SERIAL **No. 3010**

ONKYO SERVICE MANUAL

AUTOMATIC 4-CHANNEL RECEIVER

TS-500

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ONKYO®
AUDIO COMPONENT

SPECIFICATIONS

TUNER SECTION

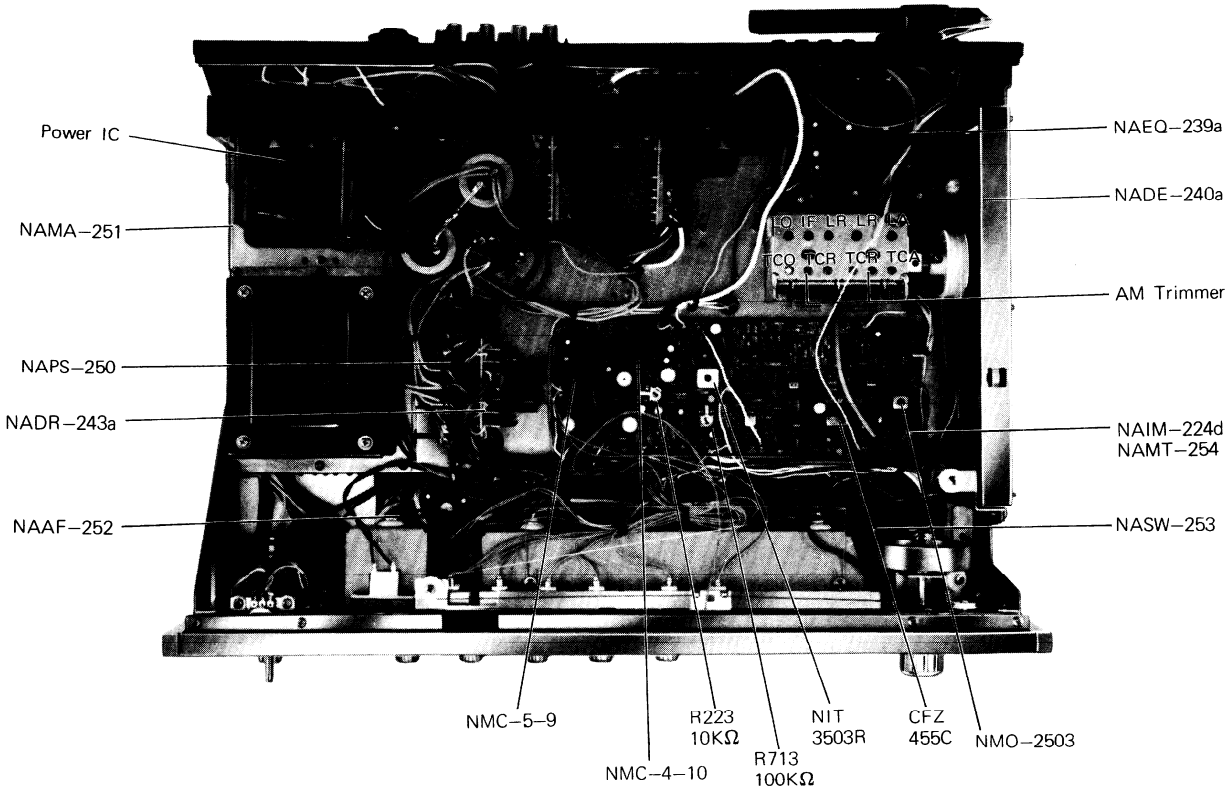
Tuning Range	FM:88–108MHz
	AM:530–1605kHz
Sensitivity	FM:1.8μV(IHF)
	AM:40μV 150μV/m
Intermediate	FM:10.7MHz
Frequency	AM:455kHz
Capture Ratio	FM:2dB
Image Rejection Ratio	FM:70dB
	AM:35dB
IF Rejection Ratio	FM:90dB
	AM:40dB
Signal to Noise Ratio	FM:70dB
	AM:40dB
Alternate Channel att.	FM:65dB
AM Suppression Ratio	FM:50dB
Harmonic Distortion	FM MONO:0.4%
	FM ST:0.8% AM:1%
Frequency Response	FM:20–15,000Hz
	±1.5dB
Stereo Separation	FM ST:40dB at 400Hz
	30dB at 100–10,000Hz
Muting Level	FM:20μV
Stereo Lamp Level	FM ST:20μV
Tuning Meter	Signal Strength Meter

Amplifier Section

Power Output	200W (IHF 4Ω)
Dynamic	140W(IHF 8Ω)
Continuous	30W× 4 (4Ω 4-channel driven at 1kHz)
	25W× 4 (8Ω 4-channel driven at 1kHz)
	19W × 4 (8Ω 4-channel driven at 20–20,000Hz)
	50W × 2 (8Ω 2-channel driven at 1kHz, BTL connection)
Total Harmonic Distortion	0.5% at Rated Power
Damping Factor	30 (8Ω 1kHz)
Frequency Response	20–30,000Hz (±1dB)
Power Bandwidth	20–20,000Hz (–3dB, THD 0.5%)
Sensitivity and	PHONO:2.5mV/50kΩ
Impedance	AUX:200mV/50kΩ
	TAPE PLAY–1/–2:200mV/50kΩ
	TAPE REC–1/–2:200mV/100kΩ
BASS Control	±8dB at 100Hz
TREBLE Control	±8dB at 10kHz
Signal to Noise Ratio	PHONO:65dB (IHF C NETWORK)
	AUX, TAPE:75dB(IHF C NETWORK)
Loudness Control	+7dB at 100Hz, +4.5dB at 10kHz
Filter Low	70Hz (6dB/oct)
High	6kHz (6dB/oct)
Dimensions	534W × 425D × 140Hmm
	21″ 16-3/4″ 5-1/2″
Weight	15.5Kgr. 34lbs.
Semiconductors	FET:9 Transistors:94 Diodes:66
	ICs:8

Specifications and features are subject to change without notice.

CHASSIS LAYOUT
TOP VIEW



FM, AM, ALIGNMENT PROCEDURE

INSTRUMENT REQUIRED

1. AM and FM sweep generator
2. AM and FM signal generator
3. Vacuum tube voltmeter (V.T.V.M.) AC.DC
4. Oscilloscope
5. Distortion meter
6. Stereo Modulator

GENERAL ALIGNMENT CONDITIONS

1. Signal input should be kept low as possible.
2. Standard modulation is 400Hz 30% (AM)
   400Hz 100% (FM.MONO), pilot 10% Sub & Main 90% (FM.ST)
3. Standard output is 500mW (2.0V, 8Ω)

STEP	CONNECT SIGNAL SOURCE TO-	SET SIGNAL TO-	CONNECT OUTPUT INDICATOR TO-	SET RADIO DIAL TO-	ADJUST	ADJUST FOR	REMARKS	STEP
1	Set Program Mode Switch to "Auto" Set Selector Switch to "AUX"							1
2	No Signal		V.T.V.M. to across "SW-OUT" terminal (NAMT–254)		Variable Resistor R1302 (2.2KΩ) (NAMT–254)	Adjust the voltage to – 1V.		2
3	Set Program Mode Switch to "DISCRETE" (CD–4) Set Amp Mode Switch to "4ch" Set Selector Switch to "AM"							3
4	AM Sweep Generator to-AM Ant.	455KHz	Oscilloscope to-across "AM OUT" terminal (NAIM–224d)	Quiet Point on Band	X104 CFZ–455C	Maximum Symmertrical response	Usually not necessary to adjust	4
5	AM Signal Generator to-AM Ant through a standard radiating loop	515KHz (modulated)	V.T.V.M. or oscilloscope to-across "SPEAKER" terminal	Lower end	L107 NMO–2503 (Red)	Maximum	Repeat steps 3 and 4 as necessary to obtain Maximum sensitivity on stations	5
6		1680KHz (modulated)		Upper end	AM Trimmer (OSC. side)	Maximum		6

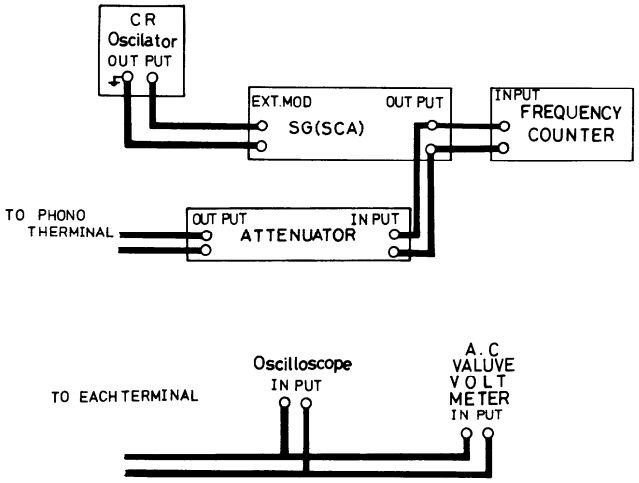
STEP	CONNECT SIGNAL SOURCE TO-	SET SIGNAL TO-	CONNECT OUTPUT INDICATOR TO-	SET RADIO DIAL TO-	ADJUST	ADJUST FOR	REMARKS	STEP
7	"	600KHz (modulated)	"	600KHz (Tuned to Signal)	L001 NMA-2509 (Coil Antenna)	Maximum	Repeat steps 5 and 6 as necessary	7
8		1400KHz (modulated)		1400KHz (Tuned to Signal)	AM Trimmer (Ant. side)	Maximum		8
9	Set Radio Selector Switch to "FM"			Set Muting Switch to "OFF"				9
10	FM Sweep Generator to "FM IN" terminal (NAIM-224d)	±0.3MHz Sweep Centered at 10.7MHz	Oscilloscope to-across "TP2" (FM DET) terminal (NAIM-224d)	Quiet Point on Band	L105 NIT-3503R Top Bottom	Maximum "S" curve Lineality	Not necessary to adjust for Symmetrical response or Zero Voltage	10
11	No Signal		Tuning Indicator may be used as the output indicator.	Quiet Point Where FM Signals are not received	L105 NIT-3503R Top	The Tuning Indicator comes to the center.		11
12	FM Signal Generator to-across FM Ant. terminal through a matching network	92MHz (100% Mod.)	V.T.V.M. to-across "SPEAKER" terminal	92MHz	LO on FM Front end	Maximum	Repeat steps 10 and 11 as necessary	12
13		104MHz (100% Mod.)		104MHz	TCO on FM Front end	Maximum		13
14		88MHz (100% Mod.)		88MHz (Tuned to Signal)	LA LR (2 points) on FM Front end	Maximum	Repeat steps 12 and 13 as necessary	14
15		108MHz (100% Mod.)		108MHz (Tuned to Signal)	TCA TCR (2 points) on FM Front end	Maximum		15
16		98MHz (100% Mod.)		98MHz (Tuned to Signal)	IF (TOP & Bottom) on FM Front end	Maximum		16
17		98MHz (100% Mod.)	Distortion meter to-across "SPEAKER" terminal	Tuned to Signal	L105 NIT-3503R Bottom	Minimum Distortion	Less than 0.3%	17
18	Set Radio Selector Switch to "FM"			Set Muting Switch to "ON"				18
19	FM Signal Generator to-across FM Ant. terminal through a matching network	98MHz (100% Mod.)	Oscilloscope to-across "SPEAKER" terminal	Tuned in and out	Variable Resistor R713 (100KΩ)	When tuned out, no noise. When tuned in, Signal.	Signals are not necessarily Squelching by turning R713 counter clockwise.	19
20	Set Radio Selector Switch to "FM AUTO"			Set Muting Switch to "OFF"				20
21	"	98MHz (Pilot Sig. 19KHz 10%) 1mv input	V.T.V.M. to-across "TP3" terminal (NAIM-224d)	Tuned to Signal	L201 NMC-4-10	Maximum	R223 (10KΩ) center	21
22	"	98MHz (Pilot Sig. 19KHz 1KHz R ch 90%	V.T.V.M. to-across "SPEAKER" terminal (R ch)	"	L202 NMC5-9	Maximum		22
23	"	98MHz (Pilot Sig. 19KHz 10%) Main & Sub Sig. 1KHz L ch 90%	" (R ch)	"	Variable Resistor R223 (10KΩ)	Minimum	Retouch slightly Repeat Steps 23 and 24 as necessary	23
24	"	" R ch 90%	" (L ch)		"	"	"	24

