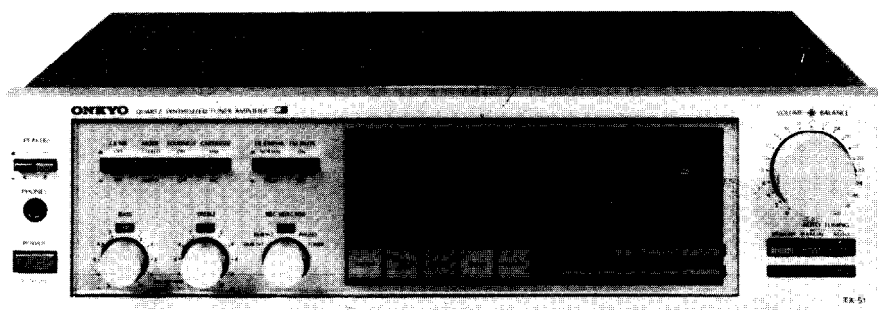


# ONKYO SERVICE MANUAL

## QUARTZ SYNTHESIZED TUNER AMPLIFIER MODEL TX-51



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**ONKYO**<sup>®</sup>  
**AUDIO COMPONENTS**

# SPECIFICATIONS

## AMPLIFIER SECTION

Output Power:	40 watts per channel min. RMS. at 8 ohms both channels driven, from 20 Hz to 20,000 with no more than 0.04% total harmonic distortion.
Total Harmonic Distortion:	0.04% at rated power 0.04% at 1 watt output
IM Distortion:	0.1% at rated power 0.04% at 1 watt output
Damping Factor:	40 at 8 ohms
Frequency Response:	20 Hz – 30,000 Hz ( $\pm 1$ dB)
RIAA Deviation:	20 Hz – 20,000 Hz ( $\pm 0.8$ dB)
Sensitivity & Impedance:	Phono (MM): 2.5 mV, 50 k $\Omega$ (MC): 350 $\mu$ V, 330 $\Omega$ Tape Play: 150 mV, 50 k $\Omega$ Tape Rec: 150 mV, 3.5 k $\Omega$ (PH)
Phono Overload:	180 mV R.M.S. at 1 kHz, 0.04% T.H.D.
Signal-to-Noise Ratio:	Phono: 85 dB (at 10 mV input A (MM) weighted) 76 dB (IHF A-202) Tape: 95 dB (A weighted) 80 dB (IHF A-202)
Tone Controls:	Bass: $\pm 12$ dB at 100 Hz Treble: $\pm 10$ dB at 10 kHz
Loudness ( $-30$ dB):	+9 dB at 40 Hz +5 dB at 20 kHz

## TUNER SECTION (120V model)

<b>FM:</b>	
Tuning Range:	87.5 – 108 MHz (100 kHz steps)
Usable Sensitivity:	Mono: 10.8 dBf, 1.9 $\mu$ V Stereo: 17.2 dBf, 4.0 $\mu$ V
50 dB Quieting Sensitivity:	Mono: 17.2 dBf, 4.0 $\mu$ V Stereo: 37.2 dBf, 40 $\mu$ V
Capture Ratio:	1.5 dB
Image Rejection Ratio:	45 dB
IF Rejection Ratio:	80 dB
Spurious Rejection Ratio:	80 dB
Signal-to-Noise Ratio:	Mono: 72 dB Stereo: 67 dB
Alternate Channel Att.:	60 dB
AM Suppression Ratio:	50 dB
Harmonic Distortion:	Mono: 0.15% Stereo: 0.25%
Frequency Response:	30 Hz – 15,000 Hz ( $\pm 1.5$ dB)
Stereo Separation:	40 dB at 1 kHz 30 dB at 100 Hz – 10,000 Hz
Muting Level:	17.2 dBf, 4 $\mu$ V
Stereo Threshold:	17.2 dBf, 4 $\mu$ V

<b>AM:</b>	
Tuning Range:	520 – 1,710 kHz (10 kHz steps)
Usable Sensitivity:	30 $\mu$ V
Image Rejection Ratio:	40 dB
IF Rejection Ratio:	30 dB
Signal-to-Noise Ratio:	40 dB
Harmonic Distortion:	0.8%

## TUNER SECTION (120/220V model)

<b>FM:</b>	
Tuning Range:	87.5 – 108 MHz ( 50 kHz steps)
Usable Sensitivity:	Mono: 10.8 dBf, 1.9 $\mu$ V Stereo: 17.2 dBf, 4.0 $\mu$ V
50 dB Quieting sensitivity:	Mono: 17.2 dBf, 4.0 $\mu$ V Stereo: 37.2 dBf, 40 $\mu$ V
Capture Ratio:	1.5 dB
Image Rejection Ratio:	45 dB
IF Rejection Ratio:	80 dB
Spurious Rejection Ratio:	80 dB
Signal-to-Noise Ratio:	Mono: 72 dB Stereo: 67 dB
Alternate Channel Att.:	60 dB
AM Suppression Ratio:	50 dB
Harmonic Distortion:	Mono: 0.15% Stereo: 0.25%
Frequency Response:	30 Hz – 15,000 Hz ( $\pm 1.5$ dB)
Stereo Separation:	40 dB at 1 kHz 30 dB at 100 Hz – 10,000 Hz
Muting Level:	17.2 dBf, 4 $\mu$ V
Stereo Threshold:	17.2 dBf, 4 $\mu$ V

<b>AM:</b>	
Tuning Range:	522 – 1611 kHz ( 9 kHz steps) or 520 – 1710 kHz (10 kHz steps)
Usable Sensitivity:	30 $\mu$ V
Image Rejection Ratio:	40 dB
IF Rejection Ratio:	30 dB
Signal-to-Noise Ratio:	40 dB
Harmonic Distortion:	0.8%

## GENERAL

Power Supply:	AC 120/220 V, 50/60 Hz (W model) AC 120 V, 60 Hz (D model)
Outputs:	Speaker A & B, Phones, Tape Rec. Out 1 & 2, AC Outlet (Unswitched $\times 1$ , switched $\times 1$ )
Inputs:	Phono, Tape Play 1 & 2 FM and AM Antennas
Antennas:	FM: 300 $\Omega$ balanced and 75 $\Omega$ unbalanced AM: built-in loop antenna and external terminal
Semiconductors:	6 FET, 32 transistors, 21 ICs, 82 diodes
Dimensions (WxHxD):	418 x 114 x 392 mm 16-1/2" x 4-1/4" x 15-7/16"
Weight:	9.5 kg, 20.9 lbs.

\* Specifications and features are subject to change without notice.

## PRECAUTIONS

### 1. Replacing the fuses

Remove the top cover. The speaker protection fuses are located on the back panel. The primary fuses are located on the power supply and protection circuit pc board as shown in the fig. 1.

Caution: For continued protection against fire hazard, replace only with same type and same rating fuse.

	Circuit No.	Parts No.	Description	Remarks
Speaker fuse	F501, F601	252059	4A (SS-2)	120V model
	F501, F601	252014	4A-T	120/220V model
Primary fuse	F901	252049	4A (ST-6)	120V model
	F902	252074	2A-SE-EAK	120/220V model
	F901	252014	4A-T	120/220V model

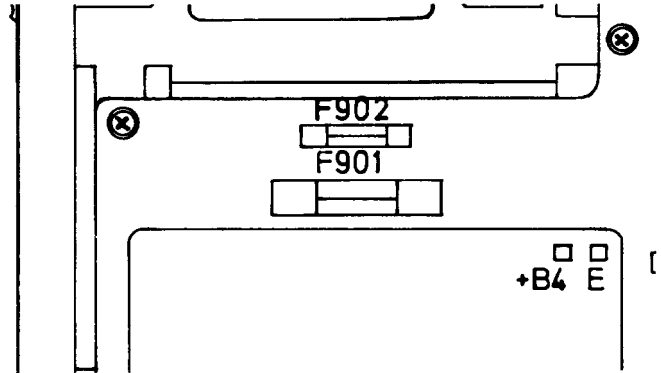


Fig. 1

### 2. Replacing the MOS IC

- All MOS devices should be stored or transported in materials that are somewhat conductive. MOS devices must not be inserted into conventional plastic "snow" or plastic trays.
- All MOS devices should be placed on a grounded bench surface and operators should ground themselves prior to handling devices, since a worker can be statically charged with respect to the bench surface.

- Nylon clothing should not be worn while handling MOS circuits.
- When lead straightening or hand soldering is necessary, provide ground straps for the apparatus used.
- Double check test equipment setup for proper polarity of voltage before conducting parametric or functional testing.
- All unused device inputs should be connected to  $V_{DD}$  or  $V_{SS}$ .

## SPECIAL MODES OPERATION

### 1. Memory Preservation Batteries

Because stations stored in the memory by the FM/AM preset keys would normally be lost when power is turned off or the plug removed from the wall socket, this unit requires two memory preservation batteries to preserve the

contents of the memory even when power is turned off. Be sure to insert the correct type of two batteries into the battery holder in the bottom of the unit before turning on power for the first time.

Type	Voltage (V)	IEC	United States									United Kingdom		West Germany	France	Denmark	Italy	Australia	
			ANSI	NEDA	Eveready	Mallory	Ray-O-Vac	Bright Star	Burgess	RCA	Sears	Eveready (BEREC)	Mallory	VARTA (Pertrix)	S A F T (Leclanche)	Hellesens	Supper Pila	Eveready	
Manganese	1.5	R6	AA	15P	815	M15P	710	59P	920	VS734	8950			251	R6S	VI-18	63	915	
				15F	915	M15F	7AA	59	910	VS034A	SP12				R6B	VI-28			1015
				15	1015	M150F	15	0199	930	VS334	SP12				T3S	VI-38			
				15D	1215	M1504	5AA			HP7					280	VI-75			

### 2. De-emphasis Switch (Only W model)

The  $50\mu\text{sec}/75\mu\text{sec}$  selector switch employed in the W (120/220V) model is located on the bottom board. When shipped from the factory, this switch is set to the  $50\mu\text{sec}$  position. For use  $75\mu\text{sec}$  regions, switch over to the  $75\mu\text{sec}$  position.

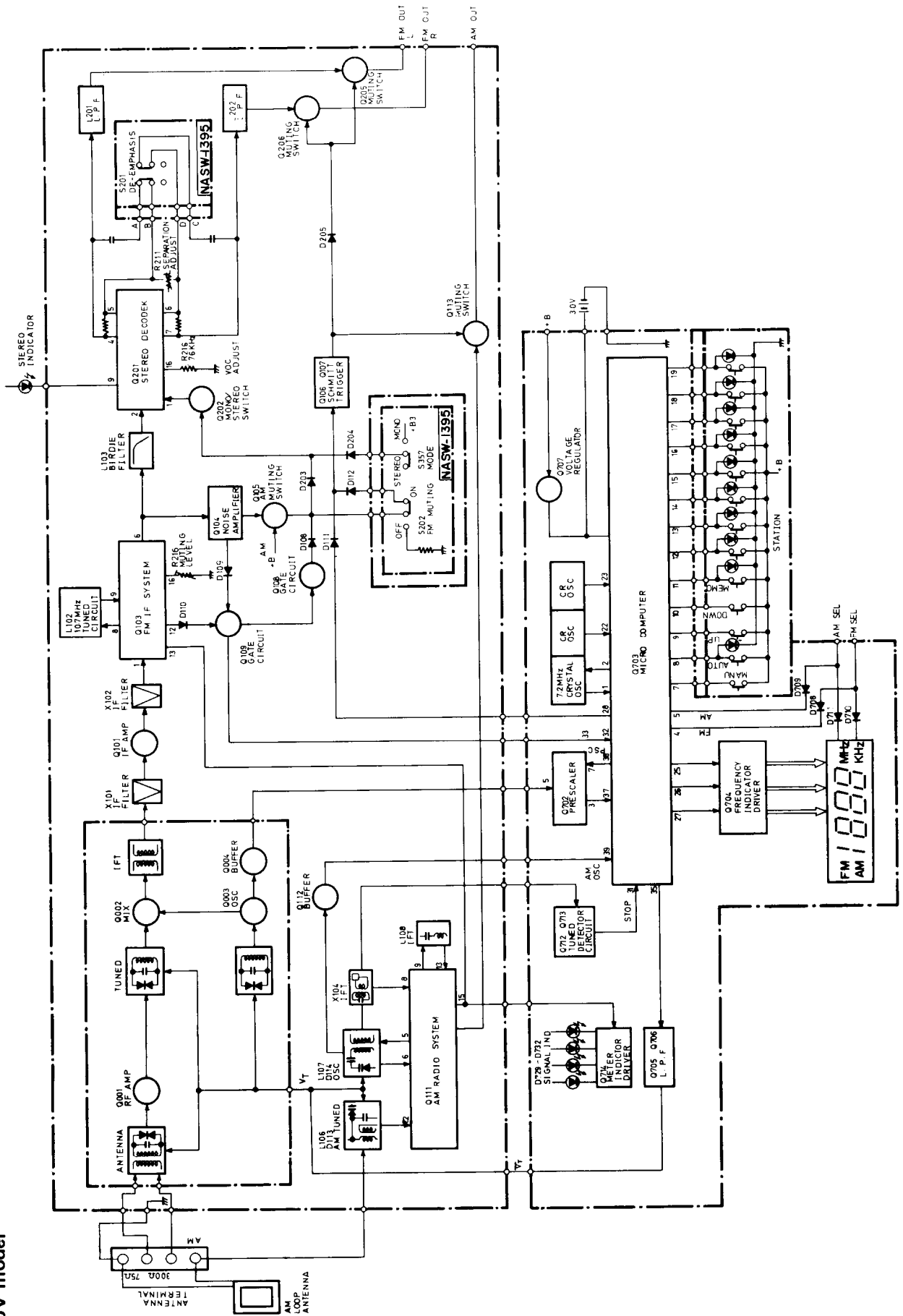
### 3. Voltage Selector (Only W model)

Some 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.

