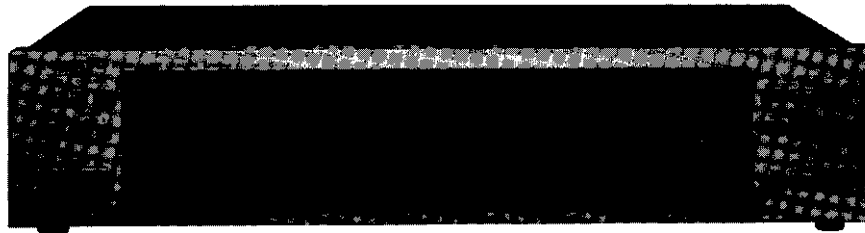


# ONKYO SERVICE MANUAL

## STEREO GRAPHIC EQUALIZER

### MODEL EQ-35



UDN, UD	120V AC, 60Hz
UW	120V or 220V AC, 50/60Hz

#### SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK  $\triangle$  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 PARTS 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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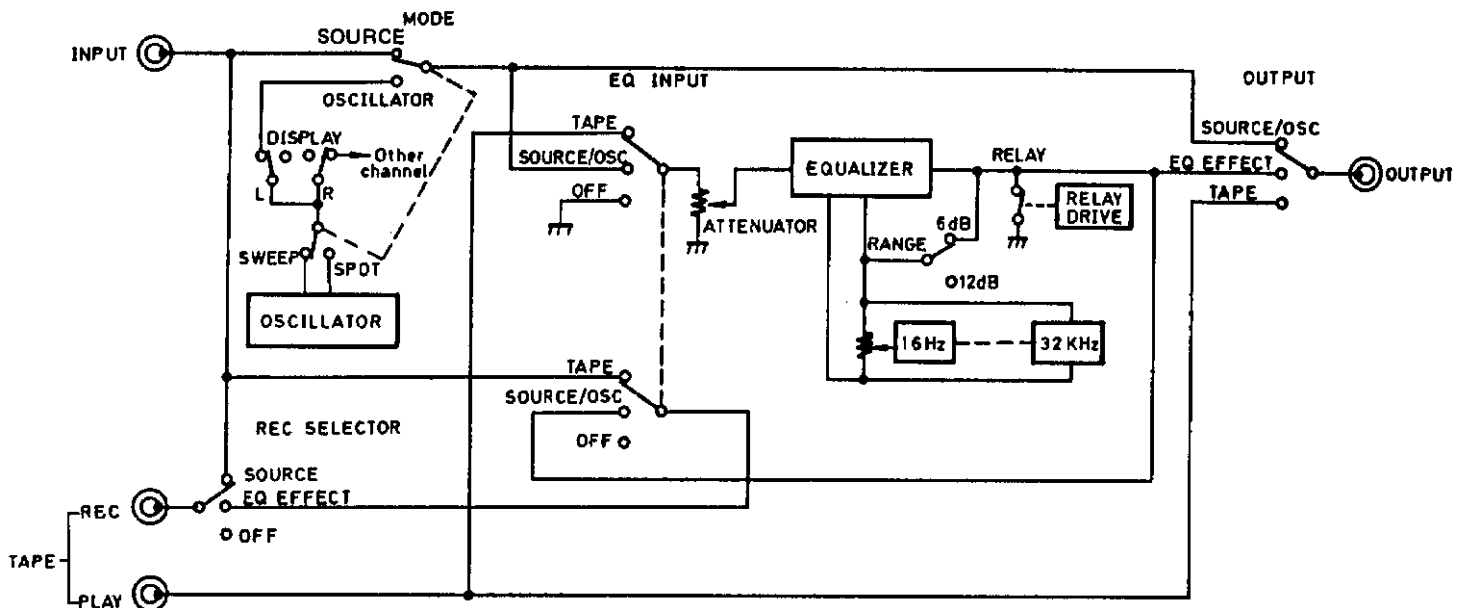
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**ONKYO**  
AUDIO COMPONENTS

# SPECIFICATIONS

Input:	Input sensitivity (FLAT): 150 mV	Generator frequency response:	±0.8 dB from 32 Hz to 16 kHz
	Input impedance: 50 kohms	Semiconductors:	18 ICs, 88 diodes, 32 transistors
Output:	Output voltage (FLAT): 150 mV	AC outlet:	200 watts (UNSWITCHED) (USA and Canadian models only)
	Output impedance: 3.0 kohms	Power supply:	AC 120V, 60 Hz (USA, Canada) AC 120/220V, 50/60 Hz (Europe, others)
Max. input:	5 volts, 20 Hz – 20 kHz, 0.05% THD	Dimensions (W x H x D):	435 x 89 x 365 mm
Center frequencies:	16 Hz, 32 Hz, 64 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, 16 kHz, 32 kHz	Weight:	4.5 kg., 9.9 lbs.
Frequency response:	±0.5 dB from 10 Hz to 35 kHz	Specifications and features are subject to change without notice.	
Total harmonic distortion:	Less than 0.01% at 20 Hz – 20 kHz, 1.5 V output (FLAT)		
Signal-to-noise ratio:	100 dB, 1.5V output, IHF-A input short		
Adjustable range:	±12 dB/±6 dB		
Gain:	0 dB to –20 dB		
Oscillator step frequencies:	32 Hz, 64 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 4 kHz, 8 kHz, 16 kHz (spot and sweep)		

# BLOCK DIAGRAM



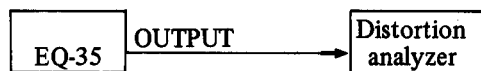
## OSCILLATOR DISTORTION ADJUSTMENT

### 1. Preliminary settings:

MODE: STOP (OSCILLATOR)

DISPLAY: L (or R)

OUTPUT: SOURCE/OSC



### 2. Adjustment

- Output 1 kHz using the SPOT pushbutton.
- While watching a distortion analyzer, adjust VR201 so that the distortion is minimized.