DEMODULATOR ALIGNMENT PROCEDURE

(1) Voltage Controlled Oscillator (V.C.O.) Alignment
(2) 30KHz Level Adjustment
(3) Demodulated Voltage Alignment
(4) Automatic Noise Reduction System (A.N.R.S.) Alignment

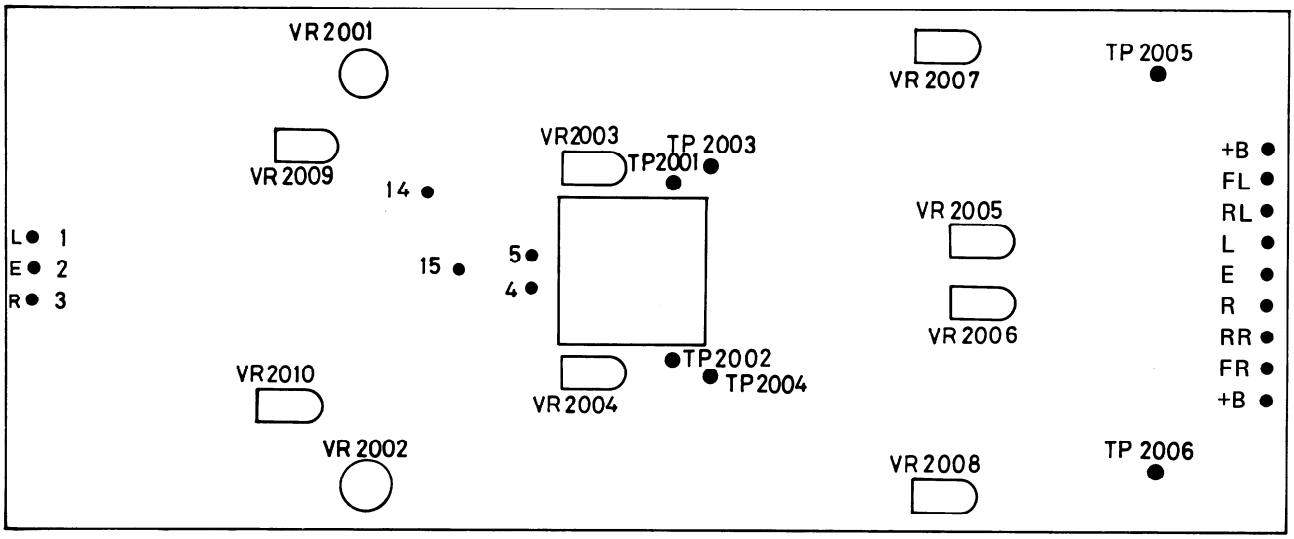
INSTRUMENT REQUIRED

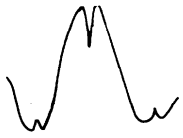
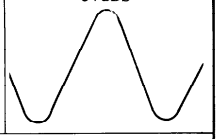
- o CR oscillator
- o SCA signal generator
- o Oscilloscope
- o Vacuum tube voltmeter (V.T.V.M.)
- o Attenuator
- o Test record (4DE–503, RG–1256, RG–1257)



Preliminary

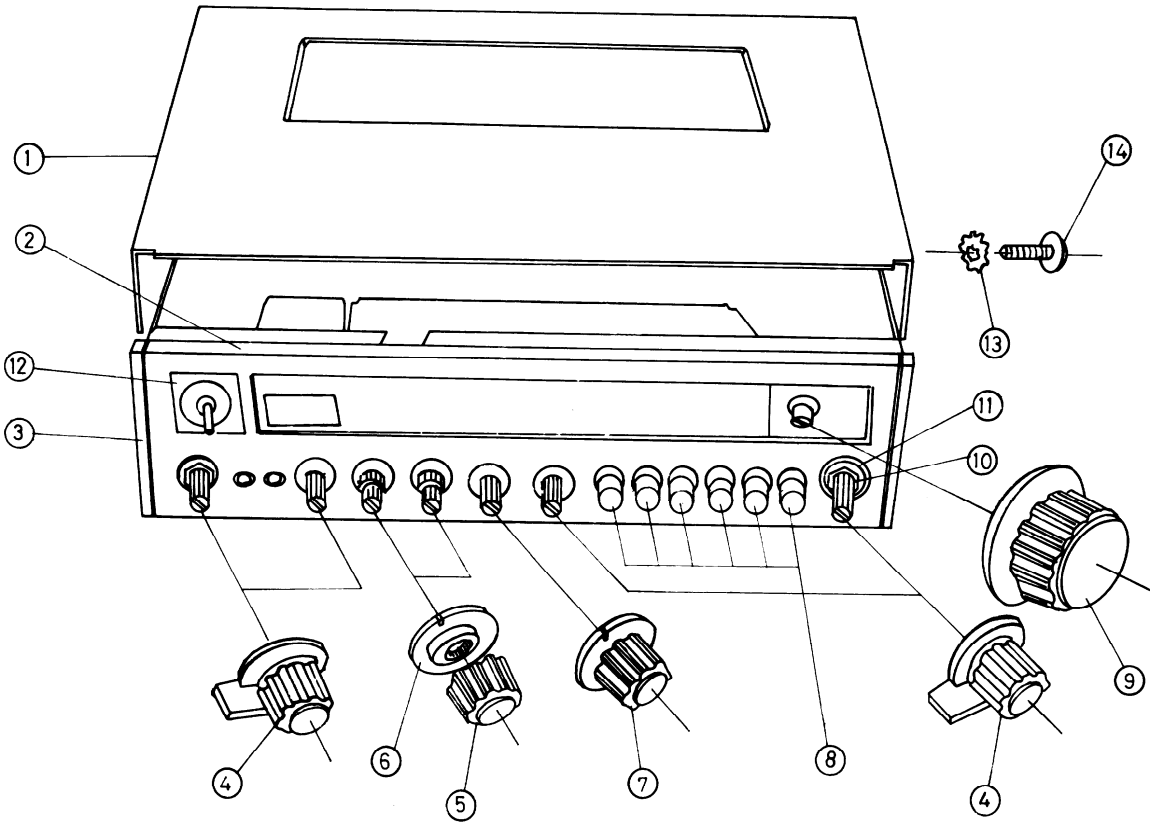
1. Connect instruments.
2. Set the receiver's selector switch to PHONO.
3. Set program mode switch to DISCRETE.
4. Connect lead wire between the junction of pin 15 on the printed circuit board (NADE–240a) and chassis ground. Then MUTING ON works.



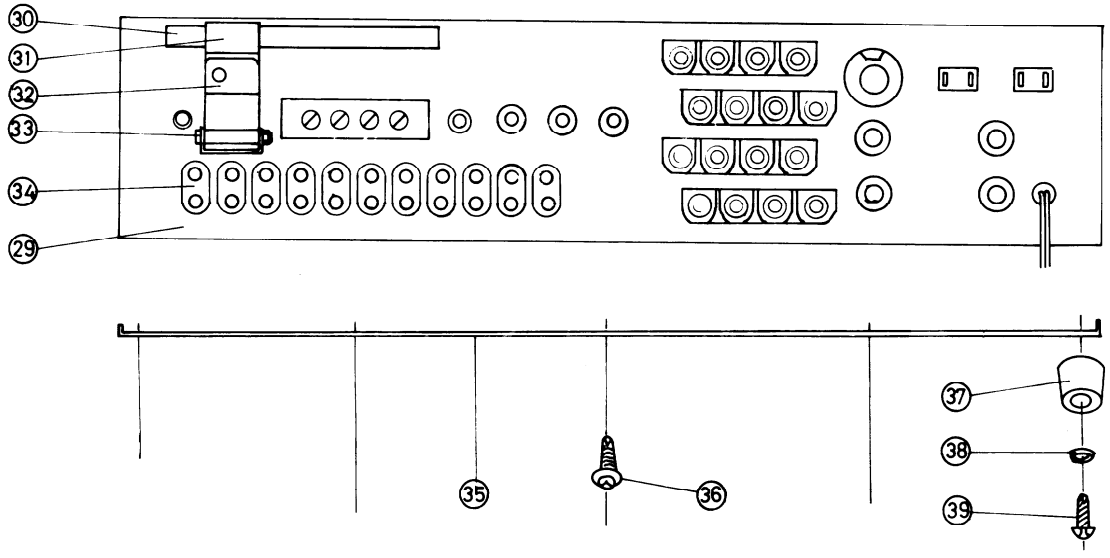
STEP	CONNECT SIGNAL SOURCE TO-	SET SIGNAL TO-		CONNECT OUTPUT INDICATOR TO-	ADJUST	ADJUST FOR	REMARKS
		SCA S.G.	TEST RECORD				
V.C.O. Alignment							
	Tune VCO'S frequency to SCA SG's frequency.						VCO< 30 KHz 
1	PHONO terminal (L)	30KHz −110dBS	RG−1256 Band 9	Oscilloscope to- across TP2003	VR2001 (2.2KB)	Zero beat	VCO = 30 KHz 
2	PHONO terminal (R)			Oscilloscope to- across TP2004	VR2002 (2.2KB)		VCO > 30 KHz 
30KHz Level Adjustment							
3	PHONO terminal (L)	30KHz −57dBS Modulation is 400Hz, deviation is 4KHz.	RG1257 Band 4 & 5 or 4DE503 Side A No 5	Oscilloscope to- across TP2003	VR2009	Just before distorted.	−58dB 
4	PHONO terminal (R)			Oscilloscope to- across TP2004	VR2010		−67dB 
							−57dBS 
Demodulated Voltage Alignment							
5	PHONO terminal (L)	30KHz −50dBS Modulation is 1KHz, deviation is 1.3KHz.	RG1256 Band 8	V.T.V.M. to- across TP2003	VR2003	Output is −15dBS.	
6	PHONO terminal (R)			V.T.V.M to- across TP2004	VR2004		
ANRS Alignment Remove lead wire between the junction of pin 15 and chassis ground.							
7	CR oscillator to- TP2001	15KHz, −25dBS	VTVM to across TP2003 (INPUT INDICATOR)	VTVM to across TP2005	VR2007	−22.5dBS	
8		600Hz −25dBS			VR2005	−23.5dBS	
9	CR oscillator to- TP2002	15KHz −25dBS	VTVM to across TP2004 (INPUT INDICATOR)	VTVM to across TP2006	VR2008	−22.5dBS	
10		600Hz −25dBS			VR2006	−23.5dBS	

