

TA-MR2ES

SERVICE MANUAL

US Model

Ver. 1.0 2004.12



SPECIFICATIONS

Continuous average power output (FTC):

35 W per channel min. RMS at 8 ohms, both channels driven from 20 Hz to 20 kHz with no more than 0.09 % THD.

40 W per channel min. RMS at 4 ohms, both channels driven from 20 Hz to 20 kHz with no more than 0.09 % THD.

Frequency response: 5 Hz – 100 kHz + 0.5/-2 dB

Residual noise (A-weighted):

150 μ V or less

Channel separation (1 kHz/10 kHz):

(input 4.7 k ohms terminated)
60 dB/45 dB

Signal-to-noise ratio: 94 dB (A-weighted filter, 150 mV input)

Audio input

Sensitivity: 150 mV

Impedance: 50 k ohms

Audio output

Voltage: minimum 2 V without clipped

Impedance: 1 k ohms

S/N: 102 dB (A-weighted filter, 2 V output)

General

12V trigger IN: accept 10 ~ 12 V of trigger

12V trigger OUT: 300 mA max

IR input: accept up to 40 kHz IR modulation frequency

IR output: buffered, 5 V

Power requirements: 120 VAC, 60 Hz

Power consumption: 100 W

Dimensions: 430 × 67 × 350 mm (w/h/d)

Mass: 6.5 kg

Unpacking

- TA-MR2ES amplifier
- AC power cord
- Installation Manual
- Rack-mount brackets (2)
- Screw (6)

Design and specifications are subject to change without notice.

SYSTEM INTEGRATION 2CH AMPLIFIER

9-879-354-01
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Audio Company
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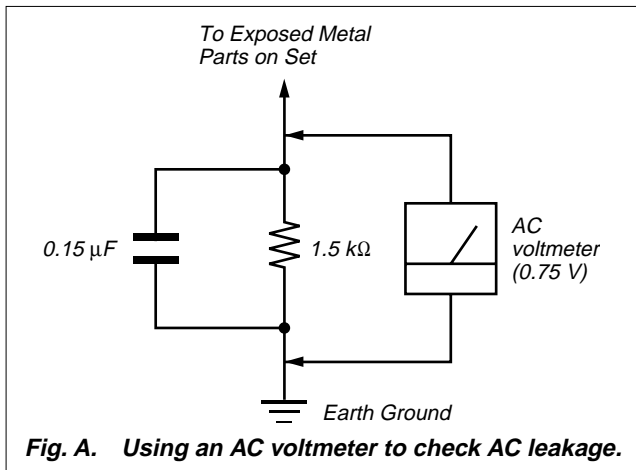
SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety check before releasing the set to the customer:
 Check the antenna terminals, metal trim, “metallized” knobs, screws, and all other exposed metal parts for AC leakage.
 Check leakage as described below.

LEAKAGE TEST

The AC leakage from any exposed metal part to earth ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 0.5 mA (500 microamperes.). Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA WT-540A. Follow the manufacturers’ instructions to use these instruments.
2. A battery-operated AC milliammeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The “limit” indication is 0.75 V, so analog meters must have an accurate low-voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 2 V AC range are suitable. (See Fig. A)



SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK Δ OR DOTTED LINE WITH MARK Δ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

Flexible Circuit Board Repairing

- Keep the temperature of the soldering iron around 270 °C during repairing.
- Do not touch the soldering iron on the same conductor of the circuit board (within 3 times).
- Be careful not to apply force on the conductor when soldering or unsoldering.

Notes on chip component replacement

- Never reuse a disconnected chip component.
- Notice that the minus side of a tantalum capacitor may be damaged by heat.

UNLEADED SOLDER

Boards requiring use of unleaded solder are printed with the lead-free mark (LF) indicating the solder contains no lead.
 (Caution: Some printed circuit boards may not come printed with the lead free mark due to their particular size)

LF : LEAD FREE MARK

Unleaded solder has the following characteristics.

- Unleaded solder melts at a temperature about 40 °C higher than ordinary solder.
 Ordinary soldering irons can be used but the iron tip has to be applied to the solder joint for a slightly longer time.
 Soldering irons using a temperature regulator should be set to about 350 °C.
 Caution: The printed pattern (copper foil) may peel away if the heated tip is applied for too long, so be careful!
- Strong viscosity
 Unleaded solder is more viscous (sticky, less prone to flow) than ordinary solder so use caution not to let solder bridges occur such as on IC pins, etc.
- Usable with ordinary solder
 It is best to use only unleaded solder but unleaded solder may also be added to ordinary solder.

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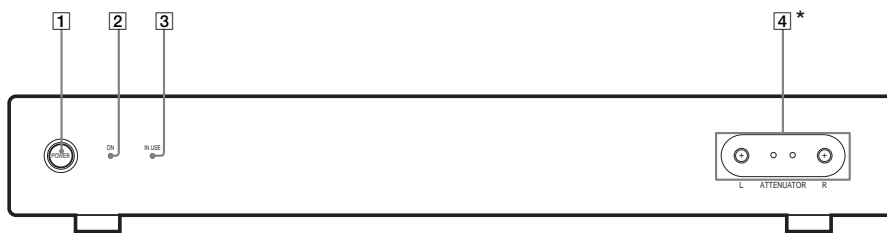
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SECTION 1 GENERAL

This section is extracted from instruction manual.

Parts and Controls

Front panel of the amplifier



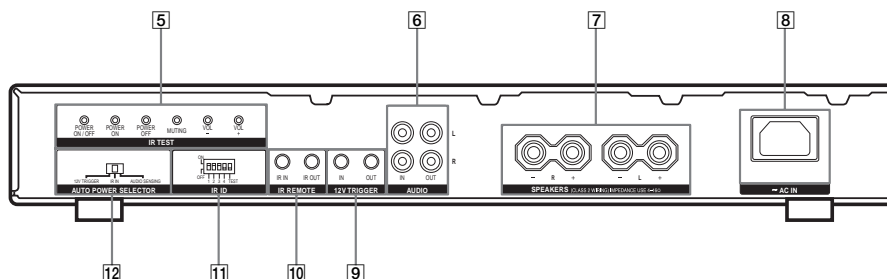
*To remove the cover



Press either ends of the cover lid to remove the cover. After you have finished adjusting the ATTENUATOR L/R, place the cover lid back to its original position.

- 1 POWER switch**
Press to turn the power on or off.
- 2 ON indicator**
The ON indicator lights up as follows:
 - green: the power is on.
 - green (flashing three times): the amplifier's memory is cleared.
 - off: the power is off.
- 3 IN USE indicator**
The IN USE indicator lights up as follows:
 - green: the amplifier is in use.
 - green (flashing): the IR ID TEST switch is set to "ON".
 - green (fast flashing): the IR TEST function is in progress.
 - red (flashing): "PROTECTION" mode is turned on.
 - off: the amplifier is not in use.
- 4 ATTENUATOR L/R**
Adjusts the maximum volume level of this amplifier to match the room and the speakers used.

Rear panel of the amplifier



- 5 IR TEST buttons (page 12)**
Press the appropriate button to output the IR codes you want to teach through the IR OUT terminal.
- 6 AUDIO jacks (page 10)**
 - a) **AUDIO IN**
RCA jacks for stereo line level audio input from a multi-room system.
 - b) **AUDIO OUT**
RCA jacks for looping out to another amplifier or component.

 Note
 This is a buffered audio connection, and this loop-through is active even when the IN USE indicator is off, as long as the AC power cord is plugged in and the POWER switch is on.
- 7 SPEAKERS (page 10)**
Terminal which accepts speaker wire sizes up to 12AWG.
Leave the AC power cord unplugged when you hook up speaker cables.
- 8 AC IN (page 10)**
Removable power cord for easy serviceability of the amplifier.
- 9 12V TRIGGER jacks (page 10)**
 - a) **IN**
A 3.5 mm monaural mini jack to turn on the amplifier via a 12-volt trigger input.
 - b) **OUT**
Enables the looping of amplifier control from one to the next to trigger multiple amplifiers from a 12-volt trigger output.
- 10 IR REMOTE jacks (page 10)**
 - a) **IR IN**
Connects to an outboard IR repeater system so you can operate the amplifier from a distant room.
 - b) **IR OUT**
A 3.5 mm monaural mini jack for the connection of an IR emitter to control other components individually. IR signals received will be routed to the IR sensor of the other components. Outputs IR from the IR TEST system built into the rear of the amplifier.
- 11 IR ID switches (page 12)**
Select from 12 discrete IR code tables to communicate with up to 12 TA-MR2ES amplifiers (with individual IR ID) on one IR repeater network.
- 12 AUTO POWER SELECTOR switch (page 11)**
Selects the method for activating the amplifier.

SECTION 2 TEST MODE

1. MEMORY CLEAR

Procedure:

- ① Select the TEST switch to "ON" of the IR ID at back panel.
- ② Press the **POWER OFF** key at back panel in advance and simultaneously press the **POWER ON** key at front panel.
- ③ See the condition of two LEDs as follows.

	POWER LED	IN USE LED
FIRST CONDITION	slow blinking 3times (each 1 sec)	off while power LED blinking
AFTER	ON	slow blinking each 1 sec

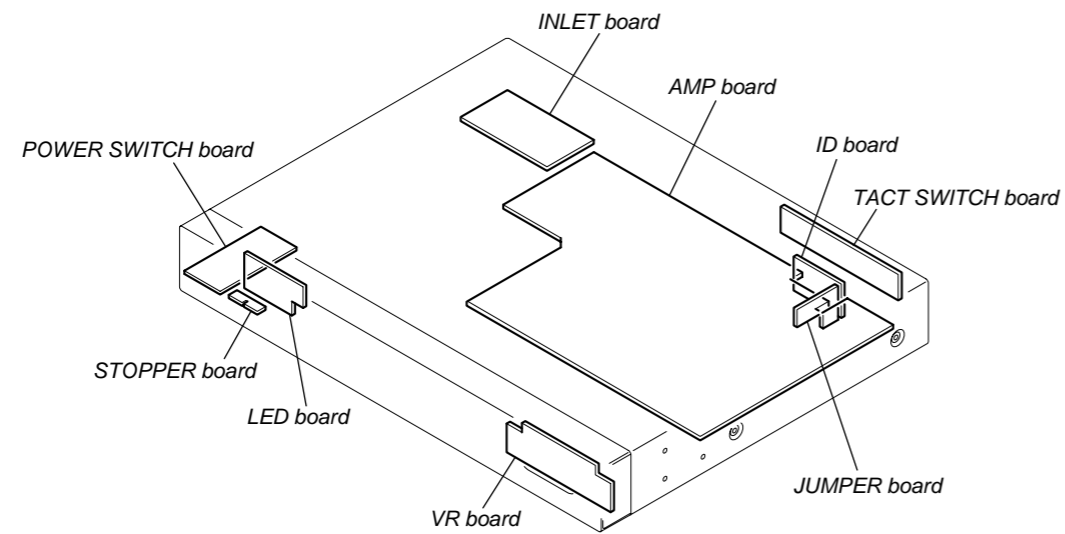
2. VERSION show

Procedure:

- ① Press the **VOL+** key and **POWER OFF** key of IR TEST in advance, and simultaneously press the **POWER ON** key at front panel.
- ② If the POWER LED turn on while 250ms, the version will show you major version.
If IN USE LED turn on while 250ms, the version will show you minor version.
- ③ POWER LED goes on, IN USE LED is blinking.

