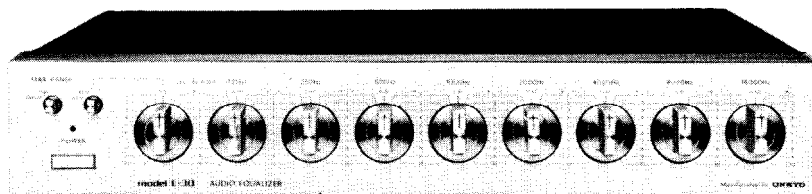


# ONKYO® SERVICE MANUAL

## OCTAVE BAND STEREO EQUALIZER Model E-30



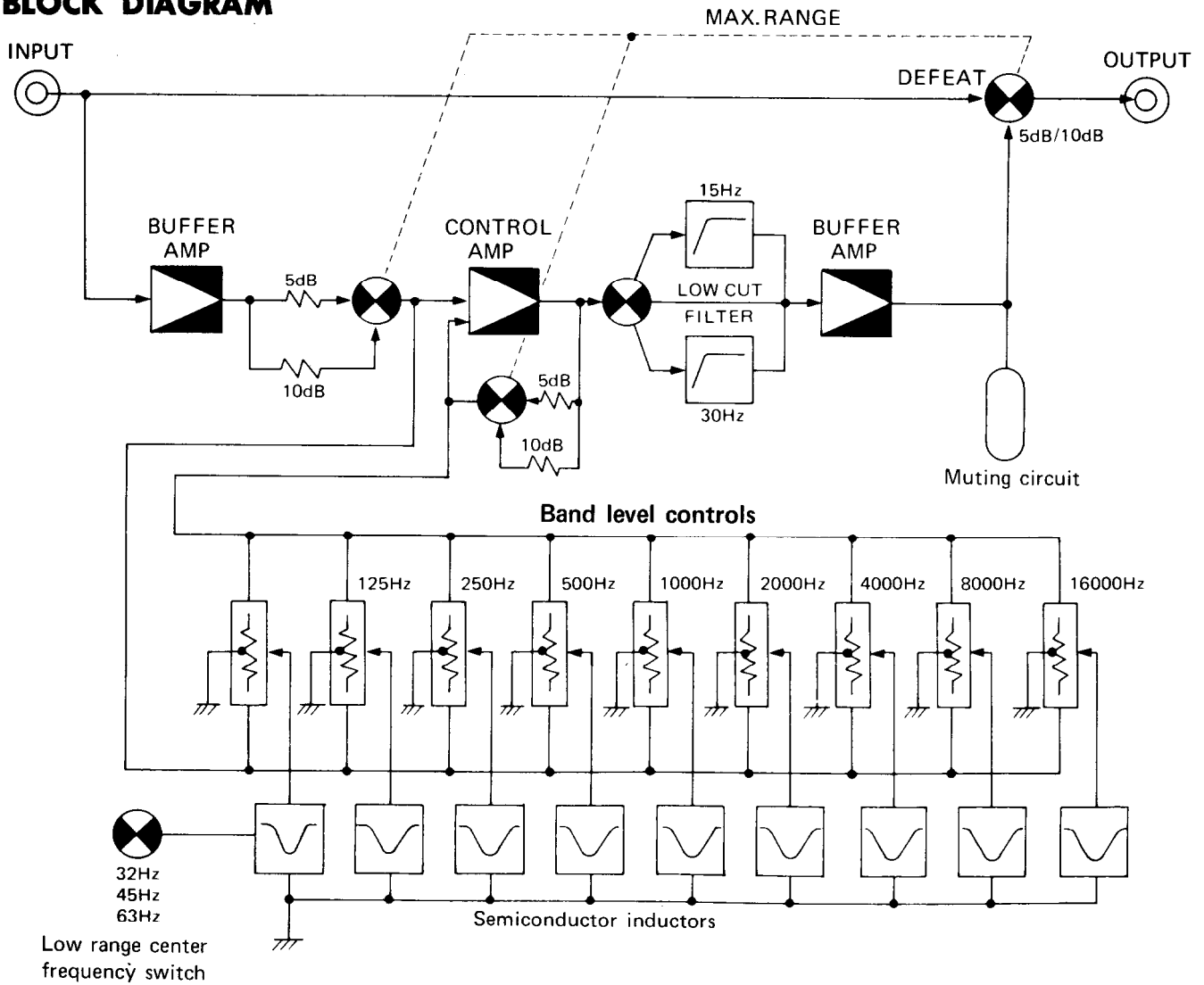
### SPECIFICATIONS

Output Voltage and Impedance: (with All Controls at FLAT)	(Rated) 1.5V, 600 ohms (Max.) 15V, 600 ohms	Center Frequencies:	32Hz/45Hz/63Hz Switchable, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz, 4kHz, 8kHz, 16kHz
Input Sensitivity and Input Impedance:	1.5V, 100 kohms	Band Level Control	-10 dB ~ 10 dB (1 dB steps) -5 dB ~ 5 dB (0.5 dB steps)
Frequency Response: (with All Controls at FLAT)	5 Hz - 100 kHz (+0 dB, -1.5 dB)	Gain:	0 dB (Controls at FLAT)
Total Harmonic Distortion: (3V Output, Controls at FLAT)	Less than 0.01% (20Hz - 20kHz)	Low Cut Filter	15 Hz, 30 Hz
Intermodulation Distortion: (at Rated Output, Controls at FLAT, SMPTE 70Hz:7kHz=4:1)	Less than 0.01%	Muting Operation	8 sec./0.1 sec.
Signal to Noise Ratio:	More than 100 dB IHF-A Network (Input Shunt)	Time: (Power ON/OFF)	
		Semiconductors:	68 Transistors, 21 Diodes
		Power Supply:	AC 120V 60 Hz or 220V 50 Hz
		Dimensions:	450(W) x 83(H) x 360(D) mm
		Weight:	6.5 kg

Specifications are subject to change without notice

**ONKYO®**  
**AUDIO COMPONENTS**

## BLOCK DIAGRAM



## CIRCUIT DESCRIPTION

An ideal flat amp is of course the most desirable type of preamplifier to have. However because cartridge and speaker characteristics along with room conditions are not necessarily ideal, the sound that reaches the listener's ears is usually a waveform that has many peaks and dips. If these peaks and dips are large, the influence they have may become audible. It is at this point that some sort of control over sound quality becomes necessary. One easy to use means of doing this is the ordinary type of tone controls that correct high and low range response. The purpose of an audio equalizer such as the E-30 is to go a step further and give the user the means to emphasize or attenuate the sound at many points on the audio spectrum and thereby greatly improve the audible sound.

