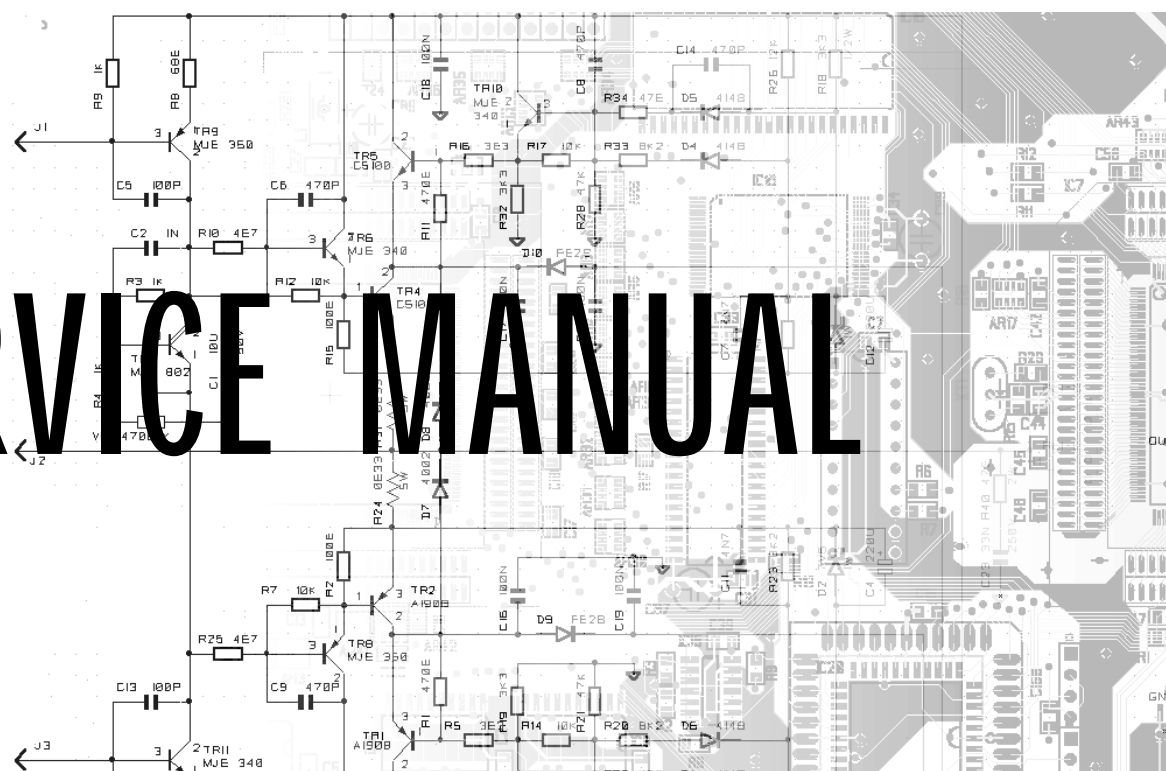




AMP 4 AMP 8 AMP 12

HEAVY DUTY POWER AMPLIFIER

SERVICE MANUAL



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- 2 Technical Specifications, Introduction, Test Procedures & Adjustments
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Warnings



Notice

Service must be carried out by qualified personnel only. Any tampering carried out by unqualified personnel during the guarantee period will forfeit the right to guarantee.

For a correct operation of the instrument, after having switched off, be careful to wait at least 3 seconds before switching on again.

To improve the device's specifications, the schematic diagrams may be subject to change without prior notice.

All components marked by this symbol have special safety characteristics, when replacing any of these components use only manufacturer's specified parts.

The (μ) micro symbol of capacitance value is substituted by U.

The (Ω) omega symbol of resistance value is substituted by E.

The electrolytic capacitors are 25Vdc rated voltage unless otherwise specified.

All resistors are 1/8 Ω unless otherwise specified.

All switches shown in the "OFF" position. All DC voltages measured to ground with a voltmeter 20K Ω m/V.

← Soldering point.

↑ Supply voltage.

⊥ Logic supply ground.

• Male connector.

□ Test point.

⊥ Analog supply ground.

○ Female connector.

◯ Flag joined with one or more flags

⊥ Chassis ground.

⊔ M/F faston connector.

with the same signal name inscribed.

⊕ Earth ground.



ATTENTION

Observe precautions when handling electrostatic sensitive devices.

Address

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▲ CODE: 270231 ▼

TECHNICAL SPECIFICATIONS

Dimensions(WxHxD):	AMP4	483x88x442mm (2U)
	AMP8	483x88x442mm (2U)
	AMP12	483x132x442mm (3U)
Weight:	AMP4	12.5Kg
	AMP8	15Kg
	AMP12	18.5Kg
Power Requirements: (230Vac±10% 50Hz)	AMP4	540VA
	AMP8	1100VA
	AMP12	2000VA
Output Power EIA: (4Ω, 1KHz, 1% THD, both channels)	AMP4	2x 235Watts
	AMP8	2x 424Watts
	AMP12	2x 562Watts
Max. Undistorted Out: (4Ω, 1KHz, 1% THD, both channels)	AMP4	124Vpp
	AMP8	164Vpp
	AMP12	190Vpp
Input Sensitivity:	(0dB)	0.775Vrms
Input Impedance:	(balanced)	20KΩ
	(unbalanced)	10KΩ
Voltage Gain:	AMP4	31±0.5dB
	AMP8	33±0.5dB
	AMP12	35±0.5dB
Slew Rate:		20V/μS
Damping Factor:	(8Ω both channels)	>200
Frequency Response	(20Hz÷20KHz)	0,-1dB
IMD:		<0.1%
THD:	(THD+N)	<0.1%
S/N Ratio:		>105dB
Crosstalk:	(1KHz)	>80dB

TEST PROCEDURES & ADJUSTMENTS

Precaution

- ✧ To prevent short circuit during any test, **the oscilloscope must be EARTH insulated**, this occurs because some test require to connect its probe to the amplifier output, noncompliance may cause damages to oscilloscope inputs circuitry.
- ✧ Read these notes entirely before proceeding to any operation. These notes are not comprehensive of all damages that possibly occur, but includes some specifically advices, checks and adjustments relative to this amplifier.