SECTION 3 DIAGRAMS




• Circuit Boards Location






THIS NOTE IS COMMON FOR PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS.
(In addition to this, the necessary note is printed in each block.)

For Schematic Diagrams.

Note:



- All capacitors are in μF unless otherwise noted. (p: pF) 50 WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and $1/4\text{ W}$ or less unless otherwise specified.
- % : indicates tolerance.
- Δ : internal component.
-  : nonflammable resistor.
-  : fusible resistor.
-  : panel designation.

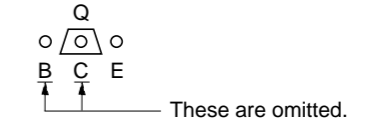
Note: The components identified by mark Δ or dotted line with mark Δ are critical for safety. Replace only with part number specified.

-  : B+ Line.
-  : B- Line.
- Voltages and waveforms are dc with respect to ground under no-signal (detuned) conditions.
No mark: POWER ON
* : Impossible to measure
- Voltages are taken with a VOM (Input impedance $10\text{ M}\Omega$). Voltage variations may be noted due to normal production tolerances.
- Waveforms are taken with a oscilloscope.
- Circled numbers refer to waveforms.
- Signal path.
 : AUDIO

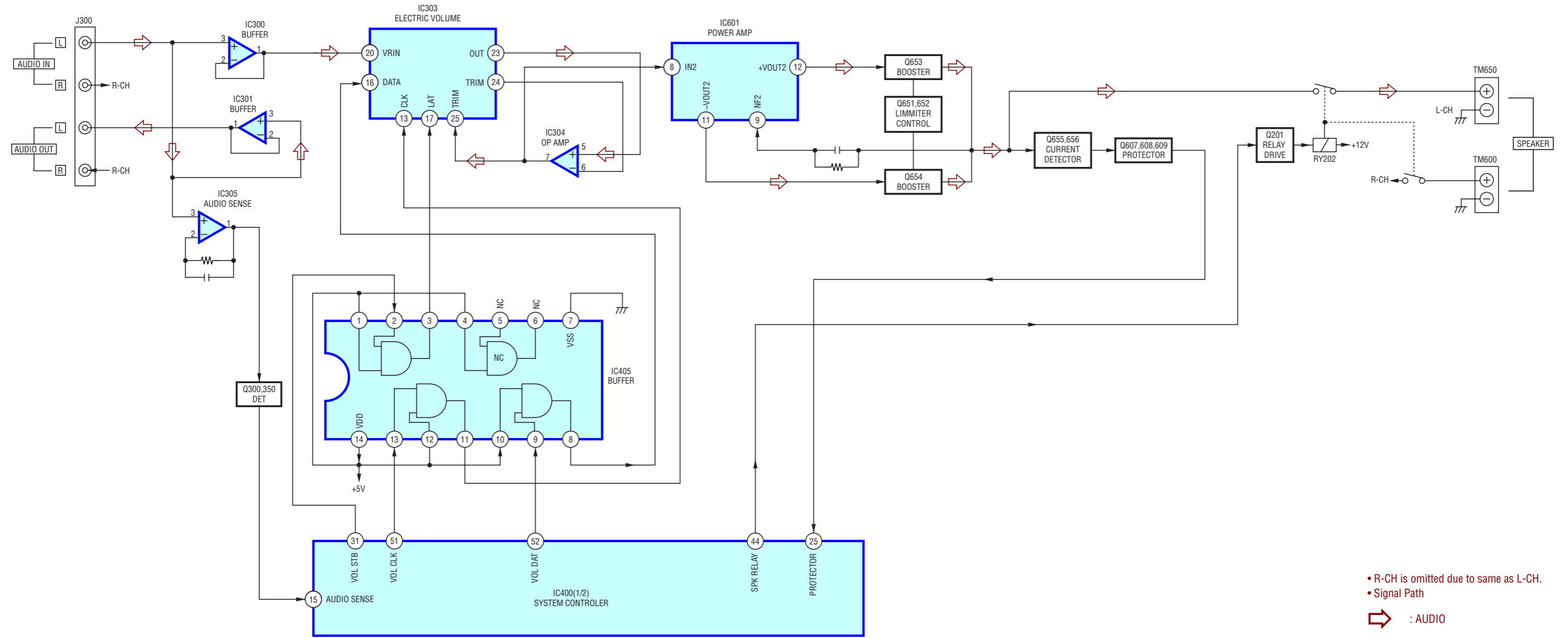
For Printed Wiring Boards.

Note:

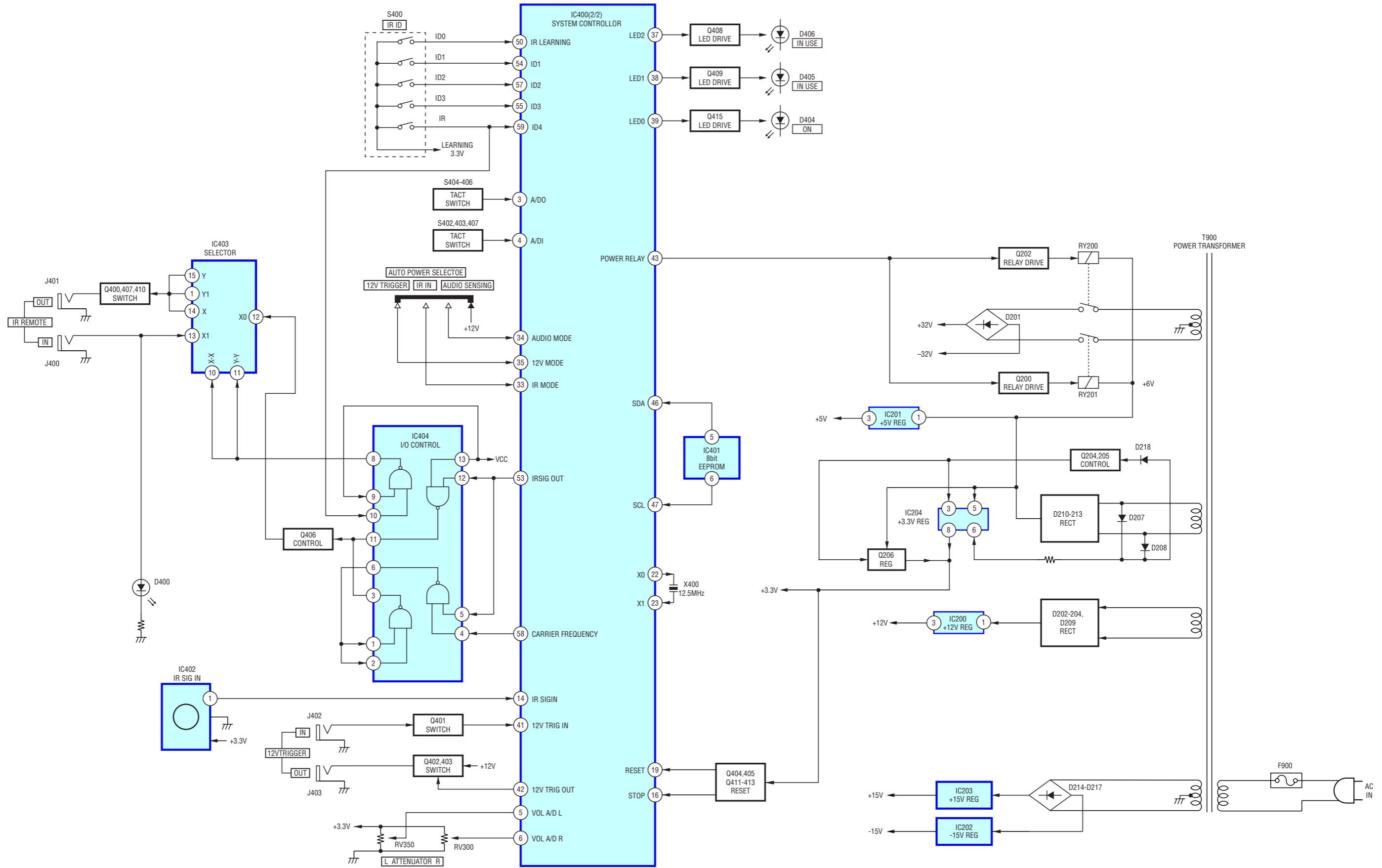
-  : parts extracted from the component side.
- \circ : Through hole.
- Δ : internal component.
-  : Pattern from the side which enables seeing.

