	Carbon 220Ω ±5% 1/4W
R 120, 127	ERD-14TJ331	Carbon 330Ω ±5% 1/4W
R 104, 111 117	ERD-14TJ471	Carbon 470Ω ±5% 1/4W
R 122	ERD-14TJ182	Carbon 1.8KΩ ±5% 1/4W
R 145	ERD-14TJ332	Carbon 3.3KΩ ±5% 1/4W
R 102, 108 114	ERD-14TJ103	Carbon 10KΩ ±5% 1/4W
R 103, 109 115	ERD-14TJ473	Carbon 47KΩ ±5% 1/4W
R 107, 119	ERD-14VJ820	Carbon 82Ω ±5% 1/4W
R 113	ERD-14VJ101	Carbon 100Ω ±5% 1/4W
R 101	ERD-14VJ121	Carbon 120Ω ±5% 1/4W
R 125, 126 116	ERD-14VJ331	Carbon 330Ω ±5% 1/4W
R 123, 110 105	ERD-14VJ471	Carbon 470Ω ±5% 1/4W
R 129	ERD-14TJ101	Carbon 100Ω ±5% 1/4W
R 128	ERD-14TJ102	Carbon 1KΩ ±5% 1/4W

(Muting Circuit Board)

R 140	ERD-14VJ472	Carbon 4.7KΩ ±5% 1/4W
R 133	ERD-14VJ563	Carbon 56KΩ ±5% 1/4W
R 130, 131	ERD-14VJ102	Carbon 1KΩ ±5% 1/4W
R 135	ERD-14VJ222	Carbon 2.2KΩ ±5% 1/4W
R 139, 132	ERD-14VJ103	Carbon 10KΩ ±5% 1/4W
R 138	ERD-14VJ184	Carbon 180KΩ ±5% 1/4W
R 136	ERD-14VJ223	Carbon 22KΩ ±5% 1/4W
R 141	ERD-14VJ120	Carbon 12Ω ±5% 1/4W
R 137	ERD-14VJ104	Carbon 100KΩ ±5% 1/4W
R 134	ERD-14VJ221	Carbon 220Ω ±5% 1/4W
RV 101	EVL-TOAAOOB54	Variable Resistor 50K (B)

(MPX Circuit Board)

R 212	ERD-14TJ271	Carbon 270Ω ±5% 1/4W
R 208	ERD-14TJ102	Carbon 1KΩ ±5% 1/4W
R 239, 240	ERD-14TJ471	Carbon 470Ω ±5% 1/4W
R 203	ERD-14TJ681	Carbon 680Ω ±5% 1/4W
R 204, 217, 220, 237, 238, 223 221	ERD-14TJ102	Carbon 1KΩ ±5% 1/4W
R 250	ERD-14TJ222	Carbon 2.2KΩ ±5% 1/4W
R 222	ERD-14TJ392	Carbon 3.9KΩ ±5% 1/4W
R 205	ERD-14TJ272	Carbon 2.7KΩ ±5% 1/4W
R 219	ERD-14TJ332	Carbon 3.3KΩ ±5% 1/4W
R 206, 210, 213, 215, 224, 216, 245	ERD-14TJ472	Carbon 4.7KΩ ±5% 1/4W
R 241, 242, 243, 244 250	ERD-14TJ562	Carbon 5.6KΩ ±5% 1/4W
R 202, 209, 229, 230,	ERD-14TJ103	Carbon 10KΩ ±5% 1/4W
R 233, 234	ERD-14TJ183	Carbon 18KΩ ±5% 1/4W
R 214	ERD-14TJ123	Carbon 12KΩ ±5% 1/4W
R 227, 228	ERD-14TJ223	Carbon 22KΩ ±5% 1/4W
R 235, 236	ERD-14TJ153	Carbon 15KΩ ±5% 1/4W
R 251	ERD-14TJ473	Carbon 47KΩ ±5% 1/4W
R 201, 207, 211	ERD-14TJ563	Carbon 56KΩ ±5% 1/4W
R 225, 226, 247, 248	ERD-14TJ104	Caron 100KΩ ±5% 1/4W
R 246	ERD-14TJ823	Carbon 82KΩ ±5% 1/4W

SYMBOL NO.	PART NO.	DESCRIPTION
R 218	ERD-14TJ184	Carbon 180Ω ±5% 1/4W
R 231, 232	ERD-14TJ274	Carbon 270KΩ ±5% 1/4W
RV 201	EVL-S3AAOOB14	Variable Resistor Separation

(AM Circuit Board)

R 316, 325	ERD-14TJ101	Car rbon 100Ω ±5% 1/4W
R 302, 306, 309	ERD-14TJ221	Carbon 220Ω ±5% 1/4W
R 303	ERD-14TJ821	Carbon 820Ω ±5% 1/4W
R 301, 311, 314, 315	ERD-14TJ102	Carbon 1KΩ ±5% 1/4W
R 308, 310, 313, 319, 322, 323	ERD-14TJ152	Carbon 1.5KΩ ±5% 1/4W
R 317	ERD-14TJ222	Carbon 2.2KΩ ±5% 1/4W
R 312	ERD-14TJ272	Carbon 2.7KΩ ±5% 1/4W
R 307	ERD-14TJ472	Carbon 4.7KΩ ±5% 1/4W
R 305	ERD-14TJ562	Carbon 5.6KΩ ±5% 1/4W
R 324	ERD-14TJ123	Carbon 12KΩ ±5% 1/4W
R 326	ERD-14TJ223	Carbon 22KΩ ±5% 1/4W
R 304, 321	ERD-14TJ333	Carbon 33KΩ ±5% 1/4W
R 318	ERD-14TJ563	Carbon 56KΩ ±5% 1/4W
R 320	ERD-14TJ154	Carbon 150KΩ ±5% 1/4W

(Equalizer Circuit Board)

R 411, 412	ERD-12TJ224	Carbon 220KΩ ±10% 1/2W
R 415, 416	ERD-12TJ153	Carbon 15KΩ ±5% 1/2W
R 409, 410, 413, 414	ERD-12TK221	Carbon 220Ω ±10% 1/2W
R 403, 404	ERD-12TK821	Carbon 820Ω ±10% 1/2W
R 419, 410	ERD-12TK182	Carbon 1.8KΩ ±10% 1/2W
R 417, 418	ERD-12TK123	Carbon 12KΩ ±10% 1/2W
R 407, 408	ERD-12TK683	Carbon 68KΩ ±10% 1/2W
R 421	ERD-12TK823	Carbon 82KΩ ±10% 1/2W
R 401, 402	ERD-12TK124	Carbon 120KΩ ±10% 1/2W
R 405, 406	ERD-12TK394	Carbon 390KΩ ±10% 1/2W

(Audio Control Amp. Circuit Board)

R 549, 550	ERD-14TJ101	Carbon 100Ω ±5% 1/4W
R 513, 514	ERD-14TJ331	Carbon 330Ω ±5% 1/4W
R 529, 530	ERD-14TJ681	Carbon 680Ω ±5% 1/4W
R 519, 520	ERD-14TJ102	Carbon 1KΩ ±5% 1/4W
R 547	ERD-14TJ152	Carbon 1.5KΩ ±5% 1/4W
R 545, 546	ERD-14TJ222	Carbon 2.2KΩ ±5% 1/4W
R 548	ERD-14TJ272	Carbon 2.7KΩ ±5% 1/4W
R 511, 512, 527, 528, 535, 536	ERD-14TJ472	Carbon 4.7KΩ ±5% 1/4W
R 515, 516	ERD-14TJ822	Carbon 8.2KΩ ±5% 1/4W
R 501, 502, 531, 532, 533, 534, 537, 538	ERD-14TJ103	Carbon 10KΩ ±5% 1/4W
R 543, 544	ERD-14TJ153	Carbon 15KΩ ±5% 1/4W
R 509, 510	ERD-14TJ183	Carbon 18KΩ ±5% 1/4W
R 503, 504 521, 522,	ERD-14TJ223	Carbon 22KΩ ±5% 1/4W
R 541, 542	ERD-14TJ393	Carbon 39KΩ ±5% 1/4W
R 523, 524	ERD-14TJ273	Carbon 27KΩ ±5% 1/4W
R 507, 508	ERD-14TJ563	Carbon 56KΩ ±5% 1/4W
R 517, 518	ERD-14TJ124	Carbon 120KΩ ±5% 1/4W
R 525, 526	ERD-14TJ154	Carbon 150KΩ ±5% 1/4W
R 539, 540	ERD-14TJ224	Carbon 220KΩ ±5% 1/4W

6. MUTING & METER ALIGNMENT

A) EQUIPMENT REQUIRED

FM SG ..... That provides 80 MHz to 110 MHz (30% modulated with 400 cps).

FM Dummy Antenna ..... 300Ω Balanced

AF VTVM

B) PROCEDURE

Receiver ..... Selector switch to FM-AUTO. Mode switch to STEREO.
Tone control to flat. Speakers switch to MAIN.
Adjust Volume control so that output level from both units becomes equal.
Balance control to center. High-Low filter to ON.
Loudness switch to OFF. Tape monitor switch to source.
Maintain line voltage at rated voltage.

STEP	SIGNAL GENERATOR CONNECTION	SIGNAL GENERATOR FREQUENCY	INPUT LEVEL	TUNER DIAL SETTING	OUTPUT METER CONNECTION	ADJUSTMENT	REMARKS
1	Connect to FM Antenna terminal through FM Dummy antenna	90~106 MHz (400 Hz 30% Mod.) Nothing position an obstroctive	36 dB	Tuning input signal	AF VTVM across speakers terminal	Muting SW to OFF	Adjust for maximum tuning meter
2						Muting SW to ON RV101	Adjust for minimum output
3			96 dB			RV801	Make adjustments so that the indication on tuning meter becomes 4.5 (Refer to fig. 12)

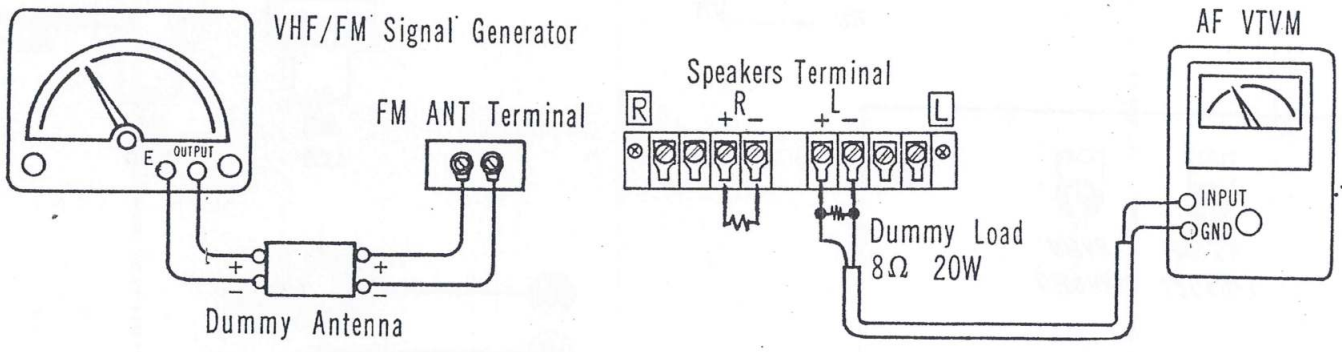


Fig. 10

Fig. 10 Recommended Equipment Connection for Muting Alignment.

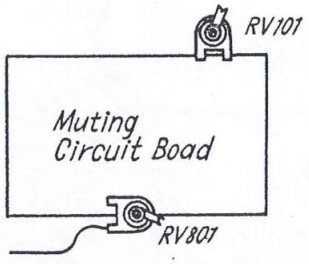


Fig. 11

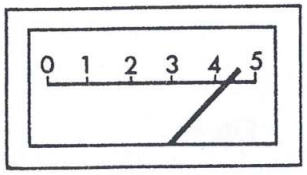


Fig. 12

Fig. 8 Recommended Equipment Connection for Separation Alignment.