Remarks

- ✧ The output circuit is an AB class amplifier with the peculiarity of transistor collectors connected directly to chassis ground, this permit a major temperature stability and dissipated power efficiency. The final stage is oversized to obtain high dynamic and high current with hard loads. To use the amplifier in bridge mode the power supply is realized with two DC rails each one for its channel.
- ✧ All components of channel 1 are marked by A suffix as many all components of channel 2 are marked by B suffix.

Visual Check

- ✧ Use compressed air to clear dust in the amplifier chassis.
- ✧ Before proceed to supply the amplifier check visually the internal assembly, if appears an evident damage find the most possible reasons that cause it.
- ✧ Check the wiring cables for possible interruptions or shorts.
- ✧ If the damage has burnt a printed circuit board don't try to repair it, replace with a new one.

Test Instruments

- ✧ Audio Generator
- ✧ Dual Trace Oscilloscope (ch.1 named as A, ch.2 as B)
- ✧ Digital Multimeter
- ✧ 4Ω 700W, 100Ω 100W resistors
- ✧ Variac (0÷250Vac)

Setup

- ✧ Connect the Variac between the mains and the amplifier and set it at zero voltage.
- ✧ Set the amplifier in PARALLEL MODE and turn full clockwise the LEVEL potentiometers.
- ✧ Connect the audio generator to the channel inputs and set it to 1KHz 775mV_{RMS} (0dB) sinusoidal signal.
- ✧ Switch off the LIMITER from rear panel.
- ✧ The procedures that follow must be executed subsequently in the order specified.

Supply Check

- ✧ Remove the transformer secondary fuses (located on SUPPLY board), set the Variac to the nominal mains voltage, check with the Multimeter the AC supply voltages:
AMP4: F601-F602=91±5Vac
AMP8: F601-F602=120±6Vac.
AMP12: F601-F602=144±7Vac.
- ✧ Reset the Variac at zero voltage, turn off the amplifier and put the fuses back on its holders.
- ✧ Connect the oscilloscope probes A and B to the channel outputs before output relays (R151), and its ground clip to the heatsink set both to 20V/div. 200μS/div.

- ✧ Set up the Variac slowly monitoring the Outputs with the oscilloscope traces A/B, these should display the sinusoidal input signal amplified with no distortions, if a distortion occur check the POWER boards as suggested in the ADVICES section.
- ✧ If the protection trips, turn off the amplifier, wait some minutes and disconnect the supplies (W108 on SUPPLY board) from the channel goes in protect mode, continue to check the supplies.

- ✧ Finally verify the DC supplies for each channel on SUPPLY board:
AMP4:
W108 pin 1-2 (+Vcc) =+62±2Vdc
W108 pin 3-4 (-Vcc) =-62±2Vdc
AMP8:
W108 pin 1-2 (+Vcc) =+82±3Vdc
W108 pin 3-4 (-Vcc) =-82±3Vdc
AMP12:
W108 pin 1-2 (+Vcc) =+98±4Vdc
W108 pin 3-4 (-Vcc) =-98±4Vdc
and on MAIN board:
Q130 pin 3 =+15±0.5Vdc
Q131 pin 3 =-15±0.5Vdc
Note: you can measure with the multimeter only the supplies with the respective channel attached, in effect the supply capacitors are mounted on MAIN board.

- ✧ If one or more voltages don't correspond, check the rectifiers, capacitors and transformers disconnecting them from circuitry, refer to schematics.

- ✧ Reset the Variac at zero voltage.

Channels Check

- ✧ The channel 1 is on the right and channel 2 is on the left of the heatsink.
- ✧ These procedures are intended for one channel at a time, repeat these operation for the other channel.

- ✧ **SETUP:**
Connect the ch.A scope GND clip to the chassis or other GND point. Connect the ch.A probe tip to R151(AMP output). Connect the ch.B probe tip to IC2 pin 1 (set it at 1V/div.). Set the amplifier in STEREO MODE and connect the signal generator to the channel under test. Set the LEVEL potentiometers full clockwise. The load resistor is disconnected.

- ✧ **THERMAL PROTECTION CHECK:**
Verify, with the Multimeter, if TSW1 is closed TSW2 is opened, and if NTC1 resistor value must be between 25Ω and 30Ω.

- ✧ **INITIAL TEST:**
Increase slowly the Variac. The channel output signals must be symmetrical respect the GND without visible distortion and oscillation, trace CH1 shows the output, trace B shows the signal after amplifier input stages. If there is a distortion on trace A read the section ADVICES and proceed to check the other channel. If the signal on trace B doesn't appear correctly check IC1, LEVEL potentiometer, IC2 and their circuitry, see schematics.

- ✧ **SIGNAL/CLIP SENSOR CHECK:**
Set the LEVEL pot to minimum, set the ch.A scope timebase at 1V/div. 200μS/div., then increase the level and check the SIGNAL/CLIP led activity: it must turn on (green light) when the amplifier output is higher than 3Vp. Set the scope at 20V/div. and increase the level, check the clip led: it