MECHANICAL DISASSEMBLIES

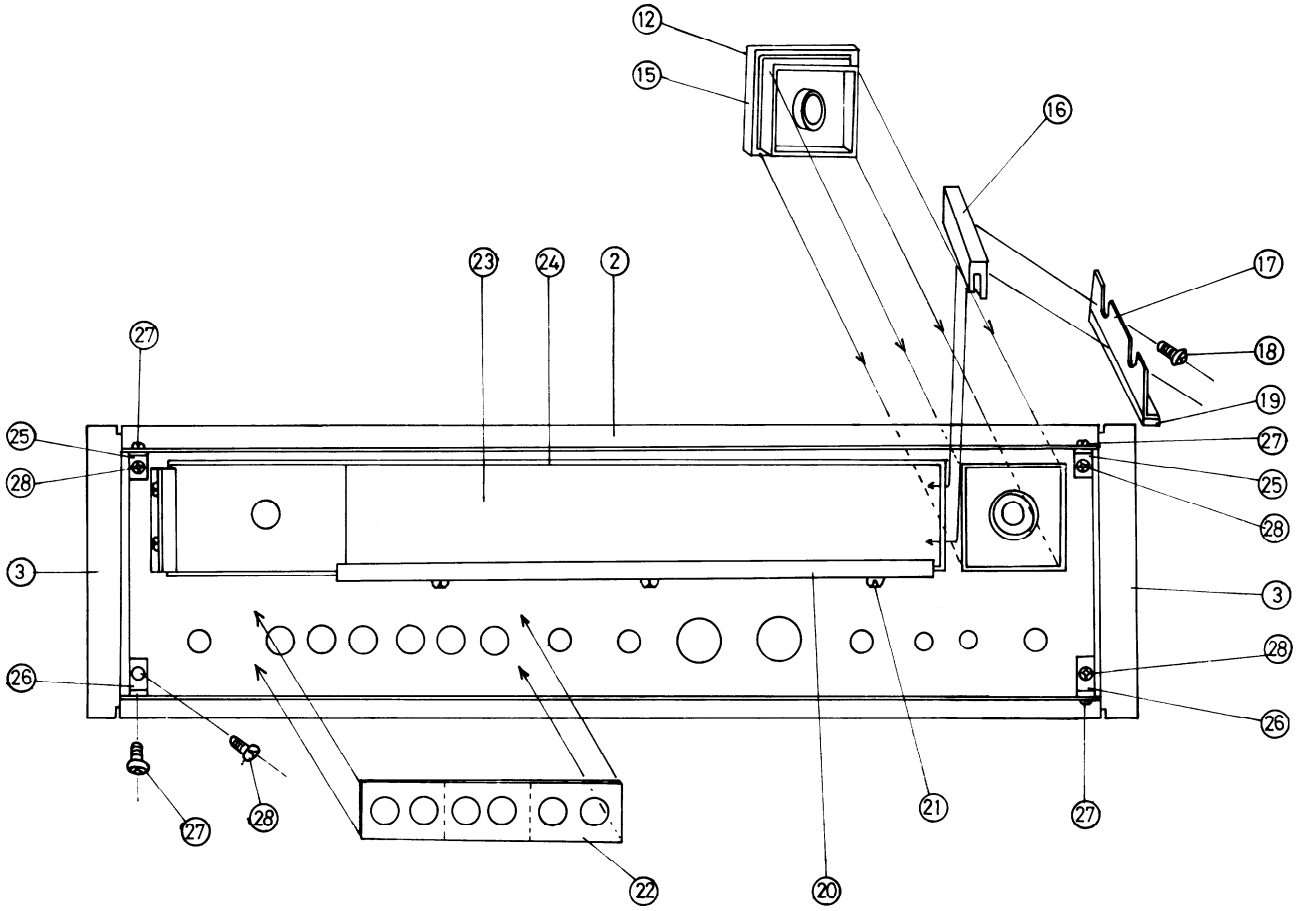
Front View



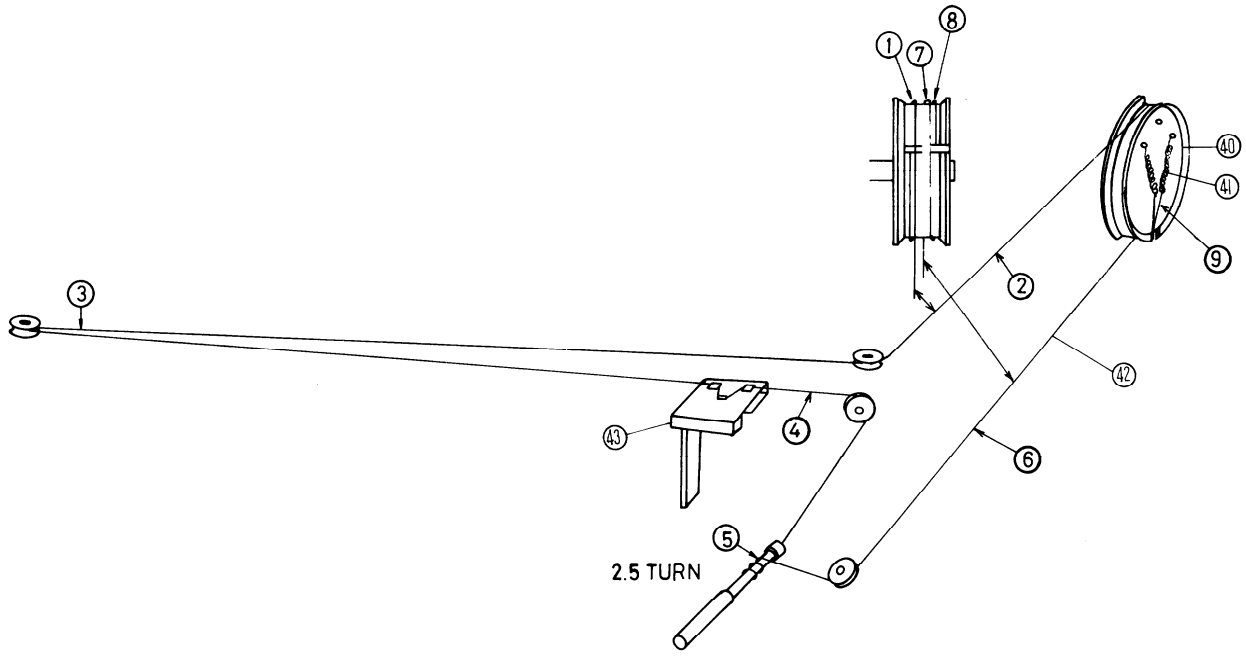
Rear View



Front Panel Rear View



Dial Cord Arrangement



CABINET PARTS LIST

KEY NO.	PARTS NO.	DESCRIPTION	SPECIFICATIONS	Q'TY	STOCK NO.	REMARKS
1	A501	AMP BOX assembly		1	281014-1	
2	A514	Front Panel		1	281016	
3	A515	End Cap		2	280319	
4	A802	Knob-Speaker		4	283056	Speakers Amp mode Program mode Selector
5	A803	Knob-Bass (Small)		2	283053	Bass Treble
6	A804	Knob-Bass (Large)		2	283054-3	Bass Treble
7	A806	Knob-Volume		1	283050	Volume
8	A807	Knob-Push		6	283123	
9	A801	Knob-Tuning		1	283051	Tuning
10	A533	Washer	W3x10F(t=0.5)	2	87619014	
11	A532	Nut	N-9F(P=0.75)	2	8631901	
12	A531	Plate-Balance		1	281018	
13	A503	Toothed lock Washer	M5-AB	4	87555015	
14	A502	Truss Screw	4T+20F-N	4	82454020	
15	A530	Panel-Balance		1	281017	
16	A522	Flame Holder-S		2	280323	
17	A523	Bracket-Flame		2	280339-1	
18	A519	Binder Screw	3B+6F-N	6	82543006	
19	A524	Neoprene Sheet		2	280261	
20	A521	Flame Holder-L		1	280338	
21	A526	Binder Screw	3B+5F-N	7	82513005	
22	A528	Knob Guide		3/2	280502-1	
23	A525	Glass Plate		1	280259-1	
24	A520	Dial Flame		1	280322-1	
25	A516	Joiner-L		2	280352-1	
26	A517	Joiner-B		2	280449	
27	A519	Binder Screw	3B+6F-N	6	82543006	(18)
28	A518	Tapping Screw	3STS+6BQ	4	834130062	
29	A071	Back Panel		1	270778	
30	L001	Coil-Antenna	NMA-2509	1	232025	
31	A072	Antenna Holder		1	270204	
32	A073	Antenna Stay		1	270205	
33	A075	Antenna Screw		1	801112	
34	P809	Jack-Pin	NTM-2WPBL-E1	2	250170	
35	A506	Bottom Cover		1	280951	
36	A510	Tapping Screw	3STW+8BQ	4	831130082	
37	A507	Rubber Cushion		4	280560	
38	A508	Washer	W4x10F	4	87614010	
39	A509	Tapping Screw	4STS+12BQ	4	834140122	
40	A004	Dial Drum		L1	270220-1	
41	A007	Spring-Dial Drum	SP-14A	2	273803	
42	A009	Dial String	Nylon 0.3mm	1.2m	273902	
43	A103	Pointer assembly		1	270535	
	A033	Dial Plate		1	270780	
	A034	Back Plate		1	2670781	
	A037	Drive Shaft		1	270218	

PARTS LIST

PARTS NO.	DESCRIPTION	SPECIFICATION	Q'TY	STOCK NO.	
U1	IF & MPX Amp assembly	NA-IM224d	1	13872524d	
U2	EQ Amp assembly	NAEQ-239a	1	13872539a	
U3	DE Amp assembly	NADE-240a	1	13872540a	
U4	SW Amp assembly	NASW-253	1	13872553	
U5	MT Amp assembly	NAMT-254	1	13872554	
U6	AF Amp assembly	NAAF-252	1	13872552	
U7	PA Amp assembly	NAMA-251R	1	13872551r	
U8	PA Amp assembly	NAMA-251L	1	138725511	
U9	PS Amp assembly	NAPS-250	1	13872550	
U10	DR Amp assembly	NADR-243a	1	13872543a	
U11	FM Front End	FL-322U	1	240005	
D001, D004	Zener Diode	BZ-240	2	223907	
D002, D003	Silicon Diode	10D2	2	223805	
D005	Germanium Diode	1N60FM	1	2231031	
PL801 - PL805	Pilot lamp	6.3V250mA	5	210001	
PL806	Pilot lamp	6.3V0.05AW-3S	1	210016	
PL807 - PL809 PL811 PL810	Pilot lamp	6.3V0.05AW-3	4	210015	
PL812 - PL814	Pilot lamp	6.3V0.05AW-2	4	210014	
T001	Transformer-Power	NPT-564ADGQ	1	230064	
L001	Coil-Antenna	NMA-2509UL	1	232025	
T002	Coil-Balloon	NBLN-1	1	233026	
C002, C003	Capacitor-Electrolytic	CE62W35V4700S-R	2	3504030A	
C004	Capacitor-Electrolytic	CE62W50V470X2S-R	1	3504037A	
C006 C010, C011	Capacitor-Electrolytic	CE02W35W470B	3	351764711A	
C008	Capacitor-Electrolytic	CE02W50V470B	1	351784711A	
R001	Control Resistor Variable	CVS100KW35A	1	5104015A	BALANCE
R016, R017	Resistor Variable	N24R10KB10M	2	5171004	CD-4 ADJUST
R018 (R019)	Resistor Variable	N24RG50KB10M	1	5177003	30KHz LEVEL
S807	Switch-Rotary	NRS-485-30Y-APUL	1	250264	SPEAKERS
S808	Switch-Rotary	NRS-282-30Y-AS	1	250265	AMP MODE
S809	Switch-Rotary	NRS-365-30Y-A	1	250266	PROGRAM MODE
S810	Switch-Rotary	NRS-484-30Y-A	1	250267	SELECTOR
S811	Klixon	9700-26-11	1	252009	
P801, P802	Jack-Stereo Headphone	XG-7716	2	250078	
M101	Tuning Indicator	NIND-0500S32	1	243023	
PL801a, PL805a	Socket Pilot lamp	PLS-G1	5	213002	
F901 - F904	Fuse	3A-T(SS-2)	4	252006	
F905	Fuse	5A-T(ST-2)UL	1	252004	AC110V/120V
F906	Fuse	3A-T(Leadtype)	1	252021	
F905	Fuse	3A			
F901a - F904a	Fuseholder	S-N1301	4	250080	
P-807	Terminal	NTM-4PUNI	1	250136	
P-808	Jack-Pin	NTM-1PBL1-H1	1	250141	
P-809, P-810 P-811 P812, P813	Jack-Pin	NTM-2WPBL-E1 NTM-6WPBL-E1	2 3	250170 250171	