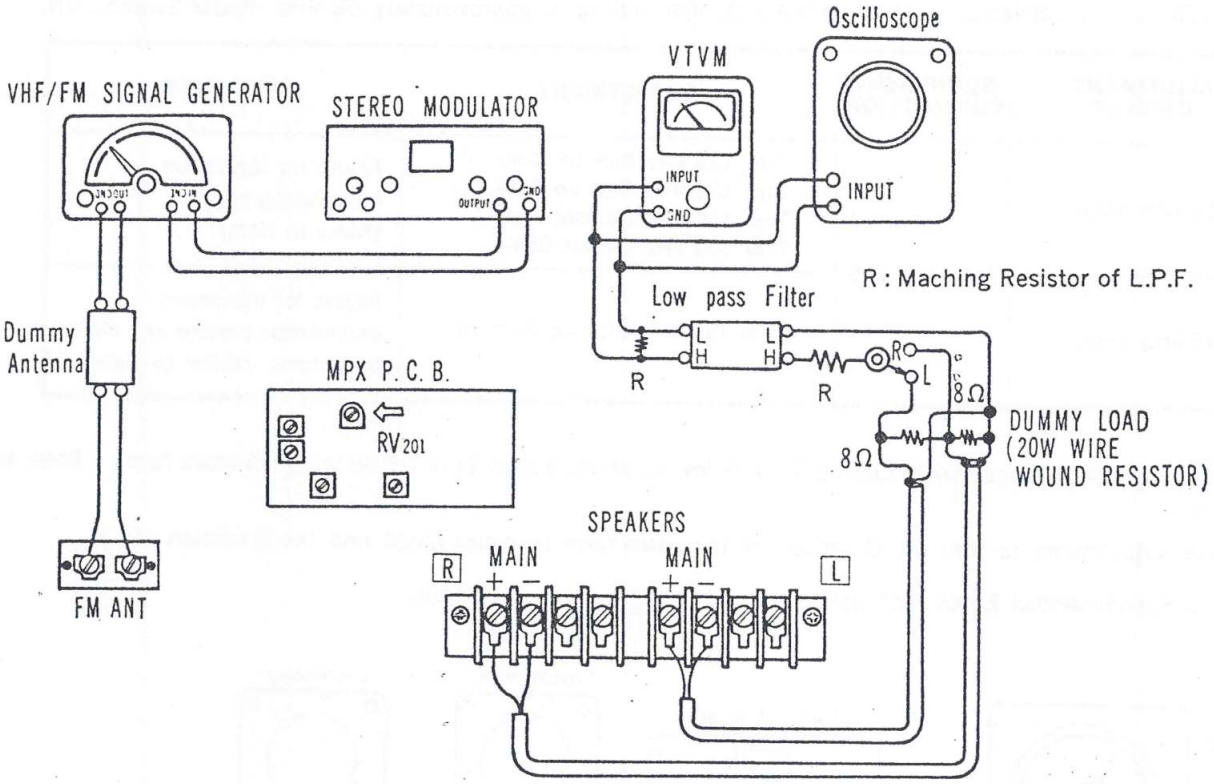


Fig. 8

Separation Alignment

A) EQUIPMENT REQUIRED

Stereo Modulator.....Connect Stereo Modulator output to EXT. Mod. terminal of signal generator.

Signal Generator.....Modulation Rate by 19 KHz Pilot Signal...8~10%

Modulation Rate by Left Signal.....27%

Output Level.....60 dB

Oscilloscope

Dummy Antenna..... 300Ω Balanced

Low Pass Filter ..... Cut Off Frequency 15~19 KHz.

B) PROCEDURE

Receiver.....Selector switch to FM-AUTO, dial setting to approximately 98 MHz. Tone control to FLAT, Balance control to CENTER, High Low Filter switch to ON, Mode switch to STEREO, Muting switch to OFF, Speakers Switch to MAIN. Adjust Volume control so that output level from both units becomes equal.

STEP	ALIGNMENT CIRCUIT	EQUIPMENT CONNECTION	ADJUSTMENT	REMARKS
1	SEPARATION	Refer to Fig. 8	RV_{201} (Separation Control)	Adjust RV_{201} for the minimum indication on VTVM from the left side output when the right side of stereo modulator is modulated. Adjust RV_{201} in the same way for the right side.

4. FM-STEREO ALIGNMENT

■ 38 kHz Band pass filter & SCA Filter Alignment.

A) EQUIPMENT REQUIRED

Audio Oscillator.....Effective up to 100 kHz Output voltage.....2 volt.

AF VTVM.....Indicates up to 0.003 volt.

B) PROCEDURE

RECEIVER .....Power switch to OFF. (All the other controls at optional positions.)

STEP	ALIGNMENT CIRCUIT	VTVM CONNECTION	FREQUENCY AF OSCILLATOR	ADJUSTMENT	REMARKS
1	38 kHz Band pass filter	Refer to Fig. 5	38 kHz	T_{206} (38 kHz B.P.F. Coil)	Adjust for maximum VTVM indication.
2	67 kHz Low pass filter		67 kHz	T_{205} (67 kHz L.P.F. Coil)	Adjust for minimum VTVM indication.
3	72 kHz Null filter		72 kHz	T_{207} (72 kHz Null Coil)	Adjust for minimum VTVM indication.

Fig. 5 Recommended Equipment Connection for 38 KHz B.P.F. & SCA Filter Alignment.

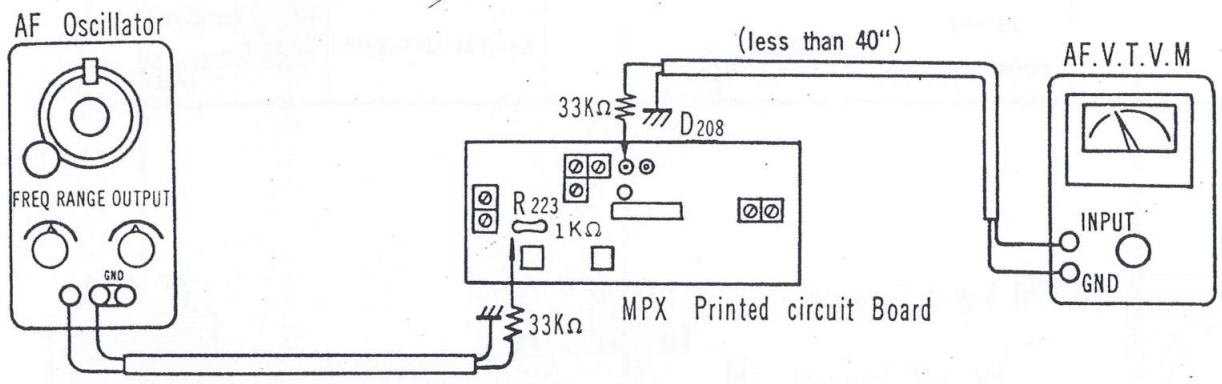


Fig. 5

■ 19 kHz Amp. Alignment

A) EQUIPMENT REQUIRED

Stereo modulator.....Connect Stereo Modulator output to EXT. Mod. terminal of signal generator.
Output Mode.....(L)

Signal generator..... Modulation Rate of 19 kHz pilot signal...8~10%.
(Output Level.....60 dB.)

Frequency.....Approximatery 98 MHz.

Oscilloscope

FM Dummy Antenna...300Ω Balanced.

V. T. V. M.

STEP	SWEEP GENERATOR CONNECTION	SIGNAL GENERATOR CONNECTION	TUNER DIAL SETTING	OSCILLO-SCOPE CONNECTION	ADJUSTMENT	REMARKS
1	High side thru. 0.001μF to TR3 gate(Bass) FM tuner terminal.	High side thru, 100μμF to TR3 gate(Bass) FM tuner terminal. Common to chassis.	Point of non-interference. (on/about 90 MHz)	Connect vert. Amp. of scope to FM IF p.c.b. terminal No. 9 FM tuner Common to chassis.	T1 (FM 1st IFT T101 (FM 2nd IFT (P)) T101 (FM 2nd IFT (S)) T102 (FM 3rd IFT (P)) T102 (FM 3rd IFT (S)) T103 (FM 4th IFT (P)) T103 (FM 4th IFT (S))	Adjust for maximum amplitude and symmetrical curve. (Refer to Fig. 1)
					T104 (FM 5th IFT (P)) T104 (FM 5th IFT (S))	Adjust T104 for maximum amplitude & proper linearity between ±100 kHz markers. (Refer to Fig. 1) Adjust T104 so that center marker is at the center. (Refer to Fig. 2)

• P=PRIMARY
• S=SECONDARY

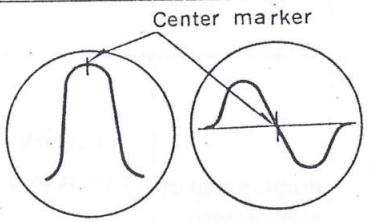


Fig. 1 Fig. 2

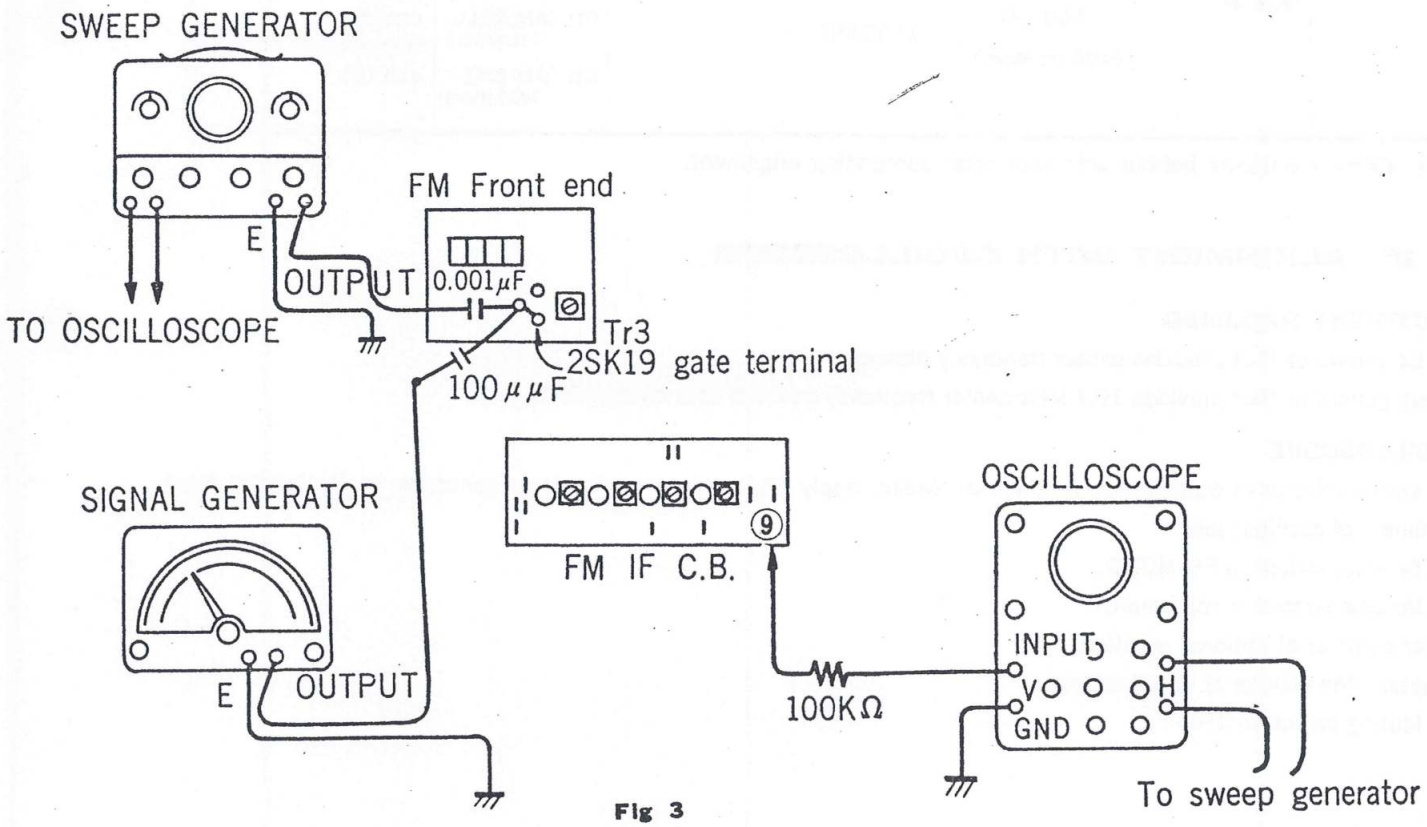
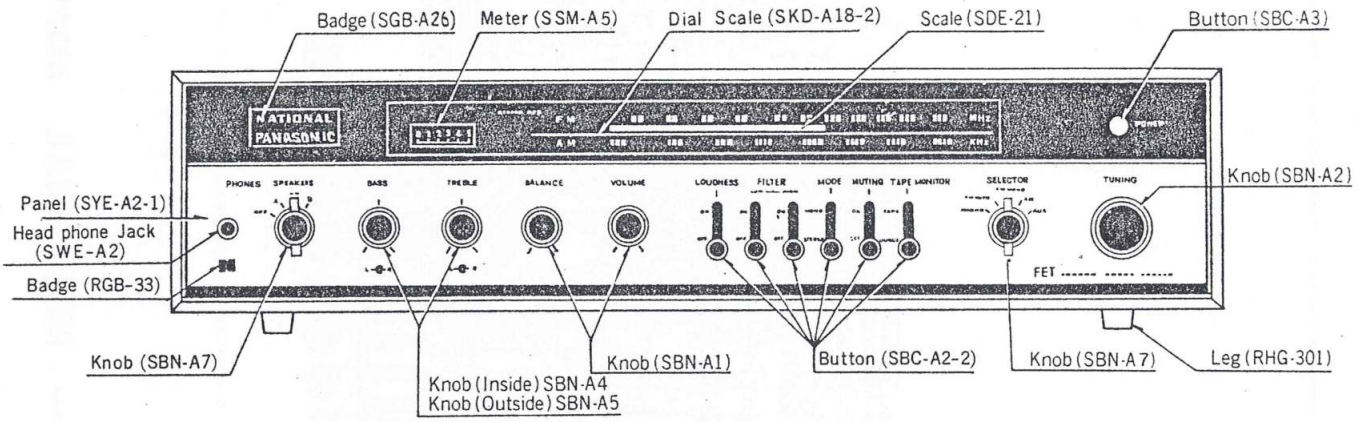


