P1000 PROFESSIONAL POWER AMPLIFIER

SERVICE MANUAL

Schematic Diagrams

CODE : 277320

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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.

Schematic Notes

⚠ 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 1/8W unless otherwise specified.

- Soldering point.
- Male connector.
- Female connector.
- M/F faston connector.
- Test point.
- Flag joined with one or more flags with the same signal name inscribed.
- Supply voltage.
- Logic supply ground.
- Analog supply ground.
- Signal ground.
- Chassis ground.

ATTENTION
Observe precautions when handling electrostatic sensitive devices

TECHNICAL SPECIFICATIONS

Dimensions:	(WxHxD)	483x88x445mm (2U)
Weight:		16Kg
Power Requirements:	(230Vac±15% 50/60Hz)	1000VA
	(115Vac±15% 50/60Hz)	1000VA
Output Power:	(4Ω stereo/parallel)	2x 500Watts
	(8Ω stereo/parallel)	2x 350Watts
	(8Ω bridge)	1000Watts
	(16Ω bridge)	700Watts
Max. Undistorted Out:	(4Ω stereo/parallel)	126Vpp
	(8Ω stereo/parallel)	149Vpp
	(8Ω bridge)	250Vpp
Input Sensitivity:	(constant sensitivity)	0.775Vrms (0dB)
	(constant gain)	2.25Vrms (+9.2dB)
Input Impedance:	(balanced)	30KΩ
	(unbalanced)	15KΩ
Voltage Gain:	(constant sensitivity)	35±0.5dB
	(constant gain)	26±0.5dB
Slew Rate:		25V/µS
Damping Factor:	(4Ω stereo/parallel)	>400
	(8Ω stereo/parallel)	>800
Frequency Response	(-0.2dB)	20Hz÷20KHz
at Full Power:	(-3dB)	10Hz÷60KHz
IMD:	(SMPTE 60Hz/7KHz 4:1)	<0.1%
THD:	(THD+N)	<0.1%
S/N Ratio:	(unweighted)	>95dB
Crosstalk:	(1KHz)	>70dB

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, non-compliance may cause damages to oscilloscope inputs circuitry.
- Before removing or installing any modules and connectors, **disconnect the amplifier from AC MAINS** and measure the DC supply voltages across each of the power suppliy capacitors. If your measurement on any of the caps is greater than 10Vdc, connect a 100Ω 100W resistor across the applicable caps to discharge them for your safety. Remember to remove the discharge resistor immediately after discharging caps. **Do not power up the amplifier with the discharge resistor connected**.
- 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 coupled transistors TR6-TR11 (MJ15022/B) and TR16-TR22 (MJ15023/B) are factory selected on V_{BE} and $V_{BREAKDOWN}$ ($I_{ECO<}$-6.6mA at $V_{(BR)CEO}$=11V for NPN and I_{ECO}<6.6mA at $V_{(BR)CEO}$=-11V for PNP)
  The selection is marked by a red digit (from 0 to B) representative of V_{BE} forward voltage categories, these are subdivided in 12 steps of 30mV each.
  Only selected transistors must be used when replacing TR6-TR11 or TR16-TR22 and every coupled transistors must have the same digit.
- The power supply utilizes a dual bipolar DC rail configuration with low and high voltages; one positive and one negative low rail (+/-Vcc1) and one positive and one negative high rail (+/-Vcc2).

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 Instrument

- Audio Generator
- Dual Trace Oscilloscope
- Digital Multimeter
- 2Ω 2000W, 4Ω 1000W, 8Ω 1000W, 100Ω 100W resistors
- Variac
- Temperature Meter

Setup

- Connect the Variac between the PROTECTION board and the TF1 and TF2 transformers and set it at zero voltage.
- Set the amplifier in STEREO 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.
- Insert the temperature meter through the IC1 interstice located at centre of heatsink.
- The procedures that follow must be executed subsequently in the order specified.