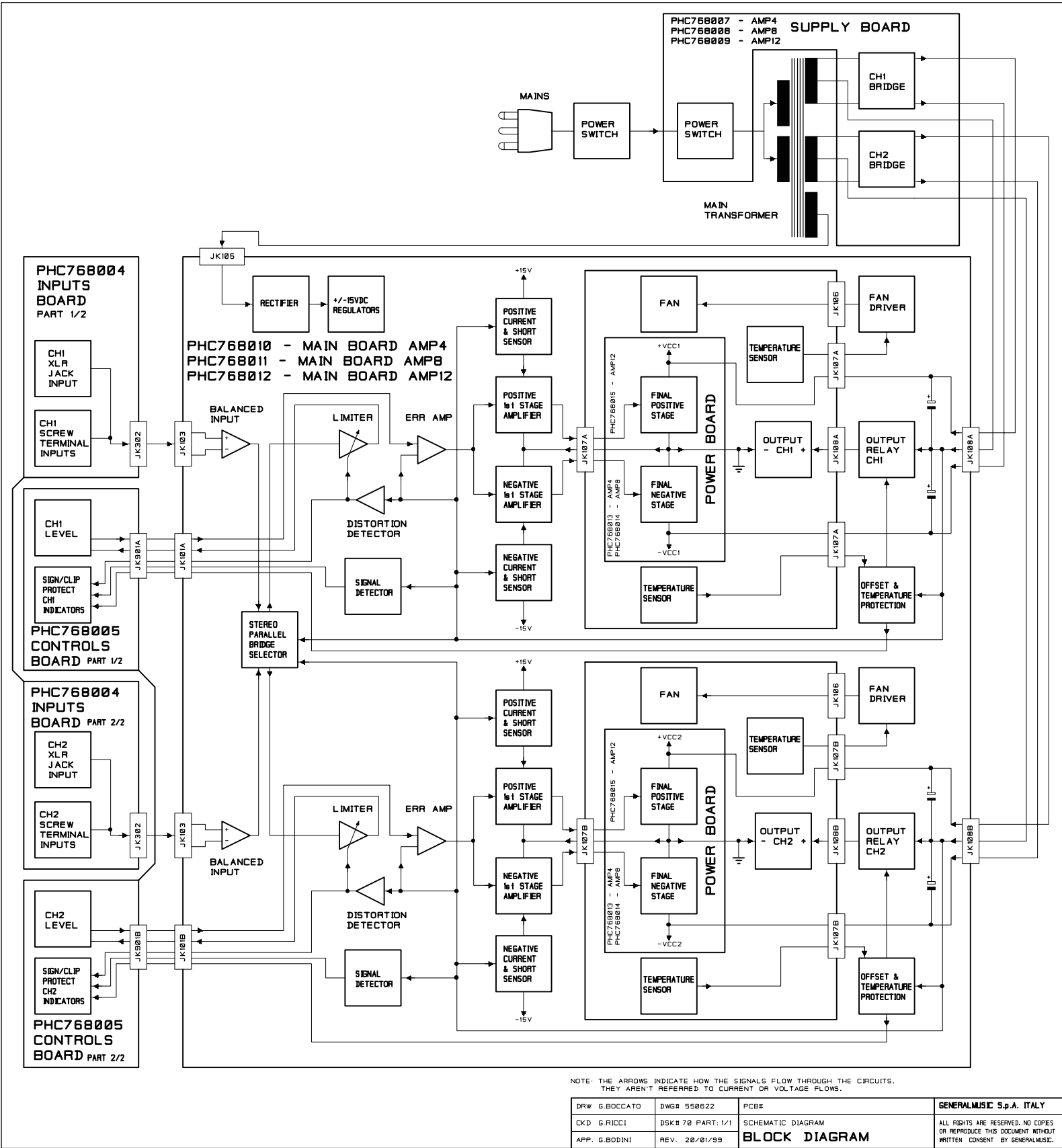
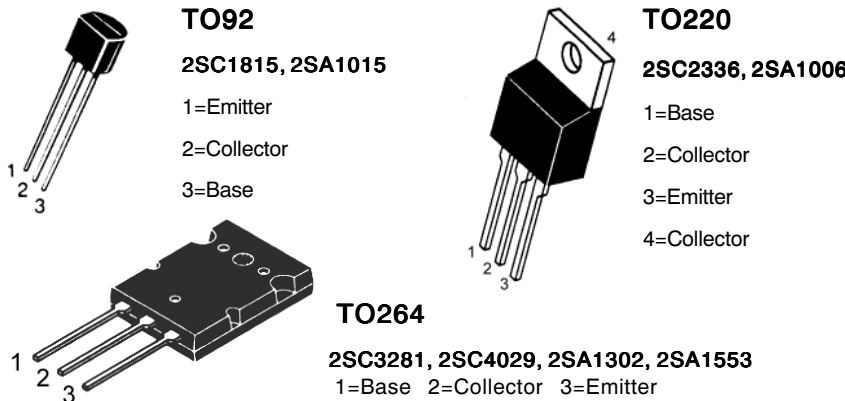
must light at the amplifier output signal clipping.