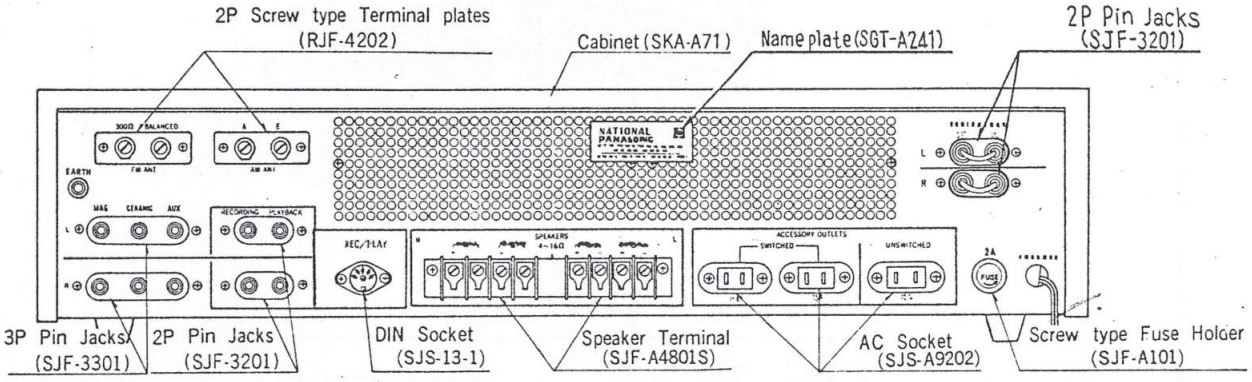
Fig 3

p.c.b. ; Printed Circuit Board

Fig. 3 Recommended Equipment Connection for FM IF Alignment.

PANEL: LOCATION OF PARTS





ADJUSTMENTS

1. AM, FM IF & RF ALIGNMENT

Allow test equipment and receiver at least 10 minutes to warm up before starting the alignment.

AM IF & RF ALIGNMENT

EQUIPMENT REQUIRED

Signal generator that provides 455 kHz—1700 kHz AM (30% modulated with 400 Hz)
Radiation loop coil
Output meter (Circuit tester or VTVM)
Monitor Speaker & Load Resistor (8Ω)

PROCEDURE

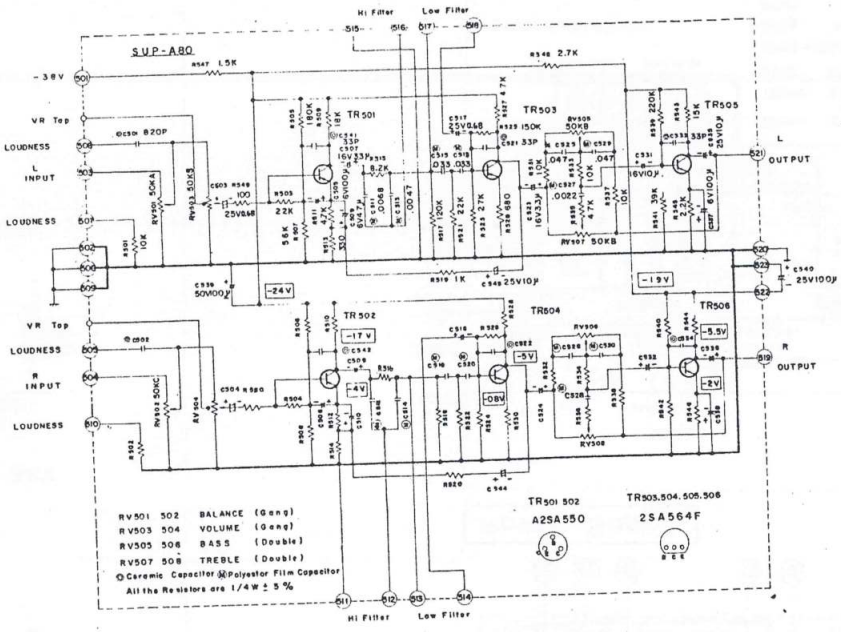
OUTPUT LEVEL ..... Keep signal generator output low enough to prevent AGC overload. (Below 2 volts on output meter.)

TUNER..... Place the Tuner 24″ away from radiation loop coil.
Set selector switch to AM.

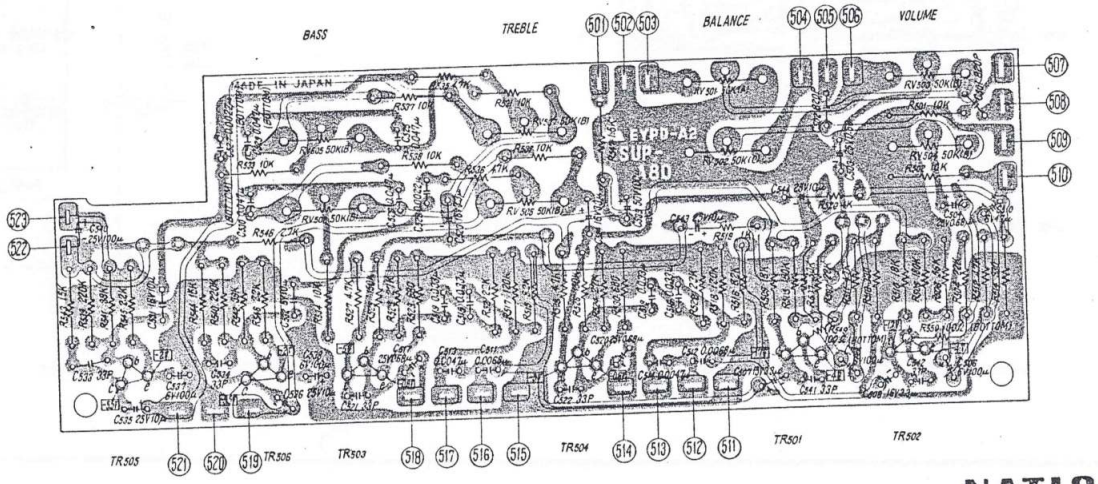
SCHEMATIC DIAGRAM
CIRCUIT BOARD

MODEL SA-54

Audio Control AMP.



(SUP-A80)

