SERIAL No.3367

ONKYO SERVICE MANUAL

AV Surround Processor

MODEL ES-300

U D	120V AC, 60Hz
U W	120V/220V AC, 50Hz/60Hz
UQA	240V AC, 50Hz

SAFETY-RELATED COMPONENT WARNING!!
COMPONENTS INDENTIFIED BY MARK ⚠ 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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ONKYO®
AUDIO COMPONENTS

SPECIFICATIONS

Power Output	30 Watts per channel, min. RMS, at 8 ohms, both channels driven, from 40 to 20 kHz, with no more than 0.09 % total harmonic distortion. (Power Amplifier Section)
Total Harmonic Dist.	0.09 % at 30 Watts (Power Amplifier Section)
Output (DECODER)	150 mV (Master volume max.)
Sensitivity and Imp.	Dolby : 150 mV, 30 kohms Theater : 150 mV, 30 kohms Hall : 300 mV, 30 kohms
Frequency Response	40 to 7,000 Hz, +0/−3 dB (DOLBY)
Signal to Noise Ratio	79 dB (DOLBY, IHF-A, Shorted)
Delay Time	20 ms/30 ms
Power Supply Rating	USA & Canadian models: AC 120 V, 60 Hz U.K. & Australian models: AC 240 V, 50 Hz Worldwide models: 120 and 220 V swichable 50/60 Hz
Dimensions	435 W x 89 H x 274 D mm 17 1/8" x 3 4/8" x 10 13/16"
Weight	4.5 kg, 9.9 lbs.

Specifications and features are subject to change without notice.

PRECAUTIONS

1. Replacing the fuses

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

CIRCUIT NO.	PART NO.	DESCRIPTION
F1	252123	2A-UL-5TT, Primary fuse (120V model)
F1	252125	T1.25A/250V, Primary fuse (240V model)
F2	252124	T2A/250V, Primary fuse (120V/220V model)
F3	252125	T1.25A/250V, Primary fuse (120V/220V model)

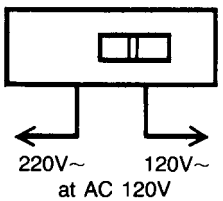
2. Insulation resistance mesurement (Only U.S.A. model)

Connect the insulating-resistance tester between the plug of power supply cable and the terminal GND on the back panel.

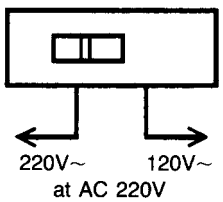
Specifications; More than 10 MΩ at 500V.

3. Voltage selector (rear panel)

Worldwide 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 to the right or left. Confirm that the switch has been moved all the way to the right or left before turning the power switch on. Models without a voltage selector can only be used in areas where the power supply is the same as that of the unit.

