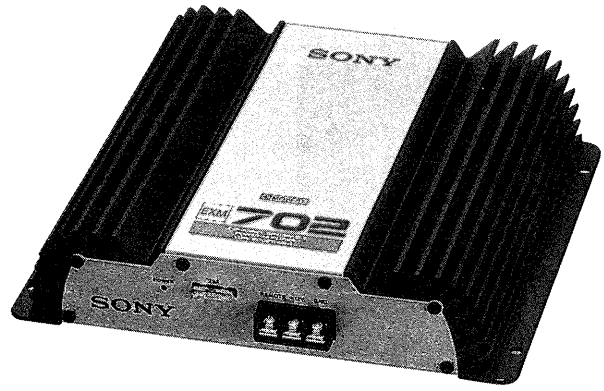
EXM-702

SERVICE MANUAL

US Model
E Model



SPECIFICATIONS

AUDIO POWER SPECIFICATIONS

POWER OUTPUT AND TOTAL HARMONIC DISTORTION
70 watts per channel minimum continuous average power into 4 ohms, both channels driven from 20 Hz to 20 kHz with no more than 0.1% total harmonic distortion per Car Audio Ad Hoc Committee standards.

Other Specifications

Circuit system	OTL (output transformerless) circuit Pulse power supply
Inputs	RCA pin jacks
Outputs	Speaker terminals
Speaker impedance	2 – 8 ohms (stereo) 4 – 8 ohms (when used as a bridging amplifier)
Maximum output 4 ohms	
	140 watts per channel 400 watts (monaural)
Rated outputs (supply voltage at 14.4 V)	
	70 watts per channel (20 Hz – 20 kHz, 0.1 % THD, at 4 ohms) 90 watts per channel (20 Hz – 20 kHz, 0.5 % THD, at 2 ohms) Monaural: 160 watts (20 Hz – 20 kHz, 0.5 % THD, at 4 ohms)
Frequency response	8 Hz – 50 kHz ($^{+0}_{-3}$ dB)
Harmonic distortion	0.01 % or less (at 1kHz, 4 ohms, 16 W)
Input level adjustment range	
	0.2 – 2 V
Low-pass filter	80 Hz, -18 dB/oct
Low boost	0 – 10 dB (40 Hz)
Power requirements	
	12 V DC car battery (negative ground)
Power supply voltage	10.5 – 16 V
Current drain	at rated output: 18 A Remote input: 5 mA
Dimensions	Approx. 219 × 56 × 212 mm (w/h/d) ($8\,^{5}/_{8} \times 2\,^{1}/_{4} \times 8\,^{3}/_{8}$ in.) not incl. projecting parts and controls
Mass	Approx. 2.1 kg (4 lb. 10 oz.) not incl. accessories
Supplied accessories	Mounting screws (4)

Design and specifications are subject to change without notice.

STEREO POWER AMPLIFIER

SONY®

SECTION 1
GENERAL

This section is extracted from instruction manual.

Features

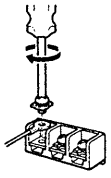
- Maximum power output of 140 watts per channel (at 4 ohms).
- Direct connection can be made with the speaker output of your car audio if it is not equipped with the line output (High level input connection).
- Built in LPF (Low-pass filter) and low boost circuit.
- The EXM-702 can be used as a monaural amplifier with a maximum output of 320 watts.
- Dual mode connection can be made for a multi-speaker system.
- Built in protection circuit.
- Pulse power supply* for stable and regulated output power.

* ***Pulse power supply***
This unit has a built-in power regulator which converts the power supplied by the DC 12 V car battery into high speed pulses using a semiconductor switch. These pulses are stepped up by the built-in pulse transformer and separated into both positive and negative power supplies before being converted into direct current again. This is to regulate fluctuating voltage from the car battery. This light weight power supply system provides a highly efficient power supply with a low impedance output.

Caution

- Before making any connections, disconnect the ground terminal of the car battery to avoid short circuits.
- Be sure to use speakers with an adequate power rating. If you use small capacity speakers, they may be damaged.
- Do not connect the ⊖ terminal of the speaker system to the car chassis, and do not connect the ⊖ terminal of the right speaker with that of the left speaker.
- Install the input and output cords away from the power supply lead as running them close together can generate some interference noise.
- This unit is a high powered amplifier. Therefore, it may not perform to its full potential if used with the speaker cords supplied with the car.
- If your car is equipped with a computer system for navigation or some other purpose, Do not to remove the ground wire from the car battery. If you disconnect the wire, the computer memory may be erased. To avoid short circuits when making connections, disconnect the +12 V power supply lead until all the other leads have been connected.

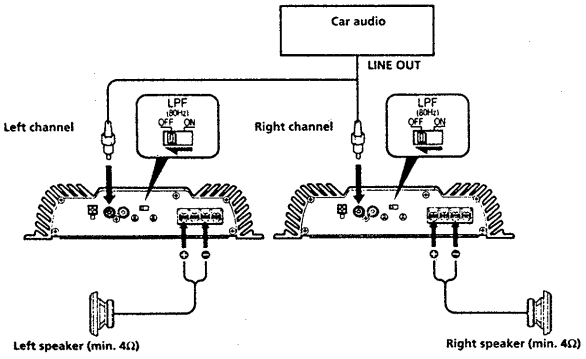
Make the terminal connections as illustrated below.



Note
When you tighten the screw, be careful not to apply too much torque as doing so may damage the screw.*

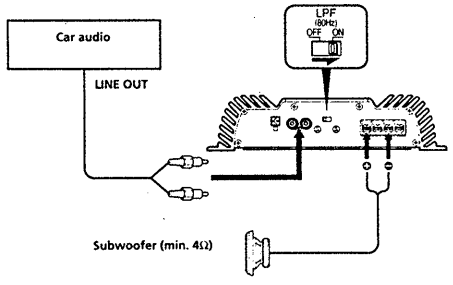
** The torque value should be less than 1 N•m.*

As a Monaural Amplifier



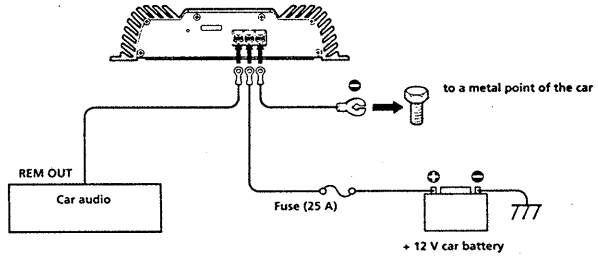
Note
Make sure that the line output from the car audio is connected to the jack marked "R (MONO)" on the unit.

