

ONKYO® SERVICE MANUAL

SUPER SERVO OPERATION INTEGRATED STEREO AMPLIFIER MODEL A-7070

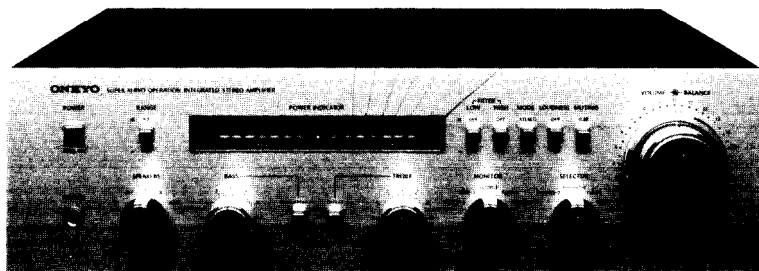
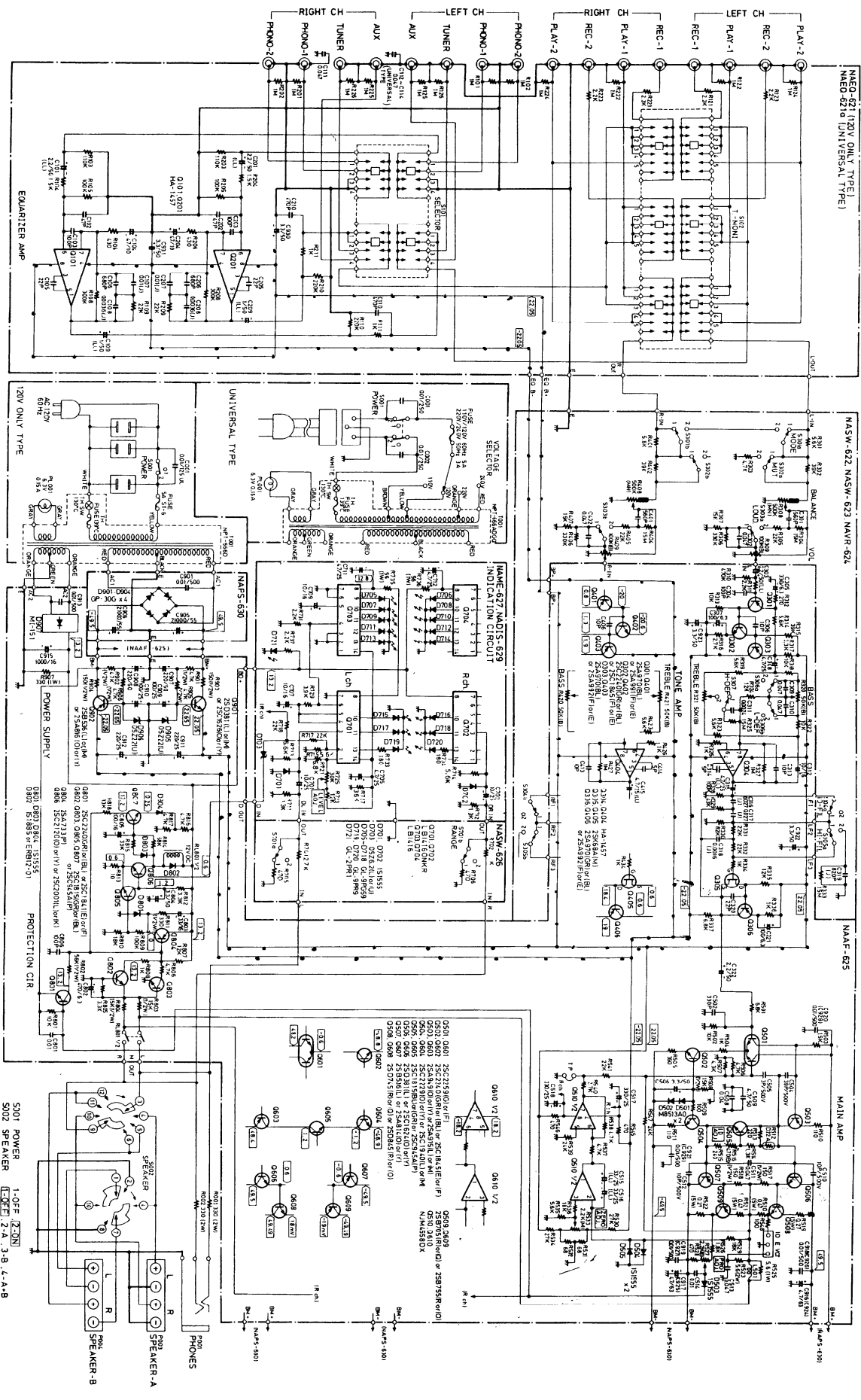


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ONKYO®
AUDIO COMPONENTS

SCHEMATIC DIAGRAM
Model A-7070



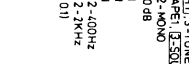
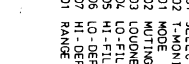
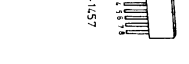
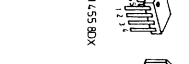
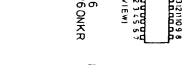
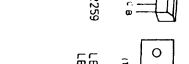
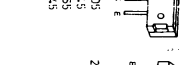
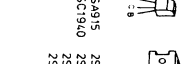
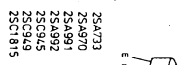
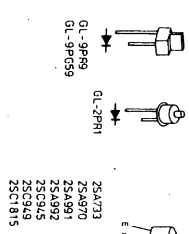
NOTES