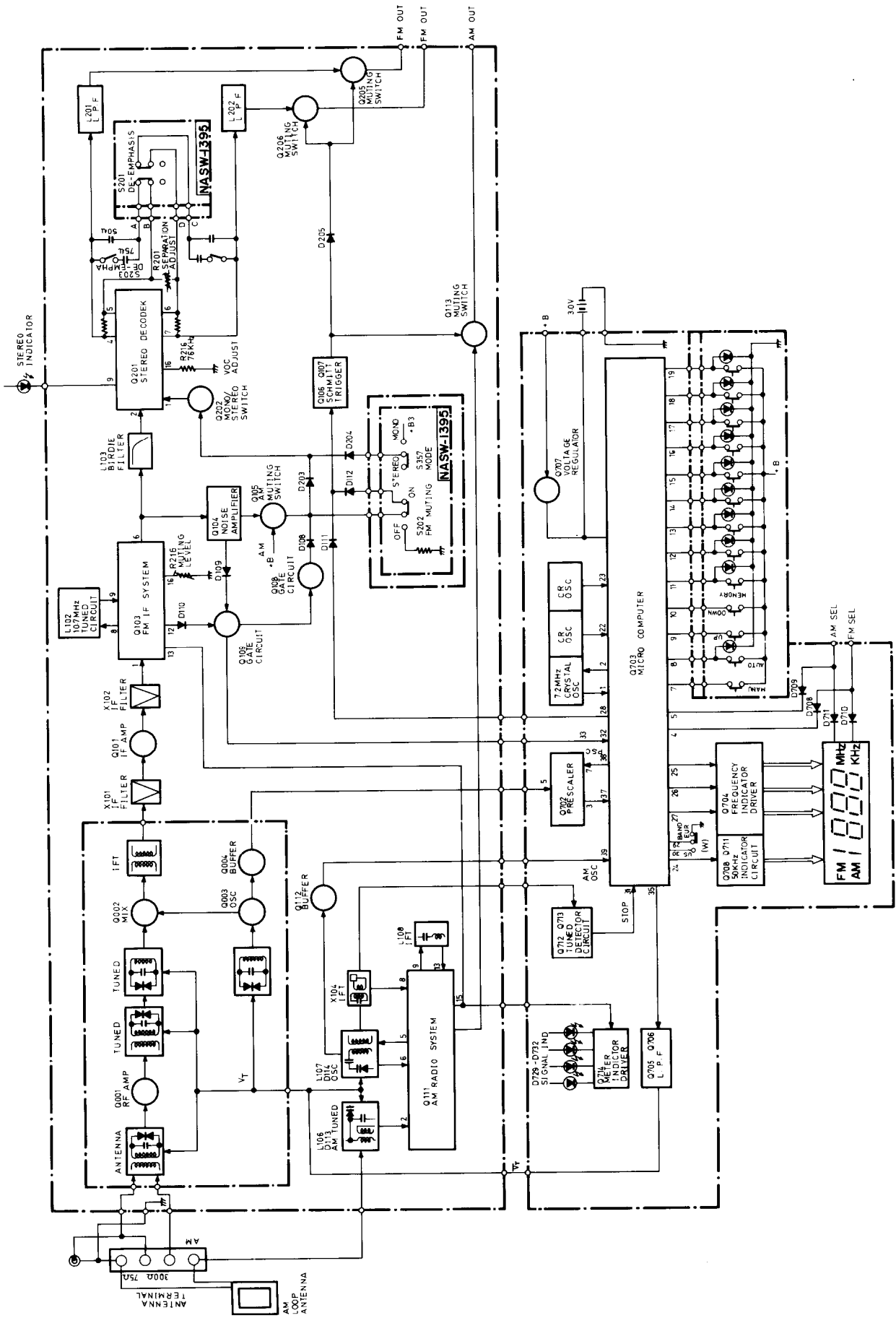
# BLOCK DIAGRAM

- TUNER SECTION -  
120V model



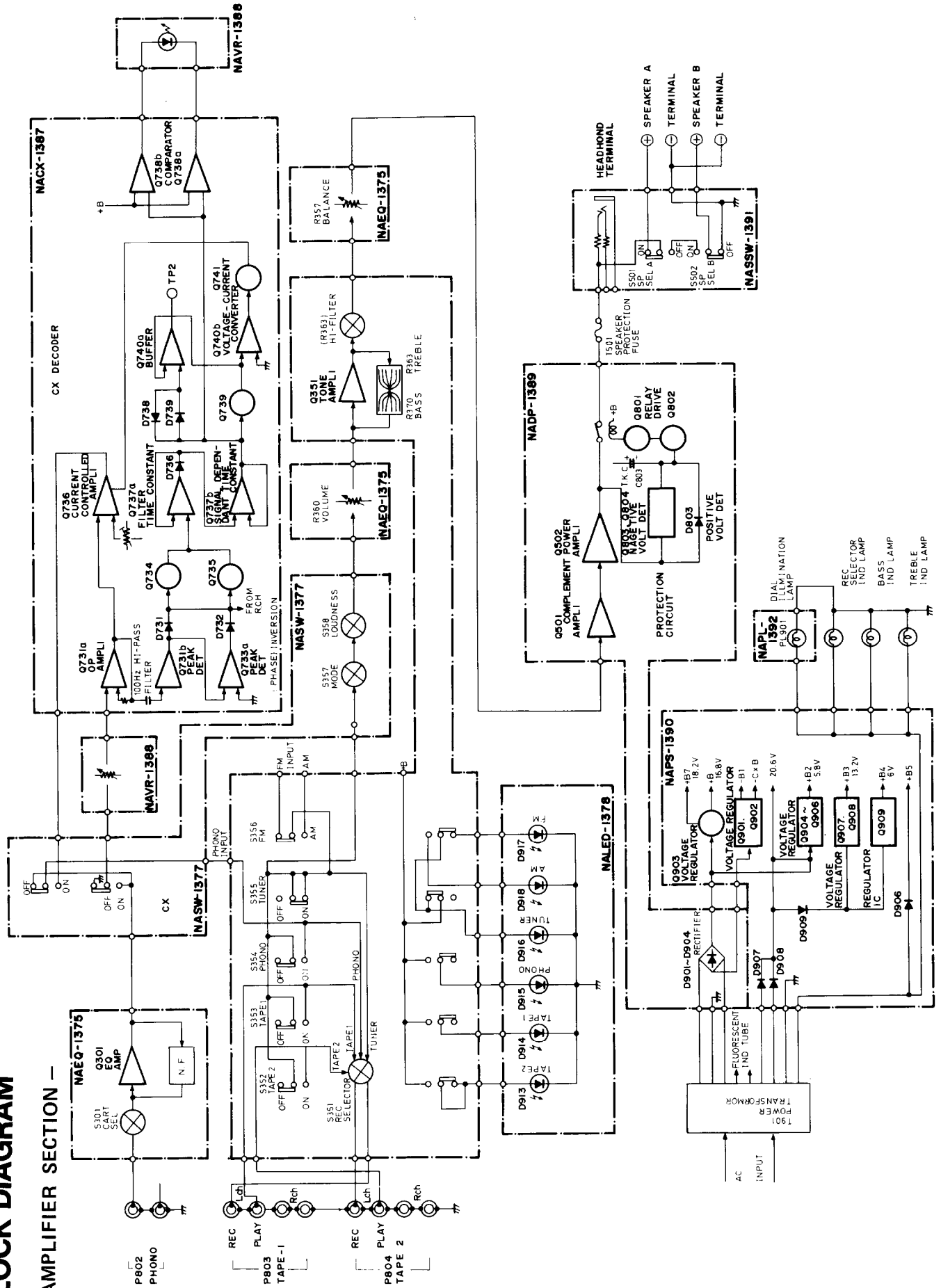
# BLOCK DIAGRAM

## - TUNER SECTION - 120/220V model



# BLOCK DIAGRAM

## AMPLIFIER SECTION



# ADJUSTMENT PROCEDURES

## INSTRUMENTS REQUIRED

1. DC Voltmeter
2. AM Sweep Generator
3. AM/FM Signal Generator
4. AC VTVM
5. Oscilloscope
7. Distortion Analyzer
8. Stereo Modulator
9. Frequency Counter

### 1. +B2 Voltage Adjustment

Connect the DC voltmeter between the +B2 and E terminals on the power supply pc board. Adjust the semi-fixed resistor R915 so that the indication of voltmeter become 25V.

### 2. CX Decoder Adjustment

1. Apply the sine wave signal of 1kHz, 2.5mV to the PHONO terminal of left-ch. (right-ch.).
2. Insert the shorted pin to the PHONO terminal of right-ch. (left-ch.). (See Fig. 8)
3. Connect the DC voltmeter to the terminal TP-2. *SAME TP2 FOR BOTH CHANNELS*
4. Adjust the variable resistor R731 (R732) on the back panel so that the reading of voltmeter become 5V. Confirm that the L.E.D of back panel light on. Specifications; 4.6 to 5.4V *5.12*
5. Connect the DC voltmeter to terminal TP-3L (TP-3R). Adjust the semi-fixed resistor R765 (R766) so that the reading of voltmeter become 150mV.
6. Proceed for right channel in the same manner.
7. Apply the tone burst signal of 1kHz, 2.5mV as shown fig. 7 to the PHONO terminal of left-ch. (right-ch.).
8. Connect the DC voltmeter to the terminal TP-3R (TR-3L). Adjust the R760 (R759) so that the reading of voltmeter become 0V.
9. Proceed for right channel in the same manner.