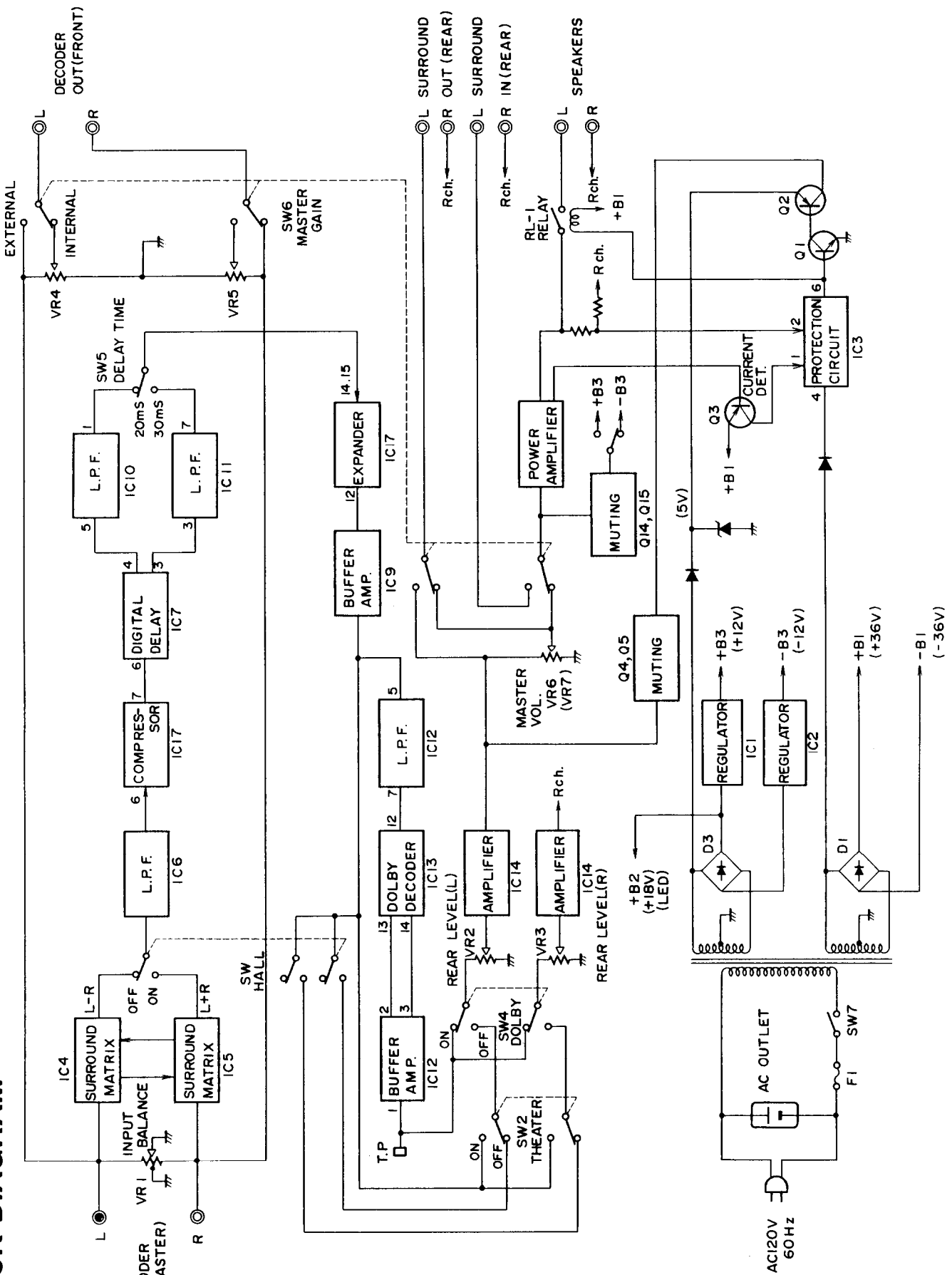


at AC 120V



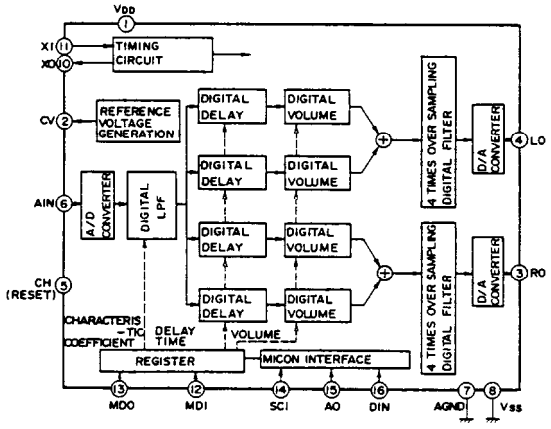
at AC 220V

BLOCK DIAGRAM



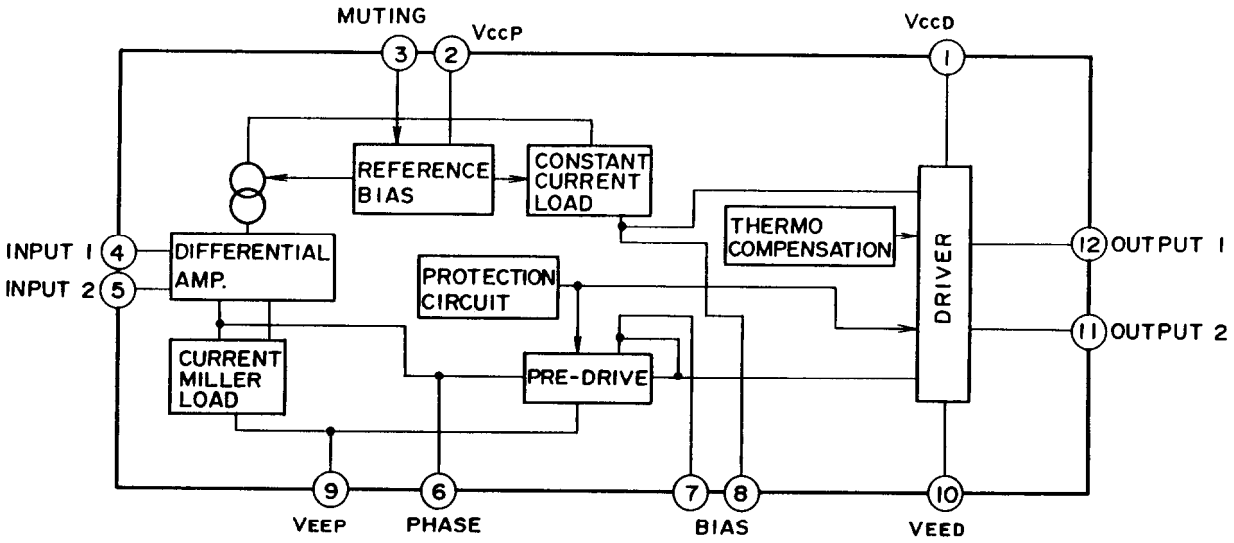
IC BLOCK DIAGRAMS

YM3428 (Digital Surround)

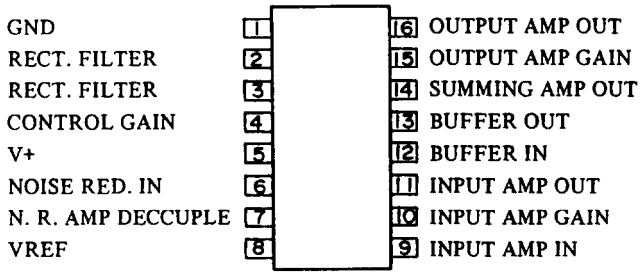


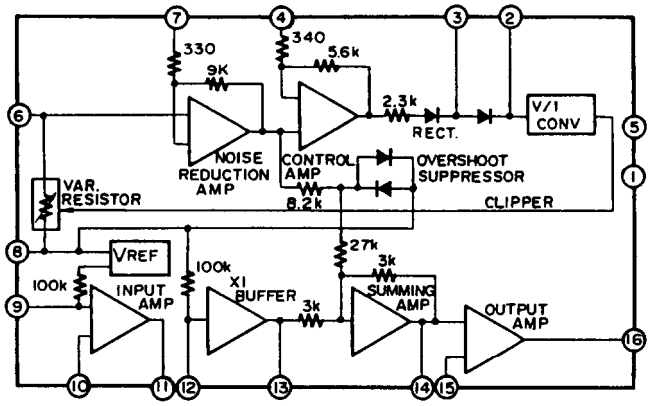
Pin No.	Terminal	I/O	Descriptions
1	V_{DD}		Power supply terminal. (+5V)
2	CV	O	Reference voltage output for A/D converter. (+2.5V)
3	RO	O	Right channel output (D/A converter analog output)
4	LO	O	Left channel output (D/A converter analog output)
5	CH	O	Capacitor connection terminal for sampling hold.
6	AIN	I	Analog signal input terminal.
7	AGND		Ground terminal of A/D and D/A converters. Connect to terminal V_{SS}.
8	V_{SS}		Ground terminal.
9	/IC	I	Rest terminal.
10 11	XO XI	O I	Connect to the crystal oscillator. The terminal XI is the clock input terminal when used the external clock.
12 13	MD1 MD0	I I	Mode setting terminals.
14	SCI	I	Data shift clock input terminal when used the microprocessor.
15	A0	I	Address/data identifier signal input terminal when used the microprocessor.
16	DIN	I	Data input terminal when used the microprocessor.