*ALL RESISTORS ARE IN OHMS, 1/2WATT UNLESS OTHERWISE NOTED

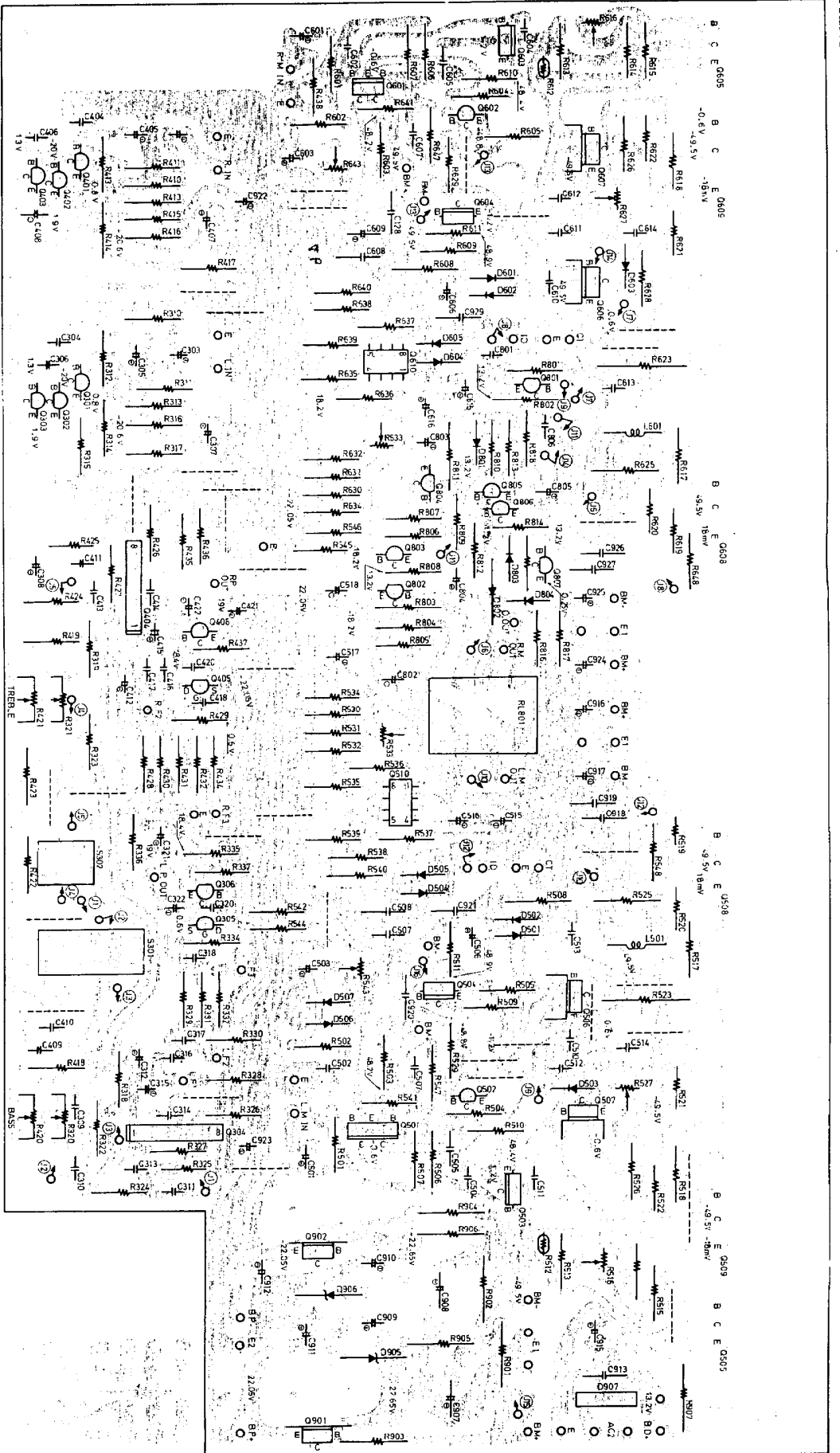
*ELECTRICAL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE NOTED

*VOLTAGE ARE MEASURED WITH DC-VOLT METER (NO SIGNAL INPUT)

*CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT



- S201 POWER 1-0FF 2-ON
- S202 SPEAKER 1-0FF 2-ON
- S203 SPEAKER 1-0FF 2-ON
- S204 SPEAKER 1-0FF 2-ON
- S205 MUTE 1-0FF 2-ON
- S206 MUTE 1-0FF 2-ON
- S207 MUTE 1-0FF 2-ON
- S208 MUTE 1-0FF 2-ON
- S209 MUTE 1-0FF 2-ON
- S210 MUTE 1-0FF 2-ON
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- S212 MUTE 1-0FF 2-ON
- S213 MUTE 1-0FF 2-ON
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- S295 MUTE 1-0FF 2-ON
- S296 MUTE 1-0FF 2-ON
- S297 MUTE 1-0FF 2-ON
- S298 MUTE 1-0FF 2-ON
- S299 MUTE 1-0FF 2-ON
- S300 MUTE 1-0FF 2-ON



POWER AMPLIFIER ADJUSTMENT

1. Set the all control knobs to standard position.

Standard knob position
 SELECTOR..... AUX
 TAPES MONITOR..... SOURCE
 VOLUME..... MAXIMUM
 BALANCE, BASS/TREBLE..... CENTER
 MODE..... STEREO
 Muting, Loudness, Low Fil./Hi Fil..... OFF
 BASS/TREBLE SHIF..... DEFEAT
 SPEAKER..... A

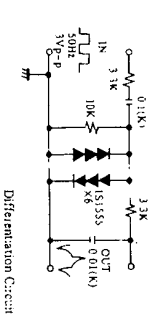
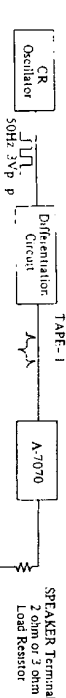
1. IDLING CURRENT ADJUSTMENT

1. Connect the DC voltmeter between I_{IN} and V_{CT} terminals.
 2. Adjust the voltage to 0.92±0.02V with semi-fixed resistor of R516 and R616
- NOTES: Adjust after switching on for 5 minutes.
 Minimum, Open load

2. SERVO OPERATIONAL AMPLIFIER ADJUSTMENT

1. Place the short circuit across TP terminals of servo operational circuit.
2. Connect the DC voltmeter between V_{CT} and E terminals and confirm the voltage within 0-0.7mV.
3. Remove the short circuit
4. Adjust the voltage to 0±0.1mV with semi-fixed resistor of R733 and R633

3. CURRENT DETECTOR LEVEL ADJUSTMENT



Differentiation Circuit

NOTES: Adjust after switching on for 5 minutes.

VOLUME..... Maximum

4. OUTPUT INDICATOR LEVEL ADJUSTMENT

1. Connect the AF oscillator across AUX terminal and AC voltmeter across speaker terminals.
2. Connect the AF oscillator resistor of 8 ohms across speaker terminal. (A).
3. Set the AF oscillator output to 100mV.
4. Adjust the output voltage to 2.3 7V with volume control.
5. Then adjust the semi-fixed resistor of R725 and R726 to light up 7th L.E.D.