## PRECAUTIONS

### 1. Replacing the lamps

This unit uses the lamps listed below.

CIRCUIT NO.	PARTS NO.	DESCRIPTION
PL1	210179	PL14V 0.08A W-3.8
PL2	210180	PL14V 0.05A W-3

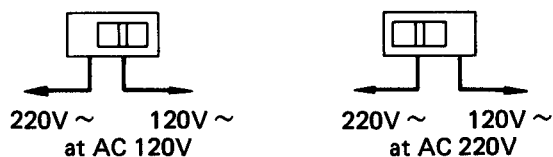
### 2. Insulation resistance measurement

Connect the insulating-resistance tester between the plug of power supply cable and the screw on the bottom board.

Specifications; 500V, more than 10M $\Omega$

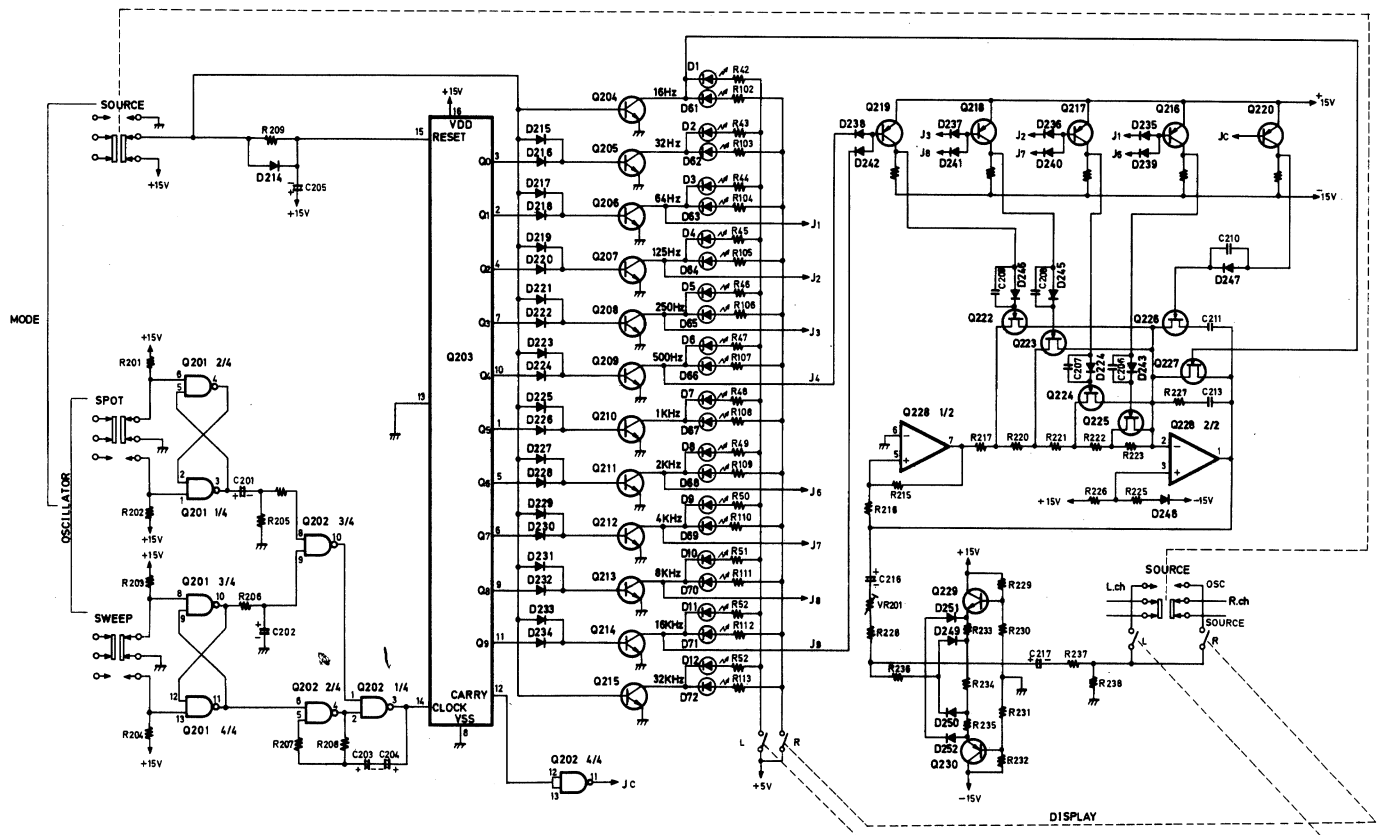
### 3. Voltage selector (Back panel)

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. Voltage is changed by sliding the groove in the switch with a screwdriver or similar instrument to the right or left position. Confirm that the switch has been moved all the way to the right or left before turning the power switch on. If there is no voltage selector switch on the unit you have purchased, it can only be used in areas where the power supply voltage is the same as that of the unit.