μPC1270H (Power Amplifier Driver)

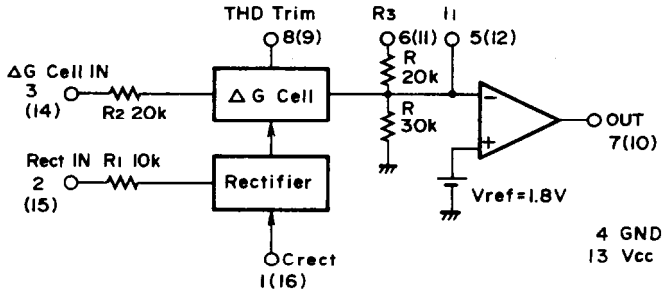


LA2730 (Dolby Encoder/Decoder)



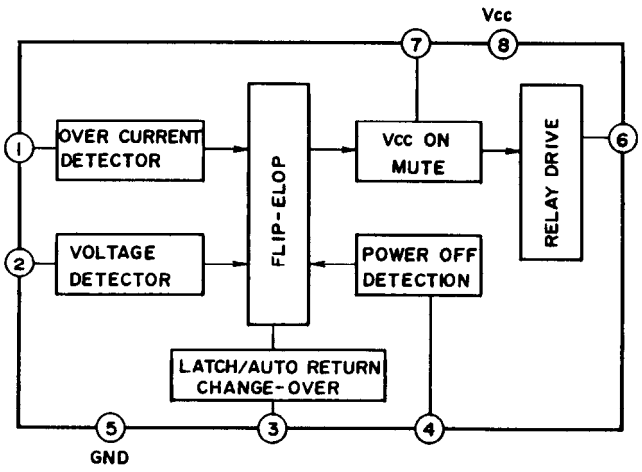


μPC1571C (Noise Ruduction Circuit)

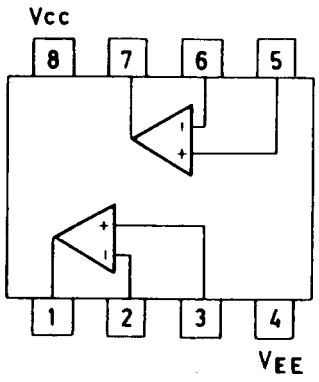


Pin No.	Function	Pin No.	Function
1	Crect1	9	THD Trim 2
2	Rect IN1	10	OUT 2
3	ΔG Cell IN1	11	R_3 2
4	GND	12	I_1 2
5	I_1 1	13	V_{CC}
6	R_3 1	14	ΔG Cell IN 2
7	OUT 1	15	Rect IN 2
8	THD Trim 1	16	Crect 2

μPC1237H (Protective Circuit)