SPECIFICATIONS

Power Output:	70 watts per channel, min. RMS, at 8 ohms both channels driven, from 20 Hz to 20 kHz, with no more than 0.02% total harmonic distortion.
Total Harmonic Distortion:	0.02% at rated power 0.018% at 1 watt output
IM Distortion:	0.02% at rated power 0.018% at 1 watt output
(60 Hz: 7 kHz = 4:1) Frequency Response:	15 ~ 50,000 Hz (± 1 dB)
RIAA Deviation:	20 ~ 20,000 Hz (± 0.3 dB)
Damping Factor:	50 at 8 ohms
Input Sensitivity and Impedance:	PHONE 1 & 2: 2.5mV, 50 kohms TUNER: 150mV, 50 kohms AUX: 150mV, 50 kohms TAPE PLAY 1 & 2: 150mV, 50 kohms
Phono Overload:	200 mV RMS. at 1 kHz, 0.02% THD
Tone Control	
BASS:	± 10 dB at 100 Hz (turn over at 400 Hz)
TREBLE:	± 10 dB at 10 kHz (turn over at 2 kHz)
Turnover Frequency:	BASS: 400 Hz TREBLE: 2 kHz
Filter	LOW: 100 Hz (12 dB/oct.) HIGH: 6 kHz (12 dB/oct.)

Signal to noise ratio:	PHONO: 80 dB (IHF A Network) AUX: 90 dB (IHF A Network)
Muting:	-20 dB
Loudness:	(-40 dB) +5 dB at 100 Hz +5 dB at 10 kHz
Range:	(Ind. switch) $\times 1$ and $\times 0.1$
GENERAL	
Power Supply Rating:	AC 120V, 50 Hz (120V model) AC 110, 120, 220/240V, 50, 60Hz
Outputs:	SPEAKER A & B, PHONES, TAPE REC 1 & 2
Inputs:	PHONO 1 & 2 TUNER AUX TAPE PLAY 1 & 2
Semiconductors:	2 FETs, 35 Transistors, 10 ICs, 26 Diodes
Dimensions:	418(W) \times 124(H) \times 396(D) mm 16-1/2" \times 4-15/16" \times 15-5/8"
Weight:	10.3 kg (22.7 lbs.)

Specifications and features are subject to change without notice for improvement.

PRECAUTIONS

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

		PARTS NO.
AC fuse	5A (ST-6)	252050 (110/120V model)
	3A-T	252003 (220/240V model)

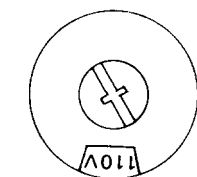
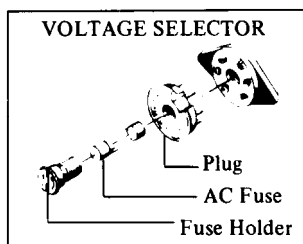
- Replacement for power amplifier transistors, if necessary, must be made from the same beta (h_{FE}) group as the original type.
- Always disconnect the chassis from power line when soldering.
Turning the power switch OFF is not enough.
Power line leakage passing through the heating element may destroy the transistors.

VOLTAGE CONVERSION (Universal model)

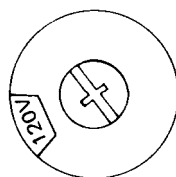
This model is equipped with a universal power transformer to permit operation at either power source of 110, 120, 220 or 240V AC 50/60Hz.

To convert the unit to a different power source voltage, change the plug as illustrated in the drawing below.

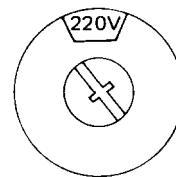
CAUTION: DISCONNECT POWER SUPPLY CORD FROM AC OUTLET BEFORE CONVERTING VOLTAGE.



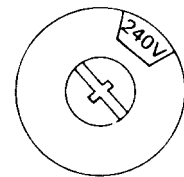
For 110V Operation



For 120V Operation

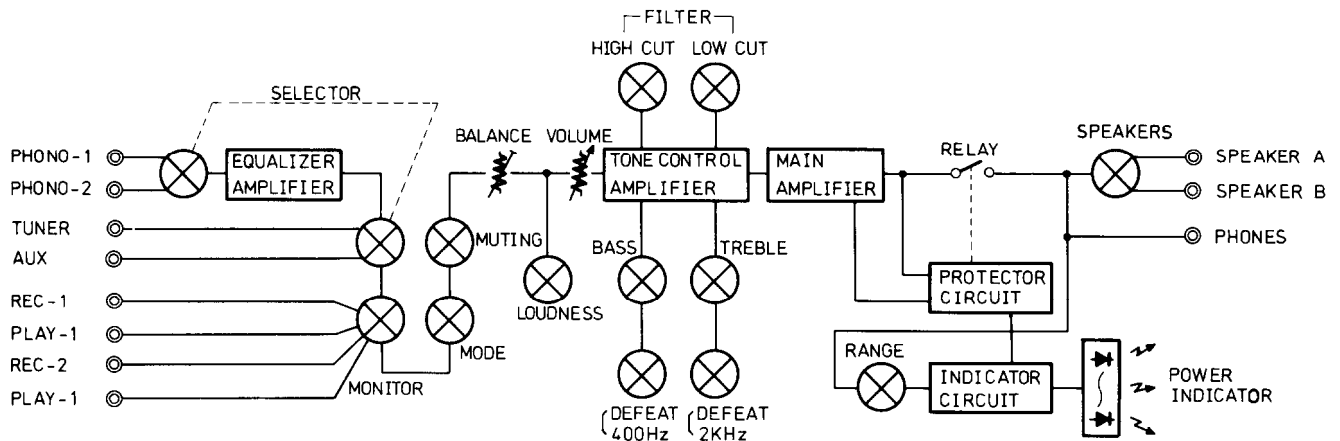


For 220V Operation



For 240V Operation

BLOCK DIAGRAM



CIRCUIT DESCRIPTION

1. SERVO OPERATIONAL AMPLIFIER

In order to achieve a greater degree of fidelity in waveform transmission, and to remove the large capacitance capacitors (which have questionable effect on the quality of sound) from the NFB, DC amplifier designs are being more and more widely used in amplifiers today. The A-7070, however, has advanced even further by adopting the recently developed Servo Operational Amplifier which features a truly superb quality of sound, and performs considerably better than the now conventional DC amplifiers.