## CIRCUIT DESCRIPTION

## Oscillator circuit



## 1. Oscillator

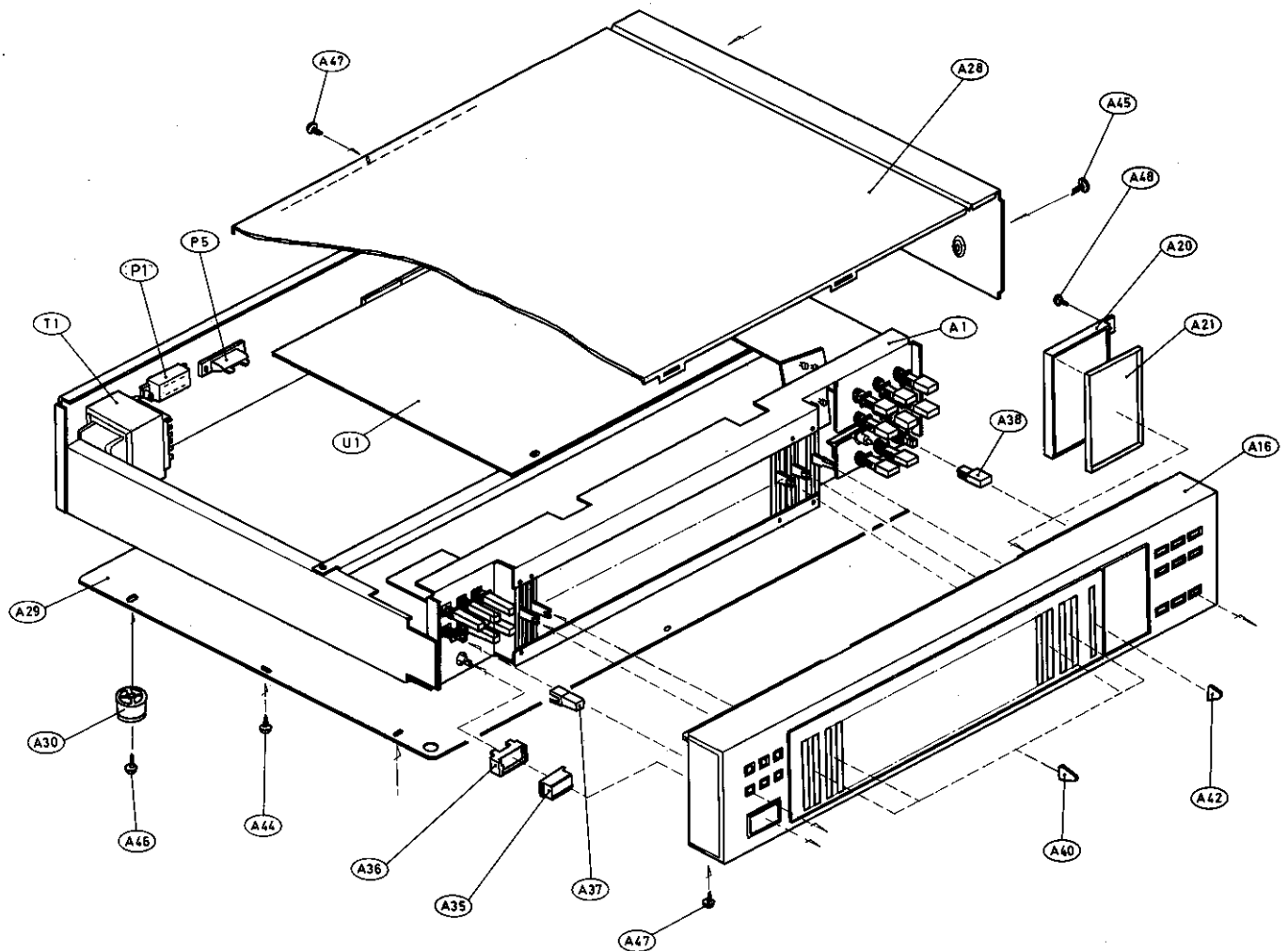
When the mode selector SOURCE pushbutton is pressed, all level control LEDs (D1–12, D61–72) light. When SWEEP is pressed, the oscillator circuit (Q202 1/4, Q202 2/4) connected to the clock terminal of Q203 begins to oscillate, the Q203 terminals Q1–7 and Q9 go to H in order and LEDs D1–12 and D61–72 light in order (the 16Hz and 32kHz LEDs do not light). Oscillator sweep is then repeated between 32Hz and 16kHz.

When STOP is pressed, sweep operation stops and the LEDs light one by one. Each time the SPOT pushbutton is pressed, one pulse is applied to the clock terminal of Q203 and the lighted LED moves to the right one step at a time up to 16kHz after which the 32Hz LED lights again.

Q228–230 are the built-in oscillator in the graphic equalizer and Q228 is the oscillator circuit. The output of Q0–9 of Q203 switches FET Q222–226 to switch the value of “C, R”. This advances the oscillation frequency to match each center frequency. During this procedure, capacity is H when the Q0–4 CARRY terminals of Q203 and H and L when Q5–9 are H.

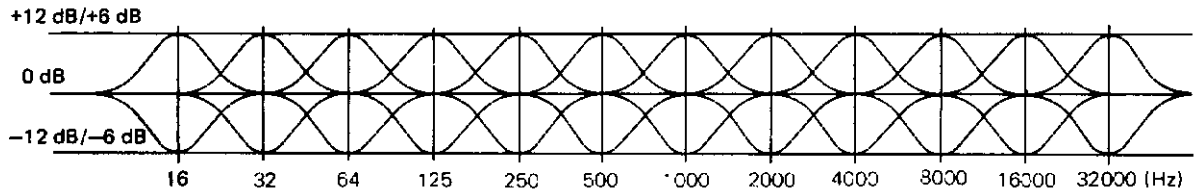
For example, when Q2 or Q203 is H, the 125Hz LEDs light and, at the same time, Q224 is turned on via J2 and the resistance of integrator becomes  $R217 + R220 + R221$ . At this time, CARRY of Q203 is H so Q226 is turned on via JC, C211 is turned on and a triangular wave of 125Hz is generated. This triangular wave is then converted to a similar sine wave by Q229 and Q230. The semi-fixed resistor VR201 is used to adjust the distortion of the oscillator.