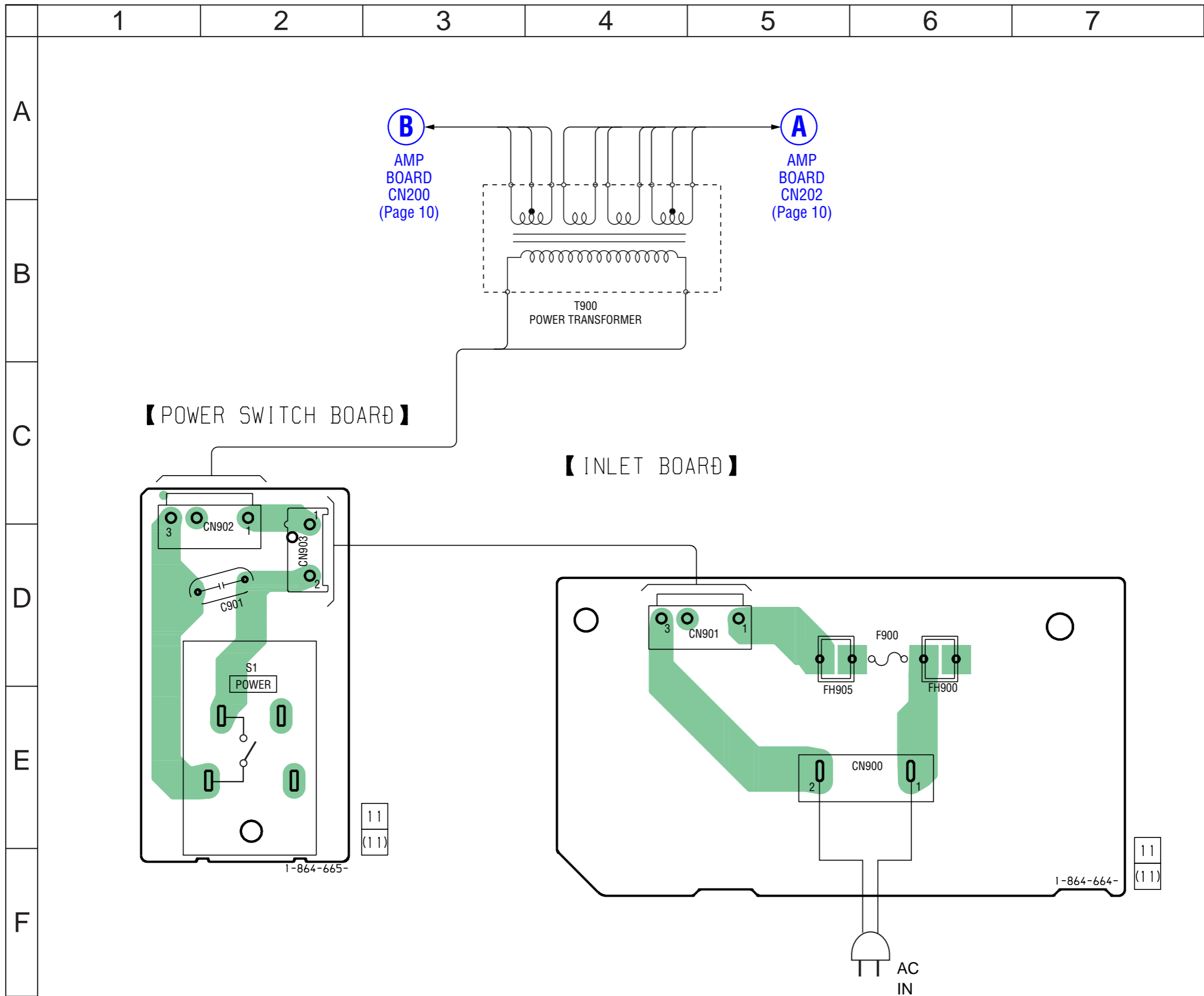


3-1. BLOCK DIAGRAM – AUDIO SECTION –

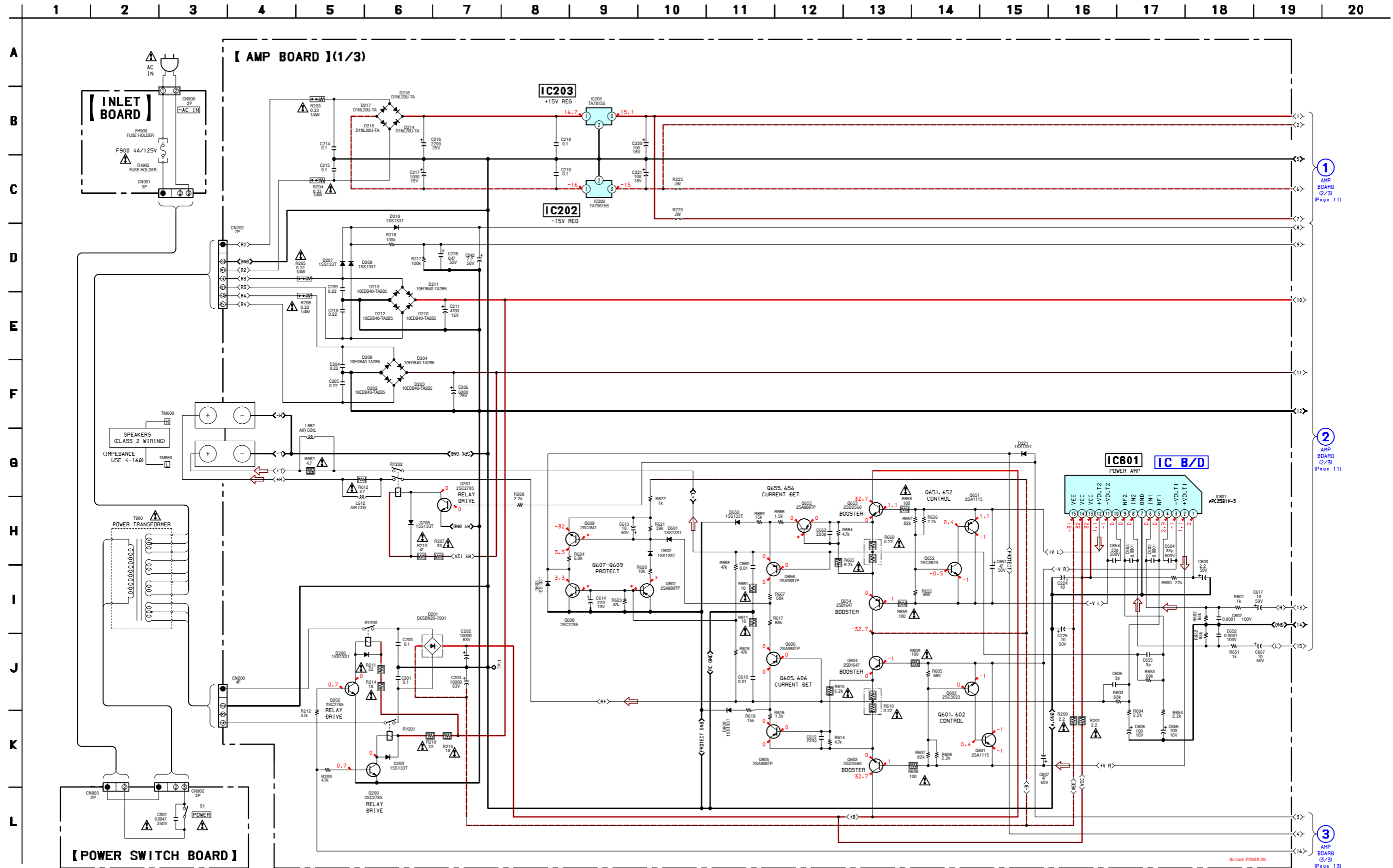


- MAIN/POWER SECTION -

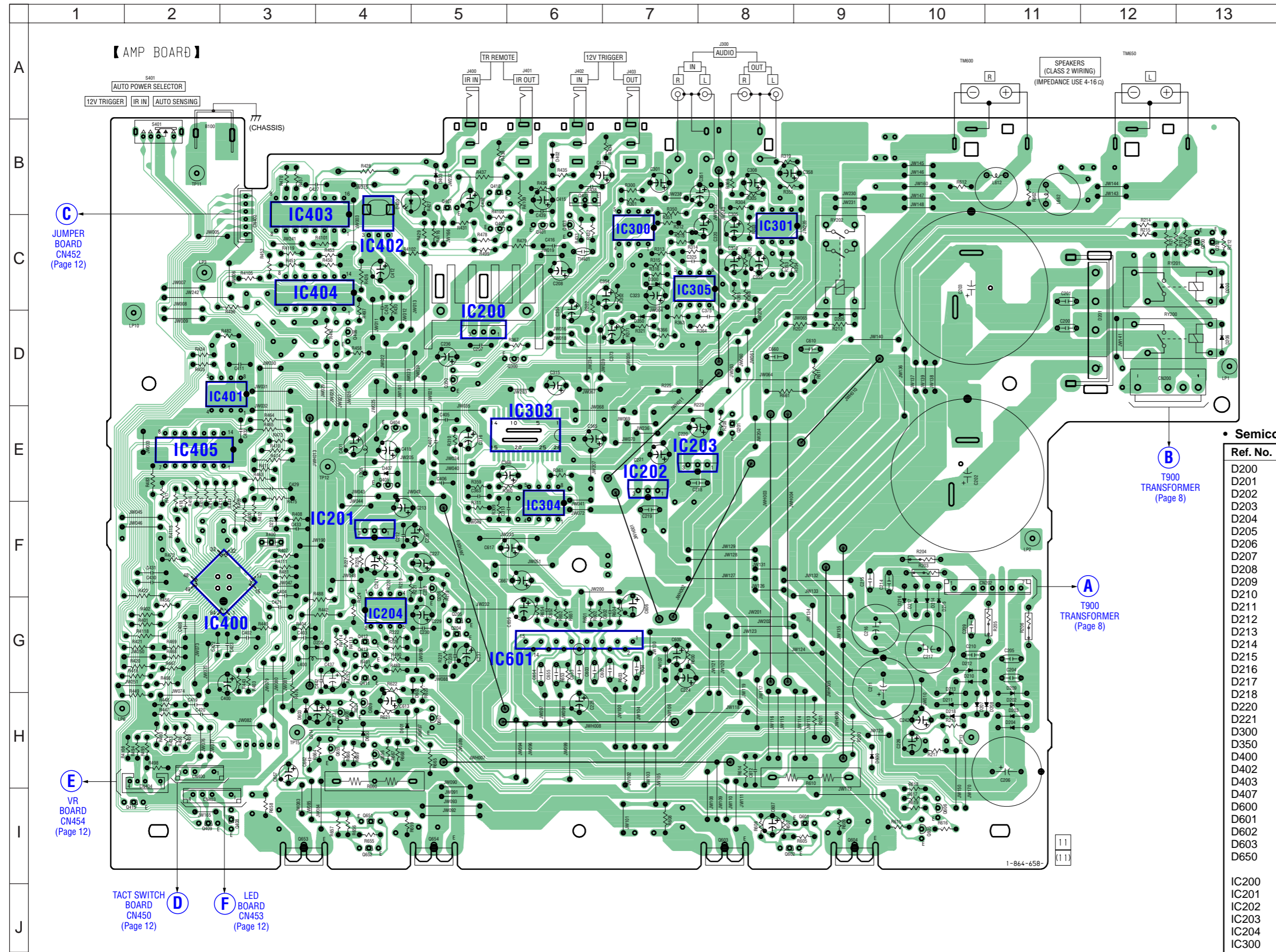




3-3. SCHEMATIC DIAGRAM – AMP SECTION (1/3) – • See page 14 for IC Block Diagram.