The major circuit feature of the Servo Operational Amplifier (see outline in Fig. 1-1) is the servo feedback loop which has no effect whatsoever on the main signal. In other words, if the signal feedback factor is β_1 and the servo feedback factor β_2 , the $0 \cong \beta_2 \ll \beta_1 \ll 1$ relation holds true within the signal bandwidth, while $\beta_2 \gg 1$ holds true in the subsonic region down to DC. For this purpose, a servo feedback amplifier was necessary. And since it was also necessary to include a high-cut filter, and suppress signal amplifier drift at higher DC gain plus 1/f noise and other subsonic region components, a -6dB/oct high-cut mirror integrating circuit (see Fig. 1-2) has been employed. The V_{ref} in Fig. 1-1 serves as the input voltage required to keep the system output DC voltage at 0V.

In the block diagram for the actual Servo Operational amplifier (see Fig. 1-3), R_f and R_B constitute the signal feedback loop, while A2 and A3 form the servo feedback loop.

Assuming that $A_1, A_2, A_3 \gg 1$, the input/output characteristics $T(\omega)$ may be expressed as,

$$T(\omega) = \frac{R_N(R_f + R_B)}{A_2 \cdot R_f \cdot R_B} \left[\frac{1 + \frac{j\omega}{\omega_1}}{1 + \frac{j\omega}{\omega_2}} \right]$$

where $\omega_0 = \frac{1}{CR}$, $\omega_1 = \frac{\omega_0}{A_2}$, $\omega_2 = \frac{R_f}{R_N} \omega_0$

The frequency response is as shown in Fig. 1.4, ω_2 being about 0.3Hz ~ 2Hz. A3 is phase inverted in order to prevent positive feedback in the DC region.

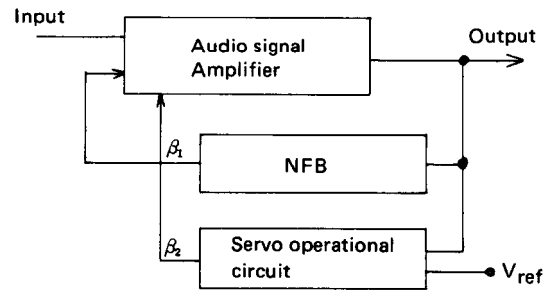


Fig. 1.1

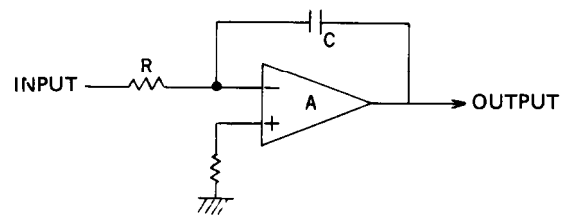


Fig. 1.2

Hence, the subsonic frequencies are effectively cut just as if by coupling capacitor. But unlike capacitors, the output impedance of the servo operational amplifier decreases at lower frequencies (coupling capacitor impedance increases at corresponding frequencies) due to a greater amount of feedback. Since, however, in actual circuits the second stage is driven at a suitable impedance level, and the output impedance of the amplifier itself is made sufficiently large enough (to improve stability) by connecting a resistance γ_0 in series, the output impedance is kept constant at γ_0 with coupling capacitors, on the other hand, the increased impedance at lower frequencies naturally results in an increase in thermal noise (directly related to effective impedance) in the low frequency region.

Although servo feedback circuit integrating capacitors of large leakage current, or high DC resistance and inductance are undesirable, the effects are nowhere near as serious as the insertion of a capacitor in the signal path.

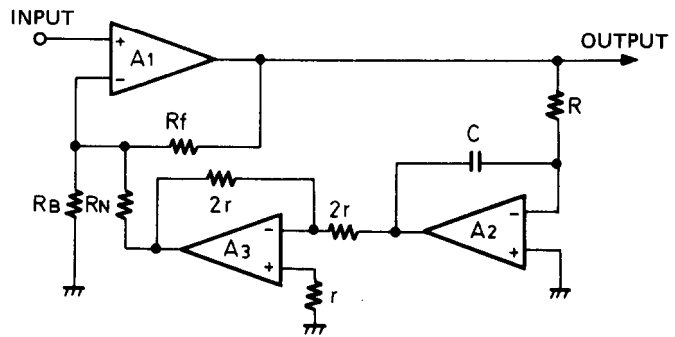


Fig 1.3

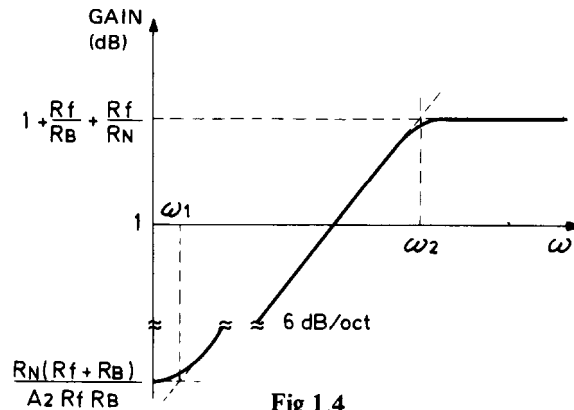


Fig 1.4

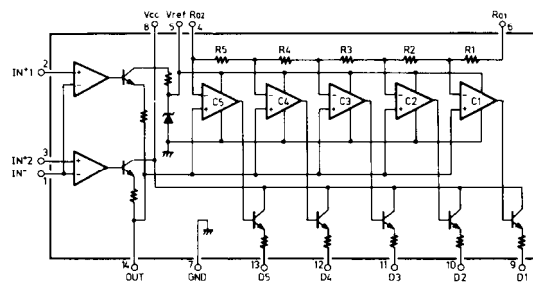
2. OUTPUT INDICATOR DRIVER CIRCUIT

Q701 (Q702) and Q703 (Q704) are the power indicator driver ICs. The audio signal applied to pin no.3 of Q701 is first amplified and then applied to the comparator. The LEDs connected to the IC output terminals pin nos.9 ~ 13 are lit up in succession depending on the comparator level. With the inclusion of a second IC, Q703, in the A-7070 the number of power indicator LEDs has been increased to 8.

The Q701 amplifier output, pin no.14, is connected to pin no.14 of Q703, while pin no.6 of Q701 is connected to pin no.4 of Q703, thereby using the comparator divider resistance in a cascade connection. The amplifier circuit in Q703 is not required, so pin no.1 is left open, and pin nos.2 and 3 are connected to ground. The corresponding LEDs will thus light up in succession from D705, D707, and D709, again depending on the comparator level.