## EXPLODED VIEW



REF. NO.	PARTS NO.	DESCRIPTION	REF. NO.	PARTS NO.	DESCRIPTION
A1	27110203	Front bracket	A37	28321229	Knob, Push A
A2	27115146	Side bracket, Left		28321231	Knob, Push A (Black)
A3	27115147	Side bracket, Right	A38	28321230	Knob, Push B
A4	27115148	Center bracket		28321232	Knob, Push B (Black)
A5	27273026	Joint	A40	28321233 *	Knob ass'y, Slide
A6	27140812	Bracket	A42	28321235	Knob, Slide
A11	27120534	Back panel (D)	A44	831430088	3TTW + 8B (BC), Tapping screw
	27120535	Back panel (W)	A45	838440089	4TTB + 8C (BC), Tapping screw
A12	28190008	Strainrelief	A46	834430108	3TTS + 10B (BC), Tapping screw
A16	<u>19865121</u>	Front panel ass'y	A47	834430068	3TTS + 6B (BC), Tapping screw
	<u>19885121</u>	Front panel ass'y (Black)	A48	880013	Rivet
A20	27190232	Holder	△ T1	230752	NPT-819D, Power transformer (D)
A21	28191209	Clear plate		230753	NPT-819DG, Power transformer (W)
A28	28184196	Top cover	△ S1, (S301)	25035401	NPS-111-L365P, Power switch
	<u>28184197</u>	Top cover (Black)	△ P1	25050124	NSCT-2P27T, AC outlet (D)
A29	27170156	Bottom board		25065228	NSS-2299, Slide switch (W)
A30	<u>27175009A</u>	Bottom leg	△ P2	253099A	AS-UC-3, Power supply cable (D)
A35	28321023	Knob, Power		253083-1	AS-CEE, Power supply cable (W)
	28321024	Knob, Power (Black)	△ P5	25060055	NTM-2PMN22, Terminal (W)
A36	28320828C	Knob, Base			

## USING THE LEVEL CONTROLS



Equalization range

### 16 Hz

This frequency range is not found in records and pre-recorded tapes. It is felt more as a vibration or wave of pressure than as music. Lowering this level control is often an effective way to cut out motor noise, rumble and other unwanted low-frequency elements from a turntable.

### 32 Hz ~ 64 Hz

This range includes the low rumbling sort of sounds created by a pipe organ or the lowest range of a piano. Lowering this level control eliminates humming noises from electric musical instruments, ventilation systems and other sources.

### 125 Hz

Frequencies around 125 Hz are the standard "bass" tones most people are familiar with. The position of this level control is very important since it has a major effect on the amount of "richness" or "body" in the music.

### 250 Hz ~ 500 Hz

These two frequency ranges contain most sounds from musical instruments and voices. Consequently, the positions of these two level controls determine the amount of power and warmth in the music.

### 1000 Hz

Sounds in this range seem to strike the face, giving music a lively feeling that should be emphasized or attenuated according to the music program and listening environment.

### 2000 Hz

This frequency range contains the sounds that seem to pierce the ears to give trumpet notes their strength. Use this level control to adjust the power of music of this sort.

### 4000 Hz

Sounds in this range give music its sparkle. It is particularly important in controlling the clarity of high violin notes and other soft, high range tones.

### 8000 Hz

Adjusting this level control affects the barely audible high range tones that give music a feeling of detail. This is also the range where most tape noise is located so lowering this control is useful in suppressing annoying background hissing when playing back cassettes.

### 16000 Hz ~ 32000 Hz

Frequencies this high are mainly harmonics and overtones of other notes of musical instruments. Adjusting this level control affects the delicacy of the music and the sensation of the music "flowing" or "drifting."

# PRINTED CIRCUIT BOARD PARTS LIST

## OSCILLATOR/POWER SUPPLY CIRCUIT PC BOARD (NAOSC-1803) PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>ICs</b>	
Q201	222840111 or 222513	4011 or TC4011BP
Q202	222840931	4093B
Q203	222840171	4017B
Q228	222735	NJM072D
	<b>Transistors</b>	
Q204-Q215	221242	2SC3401
Q216-Q221	221243	2SA1346
Q222-Q227	2212445 or 2212446	2SK365 (GR) or 2SK365 (BL)
Q229, Q302	2211255	2SC1815 (GR)
Q306		
Q230, Q304	2211455	2SA1015 (GR)
Q305		
Q301	2211853 or 2211854	2SD667 (C) or 2SA667 (D)
Q303	2211863	2SB647 (C)
	<b>Diodes</b>	
D214-D254	223119	1S1588
D309, D310		
D225-D259	224311	HZ5C-3
D301, D307	223881	W02M
D302, D303	223839	1N4002
D308		
D304-D306	224310	HZ16-1
D311	224312	HZ3C-1
	<b>Capacitors</b>	
C201, C203	352780109	1 $\mu$ F, 50V, Elect.
C204		
C202, C205	352780229	2.2 $\mu$ F, 50V, Elect.
C211	371121044	0.1 $\mu$ F, 50V, MY
C212	371125634	0.056 $\mu$ F, 50V, MY
C213	371122724	2700pF, 50V, MY
C214	371121824	1800pF, 50V, MY
C215	370136814	680pF, 100V, APS
C216	352731019	100 $\mu$ F, 10V, Elect.
C217	352751009	10 $\mu$ F, 25V, Elect.
C302, C303	352751029	1000 $\mu$ F, 25V, Elect.
C304, C305	352742219	220 $\mu$ F, 16V, Elect.
C306-C308	352744719	470 $\mu$ F, 16V, Elect.
C309	352744709	47 $\mu$ F, 16V, Elect.
C310	352752209	22 $\mu$ F, 25V, Elect.
C311	352750479	4.7 $\mu$ F, 25V, Elect.
C314, C315	379125637	0.056 $\mu$ F, 50V, DEW
C316	379121037	0.01 $\mu$ F, 50V, DEW
C317	352732229	2200 $\mu$ F, 10V, Elect.
C1, C2	370133314	330pF, 100V, APS
C61, C62		
	<b>Resistors</b>	
R244, R303	441625614	560 $\Omega$ , 1W, Metal oxide film
R301	441626804	68 $\Omega$ , 1W Metal oxide film
R302	441621014	100 $\Omega$ , 1W Metal oxide film
R310	441621024	1k $\Omega$ , 1W, Metal oxide film
R311	441622204	22 $\Omega$ , 1W, Metal oxide film
	<b>Relay</b>	
	25065230	RZ-12