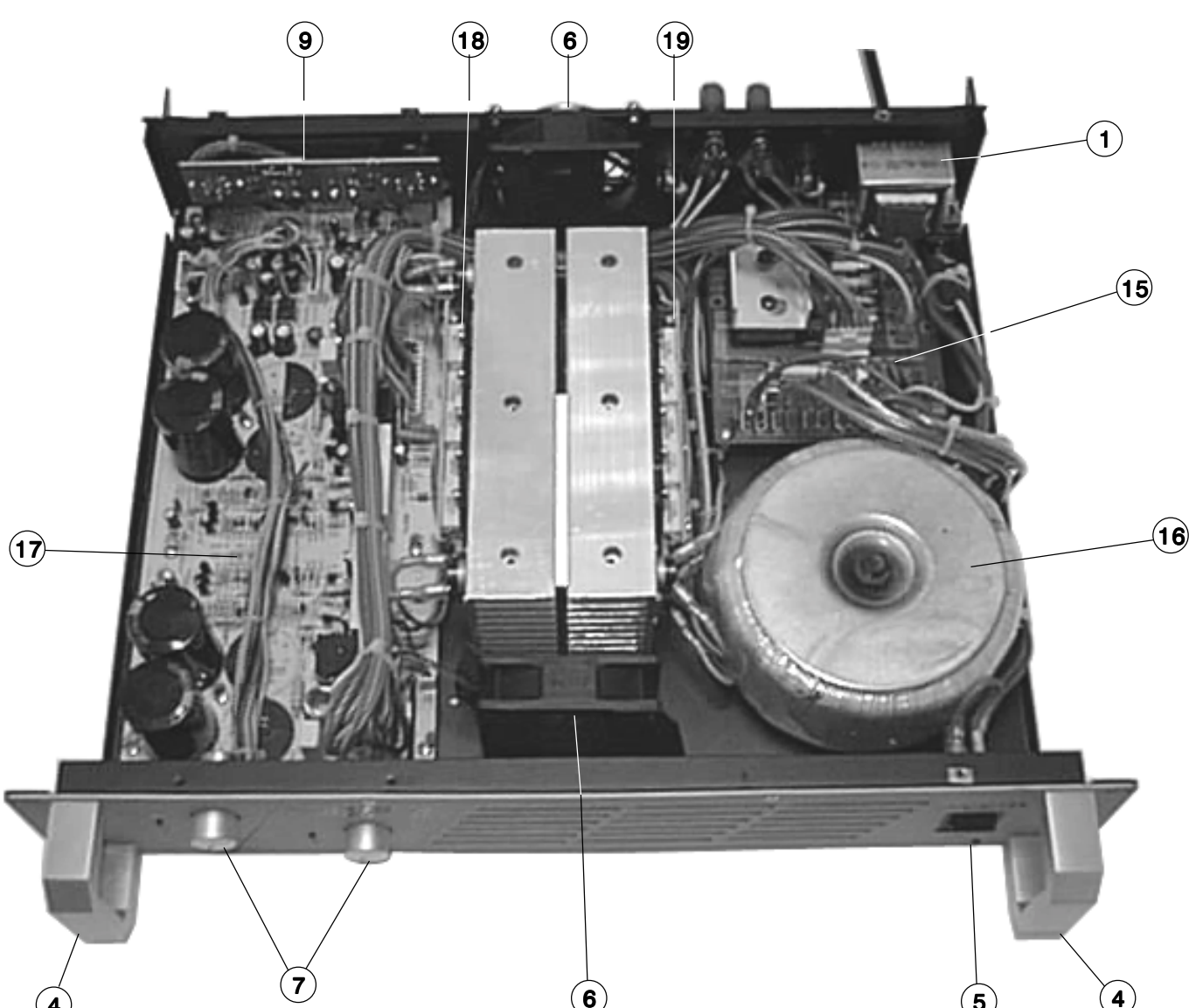
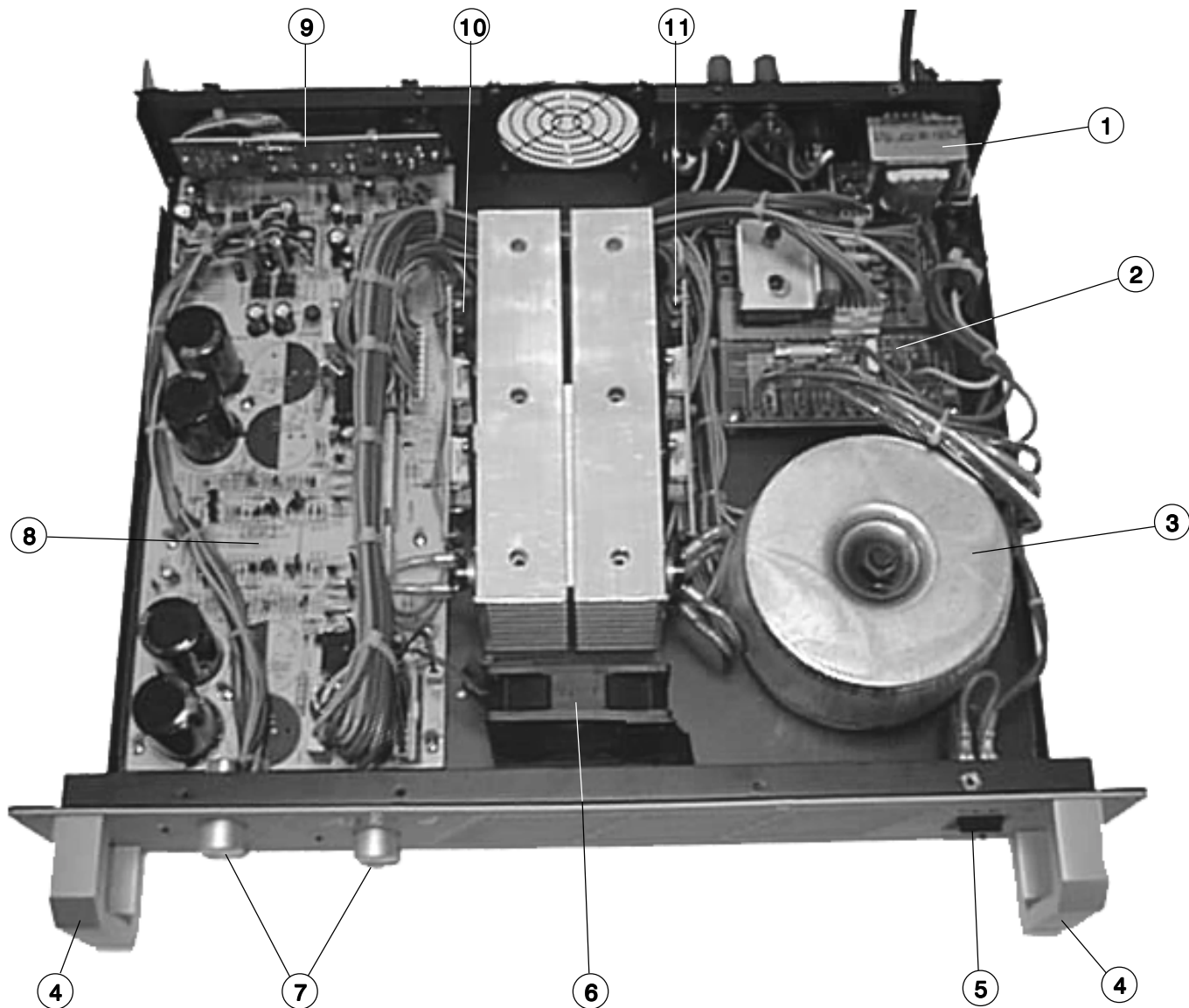
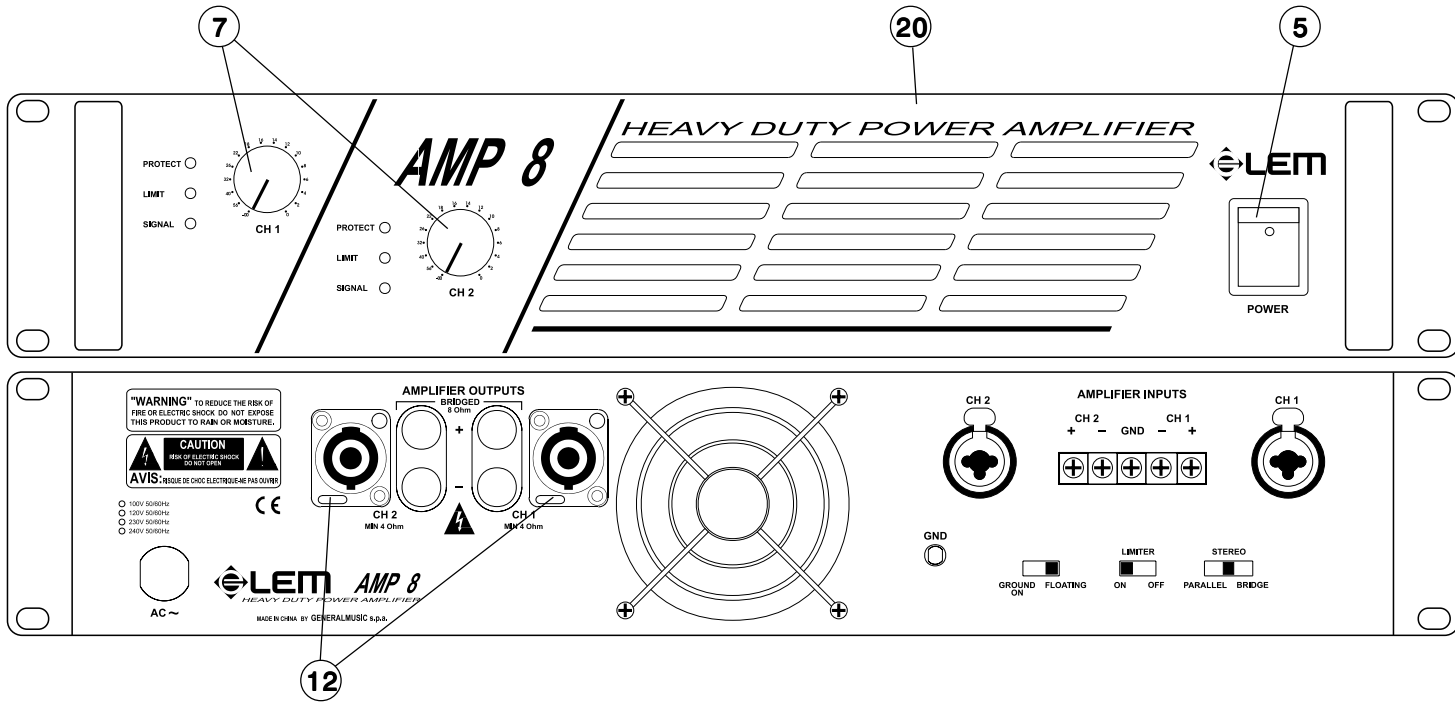
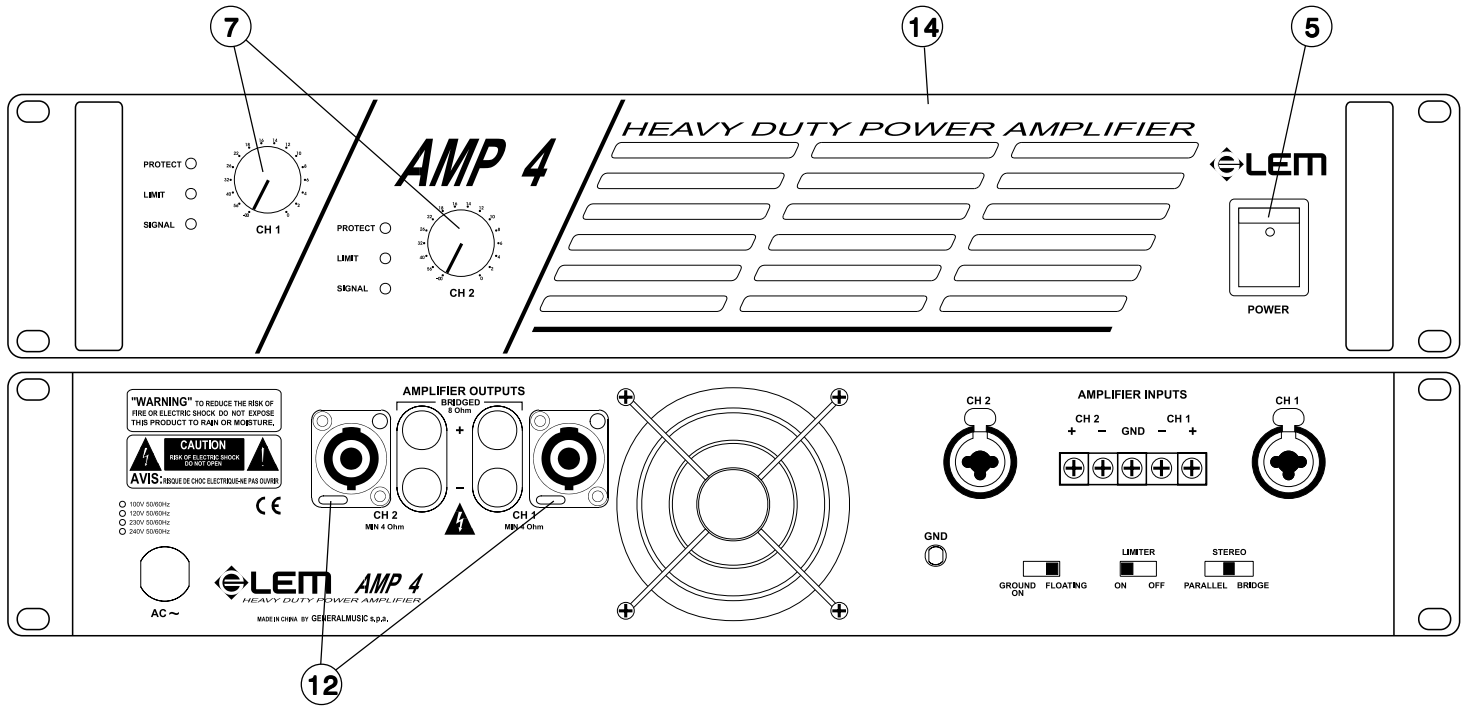
- **LIMITER CHECK:**
Switch on the LIMITER from rear panel: the signal clipping must disappear and the clip led lights off.
Reset the LIMITER to off position.
- **BANDWIDTH CHECK:**
Increase the generator level just below to clip, sweep the generator frequency from 20Hz to 20KHz: the output level must have not detectable level changes.
Reset the generator at 1KHz 775mV_{RMS} (0dB) sinusoidal signal.
- **CHECK WITH LOAD ATTACHED:**
Set the Variac at zero voltage, connect a 4Ω 700W load and repeat the previous tests.
- **CURRENT AND SHORT CIRCUIT SENSOR CHECK:**