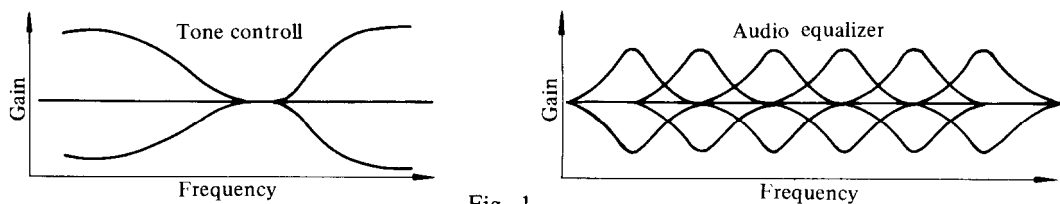


Fig-1

The E-30 is equipped with nine band level controls for nine center frequencies. Furthermore the lowest center frequency may be switched between three points. With the MAX RANGE knob, the amount of emphasis and attenuation may be switched between  $\pm 10\text{dB}$  and  $\pm 5\text{dB}$  or set to DEFEAT in which case the entire equalizer circuitry is bypassed.

The circuitry is all stage A-class push-pull with outstanding performance characteristics.

The input signal after changing impedance at the Darlington buffer amp, enters the control amp.

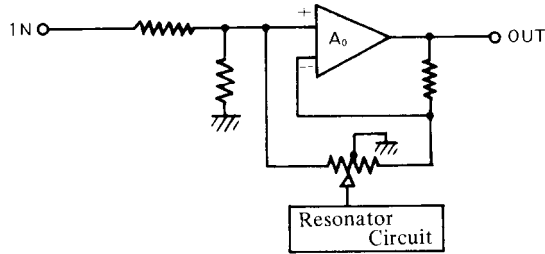


Fig-2

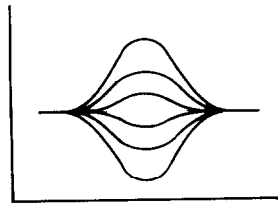
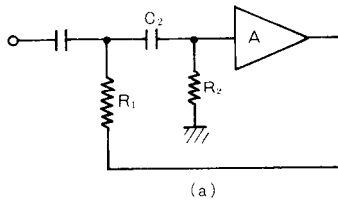
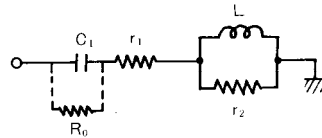


Fig-3



(a)



(b)

Fig-4

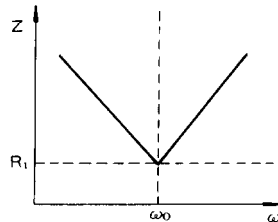
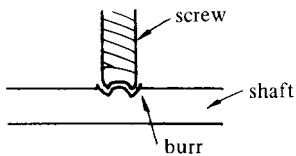


Fig-5

The control amp is constructed as shown in fig. 2. The circuit produces the resonance characteristics shown in fig. 3 by means of the inclusion of semiconductor inductor and capacitor resonance circuits in the amplifier input circuit and negative feedback circuit. Semiconductor inductors which are resistant to magnetic flux distortion and electromagnetic inductances are employed in the resonance circuits. The basic principle is shown in fig. 4 (a). If this is made into an equivalent circuit as shown in fig. 4 (b), it becomes a pseudo L.C.R series resonance circuit. If  $r_2$  is large enough, the resonance point will be:  $\omega_0 = \frac{1}{\sqrt{C_1 C_2 R_1 (AR_2 - R_1)}}$

with the characteristics shown in fig. 5 where the impedance at the resonance point is  $R_1$ . Furthermore,  $R_0$ , which is inserted in parallel with  $C_1$ , is for the purpose of matching the impedance of the DC side of the resonance characteristics with the high frequency side. A Darlington emitter follower buffer amp is used for the output to minimize outside influence on the resonance characteristics obtained by the control amp. To prevent transient distortion and noise when the power is turned on, a break type relay transient killer is placed in the output circuit. (Transient killer operation time: about 8seconds)

## SERVICE GUIDE



- (1) If the knob will not come off even after loosening the knob screw it is probably because there is a burr in the shaft as shown in the diagram. In this case pull out on the knob while turning it to the right and left or turn the knob in either direction as far as it will go and then force it a bit further.

# FRONT PANEL FACILITIES

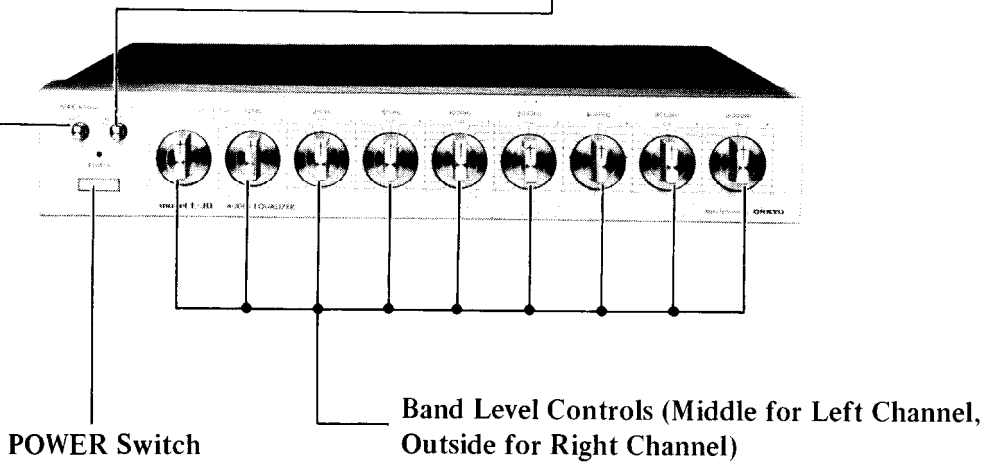
## MAX RANGE Selector:

This selector allows the user to vary the maximum emphasis or attenuation between  $\pm 10\text{dB}$  and  $\pm 5\text{dB}$ . In the DEFEAT position the equalizer circuitry is bypassed giving a flat response. In this case sound still be heard even if the unit is off but the sound quality is better if the unit is left on.

