

ONKYO SERVICE MANUAL

SYNTHESIZED FM STEREO/AM TUNER MODEL T-401



Black and Silver models

BHMDN, BHMD	120V AC, 60 Hz
BHMP, MP	230V AC, 50Hz
BHMW	120/220 V AC, 50/60Hz
BHMQA	240V AC, 50 Hz

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK Δ ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

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ONKYO
AUDIO COMPONENTS

SPECIFICATIONS

FM:

Tuning Range:	87.9-107.9MHz(200kHz steps: U.S.A model) 87.5-108.0MHz(50kHz steps: European model) 87.9-107.9MHz(200kHz steps) or 87.5-108.0MHz(50kHz steps) (Worldwide model)
Usable Sensitivity:	Mono: 11.2dBf, 1.0 μ V IHF 0.9 μ V 75ohms DIN Stereo: 2.0 μ V 75ohms Mono: 11.2dBf, 2.0 μ V IHF (120V model) Stereo: 17.2dBf, 4.0 μ V (120V model)
50dB Quieting Sensitivity:	Mono: 1.7 μ V 75ohms Stereo: 1.7 μ V 75ohms Mono: 16.1dBf, 3.5 μ V (120V model) Stereo: 36.1dBf, 35 μ V (120V model)
Capture Ratio:	1.5dB
Image Rejection Ratio:	40dB (120V model) 80dB (Other models)
IF Rejection Ratio:	90dB
Signal-to-Noise Ratio:	Mono: 73dB Stereo: 66dB
Alternate Channel	
Attenuation:	50dB IHF (\pm 400kHz) (120V model)
Selectivity:	55dB DIN (\pm 300kHz, 40kHz dev.) (Other models)
AM suppression Ratio:	50dB

Total Harmonic Distortion: Mono:	0.1%
Stereo:	0.2%
Frequency Response:	30-15,000Hz \pm 1.5dB
Stereo Separation:	40dB at 1kHz 30dB at 70-10,000Hz
Muting Level:	2.0 μ V, 75ohm 17.2dBf, 4.0 μ V
Output Voltage:	500mV (120V model) 750mV (Other models)
AM:	
Tuning Range:	530-1710kHz(10kHz steps) (U.S.A. model) 522-1611kHz(9Hz steps) (European model) 530-1620kHz(10kHz steps) or 531-1602kHz(9kHz steps) (Worldwide model)
Usable Sensitivity:	25 μ V
Image Rejection Ratio:	40dB
IF Rejection Ratio:	40dB
Signal-to-Noise Ratio:	40dB
Harmonic Distortion:	0.8%
Output voltage:	150mV
GENERAL:	
Dimensions(W \times H \times D):	455 \times 75.5 \times 306mm 17-15/16" \times 2-15/16" \times 12-1/16"
Weight:	3.4kg., 7.5 lbs.

Specifications and features are subject to change without notice.

SERVICE PROCEDURES

1. Safety-check out

(Only U.S.A. model)

After correcting the original service problem,perform the following safety check before releasing the set to the customer.

Connect the insulating-resistance tester between the plug of power supply cord and chassis.

Specifications: 3.3Mohm \pm 10% at 500V.

2. Memory preservation

This unit does not require memory preservation batteries. A built-in memory power back-up system preserves contents of the memory during power failures and even when the unit is unplugged. The unit must be plugged in and the power switch turned on and off once in order to charge the back-up system. Note that since this is not a permanent memory,the power switch must be turned on and off a few times each month to keep the back-up system operative. The period of time during which memory contents are preserved after power has last been turned off varies depending on climate and placement of the unit. On the average, memory contents are protected over a period of 3 to 4 weeks (a minimum of 2 weeks) after the last time power has been turned off. This period is shorter when the unit is exposed to very high humidity or used in an area with an extremely humid climate.

3. Voltage Selector (Back Panel)

W models are equipped with a voltage selector to conform with local power supplies. Be sure to set this switch to match the voltage of the power supply in your area before turning the power switch on. This switch is set to 220V at the factory. Voltage is changed by sliding the groove in the switch with a screwdriver to the right or left. Confirm that the switch has been moved all the way to the right or left before turning the power switch on. Models without a voltage selector can only be used in areas where the power supply is the same as that of the unit.

4. Tuning Step Frequency Switch (Back Panel)

W models are equipped with a switch for the AM (9kHz/10kHz) and FM (50kHz/100kHz) bands. The switch should be set to the proper steps for the radio broadcast frequencies in your area.

5. Changing the band step

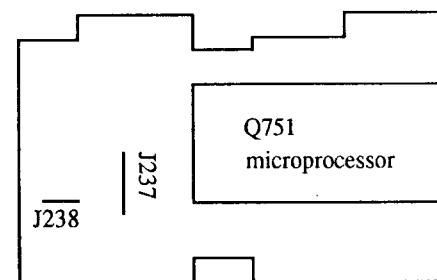
With the exception of the models below, a BAND STEP selector switch is not provided.