As the Monaural Amplifier for a Subwoofer



Note
If you wish to use a subwoofer as a monaural speaker, connect the speaker as illustrated above. The output signals to the subwoofer will be the combination of the both right and left output signals.

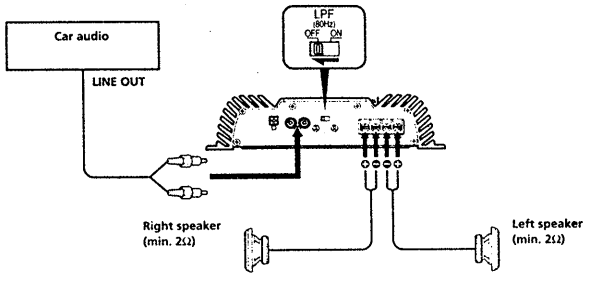
Power Connection Leads (not supplied)



Notes on the power supply

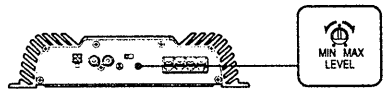
- *Connect the +12 V power supply lead only after all the other leads have been connected.*
- ***Be sure to connect the ground lead of the unit securely to a metal point of the car. A loose connection may cause a malfunction of the amplifier.***
- *Be sure to connect the remote control lead of the car audio to the remote terminal.*
- *Use the power supply lead with a fuse attached (25 A).*
- *Place the fuse in the power supply lead as close as possible to the car battery.*
- *During a full-power operation, a current of more than 25 A will run through the system. Therefore, make sure that the leads to be connected to the* ***+ 12 V*** *and* ***GND*** *terminals of this unit respectively must be larger than 12-Gauge (AWG-12) or with the sectional area of more than 3 mm².*

2-Speaker System



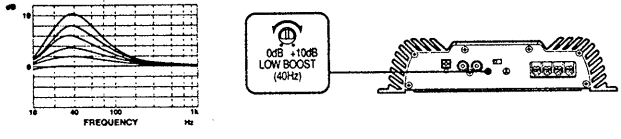
Level Adjustment Control

The input level can be adjusted with this control when using source equipment of other manufacturers. Turn it to MAX when the output level of the car audio seems low.



LOW BOOST Level Control

Turn this control to boost the frequencies around 40 Hz at the maximum of 10 dB. The low boost response curve is shown below.



Dual Mode System (With a Bridged Subwoofer)

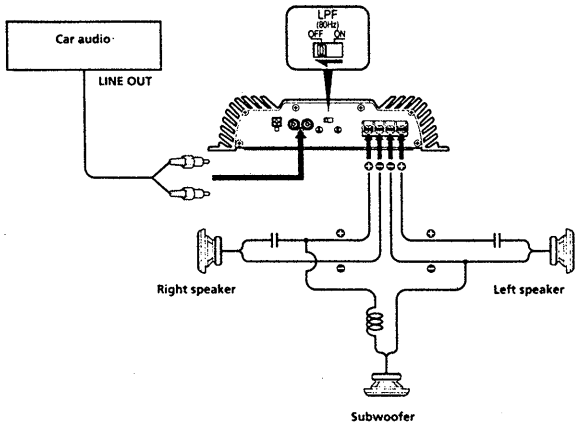


Table of crossover values for 6 dB/octave (4 ohms)

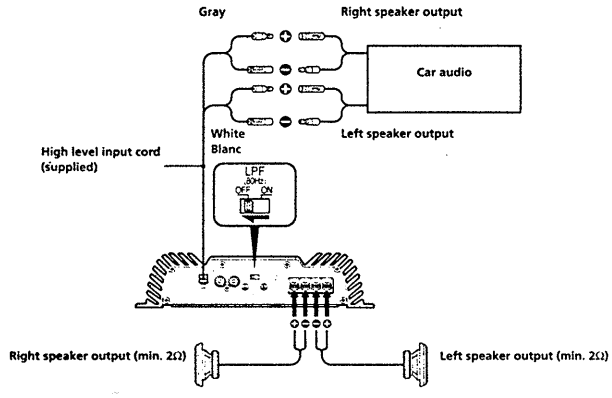
Crossover Frequency unit: Hz	L (coil)* unit: mH	C1/C2 (capacitor)* unit: µF
50	12.7	800
80	8.2	500
100	6.2	400
130	4.7	300
150	4.2	270
200	3.3	200
260	2.4	150
400	1.6	100
600	1.0	68
800	0.8	50
1000	0.6	39

* (not supplied)

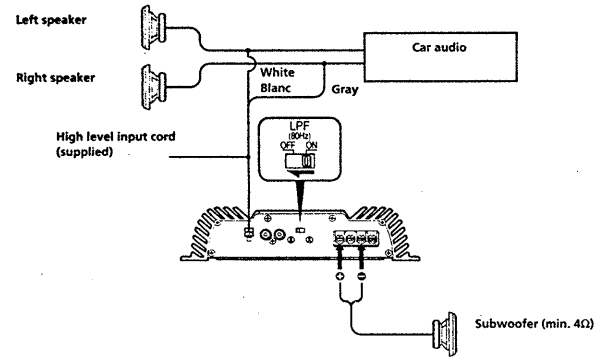
Notes

- *When using passive crossover networks in a multi-speaker system, care must be taken as the speaker system's impedance should not be lower than that of the suitable impedance for this unit.*
- *When you are installing a 12 decibels/octave system in your car, the following points must be considered. In a 12 decibels/octave system where both a choke and capacitor are used in series to form a circuit, a great care must be taken when they are connected. In such a circuit, there is going to be an increase in the current which by-passes the speaker with frequencies at around the crossover frequency. If audio signals are continued to be fed into the crossover frequency area, it may cause the amplifier to become abnormally hot or the fuse will be blown. Also if the speaker is disconnected, a series-resonant circuit will be formed by the choke and the capacitor. In this case, the impedance in the resonance area will decrease dramatically resulting in a short circuit like situation causing a damage to the amplifier. Therefore, make sure that a speaker is connected to such a circuit at all times.*

2-Speaker System (High Level Input Connection)



As the Monaural Amplifier for a Subwoofer (High Level Input Connection)