The connection from pin no.14 to pin no.1 in Q701 is part of a feedback loop where the feedback resistor R725 (22kΩ) determines the gain of the amplifier, and is consequently used in the adjustment of indicator level.

Pin no.2 of Q701 is connected to the protector circuit. So when the protector circuit is activated as a result of some abnormality in the amplifier circuitry, and for the first 4 seconds (approx.) after the power is switched on, the speaker relay is activated. All of the indicator LEDs light up in unison, and the audio output signal is muted.



LB1416 EQUIVALENT DIAGRAM

COMPONENT LOCATION – PARTS LIST

120V model

REF. NO.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
1	U1	12659521	NAEQ-621, Equalizer ampli. p.c.b.
2	U2	12659522	NASW-622, Switch p.c.b.
3	U3	12659523	NASW-623, Switch p.c.b.
4	U4	12659524	NAVR-624, Volume control p.c.b.
5	U5	12659525	NAAF-625, Preampli., power ampli., rectifier and protection circuit p.c.b.
6	U6	12659526	NASW-626, Switch p.c.b.
7	U7	12659527	NAME-627, Output indicator driver p.c.b.
8	U8	12659529	NADIS-629, Output indicator p.c.b.
9	U9	12659530	NAPS-630, Rectifier p.c.b.
10	Q505, Q605	2211256 2211255 or 2210746	2SC1815(BL), 2SC1815 (GR) or Thermo ampli. 2SC945A(P) transistor
11	Q508, Q608	2201012 2201013 or	2SD745(R) or Power ampli. 2SD745(Q) transistor
12	Q509, Q609	2201022 2201023 or	2SB705(R) or Power ampli. 2SB705(Q) transistor
13	PL001	210057	PL6.3V, 0.15A, Power indicator lamp
14	T001	230279	NPT-666D, Power transformer
15	C001	3504012	UL125V, 103M, UL capacitor
16	R001, R002	441723314	330Ω, 2W, Metal oxide film resistor
17	S001	25035135 25035138 or	NPS-111-L100P NPS-111-L103P or Power switch
18	S002	25030124	NRSM-244-35Y, Speaker selector switch
19	P001	25045018	LJ-100-H, Stereo headphone jack
20	P002	25060008	Ground terminal
21	P003, P004	25060029	NTM-4PRMN05, Speaker terminal
22	P005-P007	25050032	S-I6444-01, AC outlet
23	W001	253099	AS-UC-3, Power supply cord
24	W001a	270025	SR-3P-4, Strainrelief
25	F001	252050	5A, ST-6, AC fuse
26	F001a	250080	S-N1301, Fuseholder
27	S003	25030125	NRSM-104-35ZV, Operation block of selector switch
28	S003a	25065083	Wire block of selector switch
29	S004	25030126	NRSM-105-35ZV, Operation block of tape monitor switch
30	S004a	25065084	Wire of tape monitor switch
32	A001	27110078	Front bracket
34	A003	27190043A	Holder
35	A004	28130074	Plate, output indicator
36	A014	27115043A	Side bracket
37	A015	27140267	Bracket for pc board
38	A016	27160051	Radiator
40	A018	27130148	Bracket for power transformer
41	A019	27140268	Bracket
42	A031	27120155	Back panel
43	A032	27150096A	Shielded palte for equalizer ampli.