FM

MODEL	BAND STEP	J273
UD	200kHz \rightarrow 50kHz	Open
UP/UQ	50kHz \rightarrow 200kHz	Short

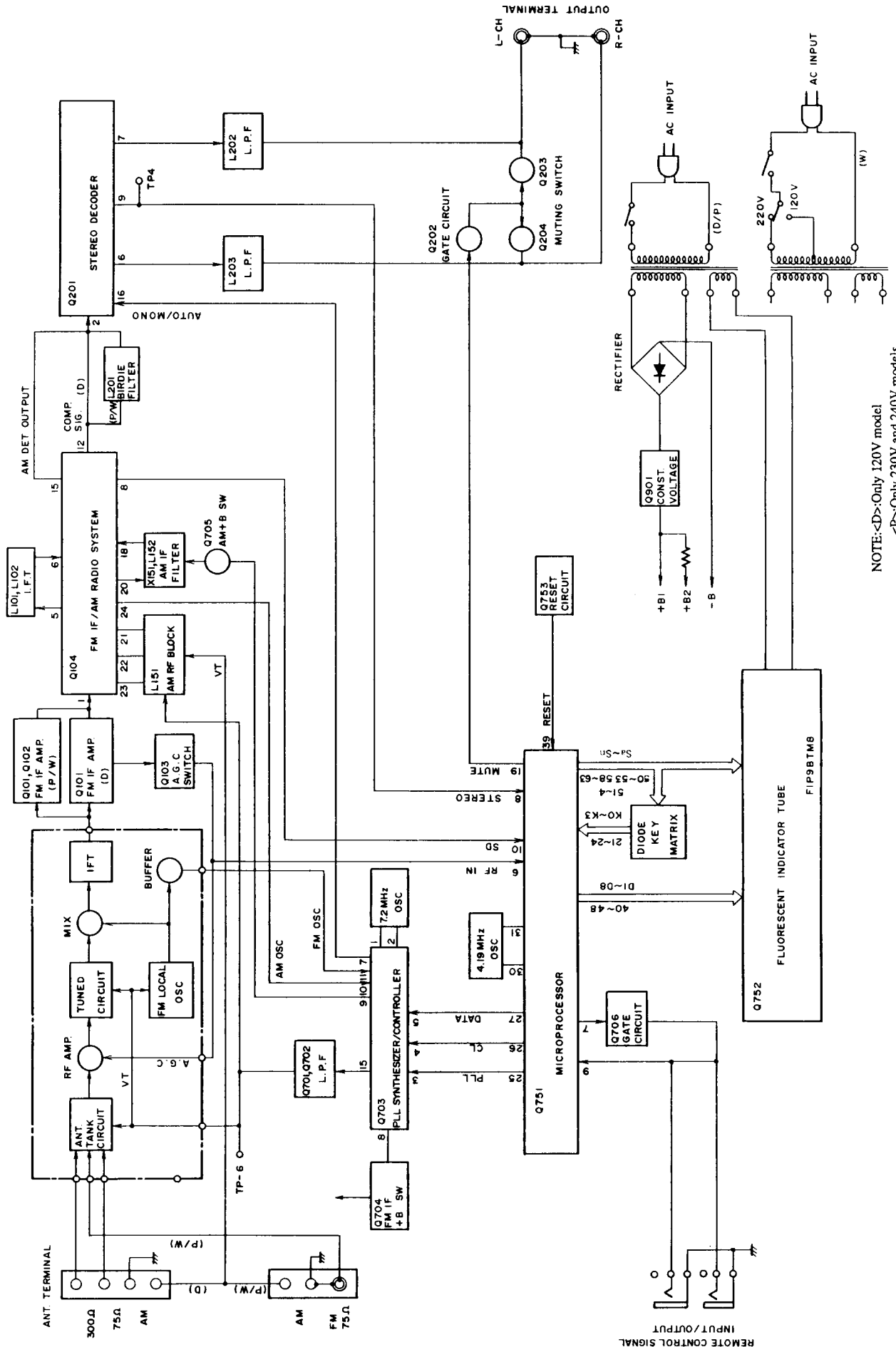
AM

MODEL	BAND STEP	J238
UD	10kHz \rightarrow 9kHz	Short
UP/UQ	9kHz \rightarrow 10kHz	Open