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>Jumper sockets</b>	
	25050141	NJPS-4P-S
	25050143	NJPS-6P-S
	25050144	NJPS-7P-S
	<b>Terminal</b>	
	25045140	NPJ-4PDBL53

## OSCILLATOR/POWER SUPPLY CIRCUIT PC BOARD (NAOSC-1803a) PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>ICs</b>	
Q201	222840111 or 222513	4011 or TC4011BP
Q202	222840931	4093B
Q203	222840171	4017B
Q228	222735	NJM072D
	<b>Transistors</b>	
Q204-Q215	221242	2SC3401
Q216-Q221	221243	2SA1346
Q222-Q227	2212445 or 2212446	2SK365 (GR) or 2SK365 (BL)
Q229, Q302	2211255	2SC1815 (GR)
Q306		
Q230, Q304	2211455	2SA1015 (GR)
Q305		
Q301	2211853 or 2211854	2SD667 (C) or 2SA667 (D)
Q303	2211863	2SB647 (C)
	<b>Diodes</b>	
D214-D254	223119	1S1588
D309, D310		
D255-D259	224311	HZ5C-3
D301, D307	223881	W02M
D302, D303	223839	1N4002
D308		
D304-D306	224310	HZ16-1
D311	224312	HZ3C-1
	<b>Capacitors</b>	
C201, C203	352780109	1 $\mu$ F, 50V, Elect.
C204		
C202, C205	352780229	2.2 $\mu$ F, 50V, Elect.
C211	371121044	0.1 $\mu$ F, 50V, MY
C212	371125634	0.056 $\mu$ F, 50V, MY
C213	371122724	2700pF, 50V, MY
C214	371121824	1800pF, 50V, MY
C215	370136814	680pF, 100V, APS
C216	352731019	100 $\mu$ F, 10V, Elect.
C217	352751009	10 $\mu$ F, 25V, Elect.
C302, C303	352751029	1000 $\mu$ F, 25V, Elect.
C304, C305	352742219	220 $\mu$ F, 16V, Elect.
C306-C308	352744719	470 $\mu$ F, 16V, Elect.
C309	352744709	47 $\mu$ F, 16V, Elect.
C310	352752209	22 $\mu$ F, 25V, Elect.
C311	352750479	4.7 $\mu$ F, 25V, Elect.
C314, C315	379125637	0.056 $\mu$ F, 50V, DEW
C316	379121037	0.01 $\mu$ F, 50V, DEW
C317	352732229	2200 $\mu$ F, 10V, Elect.

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>Resistors</b>	
R244, R303	441625614	560Ω, 1W, Metal oxide film
R301	441626804	68Ω, 1W Metal oxide film
R302	441621014	100Ω, 1W Metal oxide film
R310	441621024	1kΩ, 1W, Metal oxide film
R311	441622204	22Ω, 1W, Metal oxide film
	<b>Relay</b>	
	25065230	RZ-12
	<b>Jumper sockets</b>	
	25050141	NJPS-4P-S
	25050143	NJPS-6P-S
	25050144	NJPS-7P-S
	<b>Terminal</b>	
	25045140	NPJ-4PDBL53

#### MODE SWITCH PC BOARD (NASW-1804) PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>Switch</b>	
S1, (S2, S3)	35035402	NPS-142-222-L366

#### RANGE/DISPLAY SWITCH PC BOARD (NASW-1805) PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>Switch</b>	
S4, (S5, S6)	25035403	NPS-142-222-L367

#### REC SELECTOR SWITCH PC BOARD (NASW-1806) PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>Switch</b>	
S7, (S8, S9)	25035404	NPS-122-242-L368

#### EQ INPUT SWITCH PC BOARD (NASW-1807) PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
S10, (S11, S12)	25035405	NPS-142-262-L369

#### OUTPUT SWITCH PC BOARD (NASW-1808) PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
S13, (S14, S15)	25035406	NPS-342-L370

#### DISPLAY CIRCUIT PC BOARD (NADIS-1809) PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>Diodes</b>	
D201-D204	225137CG or	SEL2413E (CG)
D210-D213	225137DG or	SEL2413E (DG)
D207	225137DY	SEL2413E (DY)
D205, D206	225142	SEL2913K
D208, D209		
	<b>Holder</b>	
A20	27190232	