Universal model

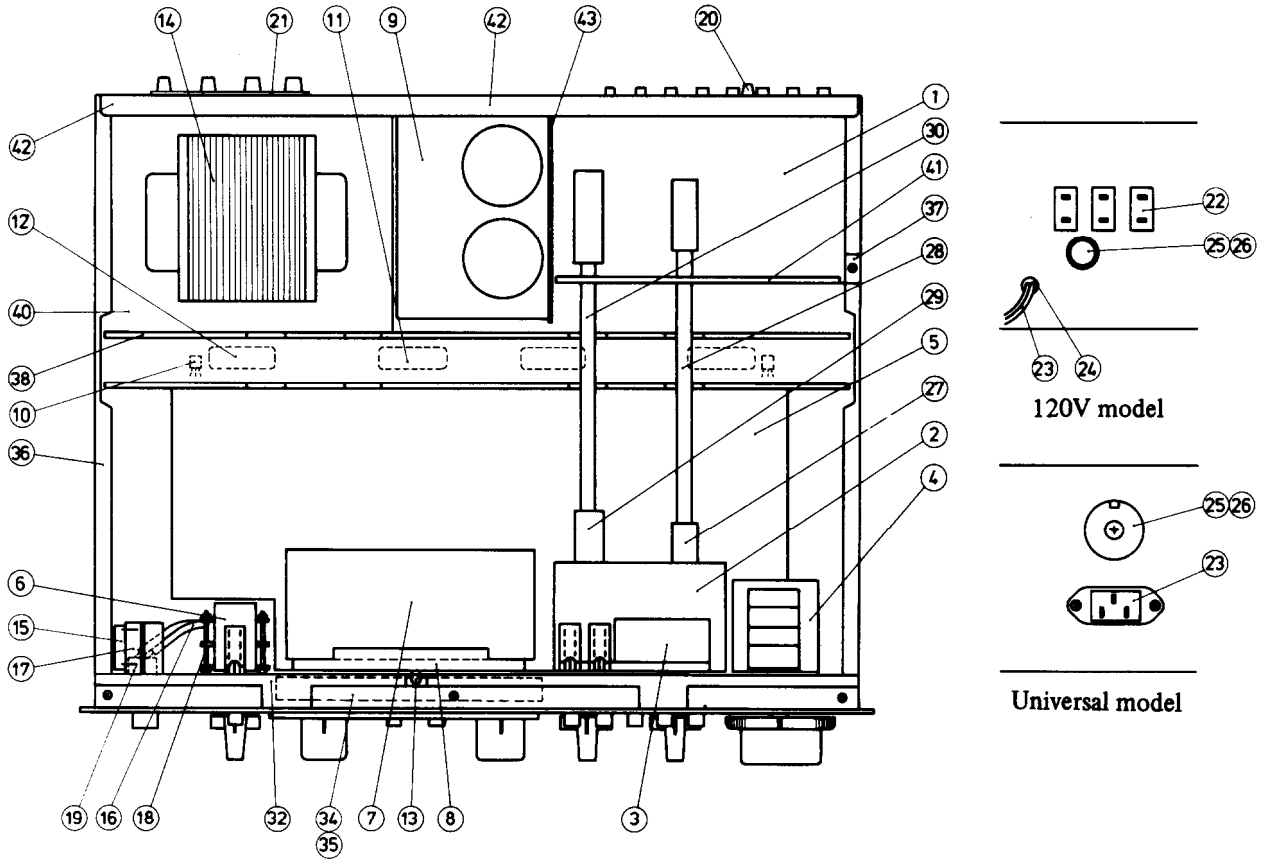
REF. NO.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
1	U1	12660521A	NAEQ-621a, Equalizer ampli. p.c.b.
2	U2	12659522	NASW-622, Switch p.c.b.
3	U3	12659523	NASW-623, Switch p.c.b.
4	U4	12659524	NAVR-624, Volume control p.c.b.
5	U5	12659525	NAAF-625, Preampli., power ampli., rectifier and protection circuit p.c.b.
6	U6	12659526	NASW-626, Switch p.c.b.
7	U7	12659527	NAME-627, Output indicator driver p.c.b.
8	U8	12659529	MADIS-629, Output indicator p.c.b.
9	U9	12656530	NAPS-630, Rectifier p.c.b.
10	Q505, Q605	2211256 2211255 or 2210746	2SC1815(BL), 2SC1815 (GR) or Thermo ampli. 2SC945A(P) transistor
11	Q508, Q608	2201012 2201013 or	2SD745(R) or Power ampli. 2SD745(Q) transistor
12	Q509, Q609	2201022 2201023 or	2SB705(R) or Power ampli. 2SB705(Q) transistor
13	PL001	210057	PL6.3V, 0.15A, Power indicator lamp
14	T001	230280	NPT-666ADGQ, Power transformer
15	C001, C002	3500052	PME271Y510CEE, IS capacitor
16	R001, R002	441723314	330Ω, 2W, Metal oxide film resistor
17	S001	25035051	NPS-121-L16P, Power switch
18	S002	25030124	NRSM-244-35Y, Speaker selector switch
19	P001	25045018	LJ-100-H, Stereo headphone jack
20	P002	25060008	Ground terminal
21	P003, P004	25060029	NTM-4PRMN05, Speaker terminal
23		25050018	PA-125, 3P Inlet
25	F001	252003 252050	3A-T, AC fuse (220/240V model) 5A, ST-6 AC fuse (110/120V model)
26	F001a	25050021	X-I7240, Voltage selector sokcet
27	S003	25030125	NRSM-104-35ZV, Operation block of selector switch
28	S003a	25065083	Wire block of selector switch
29	S004	25030126	NRSM-105-35ZV, Operation block of tape monitor switch
30	S004a	25065084	Wire of tape monitor switch
32	A001	27110078	Front bracket
34	A003	27190043A	Holder
35	A004	28130074	Plate, output indicator
36	A014	27115043A	Side bracket
37	A015	27140267	Bracket for pc board
38	A016	27160051	Radiator
39	A017	223012	RH-14, Bracket
40	A018	27130148	Bracket for power transformer
41	A019	27140268	Bracket
42	A031	27120156	Back panel
43	A032	27150096A	Shielded plate for equalizer ampli.

EXPLODED VIEW – PARTS LIST

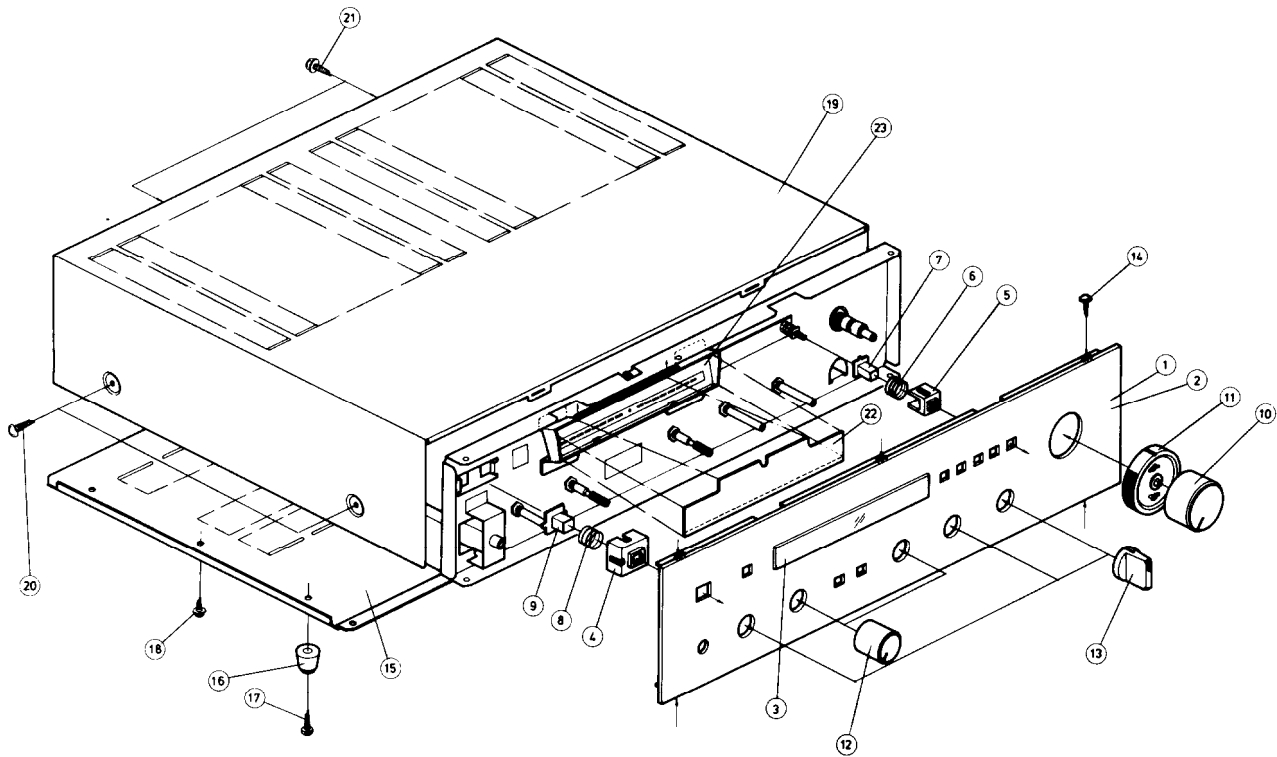
REF. NO.	PARTS NO.	DESCRIPTION
1	12659121	Front panel ass'y (2, 3)
2	27210121	Front panel
3	28191037	Glass, output indicator
4	27267048A	Guide, power switch
5	27267049A	Guide, push switch (Push switch button ass'y (5, 6, 7) (P.N 1369125))
6	27180037	Spring, push switch
7	28320318	Push switch button
8	28180038	Spring, power switch
9	28320319	Power switch button
		Power switch ass'y (7, 8, 9) (P.N 1369126)
10	28320310	Volume control knob
11	28320311	Balance control knob
12	28320312	Tone control knob