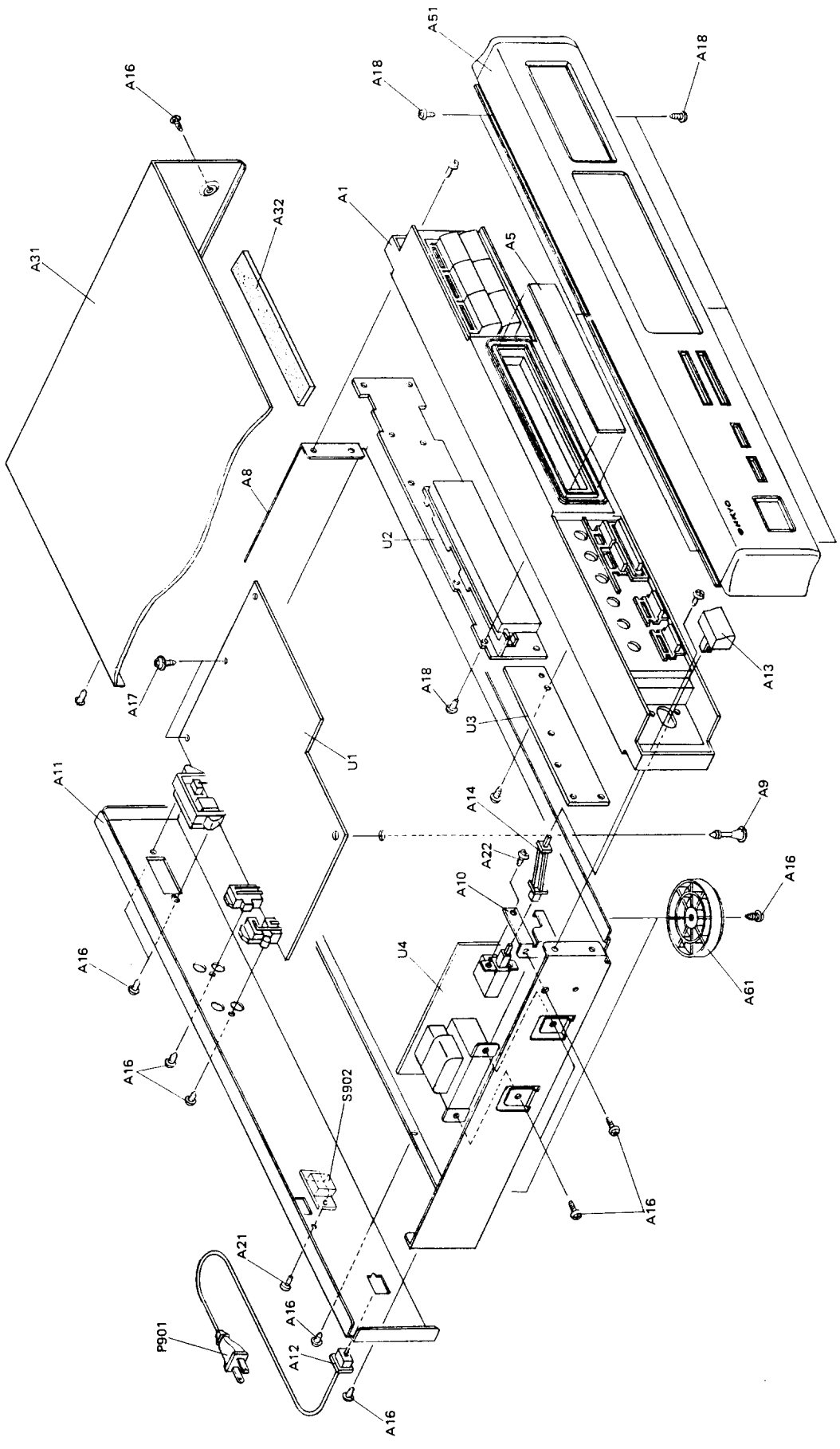
DISPLAY CIRCUIT PCB

BLOCK DIAGRAM



NOTE: <D> - Only 120V model
 <P> - Only 230V and 240V models
 <W> - Only Worldwide model

EXPLODED VIEW



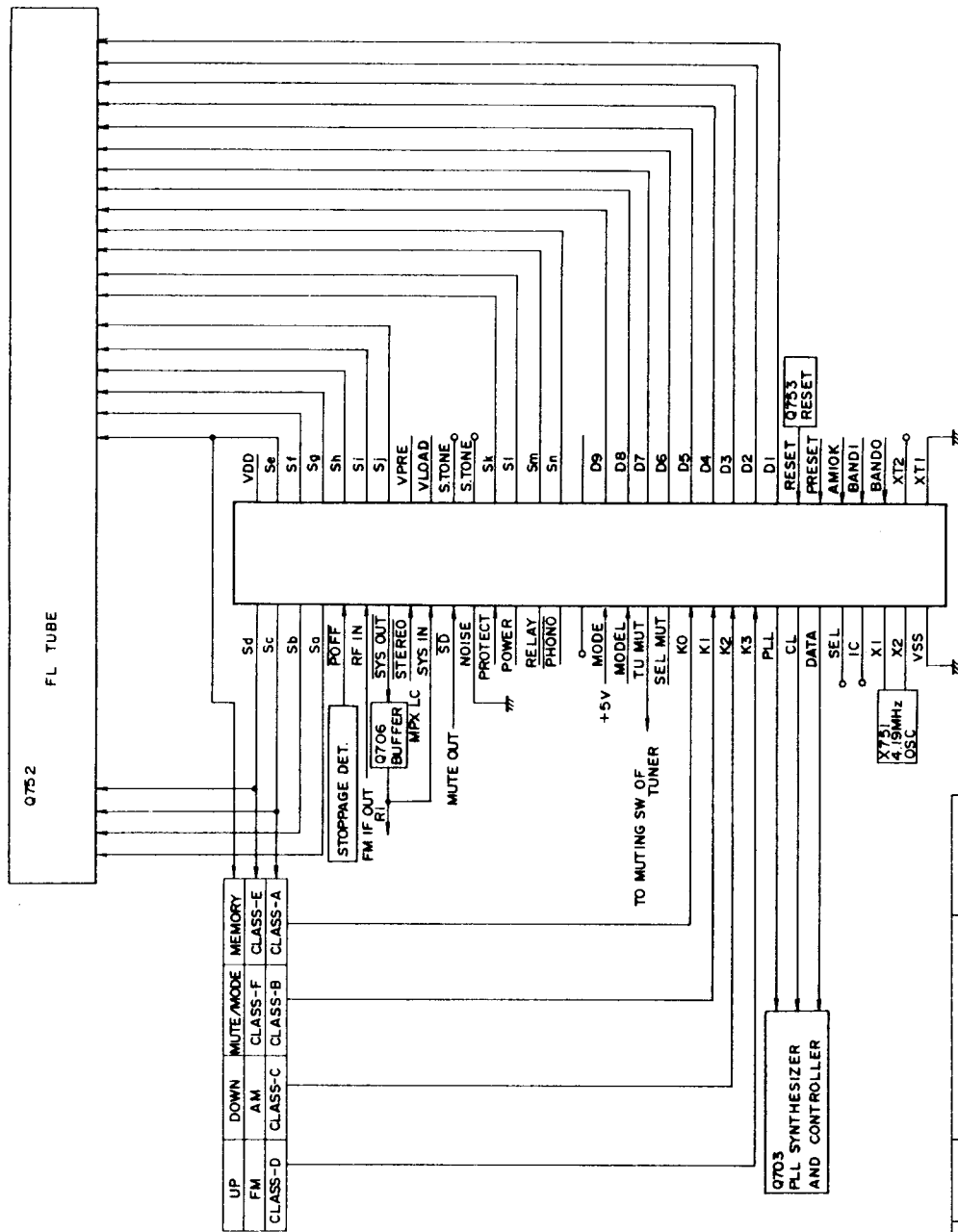
PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
A1	27110678Y	Front bracket 	U1	1A339500-3	NARF-4098-3B,Main circuit pc board ass'y <D>
A5	27110679Y	Front bracket <S>		1A339598-3A	NARF-4098-3A,Main circuit pc board ass'y <P/Q>
A8	28191579A	Clear plate		1A339598-3B	NARF-4098-3B,Main circuit pc board ass'y <W>
A8	27100230A	Chassis	U2	1A339500-3	NADIS-4099-3,Display circuit pc board ass'y <D>
A9	27190511	KGLS-16R,Holder		1A339599-3A	NADIS-4099-3A,Display circuit pc board ass'y <P/W>
A10	27141468	Bracket,power		1A339599-3B	NADIS-4099-3B,Display circuit pc board ass'y <Q>
A11	27121539Y	Back panel <D>	U3	1A339500-3	NASW-4100-1,Operation switch pc board ass'y
A11	27121540Y	Back panel <P>	U4	1A339501-3	NAPS-4101-3,Power supply circuit pc board ass'y <D>
A11	27121542Y	Back panel <W>		1A339501-3A	NAPS-4101-3A,Power supply circuit pc board ass'y <P>
A12	27121547Y	Back panel <Q>		1A339501-3B	NAPS-4101-3B,Power supply circuit pc board ass'y <W>
A12	27300750	△ Bushing		1A339501-3C	NAPS-4101-3C,Power supply circuit pc board ass'y <Q>
A13	28324140	Knob,power 			
A13	28324184	Knob,power <S>			
A14	27260294	Joint,power			
A16	834430088	3TTS+8B(BC),Self-tapping screw			
A17	831130088	3TTW+8B,Self-tapping screw			
A18	833430080	3TTP+8P(BC),Self-tapping screw			
A21	82143006	3P+6FN(BC),Pan head screw <W>			
A22	82143006	3P+6FN(BC),Pan head screw			
A31	28184474	Top cover			
A32	28140837	0.9×250×10,Cushion			
A51	1A339701K	Front panel ass'y 			
	1A340701K	Front panel ass'y <S>			
	28125230AY	End cap L			
	28125231AY	End cap R			
A61	27175254	Leg			
P901	253173Y or	△ AS-UC-7 #18,			
	253142HITSY	△ Power supply cord <D>			
	253164Y or	△ AS-CEE,Power supply cord			
	253175Y	△ <P/W>			
	253148	△ AS-SAA,Power supply cord <Q>			
S902	25065123	△ NSS-1258P, Voltage selector switch <W>			