#### EQUALIZER CIRCUIT PC BOARD (NAEQ-1810) PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>ICs</b>	
Q1, Q14	222570	NJM4560DX
Q2-Q13	222502	NJM4558DX
	<b>Capacitors</b>	
C3, C63	352780109	1μF, 50V, Elect.
C4, C5	352732209	22μF, 10V, Elect.
C64, C65		
C6, C66	370134714	470pF, 100V, APS
C7, C67	352750479	4.7μF, 25V, Elect.
C9, C69	392841005	10μF, 16V, Elect.
C10, C16	392882295	0.22μF, 50V, Elect.
C70, C76		
C11, C71	392850475	4.7μF, 25V, Elect.
C12, C72	371121244	0.12μF, 50V, MY
C13, C73	392850225	2.2μF, 25V, Elect.
C14, C25	371126834	0.068μF, 50V, MY
C74, C85		
C15, C75	392880105	1μF, 50V, Elect.
C17, C77	371123334	0.033μF, 50V, MY
C18, C78	392884795	0.47μF, 50V, Elect.
C19, C79	371128234	0.082μF, 50V, MY
C20, C29	371121834	0.018μF, 50V, MY
C80, C89		
C21, C81	371122744	0.27μF, 50V, MY
C22, C82	371121234	0.012μF, 50V, MY
C23, C83	392881595	0.15μF, 50V, MY
C24, C84	371126824	6800pF, 50V, MY
C26, C86	371124724	4700pF, 50V, MY
C27, C87	371123934	0.039μF, 50V, MY
C28, C30	371122224	2200pF, 50V, MY
C88, C90		
C31, C91	371121034	0.01μF, 50V, MY
C32, C92	371121224	1200pF, 50V, MY
C33, C93	371125624	5600pF, 50V, MY
C34, C94	370136814	680pF, 100V, APS
C312, C313	379121045	0.1μF, 50V, DEW
	<b>Jumper sockets</b>	
	25050140	NJPS-3P-S
	25050141	NJPS-4P-S
	25050142	NJPS-5P-S
	25050144	NJPS-7P-S

#### LEVEL CONTROLS CIRCUIT PC BOARD (NAVR-1811) PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
VR1-VR12	6142022	N45LL100KW15F, Level controls
VR61-VR72		
VR13, (VR73)	6142021	N45LGL100KK20F, Attenuator



A

B

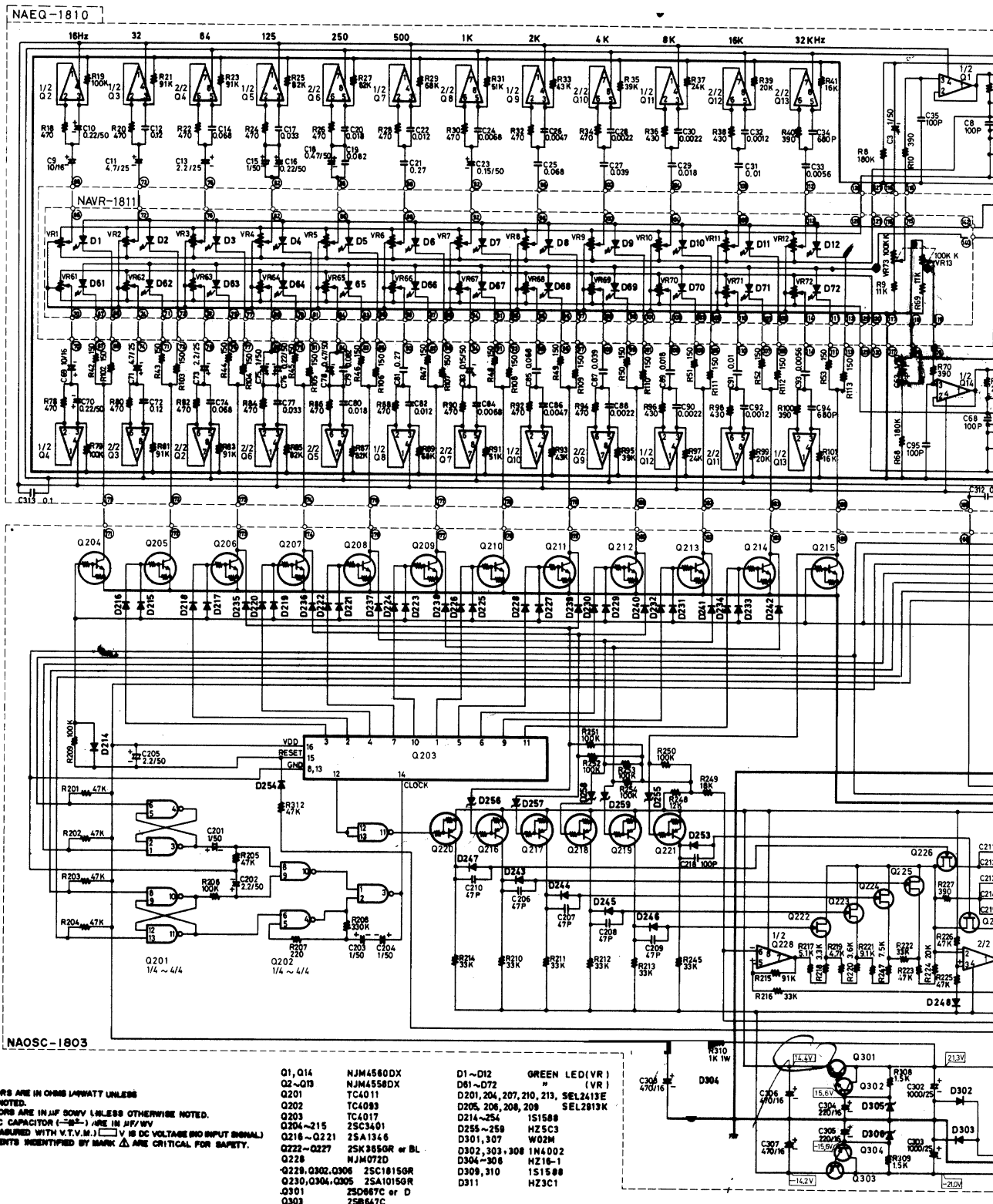
C

D

# SCHEMATIC DIAGRAM

## 120V model

# EQ-35



### NOTES

- ALL RESISTORS ARE IN OHMS (AWATT UNLESS OTHERWISE NOTED).
- ALL CAPACITORS ARE IN UF (50V UNLESS OTHERWISE NOTED).
- ELECTROLYTIC CAPACITOR (—E—) ARE IN MF/WV
- VOLTAGE (MEASURED WITH V.T.V.M.) □ V IS DC VOLTAGE (NO INPUT SIGNAL)
- THE COMPONENTS IDENTIFIED BY MARK Δ ARE CRITICAL FOR SAFETY.