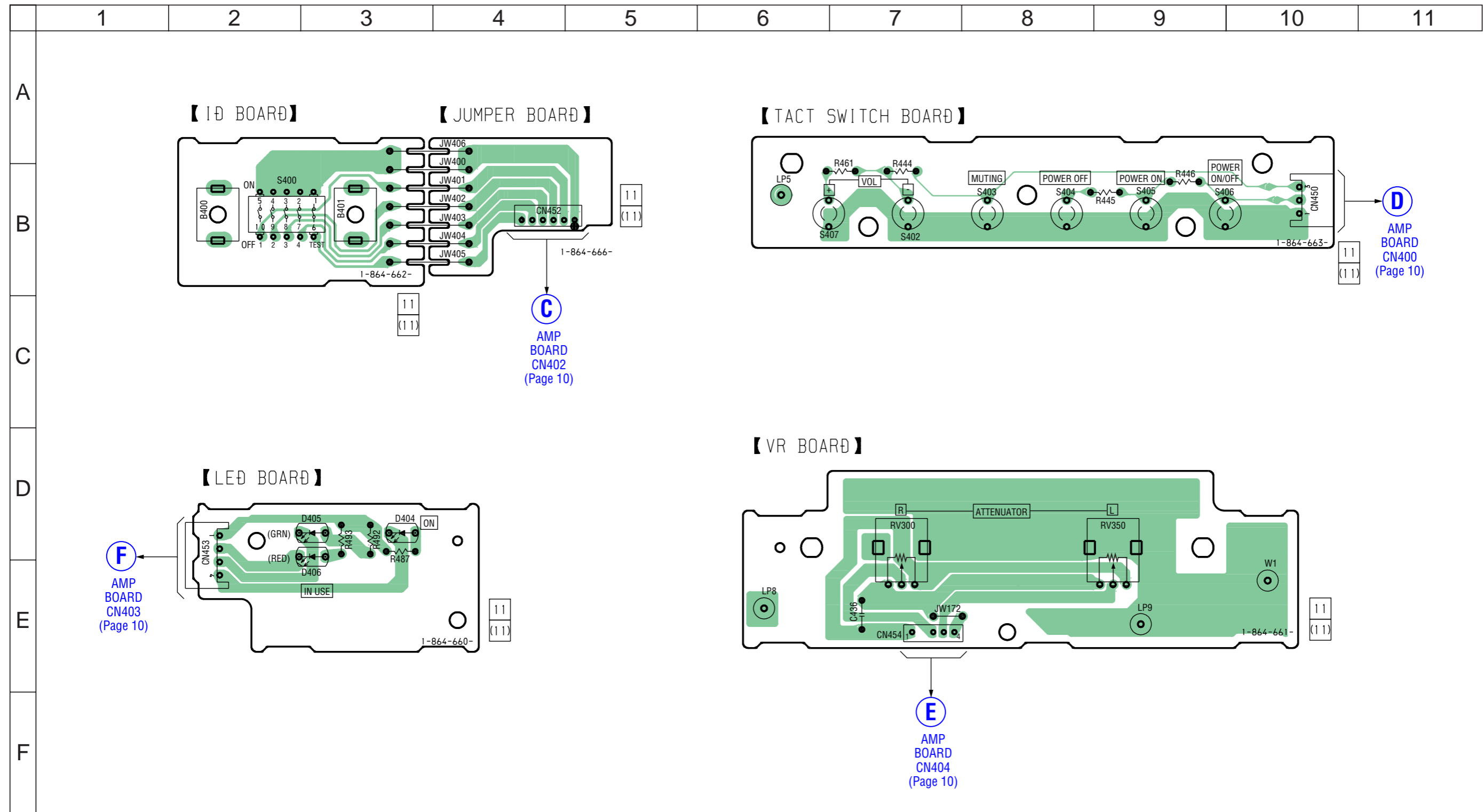


3-4. PRINTED WIRING BOARD – AMP SECTION – • See page 5 for Circuit Boards Location. •  :Uses unleaded solder.

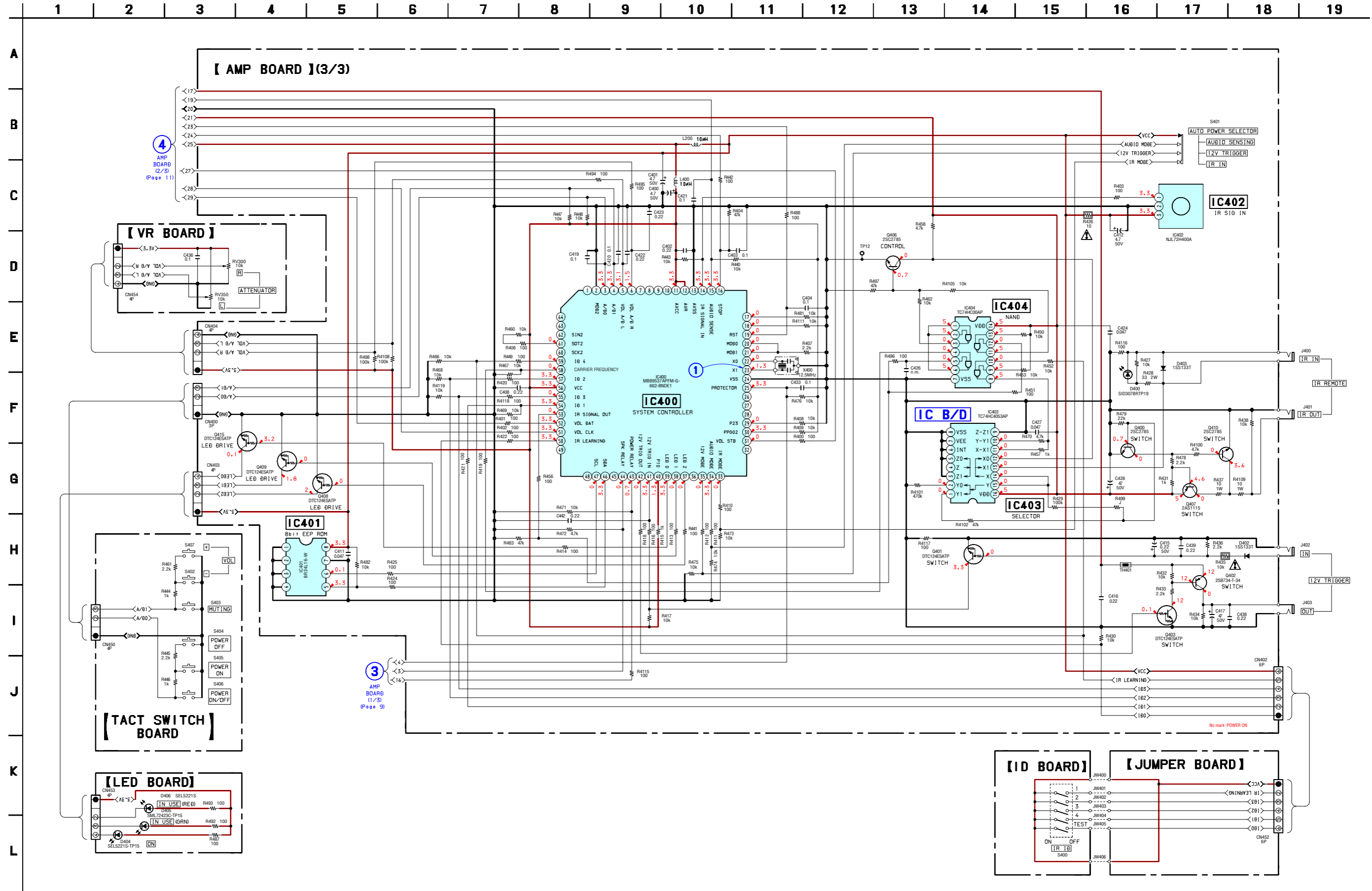


• Semiconductor Location

Ref. No.	Location	Ref. No.	Location
D200	C-13	IC402	C-4
D201	C-12	IC403	C-3
D202	H-11	IC404	C-3
D203	H-11	IC405	E-4
D204	H-11	IC601	G-5
D205	D-9		
D206	D-13	Q200	C-13
D207	H-10	Q201	E-8
D208	H-11	Q202	C-13
D209	H-11	Q204	G-5
D210	G-10	Q205	G-5
D211	H-10	Q206	F-5
D212	G-10	Q300	D-6
D213	H-10	Q350	D-5
D214	G-10	Q400	C-5
D215	G-10	Q401	C-6
D216	G-10	Q402	B-6
D217	G-10	Q403	C-6
D218	H-10	Q404	E-4
D220	C-13	Q405	E-4
D221	F-3	Q406	C-6
D300	C-7	Q407	B-5
D350	C-7	Q408	C-5
D400	B-6	Q409	I-2
D402	B-6	Q410	B-5
D403	B-5	Q411	G-4
D407	E-4	Q412	G-4
D600	H-9	Q413	G-4
D601	H-5	Q415	I-2
D602	G-5	Q601	I-9
D603	H-3	Q602	I-8
D650	H-4	Q603	I-8
		Q604	I-9
		Q605	I-10
IC200	D-5	Q606	I-10
IC201	F-4	Q607	H-5
IC202	E-7	Q608	H-4
IC203	E-7	Q609	H-4
IC204	G-4	Q609	H-4
IC300	C-7	Q651	I-4
IC301	C-8	Q652	I-4
IC303	E-6	Q653	I-4
IC304	F-6	Q654	I-5
IC305	C-7	Q655	H-4
IC400	G-3	Q656	H-4
IC401	D-2		



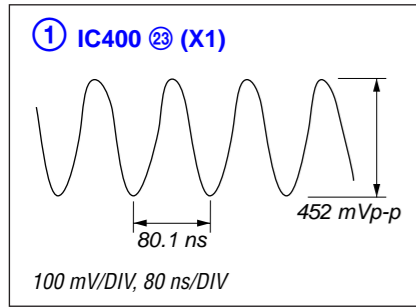
3-7. SCHEMATIC DIAGRAM – AMP SECTION (3/3) – • See page 14 for IC Block Diagram. • See page 14 for Waveform. • See page 15 for IC Pin Function Description.