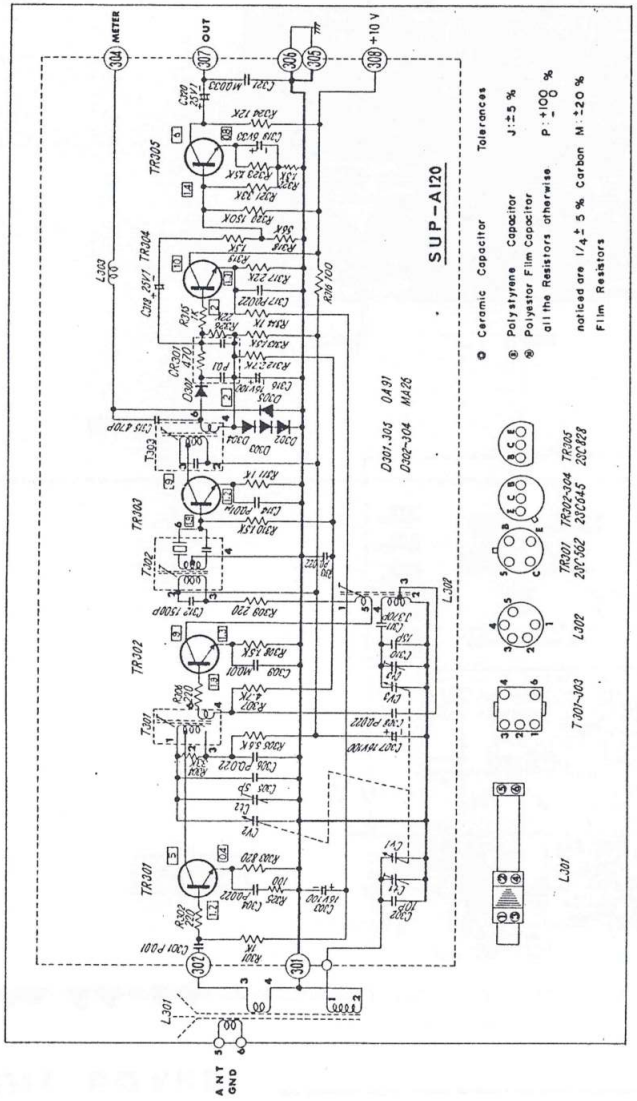


NATIONAL AMPLIFIER

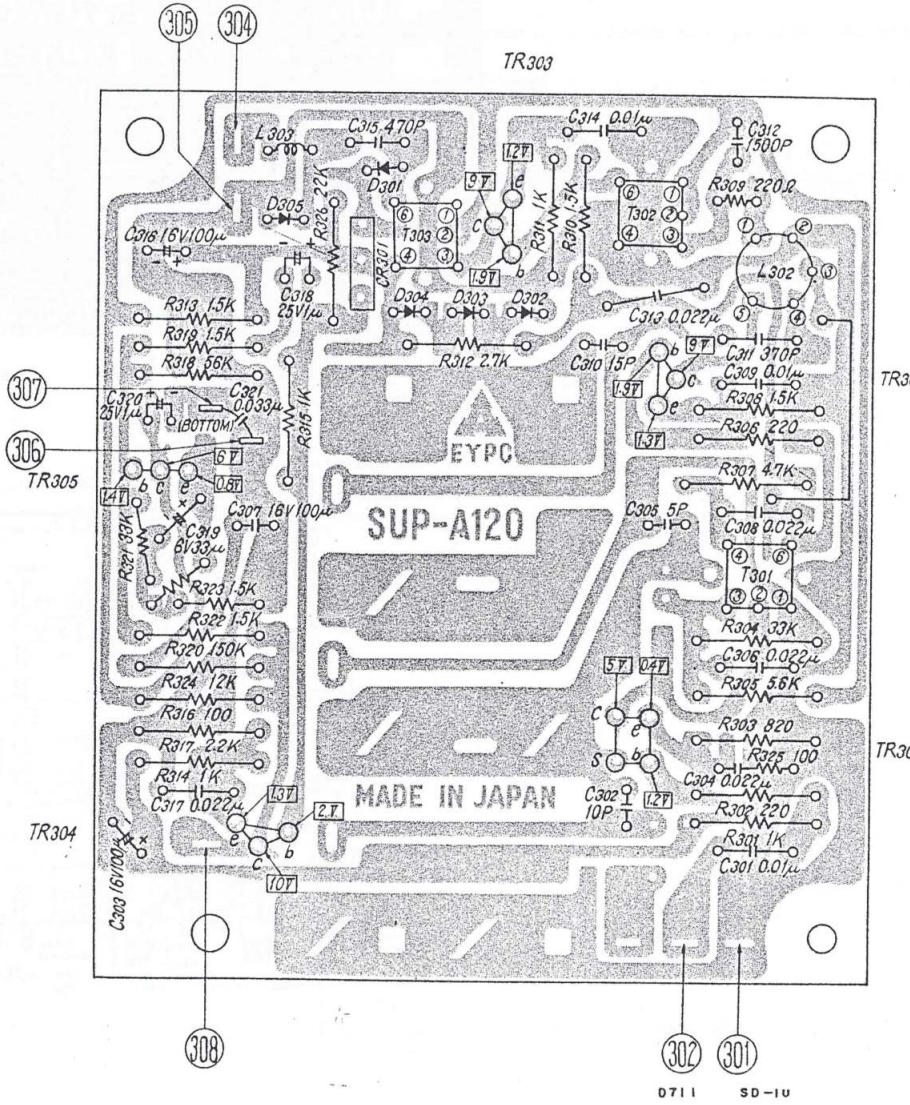
SCHEMATIC DIAGRAM
CIRCUIT BOARD

MODEL SA-54

AM



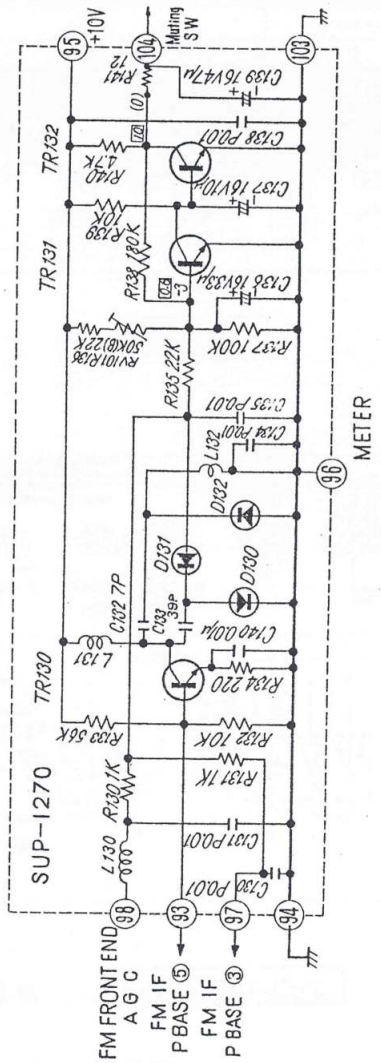
(SUP-A120)



SCHEMATIC DIAGRAM
CIRCUIT BOARD

MODEL SA-54

FM Muting

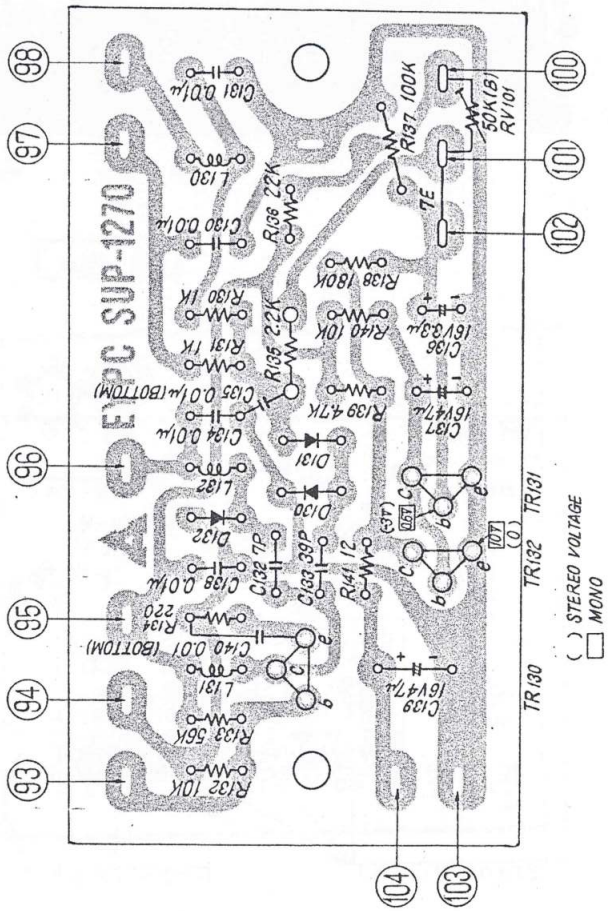


TR130 TR131~132 Di30~Di32 2SC645 2SC828 0A91

◎ Ceramic Capacitor

All the Resistors otherwise noticed are 1/4 W 5 % Carbon Film Resistor

Toleran ces P +100 -0 %



CHASSIS REMOVAL

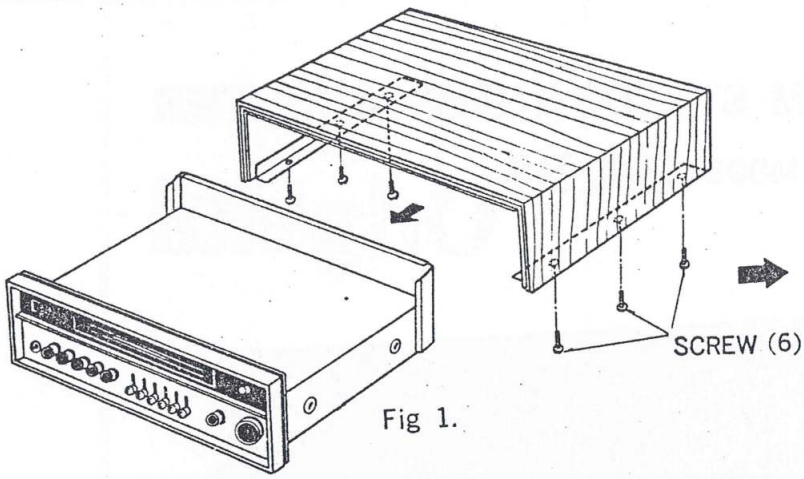


Fig 1.

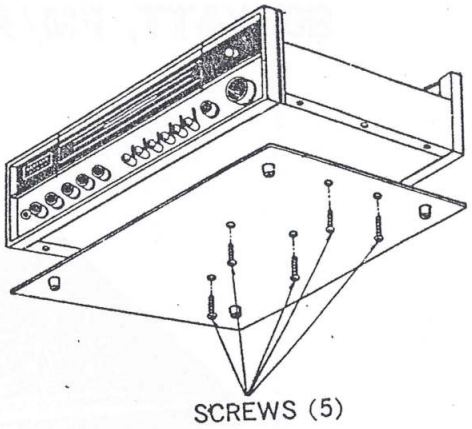


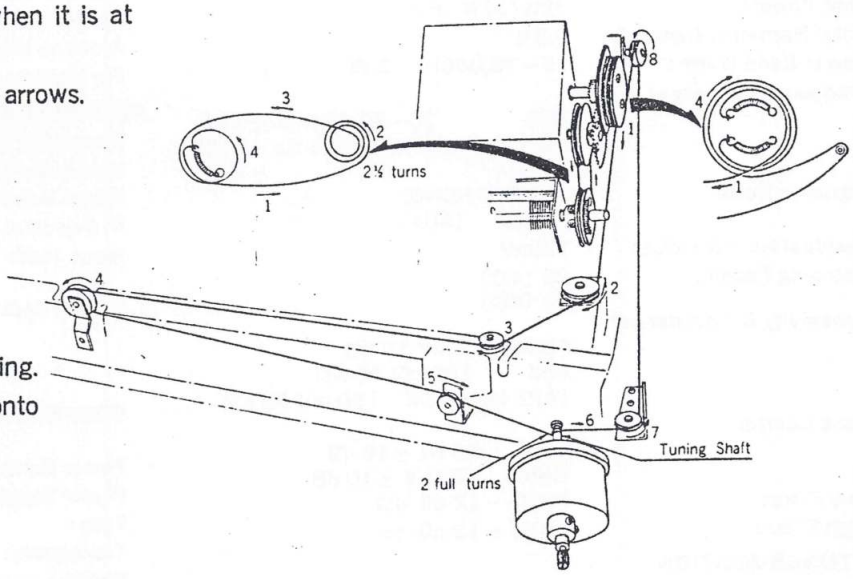
Fig 2.

To Remove Chassis (Refer to Fig. 1, 2)

1. Remove six (6) cabinet mounting screws, as illustrated in Fig. 1.
2. Remove five (5) chassis back cover mounting screws, as illustrated in Fig. 2.
3. To reassemble, reverse the above procedure.

DIAL CORD STRINGING

1. Put the cord on the variable capacitor when it is at the position of maximum capacity.
2. Mount the cord in the order shown by the arrows.
3. Mount the cord to the smaller drum first.
4. Paint-lock the cord knots.
5. The spring should stretch to ½~19/32".
6. Mount the drum cover.
7. Adjust the gear by turning the shaft receiver holding screw.
8. Oil on the turning shaft may cause slipping. Wipe it clean before winding the cord onto the shaft.