## GENERAL ALIGNMENT CONDITIONS

1. Signal input should be kept as low as possible.
2. Standard modulation is 400Hz 30% (AM), 1kHz 100% (FM MONO), pilot 9% sub and main 91% (FM STEREO).
3. Standard knob position  
 SPEAKERS ..... A  
 BASS, TERBLE & BALANCE ..... Center  
 MODE ..... STEREO  
 LOUNDNNESS ..... OFF  
 TAPE 1, 2 ..... OFF (SOURCE)

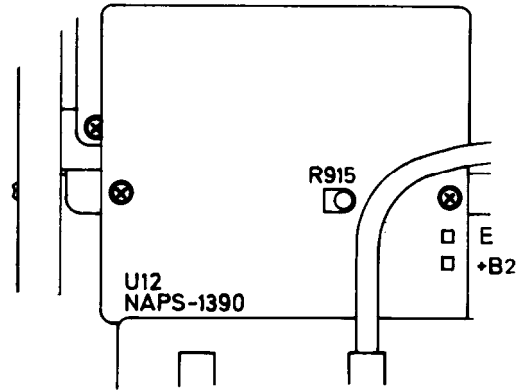


Fig. 5

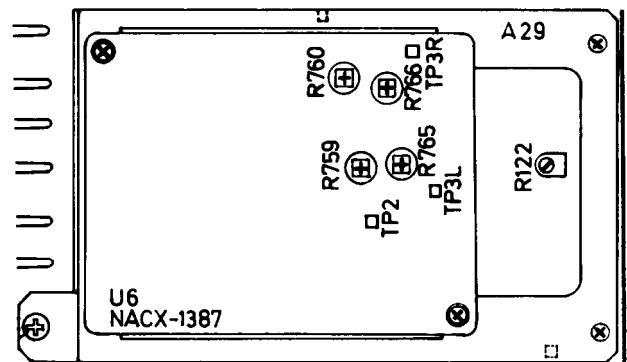


Fig. 6

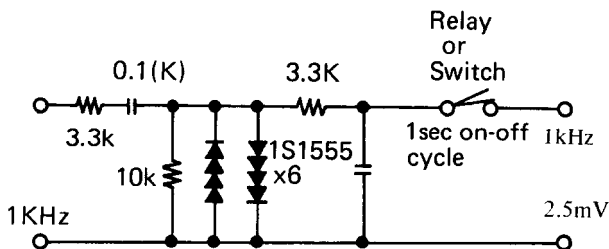


Fig. 7

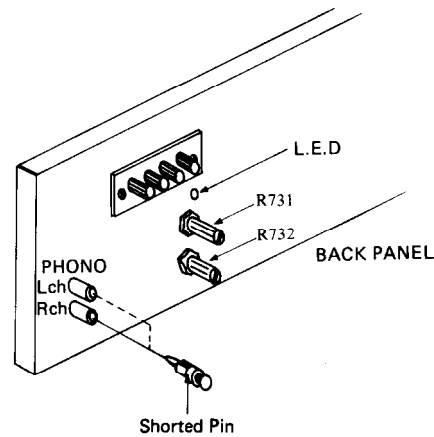
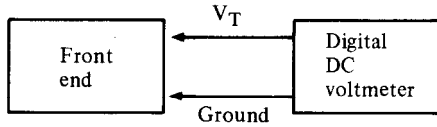


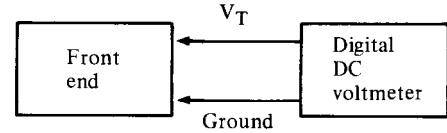
Fig. 8

**2. Front end adjustment**

**D model**



**W model**

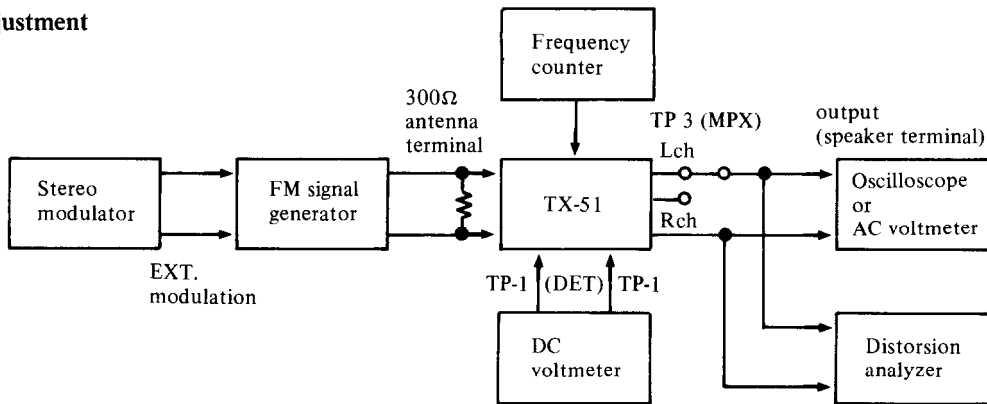


Step	Set to dial	Adjust	Output indicator	Adjust for
FM adjustment				
	88.1MHz	L008 (LO)	Digital DC voltmeter	3.03V
AM adjustment				
1	600kHz	L107	Digital DC voltmeter	2.5V
2	1400kHz	C156		15.5V
3	Repeat steps 1 and 2 as necessary			

Step	Set to dial	Adjust	Output indicator	Adjust for
FM adjustment				
	88.1MHz	L008 (LO)	Digital DC voltmeter	3.03V
AM adjustment				
1	603kHz	L107	Digital DC voltmeter	2.5V
2	1404kHz	C156		15.5V
3	Repeat steps 1 and 2 as necessary			

Remark: Usually not necessary to adjust.

**5. FM adjustment**

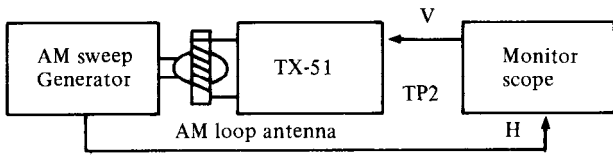


Item	FM signal generator	Stereo modulator	Dial to set	Adjust	Output indicator	Adjust for	Remarks
FM IF	1	—	No input signal	L102 BACK	DC voltmeter	0V	Repeat steps 1 and 2 as necessary
	2	98.1MHz, 65dBf, 1kHz, 75kHz devi.	98.1MHz	L102 FRONT	Distorsion analyzer	Minimum	
V.C.O	98.1MHz 65dBf	—	98.1MHz	R216	Frequency counter	76kHz	Turn off the modulation
Stereo Separation	98.1MHz 65dBf Ext. modulation	Rch	98.1MHz	R211	AC voltmeter (Lch)	Minimum	Maximum and same separation
		Lch			AC voltmeter (Rch)	Minimum	
Muting level	98.1MHz, 17dBf 1kHz, 75kHz devi.	—	98.1MHz	R122	Oscilloscope	Signal	Set the muting switch to on position
	98.1MHz, 16dBf 1kHz, 75kHz devi.	—				No signal	



### 3. AM IF adjustment

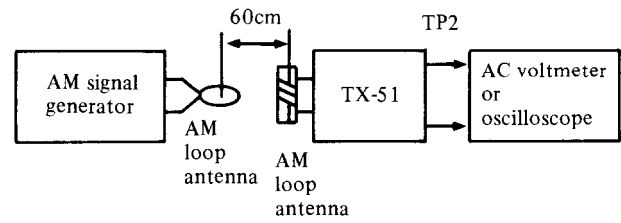
1. Set the dial to quiet point



Set signal	Adjust	Adjust for
450kHz	X104	The output of monitor scope becomes maximum symmetrical response

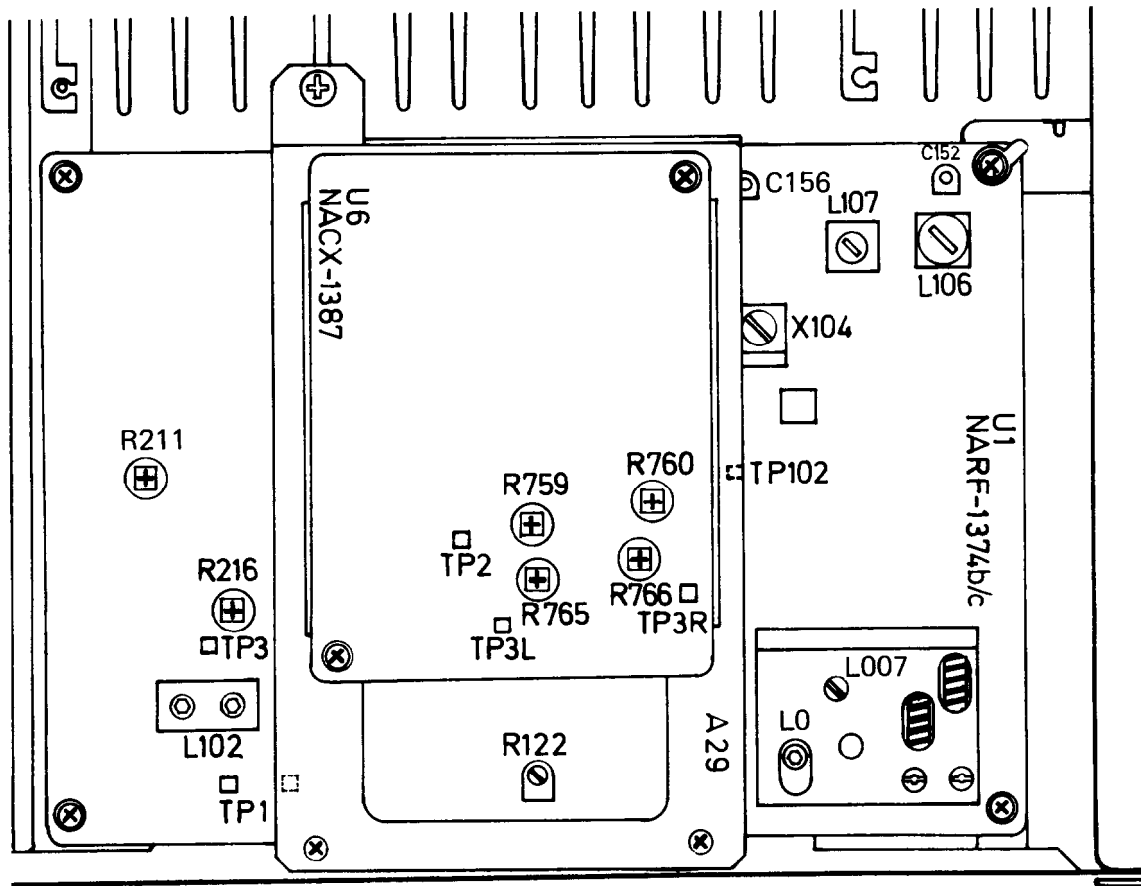
Remark: Usually not necessary to adjust.

### 4. AM RF adjustment



	AM signal generator	Dial to set	Adjust	Adjust for
1	600kHz (603kHz) 400Hz, 30% mod.	600kHz (603kHz)	L106	Maximum
2	1400kHz (1404kHz) 400Hz, 30% mod.	1400kHz (1404kHz)	C152	Maximum
3	Repeat steps 1 and 2 as necessary			

NOTE: ( ): W model



SUBSTITUTIVE PARTS LIST

NOTE:USE THE REGULAR PARTS WHEN REPLACEMENT

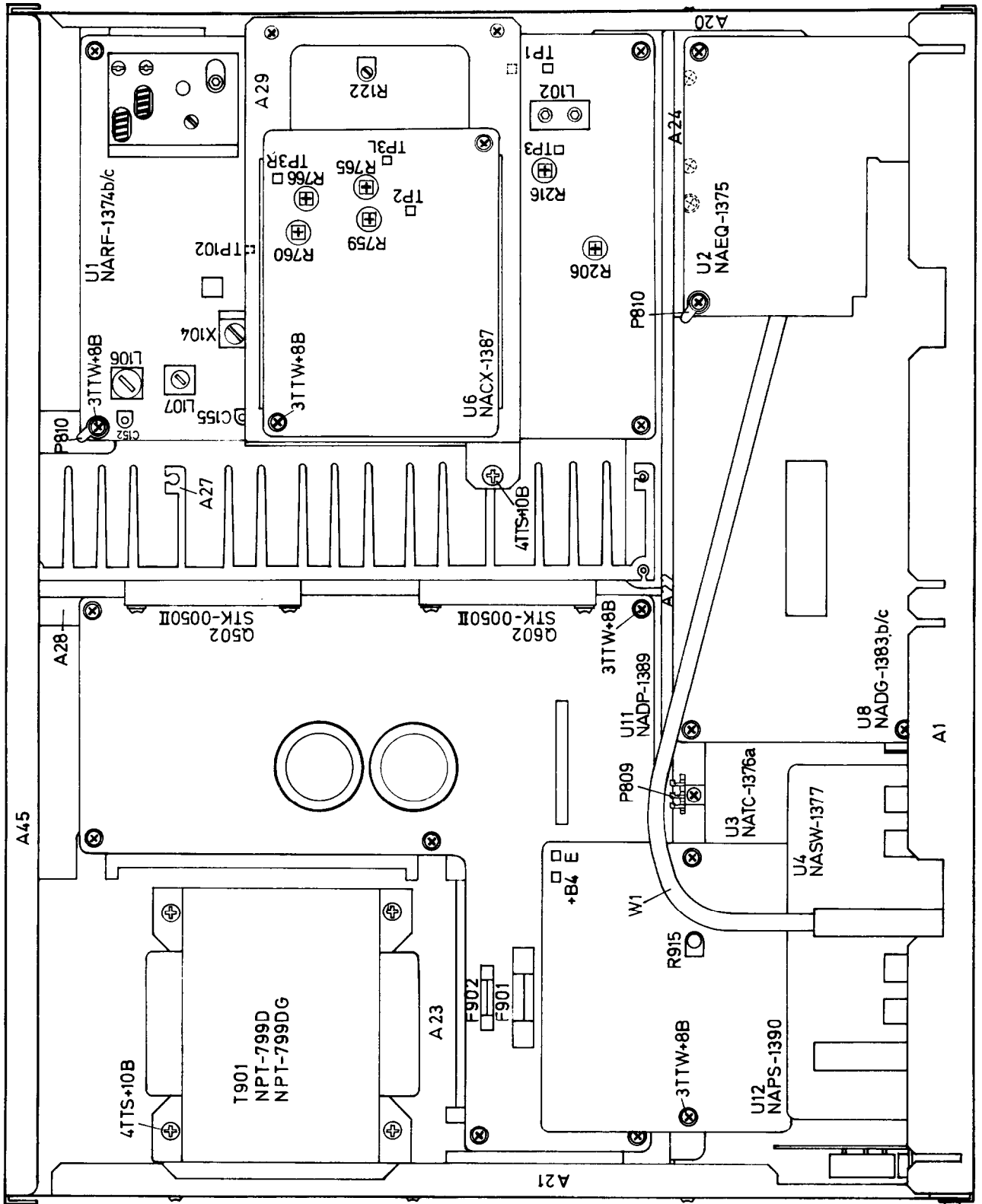
TYPE	CIRCUIT NO.	DESCRIPTION	REGULAR PARTS	SUBSTITUTIVE PARTS	APPLICATION
UD	Q737,733,738,740	IC	NJM4558DX	M5218P	13036-14035
UD	Q7D1	FL TUBE	7B8CS	7B8BC	13036-14035