Precaution

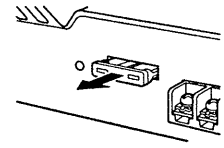
- This unit is designed for negative ground 12 V DC operation only.
- Use speakers with an impedance of 2 to 8 ohms. (4 to 8 ohms when used as a bridging amplifier)
- Do not connect any active speakers (with built-in amplifiers) to the speaker terminals of the unit. Doing so many damage the active speakers.
- Avoid installing the unit where:
  - — it would be subject to high temperatures such as from direct sunlight or hot air from the heater
  - — it would be exposed to rain or moisture
  - — it would be subject to dust or dirt.
- If your car is parked in direct sunlight and there is a considerable rise in temperature inside the car, allow the unit to cool down before use.
- When installing the unit horizontally, be sure not to cover the fins with the floor carpet etc.
- If this unit is placed too close to the car radio, interference may occur. In this case, relocate the amplifier away from the car radio.
- If no power is being supplied to the cassette player or tuner, check the connections.
- This power amplifier employs a protection circuit* to protect the transistors and speakers if the amplifier malfunctions. Do not attempt to test the protection circuits by covering the heat sink or connecting improper loads.
- Do not use the unit on a weak battery as its optimum performance depends on a good power supply.
- For safety reasons, keep your car audio volume moderate so that you can still hear sounds outside your car.

Fuse Replacement

If the fuse blows, check the power connection and replace the fuse. If the fuse blows again after replacement, there may be an internal malfunction. In such a case, consult your nearest Sony dealer.

Warning

When replacing the fuse, be sure to use one matching the amperage stated above the fuse holder. Never use a fuse with an amperage rating exceeding the one supplied with the unit as this could damage the unit.

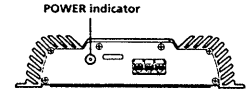


Protection circuit

This amplifier is provided with a protection circuit that operates in the following cases:
— when the unit is overheated
— when a DC current is generated
— when the speaker terminals are short circuited.
When the protection circuit activates, there will be abrupt loss of sound from the speakers. If this happens, turn off the connected equipment, take out the cassette tape or disc, and determine the cause of the malfunction. If the amplifier has overheated, wait until the unit cools down before use.

POWER indicator

The indicator (Green) will come on when the unit is turned on.
However, even if the protection circuit is being activated, the POWER indicator will not go out as long as the connected car audio is turned on.



If you have any questions or problems concerning your unit that are not covered in this manual, please consult your nearest Sony dealer.

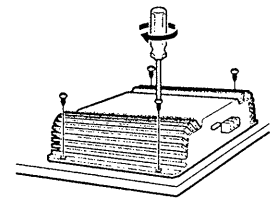
Installation

Before Installation

- Mount the unit either inside the trunk or under a seat.
- Choose the mounting location carefully so that the unit will not interfere with the normal movements of the driver and it will not be exposed to direct sunlight or hot air from the heater.
- Do not install the unit under the floor carpet, where the heat dissipation from the unit will be considerably impaired.

First, place the unit where you plan to install it, and mark the positions of the four screw holes on the mounting board (not supplied). Then drill a 3 mm pilot hole at each mark and mount the unit onto the board with the supplied mounting screws. The mounting screws are all 15 mm long, so make sure that the mounting board is more than 15 mm.

Mount the unit as illustrated below.