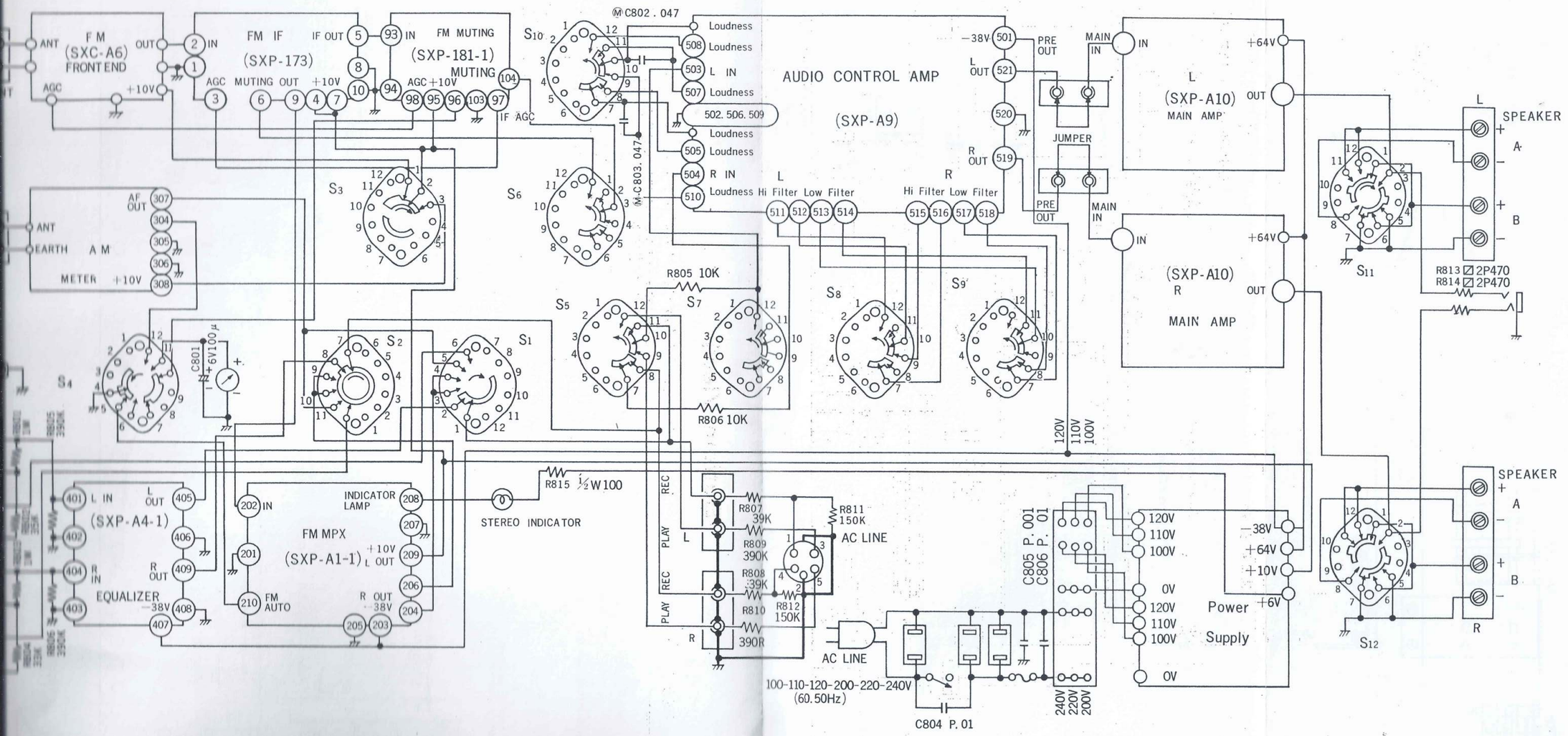
FREQUENCY & DISTANCE ON DIAL SCALE

1. Mark the measurement points on the dial back plate with a pen or a pencil in accordance with the table.
2. Alignment should be made by setting the left side of the dial pointer to the measurement point.

TABLE

AM	550 Hz	17.7mm	0.71"
	1500 kHz	148.9mm	6"
FM	90 MHz	34.2mm	1.36"
	106 MHz	143.7mm	5.7"

BLOCK DIAGRAM MODEL SA-54



S1～S4 SELECT NOW in (PHONO) Position
PHONO-FM AUTO-FM MONO-AM-AUX

S5 TAPE MONITOR NOW in (Source) Position

S6 MUTING 〃 (OFF) 〃

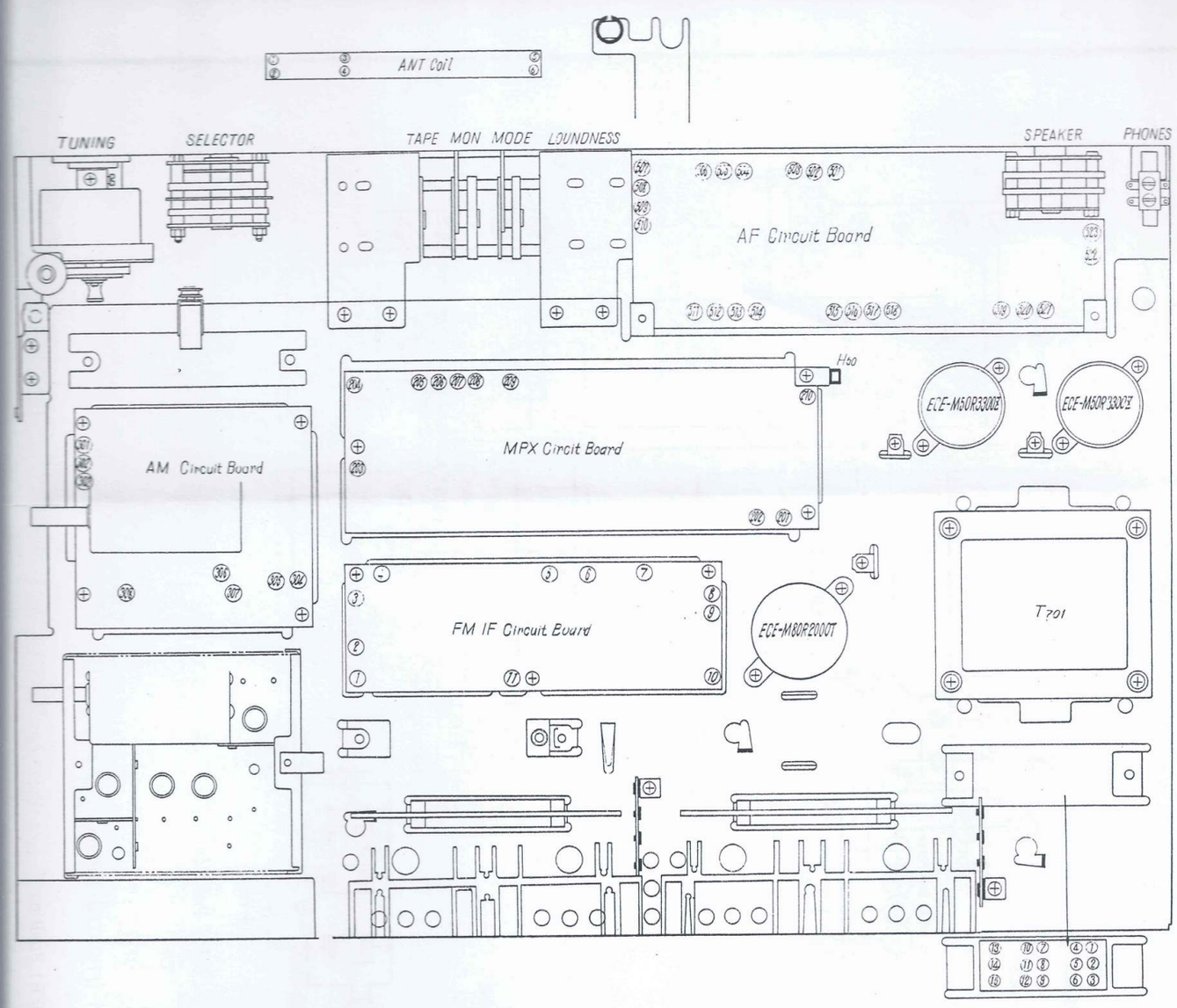
S7 MODE 〃 (STEREO) 〃

S8 HIGH FILTER NEW in (OFF) Position

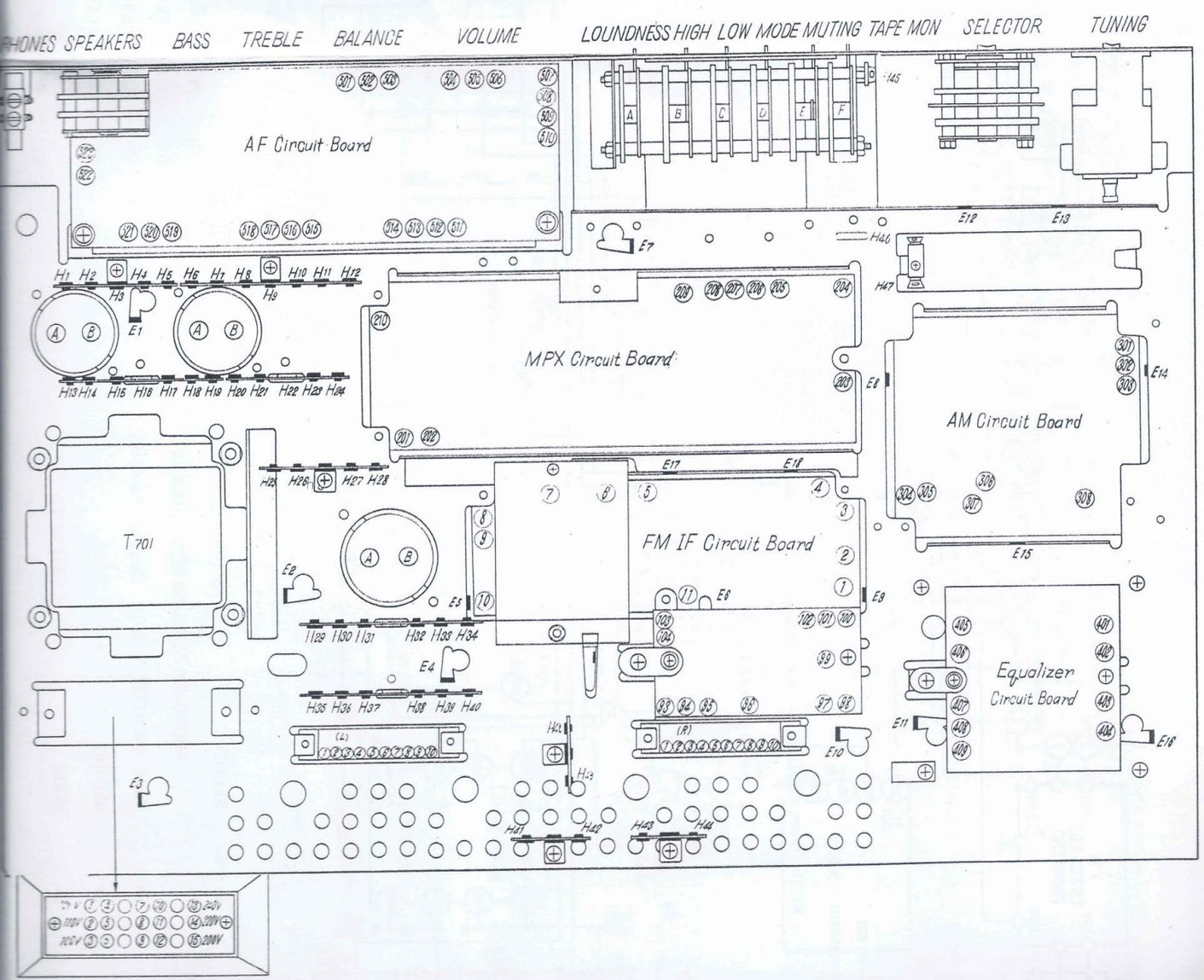
S9 LOW FILTER 〃 (OFF) 〃

S10 LOUDNESS 〃 (OFF) 〃

S11, S12 SPEAKERS NOW in (PHONES) Position
PHONES—A—A+B—B

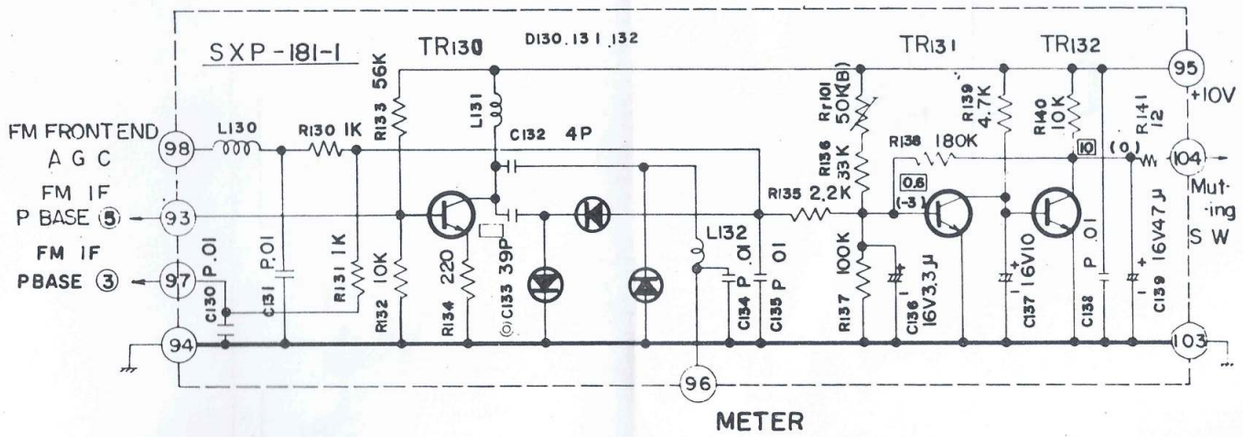

ANT Coil
TUNING
SELECTOR
TAPE MON
MODE
LOUDNESS
SPEAKER
PHONES
AF Circuit Board
MPX Circuit Board
AM Circuit Board
FM IF Circuit Board
ECE-M60R3300E
ECE-M60P3300E
ECE-M80P2000T
T701