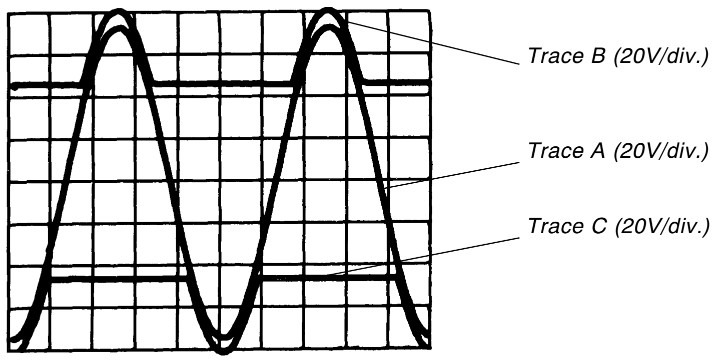
Supply Check

- Remove the transformer secondary fuses (located on FUSE board), set the Variac to the nominal mains voltage, check with the Multimeter the phase opposition between the secondaries of the two transformers (F1-F2,F3-F4), if not, verify the primary connections (T1÷T4 on Protections Board).
- Verify the AC supply voltages: F1-F2=72±2Vac F3-F4=128±3Vac.
- Re-set the Variac at zero voltage, turn off the amplifier and put the fuses back on its holders.
- Connect the oscilloscope probes CH1/2 to the channel outputs, set both to 20V/div. 200µS/div.
- Set up the Variac slowly monitoring the Outputs with the oscilloscope CH1/2 connected, it should display the sinusoidal input signal amplified with no distortions, if a distortion occur check the Driver and the Power Boards as suggested in the ADVICES section.
- If the protection trips, turn off the amplifier, wait some minutes and disconnect the supplies from the outputs modules (CN1 - CN2 - CN7 - CN8 on POWER boards), continue to check the supplies.
- **CAUTION: Before re-connecting the output modules to the supplies, you must have the capacitors discharged for your safety: connect a 100Ω 100W resistor across the caps and remove the resistor just after they are discharged.**
- Finally verify the DC supplies on Supply Board:
  CN6 (+Vcc2) =+89.5±2Vdc
  CN8 (+Vcc1) =+50±1.5Vdc
  CN7 (-Vcc1) =-50±1.5Vdc
  CN2 (-Vcc2) =-89.5±2Vdc
  on Protections Board:
  CN2 pin3 =+27±1Vdc
  CN3 pin3 =-27±1Vdc
  CN1 pin4-5-6 =+13.8±1Vdc
  CN1 pin1-2-3 =-13.8±1Vdc
- If one or more voltages don't correspond, check the rectifiers, capacitors and transformers disconnecting them from circuitry, refer to schematics.

Channels Check

- The channel A is facing the front and channel B the rear of the chassis.
- These procedures are intended for one channel at a time, repeat these operation for the other channel.
- Verify, with the Multimeter, the insulation between the heatsink and the transistors collectors.
- **SETUP:**
  Connect the CH1 scope GND clip to CN5 (GND terminal).
  Connect the CH1 probe tip to CN6 (AMP output).
  Connect the CH2 probe tip to D2 cathode on POWER board.
  Set the LEVEL potentiometers full clockwise.
  The load resistor is disconnected.
- **INITIAL TEST:**
  Increase slowly the Variac. The channel output signals must be symmetrical respect the GND without visible distortion and oscillation as shown in *Fig.1 Trace A*. If there is a distortion read the section ADVICES and proceed to check the other channel.
  Verify that, when the heatsink temperature is less 50°c, the cooling fan

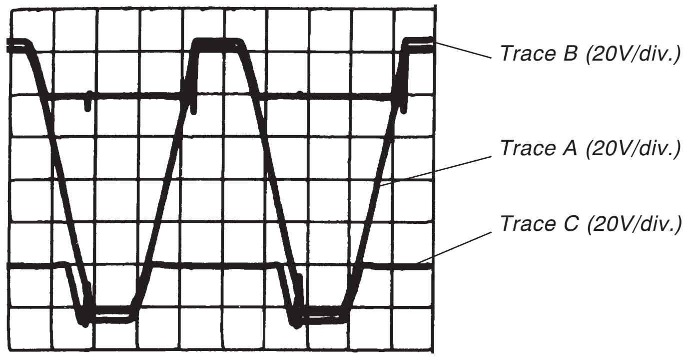
Fig. 1



voltage must be between 12 and 16V.