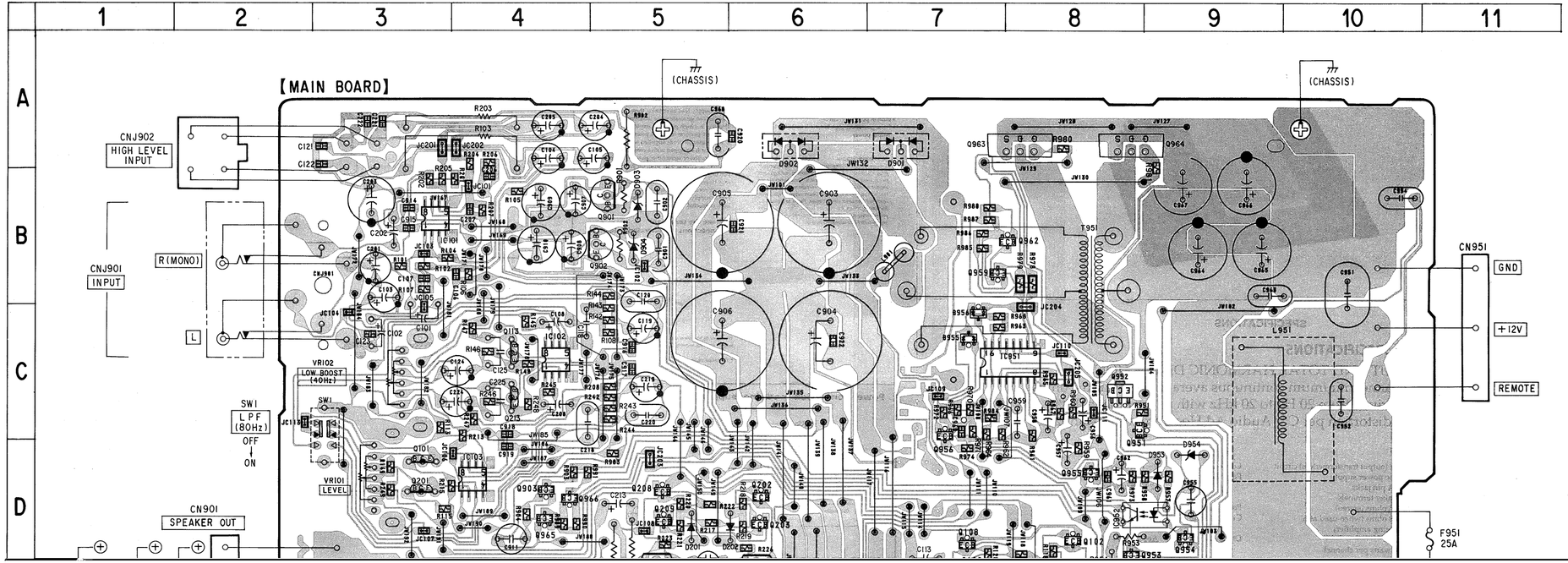


SECTION 2
DIAGRAMS

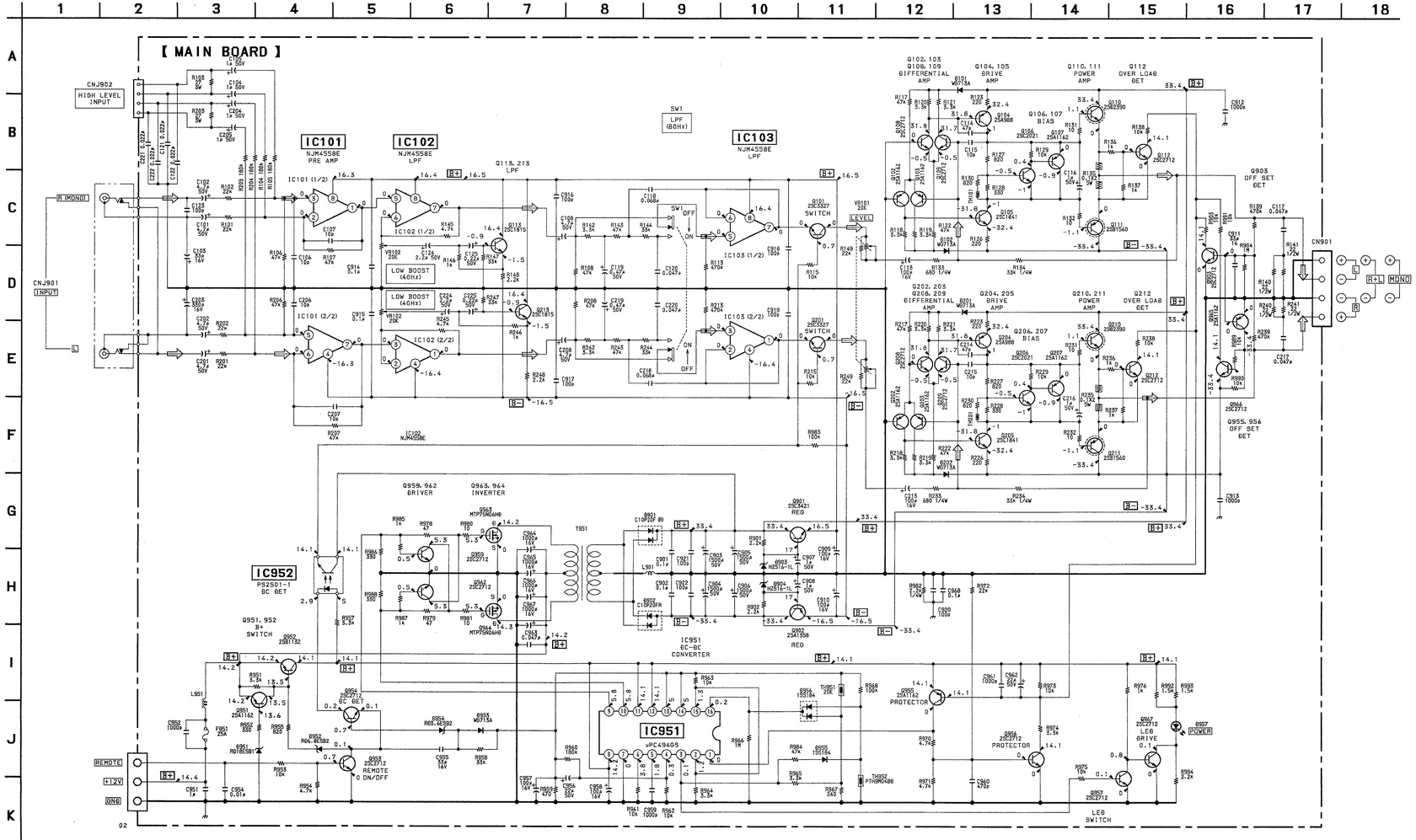
● SEMICONDUCTOR LOCATION

Ref. No.	Location	Ref. No.	Location
D101	E-7	Q202	D-6
D102	E-8	Q203	D-6
D201	D-5	Q204	D-5
D202	D-6	Q205	D-6
D901	A-7	Q206	F-5
D902	A-6	Q207	E-5
D903	B-5	Q208	D-5
D904	B-5	Q209	D-5
D951	E-8	Q210	F-5
D952	D-9	Q211	F-6
D953	D-9	Q212	E-6
D954	D-9	Q213	C-4
D955	C-7	Q901	B-5
D956	C-7	Q902	B-5
D957	E-10	Q903	D-4
		Q951	C-8
IC101	B-3	Q952	C-8
IC102	C-4	Q953	D-8
IC103	D-4	Q954	D-9
IC951	C-7	Q955	D-8
IC952	D-8	Q956	C-7
		Q957	E-10
Q101	D-3	Q959	B-7
Q102	D-8	Q962	B-8
Q103	D-8	Q963	A-8
Q104	E-7		
Q105	E-8	Q964	A-8
		Q965	D-4
Q106	F-7	Q966	D-4
Q107	E-8	Q967	E-10
Q108	D-7		
Q109	D-7		
Q110	F-7		
Q111	F-8		
Q112	E-8		
Q113	C-4		
Q201	D-3		