Set the LEVEL potentiometer at minimum.
Connect the scope ch.B GND clip at one of the emitter resistors, side positive supply rail (R141 thru 145 or also R168,169), located on POWER board.
Connect the scope ch.B probe tip at the same resistor side transistor emitter.
Set the scope ch.B sensitivity to 0.2V/div.
Increase the input signal, the output current limiter must keep the emitter voltages, both half channel, at 0.6Vp approx.
Temporarily short the amplifier output: the current limiter must keep the emitter voltages, both half channel, at 0.2Vp approx.
Repeat this check for the negative rail connecting the scope ch.B at one emitter resistor (R146 thru R150 or also R170,171).
If this test fail, check the Q102 (positive) and Q103 (negative) circuitries, refer to schematics.
- **SIGNAL TO NOISE RATIO CHECK**
Disconnect the audio generator and short the input (pin 1,2,3 of XLR socket shorted) the output signal (noise) must be less than 2mV approx.
- **OFFSET SENSOR CHECK:**
Set the Variac to zero voltage output.
Disconnect the amplifier load and the supply connection to MAIN board (JK107, JK108), short temporarily pin 8 and 9 of JK107, turn on the amplifier, connect temporarily (by means of a suitable conductor wire) JK108 pin 7 to +15Vdc, the PROTECT led must turn on in 5 seconds approx.
Remove the connection, wait until the leds turn off and after some seconds repeat the check with -15Vdc, the led PROTECT must turn on again.