REF. NO.	PARTS NO.	DESCRIPTION
13	28320314	Selector switch knob
14	834130062	3STS+6BQ, Tapping screw
15	27170054	Bottom board
16	27175009	Leg
17	831130162	3STW+16BQ, Tapping screw
18	831130082	3STW+8BQ, Tapping screw
19	28184051	Top cover
	28140020	4t x 10 x 40mm, Cushion
20	838440109	4TTB+10C(BC), Tap screw
21	834430062	3STS+6BQ(BC), Tapping screw
22	28130074	Plate, output indicator
23	27190043A	Holder

COMPONENT LOCATION



EXPLODED VIEW



PRINTED CIRCUIT BOARD - PARTS LIST

EQUALIZER AMPLIFIER PC BOARD (NAEQ-621) - PARTS LIST 120V model

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Q101, Q201	ICs 222471	HA-1457
	Capacitors 392880227 352734701 392880107 C930, C931	2.2 μ F, 50V, LL 47 μ F, 10V, Elect. 1 μ F, 50V, LL 3.3 μ F, 50V, Elect.
P101, P102 P103	Terminals 25045041 25045020	NPJ-6PDBL18 NPJ-4PDBL11
	Switches S101 25065081 S102 25065082	NSS-4445, Selector NSS-6646, Tape monitor

EQUALIZER AMPLIFIER PC BOARD (NAEQ-621a) - PARTS LIST Universal model

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Q101, Q201	ICs 222471	HA-1457
	Capacitors 392880227 352734701 392880107 C930, C931	2.2 μ F, 50V, LL 47 μ F, 10V, Elect. 1 μ F, 50V, LL 3.3 μ F, 50V, Elect.
P101, P102 P103	Terminals 25045041 25045020	NPJ-6PDBL18 NPJ-4PDBL11
	Switches S101 25065081 S102 25065082	NSS-4445, Selector NSS-6646, Tape monitor

SWITCH PC BOARD (NASW-622) - PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
C319, C419	Capacitors 372328214	820pF \pm 5%, 50V, ST
	Switches S301-S305 25035111	NPS-522-L76, Low-cut/High-cut/Mode/Loudness/Muting

VOLUME CONTROL PC BOARD (NAVR-624) - PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
R308, R408 R309, R409	5104078	N24RDQ41C500KMN100KBTP35H, Volume/Balance control variable resistor

PREAMPLI., POWER AMPLI., AND PROTECTION CIRCUIT PC BOARD (NAAF-625) - PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Q304, Q404 Q510, Q610	ICs 222471 222502	HA-1457 NJM4558DX
	Transistors 2211782 or 2211783 2211732 or 2211733 2211792 or 2211793 2211303 2211792 or 2211793	2SA991(F) or 2SA991(E) 2SC1845(F) or 2SC1845(E) 2SA992(F) or 2SA992(E) 2SK68(A) (M) 2SA992(F) or 2SA992(E)

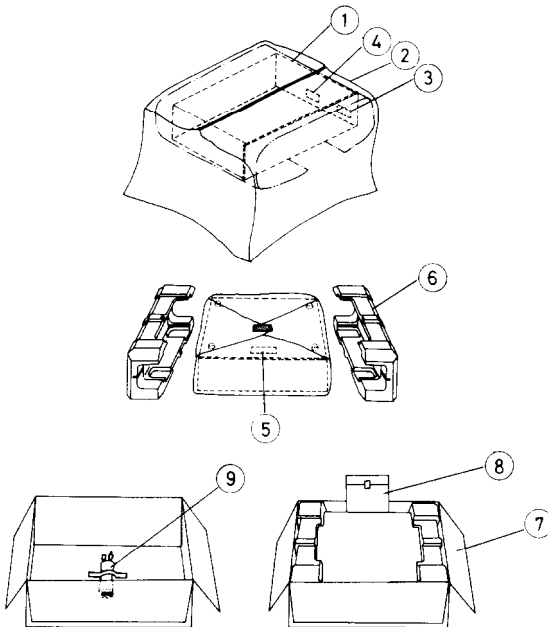
CIRCUIT NO.	PARTS NO.	DESCRIPTION
Q501, Q601	2211372 or 2211371	2SC2259(G) or 2SC2259(F)
	2211732 or 2211733	2SC1845(F) or 2SC1845(E)
Q503, Q603	2211742 or 2211743	2SA915(L) or 2SA915(M)
Q504, Q604	2211762 or 2211763	2SC1940(L) or 2SC1940(M)
Q505, Q605	2211256, - 2211255 or 2210746	2SC1815(BL), 2SC1815(GR) or 2SC945A(P)
	2201042 2201052	2SD381(L) 2SB536(L)
Q506, Q606 Q507, Q607 Q508, Q608	2201012 or 2201013	2SD745(R) or 2SD745(Q)
Q509, Q609	2201022 or 2201023	2SB705(R) or 2SB705(Q)
	2211405, 2211406, 2211802 or 2211803	2SC2240(GR), 2SC2240(BL), 2SC1841(F) or 2SC1841(E)
Q801	2211255, 2211256 or 2210746	2SC1815(GR), 2SC1815(BL) or 2SC945(A)P
Q802, Q803	2210803 2211255, 2211256 or 2210746	2SA733(P) 2SC1815(GR), 2SC1815(BL) or 2SC945(A)P
Q804 Q805	2211255, 2211256 or 2210746	2SC1815(GR), 2SC1815(BL) or 2SC945(A)P
Q806	2211163, 2211164, 2211772 or 2211771	2SC2120(O), 2SC2120(Y), 2SC2001(L) or 2SC2001(K)
Q807	2211225, 2211256 or 2210746	2SC1815(GR), 2SC1915(BL) or 2SC945(A)P
Q901	2200663, 2200664, 2201042 or 2201043	2SC1626(O), 2SC1626(Y), 2SD381(L) or 2SD381(M)
Q902	2200673, 2200674, 2201052 or 2201053	2SA816(O), 2SA816(Y), 2SB536(L) or 2SB536(M)
Diodes		
D501, D502, D601, D602 D503-D505 D603-D605 D801, D803 D804 D802	4000031 223105 223105 223802 or 223849	M8513A(O) 1S1555 1S1555 1S1885 or ERB12-01
D905 D906 D907	224069 224069 223853	05Z22U 05Z22U MI-151
Coils		
S501, S601	231001	S-1.3B
Capacitors		
C303, C403 C305, C405 C307, C407 C308, C408 C312, C412 C315, C415 C321, C421 C322, C422 C506, C606 C509, C609 C513, C613 C515, C516 C615, C616 C517, C518 C802 C803 C804 C805 C907 C908 C909, C910 C911, C912 C915	392880227 352723311 352721011 352750471 352741001 392850477 352721011 352780221 352780331 352780471 374124735 392853307 392853307 352753311 352724711 352743301 352780331 352741011 352782211 352782211 352751011 352752211 352741021	2.2 μ F, 50V, LL 330 μ F, 6.3V, Elect. 100 μ F, 6.3V Elect. 4.7 μ F, 25V, Elect. 10 μ F, 16V, Elect. 4.7 μ F, 25V, LL 100 μ F, 6.3V, Elect. 2.2 μ F, 50V, Elect. 3.3 μ F, 50V, Elect. 4.7 μ F, 50V, Elect. 0.047 μ F \pm 10%, 50V, DE 33 μ F, 25V, LL 33 μ F, 25V, LL 330 μ F, 25V, Elect. 470 μ F, 6.3V, Elect. 33 μ F, 16V, Elect. 3.3F, 50V, Elect. 100 μ F, 16V, Elect. 220 μ F, 50V, Elect. 220 μ F, 50V, Elect. 100 μ F, 25V, Elect. 220 μ F, 25V, Elect. 1,000 μ F, 16V, Elect.