SUBSTITUTIVE PARTS LIST

NOTE:USE THE REGULAR PARTS WHEN REPLACEMENT

TYPE	CIRCUIT NO.	DESCRIPTION	REGULAR PARTS	SUBSTITUTIVE PARTS	APPLICATION
UD	Q737,733,738,740	IC	NJM4558DX	M5218P	13036-14035
UD	Q7D1	FL TUBE	7B8CS	7B8BC	13036-14035
UD	Q351	IC	NJM4559DX	NJM4559DD	TOTAL 200
UD	Q731-733	IC	NJM4558DX	NJM4558DD	14036-14535
UD	Q737,738,740	IC	NJM4558DX	NJM4558DD	14036-14535
UD	Q351	IC	NJM4559DX	NJM4559DD	14936-15390
UD	Q731-Q733	IC	NJM4558DX	NJM4558DD	14936-15390
UD	Q737,738,740	IC	NJM4558DX	NJM4558DD	14936-15390

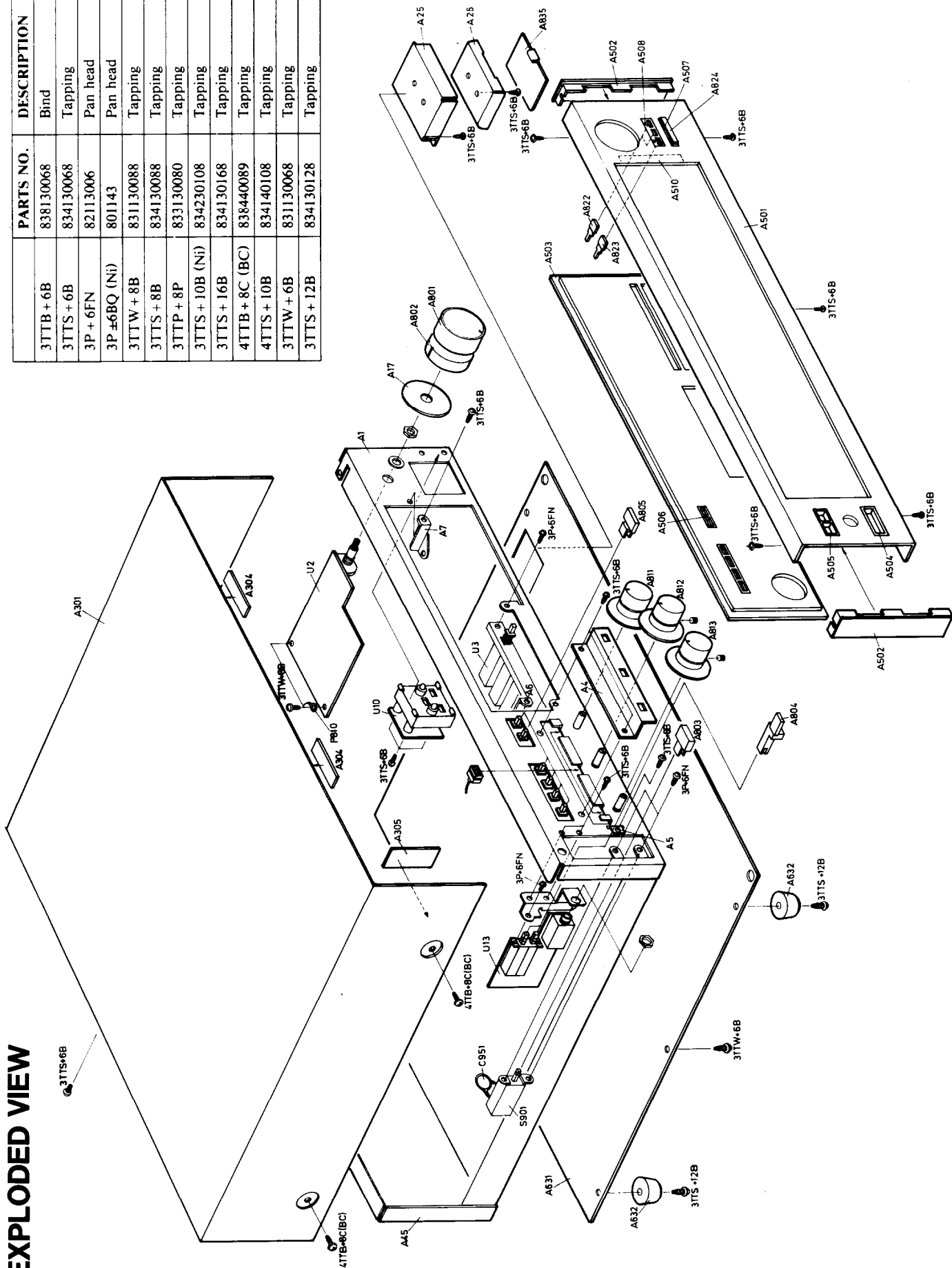
COMPONENT LOCATION



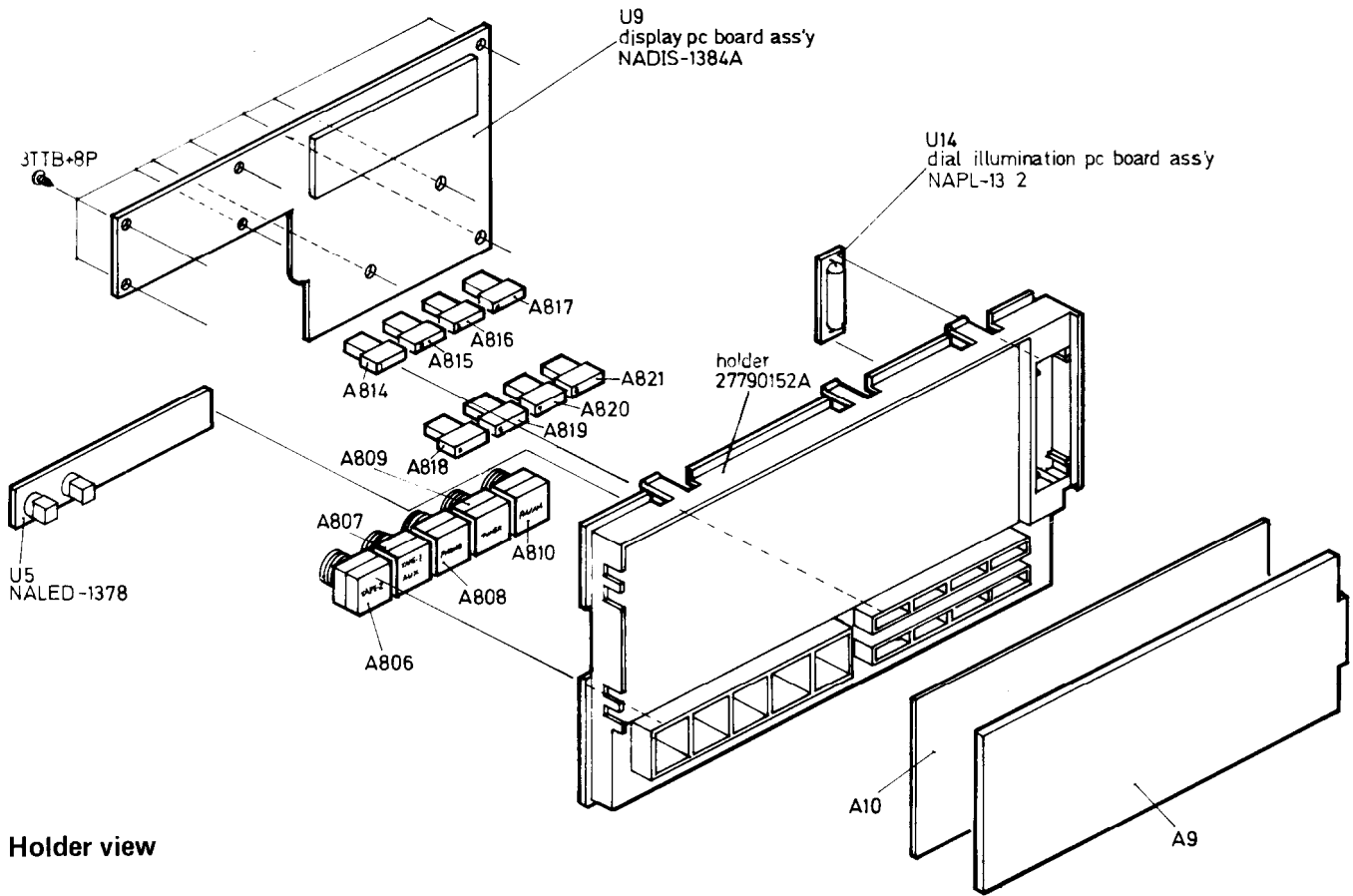
[screws]