Advices

- Check the channels one at time to determine which is right (note: if you have a spare power module that you know as right, use it).
- If the input sinewave appears to be distorted during the negative cycle, you can assume that the problem is located somewhere in the circuitry of the positive rail.
If the positive cycle appears distorted, you can assume that the problem is in the circuitry of the negative rail.
- If you have determined that the problem is a short on a rail, you must check the output transistors.
To determine which transistor devices are bad, use a soldering iron to lift one leg of each emitter pin and measure the emitter-collector resistance on each device. Unsolder and lift one leg of each base pin and check the

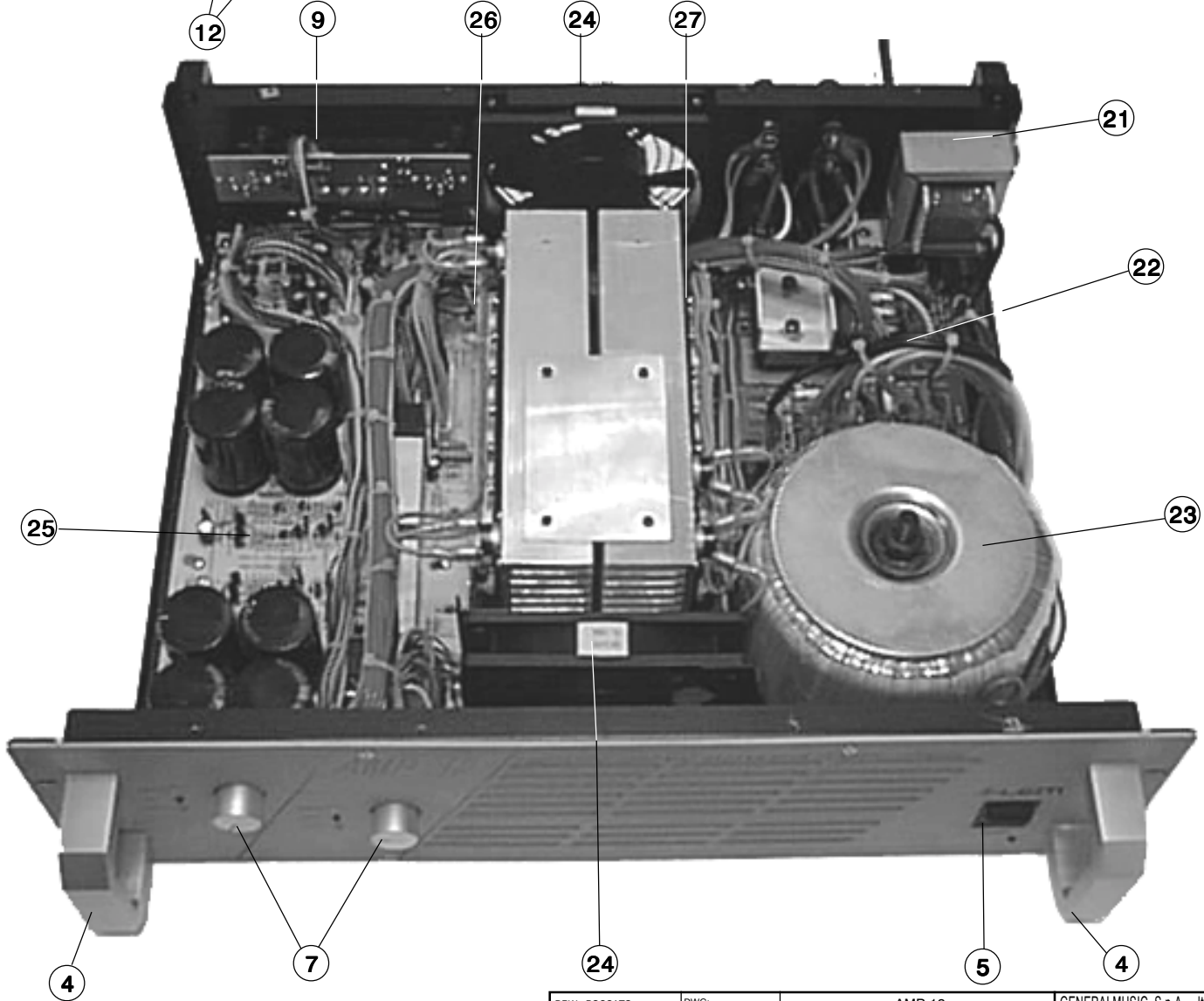
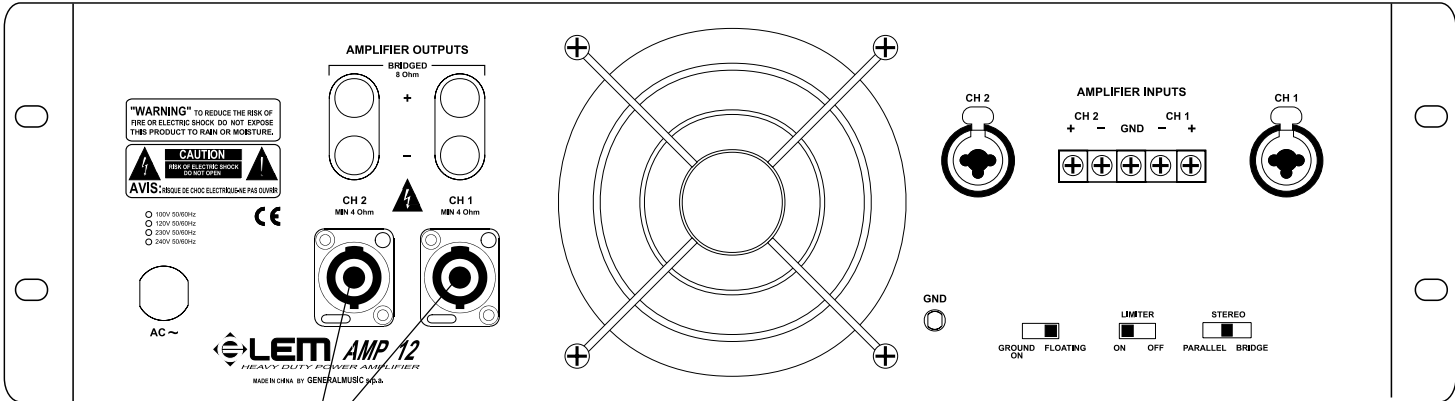
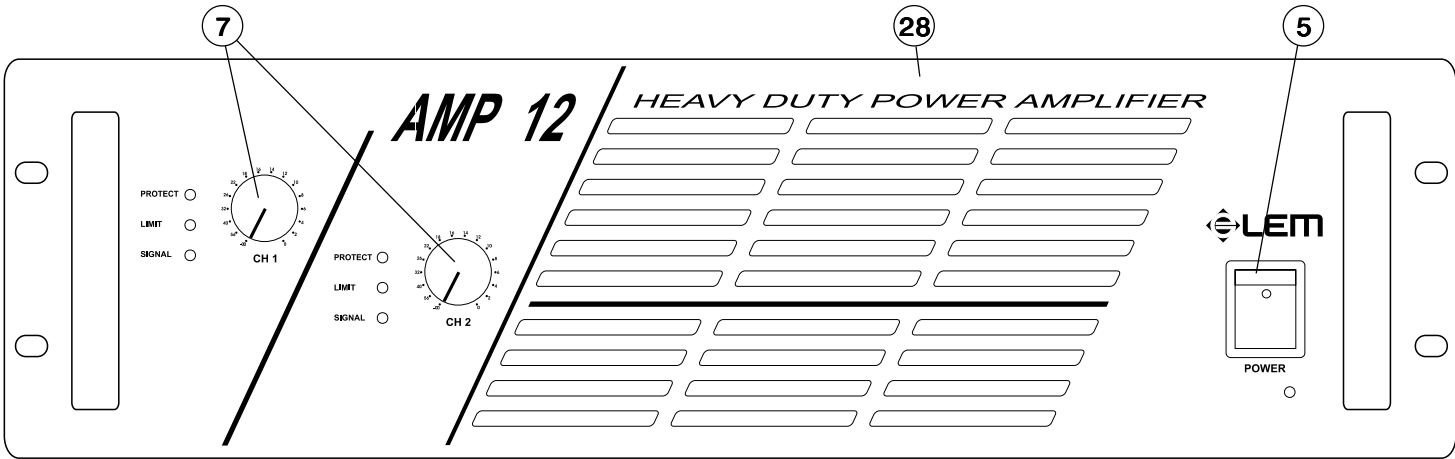
base-collector resistance of each transistor and replace any that measure as a short.
If all the transistors are OK, unsolder and lift one leg of each diode and check them.
Check the circuit board for open foil traces.
Use the Multimeter as Ohm-meter to check the resistors, particularly the base and emitter resistors of damaged transistor.