2-1. PRINTED WIRING BOARD

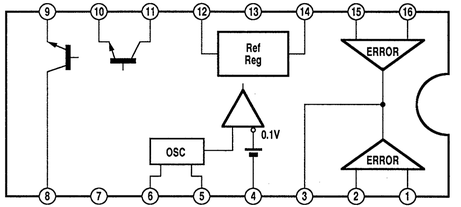


2-2. SCHEMATIC DIAGRAM

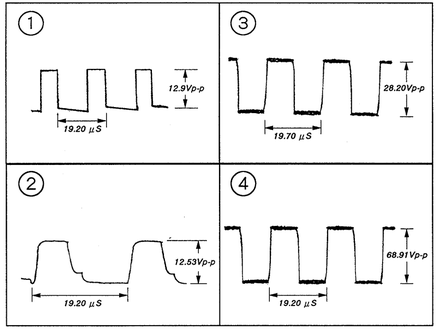


● IC BLOCK DIAGRAM

IC951 μPC494GS



● WAVEFORMS



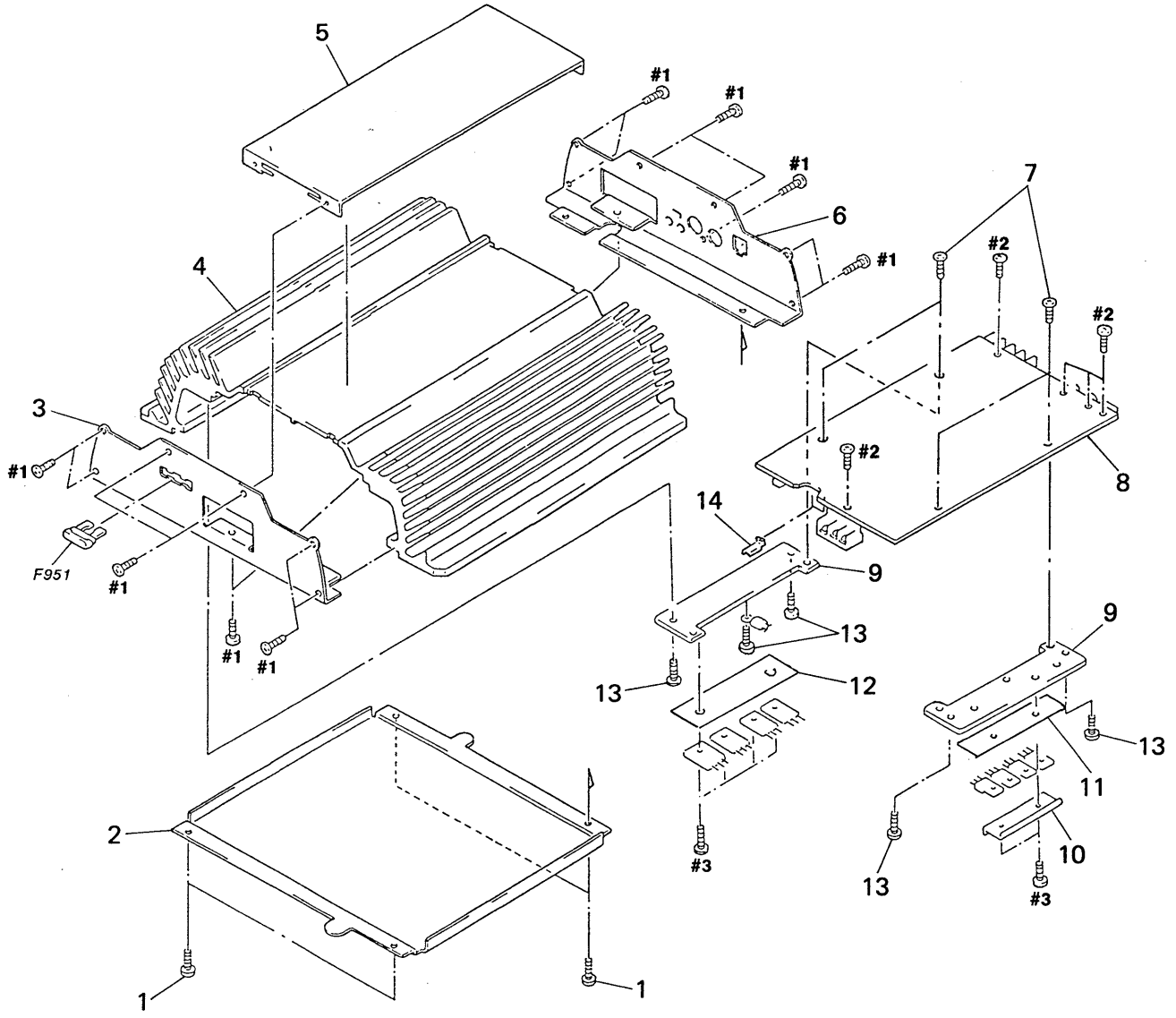
Note :

- All capacitors are in μ F unless otherwise noted. pF: μ μ F 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and ¼W or less unless otherwise specified.
- B+ : B+ Line
- Power voltage is dc 14.4 V and fed with regulated dc power supply from +12V and REMOTE terminal (CNP951).
- Voltage and waveforms are dc with respect to ground under no-signal conditions.
- Voltages are taken with a VOM (Input impedance 10M Ω). Voltage variations may be noted due to normal production tolerances.
- Waveforms are taken with a oscilloscope. Voltage variations may be noted due to normal production tolerances.
- Circled numbers refer to waveforms.
- Signal path. ⇨

SECTION 3
EXPLODED VIEW

NOTE :

- -XX, -X mean standardized parts, so they may have some differences from the original one.
- The construction parts of an assembled part are indicated with a collation number in the remark column.
- Items marked " * "are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.
- Hardware (# mark) list and accessories and packing materials are given in the last of this parts list.



Ref. No.	Part No.	Description	Remark
1	3-933-765-01	SCREW (3X6) (SWCH)	
* 2	3-932-766-01	PLATE, BOTTOM	
* 3	3-933-092-11	PANEL (FRONT)	
* 4	3-932-763-11	SINK, HEAT	
* 5	3-932-765-11	PLATE, ORNAMENTAL	
* 6	3-932-764-11	PANEL (REAR)	
7	3-933-764-01	SCREW (3X6) (SWCH)	
* 8	A-3309-173-A	MAIN BOARD, COMPLETE	

Ref. No.	Part No.	Description	Remark
* 9	3-932-767-01	SINK (SUB), HEAT	
* 10	3-932-768-01	BRACKET (TR)	
11	3-933-057-01	SHEET (INSULATING 2)	
12	3-933-056-01	SHEET (INSULATING)	
13	3-933-766-01	SCREW (3X8) (SWCH) (CZN-N)	
14	1-537-479-11	TERMINAL (HOLDER)	
F951	1-576-256-11	FUSE (BLADE TYPE) (AUTO FUSE) (25A)	

SECTION 4
ELECTRICAL PARTS LIST

MAIN

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, -X mean standardized parts, so they may have some differences from the original one.
- RESISTORS
  All resistors are in ohms
  METAL : Metal-film resistor
  METAL OXIDE : Metal oxide-film resistor
  F : nonflammable
- 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....
- CAPACITORS
  uF : μ F
  COILS
  uH : μ H