- Q1, Q14 NJM4560DX
- Q2-Q3 NJM4558DX
- Q201 TC4011
- Q202 TC4093
- Q203 TC4017
- Q204-Q215 25C3401
- Q216-Q221 25A1346
- Q222-Q227 25K385GR or BL
- Q228 NJM072D
- Q229, Q202, Q206 25C1815GR
- Q230, Q304, Q305 25A1015GR
- Q301 25D667C or D
- Q303 25B647C

- D1-D12 GREEN LED (VR)
- D61-D72 " (VR)
- D201, 204, 207, 210, 213, SEL2413E
- D205, 206, 208, 209 SEL2819K
- D214-254 1S1588
- D255-258 HZ5C3
- D301, 307 W029W
- D302, 303, 308 1N4002
- D304-308 HZ16-1
- D309, 310 1S1588
- D311 HZ3C1



25C1815  
25A1015  
25B647C



25C3401  
25A1346



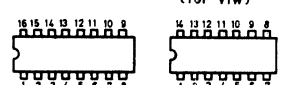
25K385

(BOTTOM VIEW)



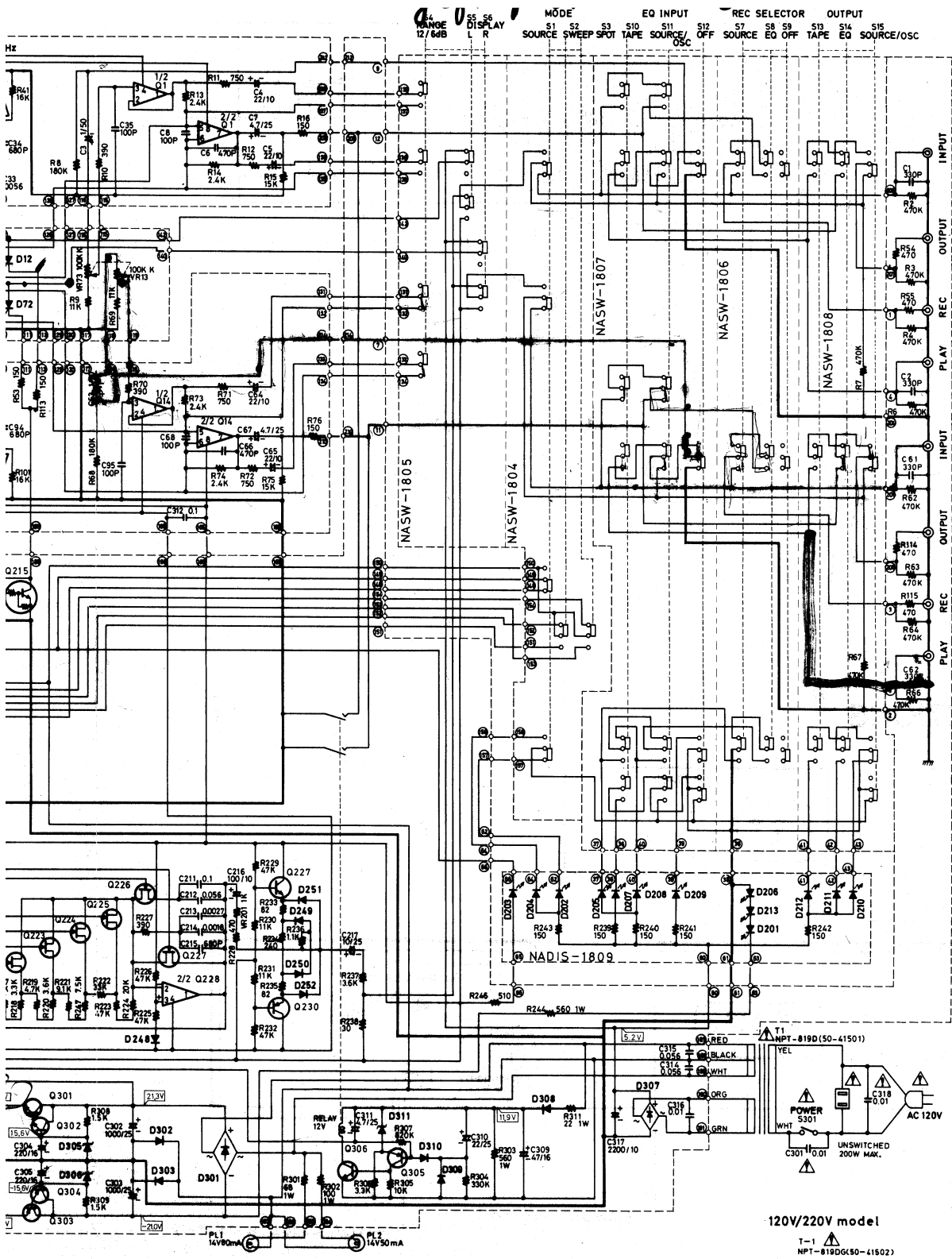
NJM4560DX

(TOP VIEW)