NOTE::Black model only
 <S>:Silver model only
 <D>:120V model only
 <P>:230V model only
 <Q>:240V model only
 <W>:Worldwide model only

NOTE: THE COMPONENTS IDENTIFIED BY MARK △
 ARE CRITICAL FOR RISK OF FIRE AND
 ELECTRIC SHOCK. REPLACE ONLY WITH
 PART NUMBER SPECIFIED.

μPD75268CW-025 (Microprocessor)



BAND1	BAND0	REGION	BAND	FREQUENCY RANGE	CH. SPACE
0	0	U.S.A.	FM	87.50-108.00MHz	50kHz
0	1	EUROPE 1	AM	530-1710kHz	10kHz
1	0	EUROPE 2	FM	87.50-108.00MHz	50kHz
1	1	JAPAN	AM	522-1611kHz	9kHz
			FM	87.50-108.00MHz	50kHz
			AM	531-1602kHz	9kHz
			FM	76.0-90.0MHz	100kHz
			AM	522-1611kHz	9kHz

Terminal No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Electrode	F	F	NP	9G	NP	NP	NP	NP	NP	9G	NP	8G	NP	NP	8G	P(c)
Terminal No.	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Electrode	7G	7G	P(m)	6G	6G	P(l)	P(k)	5G	P(j)	P(i)	4G	P(h)	NP	4G	P(g)	
Terminal No.	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	
Electrode	3G	P(o)	P(c)	3G	P(a)	2G	2G	P(b)	1G	P(e)	P(d)	1G	NP	F	F	