PRINTED MATTER & PACKING

A851	Master Carton Box		1	290461	
A852	Side Pad		2	290458-1	
A853	Amp Cover		1	290460	
A907	Instruction Booklet		1	293226-1	
A902	Warranty Card		1	293036	
A903	Caution Label		1	293041	
A906	Warranty Notes		1	293078	
A910	Silicon Cloth		1	292017	
A911	FM ANT AS	TFD-2US	1	253071	
A912	Polyethylene Bag	230X320	3	290078	
A913	Shorted Pinplug	PO-107	2	250153	
A914	Pinplug (Red)	SQ-4151	4	250091	
A915	Pinplug (Black)	SQ-4152	4	250092	

NAIM-224d

Q101, Q102 Q104 - Q108 Q201 - Q203	Transistor	2SC380(0)	7	2210123	
Q209 - Q210 Q703 - Q705	Transistor	2SC733(GR)	8	2210085	
Q205 - Q208 Q701 - Q702	Transistor	2SC733(BL)	6	2210086	
Q204	Transistor	2SC945(Q1)	1	2210355	
Q103	IC	TA-7061AP	1	222402	
D101, D102 D112, D113 D116 - D119 D201, D202 D701	Germanium Diode	1N60(N)FM	12	2231031	

PARTS NO.	DESCRIPTION	SPECIFICATION	Q'TY	STOCK NO.	
D105, D106 D120, D121	Silicon Diode	1S1555	4	223105	
L101, L102	Coil-Choke	NCCH-1504	2	233040	
L105	Transformer-IFT	NET-3503R	1	233022	
L106	Transformer-IFT	NIT-5501D	1	232012	
L107	Coil-OSC	NMO-2503	1	232013	
L201	Coil-MPX	NMC-4-10	1	233017	
L202	Coil-MPX	NMC-5-9	1	233019	
L203, L204	Coil-MPX	NMC-8-5	2	233021	
L205	Coil-MPX	NMC-4-11-A	1	233041	
L701	Coil-MPX	NMC-4-11	1	233018	
C119, C151	Capacitor-Electrolytic	CE04W25V4.7S	2	352750471A	
C122	Capacitor-Electrolytic	CE04W16V33S	1	352743301A	
C123	Capacitor-Electrolytic	CE04W6.3V200S	1	352722011A	
C128, C150 C208, C215	Capacitor-Electrolytic	CE0.W50V0.47S	4	352784791A	
C142	Capacitor-Electrolytic	CE04W16V100S	1	352741011A	
C201, C206	Capacitor-Electrolytic	CE04W50V1S	2	352780101A	
C207	Capacitor-Electrolytic	CE04W16V22S	1	352742201A	
C705	Capacitor-Electrolytic	CE04W16V10S	1	352741001A	
R223	Resistor-Semi Fixed	R-HK10KB3L	1	5225002	
R713	Resistor-Semi Fixed	R-HK100KB3L	1	5225003	
X101 - X103	Ceramic Filter	SFE-10.7MA	3	3010003	
X104	Ceramic Filter CFZ 455C 3712	SFE-455C	1	3010004	WITH CERAMIC FILTERS
Z101 - Z103	CR Composite	B44TS-1	3	3020001	

NAEQ-239a

Q401 - Q408	Transistor	2SC1000(GR)	8	2210285	
C401, C402 C421, C422	Capacitor-Electrolytic	CE04W50V1S	4	352780101A	
C407, C408 C425, C426	Capacitor-Electrolytic	CE04W50V4.7S	4	352780471A	
C409, C410 C427, C428 C431, C432	Capacitor-Electrolytic	CE04W16V10S	6	352741001A	
C411, C412	Capacitor-Electrolytic	CE04W25V47S	2	352754701A	
	Low Pass Filter	NDE-4-1	1	233038	

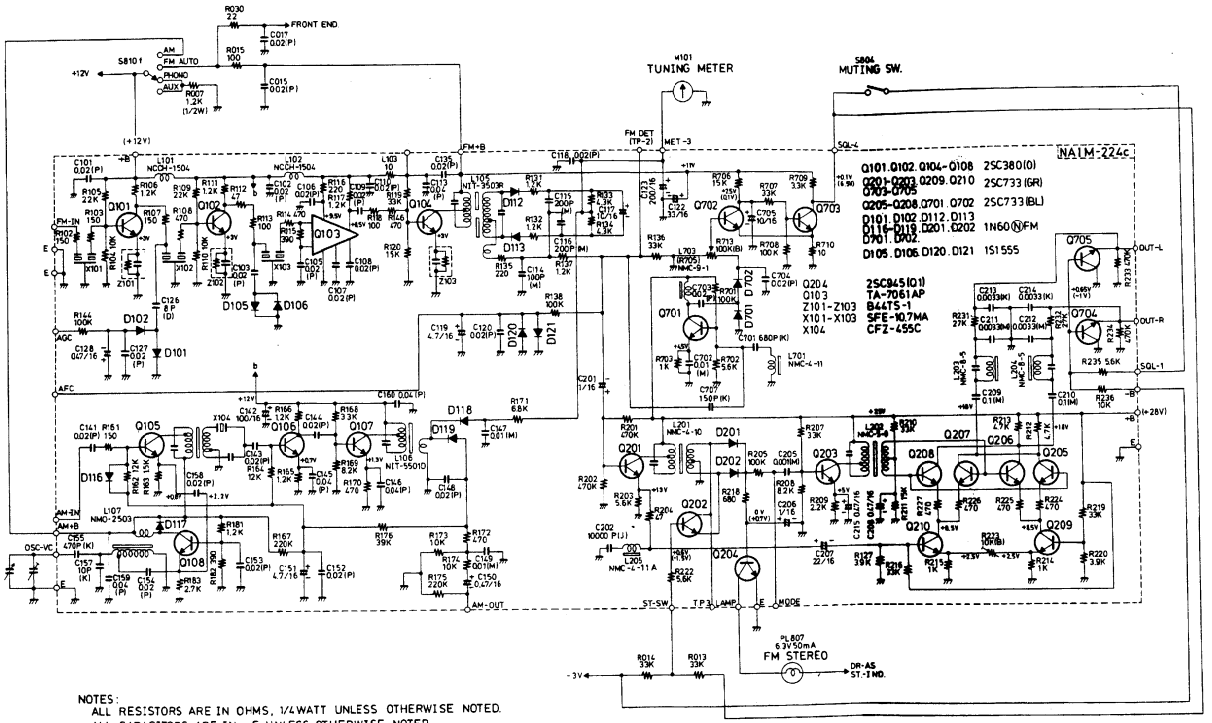
NADE-240a

Q2025 - Q2031 Q2001, Q2002 Q2009, Q2010 Q2017, Q2018 Q2021, Q2022	Transistor	2SC732(BL)	15	2210046-1	
Q2011 - Q2016 Q2003, Q2004	Transistor	2SC1000(GR)	6	2210285	
Q2019, Q2020 Q2023, Q2024	Transistor	2SK30(Y)	6	2210274	
Q2005 - Q2008	Transistor	2SA495(Y)	4	2210404	
Q2032	Transistor	2SA561(Y)	1	2210074	
IC2001, IC2002	IC	CD-894	2	222403	
D2001 - D2004 D2014	Silicon Diode	1s1555	5	223105	
D2005 - D2012 D2015 - D2018	Germanium Diode	1N60(N)FM	12	2231031	
D2013	Zenor Diode	BZ-120	1	223918	
F2001	Low Pass Filter	NDE-4-1	1	233038	
L2001, L2002	Low Pass Filter	NDE-5-1	2	233039	
C2009, C2010 C2017, C2018 C2043, C2044	Capacitor-Electrolytic	CE04W50V1S	6	352780101A	
C2025, C2026 C2083 C2029, C2030	Capacitor-Electrolytic	CE04W50V0.47S	3	352784791A	
C2045 - C2048 C2075, C2076 C2089, C2090	Capacitor-Electrolytic	CE04W25V4.7S	10	352750471	
C2077 - C2079 C2086	Capacitor-Electrolytic	CE04W25V10S	4	352751001A	
C2063, C2064 C2085	Capacitor-Electrolytic	CE04W25V33S	3	352753301A	
C2080	Capacitor-Electrolytic	CE04W16V100S	1	352741011A	
C2041, C2042	Capacitor-Aluminium	AL04B25V0.68MS	2	392156897	
C2019, C2020	Capacitor-Aluminium	AL04B25V2.2MS	2	392150227	
C2059, C2060	Capacitor-Aluminium	AL04B25V0.22MS	2	392152297	
C2015, C2016	Capacitor-Plastic	SP04C25V-10XS	2	392251009	
VR2001, VR2002	Resistor-Semi Fixed	R-HK2.2KB	2	5225005	
VR2003, VR2004	Resistor-Semi Fixed	R-HK5KB3P	2	5225010	
VR2005-VR2008	Resistor-Semi Fixed	R-HK20KB3P	4	5225011	
VR2009, VR2010	Resistor-Semi Fixed	R-HK10KB3P	2	5225012	
S2001, S2002	Socket-IC	NICS-14PS	2	250179	