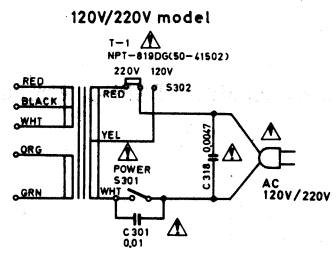
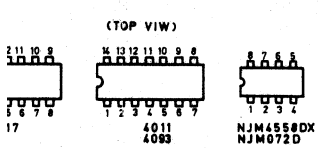
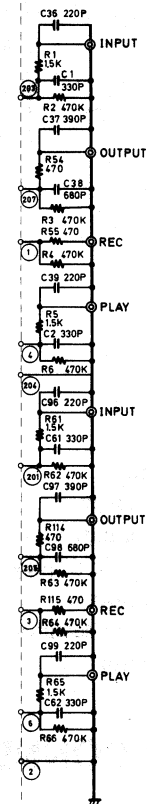


4017

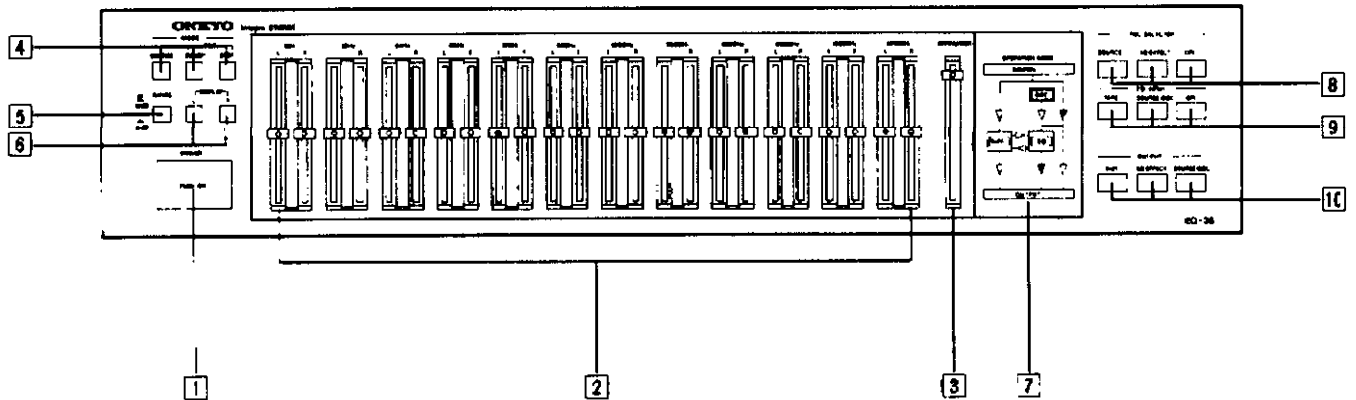
4011  
4099



120V/220V model

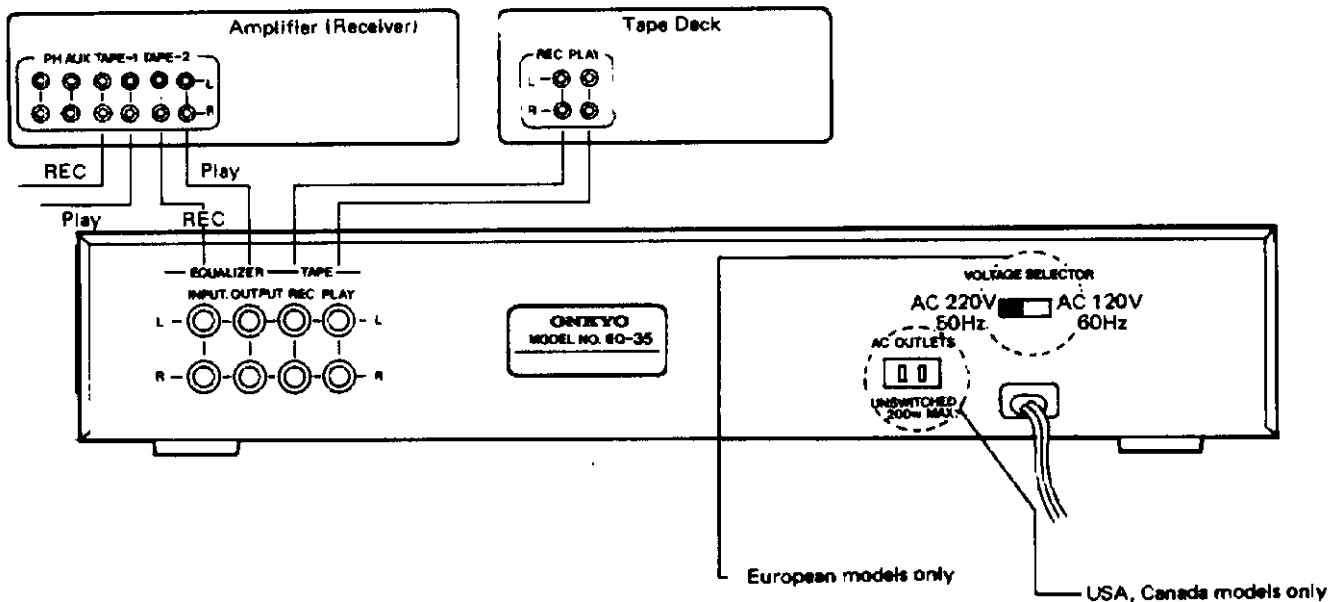


## FRONT PANEL



1. Power switch
2. Level controls
3. Attenuator
4. Mode selector
5. EQ variable range
6. Level control indicator off switches
7. Operation mode display
8. Recording selector
9. Equalizer input selector
10. Output selector

## SYSTEM CONNECTIONS



Connect a second tape deck to the amplifier TAPE-1 terminals.