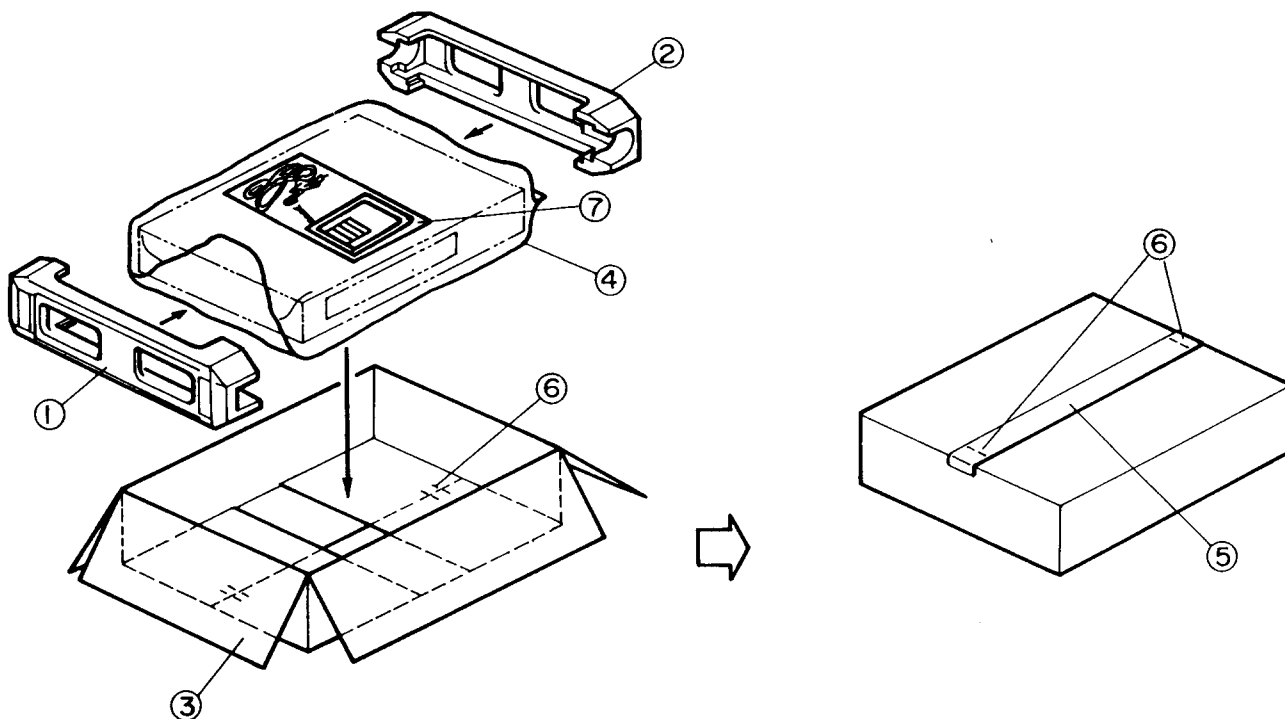
Note: F:Filament
G:Grid
P:Anode
NP:No pin

Terminal Descriptions

Pin No.	Symbol	Description						
1	Sd							
2	Sc	Segment and key scan output terminals. "H" when active.						
3	Sb							
4	Sa							
5	POFF	This is the input terminal for detection of the stoppage of electric current. "L" when the stoppage of electric current.						
6	RF IN	RF mode input terminal. <table border="1" style="margin-left: 20px;"> <tr> <td>RF IN</td> <td>RF MODE</td> </tr> <tr> <td>L</td> <td>LOCAL</td> </tr> <tr> <td>H</td> <td>DX</td> </tr> </table>	RF IN	RF MODE	L	LOCAL	H	DX
RF IN	RF MODE							
L	LOCAL							
H	DX							
7	SYS OUT/ SYS EN	System code output terminal. "L" when active. Initializing input terminal when the power turns on.						
8	STEREO	Stereo broadcast detection input terminal. "L" when stereo broadcast.						
9	SYS IN	System code input terminal. "H" when active.						
10	SD	Broadcast detection input terminal. "L" when active. Control the stop of auto tuning and output TU MUT(#19).						
11	NOISE	Noise detection input terminal. Not used.						
12	PROTECT	Protection circuit operation detection input terminal. Not used.						
13	POWER	Power control output terminal. Not used.						
14	RELAY	Speaker relay control output terminal. Not used.						
15	PHONO	Phono control output terminal. Not used.						
16		Not used.						
17	MODE	Initializing input terminal for operation mode setting.						
18	MODEL	Initializing input terminal for model setting of receiver.						
19	TU MUT	Muting output terminal. "H" when active.						
20	SEL MUT	Audio muting output terminal. Not used.						
21	K0							
22	K1	Key scan input terminals.						
23	K2	"H" when active.						
24	K3							
25	PLL	Connect to the terminal CE of PLL IC(LM7001 Q703).						
26	CL	Connect to the terminal CL of PLL IC(LM7001 Q703).						
27	DATA	Connect to the terminal DATA of PLL IC(LM7001 Q703).						
28	SEL	Not used.						

Pin No.	Function	Description
29	IC	Internal connected.
30	X1	Ceramic oscillator connection terminal for main system clock.
31	X2	Connect to the 4.19MHz ceramic oscillator.
32	VSS	Ground terminal.
33	XT1	Ceramic oscillator connection terminal for sub system clock.
34	XT2	Not used.
35	BAND0	Initializing input terminal for region setting of FM band.
36	BAND1	
37	AM 10K	Initializing input terminal for region setting of AM band.
38	PRESET	Initializing input terminal for operation mode setting.
39	RESET	Reset input terminal. "L" when active.
40	D1	
41	D2	
42	D3	
43	D4	
44	D5	Digit output terminals. "H" when active.
45	D6	
46	D7	
47	D8	
48	D9	
49		Not used.
50	Sn	
51	Sm	Segment output terminals. "H" when active.
52	Sl	
53	Sk	
54	S.TONE	SELECTIVE TONE indication output terminal. Not used.
55	S.TONE	SELECTIVE TONE control output terminal. Not used.
56	VLOAD	Pull-down resistor connection terminal of FIP controller/driver.
57	VPRE	Power supply terminal of output buffer of FIP controller/driver.
58	Si	
59	Si	
60	Sh	Segment and key scan output terminals.
61	Sg	"H" when active.
62	Sf	
63	Se	
64	VDD	Power supply terminal. (+5V)