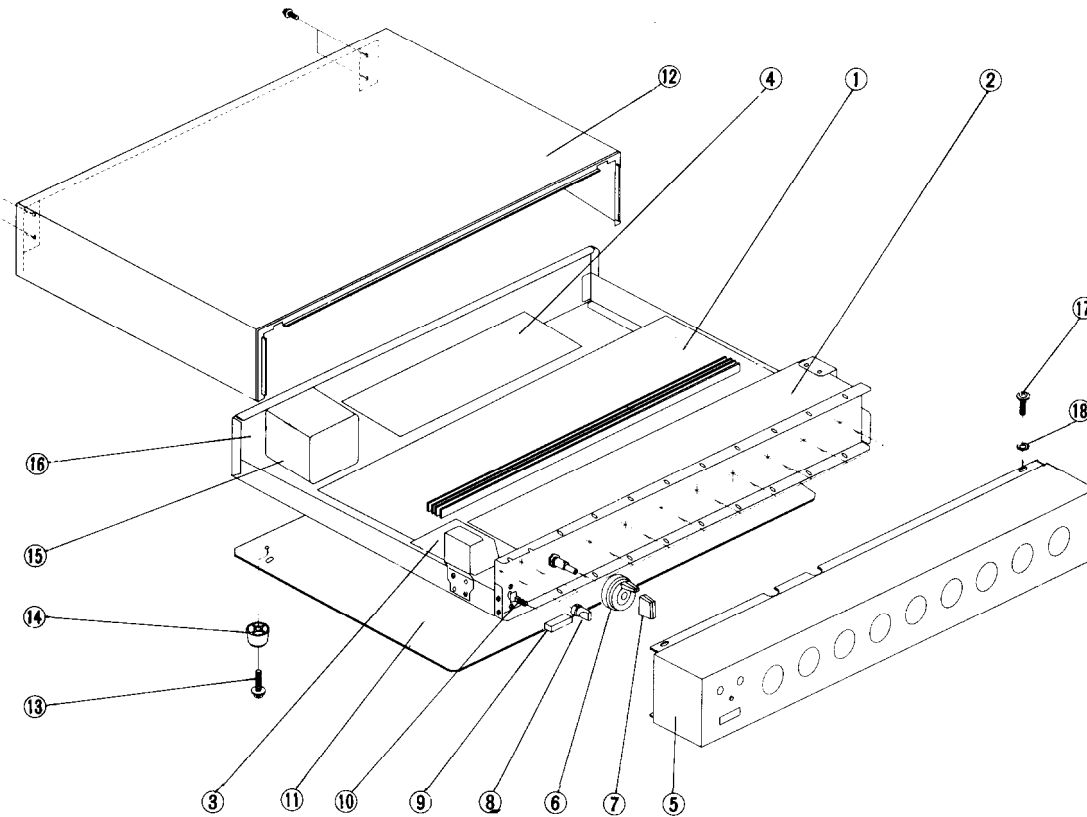
## Low range center frequency selector:

The center frequency of the lowest of the band level controls may be switched between three points: 63Hz, 45Hz, and 32Hz.

These are useful for dealing with speaker characteristics and room conditions.