TA-MR2ES

• **Waveform**

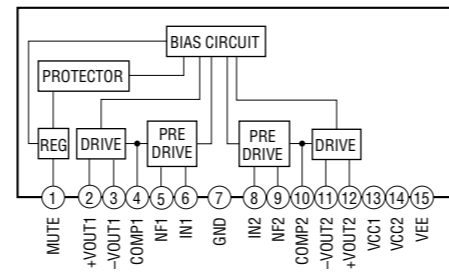
– AMP Board –



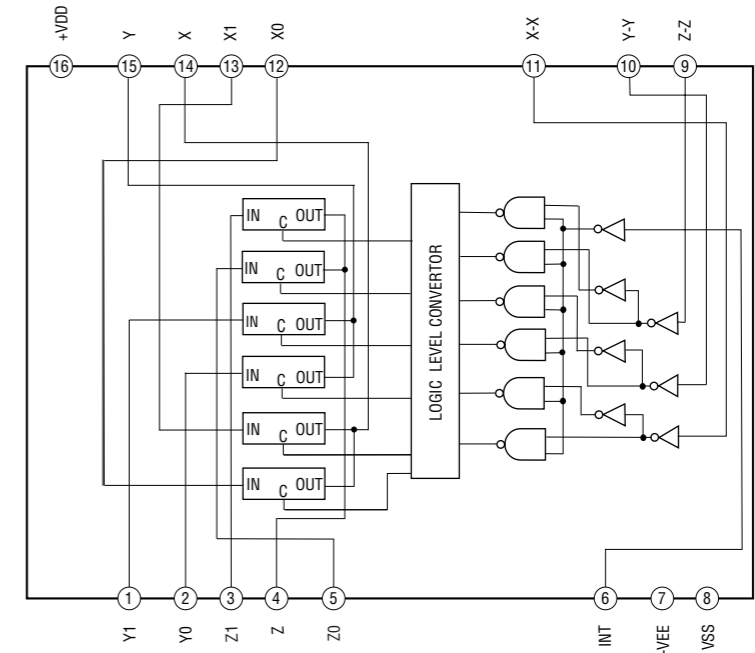
• **IC Block Diagrams**

– AMP Board –

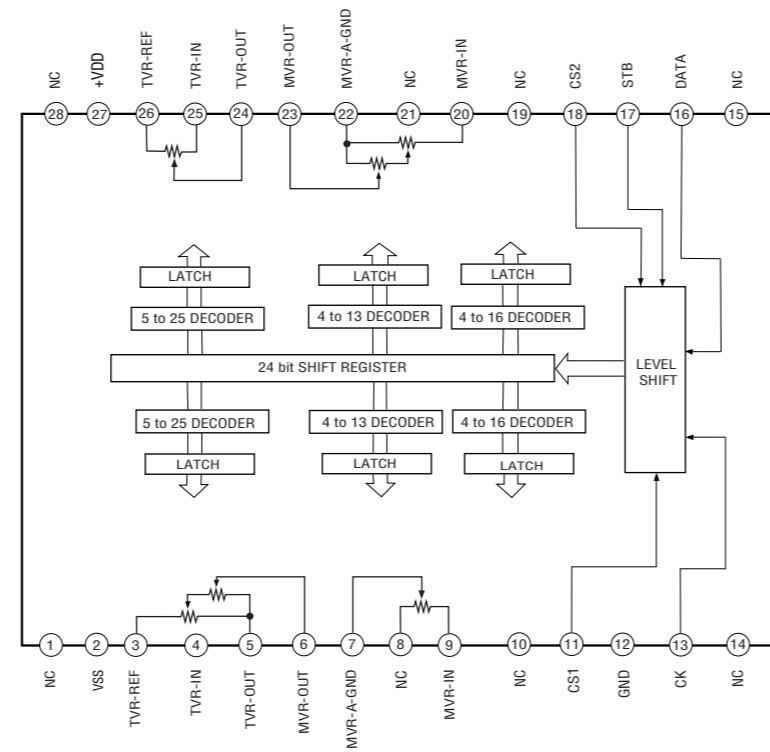
IC601 μ PC2581V-S



IC403 TC74HC4053AP



IC303 CXD9725M



• IC Pin Function Description

AMP BOARD IC400 MB89537APFM-G-662-BNDE1 (SYSTEM CONTROLLER)

Pin No.	Pin Name	I/O	Description
1	NC	–	Not used
2	MOD2	–	USB programming setting
3	A/D0	I	A/D KEY1 from the TACT SW
4	A/D1	I	A/D KEY2 from the TACT SW
5	VOL A/D L	I	VOL A/D L input from the VR PWB
6	VOL A/D R	I	VOL A/D R input from the VR PWB
7	NC	–	Not used
8	NC	–	Not used
9	NC	–	Not used
10	NC	–	Not used
11	AVCC	–	Power supply terminal (+3.3V)
12	AVR	–	Connect to AVCC
13	AVSS	–	Ground terminal
14	IR SIGNAL IN	I	IR signal input from the IC402
15	AUDIO SENSE	I	AUDIO sensing
16	STOP	I	AC off detection input terminal
17	NC	–	Pull down terminal
18	NC	–	Pull down terminal
19	RST	O	Reset signal output
20	MOD0	I	USB programming setting terminal
21	MOD1	I	USB programming setting terminal
22	X0	O	Crystal pin (OUT)
23	X1	I	Crystal pin (IN)
24	VSS	–	Ground terminal
25	PROTECTOR	I	Protector signal input terminal
26	NC	–	Not used
27	NC	–	Not used
28	NC	–	Not used
29	P23	–	Pull down ground terminal
30	PPG02	–	Pull up Vcc terminal
31	VOL STB	O	Output signal to the IC405
32	NC	–	Not used
33	IR MODE	I	To Auto power selector sw
34	AUDIO MODE	I	To Auto power selector sw
35	12V MODE	I	To Auto power selector sw
36	NC	–	Not used
37	LED2	O	LED control signal output
38	LED1	O	LED control signal output
39	LED0	O	LED control signal output
40	P10	–	USB programming setting terminal
41	12V TRIG IN	I	12V trigger input detection
42	12V TRIG OUT	O	12V trigger output control
43	POWER RELAY	O	Power relay control terminal
44	SPK RELAY	O	Speaker relay control terminal
45	NC	–	Not used
46	SDA	I/O	EEPROM DATA
47	SCL	O	EEPROM CLOCK

Pin No.	Pin Name	I/O	Description
48	NC	–	Not used
49	NC	–	Not used
50	IR LEARNING	O	IR code ID setting terminal
51	VOL CLK	O	VOLUME CLOCK output signal
52	VOL DAT	O	VOLUME DATA output signal
53	IR SIGNAL OUT	O	IR signal output
54	ID1	I	IR code ID setting
55	ID3	I	IR code ID setting
56	VCC	–	Power supply terminal (+3.3V)
57	ID2	I	IR code ID setting
58	CARRIER FREQUENCY	I	40 kHz carrier
59	ID4	I	IR code ID setting
60	SCK2	–	USB programming setting terminal
61	SOT2	–	USB programming setting terminal
62	SIN2	–	USB programming setting terminal
63	NC	–	Not used
64	NC	–	Not used

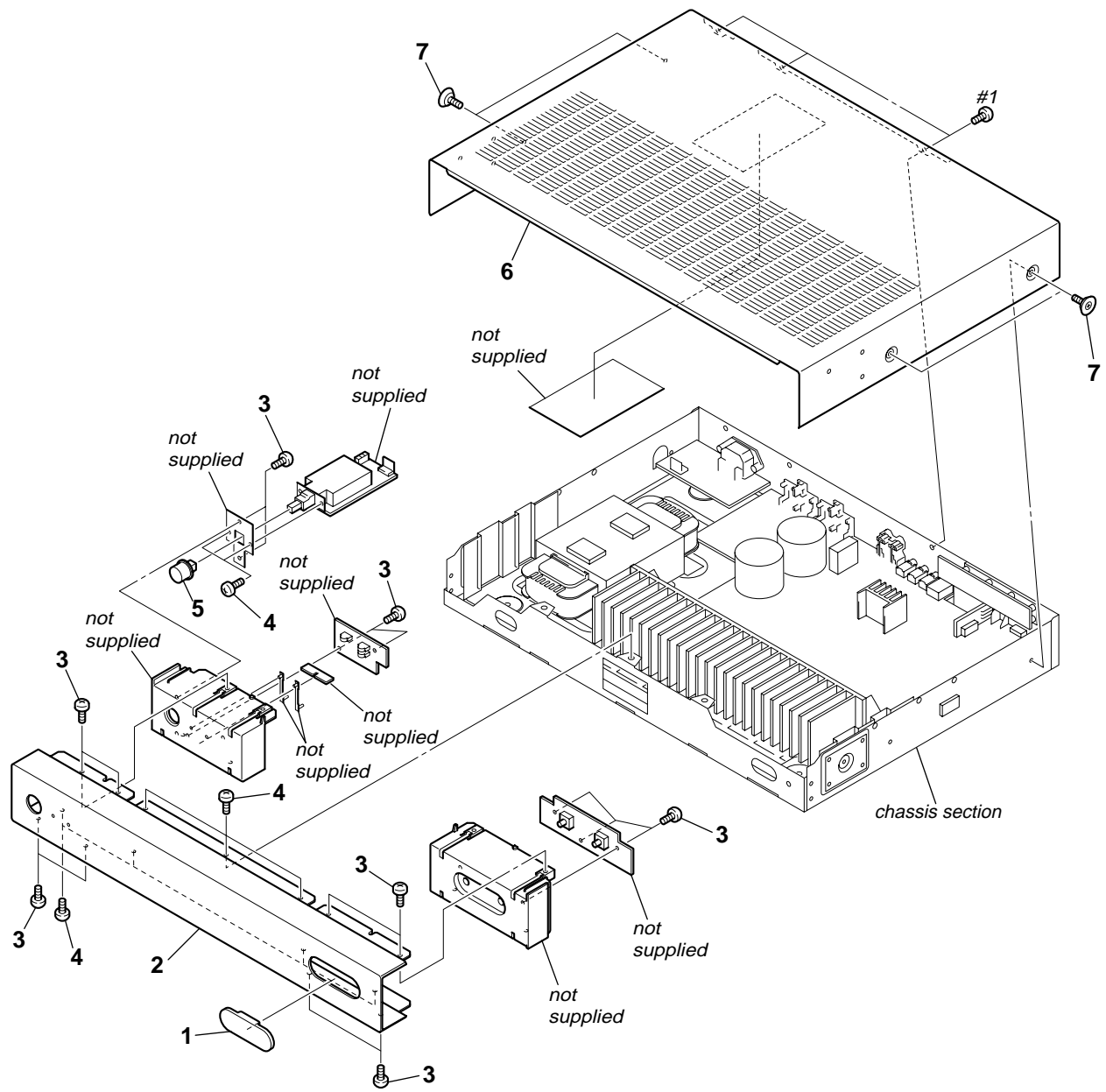
SECTION 4 EXPLODED VIEWS

NOTE:

- -XX, -X mean standardized parts, so they may have some difference from the original one.
- The mechanical parts with no reference number in the exploded views are not supplied.
- Items marked "*" are not stocked since they are required for routine service. Some delay should be anticipated when ordering these items.