**EXPLODED VIEW**

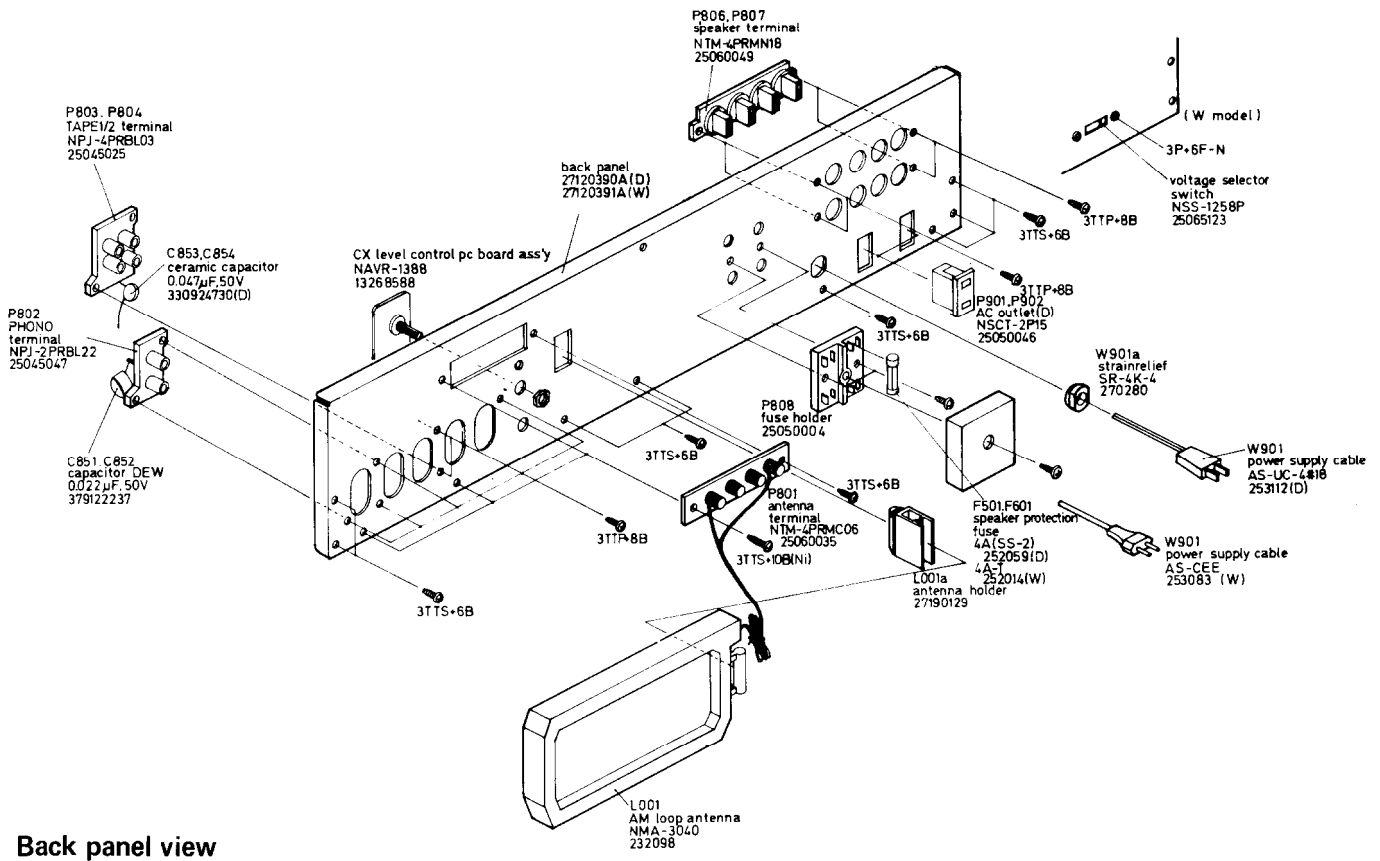
PARTS NO.	DESCRIPTION
3TTB + 6B	Bind
3TTS + 6B	Tapping
3P + 6FN	Pan head
3P ±6BQ (Ni)	Pan head
3TTW + 8B	Tapping
3TTS + 8B	Tapping
3TTP + 8P	Tapping
3TTS + 10B (Ni)	Tapping
3TTS + 16B	Tapping
4TTB + 8C (BC)	Tapping
4TTS + 10B	Tapping
3TTW + 6B	Tapping
3TTS + 12B	Tapping



# EXPLODED VIEW

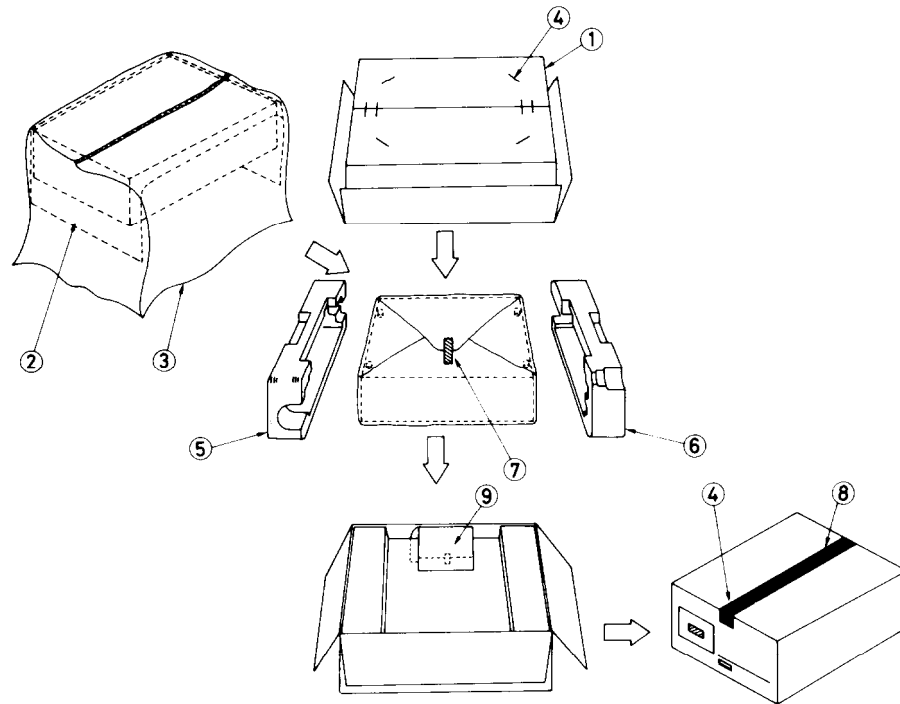


Holder view



Back panel view

# PACKING VIEW



REF. NO.	PARTS NO.	DESCRIPTION	REF. NO.	PARTS NO.	DESCRIPTION
1	29050557	Master carton box			
2	29095012-1	500x800mm, Protection sheet			
3	29100034	850x650mm, Poly-vinyl bag			
4	282301	Sealing hook			
5	29090693	Pad, right side			
6	29090692	Pad, left side			
7	261504	30x50mm, Adhesive tape			
8	260012	Damplon tape			
9		Accessory bag ass'y			
	<b>(U.S.A. model)</b>				
	29340606	Instruction manual		<b>(120V model)</b>	
	292064A	FM antenna		29340606	Instruction manual
	29365006-3	Warranty card		292064A	FM antenna
	29358002	Service station list		29100006	250x350mm, Poly-vinyl bag
	29100006	250x350mm, Poly-vinyl bag		252059	4A (SS-2), Fuse
	252059	4A (SS-2), Fuse		3010054	Battery
	3010054	Battery		<b>(120/220V model)</b>	
				29340599	Instruction manual
				292064A	FM antenna
				25055040	CV-K-2, Conversion plug
				252014	4A-T, Fuse
				29100006	250x350mm, Poly-vinyl bag

# PARTS LIST

REF. NO.	PARTS NO.	DESCRIPTION	REF. NO.	PARTS NO.	DESCRIPTION
A1	27110167C	Front bracket	A7	27140659	Bracket, right side
A3	27140662	Bracket, switch	A8	27140664	Bracket, push switch
A4	27130308	Bracket, lamp	A9	28130151	Dial plate
A5	27140661	Bracket, shielded	A10	28133061	Back plate
A6	27140658	Bracket, left side	A16	28140020	4x10x40mm, Cushion

REF. NO.	PARTS NO.	DESCRIPTION	REF. NO.	PARTS NO.	DESCRIPTION
A17	28140126	53mm, Cushion	F902	252074	2A-SE-EAK, Primary fuse (W)
A18	28175055	0.5x20x40mm, Insulator plate	L001	232098	NMA-3040, AM loop antenna
A20	27115116A	Side bracket, right	L001a	27190129	Holder, antenna
A21	27115115A	Side bracket, left	P801	25060035	NTM-4PRMC06, Terminal, antenna
A22	27130309	Bracket, center	P802	25045047	NPJ-2PRBL22, Terminal, phono
A23	27130310	Bracket, power transformer	P803, P804	25045025	NPJ-4PRBL03, Tape input/output terminal
A24	27140660	Bracket, volume	P806, P807	25060049	NTM-4PRMN18, Speaker terminal
A25	27140463	Bracket, battery	P901, P902	25050046	NSCT-2P15, AC outlet (D)
A26	27300360	Battery case	Q502, Q602	222022	STK-0050II, Power amplifier IC
A27	27160105	Radiator	R951	431523355	3.3M $\Omega$ , 1/2W, Solid resistor (D)
A28	27140663	Bracket, radiator	S901	25035321 or	NPS-111-L285P or
A29	27130311	Bracket, CX		25035135	NPS-111-L100P, Power switch (D)
A30	28140051	8x10x28mm, Cushion	S901	2503522 or	NPS-111-L286P or
A45	27120390A	Back panel (D)		25035176	NPS-111-L140P, Power switch (W)
	27120391A	Back panel (W)	S902	25065123	NSS-1258P, Voltage selector switch (W)
A301	28184147	Top cover	T901	230603	NPT-779D, Power transformer (D)
A304	28140020	4x10x40mm, Cushion		230604	NPT-779DG, Power transformer (W)
A305	28175055	Insulator plate	U1	13268574B	NARF-1374b, FM/AM tuner pc board ass'y (D)
A501	13268121	Front panel ass'y		13270574C	NARF-1374c, FM/AM tuner pc board ass'y (W)
A502	28125117	End cap	U2	13284575	NAEQ-1375, Equalizer amplifier and volume/balance control pc board ass'y
A503	13268901	Clear plate ass'y	U3	13268576A	NATC-1376a, Tone control circuit pc board ass'y
A504	27267179	Guide, power	U4	13268577A	NASW-1377a, Operation switch pc board ass'y
A505	27267191	Guide, speaker	U5	13284578	NALED-1378, Source indicator pc board ass'y
A506	27267192	Guide, mode	U6	13268587	NACX-1387, CX decoder pc board ass'y
A507	27267193A	Guide, tuning	U7	13268588	NAVR-1388, CX level control pc board ass'y
A508	28198572	Facet	U8	13268583B	NADG-1383b, Digital circuit pc board ass'y
A509	27265057	Ring		13270583C	NADG-1383c, Digital circuit pc board ass'y
A510	28140429	0.5x10x50mm, Cushion	U9	13268584A	NADIS-1384a, Frequency and signal strength indicator pc board ass'y
A631	27170130A	Bottom board	U10	13268585	NADIS-1385, Tuning and indicator pc board ass'y
A632	27175009	Leg	U11	13268589	NADP-1389, Power amplifier and protection circuit pc board ass'y
A635	27300359	Lid		13270589A	NADP-1389d, Power amplifier and protection circuit pc board ass'y
A801	28320570	Knob, volume	U12	13268590	NAPS-1390, Power supply pc board ass'y
A802	28320798	Knob, balance	U13	13268591	NASSW-1391, Speaker switch and headphone terminal pc board ass'y
A803	28320760	Knob, power	U14	13268592	NAPL-1392, Dial illumination lamp pc board ass'y
A804	28320773	Knob, speaker	U15	13280586	NASW-1392, Band selector pc board ass'y (W)
A805	28320772	Knob, mode	W901	253112	AS-UC-4, #18, Power supply cable (D)
A806	28320774	Knob, tape 2		253092	AS-CEE-2, Power supply cable (W)
A807	28320775	Knob, tape 1	W901a	270280	SR-4K-4, Strainrelief
A808	28320776	Knob, phono	P808	25050004	Fuse holder
A809	28320777	Knob, tuner	P809	25060025	T-5251-B, Terminal, ground
A810	28320778	Knob, FM	W1	25065204	Wire, remote switch
A811	28320770A	Knob, selector	P810	223004-1	B-5-1, Terminal
A812	28320771A	Knob, tone		260208	Binder
A813	28320791A	Knob, treble			
A814	28320781	Knob, station 1			
A815	28320782	Knob, station 2			
A816	28320783	Knob, station 3			
A817	28320784	Knob, station 4			
A818	28320785	Knob, station 5			
A819	28320786	Knob, station 6			
A820	28320792	Knob, station 7			
A821	28320793	Knob, station 8			
A822	28320780	Knob, memory			
A823	28320794	Knob, red			
A824	13284902	Knob, tuning			
C851, C852	379122237	0.022 $\mu$ F, 50V, Capacitor. DEW			
C853, C854	330924730	0.047 $\mu$ F, 50V, Ceramic capacitor			
C951	3500060	0.01 $\mu$ F, 125V, Capacitor CS (D)			
C951	3500065A	0.01 $\mu$ F, 250V, Capacitor IS (W)			
C951a	27300080	Cover, capacitor			
F501, F601	252059	4A (SS-2), Speaker protection fuse (D)			
	252014	4A-T, Speaker protection fuse (W)			
F901	252049	4A (ST-6), Primary fuse (D)			
F901	252014	4A-T, Primary fuse (W)			