# EXPLODED VIEW

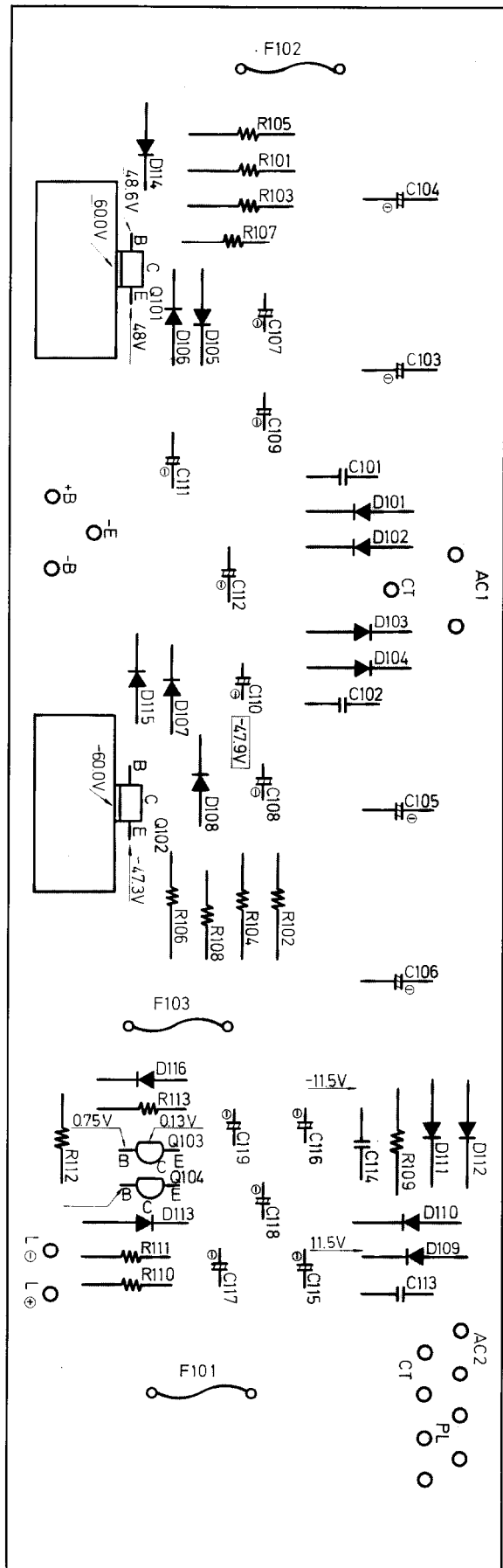


# PARTS LIST

120V Model				220V Model			
REF. NO.	CIRCUIT NO.	PARTS NO.	DESCRIPTION	REF. NO.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
1	U1	12851520	NAEQ-420, Equalizer p.c.b.	1	U1	12851520	NAEQ-420, Equalizer p.c.b.
2	U2	12851521	NAVR-421, Volume Control p.c.b.	2	U2	12851521	NAVR-421, Volume Control p.c.b.
3	U3	12851522	NASW-422, Switch p.c.b.	3	U3	12851522	NASW-422, Switch p.c.b.
4	U4	12851523	NAPS-423, Power Supply p.c.b.	4	U4	12851523	NAPS-423, Power Supply p.c.b.
5		12759121	Front Panel Ass'y	5		12759121	Front Panel Ass'y
	A501	27210088	Front Panel		A501	27210088	Front Panel
	A502	28125037-1	End Cap L		A502	28125037-1	End Cap L
	A503	28125038-1	End Cap R		A503	28125038-1	End Cap R
	A505	28198505	Facet for Power Indicator		A505	28198505	Facet for Power Indicator
	A507	27267018	Guide for Power Switch		A507	27267018	Guide for Power Switch
	A510	28140081	Cushion for Facet		A510	28140081	Cushion for Facet
6	A804	28320196A	Knob E	6	A804	28320196A	Knob E
7	A803	28320182	Knob V	7	A803	28320182	Knob V
8	A802	28320183	Max. Range and Low Frequency Selector Knob	8	A802	28320183	Max. Range and Low Frequency Selector Knob
9	A801	28320168A-1	Power Switch Knob	9	A801	28320168A-1	Power Switch Knob
10	S0001	25035015	NPS-111LA3, Power Switch	10	S0001	25035015	NPS-111LA3, Power Switch
11	A601	27170031A	Bottom Board	11	A601	27170031A	Bottom Board
12	A351	28110123	Top Cover	12	A351	28110123	Top Cover
13	A604	831130162	3STW+16BQ, Tapping Screw	13	A604	831130162	3STW+16BQ, Tapping Screw
14	A602	280379	Leg	14	A602	280379	Leg
15	T0001	230223	NPT-625D, Power Transformer	15	T0001	230224	NPT-625G, Power Transformer
16	A021	27120100	Back Panel	16	A021	27120101	Back Panel
17	A508	831130082	3STW+8BQ, Tapping Screw	17	A508	831130082	3STW+8BQ, Tapping Screw
18	A509	87313006	M3-B, Toothed Lock Washer	18	A509	87313006	M3-B, Toothed Lock Washer
	PL001	210015A	6.3V 50mA W3ULRED, Power Indicator Light		PL001	210015A	6.3V 50mA W3ULRED, Power Indicator Light
	C0001	3504012	0.01 $\mu$ F 125V, UL Capacitor		C0001	3500052	PME271Y510CEE, IS Capacitor
	S0002	25065027	NSS-4329, Low Cut Filter		S0002	25065027	NSS-4329, Low Cut Filter
	P0001, P0002	25045035	NPJ-2PRBL12, Input/Output Terminal		P0001, P0002	25045035	NPJ-2PRBL12, Input/Output Terminal
	P0003	270665	Ground Terminal		P0003	270665	Ground Terminal
		253072	AS-UC, Power Supply Cord			253072	AS-UC, Power Supply Cord
		260208	SKB-1, Binder			260208	SKB-1, Binder
	A001	27110044A	Front Bracket		A001	27110044A	Front Bracket
	A002	27190010	Holder for Lamp		A002	27190010	Holder for Lamp
	A004	27115021	Side Bracket R		A004	27115021	Side Bracket R
	A005	27115022	Side Bracket L		A005	27115022	Side Bracket L
	A022	270025	SR-3P-4 (UL), Strainrelief		A022	270025	SR-3P-4 (UL), Strainrelief
	A356	27270020	Spacer		A356	27270020	Spacer
	A603	28140085	Cushion for Power Supply p.c.b.		A603	28140085	Cushion for Power Supply p.c.b.
	R0001	431523355	3.3M $\Omega$ 1/2W, Solide Resistor		R0001	431523355	3.3M $\Omega$ 1/2W, Solide Resistor

# RECTIFIER PC BOARD VIEW

FROM BOTTOM SIDE



# RECTIFIER PC BOARD(NAPS-423)-PARTS LIST

CIRCUIT NO. PARTS NO. DESCRIPTION

### Transistors

Q101	2200744	2SD526(Y)
Q102	2200413	2SB596(Y)
Q103	2210085	2SC733(GR)
Q104	2210743	2SC945(D)(P)
	2210085	or 2SC733(GR)

### Diodes

D101-D104	223827	1S1887
D105-D108	223916	WZ240
D109-D113	223802	1S1885
D114-D116	223105	1S1555

### Elect. Capacitors

C103-C106	3500044	470μF, 80V
C107, C108	352771011	100μF, 63V
C109, C110	352774701	47μF, 63V
C111, C112	352783311	330μF, 50V
C115-C117	352741011	100μF, 16V
C118	352742211	220μF, 16V
C119	352744701	47μF, 16V

### Metal Resistors

R105, R106	451631004	10Ω 1W
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### Metal Oxide Film Resistors

R101, R102	441621524	1.5kΩ 1W
R103, R104	441621224	1.2kΩ 1W
R109	441624714	470Ω 1W

### Fuses

252023	0.5A-T
252001	1A-T

### Fuseholders

250113	S-N5051
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### Radiators

27160021	RAD-06B P-2
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# VOLUME CONTROL PC BOARD (NAVR-421)-PARTS LIST

### Variable Resistors

R101-R109	5104048	N40DDL21C250KT25M
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# SWITCH PC BOARD (NASW-422)-PARTS LIST