PARTS NO.	DESCRIPTION	SPECIFICATION	Q'TY	STOCK NO.	
NASW-253					
S801 – S806	Switch-Push	NPS-142LA2	6	250262	
NAMT-254					
Q301, Q302 Q304, Q305 Q307	Transistor	2SC1000(GR)	9	2210285	
Q322 – Q325					
Q309 – Q317	Transistor	2SC1000(BL)	9	2210286	
Q303, Q306	Transistor	2SK30(Y)	2	2210274	
Q318 – Q320	Transistor	2SA493(GR)	3	2210235	
Q326	Transistor	2SC734(Y)	1	2210064	
D301 – D312	Germanium Diode	1N60(N)FM	12	2231031	
D313	Silicon Diode	10D2	1	223805	
C301, C302 C376 – C379	Capacitor-Aluminium	AL04B25V0.47MS	6	392154797	
C360, C361 C305, C306 C309, C310 C322 – C335 C338 – C343	Capacitor-Electrolytic	CE04W50V1S	15	352780101A	
C336, C337	Capacitor-Electrolytic	CE04W50V0.47S	2	352784791A	
C352, C353 C372 – C375	Capacitor-Electrolytic	CE04W50V3.3S	6	352780331	
C329	Capacitor-Electrolytic	CE04W25W220S	1	352752211A	
C314	Capacitor-Electrolytic	CE04W16V47S	1	352744701A	
C313	Capacitor-Electrolytic	CE04W16V10S	1	352741001A	
C358, C359 C362, C363	Capacitor-Electrolytic	CE04W25V4.7S	4	352750471A	
C350, C351	Capacitor-Electrolytic	CE04W6.3V100S	2	352721011A	
C366, C367	Capacitor-Electrolytic	CE02W50V1B	2	351780101	
R1302	Resistor-Semi Fixed	R-HK 2.2KB	1	5225005	
	Relay	NRL4P1A-DC12	1	250255	
NAAF-252					
Q501 – Q508	Transistor	2SC1000(GR)	8	2210285	
Q509, Q510	Transistor	2SC1000(BL)	2	2210286	
C501 – C504 C509 – C512	Capacitor-Aluminium	AL04B6.3V2.2MS	4	392120227	
C551, C552 C555, C556	Capacitor-Electrolytic	CE04W50V3.3S	8	352780331A	
C525 – C528 C533 – C536	Capacitor-Electrolytic	CE04W50V1S	8	352780101A	
C541, C557	Capacitor-Electrolytic	CE04W25V220S	2	352752211A	
C547, C548	Capacitor-Electrolytic	CE04W25V4.7S	2	352750471A	
R501	Resistor-Variable	N24RQL250KBT30	1	5174004	4 gang Volume
R529 – R533	Resistor-Variable	N24RKL100KB3020H	2	5104014	4 gang Bass Treble
NAMA-251R & L					
Q601R,L Q1601R,L	IC	STK-032	4	222003	
C601R,L C1601R,L	Capacitor-Electrolytic	CE04W25V4.7S	4	35270471A	
C605R,L C607R,L C1605R,L C1607R,L	Capacitor-Electrolytic	CE04W35V10S	8	352761001A	
C609R,L C610R,L C1609R,L C1610R,L	Capacitor-Electrolytic	CE04W25V47S	8	352754701A	
NADR-243a					
Q801	Transistor	2SC734(Y)	1	2210064	
Q802	Transistor	2SA495(Y)	1	2210404	
Q803	Transistor	2SD234(Y)	1	2200020	
D801, D802 D805, D806	Diode-Cilicon	10D2	4	223805	
D803	Diode-Zener	WZ-192	1	223927	
C805	Capacitor-Electrolytic	CE04W25V1000S	1	352751021A	
C806	Capacitor-Electrolytic	CE04W10V2200S	1	352732221A	
C807	Capacitor-Electrolytic	CE02W50V1B	1	351780101	
NAPS-250					
Q901	Transistor	2SD234(Y)	1	2200020	
D901, D902	Diode-Silicon	S5151	2	223819	
D903, D904	Diode-Silicon	10D2	2	223805	
D905	Diode-Zener	WZ-310	1	223909	
D907	Diode-Zener	WZ-120	1	223910	
D906	Diode-Zener	BZ-240	1	223907	
C903	Capacitor-Electrolytic	CE04W35V470S	1	352764711A	
C911	Capacitor-Electrolytic	CE04W25V220S	1	352752211A	
C905	Capacitor-Electrolytic	CE04W16V100S	1	352741011A	

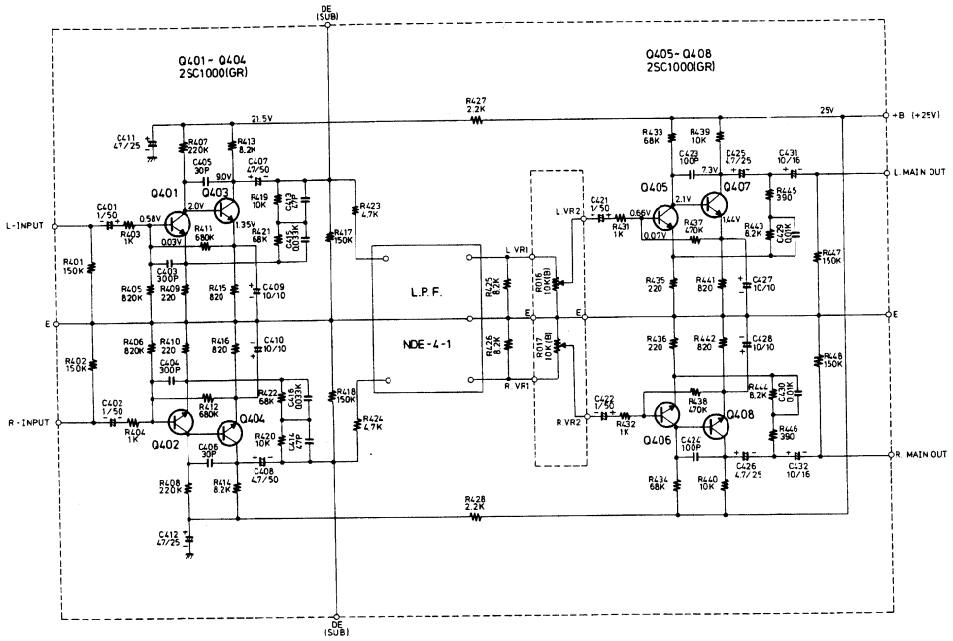
CIRCUIT DIAGRAM and
CIRCUIT BOARD-COMPONENT LOCATION

NAIM-224d(IF&MRX Amp assembly)



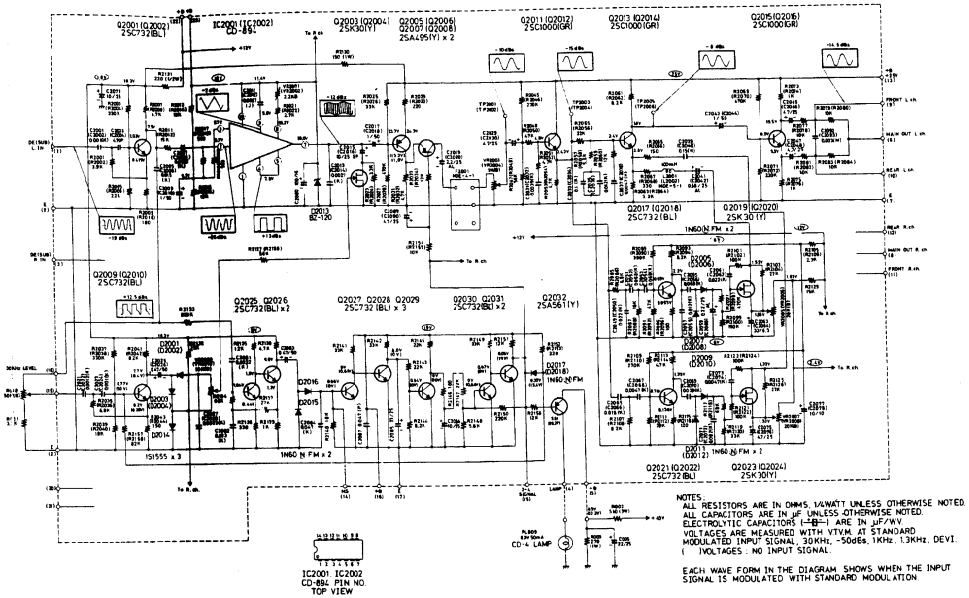
NOTES:
ALL RESISTORS ARE IN OHMS, 1/4WATT UNLESS OTHERWISE NOTED.
ALL CAPACITORS ARE IN μF UNLESS OTHERWISE NOTED.
ELECTROLYTIC CAPACITORS (⊣⊢) ARE IN μF/WV.
VOLTAGES ARE MEASURED WITH V.T.V.M. AT NO INPUT SIGNAL.
( ) VOLTAGES; FM STEREO.

NAEQ-239a(Equalizer Amp assembly)



NOTES:
ALL RESISTORS ARE IN OHMS, 1/4WATT UNLESS OTHERWISE NOTED.
ALL CAPACITORS ARE IN μF UNLESS OTHERWISE NOTED.
ELECTROLYTIC CAPACITORS (-⫫-) ARE IN μF/WV.
VOLTAGES ARE MEASURED WITH V.T.V.M AT NO INPUT SIGNAL.

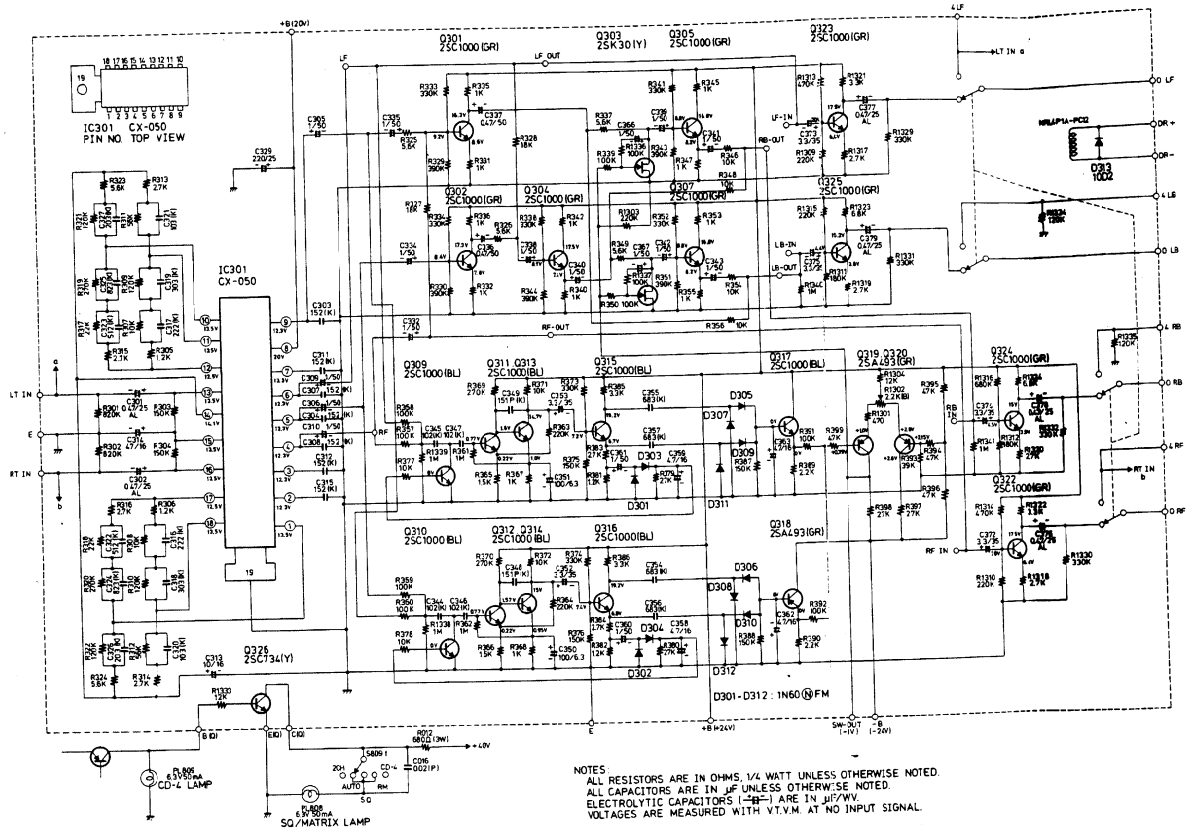
NADE-240a(Demodulator Amp assembly)



NOTES:
ALL RESISTORS ARE IN OHMS, 1/4WATT UNLESS OTHERWISE NOTED.
ALL CAPACITORS ARE IN μF UNLESS OTHERWISE NOTED.
ELECTROLYTIC CAPACITORS (-⫫-) ARE IN μF/WV.
VOLTAGES ARE MEASURED WITH VTVM AT STANDARD MODULATED INPUT SIGNAL, 30KHz, -50dBs, 1KHz, 13KHz, DEVI.
( ) VOLTAGES : NO INPUT SIGNAL.