PACKING VIEW



REF. NO.	PART NO.	DESCRIPTION
1	29091454	Pad L
2	29091455	Pad R
3	29052337AY	Master carton box
	29052473	◎ Master carton box
	29052419Y	Master carton box <S>
	29052474	◎ Master carton box <S>
4	291000374A	650×850mm, Styrene bag
5	29110071	Dampson tape
6	282301	Sealing hook
7	Accessory bag ass'y	
	29341691AY	Instruction manual <D>
	29341692Y	Instruction manual <P/W/Q/C>
	292111Y	FM antenna <D/W>
	292112Y	FM antenna <P/Q>
	232140	NMA-3057, AM loop antenna
	2010098A	Connection cord
	2010200	Remote control cord
	25065448	FM antenna adaptor <F/W/Q>
	25055018	CV-K-1, Conversion plug <W>
	29365019A	Warranty card <N>
	29365024A	Warranty card <F>
	29358002J	Service station list <N>
	29100097	350×250mm, Styrene bag
	29100107	Styrene bag for warranty card <F>

NOTE:: Black model only
 <S>: Silver model only
 <D>: 120V model only
 <P>: 230V model only
 <Q>: 240V model only
 <N>: U.S.A. model only
 <F>: French model only
 <W>: Worldwide model only
 <C>: Canadian model only
 ◎: Made in Japan

PRINTED CIRCUIT BOARD-PARTS LIST

MAIN CIRCUIT PC BOARD (NARF-4098-3/3A/3B)

CIRCUIT NO.	PART NO.	DESCRIPTION	CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs			Capacitors	
Q104	22240039	LA1266	C155,C156	354761009	10 μ F,35V,Elect.
Q201	22240242	AN7470	C158	374723334	0.033 μ F \pm 5%,50V,Plastic
Q703	22240090	LM7001	C159	374722234	0.022 μ F \pm 5%,50V,Plastic
Q901	222780125NEC	78M12HF	C160	354761009	10 μ F,35V,Elect.
	Transistors		C201	374724734	0.047 μ F \pm 5%,50V,Plastic
Q101	2211723	2SC1923-O	C202	354742209	22 μ F,16V,Elect.
Q102	2210746	2SC945A-P <P/W>	C203	354744719	470 μ F,16V,Elect.
Q103,Q701	2211255 or 2213284	2SC1815-GR or 2SC1740S-R	C205,C206	374721824 374721224	1800pF \pm 5%,50V,Plastic <D> 1200pF \pm 5%,50V,Plastic <P>
Q202	2211455 or 2213354	2SA1015-GR or 2SA933S-R		374721524	1500pF \pm 5%,50V,Plastic <W>
Q203,Q204	2212794	2SD1468-R	C208,C209	354761009	10 μ F,35V,Elect.
Q702	2212445	2SK365-GR	C210	370134714	470pF \pm 5%,100V,APS
Q704,Q705	2213090	DTA114YS	C211	354780109	1 μ F,50V,Elect.
Q706	2212600	DTA124ES	C212	354780339	3.3 μ F,50V,Elect.
	Diodes		C213	354782299	0.22 μ F,50V,Elect.
D101,D102	223132	1K60	C215,C216	354742209	22 μ F,16V,Elect.
D202,D203	223163	1SS133	C217	354781099	0.1 μ F,50V,Elect.
D701	224450562	MTZ5.6B	C701	354782299	0.22 μ F,50V,Elect.
D702-D704	223163	1SS133	C702	354780229	2.2 μ F,50V,Elect.
D903-D905	22380032	1SR139-100	C703,C704	374721034	0.01 μ F \pm 5%,50V,Plastic
D906	224450562	MTZ5.6B	C706	354722219	220 μ F,6.3V,Elect.
D907	224450623	MTZ6.2C	C903	354761029	1000 μ F,35V,Elect.
D908	224452704	MTZ27D	C905,C907	354761009	10 μ F,35V,Elect.
D909,D910	22380032	1SR139-100	C909	354772219	220 μ F,63V,Elect.
D911	224451503	MTZ15C	C910,C911	354764709	47 μ F,35V,Elect.
	Coils & Transformers		C912	354761009	10 μ F,35V,Elect.
L101	233401	NMIF-4072	C913	354762219	220 μ F,35V,Elect.
L102	233402	NMIF-4073			Resistors
L151	232148	NMRF-7050	R101	5210070 or 5210221	N06HR100KBD or N06HR100KBD,Semi-fixed
L152	232139	NMIF-4062	R118	442522734	27k Ω \pm 5%,1/2W,Metal oxide film
L201	233383	NMC-6070 <P/W>	R201	5210062 or 5210216	N06HR4.7KBD or N06HR5KBD,Semi-fixed
L202.L203	233355A	NMC-4059	R903	442521214	120 Ω \pm 5%,1/2W,Metal oxide film
	Front end		R905	441629114	910 Ω \pm 5%,1W,Metal oxide film
U001	240088	FE337-A07<D>			Terminals
	240089	FE415-G11 <P/W>	P101	25060085	NTM-4PDMN29 <D>
	Ceramic filters			25060117	NTM-2PDML051 <P/W>
X101,X102	3010071	SFE10.7MA5 <D>	P102	25045307	NPJ-2PDBL166 <D>
X101-X103	3010137	SFE10.7MMK <P/W>		25045333	NPJ-2PDBL185 <P/W>
X151	3010123	SFZ-450JL	P103	25045330	NPJ-2PDBL184
X152	3010076	BFU-450C			Switch
	X'tal		S710	25065286	NSS-22112,Band <W>
X701	3010141 or 3010158	XTL-7.2M			
	Capacitors				
C001	354741019	100 μ F,16V,Elect.			
C108,C113	354742209	22 μ F,16V,Elect.			
C110	354780109	1 μ F,50V,Elect.			
C112	354780339	3.3 μ F,50V,Elect.			
C115	354784799	0.47 μ F,50V,Elect.			
C152	354741019	100 μ F,16V,Elect.			
C154	354780479	4.7 μ F,50V,Elect.			