### Rotary Switches

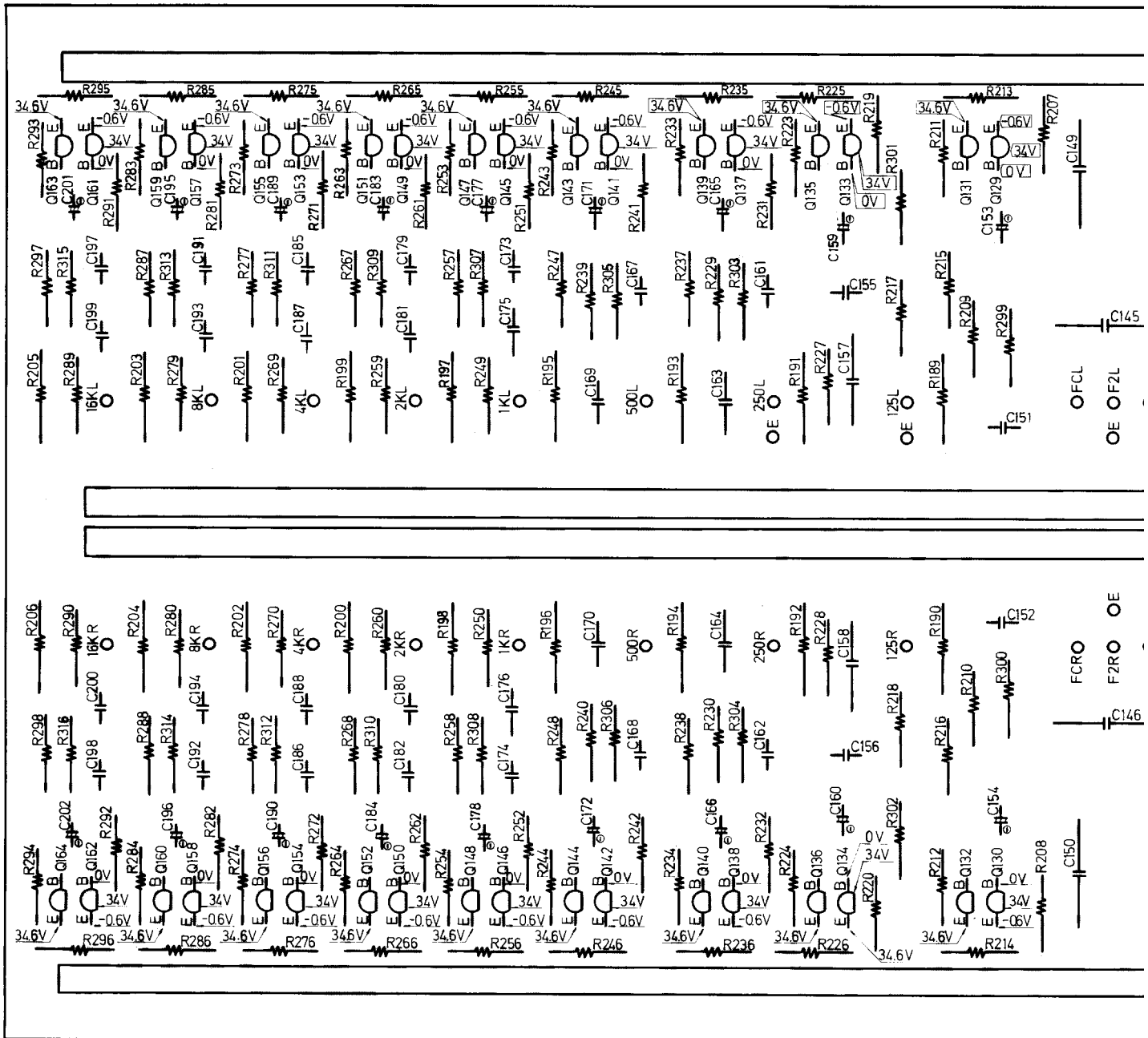
S101	25030080	NRSM-163-15ZV
S102	25030081	NRSM-143-15ZV

### NOTES:

DE: Non-Inductive Polyester Film Capacitor  
 LD: Low-Leakage Current Type Electrolytic Capacitor  
 SLD: Low-Leakage Current Type Electrolytic Capacitor  
 ST: Polystyren Film Capacitor  
 NP: Non-polar Electrolytic Capacitor  
 When replacing differential amplifier or push-pull amplifier transistors, be sure that transistors of one channel have the same hFE ratings.