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

Ref. No.	Part No.	Description			Remark
*	A-3309-173-A	MAIN BOARD, COMPLETE			
		**********			
	1-537-479-11	TERMINAL (HOLDER)			
		< CAPACITOR >			
C101	1-126-963-11	ELECT	4.7uF	20%	50V
C102	1-126-963-11	ELECT	4.7uF	20%	50V
C103	1-126-966-11	ELECT	33uF	20%	16V
C104	1-124-903-11	ELECT	1uF	20%	50V
C105	1-124-903-11	ELECT	1uF	20%	50V
C106	1-163-227-11	CERAMIC CHIP	10PF	0.5PF	50V
C107	1-163-227-11	CERAMIC CHIP	10PF	0.5PF	50V
C108	1-126-963-11	ELECT	4.7uF	20%	50V
C113	1-126-933-11	ELECT	100uF	20%	16V
C114	1-101-880-00	CERAMIC	47PF	5%	50V
C115	1-102-947-00	CERAMIC	10PF	0.5PF	50V
C116	1-124-903-11	ELECT	1uF	20%	50V
C117	1-130-491-00	MYLAR	0.047uF	5%	50V
C118	1-130-493-00	MYLAR	0.068uF	5%	50V
C119	1-124-902-00	ELECT	0.47uF	20%	50V
C120	1-130-491-00	MYLAR	0.047uF	5%	50V
C121	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C122	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C123	1-163-251-11	CERAMIC CHIP	100PF	5%	50V
C124	1-124-925-11	ELECT	2.2uF	20%	100V
C125	1-136-169-00	FILM	0.22uF	5%	50V
C201	1-126-963-11	ELECT	4.7uF	20%	50V
C202	1-126-963-11	ELECT	4.7uF	20%	50V
C203	1-126-940-11	ELECT	330uF	20%	16V
C204	1-124-903-11	ELECT	1uF	20%	50V
C205	1-124-903-11	ELECT	1uF	20%	50V
C206	1-163-227-11	CERAMIC CHIP	10PF	0.5PF	50V
C207	1-163-227-11	CERAMIC CHIP	10PF	0.5PF	50V
C208	1-126-963-11	ELECT	4.7uF	20%	50V
C213	1-126-933-11	ELECT	100uF	20%	16V
C214	1-101-880-00	CERAMIC	47PF	5%	50V
C215	1-102-947-00	CERAMIC	10PF	0.5PF	50V
C216	1-124-903-11	ELECT	1uF	20%	50V
C217	1-130-491-00	MYLAR	0.047uF	5%	50V
C218	1-130-493-00	MYLAR	0.068uF	5%	50V
C219	1-124-902-00	ELECT	0.47uF	20%	50V
C220	1-130-491-00	MYLAR	0.047uF	5%	50V
C221	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C222	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C224	1-124-925-11	ELECT	2.2uF	20%	100V
C225	1-136-169-00	FILM	0.22uF	5%	50V
C901	1-130-495-00	MYLAR	0.1uF	5%	50V
C902	1-130-495-00	MYLAR	0.1uF	5%	50V
C903	1-115-454-11	ELECT	1500uF	20%	50V
C904	1-115-454-11	ELECT	1500uF	20%	50V
C905	1-115-454-11	ELECT	1500uF	20%	50V
C906	1-115-454-11	ELECT	1500uF	20%	50V
C907	1-124-903-11	ELECT	1uF	20%	50V
C908	1-124-903-11	ELECT	1uF	20%	50V
C909	1-126-933-11	ELECT	100uF	20%	16V
C910	1-126-933-11	ELECT	100uF	20%	16V
C911	1-107-716-11	ELECT	33uF	20%	16V
C912	1-106-343-00	MYLAR	1000PF	5%	200V
C913	1-106-343-00	MYLAR	1000PF	5%	200V
C914	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C915	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C916	1-163-251-11	CERAMIC CHIP	100PF	5%	50V
C917	1-163-251-11	CERAMIC CHIP	100PF	5%	50V
C918	1-163-251-11	CERAMIC CHIP	100PF	5%	50V
C919	1-163-251-11	CERAMIC CHIP	100PF	5%	50V
C920	1-163-251-11	CERAMIC CHIP	100PF	5%	50V
C921	1-163-251-11	CERAMIC CHIP	100PF	5%	50V
C922	1-163-251-11	CERAMIC CHIP	100PF	5%	50V
C951	1-136-177-00	FILM	1uF	5%	50V
C952	1-106-343-00	MYLAR	1000PF	5%	200V
C954	1-130-483-00	MYLAR	0.01uF	5%	50V
C955	1-107-716-11	ELECT	33uF	20%	16V
C956	1-126-965-11	ELECT	22uF	20%	50V
C957	1-126-933-11	ELECT	100uF	20%	16V
C958	1-126-933-11	ELECT	100uF	20%	16V
C959	1-106-343-00	MYLAR	1000PF	5%	200V
C960	1-163-005-11	CERAMIC CHIP	470PF	10%	50V
C961	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V