NOTE:<D>:120V model only

<P>:230V and 240V models only

<W>:Worldwide model only

A

B

C

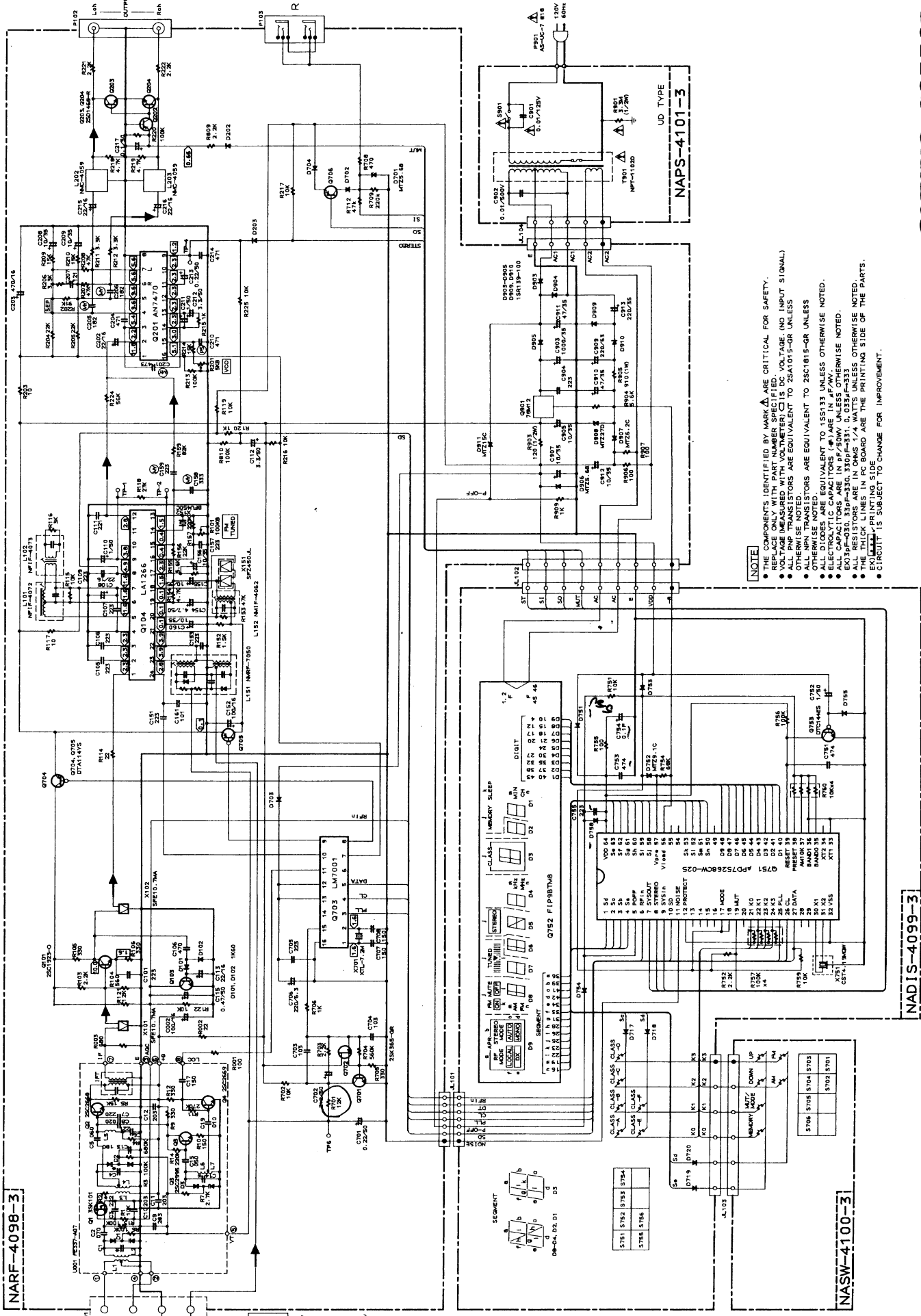
D

E

F

G

SCHEMATIC DIAGRAM — 120V MODEL —



NOTE

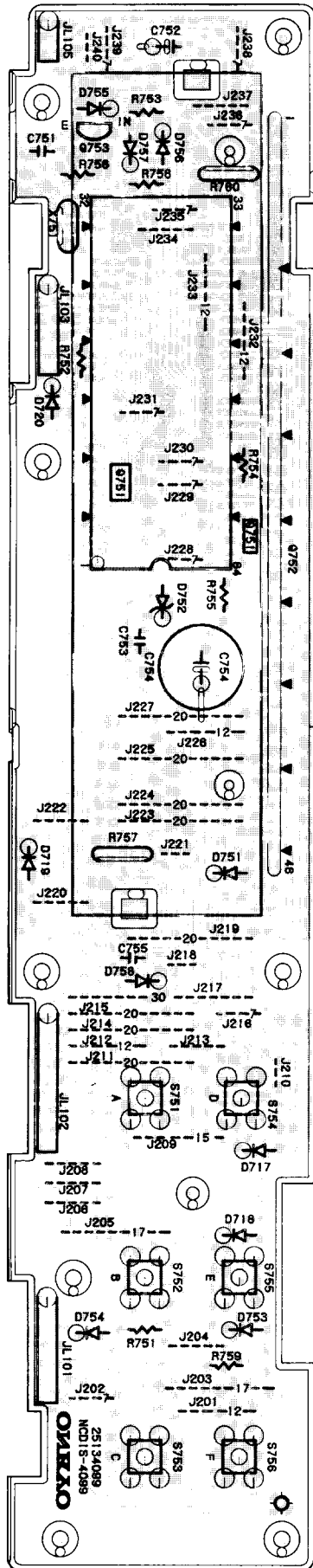
- THE COMPONENTS IDENTIFIED BY MARK Δ ARE CRITICAL FOR SAFETY.
- REPLACE ONLY WITH PART NUMBER SPECIFIED. VOLTAGAGE (V) IS INPUT SIGNAL.
- VOLTAGE MEASURED WITH VOLTMETER C.I.S. IS EQUIVALENT TO 250/15/50R UNLESS OTHERWISE NOTED.
- ALL NPN TRANSISTORS ARE EQUIVALENT TO 2SC1815-QR UNLESS OTHERWISE NOTED.
- OTHER DIODES NOTED ARE EQUIVALENT TO 1SS133 UNLESS OTHERWISE NOTED.
- ALL CAPACITORS ARE IN PF/50V UNLESS OTHERWISE NOTED.
- ALL RESISTORS ARE IN OHMS/5% UNLESS OTHERWISE NOTED.
- THE THICK LINES IN PC BOARD ARE THE PRINTING SIDE OF THE PARTS.
- EXCEPT AS PRINTING SIDE FOR IMPROVEMENT.