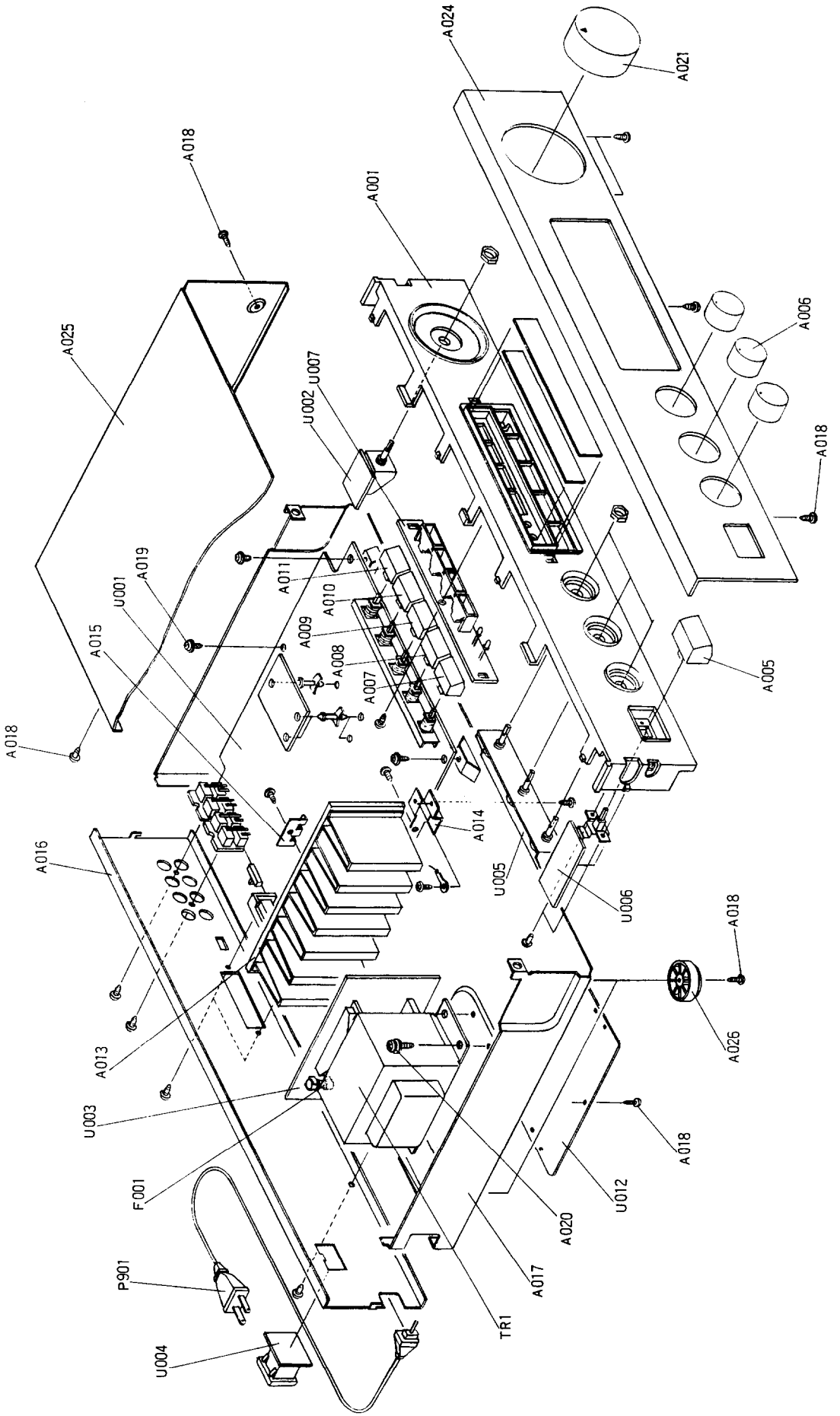


NJM4558DX (Operation Amplifier)



ES-300

CHASSIS-EXPLODED VIEW



CHASSIS-EXPLODED VIEW-PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
A001	27110584	FRONT GUIDE PANEL ASS'Y
(A002)	27110580	GUIDE PANEL
(A003)	28191564	CLEAR PANEL
(A004)	28133246	BACK PLATE
A005	28323970	KNOB (POW)
A006	28323240	KNOB (TONE)
A007	28324053	KNOB (DEL)
A008	28324054	KNOB (DOL)
A009	28324055	KNOB (THEA)
A010	28324056	KNOB (HALL)
A011	28324057	KNOB (OFF)
A012	27130618	BRACKET (PT)
A013	27160260	HEATSINK
A014	27141406	BRACKET (HEAT)
A015	27141407	BRACKET (TR)
A016	27121352	REAR PANEL [D]
	27121352-1	REAR PANEL [W]
	27121352-2	REAR PANEL [A]
A017	27100217	CHASSIS
A018	838430088	3TTB+8BBC, TAPPING SCREW
A019	831130088	3TTW+8B, TAPPING SCREW
A020	801450	4SMP10WSW+10CBC, SPECIAL TAPPING SCREW
A021	28323242A	KNOB ASS'Y (VOL)
A024	27211215	FRONT PANEL
A025	28184461	TOP COVER
A026	27175217	BOTTOM LEG
⚠ TR-1	2300573	NPT-1076D, POWER TRANSFORMER [D]
	2300574	NPT-1076DG, POWER TRANSFORMER [W]
	2300575	NPT-1076Q, POWER TRANSFORMER [A]
⚠ P901	253165	AS-UL/CSA(WP), POWER SUPPLY CABLE[D]
	253154	AS-EQ540-UW, POWER SUPPLY CABLE [W]
	253155	AS-EQ540-UQA, POWER SUPPLY CABLE [A]
⚠ F1	252123	2A-UL-5TT, PRIMALY FUSE [D]
	252125	T1.25A/250V, PRIMALY FUSE [A]
⚠ F2	252124	T2A/250V, PRIMALY FUSE [W]
⚠ F3	252125	T1.25A/250V, PRIMALY FUSE [W]
Q6, Q7	2211255	2SC1815GR, TRANSISTOR
Q8, Q9	2202303 OR	2SC4512O OR
	2202304	2SC4512Y, TRANSISTOR
Q10, Q11	2202313 OR	2SA1726O OR
	2202314	2SA1726Y, TRANSISTOR
U001	1W065529-1	NAAF-3929-1, MAIN CIRCUIT PC BOARD ASS'Y [D]
	1W065529-1A	NAAF-3929-1A, MAIN CIRCUIT PC BOARD ASS'Y [W]
	1W065529-1B	NAAF-3929-1B, MAIN CIRCUIT PC BOARD ASS'Y [A]
U002	1W065530-1	NAETC-3930-1, MASTER VOLUME PC BOARD ASS'Y
U003	1W065531-1	NAETC-3931-1, FUSE CIRCUIT PC BOARD ASS'Y [D]
	1W065531-1A	NAETC-3931-1A, FUSE CIRCUIT PC BOARD ASS'Y [W]
	1W065531-1B	NAETC-3931-1B, FUSE CIRCUIT PC BOARD ASS'Y [A]
U004	1W065532-1	NAETC-3932-1, AC OUTLET PC BOARD ASS'Y
U005	1W065533-1	NAETC-3933-1, VARIABLE RESISTOR (REAR), PC BOARD ASS'Y [D]
	1W065533-1A	NAETC-3933-1A, VARIABLE RESISTOR (REAR), PC BOARD ASS'Y [W]
	1W065533-1B	NAETC-3933-1B, VARIABLE RESISTOR (REAR), PC BOARD ASS'Y [A]
U006	1W065534-1	NAETC-3934-1, POWER SWITCH PC BOARD ASS'Y [D]
	1W065534-1A	NAETC-3934-1A, POWER SWITCH PC BOARD ASS'Y [W]
	1W065534-1B	NAETC-3934-1B, POWER SWITCH PC BOARD ASS'Y [A]
U007	1W065535-1	NADIS-3935-1, DISPLAY (LED) PC BOARD ASS'Y
U009	1W065548-1	NASW-3948-1, SLIDE SWITCH PC BOARD ASS'Y [W]