Note: (D); Only 120V model  
(W); Only 120/220V model

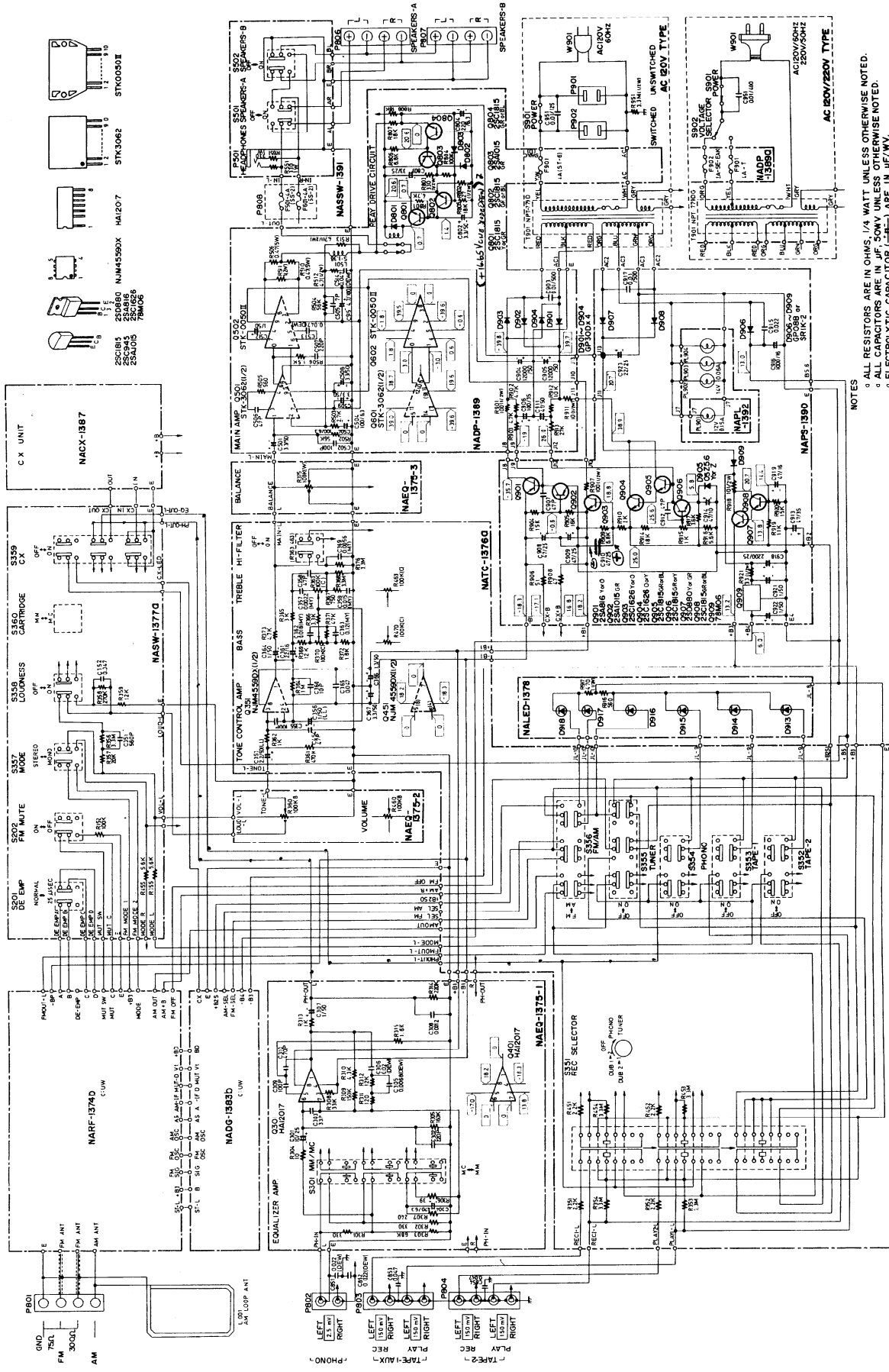
# PRINTED CIRCUIT BOARD-PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION	CIRCUIT NO.	PARST NO.	DESCRIPTION
	<b>Front end</b>				
	240054	FE396U11	C164, C166	352741009	10μF, 16V, Elect.
			C165	352721019	100μF, 6.3V, Elect.
			C169	352750479	4.7μF, 25V, Elect.
			C170	352780339	3.3μF, 50V, Elect.
			C173	352744709	47μF, 16V, Elect.
Q103	222608	μPC1167C2, FM IF	C176	352741019	100μF, 16V, Elect.
Q111	222497	LA1240, AM radio system	C201	352741009	10μF, 16V, Elect.
Q201	222593	HA12016, Stereo decoder	C202	352744719	470μF, 16V, Elect.
	<b>Transistors</b>		C203, C204	352742209	22μF, 16V, Elect.
Q101	2211722	2SC1923 (R)	C205, C206	372524714	470pF ± 5%, 50V, Styrol
Q104	2210746	2SC945A (P)	C207	352780339	3.3μF, 50V, Elect.
Q105-Q109	2210746,	2SC945A(P),	C208	352780109	1μF, 50V, Elect.
Q113, Q202	2211255 or	2SC1815(GR) or	C209	352780339	3.3μF, 50V, Elect.
	2212115	2SC2458(GR)	C210	372521024	1,000pF ± 5%, 50V, Styrol
Q112	2211302 or	2SK68A (L) or	C215, C216	352780339	3.3μF, 50V, Elect.
	2211303	2SK68A (M)	C217, C218	372521024	1,000pF ± 5%, 50V, Styrol [D]
Q205, Q206	2211705	2SD655E	C217-C220	372525614	560pF ± 5%, 50V, Styrol [W]
	<b>Diodes</b>			<b>Resistors</b>	
D102	4000068	VD1222	R122	5215023	N08HR50KBC, Semi-fixed
D103-D112	223105,	1S1555,	R211	5225037	N10HR220KBD, Semi-fixed
D101, D115	223133 or	DS442X or	R216	5225029	N10HR3.3KBD, Semi-fixed
D118	223145	1S2076TD		<b>Switch</b>	
D203-D205			S201	250142	NSS-2225, De-emphasis selector [W]
D113, D114	223136	KV1226		<b>Screws</b>	
D116	4000068	VD1222		82142604	2.6P+4F (BC), Pan head, de-emphasis [W]
	<b>Coils</b>				
L101	233105 or	NCH-1005 or			
	233024	NCCH-1501			
L103	233236	NMC-6027			
L104	233122	NCH3013			
L105	233031	NMC-9-1			
L106	232107 or	NMA3045 or			
	232089	NMA3037			
L107	232084	NMO2018			
L108	232041	NIT-0509			
L201, L202	233107	NMC5002			
	<b>Transformer</b>				
L102	233270	NFIF-6040			
L108	232041	NIT-0509			
	<b>Ceramic filters</b>				
X104	3010058	BCFLZ450A			
X101, X102	3010006	SFE10.7MA (RED)			
	<b>Capacitors</b>				
C106, C107	352780109	1μF, 50V, Elect.			
C116	352784799	0.47μF, 50V, Elect.			
C118, C119	352742209	22μF, 16V, Elect.			
C125	352783399	0.33μF, 50V, Elect.			
C127	352780229	2.2μF, 50V, Elect.			
C128-C132	352780109	1μF, 50V, Elect.			
C152, C156	3060010	NTC-20P09, Trimmer			
C157	372525114	510pF ± 5%, 50V, Styrol			

Note: [D]: only 120V model  
[W]: only 120/220 model



# SCHEMATIC DIAGRAM OF AMPLIFIER SECTION

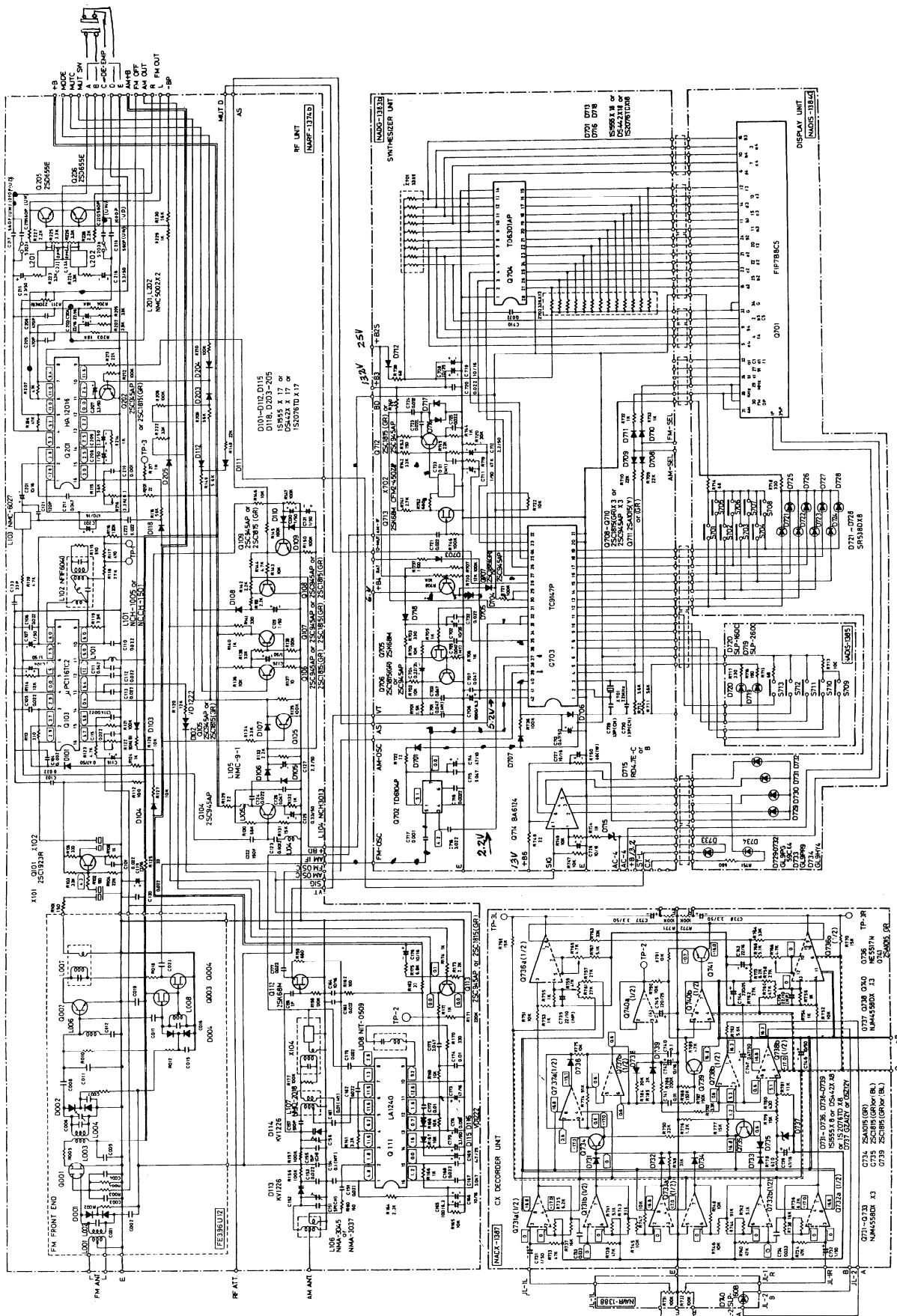


- NOTES**
- ALL RESISTORS ARE IN OHMS, 1/4 WATT UNLESS OTHERWISE NOTED.
  - ALL CAPACITORS ARE IN JUF, 50MV UNLESS OTHERWISE NOTED.
  - ELECTROLYTIC CAPACITOR (—) ARE IN JUF.
  - VOLTAGE MEASURED WITH V.T.V.M. (NO INPUT SIGNAL).
  - CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.