MAIN

Ref. No.	Part No.	Description			Remark
C962	1-126-965-11	ELECT	22uF	20%	50V
C963	1-130-491-00	MYLAR	0.047uF	5%	50V
C964	1-126-146-11	ELECT	1000uF	20%	16V
C965	1-126-146-11	ELECT	1000uF	20%	16V
C966	1-126-146-11	ELECT	1000uF	20%	16V
C967	1-126-146-11	ELECT	1000uF	20%	16V
C968	1-130-495-00	MYLAR	0.1uF	5%	50V
		< CONNECTOR >			
CN901	1-537-478-21	TERMINAL BOARD (4P) (SPEAKER OUT)			
CN951	1-537-477-21	TERMINAL BOARD (3P) (GND/+12V/REMOTE)			
		< JACK >			
CNJ901	1-770-068-21	JACK, PIN 2P (INPUT)			
* CNJ902	1-691-785-11	PIN, CONNECTOR (PC BOARD) 4P			
		< DIODE >			
D101	8-719-911-19	DIODE 1SS119			
D102	8-719-911-19	DIODE 1SS119			
D201	8-719-911-19	DIODE 1SS119			
D202	8-719-911-19	DIODE 1SS119			
D901	8-719-058-11	DIODE C10P20F			
D902	8-719-058-10	DIODE C10P20FR			
D903	8-719-110-44	DIODE RD16ES-B1			
D904	8-719-110-44	DIODE RD16ES-B1			
D951	8-719-110-48	DIODE RD18ES-B1			
D952	8-719-109-97	DIODE RD6.8ES-B2			
D953	8-719-911-19	DIODE 1SS119			
D954	8-719-109-69	DIODE RD3.6ES-B2			
D955	8-719-801-78	DIODE 1SS184			
D956	8-719-801-78	DIODE 1SS184			
D957	8-719-946-52	LED GL-8EG22 (POWER)			
		< FUSE >			
F951	1-576-256-11	FUSE (BLADE TYPE) (AUTO FUSE) (25A)			
		< IC >			
IC101	8-759-331-71	IC NJM4558E (TE2)			
IC102	8-759-331-71	IC NJM4558E (TE2)			
IC103	8-759-331-71	IC NJM4558E (TE2)			
IC951	8-759-144-88	IC uPC494GS			
IC952	8-719-156-73	IC PHOTO COUPLER PS2501-1LA			
		< JUMPER RESISTOR >			
JC101	1-216-295-00	METAL GLAZE	0	5%	1/10W
JC102	1-216-295-00	METAL GLAZE	0	5%	1/10W
JC103	1-216-295-00	METAL GLAZE	0	5%	1/10W
JC104	1-216-295-00	METAL GLAZE	0	5%	1/10W
JC105	1-216-295-00	METAL GLAZE	0	5%	1/10W
JC106	1-216-295-00	METAL GLAZE	0	5%	1/10W
JC107	1-216-295-00	METAL GLAZE	0	5%	1/10W
JC108	1-216-295-00	METAL GLAZE	0	5%	1/10W
JC109	1-216-295-00	METAL GLAZE	0	5%	1/10W
JC110	1-216-295-00	METAL GLAZE	0	5%	1/10W
JC111	1-216-295-00	METAL GLAZE	0	5%	1/10W
JC112	1-216-295-00	METAL GLAZE	0	5%	1/10W
JC113	1-216-295-00	METAL GLAZE	0	5%	1/10W
JC201	1-216-296-00	METAL GLAZE	0	5%	1/8W
JC202	1-216-296-00	METAL GLAZE	0	5%	1/8W
JC203	1-216-296-00	METAL GLAZE	0	5%	1/8W
JC204	1-216-296-00	METAL GLAZE	0	5%	1/8W
JC205	1-216-296-00	METAL GLAZE	0	5%	1/8W
		< COIL >			
L901	1-411-771-11	COIL, CHOKE			
L952	1-410-397-21	FERRITE BEAD INDUCTOR			
		< TRANSISTOR >			
Q101	8-729-203-48	TRANSISTOR 2SC3327-A			
Q102	8-729-216-22	TRANSISTOR 2SA1162-G			
Q103	8-729-216-22	TRANSISTOR 2SA1162-G			
Q104	8-729-140-82	TRANSISTOR 2SA988-PAFAEA			
Q105	8-729-140-84	TRANSISTOR 2SC1841-PAFAEA			
Q106	8-729-902-11	TRANSISTOR 2SC2021-Q			
Q107	8-729-216-22	TRANSISTOR 2SA1162-G			
Q108	8-729-230-49	TRANSISTOR 2SC2712-YG			
Q109	8-729-230-49	TRANSISTOR 2SC2712-YG			
Q110	8-729-020-27	TRANSISTOR 2SD2390-P			
Q111	8-729-020-23	TRANSISTOR 2SB1560-P			
Q112	8-729-230-49	TRANSISTOR 2SC2712-YG			
Q113	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q201	8-729-203-48	TRANSISTOR 2SC3327-A			
Q202	8-729-216-22	TRANSISTOR 2SA1162-G			
Q203	8-729-216-22	TRANSISTOR 2SA1162-G			
Q204	8-729-140-82	TRANSISTOR 2SA988-PAFAEA			
Q205	8-729-140-84	TRANSISTOR 2SC1841-PAFAEA			
Q206	8-729-902-11	TRANSISTOR 2SC2021-Q			
Q207	8-729-216-22	TRANSISTOR 2SA1162-G			
Q208	8-729-230-49	TRANSISTOR 2SC2712-YG			
Q209	8-729-230-49	TRANSISTOR 2SC2712-YG			
Q210	8-729-020-27	TRANSISTOR 2SD2390-P			
Q211	8-729-020-23	TRANSISTOR 2SB1560-P			
Q212	8-729-230-49	TRANSISTOR 2SC2712-YG			
Q213	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q901	8-729-207-82	TRANSISTOR 2SC3421-Y			
Q902	8-729-207-89	TRANSISTOR 2SA1358-Y			

Ref. No.	Part No.	Description			Remark
Q903	8-729-230-49	TRANSISTOR	2SC2712-YG		
Q951	8-729-216-22	TRANSISTOR	2SA1162-G		
Q952	8-729-106-60	TRANSISTOR	2SB1115A		
Q953	8-729-230-49	TRANSISTOR	2SC2712-YG		
Q954	8-729-230-49	TRANSISTOR	2SC2712-YG		
Q955	8-729-216-22	TRANSISTOR	2SA1162-G		
Q956	8-729-230-49	TRANSISTOR	2SC2712-YG		
Q957	8-729-230-49	TRANSISTOR	2SC2712-YG		
Q959	8-729-230-49	TRANSISTOR	2SC2712-YG		
Q962	8-729-230-49	TRANSISTOR	2SC2712-YG		
Q963	8-729-035-83	TRANSISTOR	MTP75N06HD		
Q964	8-729-035-83	TRANSISTOR	MTP75N06HD		
Q965	8-729-216-22	TRANSISTOR	2SA1162-G		
Q966	8-729-230-49	TRANSISTOR	2SC2712-YG		
Q967	8-729-230-49	TRANSISTOR	2SC2712-YG		
		< RESISTOR >			
R101	1-216-081-00	METAL CHIP	22K	5%	1/10W
R102	1-216-081-00	METAL CHIP	22K	5%	1/10W
R103	1-216-471-11	METAL OXIDE	27	5%	3W
R104	1-216-103-00	METAL GLAZE	180K	5%	1/10W
R105	1-216-103-00	METAL GLAZE	180K	5%	1/10W
R106	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R107	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R108	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R113	1-216-113-00	METAL CHIP	470K	5%	1/10W
R115	1-216-073-00	METAL CHIP	10K	5%	1/10W
R117	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R118	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R119	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R120	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R121	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R122	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R123	1-216-033-00	METAL CHIP	220	5%	1/10W
R126	1-216-033-00	METAL CHIP	220	5%	1/10W
R127	1-216-047-00	METAL GLAZE	820	5%	1/10W
R128	1-216-037-00	METAL CHIP	330	5%	1/10W
R129	1-216-073-00	METAL CHIP	10K	5%	1/10W
R130	1-249-416-11	CARBON	820	5%	1/4W
R131	1-249-393-11	CARBON	10	5%	1/4W
R132	1-249-393-11	CARBON	10	5%	1/4W
R133	1-249-415-11	CARBON	680	5%	1/4W
R134	1-249-435-11	CARBON	33K	5%	1/4W
R135	1-205-991-11	RES, METEL PLATE	0.1		
R136	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R137	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R138	1-216-073-00	METAL CHIP	10K	5%	1/10W
R139	1-216-113-00	METAL CHIP	470K	5%	1/10W