NOTE [D]: ONLY 120V MODEL
[W]: ONLY 120V/220V MODEL
[A]: ONLY AUSTRALIAN MODEL

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

ADJUSTMENT PROCEDURES

1. Preparations

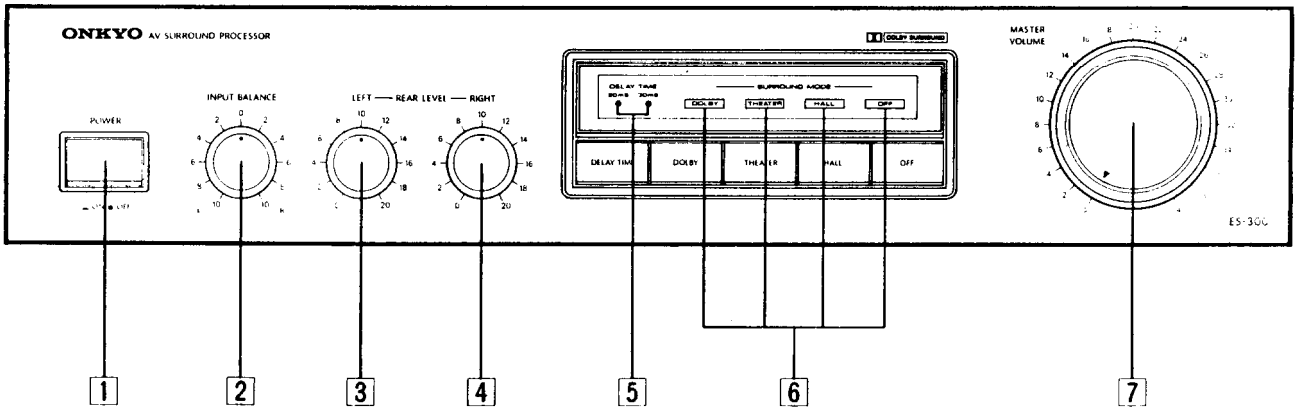
1) Place the unit on the workbench.
2) Set up the unit as follows.
   (1) No load
   (2) No signal
   (3) Volume turned all the way down
   (4) Power switch off

2. Adjustment of idling current

1) Turn the power switch ON and allow the unit to warm up for about 10 minutes.
   Adjust VR9 (VR10) so that the voltage at test point "BIAS" socket on the NAAF-3929 circuit board is 10 mV.

Note) Semi-fixed resistors enclosed in parentheses ( ) are for the right channel.

FRONT PANEL FACILITIES



[1] **POWER Switch (POWER)**
Press once to turn on the power. Press again to turn off the power.

[2] **INPUT BALANCE Control Knob (INPUT BALANCE)**
Use this control to adjust the relative volume level of the left and right channel input. (For details, see Operations

[3] **REAR LEVEL - LEFT Control Knob (REAL LEVEL - LEFT)**
Use this control to adjust the volume level of the rear left channel speaker.

[4] **REAR LEVEL - RIGHT Control Knob (REAR LEVEL - RIGHT)**
Use this control to adjust the volume level of the rear right channel speaker.

[5] **DELAY TIME Switch and Indicators (DELAY TIME)**
When the Surround Mode is set to DOLBY, THEATER, or HALL, this switch can be used to set the delay time of the sound from the rear speakers to 20ms or 30ms. Select the delay time depending on the positions of the front and rear speakers to improve the sound effect.

[6] **SURROUND MODE Switches and Indicators**
DOLBY: Press to produce a Dolby Surround effect for programs recorded by a Dolby Surround system.
THEATER: Press to produce the acoustic effect of a movie theater.
The REAR signal is generated from the difference between the left and right channel signal levels. The rear speakers thus basically produce no sound when the input source is monaural (left=right), but will produce sound if the REAR-L and REAR-R input signals have different levels.
HALL: Press to produce the acoustic effect of a concert hall.
OFF: Press to disable the Surround effect (no sound is produced from the rear speakers).

[7] **MASTER VOLUME Control Knob (MASTER VOLUME)**
Use this control to simultaneously adjust the volume level of both the front and rear speakers. If an ONKYO preamplifier with SURROUND jacks is connected and the MASTER GAIN switch is set to EXTERNAL, the overall volume cannot be adjusted by this control.

PRINTED CIRCUIT BOARD PARTS LIST

MAIN CIRCUIT PC BOARD (NAAF-3929-1, NAAF-3929-1A, NAAF-3929-1B)-PART LIST

CIRCUIT NO.	PART NO.	DESCRIPTION
	PC board ass'y	
U008	1W065536-1	NAAF-3936-1
	ICs	
IC1	222780125	78M12HF
IC2	222790125	79M12HF
IC3	22240360	μPC1237H
IC4~IC6	222502	NJM4558DX
IC10~IC12		
IC14		
IC7	22240281	YM3428
IC8	222780053	78L05
IC13	22240139	LA2730
IC15, IC16	22240359	μPC1270H
	Transistors	
Q1	2213284	2SC1740SR
Q2	2213750	DTA144ES
Q3	2212205	2SA1175EF
Q4, Q5	2213683	2SC3327A
Q12, Q13	2212215	2SC2785EF
Q14, Q15	2213683	2SC3327A
	Diodes	
D1	22380037	KBU6DL
D2, D4, D12	223188	MPG06B
D3	223892	DF02M
D5	224450512T	MTZ5.1B, Zener
D7~D11	223172	1SS131
D15, D16		
	Coils	
L1, L2	231174	S-1.0A
	Osc. element	
X1	3010162	KBR3.5MES
	Capacitors	
C1, C2	354751029	1000μF, 25V, Elect.
C3, C4	354741019	100μF, 16V, Elect.
C5, C32	354752219	220μF, 25V, Elect.
C7, C8	3500126	6800μF, 50V, Elect.
C9, C31	354780479	4.7μF, 50V, Elect.
C10	354732219	220μF, 10V, Elect.
C11	354782209	22μF, 50V, Elect.
C12	354781009	10μF, 50V, Elect.
C16, C17, C22	354780109	1μF, 50V, Elect.
C37, C38, C48		
C51, C59		
C89~C91		
C23, C26, C39	371121524	1500pF, 50V, Mylar
C40		
C25, C28, C43	371124724	4700pF, 50V, Mylar
C44, C53, C58		
C30	371121024	1000pF, 50V, Mylar
C33	354734709	47μF, 10V, Elect.
C46	371121834	0.018μF, 50V, Mylar
C47	371121824	1800pF, 50V, Mylar
C49	354783399	0.33μF, 50V, Elect.
C50	354781099	0.1μF, 50V, Elect.
C52	371123334	0.033μF, 50V, Mylar
C54	371122734	0.027μF, 50V, Mylar
C55	354742209	22μF, 16V, Elect.
C56, C71, C72	354741019	100μF, 16V, Elect.
C57, C88, C92	354741009	10μF, 16V, Elect.
C60~C64		