NARS-4098-3

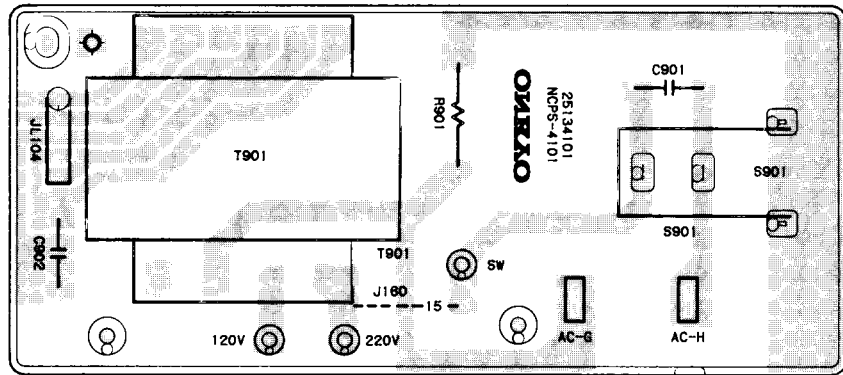
NASW-4100-3

NADIS-4099-3

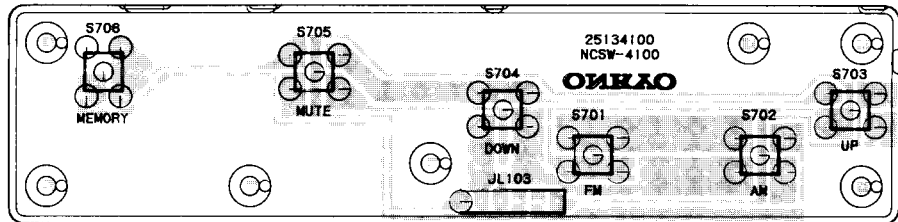
PRINTED CIRCUIT BOARD VIEW FROM BOTTOM SIDE



DISPLAY PC BOARD



POWER SUPPLY CIRCUIT PC BOARD



SWITCH PC BOARD

PRINTED CIRCUIT BOARD PARTS LIST

DISPLAY CIRCUIT PC BOARD(NADIS-4099-3/3A/3B)

CIRCUIT NO.	PART NO.	DESCRIPTION
Q751	22240406	μ PD75268CW-025,IC
Q752	212093	FIP9BTM8,FL tube
Q753	221282	DTC144ES,Transistor
D717-D720	223163	1SS133,Diodes
D751,D758	223163	1SS133,Diode
D752	224450913	MTZ9.1C,Zener diode
D753-D755	223163	1SS133,Diodes
C751	375524744	0.47 μ F,5%,50V,Plastic capacitor
C752	354780109	1 μ F,50V,Elect. capacitor
C753	375524744	0.47 μ F,5%,50V,Plastic capacitor
C754	3000057	0.1F,5.5V,Super capacitor
R757	49163104404	100kohm \times 4,1/10W,Network resistor
R760	49163103404	10kohm \times 4,1/10W,Network resistor
S751-S756	25035548	NPS-111-S510,Push switches
X751	3010163	CST4.19MGW,Ceramic oscillator
	27190818	Holder FL

OPERATION SWITCH PC BOARD(NASW-4100-3)

CIRCUIT NO.	PART NO.	DESCRIPTION
S701-S706	25035548	NPS-111-S510,Push switches

POWER SUPPLY CIRCUIT PC BOARD (NAPS-4101-3A/3B/3C)

CIRCUIT NO.	PART NO.	DESCRIPTION
C901	3500065A	△ DE7150FZ103PAC400V/125V, IS capacitor
	273001216	△ Cover for C901 <P/W/Q>
T901	2300636UM	△ NPT-1102D,Power transformer <D>
	2300637UM	△ NPT-1102P,Power transformer <P>
	2300638UM	△ NPT-1102DG,Power transformer <W>
	2300639UM	△ NPT-1102Q,Power transformer <Q>
S901	25035636	△ NPS-111-L590P,Power switch
R901	431523355	3.3Ω,1/2W,Solid resistor <D>
	28175137	Insulator plate

NOTE:<D>:120V model only

<P>:230V model only

<W>:Worldwide model only

<Q>:240V model only

NOTE:THE COMPONENTS IDENTIFIED BY MARK △
ARE CRITICAL FOR RISK OF FIRE AND
ELECTRIC SHOCK.REPLACE ONLY WITH PART
NUMBER SPECIFIED.

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