CIRCUIT NO.	PARTS NO.	DESCRIPTION
C916, C917	352770471	4.7μF, 63V, Elect.
C922, C923	352780331	3.3μF, 50V, Elect.
C924, C925	352770471	4.7μF, 6.3V, Elect.
Resistors		
R320, R420	5148033	N16RGM11C50KB35, Bass control variable
R321, R421	5148033	N16RGM11C50KB35, Treble control variable
R512, R612	4000003	D22A, Thermistor
R516, R616	5225026	N10HR470BD, Semi-fixed
R517, R617	441521514	150Ω, 1/2W, M.O.F.
R518, R618	441521514	150Ω, 1/2W, M.O.F.
R519, R619	4000049	0.27Ω, 5W, Metal plate
R520, R620	4000047	0.47Ω, 5W, Metal plate
R521, R621	4000047	0.47Ω, 5W, Metal plate
R522, R622	4000049	0.27Ω, 5W, Metal plate
R523, R624	451730564	5.6Ω, 2W, Metal
R525, R625	451630564	5.6Ω, 1W, Metal
R527, R627	5225005	N10HR2.2KBD, Semi-fixed
R533, R633	5225070	N10HR2.2KBDM, Semi-fixed
R903, R904	441521514	150Ω, 1/2W, M.O.F.
R907	441623314	330Ω, 1W, M.O.F.
Radiators		
	27160029	RAD-07
	27160011	RAD-05
Relay		
RL801	25065085A	NRL-2PSA-DC12-03
Switches		
S301, S302	25035110	NPS-122-142-L75, Tone defeat

SWITCH PC BOARD (NASW-626) – PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
S701	25035109	NPS-122-L74, Output level indicator attenuator

PACKING PROCEDURES



OUTPUT INDICATOR DRIVER PC BOARD (NAME-627) – PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Q701-Q702	222564	LB-1416ONK(R), Power indicator driver IC
Q703, Q704	222539	LB-1416, Power indicator driver IC
D701, D702	223105	1S1555, Diode
D703	224042 or 224043	05Z6.2L or 05Z6.2U, Diode
C701, C702	352751001	10μF, 25V, Elect. capacitor
C705-C706	352750471	4.7μF, 25V, Elect.
C707-C710	352741001	10μF, 16V, Elect.
C711, C712	352750471	4.7μF, 25V, Elect.
R725, R726	5225089	N10HR30KBC, Semi-fixed resistor
R735, R736	441625604	56Ω, 1W, M.O.F. resistor

OUTPUT INDICATOR PC BOARD (NADIS-629) – PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
D705-D718	225028	GL-9PG59, L.E.D
D719, D720	225029	GL-9PR9, L.E.D
D721	225018	GL-2PR1, L.E.D

RECTIFIER PC BOARD (NAPS-630) – PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
D901-D904	223841	GP-30G, Diode
C905, C906	3504117	21,000μF, 55V, Elect. capacitor

NOTES:

- Capacitors
 - LL: Low leakage current type electrolytic capacitor
 - DE: Non-inductive polyester film capacitor
 - ST: Polystyren film capacitor
- Resistors
 - MOF: Metal oxide film resistor

REF. NO.	PARTS NO.	DESCRIPTION
1	29100036	850 x 550mm, Poly bag
2	29095012	500 x 800mm, Protection sheet
3	29380040	Cabinet composite label (USA)
4	282969	Caution label (A) (USA)
5	293041	Caution label (USA)
6	29090398	Pad
7	29050268	Carton box
8		Accessory bag complete
U.S.A. model		
	29340313	Instruction manual
	29365006	Warranty card
	29358002	S. S list
	29100006	250 x 350mm, Poly bag
Universal model		
	29340314	Instruction manual
	25055018	Conversion plug
	252020	5A-7T, Fuse
	29100002	150 x 80 mm Poly bag for fuse
	29100006	250 x 350mm, Poly bag
Germany model		
	29340314	Instruction manual
	29365005-1	Warranty card
	29100006	250 x 350mm, Poly bag
9		Power supply cord (UU)
	253089	AS-VDE-C, Power supply cord (G)
	29380038	Voltage tag
NOTE:	(USA):	U.S.A. model
	(UU):	Universal model
	(G):	Germany model

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