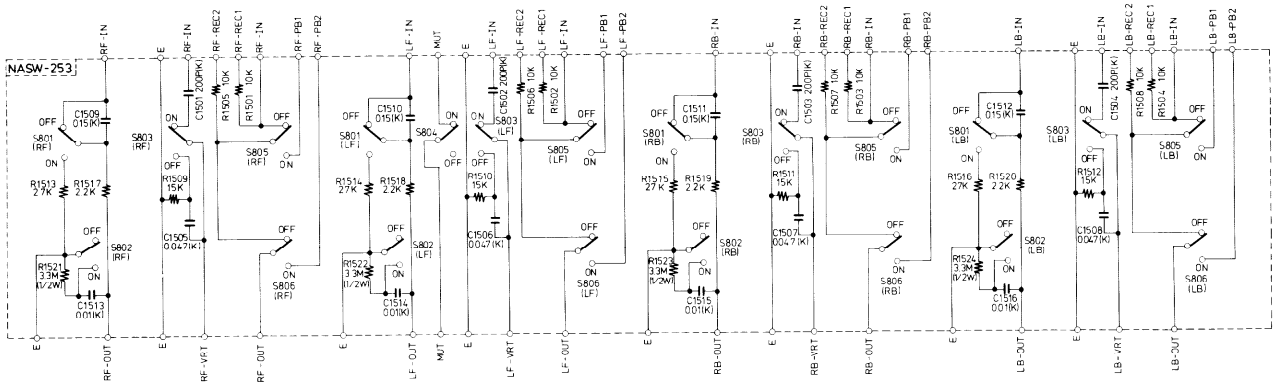
EACH WAVE FORM IN THE DIAGRAM SHOWS WHEN THE INPUT SIGNAL IS MODULATED WITH STANDARD MODULATION

NAMT-254(Matrix Amp assembly)



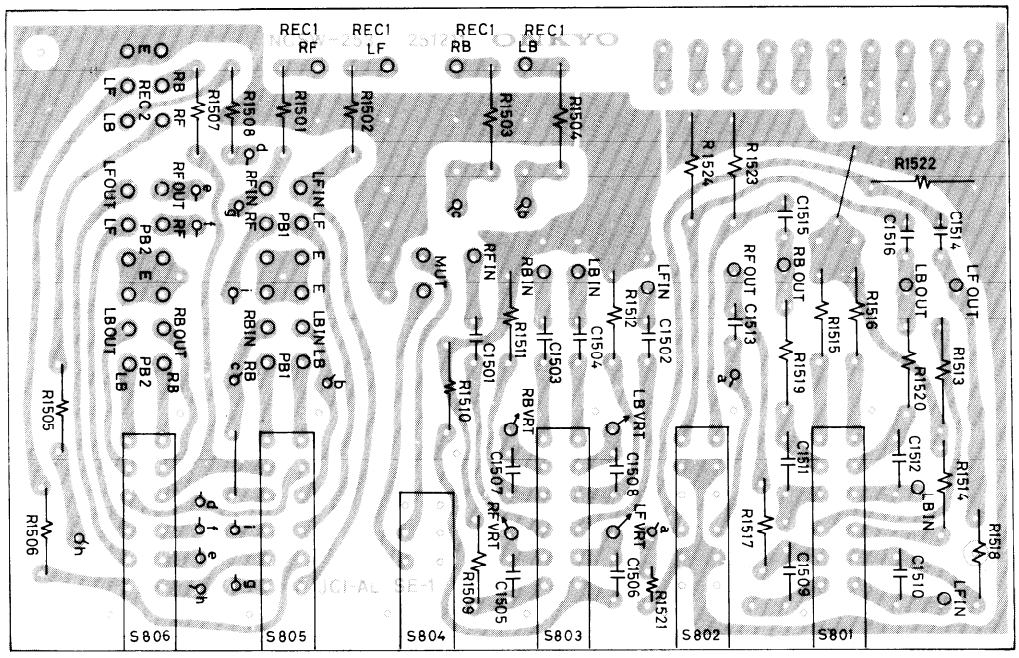
NOTES:
ALL RESISTORS ARE IN OHMS, 1/4 WATT UNLESS OTHERWISE NOTED.
ALL CAPACITORS ARE IN μF UNLESS OTHERWISE NOTED.
ELECTROLYTIC CAPACITORS (—⊕—) ARE IN μF/WV.
VOLTAGES ARE MEASURED WITH V.T.V.M. AT NO INPUT SIGNAL.

NASW-253(Switch assembly)

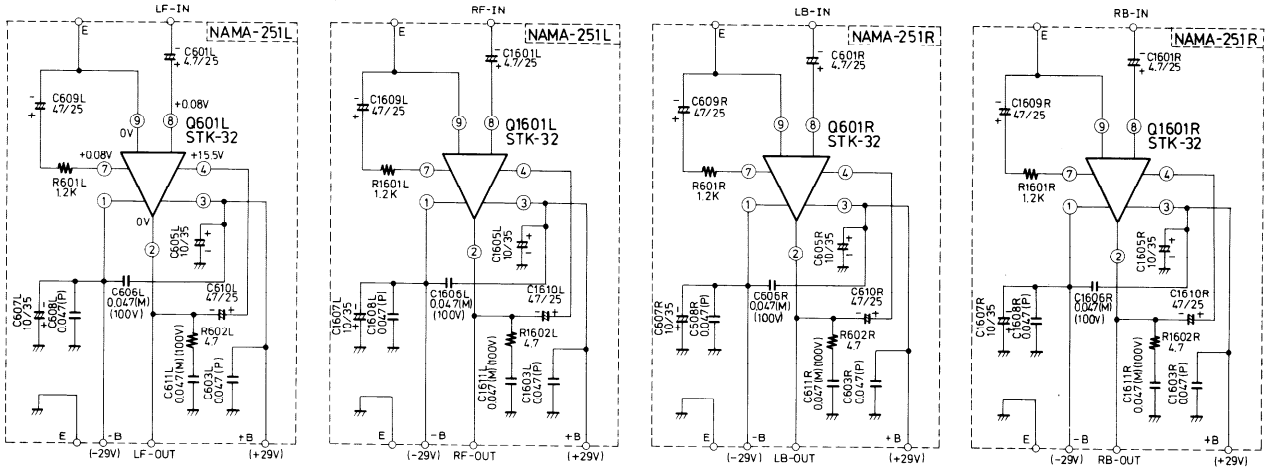


NOTES:
ALL RESISTORS ARE IN OHMS, 1/4WATT UNLESS OTHERWISE NOTED.
ALL CAPACITORS ARE IN μF UNLESS OTHERWISE NOTED.

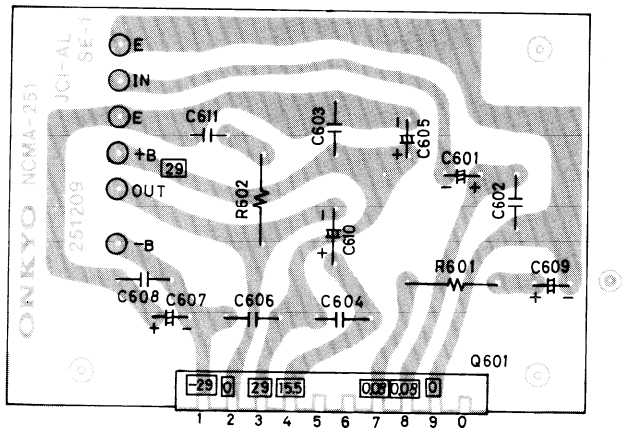
SWITCH
S801 (LOW FILTER)
S802 (HIGH FILTER)
S803 (LOUDNESS)
S804 (MUTING)
S805 (TAPE MONITOR) OFF - SOURCE ON - TAPE 1
S806 (TAPE MONITOR) OFF - SOURCE ON - TAPE 2



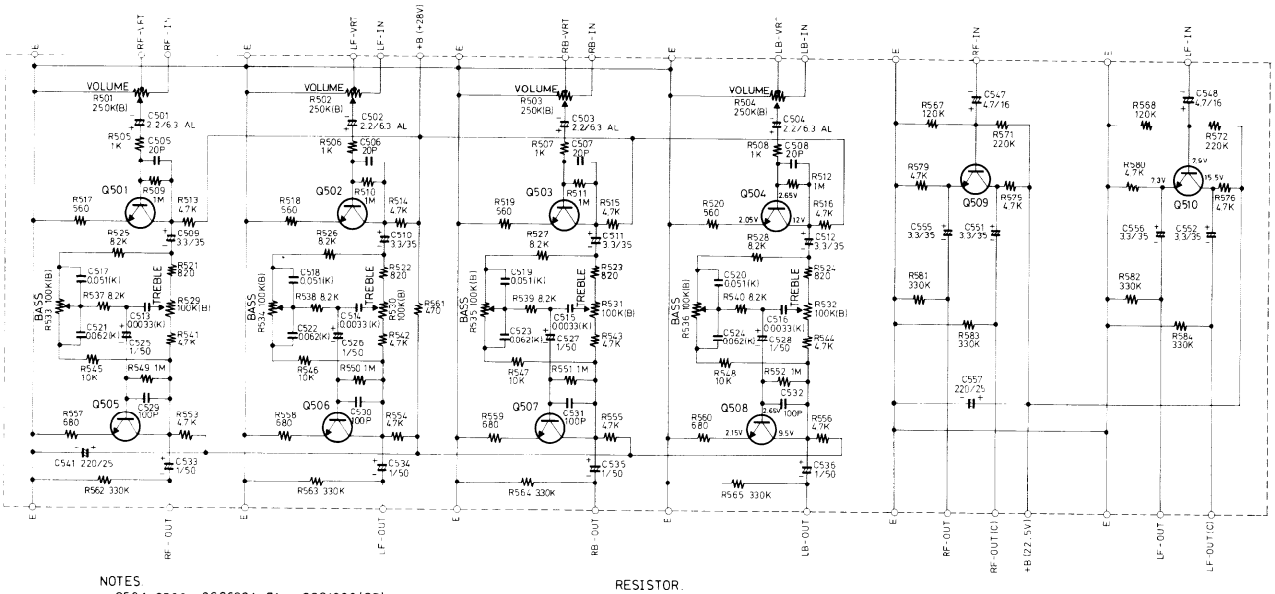
NAMA-251R,L(Power Amp assembly)



NOTES:
ALL RESISTORS ARE IN OHMS, 1/4WATT UNLESS OTHERWISE NOTED.
ALL CAPACITORS ARE IN μF UNLESS OTHERWISE NOTED.
ELECTROLYTIC CAPACITORS (+ −) ARE IN μF/WV
VOLTAGES ARE MEASURED WITH V.T.V.M AT NO INPUT SIGNAL.