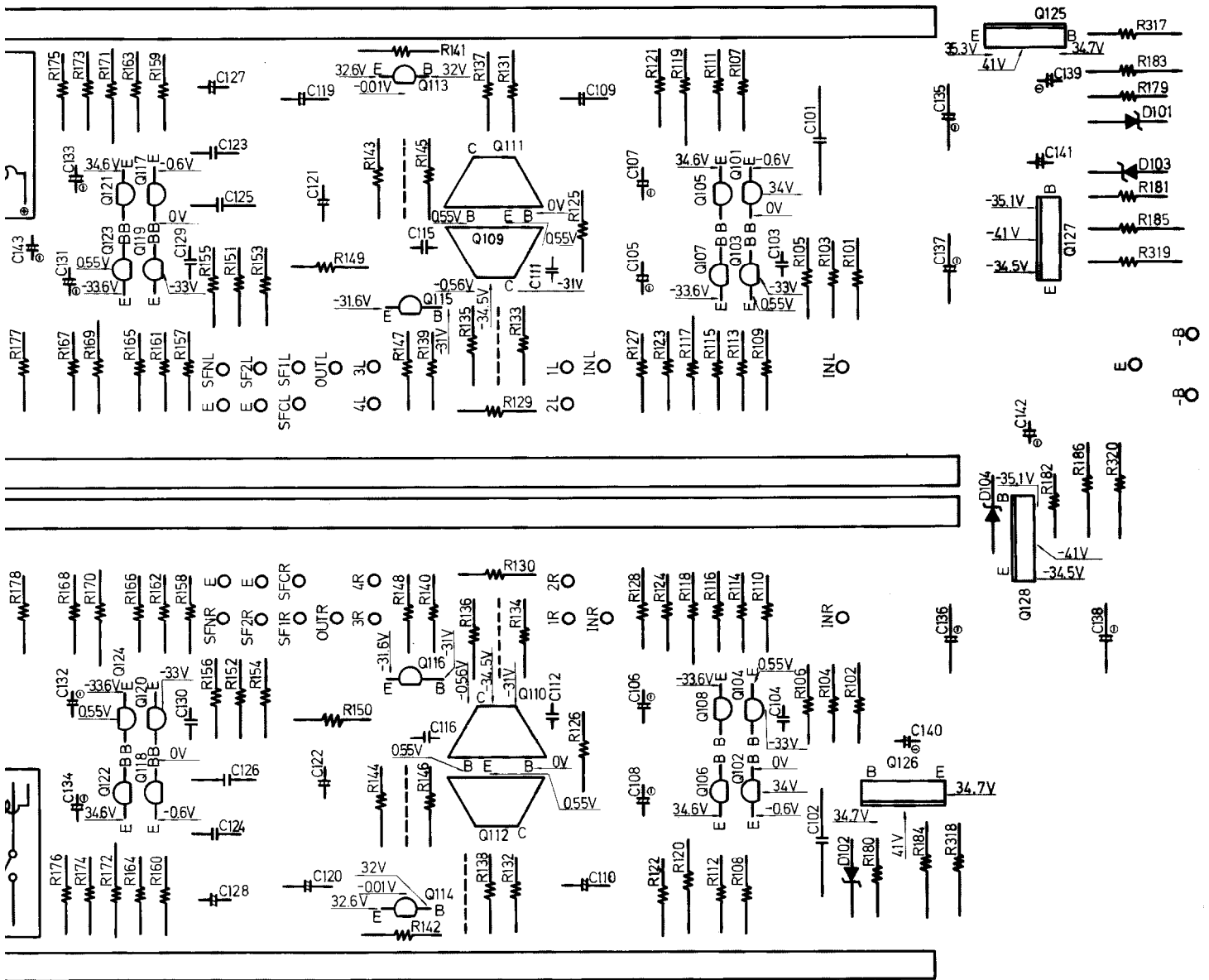
# AUDIO EQUALIZER PC BOARD VIEW

# FROM BOTTOM SIDE



## AUDIO EQUALIZER PC BOARD(NAEQ-420) PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION	CIRCUIT NO.	PARTS NO.	DESCRIPTION
Q101, Q102	2211217	2SC1708(G)	Q141, Q142	2211217	2SC1708(G)
	2210755	2SC1775A(E) or		2210755	2SC1775A(E) or
Q103, Q104	2211207	2SA847(G)	Q143, Q144	2210834	2SA850(D)
	2211085	2SA872A(E) or	Q145, Q146	2211217	2SC1708(G)
Q105, Q106	2210834	2SA850(D)		2210755	2SC1775A(E) or
Q107, Q108	2210844	2SC1735(D)	Q147, Q148	2210834	2SA850(D)
Q109, Q110	2211140	2SA798(0-001)	Q149, Q150	2211217	2SC1708(G)
Q111, Q112	2210700	2SC1583(0-001)		2210755	2SC1775A(E) or
Q113, Q114	2211207	2SA847(G)	Q151, Q152	2210834	2SA850(D)
	2211085	2SA872A(E) or	Q153, Q154	2211217	2SC1708(G)
Q115-Q118	2211217	2SC1708(G)		2210755	2SC1775A(E) or
	2210755	2SC1775A(E) or	Q155, Q156	2210834	2SA850(D)
Q119, Q120	2211207	2SA847(G)	Q157, Q158	2211217	2SC1708(G)
	2211085	2SA872A(E) or		2210755	2SC1775A(E) or
Q121, Q122	2210834	2SA850(D)	Q159, Q160	2210834	2SA850(D)
Q123, Q124	2210844	2SC1735(D)	Q161, Q162	2211217	2SC1708(G)
Q125, Q126	2210863	2SC1212AWT(C)		2210755	2SC1775A(E) or
Q127, Q128	2210853	2SA743A(C)	Q163, Q164	2210834	2SA850(D)
Q129, Q130	2211217	2SC1708(G)			
Q133, Q134	2210755	2SC1775A(E) or		<b>Diodes</b>	
Q131, Q132	2210834	2SA850(D)		D101-D104	224022 WZ-350, Zener
Q137, Q138	2211217	2SC1708(G)		D105	223802 1S1885
	2210755	2SC1775A(E) or			
Q139, Q140	2210834	2SA850(D)		<b>Capacitors</b>	
				C101, C102	374121057 1μF±20% 50V, DE
				C105-C110	390983307 33μF 50V, LM



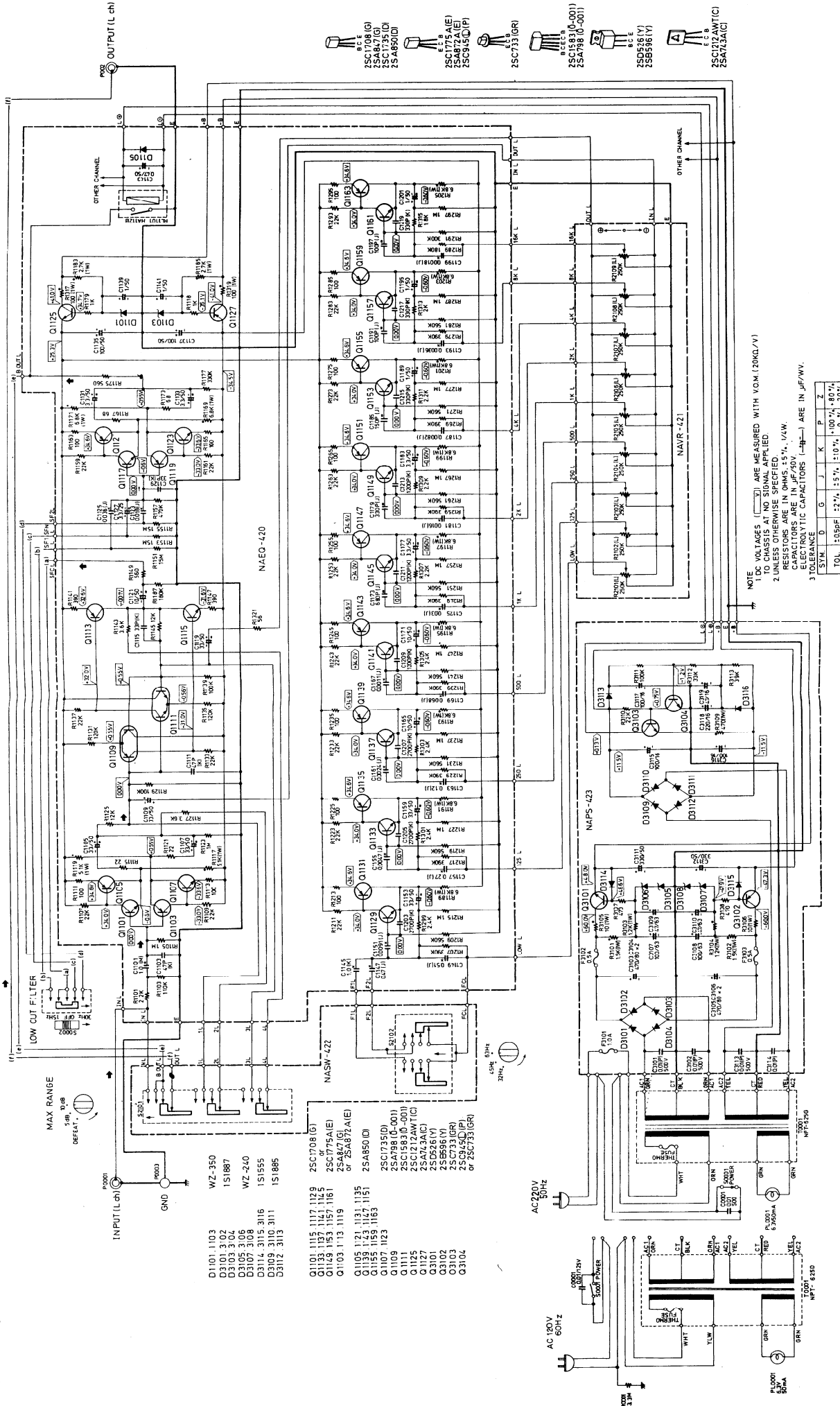
CIRCUIT NO.	PARTS NO.	DESCRIPTION
C119, C120	390983307	33μF 50V, LM
C121, C122	390981007	10μF 50V, LM
C123, C124	374121834	0.018μF±5% 50V, DE
C125, C126	374123634	0.036μF±5% 50V, DE
C127, C128	390980337	3.3μF 50V, LM
C131-C134		
C135-C138	390881017	100μF 50V, SLD
C139-C142	352780101	1μF 50V, Elect.
C143	352784791	0.47μF 50V, Elect.
C145, C146	374121055	1μF±10% 50V, DE
C147-C150	374125144	0.51μF±5% 50V, DE
C151, C152	374129124	9,100pF±5% 50V, DE
C153, C154	390983307	33μF 50V, DM
C155, C156	374124727	4,700pF±5% 50V, DE
C157, C158	374122744	0.27μF±5% 50V, DE
C159, C160	390983307	33μF 50V, LM
C161, C162	374122424	2,400pF±5% 50V, DE
C163, C164	374121244	0.12μF±5% 50V, DE
C165, C166	390981007	10μF 50V, LM
C167, C168	374121124	1,100pF±5% DE
C169, C170	374126834	0.068μF±5% 50V, DE
C171, C172	390981007	10μF 50V, LM
C173, C174	372326814	680pF±5% 50V, ST
C175, C176	374123034	0.3μF±5% 50V, DE
C177, C178	390980337	3.3μF 50V, LM