CIRCUIT NO.	PART NO.	DESCRIPTION
C67, C68	371124714	470pF, 50V, Mylar
C69, C70	354780229	2.2μF, 50V, Elect.
C73, C74, C79	354781019	100μF, 50V, Elect.
C80		
C77, C78	371123334	0.033μF, 50V, Mylar
C81, C82	375524734	0.047μF, 50V, Film (MMT)
C83	354754709	47μF, 25V, Elect.
C84	371121834	0.018μF, 50V, Mylar
C111, C112	371122224	2200pF, 50V, Mylar
	Resistors	
R13	442623914	390Ω, 1W, Metal oxide film
R48, R128	442521004	10Ω, 1/2W, Metal oxide film
R129, R138		
R139, R142		
R122, R123	4800048	0.22Ω×2, METAL PLATE
VR9, VR10	5210227	N06HR500BC, Semi fixed
	Switches	
SW1~SW5	25035626	NPS-342-162-L584, Push switch
SW6	25065395	NSS-62149, Slide switch
	Input terminals	
	25045297	NPJ-4PDBL156
	Terminal	
	25060150	NTM-4PDML078
	Plugs	
	25055100	NPLG-3P84
	25055146	NPLG-2P130
	Relay	
RL1	25065389	NRL-2P2A-DC24-064
	Jumper sockets	
	25050142	NJPS-5P-S
	25050143	NJPS-6P-S
	25050144	NJPS-7P-S
	Sockets ass'y	
CN51	2009990101	NSAS-6P0141
CN54, CN56	2009990100	NSAS-4P0140
	Heatsink	
	27160256	
	Holder	
	27190781	Holder (PC)

MASTER VOLUME PC BOARD (NAETC-3930-1)-PART LIST

CIRCUIT NO.	PART NO.	DESCRIPTION
	Resistors	
VR4 (VR5~VR7)	5104273	N16RGL50KA20F
	Plate	
	27150303	Shield plate (B)

FUSE CIRCUIT PC BOARD (NAETC-3931-1, NAETC-3931-1A, NAETC-3931-1B)-PART LIST

CIRCUIT NO.	PART NO.	DESCRIPTION
	Capacitor	
⚠C100	3500077	4700pF, AC400V/125V, IS
	Fuse holder	
	27190765	[W]
	Fuse label	
F1a	29361263	T1.25A/250V [A]
	Plug	
	25055490	NPLG-2P465
	Sockets ass'y	
CN7	2009990095	NSAS-6P0134
CN10	2009990096	NSAS-6P0135

AC OUTLET PC BOARD (NAETC-3932-1)-PART LIST

CIRCUIT NO.	PART NO.	DESCRIPTION
	Outlet	
	25050411	NSCT-2P236

VARIABLE RESISTOR (REAR) PC BOARD (NAETC-3933-1, NAETC-3933-1A, NAETC-3933-1B)-PART LIST

CIRCUIT NO.	PART NO.	DESCRIPTION
	Resistors	
VR1	5146056	N16RLC200KBTP20F, Variable
VR2, VR3	5146057	N16RL100KA20F, Variable
	Plate	
	27150302	Shield plate (A)
	Socket	
CN13	2009990102	NSAS-6P0142

POWER SWITCH PC BOARD (NAETC-3934-1, NAETC-3934-1A, NAETC-3934-1B)-PART LIST

CIRCUIT NO.	PART NO.	DESCRIPTION
	Capacitor	
⚠C13	3500065A	0.01μF, AC400V/125V
	Switch	
⚠SW7	25035627	NPS-111-L585P
	Socket ass'y	
	2009990093	NSAS-2P0132

DISPLAY PC BOARD (NADIS-3935-1)-PART LIST

CIRCUIT NO.	PART NO.	DESCRIPTION
	Diodes	
LED1	225227	SLV-31VC, LED
LED2~LED4	225228L	SLV-31MC(L), LED
LED5, LED6	225261	SLR-34MC, LED
	Holder	
	27190773	LED holder

EXPANDER CIRCUIT PC BOARD (NAAF-3936-1)-PART LIST

CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs	
IC9	222502	NJM-4558DX
IC17	22240131	μPC1571C
	Capacitors	
C29, C97	354780109	1μF, 50V, Elect.
C45, C101	354741009	10μF, 16V, Elect.
C102, C106		
C95, C96, C103	354782299	0.22μF, 50V, Elect.
C105	354742209	22μF, 16V, Elect.