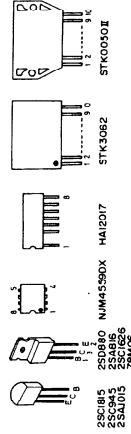
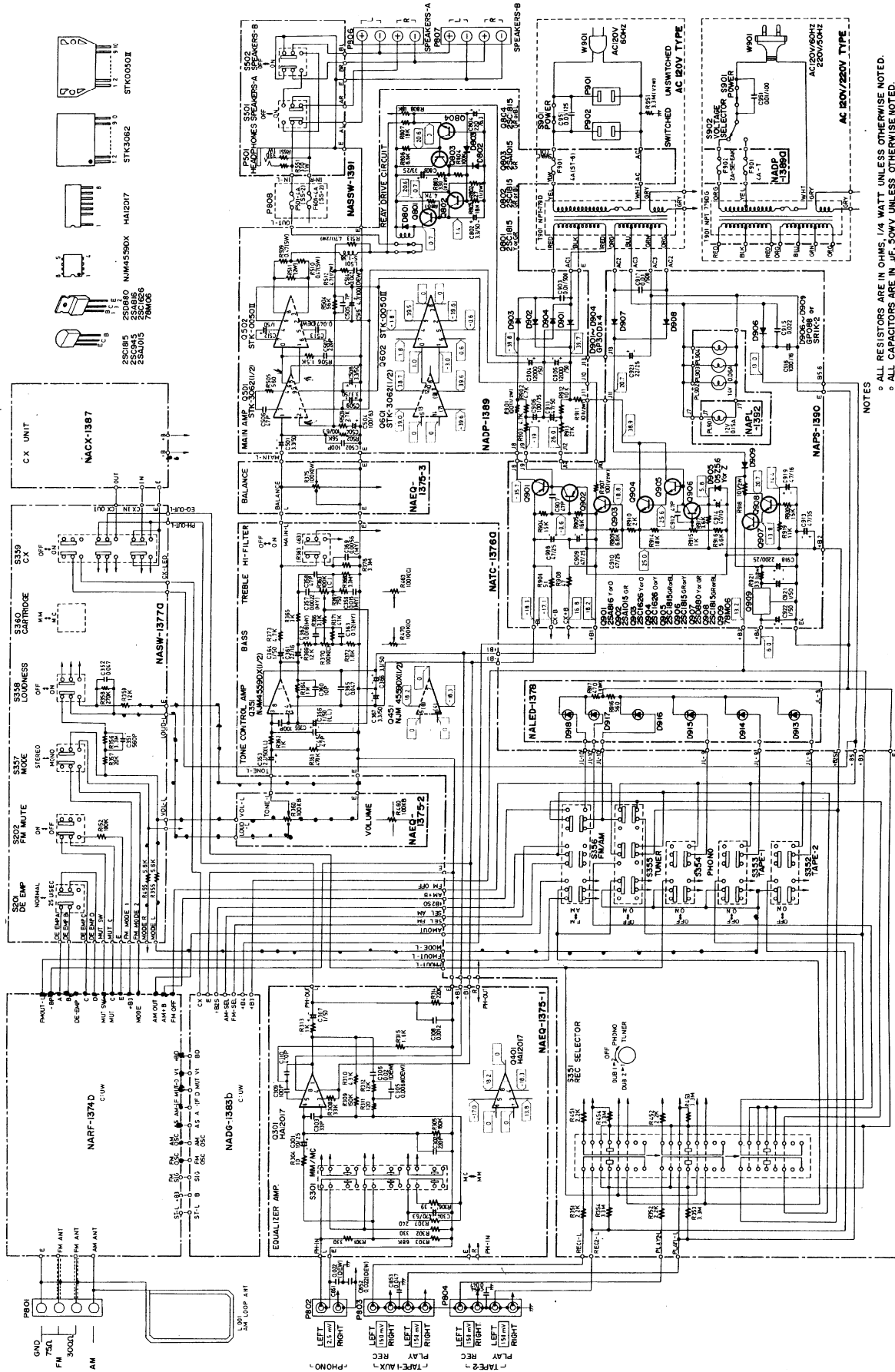


# SCHEMATIC DIAGRAM OF TUNER SECTION

120V model



# SCHEMATIC DIAGRAM OF AMPLIFIER SECTION



# PRINTED CIRCUIT BOARD VIEW FROM COMPONENT SIDE

## DIGITAL CIRCUIT PC BOARD

# PRINTED CIRCUIT BOARD-PARTS LIST

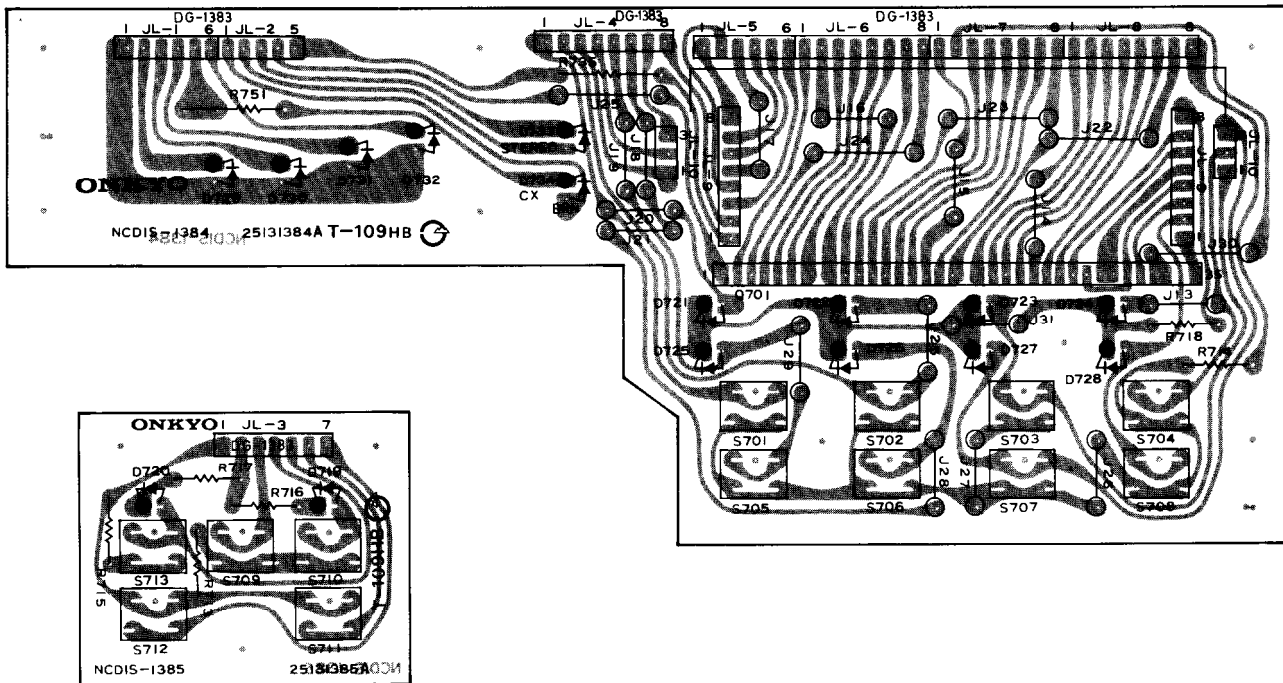
## DIGITAL CIRCUIT PC BOARD (NADG-1383b/c)

CIRCUIT NO.	PARTS NO.	DESCRIPTION	CIRCUIT NO.	PARTS NO.	DESCRIPTION
<b>ICs</b>			<b>Diodes (D model)</b>		
Q702	222675	TD-6104P, Prescaler	D701-D712	223103,	1S1555,
Q703	222674	TC9147P, Micro computer	D716-D718	223133 or	DS442X or
Q704	222673	TD6301AP, Frequency indicator driver		223145	1S2076TD
Q714	222670	BA6124, Signal strength indicator driver	D715	223944 or	RD4.7E-C or
				223943	RD4.7E-B
<b>Transistors</b>			<b>Ceramic filter</b>		
Q705	2211303	2SK68A (M)	X702	3010048	CFM2-450ZL
Q706-Q710	2211255 or	2SC1815 (GR) or			
	2210746	2SC945 (P), [W]	X701	3010073	XTL-7.2M
Q706-Q709	2211255 or	2SC1815 (GR) or			
	2210746	2SC945A (P), [D]	<b>Crystal</b>		
Q711	2211454 or	2SA1015 (Y) or	C702	352761009	10 $\mu$ F, 35V, Elect.
	2211455	2SA1015 (GR)	C704	395162297	0.22 $\mu$ F, 35V, Tantalum
Q712	2211255 or	2SC1815 (GR) or	C706	352721029	1,000 $\mu$ F, 6.3V, Elect.
	2210746	2SC945A (P)	C708	352761009	10 $\mu$ F, 35V, Elect.
Q713	2211303	2SK68A (M)	C711	352780109	1 $\mu$ F, 50V, Elect.
<b>Diodes (W model)</b>			C712	352780229	2.2 $\mu$ F, 50V, Elect.
D701-D713	223103,	1S1555,	C713	352784799	0.47 $\mu$ F, 50V, Elect.
D716-D718	223133 or	DS442X or	C714	352734709	47 $\mu$ F, 10V, Elect.
	223145	1S2076TD	C719	352741009	10 $\mu$ F, 16V, Elect.
D714	2239752 or	RD22E-B2 or	C726, C727	352741009	10 $\mu$ F, 16V, Elect.
	2241231	GZA22X	<b>Resistors</b>		
D715	223944 or	RD4.7E-C or	R750	441626804	68 $\Omega$ , 1W, Metal oxide film
	223943	RD4.7E-B	Z701	49121333509	33k $\Omega$ x9, 1/8W, Network
			Z702	49121333513	33k $\Omega$ x13, 1/8W, Network

**FREQUENCY AND SIGNAL INDICATOR PC BOARD (NADIS-1384a)**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>Fluorescent indicator tube</b>	
Q701	212016	FIP7B8CS
	<b>L.E.Ds</b>	
D721-D728	225057	SR538D
D729-D732	225028	GL9PG59
D733	225029	GL9PR9
D734	225112	GL9HY84
	<b>Resistor</b>	
R751	441526814	680Ω, 1/2W, Metal oxide film
	<b>Switches</b>	
S701-S708	25035275	NPS-111-S239, Station selector
	<b>Holder</b>	
	27190152A	
	<b>Screws</b>	
	833130080	3TTB+8B
	<b>Cushion</b>	
	28140417	
	<b>Knobs</b>	
	28320781	Knob, station 1
	28320782	Knob, station 2
	28320783	Knob, station 3
	28320784	Knob, station 4
	28320785	Knob, station 5
	28320786	Knob, station 6
	28320792	Knob, station 7
	28320793	Knob, station 8

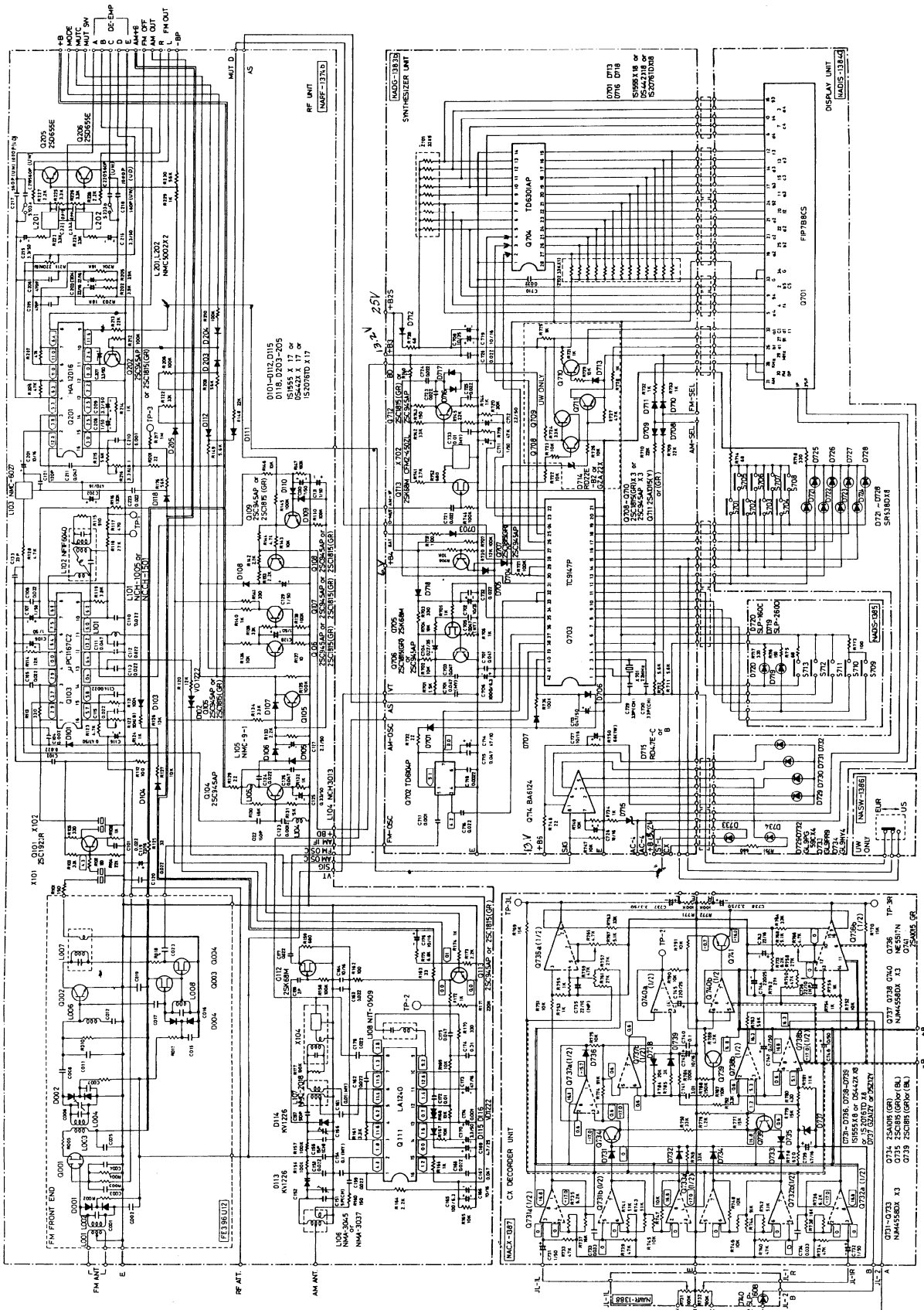
**FREQUENCY AND SIGNAL INDICATOR PC BOARD**