NAAF-252(Pre-Amp assembly)



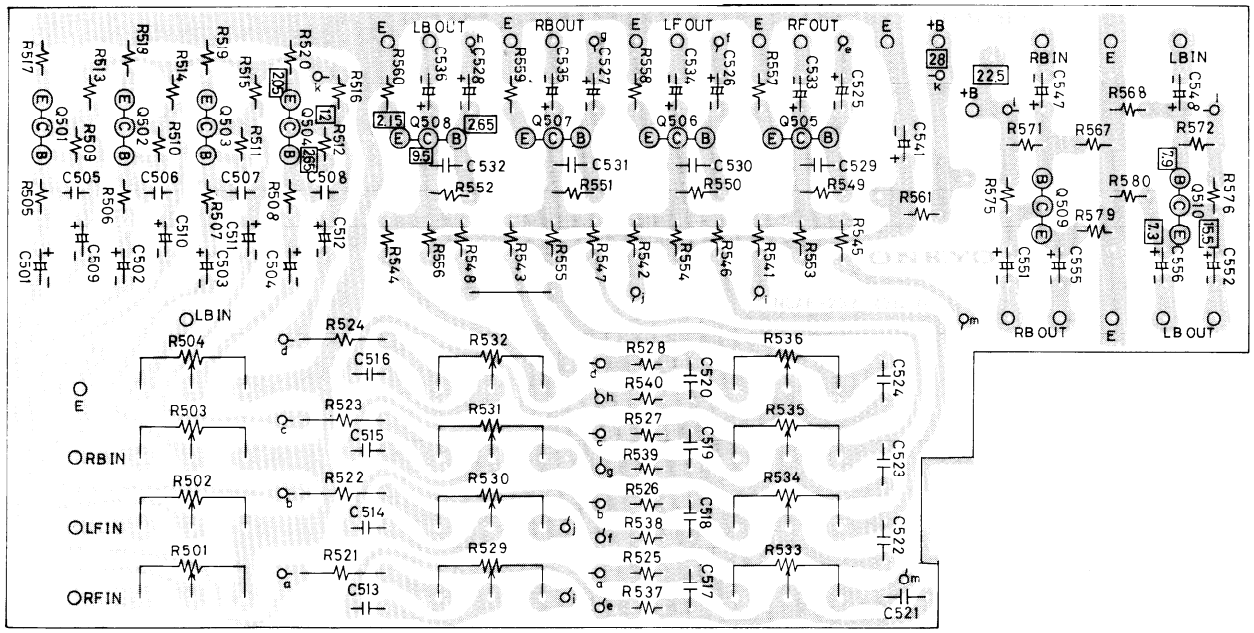
NOTES

Q501-Q508 : 2SC632A-71 or 2SC1000(GR)
Q509 Q510 : 2SC1000(BL)

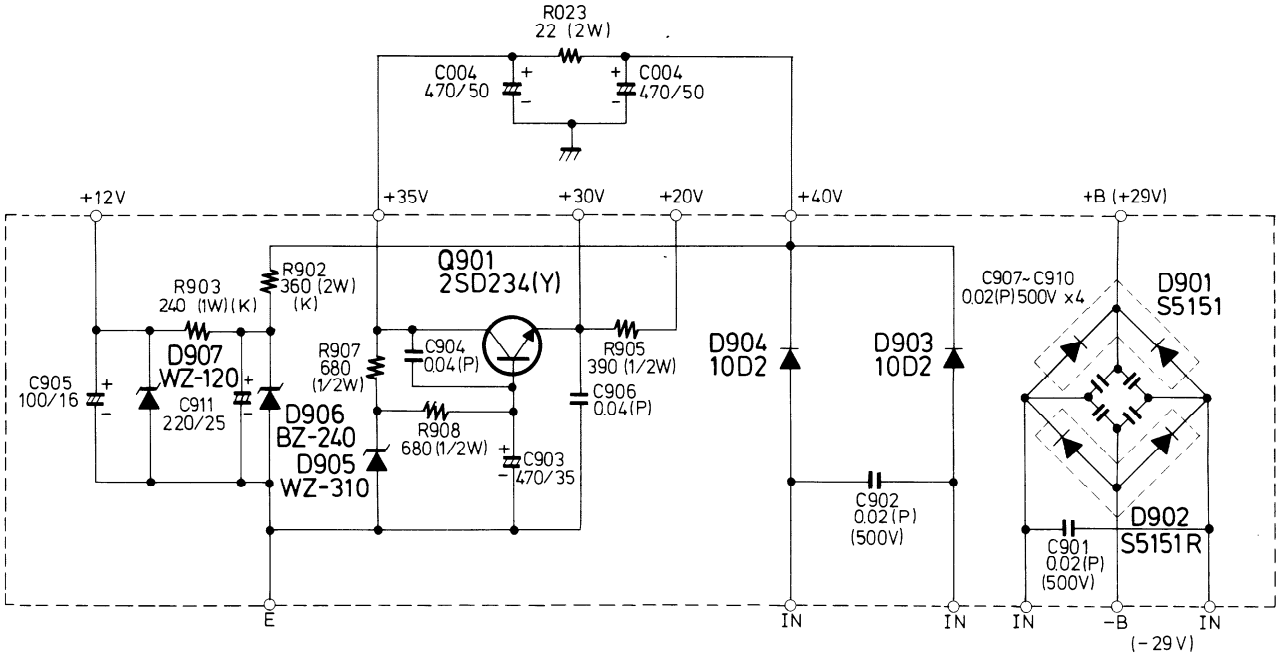
ALL RESISTORS ARE IN OHMS, 1/4WATT UNLESS OTHERWISE NOTED.
ALL CAPACITORS ARE IN μF UNLESS OTHERWISE NOTED.
ELECTROLYTIC CAPACITORS (-|(+)|-) ARE IN μF/WV.
VOLTAGES ARE MEASURED WITH V.T.V.M AT NO INPUT SIGNAL.

RESISTOR

R501-R504 (VOLUME)	250K(B)
R529-R532 (TREBLE)	100K(B)
R533 R536 (BASS)	100K(B)

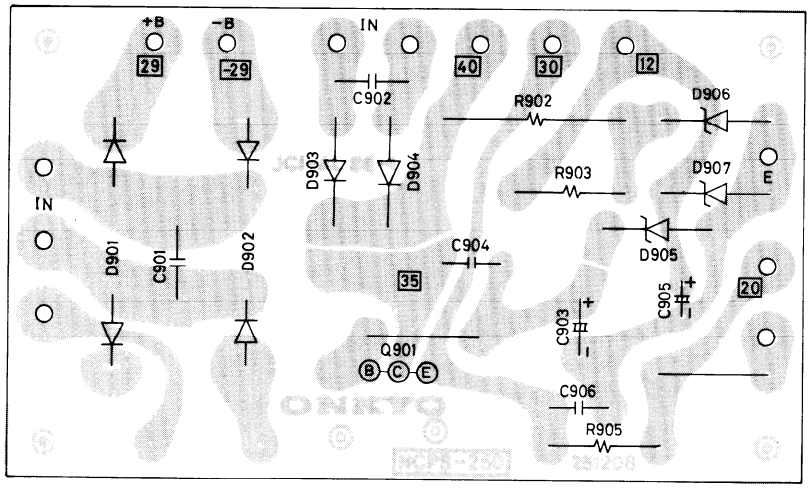


NAPS-250(Power Supply assembly)

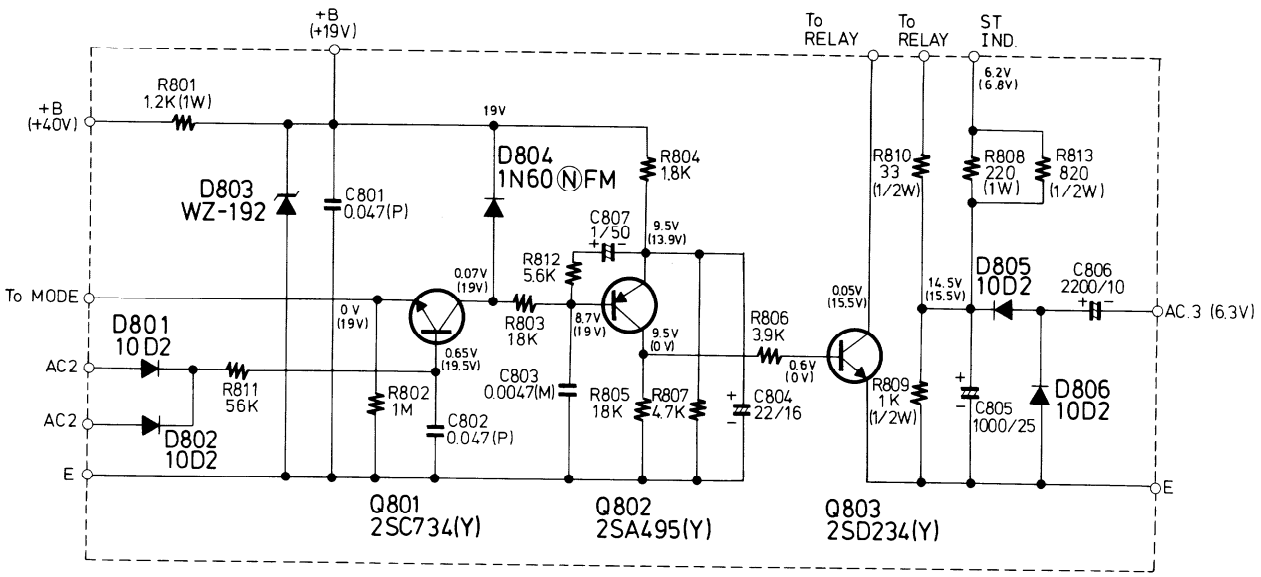


NOTES :

ALL RESISTORS ARE IN OHMS, 1/4WATT UNLESS OTHERWISE NOTED.
ALL CAPACITORS ARE IN μF UNLESS OTHERWISE NOTED.
ELECTROLYTIC CAPACITORS (—|(+)|—) ARE IN μF/WV.
VOLTAGES ARE MEASURED WITH V.T.V.M AT NO INPUT SIGNAL.