CIRCUIT NO.	PARTS NO.	DESCRIPTION
C179, C180	372323314	330pF±5% 50V, ST
C181, C182	374121634	0.016μF±5% 50V, DE
C183, C184	390980337	3.3μF 50V, LM
C185, C186	372321545	150pF±5% 50V, ST
C187, C188	374128224	8,200pF±5% 50V, DE
C189, C190	390980107	1μF 50V, LM
C191, C192	372321014	100pF±5% 50V, ST
C193, C194	374123624	3,600pF±5% 50V, DE
C195, C196	390980107	1μF 50V, LM
C197, C198	372321014	100pF±5% 50V, ST
C199, C200	374121824	1,800pF±5% 50V, DE
C201, C202	390980107	1μF 50V, LM

Metal Oxide Film Resistors		
R117-R120	441625124	5.1kΩ 1W
R169-R172	441626824	6.8kΩ 1W
R183-R186	441622724	2.7kΩ 1W
R189-R206	441626824	6.8kΩ 1W
R318-R320	441621014	100Ω 1W
Relays		
RL101, RL102	25065029	HA-112B



**SCHEMATIC DIAGRAM**  
**Model E-30**



- MAX RANGE  
SUB. 0.5B  
DEFLECT.
- INPUT (Lch)      OUTPUT (Lch)
- WZ-350
  - 1S1887
  - WZ-240
  - 1S1555
  - 1S1885
  - 25C1735(D)
  - 25A877(A)(E)
  - 25A850(D)
  - 25C1735(D)
  - 25A798 (I-001)
  - 25C1583 (I-001)
  - 25A724(A)(C)
  - 25S656(V)
  - 25C733(GR)
  - 25C733(GR)
  - 25C1735(D)
  - 25A877(A)(E)
  - 25A850(D)
  - 25C1735(D)
  - 25A798 (I-001)
  - 25C1583 (I-001)
  - 25A724(A)(C)
  - 25S656(V)
  - 25C733(GR)
  - 25C733(GR)
  - 25C1735(D)
  - 25A877(A)(E)
  - 25A850(D)
  - 25C1735(D)
  - 25A798 (I-001)
  - 25C1583 (I-001)
  - 25A724(A)(C)
  - 25S656(V)
  - 25C733(GR)
  - 25C733(GR)

- O101, 1103
- O131, 1107
- O3103, 3102
- O3105, 3106
- O3107, 3108
- O3114, 3115
- O3109, 3110
- O3112, 3113
- O109, 1115
- O133, 1117
- O148, 1153
- O103, 1113
- O105, 1121
- O155, 1153
- O107, 1123
- O111
- O125
- O127
- O3102
- O3103
- O3104

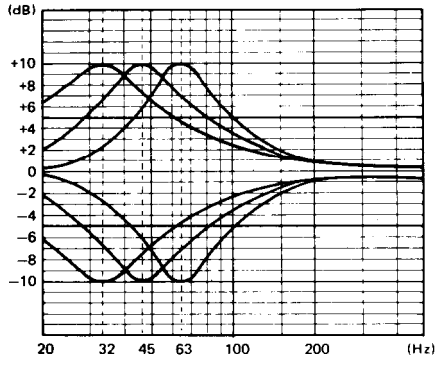
NOTE  
1. DC VOLTAGES ( ) ARE MEASURED WITH VOM (20KΩ/V)  
2. UNLESS OTHERWISE SPECIFIED  
RESISTORS ARE IN OHMS. ±5%, 1/4W.  
CAPACITORS ARE IN μF/20V.  
ELECTROLYTIC CAPACITORS (—) ARE IN μF/VV.  
3. TOLERANCE  
4. LEAKAGE  
• LOW LEAKAGE CURRENT TYPE ELECTROLYTIC CAPACITOR.  
• NON-INFLAMMABLE RESISTOR.

TOL.		±10%		±5%		±2%	
S	T	D	G	J	K	P	Z
100%	100%	100%	100%	100%	100%	100%	100%
±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%

**ONKYO CORPORATION**

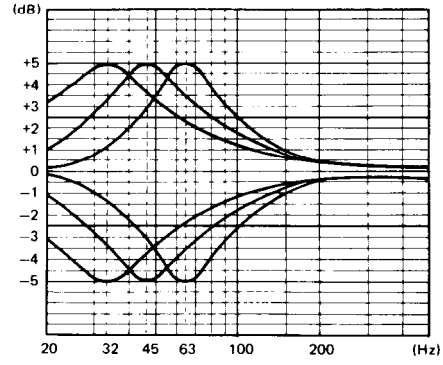
# RESPONSE CHARACTERISTICS

Figure 1



Low range center frequency switch frequency response characteristics (MAX RANGE at 10 dB)

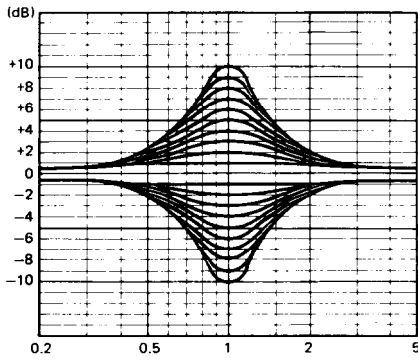
Figure 2



Low range center frequency switch frequency response characteristics (MAX RANGE at 5 dB)