**OPERATION SWITCH PC BOARD**

SCHEMATIC DIAGRAM OF TUNER SECTION

120/220V model  
OVERSERIES



# PRINTED CIRCUIT BOARD VIEW FROM COMPONENT SIDE

OPERATION SWITCH PC BOARD

TONE CONTR

## PRINTED CIRCUIT BOARD-PARTS LIST

### OPERATION SWITCH PC BOARD (NASW-1377a)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>Switches</b>	
S201, S202	25035319	NPS-222-L283, De-emphasis/FM muting
S357, S360	25035323	NPS-100-222-162-L287, Mode/Loudness/CX/Cartridge
	<b>Bracket</b>	
	27140664A	Push switch
	<b>Screws</b>	
	82113006	3P+6FN, Pan head

### OPERATION SWITCH PC BOARD (NADIS-1385)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>L.E.Ds</b>	
D719	225093	SLP-260C, Auto indicator
D720	225092	SLP-160C, Memory indicator
	<b>Switches</b>	
S709-S713	25035275	NPS-111-S239
	<b>Holder</b>	
	27190151	
	<b>Screw</b>	
	834130068	3TTS+6B

### TONE CONTROL CIRCUIT PC BOARD (NATC-1376a)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>IC</b>	
Q351, Q451	222534	NJM-4559DX
	<b>Capacitors</b>	
C353, C453	392880227	2.2 $\mu$ F, 50V, LL
C356, C456	392880107	1 $\mu$ F, 50V, LL
C361, C461	352742209	22 $\mu$ F, 16V, Elect.
C364, C464	352780109	1 $\mu$ F, 50V, Elect.
C366, C367	352780339	3.3 $\mu$ F, 50V, Elect.
	<b>Resistors</b>	
R363, R463	5148082	N16RQMS11C100KCO25M, Treble control and hi-cut filter
R370, R470	5148081	N16RGM11C100KCS25M, Bass control variable
	<b>Switches</b>	
S351	25030219	NRSM-165-25SS, Recording selector
S352-S356	25035318	NPS-262-342-L282, Source selector

**BAND SELECTOR PC BOARD (NASW-1386)**

Only W model

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	250142	NSS-2225, Slide switch
	82142604	2.6P+4F (BC), Pan head screw

**SPEAKER SWITCH AND HEADPHONE TERMINAL PC BOARD (NASSW-1391)****SPEAKER SWITCH AND HEADPHONE TERMINAL**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
R551, R651	441623314	330 $\Omega$ , 1/2W, Metal oxide film resistor
S501, S502	25035312	NPS-222-L276, Speaker selector switch
P501	25045105	HLJ-4307-01-020, Headphone terminal
	37140662A	Bracket, switch
	82113006	3P+6FN, Pan head screw

**DIAL ILLUMINATION LAMP PC BOARD (NAPL-1392)**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
PL901	210091	PL-12V150mA, Lamp



# PRINTED CIRCUIT BOARD VIEW FROM COMPONENT SIDE

## PRINTED CIRCUIT BOARD-PARTS LIST

### EQUALIZER AMPLIFIER AND VOLUME/BALANCE CONTROL PC BOARD (NAEQ-1375)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Q301, Q401	222594	HA12017
	<b>ICs</b>	
C301, C401	352751009	10 $\mu$ F, 25V, Elect.
C304, C404	352724719	470 $\mu$ F, 6.3V, Elect.
C307, C407	352780109	1 $\mu$ F, 50V, Elect.
C311, C312	352780109	1 $\mu$ F, 50V, Elect.
C411, C412	352780109	1 $\mu$ F, 50V, Elect.
	<b>Resistor</b>	
R360, R460	5104136	N16RDTM100KW100KBTP35H, Volume/Balance control variable
R375		
	<b>Switch</b>	
S301	25065151	NSS-6268, MM/MC selector

### CX DECODER PC BOARD (NACX-1387)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Q731-Q733	NJM4558DX	<b>ICs</b>
Q736	NE5517N	
Q737, Q738	NJM4558DX	
Q740		
	<b>Transistors</b>	
Q734, Q741	2211455	2SA1015 (GR)
Q735, Q739	2211255 or 2211256	2SC1815 (GR) or 2SC1815 (BL)
	<b>Diodes</b>	
D731-D736	223105,	1S1555
D738, D739	223133 or 223145	DS442X or 1S2076TD
D737	2241112 or 224187	GZA12Y or 05Z12Y
	<b>Capacitors</b>	
C731, C732	352780109	1 $\mu$ F, 50V, Elect.
C735, C736	352932206	22 $\mu$ F, 10V, Non-polar elect.
C737, C738	352780339	3.3 $\mu$ F, 30V, Elect.
C739	352744709	47 $\mu$ F, 16V, Elect.
C742	352741009	10 $\mu$ F, 16V, Elect.
C743	352742209	22 $\mu$ F, 16V, Elect.
C744, C745	352752219	220 $\mu$ F, 25V, Elect.
C746	352781009	10 $\mu$ F, 50V, Elect.
C747	352784799	0.47 $\mu$ F, 50V, Elect.
	<b>Resistors</b>	
R759, R760	5225034	N10HR47KBD, Semi-fixed
R765, R766	5225019	N10HR47KBD, Semi-fixed

### CX LEVEL CONTROL PC BOARD (NAVR-1388)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
D740	225103	SLP-1608, L.E.D.
R731, R732	5148083	N16RL100KB20Z, CX level control

### SOURCE INDICATOR PC BOARD (NALED-1378)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
D913-D916	L.E.Ds	
D917, D918	225112	GL-9HY84
	225111	GL9PG54
	<b>Resistor</b>	
R917	442524714	470 $\Omega$ , 1/2W, Metal oxide film
	<b>Spacer</b>	
	27270071	L.E.D.

# PRINTED CIRCUIT BOARD VIEW FROM COMPONENT SIDE

## POWER AMPLIFIER AND PROTECTION CIRCUIT

### PRINTED CIRCUIT BOARD-PARTS LIST

#### POWER AMPLIFIER AND PROTECTION CIRCUIT PC BOARD (NADP-1389)

CIRCUIT NO.	PARTS NO.	DESCRIPTION	CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>ICs</b>		C803	352753309	33 $\mu$ F, 25V, Elect.
Q501, Q601	222023	STK-3062, Differential and driver IC	C804	352722219	220 $\mu$ F, 6.3V, Elect.
Q502, Q602	222022	STK-0050II, Power amplifier	C904, C905	3504158	12,000 $\mu$ F, 50V, Elect.
	<b>Transistors</b>		C906	352761019	100 $\mu$ F, 35V, Elect.
Q801	2211254 or 2211255	2SC1815 (Y) or 2SC1815 (GR)	C911	352784709	47 $\mu$ F, 50V, Elect.
Q802, Q804	2211255 or 2211256	2SC1815 (GR) or 2SC1815 (BL)		<b>Resistors</b>	
Q803	2211455	2SA1015 (GR)	R509, R609	4000080	0.47 $\Omega$ , 5W, Metal plate
	<b>Diodes</b>		R510, R610	4000080	0.47 $\Omega$ , 5W, Metal plate
D801-D803	223105, 223133 or 223145	1S1555, DS442X or 1S2076TD	R511, R611	441720104	1 $\Omega$ , 2W, Metal oxide film
D901-D904	223863	GP-30DL	R512, R612	441520474	4.7 $\Omega$ , 1/2W, Metal oxide film
	<b>Coils</b>		R513, R613		
L501, L601	231001	S1.3B	R802	441522704	27 $\Omega$ , 1/2W, Metal oxide film
	<b>Capacitors</b>		R803	441523314	330 $\Omega$ , 1/2W, Metal oxide film
C501, C601	352780339	3.3 $\mu$ F, 50V, Elect.	R901	441521014	100 $\Omega$ , 1/2W, Metal oxide film
C504, C604	357221019	100 $\mu$ F, 6.3V, Elect.	R911	441521004	10 $\Omega$ , 1/2W, Metal oxide film
C508, C509	352780339	3.3 $\mu$ F, 50V, Elect.		<b>Relay</b>	
C512, C612	352780109	1 $\mu$ F, 50V, Elect.	RL801	25065134	NRL-2P-DC24V-07, Protection
C515, C615	352790479	4.7 $\mu$ F, 100V, Elect.		<b>Fuse holder</b>	
C802	352780339	3.3 $\mu$ F, 50V, Elect.	F901a	250113	SN5051
			F902a	25050065	YSH403T (W)
				<b>Fuse</b>	
			F901	252049	4A (ST-6) (D)
			F901	252014	4A-T (W)
			F902	252074	2A-SE-EAK (W)

## POWER SUPPLY PC BOARD

### POWER SUPPLY CIRCUIT PC BOARD (NAPS-1390)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
<b>Transistors</b>		
Q901	2200674 or 2200673	2SA816 (Y) or 2SA816 (O)
Q902	2211455	2SA1015 (GR)
Q903, Q904	2200664 or 2200663	2SC1626 (Y) or 2SC1626 (O)
Q905, Q906	2211255 or 2211256	2SC1815 (GR) or 2SC1815 (BL)
Q907	2201074 or 2201075	2SD880 (Y) or 2SD880 (GR)
Q908	2211255 or 2211256	2SC1815 (GR) or 2SC1815 (BL)
<b>IC</b>		
Q909	222780062	78M06, Voltage regulator
<b>Diodes</b>		
D905	224163 or 224164	05Z5.6Y or 05Z5.6Z
D906-D909	223804 or 223848	SR1K-2 or GP08B
<b>Lamps</b>		
PL902-PL904	210109	PL14V0.06AW4.0
<b>Capacitors</b>		
C908-C910	352754709	47 $\mu$ F, 25V, Elect.
C913	352764709	47 $\mu$ F, 35V, Elect.
C914	352734709	47 $\mu$ F, 10V, Elect.
C916	352741029	1,000 $\mu$ F, 16V, Elect.
C918	352752229	2,200 $\mu$ F, 25V, Elect.
C919, C920	352744709	47 $\mu$ F, 16V, Elect.
C921, C922	352780109	1 $\mu$ F, 50V, Elect.
C923	352752209	22 $\mu$ F, 25V, Elect.
<b>Resistors</b>		
R907	442521014	100 $\Omega$ , 1/2W, Metal oxide film
R915	5215018	N08HR1KBC, Semi-fixed
R918	442521004	10 $\Omega$ , 1/2W, Metal oxide film
R921	442523304	33 $\Omega$ , 1/2W, Metal oxide film
<b>Radiator</b>		
	271600029	
<b>Screws</b>		
	82113008	3P+8FN