Ref. No.	Part No.	Description			Remark
R140	1-249-633-11	CARBON	22	5%	1/2W
R141	1-249-633-11	CARBON	22	5%	1/2W
R142	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R143	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R144	1-216-085-00	METAL CHIP	33K	5%	1/10W
R145	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R146	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R147	1-216-085-00	METAL CHIP	33K	5%	1/10W
R148	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R149	1-216-081-00	METAL CHIP	22K	5%	1/10W
R201	1-216-081-00	METAL CHIP	22K	5%	1/10W
R202	1-216-081-00	METAL CHIP	22K	5%	1/10W
R203	1-216-471-11	METAL OXIDE	27	5%	3W
R204	1-216-103-00	METAL GLAZE	180K	5%	1/10W
R205	1-216-103-00	METAL GLAZE	180K	5%	1/10W
R206	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R207	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R208	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R213	1-216-113-00	METAL CHIP	470K	5%	1/10W
R215	1-216-073-00	METAL CHIP	10K	5%	1/10W
R217	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R218	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R219	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R220	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R221	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R222	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R223	1-216-033-00	METAL CHIP	220	5%	1/10W
R226	1-216-033-00	METAL CHIP	220	5%	1/10W
R227	1-216-047-00	METAL GLAZE	820	5%	1/10W
R228	1-216-037-00	METAL CHIP	330	5%	1/10W
R229	1-216-073-00	METAL CHIP	10K	5%	1/10W
R230	1-249-416-11	CARBON	820	5%	1/4W
R231	1-249-393-11	CARBON	10	5%	1/4W
R232	1-249-393-11	CARBON	10	5%	1/4W
R233	1-249-415-11	CARBON	680	5%	1/4W
R234	1-249-435-11	CARBON	33K	5%	1/4W
R235	1-205-991-11	RES, METEL PLATE	0.1		
R236	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R237	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R238	1-216-073-00	METAL CHIP	10K	5%	1/10W
R239	1-216-113-00	METAL CHIP	470K	5%	1/10W
R240	1-249-633-11	CARBON	22	5%	1/2W
R241	1-249-633-11	CARBON	22	5%	1/2W
R242	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R243	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R244	1-216-085-00	METAL CHIP	33K	5%	1/10W
R245	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R246	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R247	1-216-085-00	METAL CHIP	33K	5%	1/10W

MAIN

Ref. No.	Part No.	Description			Remark
R248	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R249	1-216-081-00	METAL CHIP	22K	5%	1/10W
R901	1-249-421-11	CARBON	2.2K	5%	1/4W
R902	1-249-421-11	CARBON	2.2K	5%	1/4W
R903	1-216-073-00	METAL CHIP	10K	5%	1/10W
R904	1-216-121-00	METAL GLAZE	1M	5%	1/10W
R951	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R952	1-216-186-00	METAL GLAZE	330	5%	1/8W
R953	1-249-429-11	CARBON	10K	5%	1/4W
R954	1-249-425-11	CARBON	4.7K	5%	1/4W
R955	1-247-712-11	CARBON	820	5%	1/4W
R957	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R958	1-216-085-00	METAL CHIP	33K	5%	1/10W
R959	1-216-041-00	METAL CHIP	470	5%	1/10W
R960	1-216-103-91	METAL GLAZE	180K	5%	1/10W
R961	1-216-073-00	METAL CHIP	10K	5%	1/10W
R962	1-216-073-00	METAL CHIP	10K	5%	1/10W
R963	1-216-073-00	METAL CHIP	10K	5%	1/10W
R964	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R965	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R966	1-216-121-00	METAL GLAZE	1M	5%	1/10W
R967	1-216-034-00	METAL CHIP	240	5%	1/10W
R968	1-216-097-91	METAL GLAZE	100K	5%	1/10W
R970	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R971	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R972	1-216-081-00	METAL CHIP	22K	5%	1/10W
R973	1-216-073-00	METAL CHIP	10K	5%	1/10W
R974	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R975	1-216-073-00	METAL CHIP	10K	5%	1/10W
R976	1-249-417-11	CARBON	1K	5%	1/4W
R978	1-216-166-00	METAL GLAZE	47	5%	1/8W
R979	1-216-166-00	METAL GLAZE	47	5%	1/8W
R980	1-216-001-00	METAL CHIP	10	5%	1/10W
R981	1-216-001-00	METAL CHIP	10	5%	1/10W
R982	1-249-931-11	CARBON	2.2K	5%	1/4W
R983	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R984	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R985	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R986	1-216-037-00	METAL CHIP	330	5%	1/10W
R987	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R988	1-216-037-00	METAL CHIP	330	5%	1/10W
R989	1-216-073-00	METAL CHIP	10K	5%	1/10W
R990	1-216-073-00	METAL CHIP	10K	5%	1/10W
R991	1-216-073-00	METAL CHIP	10K	5%	1/10W
R992	1-249-419-11	CARBON	1.5K	5%	1/4W
R993	1-249-419-11	CARBON	1.5K	5%	1/4W
R994	1-216-057-00	METAL CHIP	2.2K	5%	1/10W

Ref. No.	Part No.	Description	Remark
		< SWITCH >	
SW1	1-571-478-11	SWITCH, SLIDE (LPF)	
		< TRANSFORMER >	
T951	1-429-511-11	TRANSFORMER, DC/DC CONVERTER	
		< THERMISTOR >	
TH101	1-810-326-11	THERMISTOR (CHIP TYPE)	
TH201	1-810-326-11	THERMISTOR (CHIP TYPE)	
TH951	1-808-779-11	THERMISTOR	
TH952	1-809-789-71	THERMISTOR, POSITIVE	
		< VARIABLE RESISTOR >	
VR101	1-225-244-11	RES, VAR, CARBON 20K/20K (LEVEL)	
VR102	1-238-424-11	RES, VAR, CARBON 20K/20K (LOW BOOST)	

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ACCESSORIES & PACKING MATERIALS
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	1-690-779-11	CORD (WITH CONNECTOR)	(HIGH LEVEL INPUT)
	3-367-410-11	SCREW (DIA. 5X15), TAPPING	
	3-810-699-11	MANUAL, INSTRUCTION (ENGLISH/FRENCH)	

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****
HARDWARE LIST
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#1	7-685-546-19	SCREW +BTP	3X8 TYPE2 N-S
#2	7-685-146-11	SCREW +P	3X8 TYPE2 NON-SLIT
#3	7-682-549-04	SCREW (WASHER)	

9-923-483-11

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