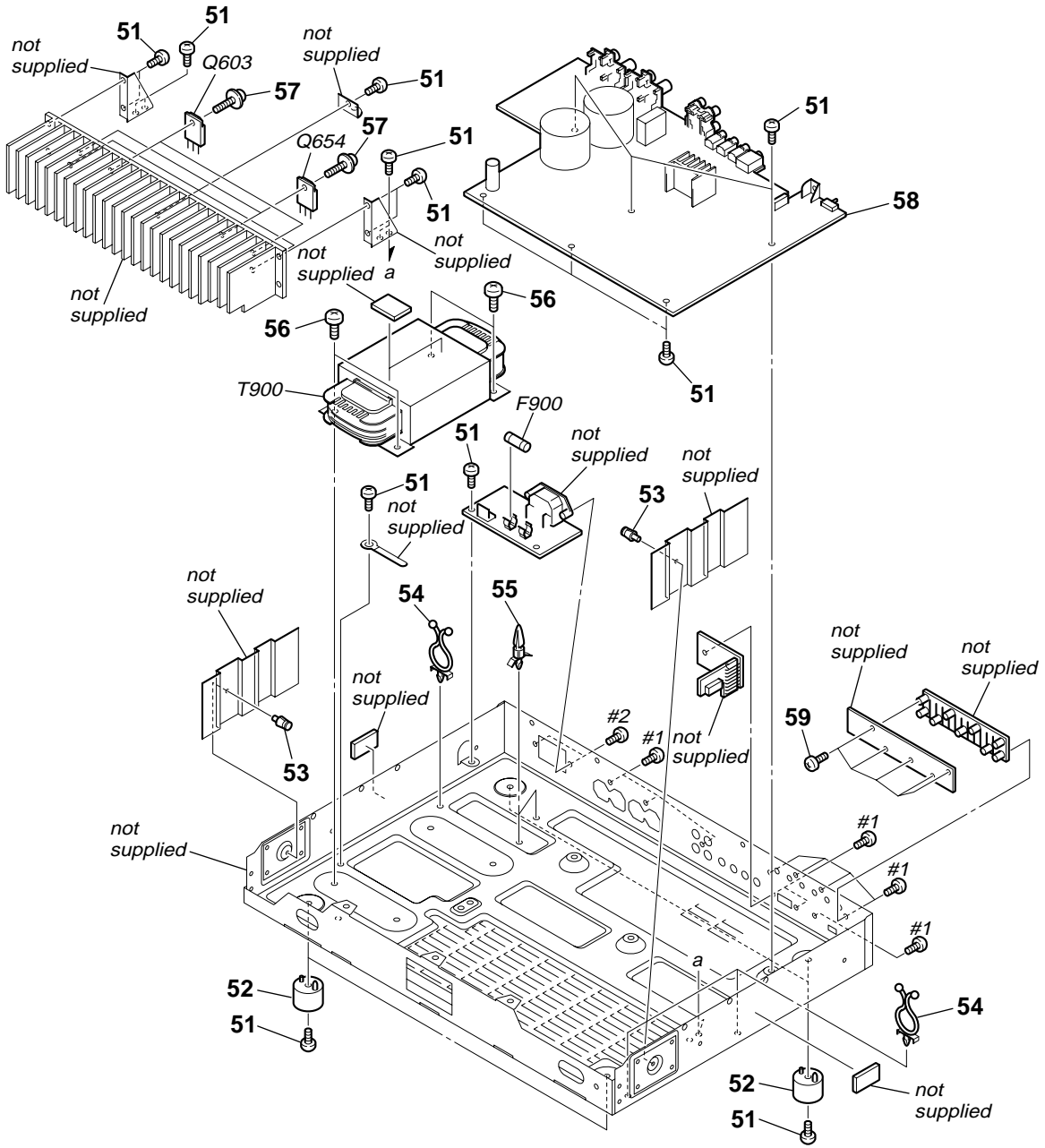
The components identified by mark Δ or dotted line with mark Δ are critical for safety. Replace only with part number specified.

4-1. FRONT PANEL SECTION



Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
1	A-1079-673-A	LID ASSY		5	X-4955-618-1	BUTTON (POWER) ASSY	
2	2-190-786-01	FRONT PANEL (AL)		6	4-254-457-21	CASE (SL500)	
3	3-087-053-01	+BVTP2.6 (3CR)		7	3-070-883-11	SCREW, TAPPING	
4	3-077-331-21	+BV3 (3-CR)		#1	7-685-646-79	SCREW +BVTP 3X8 TYPE2 IT-3	

4-2. CHASSIS SECTION



Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
51	3-077-331-21	+BV3 (3-CR)		59	3-087-053-01	+BVTP2.6 (3CR)	
52	X-2022-049-1	FOOT ASSY		#1	7-685-646-79	SCREW +BVTP 3X8 TYPE2 IT-3	
53	3-531-576-01	RIVET		#2	7-685-659-79	SCREW +BVTP 4X8 TYPE2 IT-3	
54	3-701-748-00	CLAMP		△ F900	1-533-419-11	FUSE, GLASS CYLINDRICAL (DIA.5) (4A/125V)	
55	4-924-098-01	HOLDER, PC BOARD		Q603	8-729-051-92	TRANSISTOR 2SD2560	
56	4-249-675-01	+BV SUMITITE S 4X6 ROUND		Q654	8-729-051-93	TRANSISTOR 2SB1647	
57	3-905-609-01	SCREW (TRANSISTOR)		△ T900	1-443-501-11	POWER TRANSFORMER	
58	A-1079-664-A	AMP BOARD, COMPLETE					

The components identified by mark △ or dotted line with mark △ are critical for safety. Replace only with part number specified.

SECTION 5 ELECTRICAL PARTS LIST

NOTE:

- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- -XX and -X mean standardized parts, so they may have some difference from the original one.
- RESISTORS
All resistors are in ohms.
METAL: Metal-film resistor.
METAL OXIDE: Metal oxide-film resistor.
F: nonflammable
- CAPACITORS
uF: μ F

- COILS
uH: μ H
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- SEMICONDUCTORS
In each case, u: μ , for example:
uA. . : μ A. . uPA. . : μ PA. .
uPB. . : μ PB. . uPC. . : μ PC. .
uPD. . : μ PD. .
- Accessories are given in the last of this parts list.

When indicating parts by reference number, please include the board name.

The components identified by mark Δ or dotted line with mark Δ are critical for safety. Replace only with part number specified.

Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
	A-1079-664-A	AMP BOARD, COMPLETE *****		C313	1-137-505-11	FILM	220PF 5% 100V
	7-685-646-79	SCREW +BVTP 3X8 TYPE2 IT-3 < CAPACITOR >		C315	1-112-091-11	ELECT	220uF 20% 25V
C200	1-130-495-00	MYLAR	0.1uF 5% 50V	C316	1-112-083-11	ELECT	100uF 20% 16V
C201	1-130-495-00	MYLAR	0.1uF 5% 50V	C320	1-126-964-11	ELECT	10uF 20% 50V
C202	1-100-691-11	ELECT	10000uF 20% 63V	C323	1-126-959-11	ELECT	0.47uF 20% 50V
C203	1-100-691-11	ELECT	10000uF 20% 63V				
C204	1-135-851-21	MYLAR	0.22uF 100V	C325	1-128-809-11	CERAMIC	100PF 5% 50V
C205	1-135-851-21	MYLAR	0.22uF 100V	C351	1-112-100-11	ELECT	10uF 20% 50V
C206	1-126-946-11	ELECT	6800uF 20% 25V	C354	1-112-100-11	ELECT	10uF 20% 50V
C207	1-113-342-11	CERAMIC	0.1uF 50V	C355	1-112-100-11	ELECT	10uF 20% 50V
C208	1-126-967-11	ELECT	47uF 20% 50V	C358	1-112-100-11	ELECT	10uF 20% 50V
C209	1-135-851-21	MYLAR	0.22uF 100V				
C210	1-135-851-21	MYLAR	0.22uF 100V	C363	1-137-505-11	FILM	220PF 5% 100V
C211	1-126-937-11	ELECT	4700uF 20% 16V	C365	1-112-091-11	ELECT	220uF 20% 25V
C212	1-113-342-11	CERAMIC	0.1uF 50V	C366	1-112-083-11	ELECT	100uF 20% 16V
C213	1-126-967-11	ELECT	47uF 20% 50V	C370	1-126-964-11	ELECT	10uF 20% 50V
C214	1-130-495-00	MYLAR	0.1uF 5% 50V	C373	1-126-959-11	ELECT	0.47uF 20% 50V
C215	1-130-495-00	MYLAR	0.1uF 5% 50V				
C216	1-112-093-11	ELECT	2200uF 20% 25V	C375	1-128-809-11	CERAMIC	100PF 5% 50V
C217	1-112-092-11	ELECT	1000uF 20% 25V	C400	1-126-963-11	ELECT	4.7uF 20% 50V
C218	1-130-495-00	MYLAR	0.1uF 5% 50V	C401	1-126-963-11	ELECT	4.7uF 20% 50V
C219	1-130-495-00	MYLAR	0.1uF 5% 50V	C402	1-135-798-11	CERAMIC	0.22uF 50V
C220	1-112-083-11	ELECT	100uF 20% 16V	C403	1-113-342-11	CERAMIC	0.1uF 50V
C221	1-112-083-11	ELECT	100uF 20% 16V				
C224	1-112-100-11	ELECT	10uF 20% 50V	C404	1-113-342-11	CERAMIC	0.1uF 50V
C225	1-112-100-11	ELECT	10uF 20% 50V	C405	1-128-821-11	CERAMIC	1000PF 5% 50V
C226	1-126-959-11	ELECT	0.47uF 20% 50V	C406	1-128-821-11	CERAMIC	1000PF 5% 50V
C227	1-126-967-11	ELECT	47uF 20% 50V	C407	1-127-876-11	CERAMIC	0.01uF 5% 50V
C228	1-113-342-11	CERAMIC	0.1uF 50V	C408	1-135-798-11	CERAMIC	0.22uF 50V
C229	1-126-963-11	ELECT	4.7uF 20% 50V				
C230	1-113-342-11	CERAMIC	0.1uF 50V	C411	1-127-884-11	CERAMIC	0.047uF 10% 50V
C231	1-126-957-11	ELECT	0.22uF 20% 50V	C412	1-126-963-11	ELECT	4.7uF 20% 50V
C235	1-126-963-11	ELECT	4.7uF 20% 50V	C415	1-126-957-11	ELECT	0.22uF 20% 50V
C236	1-126-963-11	ELECT	4.7uF 20% 50V	C416	1-135-798-11	CERAMIC	0.22uF 10% 50V
C237	1-126-963-11	ELECT	4.7uF 20% 50V	C417	1-126-967-11	ELECT	47uF 20% 50V
C238	1-113-342-11	CERAMIC	0.1uF 50V				
C242	1-126-961-11	ELECT	2.2uF 20% 50V	C418	1-126-963-11	ELECT	4.7uF 20% 50V
C244	1-113-342-11	CERAMIC	0.1uF 50V	C419	1-113-342-11	CERAMIC	0.1uF 50V
C301	1-112-100-11	ELECT	10uF 20% 50V	C420	1-113-342-11	CERAMIC	0.1uF 50V
C304	1-112-100-11	ELECT	10uF 20% 50V	C421	1-113-342-11	CERAMIC	0.1uF 50V
C305	1-112-100-11	ELECT	10uF 20% 50V	C422	1-135-798-11	CERAMIC	0.22uF 50V
C308	1-112-100-11	ELECT	10uF 20% 50V				
				C423	1-135-798-11	CERAMIC	0.22uF 50V
				C424	1-127-884-11	CERAMIC	0.047uF 10% 50V
				C427	1-127-884-11	CERAMIC	0.047uF 10% 50V
				C428	1-126-967-11	ELECT	47uF 20% 50V
				C429	1-128-805-11	CERAMIC	47PF 5% 50V
				C430	1-128-805-11	CERAMIC	47PF 5% 50V
				C431	1-128-805-11	CERAMIC	47PF 5% 50V
				C432	1-135-798-11	CERAMIC	0.22uF 50V
				C433	1-113-342-11	CERAMIC	0.1uF 50V
				C437	1-126-963-91	ELECT	4.7uF 20% 50V

Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
Q407	8-729-119-76	TRANSISTOR	2SA1175-HFE	R311	1-247-879-91	CARBON	100K 5% 1/4W
Q408	8-729-029-86	TRANSISTOR	DTC124ESA	R312	1-247-879-91	CARBON	100K 5% 1/4W
Q409	8-729-029-86	TRANSISTOR	DTC124ESA	R313	1-247-830-11	CARBON	910 5% 1/4W
Q410	8-729-119-79	TRANSISTOR	2SC2785-FEK	R314	1-247-887-00	CARBON	220K 5% 1/4W
Q411	8-729-029-86	TRANSISTOR	DTC124ESA	R315	1-247-879-91	CARBON	100K 5% 1/4W
Q412	8-729-029-40	TRANSISTOR	DTA124ESA	R316	1-247-871-91	CARBON	47K 5% 1/4W
Q413	8-729-119-79	TRANSISTOR	2SC2785-FEK	R318	1-247-831-91	CARBON	1K 5% 1/4W
Q415	8-729-029-86	TRANSISTOR	DTC124ESA	R319	1-247-831-91	CARBON	1K 5% 1/4W
Q601	8-729-119-76	TRANSISTOR	2SA1175-HFE	R321	1-247-887-00	CARBON	220K 5% 1/4W
Q602	8-729-141-30	TRANSISTOR	2SC3623A-LK	R350	1-247-831-91	CARBON	1K 5% 1/4W
Q603	8-729-051-92	TRANSISTOR	2SD2560	R351	1-247-879-91	CARBON	100K 5% 1/4W
Q604	8-729-051-93	TRANSISTOR	2SB1647	R352	1-247-879-91	CARBON	100K 5% 1/4W
Q605	8-729-140-82	TRANSISTOR	2SA988-PAFAEA	R353	1-247-831-91	CARBON	1K 5% 1/4W
Q606	8-729-140-82	TRANSISTOR	2SA988-PAFAEA	R354	1-247-879-91	CARBON	100K 5% 1/4W
Q607	8-729-140-82	TRANSISTOR	2SA988-PAFAEA	R355	1-247-879-91	CARBON	100K 5% 1/4W
Q608	8-729-119-79	TRANSISTOR	2SC2785-FEK	R359	1-247-879-91	CARBON	100K 5% 1/4W
Q609	8-729-140-84	TRANSISTOR	2SC1841-PAFAEA	R360	1-247-831-91	CARBON	1K 5% 1/4W
Q651	8-729-119-76	TRANSISTOR	2SA1175-HFE	R361	1-247-879-91	CARBON	100K 5% 1/4W
Q652	8-729-141-30	TRANSISTOR	2SC3623A-LK	R362	1-247-879-91	CARBON	100K 5% 1/4W
Q653	8-729-051-92	TRANSISTOR	2SD2560	R363	1-247-830-11	CARBON	910 5% 1/4W
Q654	8-729-051-93	TRANSISTOR	2SB1647	R364	1-247-887-00	CARBON	220K 5% 1/4W
Q655	8-729-140-82	TRANSISTOR	2SA988-PAFAEA	R365	1-247-879-91	CARBON	100K 5% 1/4W
Q656	8-729-140-82	TRANSISTOR	2SA988-PAFAEA	R366	1-247-871-91	CARBON	47K 5% 1/4W
		< RESISTOR >		R368	1-247-831-91	CARBON	1K 5% 1/4W
△ R200	1-249-385-11	CARBON	2.2 5%	R369	1-247-831-91	CARBON	1K 5% 1/4W
△ R201	1-249-385-11	CARBON	2.2 5%	R371	1-247-887-00	CARBON	220K 5% 1/4W
△ R203	1-219-122-91	FUSIBLE	0.33 5%	R400	1-247-807-31	CARBON	100 5% 1/4W
△ R204	1-219-122-91	FUSIBLE	0.33 5%	R401	1-247-807-31	CARBON	100 5% 1/4W
△ R205	1-219-121-11	FUSIBLE	0.22 5%	R402	1-247-807-31	CARBON	100 5% 1/4W
△ R206	1-219-121-11	FUSIBLE	0.22 5%	R403	1-247-807-31	CARBON	100 5% 1/4W
△ R207	1-249-399-11	CARBON	33 5%	R404	1-247-871-91	CARBON	47K 5% 1/4W
R208	1-249-421-11	CARBON	2.2K 5%	R406	1-247-807-31	CARBON	100 5% 1/4W
R209	1-247-847-91	CARBON	4.7K 5%	R407	1-249-421-11	CARBON	2.2K 5% 1/4W
△ R210	1-249-397-11	CARBON	22 5%	R408	1-249-429-11	CARBON	10K 5% 1/4W
△ R211	1-249-397-11	CARBON	22 5%	R409	1-249-429-11	CARBON	10K 5% 1/4W
R212	1-247-847-91	CARBON	4.7K 5%	R410	1-247-807-31	CARBON	100 5% 1/4W
R213	1-249-401-11	CARBON	47 5%	R411	1-247-807-31	CARBON	100 5% 1/4W
△ R214	1-249-396-81	CARBON	18 5%	R412	1-247-807-31	CARBON	100 5% 1/4W
△ R215	1-249-396-81	CARBON	18 5%	R413	1-247-807-31	CARBON	100 5% 1/4W
R216	1-247-879-91	CARBON	100K 5%	R414	1-247-807-31	CARBON	100 5% 1/4W
R217	1-247-879-91	CARBON	100K 5%	R415	1-247-831-91	CARBON	1K 5% 1/4W
R218	1-249-429-11	CARBON	10K 5%	R416	1-247-807-31	CARBON	100 5% 1/4W
R219	1-247-847-91	CARBON	4.7K 5%	R417	1-249-429-11	CARBON	10K 5% 1/4W
R220	1-247-850-11	CARBON	6.2K 5%	R418	1-247-807-31	CARBON	100 5% 1/4W
R221	1-247-847-91	CARBON	4.7K 5%	R419	1-247-807-31	CARBON	100 5% 1/4W
R222	1-249-429-11	CARBON	10K 5%	R420	1-247-807-31	CARBON	100 5% 1/4W
R224	1-247-831-91	CARBON	1K 5%	R421	1-247-807-31	CARBON	100 5% 1/4W
R227	1-249-428-11	CARBON	8.2K 5%	R422	1-247-807-31	CARBON	100 5% 1/4W
R231	1-247-847-91	CARBON	4.7K 5%	R423	1-247-807-31	CARBON	100 5% 1/4W
R300	1-247-831-91	CARBON	1K 5%	R424	1-247-807-31	CARBON	100 5% 1/4W
R301	1-247-879-91	CARBON	100K 5%	R425	1-247-807-31	CARBON	100 5% 1/4W
R302	1-247-879-91	CARBON	100K 5%	△ R426	1-249-393-11	CARBON	10 5% 1/4W
R303	1-247-831-91	CARBON	1K 5%	R427	1-249-429-11	CARBON	10K 5% 1/4W
R304	1-247-879-91	CARBON	100K 5%	R428	1-215-883-11	METAL OXIDE	33 5% 2W
R305	1-247-879-91	CARBON	100K 5%	R429	1-247-879-91	CARBON	100K 5% 1/4W
R309	1-247-879-91	CARBON	100K 5%	R430	1-249-429-11	CARBON	10K 5% 1/4W
R310	1-247-831-91	CARBON	1K 5%	R431	1-247-831-91	CARBON	1K 5% 1/4W

The components identified by mark △ or dotted line with mark △ are critical for safety.
Replace only with part number specified.