(Bottom View)


PHONES
SPEAKERS
BASS
TREBLE
BALANCE
VOLUME
LOUDNESS
HIGH
LOW
MODE
MUTING
TAPE MON
SELECTOR
TUNING
AF Circuit Board
MPX Circuit Board
AM Circuit Board
FM IF Circuit Board
Equalizer Circuit Board
T701
240V
220V
200V
100V

MODEL SA-54

FM Muting (SXP-181-1)

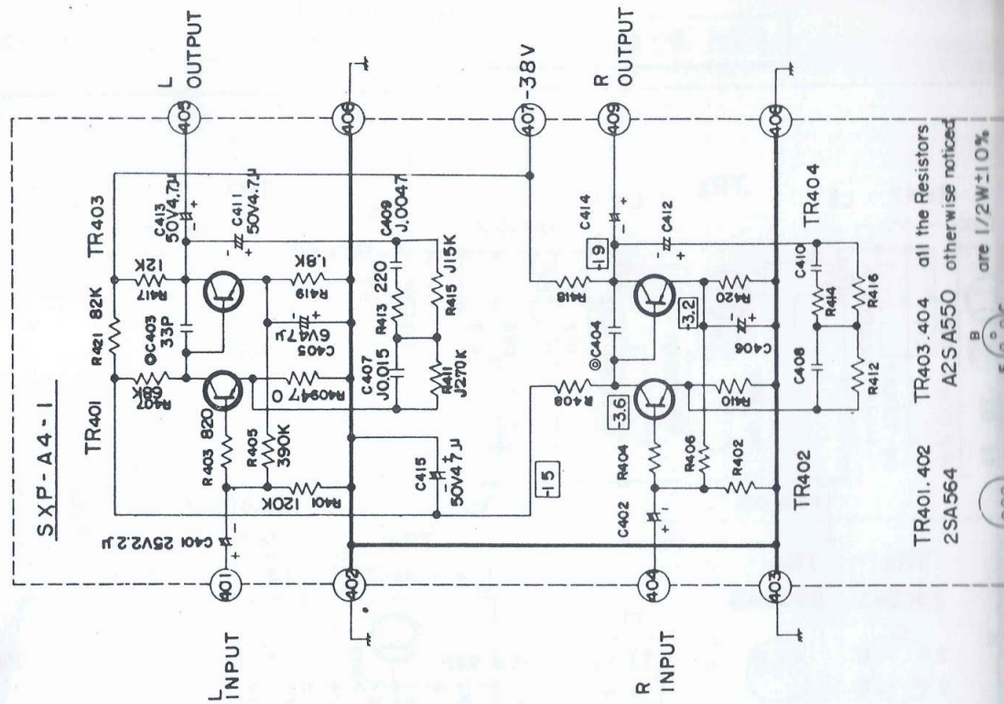


TR130 TR131~132 D130~D132
2SC645 2SC828 0A91

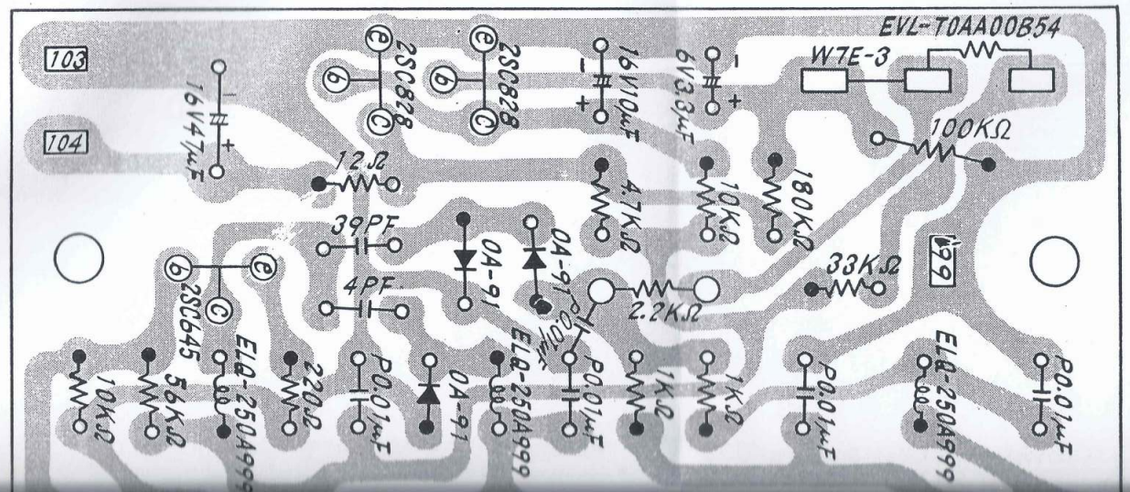
◎Ceramic Capacitor
All the Resistors otherwise noticed are 1/4W 5% Carbon Film Resistor

Tolerances P = +100 -0 %

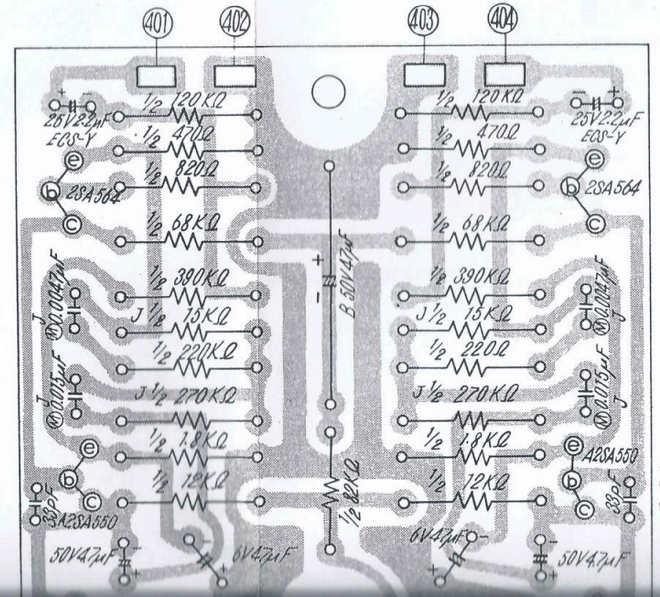
Equalizer (SXP-A4-1)



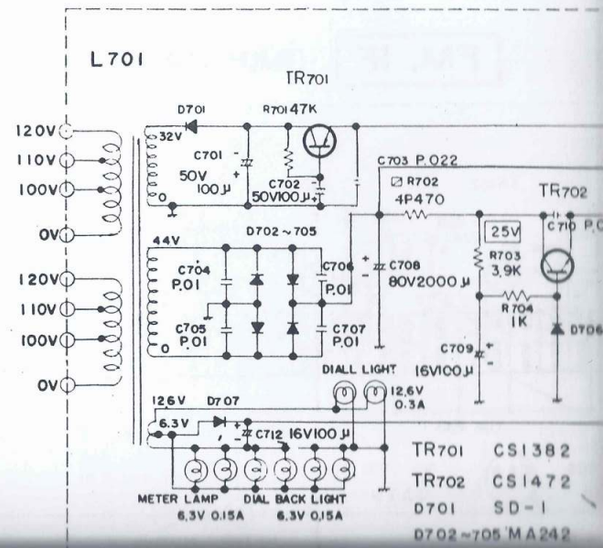
(SXP-181-1)



(SXP-A4-1)