SLIDE SWITCH PC BOARD (NASW-3948-1)-PART LIST

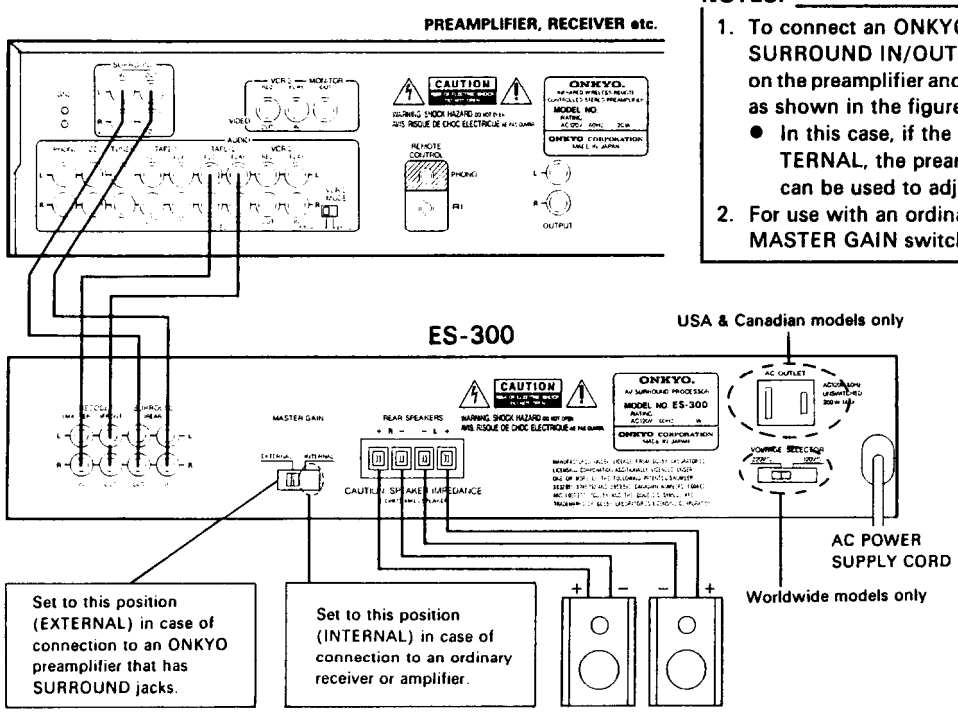
CIRCUIT NO.	PART NO.	DESCRIPTION
	Switch	
	⚠25065228	NSS-2299, Slide switch [W]

NOTE [D]: Only 120V model
[W]: Only 120V/220V model
[A]: Only Australian model

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

SYSTEM CONNECTIONS

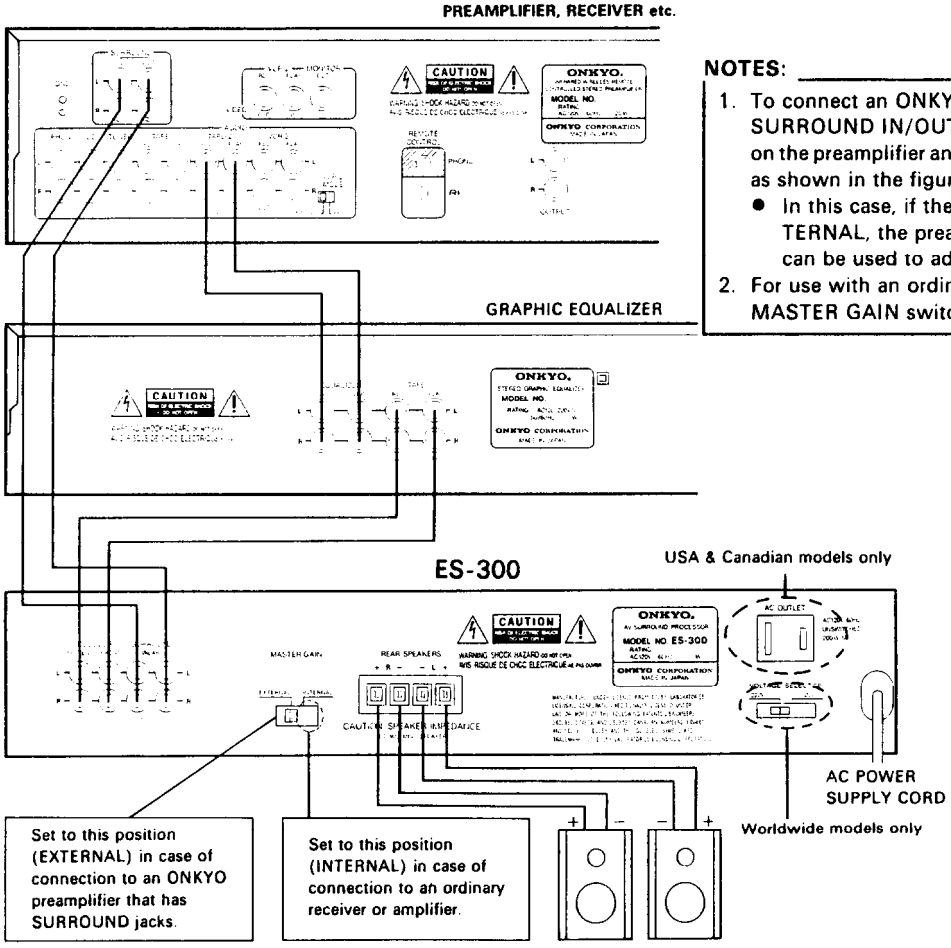
- Standard Connection Procedures



NOTES:

1. To connect an ONKYO preamplifier that is equipped with SURROUND IN/OUT jacks, connect the SURROUND jacks on the preamplifier and on the AV SURROUND PROCESSOR as shown in the figure.
   - In this case, if the MASTER GAIN switch is set to EXTERNAL, the preamplifier's MASTER VOLUME control can be used to adjust the volume of the rear speakers.
2. For use with an ordinary amplifier or receiver, leave the MASTER GAIN switch set to INTERNAL.