TA-MR2ES

AMP

Ref. No.	Part No.	Description			Remark
R432	1-249-429-11	CARBON	10K	5%	1/4W
R433	1-249-421-11	CARBON	2.2K	5%	1/4W
R434	1-249-429-11	CARBON	10K	5%	1/4W
△ R435	1-249-429-11	CARBON	10K	5%	1/4W
R436	1-249-421-11	CARBON	2.2K	5%	1/4W
R437	1-215-857-11	METAL OXIDE	10	5%	1W
R438	1-249-429-11	CARBON	10K	5%	1/4W
R440	1-249-429-11	CARBON	10K	5%	1/4W
R441	1-247-807-31	CARBON	100	5%	1/4W
R442	1-247-807-31	CARBON	100	5%	1/4W
R443	1-249-429-11	CARBON	10K	5%	1/4W
R447	1-249-429-11	CARBON	10K	5%	1/4W
R448	1-249-429-11	CARBON	10K	5%	1/4W
R449	1-249-807-31	CARBON	100	5%	1/4W
R450	1-249-429-11	CARBON	10K	5%	1/4W
R451	1-247-807-31	CARBON	100	5%	1/4W
R452	1-249-429-11	CARBON	10K	5%	1/4W
R453	1-249-429-11	CARBON	10K	5%	1/4W
R456	1-247-807-31	CARBON	100	5%	1/4W
R457	1-247-831-91	CARBON	1K	5%	1/4W
R458	1-247-847-91	CARBON	4.7K	5%	1/4W
R459	1-247-807-31	CARBON	100	5%	1/4W
R460	1-249-429-11	CARBON	10K	5%	1/4W
R462	1-249-429-11	CARBON	10K	5%	1/4W
R463	1-247-807-31	CARBON	100	5%	1/4W
R464	1-247-807-31	CARBON	100	5%	1/4W
R465	1-247-807-31	CARBON	100	5%	1/4W
R466	1-249-429-11	CARBON	10K	5%	1/4W
R467	1-249-429-11	CARBON	10K	5%	1/4W
R468	1-249-429-11	CARBON	10K	5%	1/4W
R469	1-249-429-11	CARBON	10K	5%	1/4W
R470	1-247-831-91	CARBON	1K	5%	1/4W
R472	1-247-847-91	CARBON	4.7K	5%	1/4W
R473	1-249-429-11	CARBON	10K	5%	1/4W
R474	1-249-429-11	CARBON	10K	5%	1/4W
R475	1-249-429-11	CARBON	10K	5%	1/4W
R476	1-249-429-11	CARBON	10K	5%	1/4W
R478	1-249-421-11	CARBON	2.2K	5%	1/4W
R479	1-247-863-91	CARBON	22K	5%	1/4W
R481	1-249-429-11	CARBON	10K	5%	1/4W
R482	1-249-429-11	CARBON	10K	5%	1/4W
R483	1-247-871-91	CARBON	47K	5%	1/4W
R488	1-247-807-31	CARBON	100	5%	1/4W
R489	1-247-871-91	CARBON	47K	5%	1/4W
R490	1-247-871-91	CARBON	47K	5%	1/4W
R491	1-247-847-91	CARBON	4.7K	5%	1/4W
R494	1-247-807-31	CARBON	100	5%	1/4W
R495	1-247-807-31	CARBON	100	5%	1/4W
R496	1-247-807-31	CARBON	100	5%	1/4W
R497	1-247-871-91	CARBON	47K	5%	1/4W
R498	1-247-879-91	CARBON	100K	5%	1/4W
R600	1-247-863-91	CARBON	22K	5%	1/4W
R601	1-247-831-91	CARBON	1K	5%	1/4W
R602	1-249-439-11	CARBON	68K	5%	1/4W
R603	1-249-439-11	CARBON	68K	5%	1/4W
R604	1-249-421-11	CARBON	2.2K	5%	1/4W
R605	1-249-414-11	CARBON	560	5%	1/4W
R606	1-249-421-11	CARBON	2.2K	5%	1/4W

Ref. No.	Part No.	Description			Remark
R607	1-249-440-11	CARBON	82K	5%	1/4W
△ R608	1-249-405-11	CARBON	100	5%	1/4W
△ R609	1-249-405-11	CARBON	100	5%	1/4W
△ R610	1-234-182-11	ENCAPSULATED COMPONENT			
△ R611	1-249-393-11	CARBON	10	5%	1/4W
△ R612	1-249-389-11	CARBON	4.7	5%	1/4W
R614	1-247-847-91	CARBON	4.7K	5%	1/4W
△ R615	1-240-855-81	CARBON	6.2K	5%	1/4W
R616	1-249-419-11	CARBON	1.5K	5%	1/4W
R617	1-249-439-11	CARBON	68K	5%	1/4W
R618	1-247-871-91	CARBON	47K	5%	1/4W
R619	1-249-431-11	CARBON	15K	5%	1/4W
R620	1-249-429-11	CARBON	10K	5%	1/4W
R621	1-249-436-11	CARBON	39K	5%	1/4W
R622	1-247-831-91	CARBON	1K	5%	1/4W
R623	1-247-871-91	CARBON	47K	5%	1/4W
R624	1-249-427-11	CARBON	6.8K	5%	1/4W
R651	1-247-831-91	CARBON	1K	5%	1/4W
R652	1-249-439-11	CARBON	68K	5%	1/4W
R653	1-249-439-11	CARBON	68K	5%	1/4W
R654	1-249-421-11	CARBON	2.2K	5%	1/4W
R655	1-249-414-11	CARBON	560	5%	1/4W
R656	1-249-421-11	CARBON	2.2K	5%	1/4W
R657	1-249-440-11	CARBON	82K	5%	1/4W
△ R658	1-249-405-11	CARBON	100	5%	1/4W
△ R659	1-249-405-11	CARBON	100	5%	1/4W
△ R660	1-234-182-11	ENCAPSULATED COMPONENT			
△ R661	1-249-393-11	CARBON	10	5%	1/4W
△ R662	1-249-389-11	CARBON	4.7	5%	1/4W
R664	1-247-847-91	CARBON	4.7K	5%	1/4W
△ R665	1-240-855-81	CARBON	6.2K	5%	1/4W
R666	1-249-419-11	CARBON	1.5K	5%	1/4W
R667	1-249-439-11	CARBON	68K	5%	1/4W
R668	1-247-871-91	CARBON	47K	5%	1/4W
R669	1-249-431-11	CARBON	15K	5%	1/4W
R4100	1-247-847-91	CARBON	4.7K	5%	1/4W
R4101	1-247-895-00	CARBON	470K	5%	1/4W
R4102	1-247-871-91	CARBON	47K	5%	1/4W
R4105	1-249-429-11	CARBON	10K	5%	1/4W
R4108	1-247-879-91	CARBON	100K	5%	1/4W
R4109	1-215-857-11	METAL OXIDE	10	5%	1W
R4111	1-249-429-11	CARBON	10K	5%	1/4W
R4112	1-249-429-11	CARBON	10K	5%	1/4W
R4113	1-247-871-91	CARBON	47K	5%	1/4W
R4114	1-247-843-81	CARBON	33K	5%	1/4W
R4115	1-247-807-31	CARBON	100	5%	1/4W
R4116	1-247-807-31	CARBON	100	5%	1/4W
R4117	1-247-807-31	CARBON	100	5%	1/4W
R4118	1-247-807-31	CARBON	100	5%	1/4W
R4119	1-249-429-11	CARBON	10K	5%	1/4W
< RELAY >					
RY200	1-755-541-11	RELAY			
RY201	1-755-541-11	RELAY			
RY202	1-755-170-11	RELAY (12V)			

The components identified by mark △ or dotted line with mark △ are critical for safety.
Replace only with part number specified.

AMP **ID** **INLET** **JUMPER** **LED** **POWER SWITCH** **TACT SWITCH** **VR**

Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
		< SWITCH >				POWER SWITCH BOARD *****	
S401	1-692-989-11	SWITCH, SLIDE (AUTO POWER SELECTOR)				< CAPACITOR >	
		< THERMISTOR >		△ C901	1-117-703-11	CERAMIC 0.0047uF 99% 250V	
TH401	1-805-608-21	THERMISTOR, POSITIVE				< CONNECTOR >	
		< TERMINAL >		CN903	1-785-101-11	PIN, CONNECTOR (3.96mm PITCH) 3P	
TM600	1-780-178-11	TERMINAL BOARD (SP) (2P) (SPEAKERS R)				< SWITCH >	
TM650	1-780-178-11	TERMINAL BOARD (SP) (2P) (SPEAKERS L)					
		< VIBRATOR >		△ S1	1-692-349-11	SWITCH, PUSH (AC POWER) (POWER) *****	
X400	1-767-661-11	VIBRATOR, CERAMIC (12.5MHz) *****				TACT SWITCH BOARD *****	
		ID BOARD *****				< CONNECTOR >	
	4-924-264-01	TERMINAL, MOUNT		* CN450	1-564-518-11	PLUG, CONNECTOR 3P	
		< SWITCH >				< RESISTOR >	
S400	1-570-620-11	SWITCH, DIP (IR ID) *****		R444	1-247-831-91	CARBON 1K 5% 1/4W	
		INLET BOARD *****		R445	1-249-421-11	CARBON 2.2K 5% 1/4W	
		< CONNECTOR >		R446	1-247-831-91	CARBON 1K 5% 1/4W	
CN900	1-816-148-11	INLET, AC (~ AC IN)		R461	1-249-421-11	CARBON 2.2K 5% 1/4W	
CN901	1-785-101-11	PIN, CONNECTOR (3.96mm PITCH) 3P *****				< SWITCH >	
		JUMPER BOARD *****		S402	1-762-875-21	SWITCH, KEYBOARD (VOL-)	
		< CONNECTOR >		S403	1-762-875-21	SWITCH, KEYBOARD (MUTING)	
CN452	1-778-227-41	CONNECTOR, BOARD TO BOARD 6P *****		S404	1-762-875-21	SWITCH, KEYBOARD (POWER OFF)	
		LED BOARD *****		S405	1-762-875-21	SWITCH, KEYBOARD (POWER ON)	
		< CONNECTOR >		S406	1-762-875-21	SWITCH, KEYBOARD (POWER ON/OFF)	
* CN453	1-564-519-11	PLUG, CONNECTOR 4P		S407	1-762-875-21	SWITCH, KEYBOARD (VOL+) *****	
		< DIODE >				VR BOARD *****	
D404	8-719-058-03	DIODE SEL5423E-TP15 (ON)				< CAPACITOR >	
D405	8-719-058-03	DIODE SEL5423E-TP15 (IN USE)		C436	1-113-342-11	CERAMIC 0.1uF 50V	
D406	8-719-046-44	DIODE SEL5221S (IN USE)				< VARIABLE RESISTOR >	
		< RESISTOR >		RV300	1-223-548-21	RES, VAR, CARBON 10K (ATTENUATOR R)	
R487	1-247-807-31	CARBON 100 5% 1/4W		RV350	1-223-548-21	RES, VAR, CARBON 10K (ATTENUATOR L) *****	
R492	1-247-807-31	CARBON 100 5% 1/4W				MISCELLANEOUS *****	
R493	1-247-807-31	CARBON 100 5% 1/4W *****		1	A-1079-673-A	LID ASSY	
				5	X-4955-618-1	BUTTON (POWER) ASSY	
				52	X-2022-049-1	FOOT ASSY	
				△ F900	1-533-419-11	FUSE, GLASS CYLINDRICAL (DIA.5) (4A/125V)	
				Q603	8-729-051-92	TRANSISTOR 2SD2560	
				Q654	8-729-051-93	TRANSISTOR 2SB1647	
				△ T900	1-443-501-11	POWER TRANSFORMER *****	

The components identified by mark △ or dotted line with mark △ are critical for safety. Replace only with part number specified.

TA-MR2ES

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>	<u>Remark</u>
		ACCESSORIES *****	
△	1-823-512-12	CORD, POWER	
	2-345-292-01	BRACKET (RACK MOUNT)	
	2-514-603-11	INSTRUCTION MANUAL (ENGLISH)	
	7-685-873-09	SCREW +BVTT 3X10 (S) (for Install the rack-mount brackets)	

The components identified by mark △ or dotted line with mark △ are critical for safety.
Replace only with part number specified.

MEMO