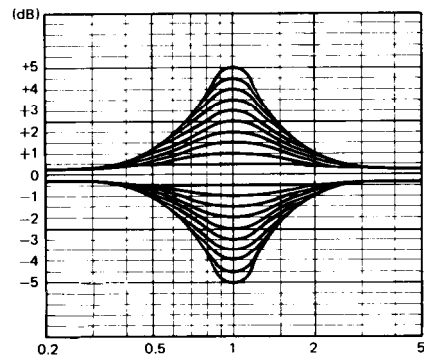
## Band level controls response characteristics

Figure 3



Response characteristics at different dB settings (MAX RANGE at 10 dB)

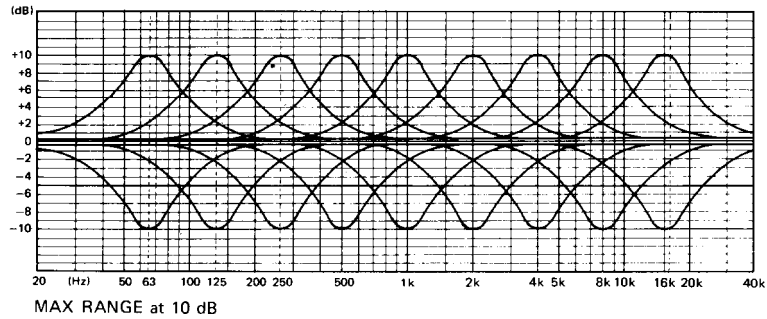
Figure 4



Response characteristics at different dB settings (MAX RANGE at 5 dB)

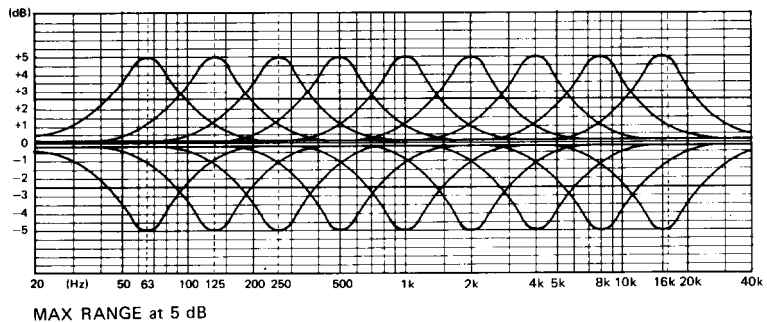
## Response characteristics of all band level controls

Figure 5



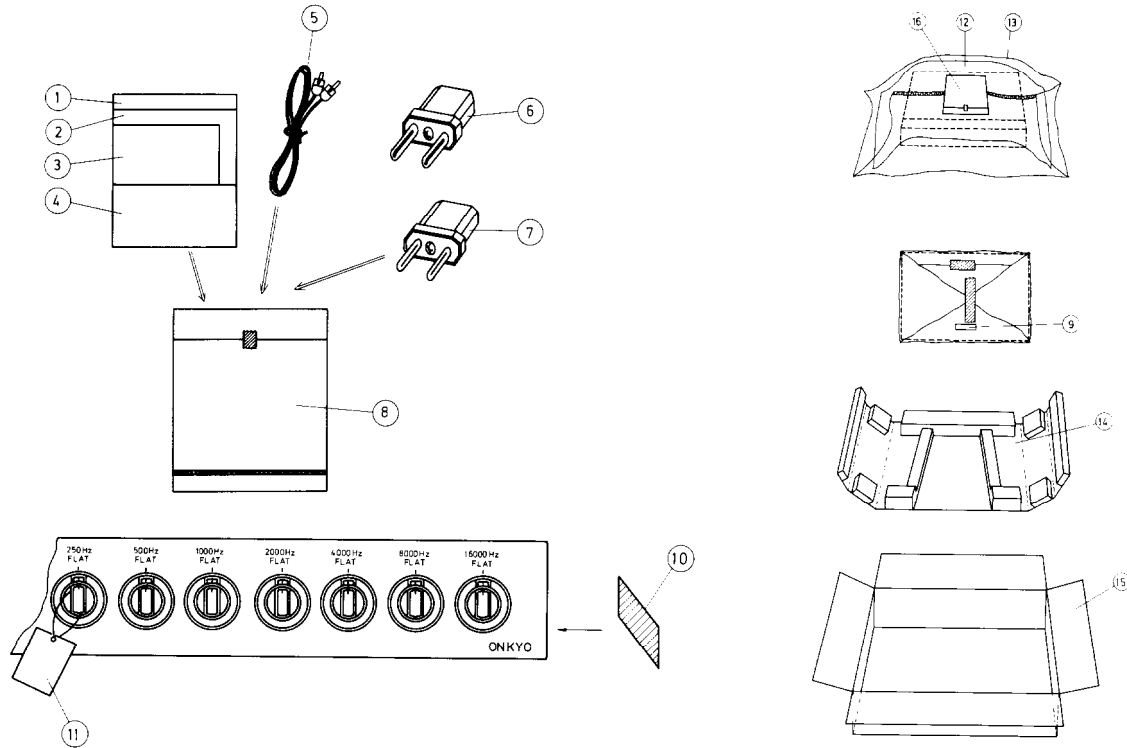
MAX RANGE at 10 dB

Figure 6



MAX RANGE at 5 dB

# PACKING PROCEDURES



## PARTS LIST

REF. NO.	DESCRIPTION	PARTS NO.			
		U.S.A. model	120V model	220V model	Germany model
1	Instruction Manual	29340243	29340243	29340243	29340243
2	Service Station List	29358001	_____	_____	_____
3	Caution Card for 4	29355046	_____	_____	_____
4	Warranty Card	29365003	_____	_____	29365001-1
5	Connection Cord	24505014	24505014	24505014	24505014
6	CV-C, Conversion Plug	_____	292005	292005	292005
7	CV-BS, Conversion Plug	_____	292006	292006	_____
8	250x350mm, Poly Bag	29100006	29100006	29100006	29100006
9	Caution Label	293041	293041	_____	_____
10	Caution Label A	282969	282969	_____	_____
11	Cabinet Composite Tag	29380031	_____	_____	_____
12	500x800mm, Protection Sheet	29095012	29095012	29095012	29095012
13	550x850mm, Poly Bag	29100019A	29100019A	29100019A	29100019A
14	Pad	29090229	29090229	29090229	29090229
15	Carton Box	29050157	29050157	29050157	29050157
16	Accessory Bag Complete	_____	_____	_____	_____

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