- To connect the AV SURROUND PROCESSOR to a GRAPHIC EQUALIZER:

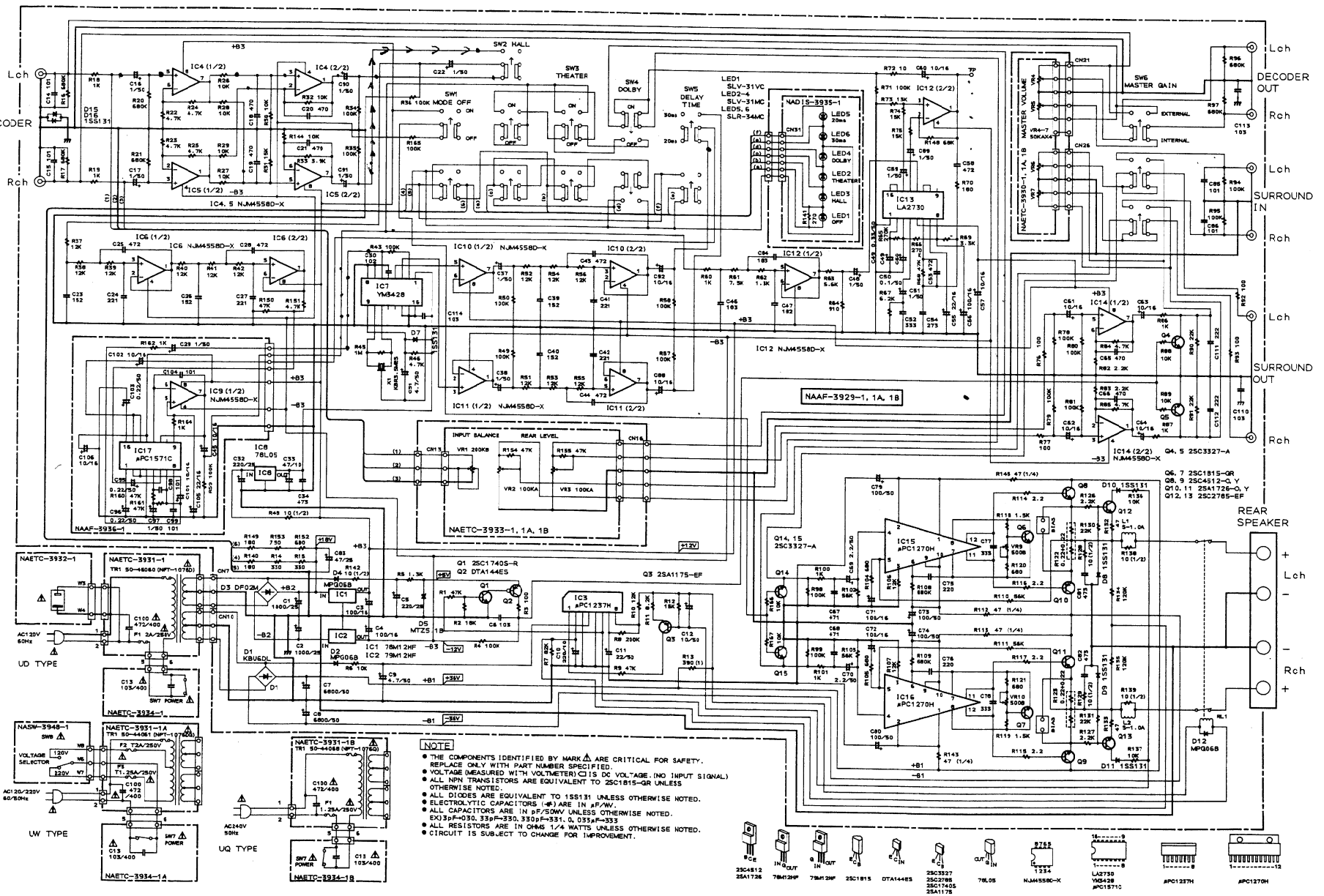


NOTES:

1. To connect an ONKYO preamplifier that is equipped with SURROUND IN/OUT jacks, connect the SURROUND jacks on the preamplifier and on the AV SURROUND PROCESSOR as shown in the figure.
   - In this case, if the MASTER GAIN switch is set to EXTERNAL, the preamplifier's MASTER VOLUME control can be used to adjust the volume of the rear speakers.
2. For use with an ordinary amplifier or receiver, leave the MASTER GAIN switch set to INTERNAL.

SCHEMATIC DIAGRAM

Model ES-300



NOTE

- THE COMPONENTS IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR SAFETY. REPLACE ONLY WITH PART NUMBER SPECIFIED.
- VOLTAGE (MEASURED WITH VOLTMETER) CIS DC VOLTAGE. (NO INPUT SIGNAL)
- ALL NPN TRANSISTORS ARE EQUIVALENT TO 2SC1815-GR UNLESS OTHERWISE NOTED.
- ALL DIODES ARE EQUIVALENT TO 1SS131 UNLESS OTHERWISE NOTED.
- ELECTROLYTIC CAPACITORS (—●—) ARE IN μF/W.
- ALL CAPACITORS ARE IN pF/50WV UNLESS OTHERWISE NOTED. EX) 3p-F=030, 33p-F=330, 330p-F=331, 0.033μ-F=333
- ALL RESISTORS ARE IN OHMS 1/4 WATTS UNLESS OTHERWISE NOTED.
- CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.

PACKING PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
A851	29052075	Master carton box
A852	29091420	Pad
A853	29100110	800 × 450, Poly-vinyl bag
A854	29110077-1	Damplon tape
A855	282301	Sealing hook
	ACCESSARY BAG ASS'Y	
A891	29341518	Instruction manual
A893	2010112	Connection cable
A896	29100006A	250 × 360, Poly-vinyl bag
	29365019	Warranty card [N]
	29358002H	Service station list [N]
	25055040	CV-K-2, Conversion plug [W]

NOTE [N]: Only U.S.A. model
[W]: Only 120V/220V model