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Spare Part List

Code	Ref.	Description
Accessories		
277328		Owner's Manual AMP-Series
Assembly		
PHC667000	14	Front Panel (AMP4)
PHC667001	20	Front Panel (AMP8)
PHC667002	28	Front Panel (AMP12)
PHC667003	7	Knob
PHC177000	4	Handle
PHC120000		Screw for Handle
PHC238000	3	Transformer (AMP4)
PHC238001	16	Transformer (AMP8)
PHC238002	23	Transformer (AMP12)
PHC230000	1	070-20279-500-0 Mains Coil (AMP4)(AMP8)
PHC230001	21	070-20289-500-0 Mains Coil (AMP12)
110291	5	Power Switch
141200	12	Speakon Neutrik Socket
PHC110000	6	80x25mm 24Vdc Fan
PHC110001	24	120x25mm 24Vdc Fan
PHC110003		Thermal Switch A85-03PN6308
PHC110004		Thermal Switch B50-03PN6471
Boards		
PHC768004	9	Inputs Board
PHC768005		Controls Panel Board
PHC768006		Power-on Led Board
PHC768007	2	Supply Board (AMP4)
PHC768008	15	Supply Board (AMP8)
PHC768009	22	Supply Board (AMP12)
PHC110005	*	T5A 250V 6.3x32mm Fuse
PHC110006	*	T7A 250V 6.3x32mm Fuse
PHC110006	*	T8A 250V 6.3x32mm Fuse
110038	*	T15A 250V 6.3x32mm Fuse
110062	*	T20A 250V 6.3x32mm Fuse
PHC080003	*	KBPC3506 35A 600V Rectifier Diode Bridge
PHC080004	*	Ntc type N155P2R5L (AMP8)(AMP12)
PHC080005	*	Ntc type N205P010L (AMP4)
PHC768010	8	Main Board (AMP4)
PHC768011	17	Main Board (AMP8)
PHC768012	25	Main Board (AMP12)
PHC080006	*	Ntc type TDC05A045L
PHC090000	*	A1015GR TO92 LN Pnp Transistor
PHC090001	*	C1815GR TO92 LN Npn Transistor
PHC090002	*	A1006BQ TO220 Pnp Transistor
PHC090003	*	C2336BQ TO220 Npn Transistor
PHC080001	*	1N4934 1A 100V Fast Rectifier Diode
PHC080002	*	PB154M Rectifier Diode Bridge
PHC100000	*	KF353 Dual J-Fet Operational Amplifier
PHC100001	*	M5218 Dual LN Operational Amplifier
PHC100002	*	HTVP873-G35-555 Analog Optoisolator
PHC110002	*	Relay 24V / 2 Switch 5A 250V
PHC768013	10-11	Power Board (AMP4)
PHC768014	18-19	Power Board (AMP8)
PHC768015	26-27	Power Board (AMP12)
PHC080000	*	1N5404 3A 400V Rectifier Diode
PHC090004	*	2SA1302-O TO264 Pnp Transistor
PHC090005	*	2SC3281-O TO264 Npn Transistor
PHC090006	*	2SA1553-O TO264 Pnp Transistor
PHC090007	*	2SC4029-O TO264 Npn Transistor

Note:

Each spare part is single quantity unless otherwise specified.

Asterisk prefix explanation:

Omitted = First level spare part.

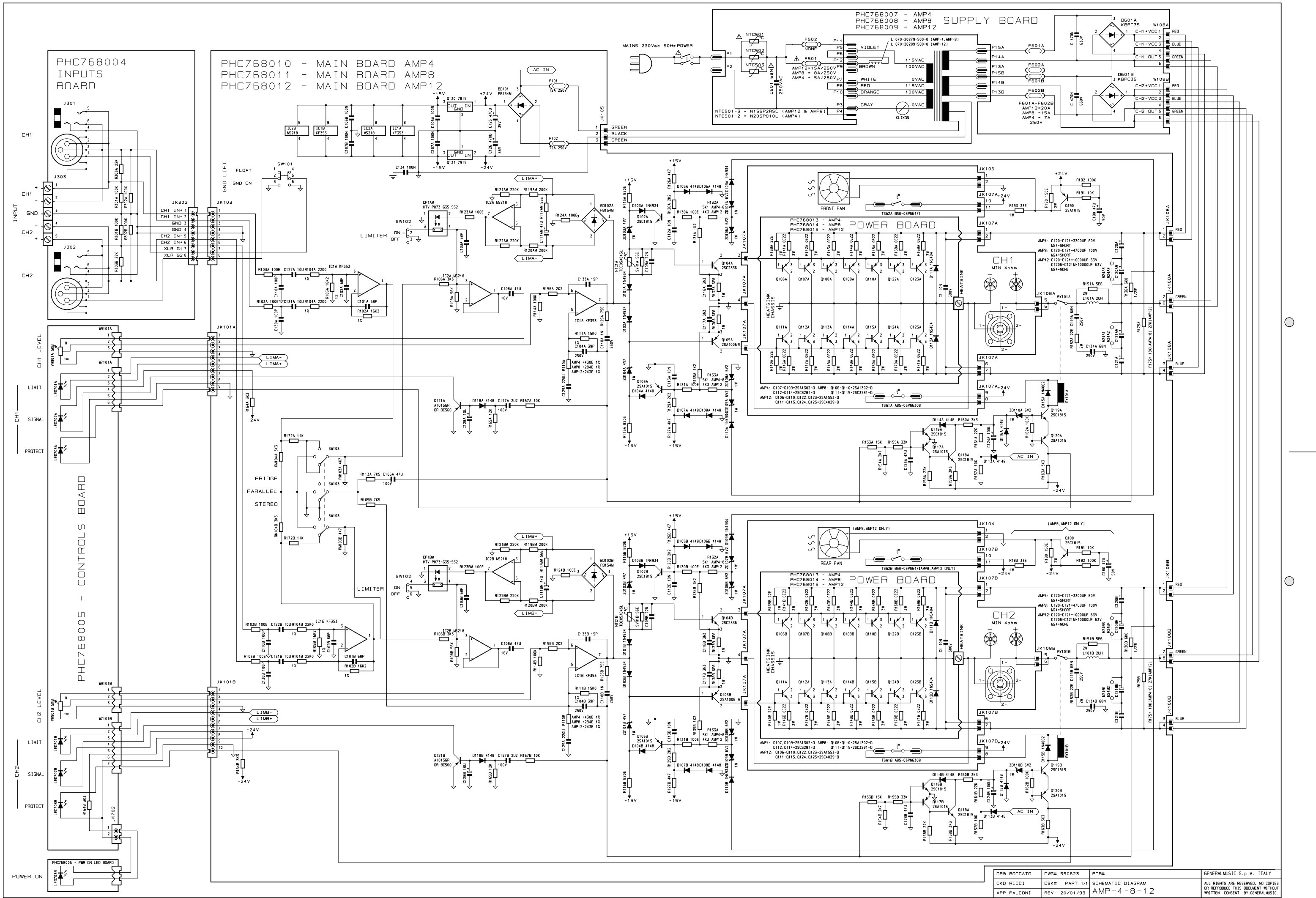
One asterisk = Second level, part of previous listed first level part.

Two asterisk = Third level, part of previous listed second level part.

Three asterisk =

Any request for not above mentioned part must encompass specific description including:

- 1) Model name,
- 2) Section name,
- 3) Module code,
- 4) Reference name,
- 5) Quantity number.



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