NADR-243a(Drive Amp for Matrix Relay)



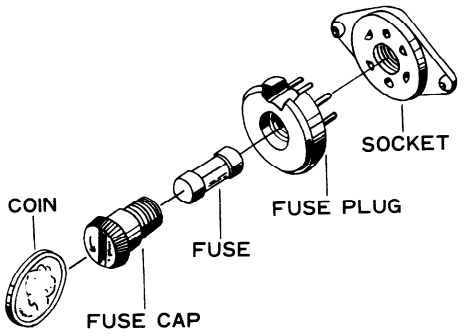
NOTES:
ALL RESISTORS ARE IN OHMS, 1/4WATT UNLESS OTHERWISE NOTED.
ALL CAPACITORS ARE IN μF UNLESS OTHERWISE NOTED.
ELECTROLYTIC CAPACITORS (⊣⊢) ARE IN μF/WV.
VOLTAGES ARE MEASURED WITH V.T.V.M AT PROGRAM MODE-CD-4.
( )VOLTAGES : AT PROGRAM MODE-2CH.

LINE VOLTAGE AND FUSE

The model TS–500 operates on one of the four line voltages, 110V, 120V, 220V and 240V. Set the unit to the proper line voltage by following the procedure described below.

CHANGING LINE VOLTAGE SETTING AND FUSE

Turn the fuse cap located on the line voltage selector counter-clockwise.
Then remove the fuse plug from the unit. Put the fuse plug back so that the proper line voltage mark can be seen through the cut on the edge of the plug.
Whenever the position of the selector is changed, check the rating of the fuse. A 3.0A fuse is for 220V or 240V operation and a 5.0A fuse for 110V or 120V operation.



FUSE REPLACEMENT

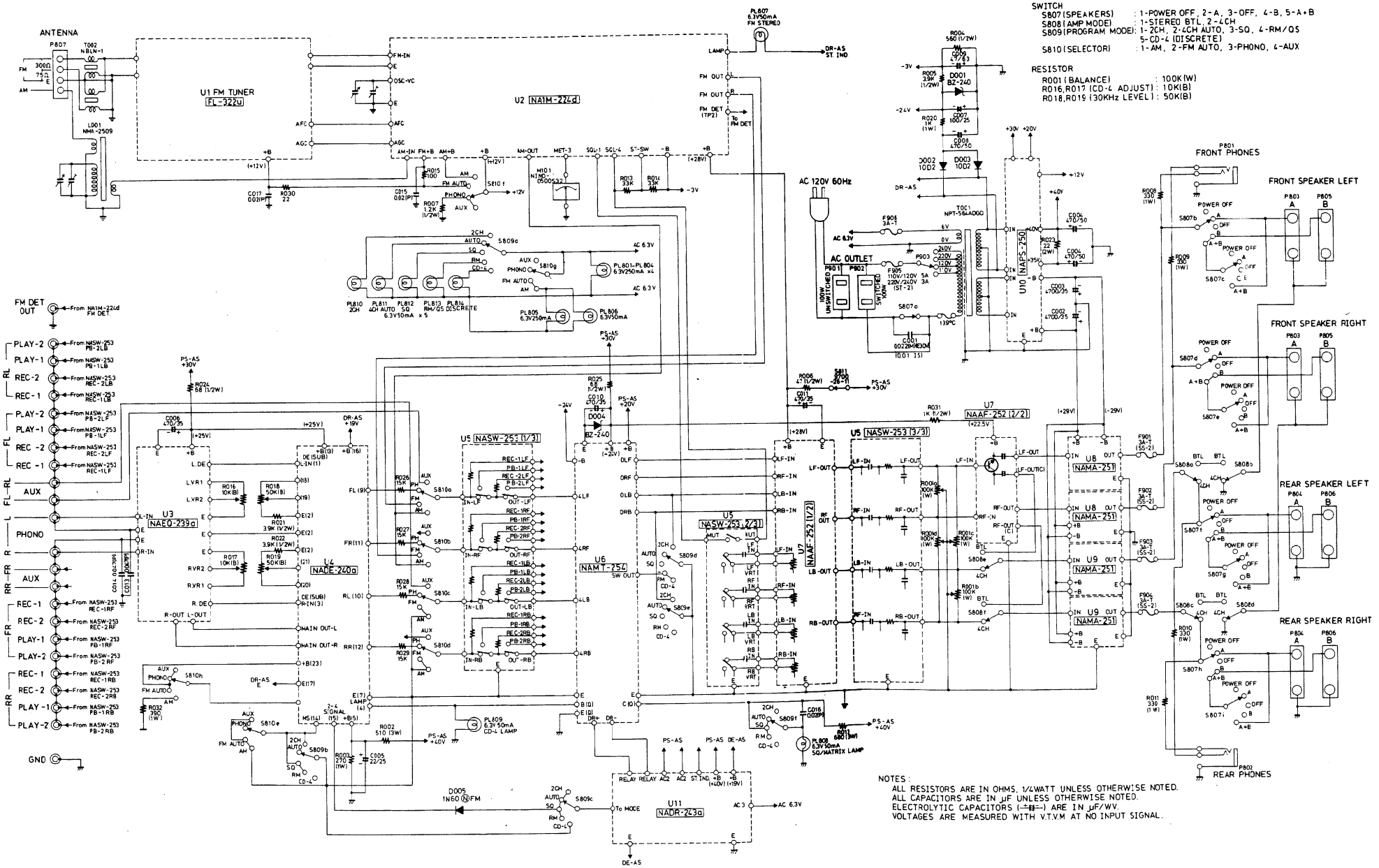
When the fuse has blown, remove the fuse cap and replace the fuse with new one. See Fig. 1.
The fuses are as follows.

AC fuse	3A–T(ST–2)UL(220/240V)
	5A–T(ST–2)UL(110/120V)
Pilot lamp fuse	3A–T(lead type)UL
Speaker fuse	3A–T(SS–2)UL

REPLACEMENT OF THE POWER IC.

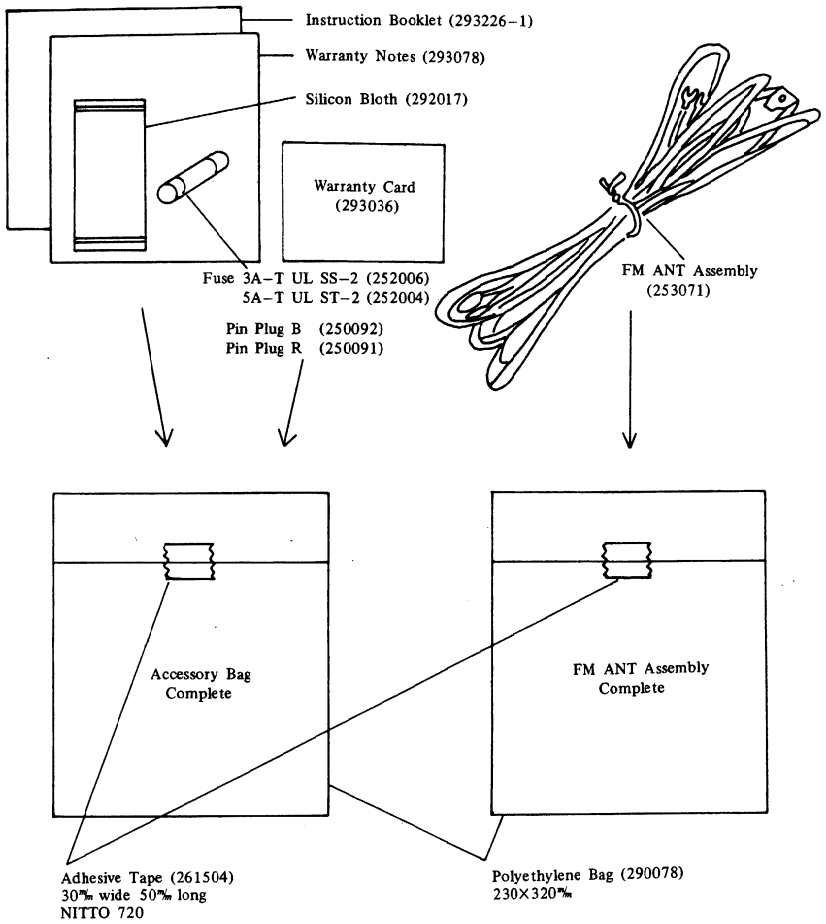
1 Take off the Back Panel. (off 4 screws)
2 Take off the Heat Sink.
3 Replace the Power IC.

CIRCUIT DIAGRAM



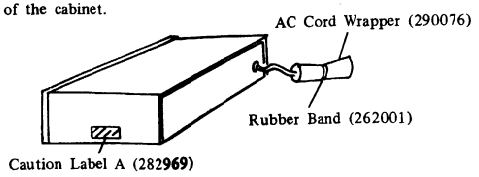
PACKING PROCEDURE

Complete instruction bookletes and others.
Put the following things as illustrated in the polyethylene bag and stick the tape on the polyethylene bag each.

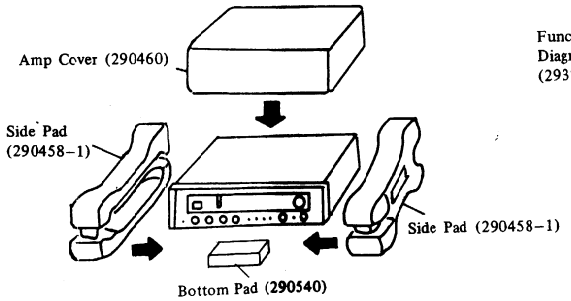


* In case of TX-220 universal type, see page 16.

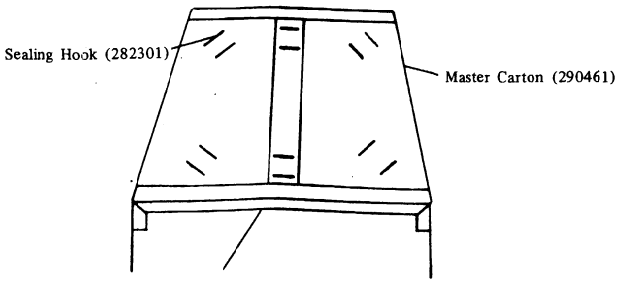
1. Wrap the AC cord with the AC cord wrapper and pass the rubber band round the AC cord wrapper.
2. Stick the caution label on the right side of the cabinet.



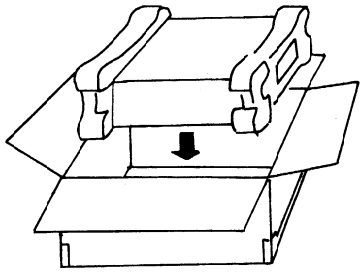
3. Cover the set with the Amp cover (polyethylene) and fix the side pad.



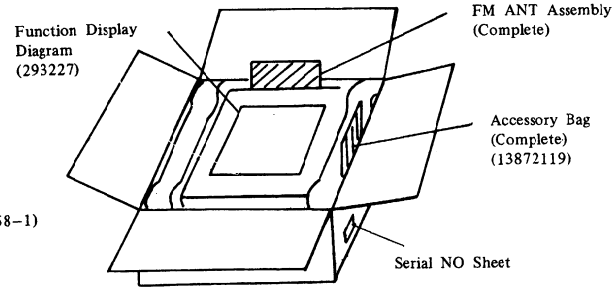
4. Fix the flap of the bottom of the master carton with sealing hooks and stick the tape on the bottom.



5. Put the set in the master carton and match the front mark of the carton and the front of the set.



6. Put the accessory bag (Complete), FM ANT Assembly (Complete) and a sheet of Function Display Diagram, before shutting the flap of the carton. Then stick two sheets of Serial NO Sheet both sides.



7. Shut the flap of the carton and stick the tape.