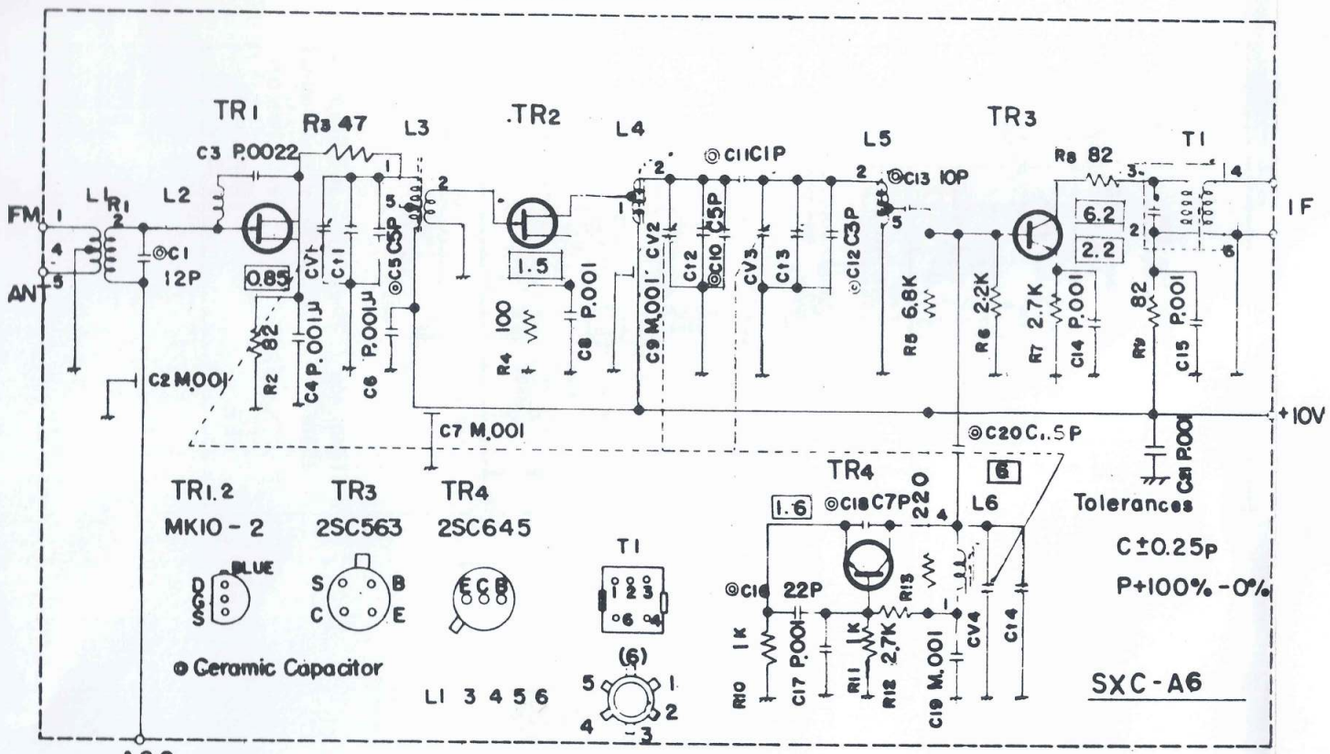


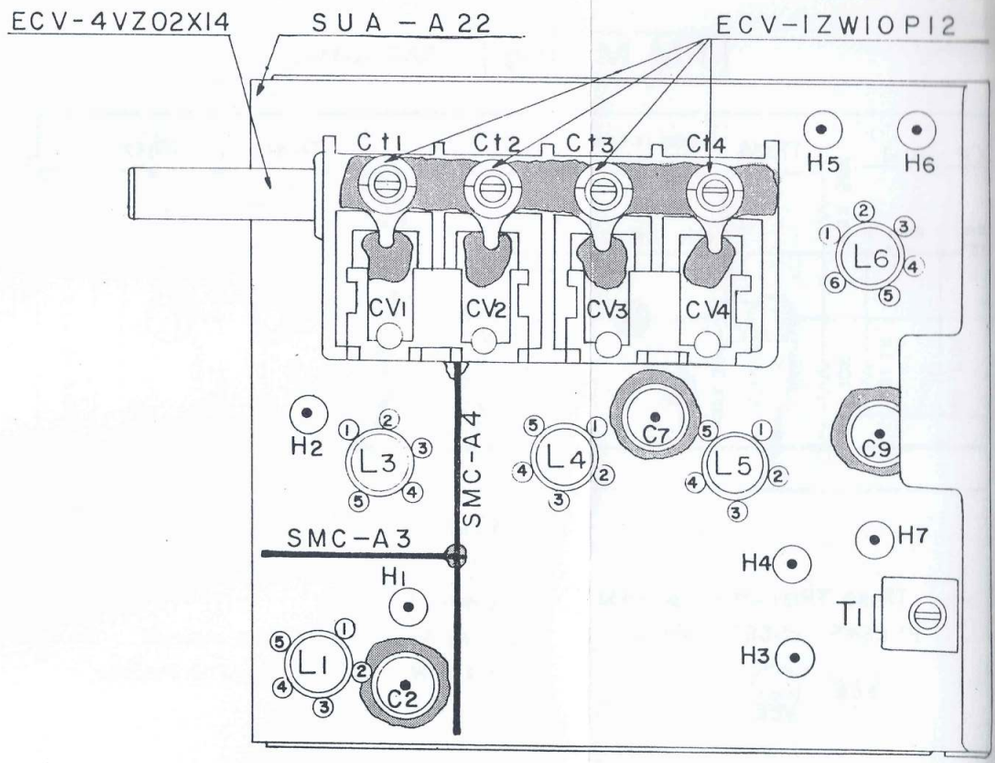
Power Supply



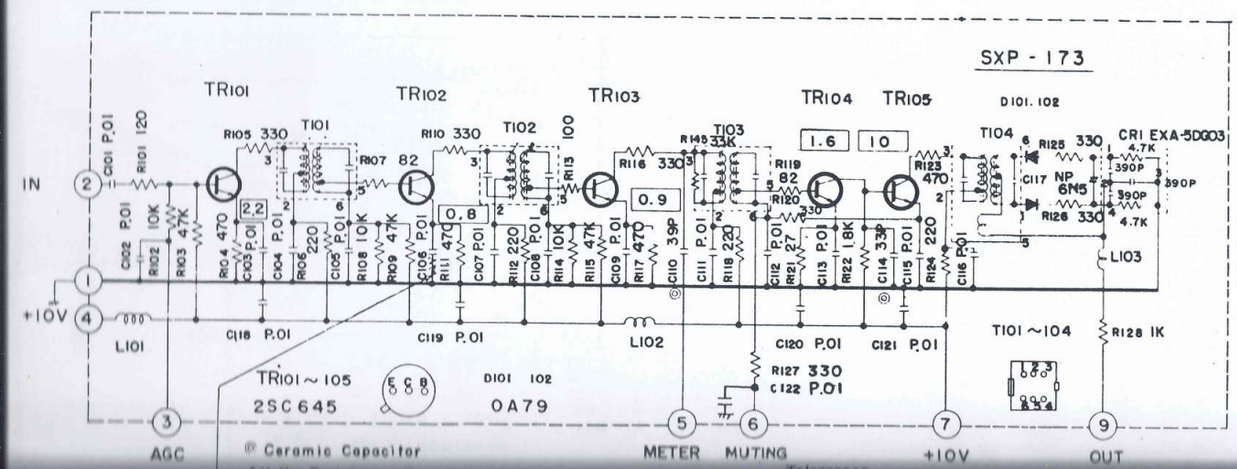
MODEL SA-54

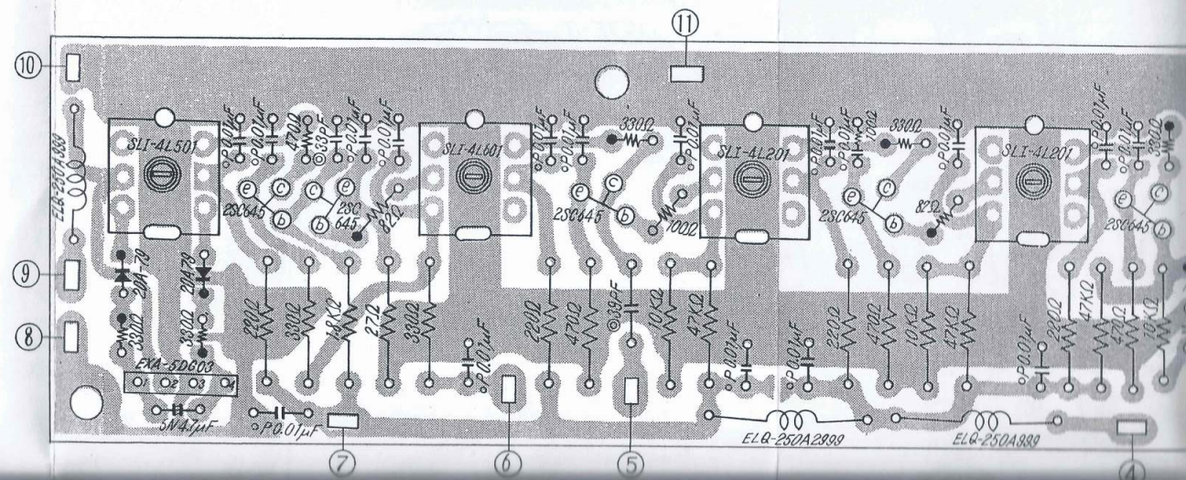
FM Front End (SXC-A6)



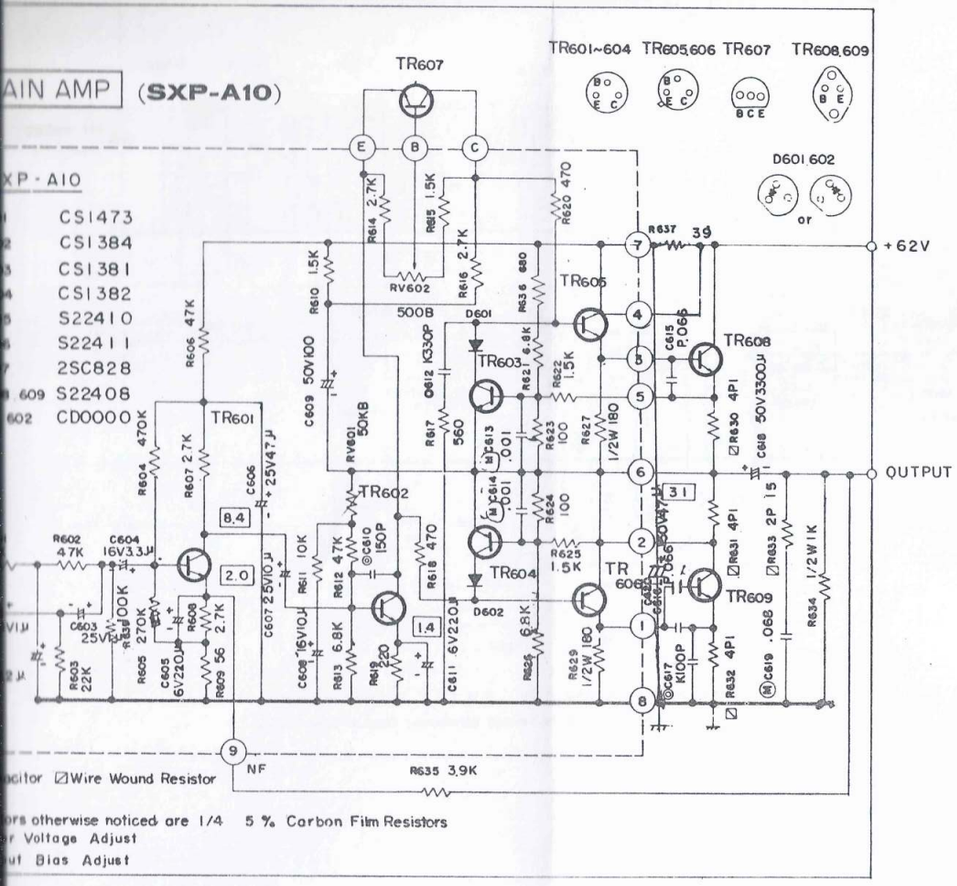


FM, IF (SXP-173)

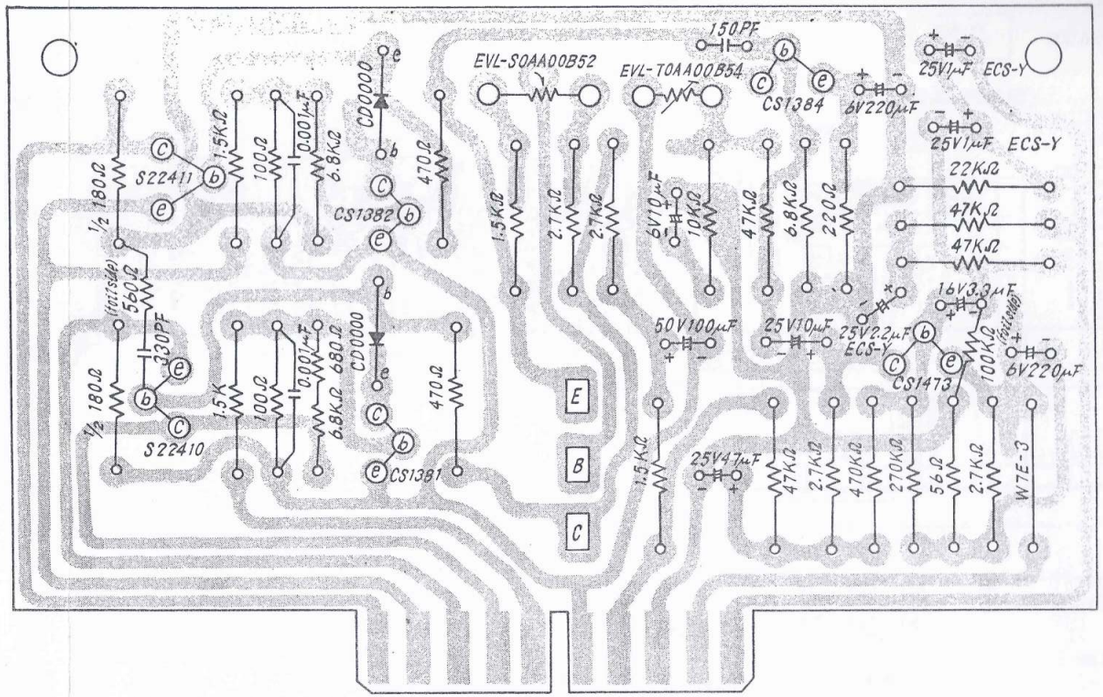




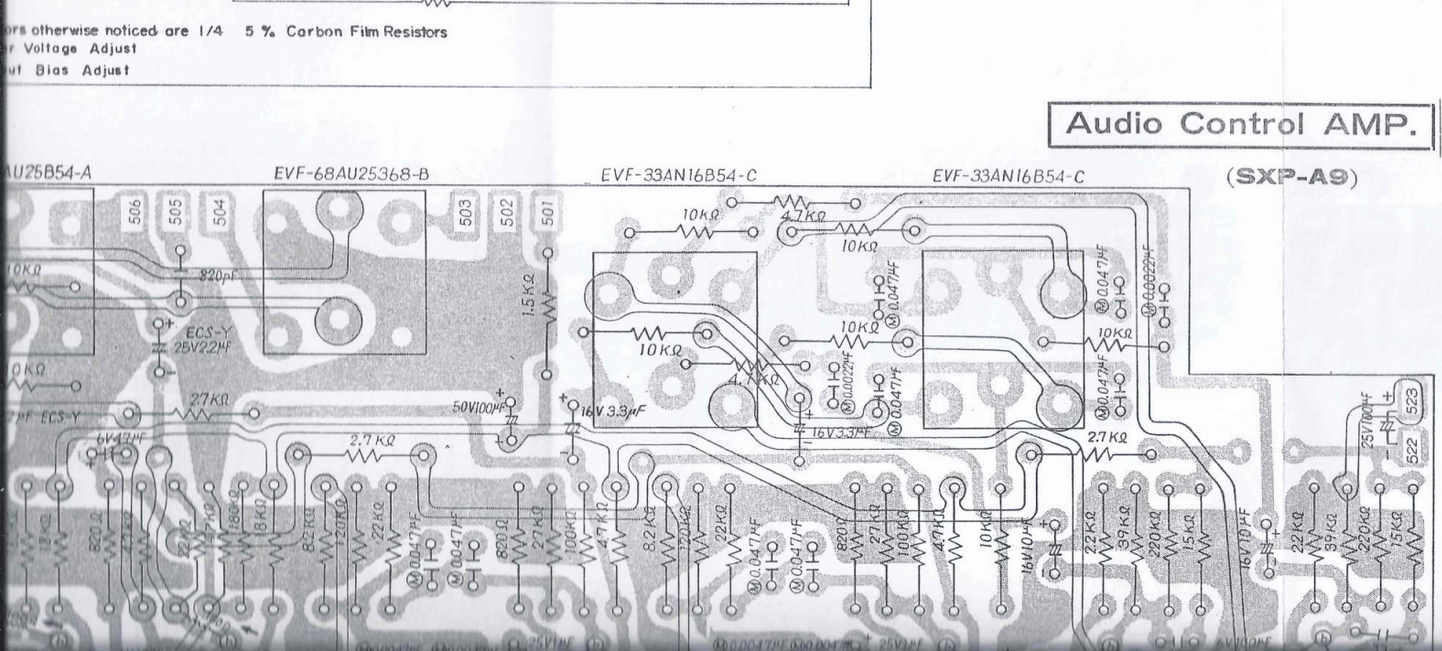
AIN AMP (SXP-A10)

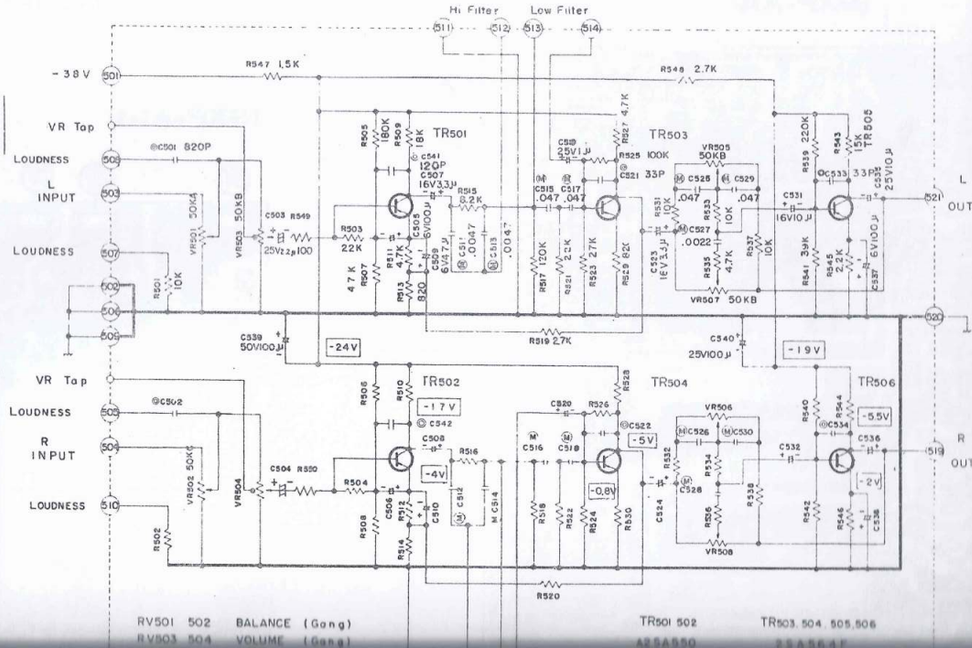


(SXP-A10)



Audio Control AMP. (SXP-A9)

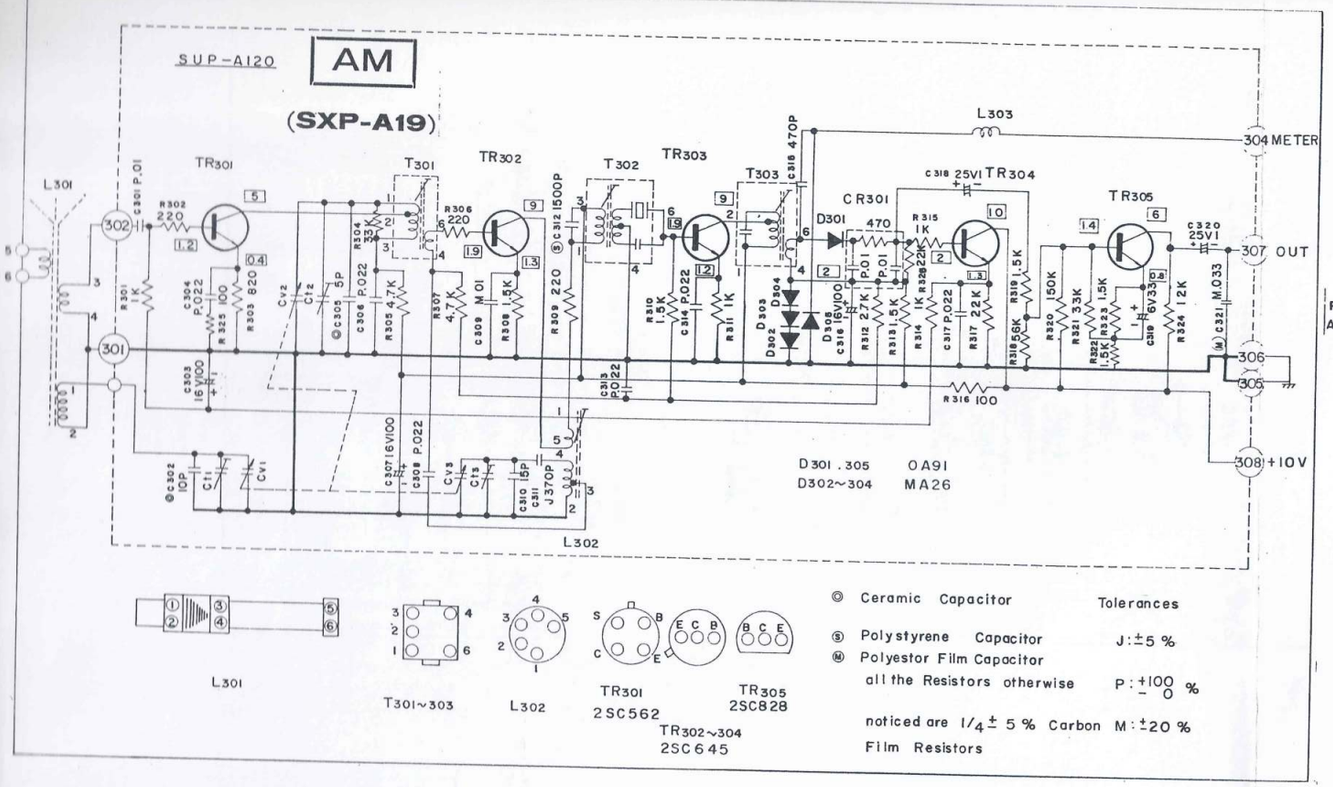




SUP-A120

AM

(SXP-A19)



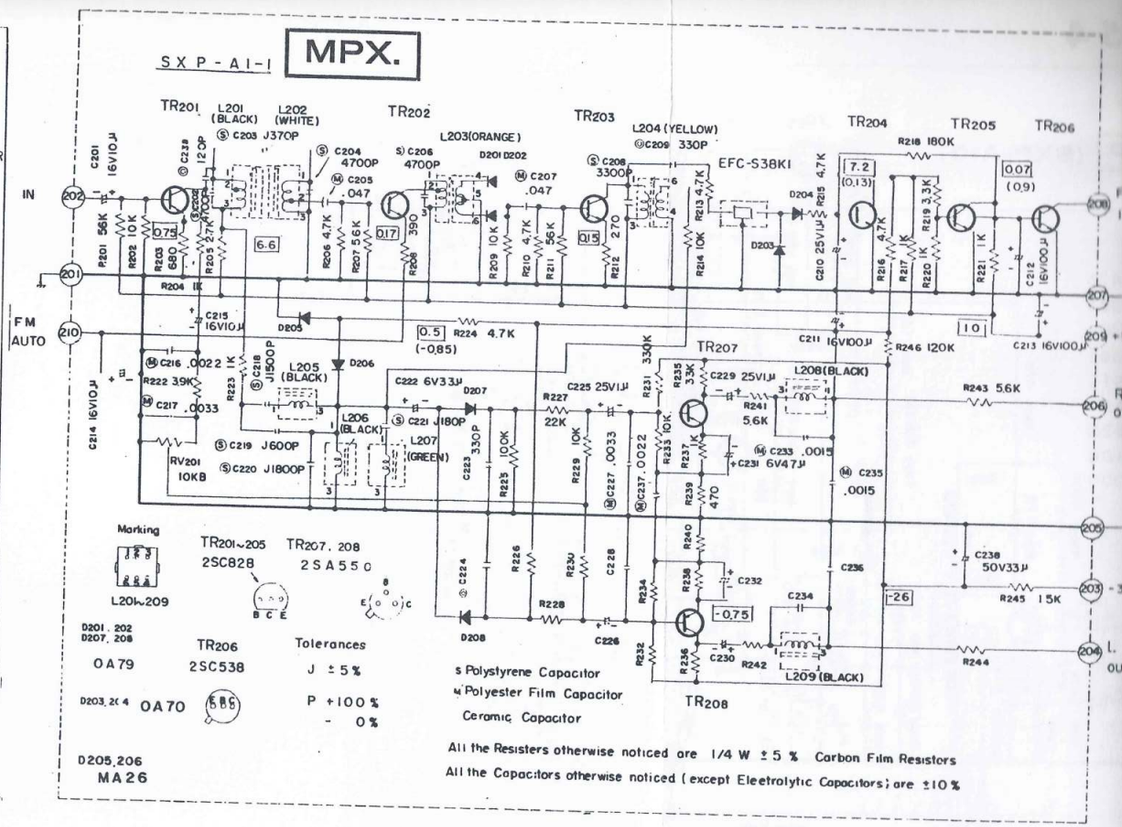
◎ Ceramic Capacitor — Tolerances

Ⓢ Polystyrene Capacitor — J : ±5 %

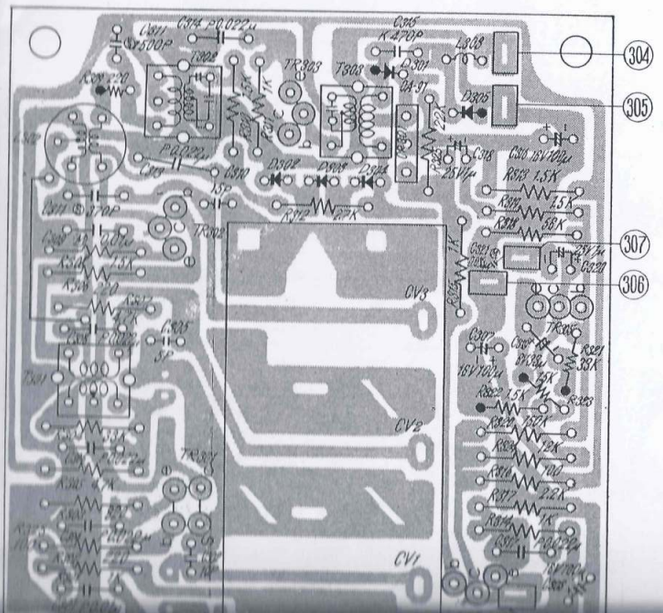
Ⓜ Polyestor Film Capacitor all the Resistors otherwise noticed are 1/4 ± 5 % Carbon Film Resistors — P : +100 −0 % M : ±20 %

SXP-A1-1

MPX.



(SXP-A19)



(SXP-A1-1)