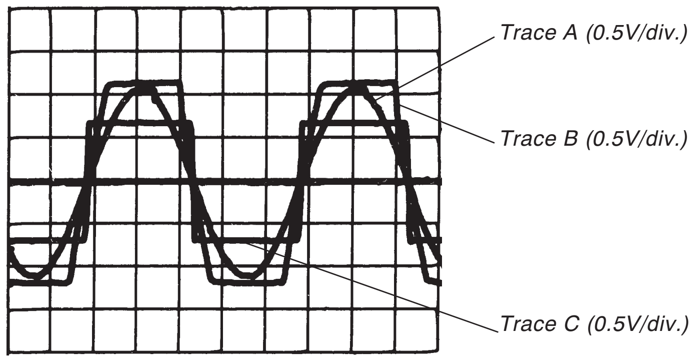
- **HIGH RAIL CHECK:**
  When the output signal (Positive half-wave) is less than 44Vp the voltage on D2 cathode must remain constant at 50V, when the output signal exceeds 44Vp the voltage must follow the output signal with 6V offset (see *Fig.1 Trace B*), to check the negative high rail connect the probe to D18 anode (see *Fig.1 Trace C*).
  Connect the 4Ω 1000W load on the output and repeat the INITIAL and HIGH RAIL checks.
  Check the signal clipping, it must occur at 130±5Vpp (see *Fig.2 Trace ABC*).

Fig. 2



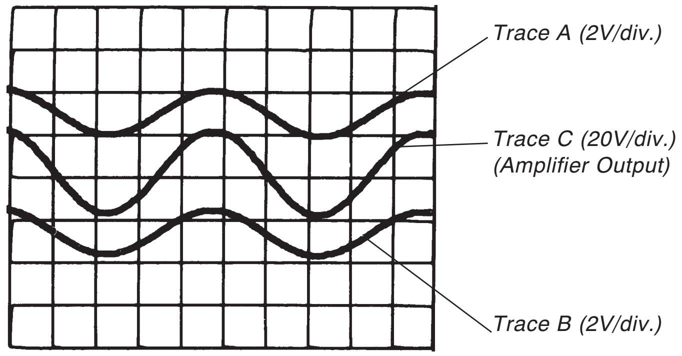
- **SIGNAL/CLIP SENSOR CHECK:**
  Set the LEVEL pot to minimum, set the scope timebase at 1V/div. 200µS/div., then increase the level and check the SIGNAL/CLIP led activity: it must turn on (green light) when the amplifier output is higher than 5Vpp. Set the scope at 50V/div. and increase the level, check the led: it must change from green to red colour when the amplifier output signal clip.
- **CURRENT AND SHORT CIRCUIT SENSOR CHECK:**
  Set the CH2 sensitivity to 0.5V/div., connect the scope CH1, GND clip at CN6 (AMP output) and the probe tip at CN5 (GND terminal), CH2 probe tip alternatively on TR6, TR11 (NPN) and TR16, TR22 (PNP) emitters.
  Set the generator to have approx. 1Vp on the emitters: their difference must be less than 10% one each other (see *Fig.3 Trace A*). The NPN or PNP transistors out of tolerance must be replaced with a new selected pair.
  Connect a 2Ω 2000W load. Connect the CH1 probe tip on TR16 emitter and the CH2 probe tip on TR11 emitter. Increase the input signal, the output current limiter must keep the emitter voltages (both half channel) at 1.2Vp approx. (see *Fig.3 Trace B*).
  Temporarily short the amplifier output: the current limiter must keep the emitter voltages (both half channel) at 0.7Vp (see *Fig.3 Trace C*).

Fig. 3



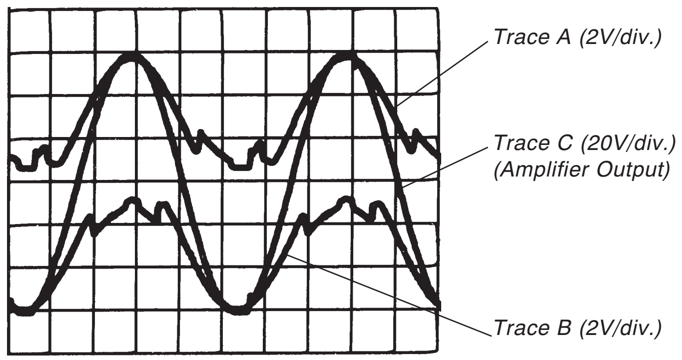
- **COOLING FAN & PROTECTION CHECK:**
  Short circuit pins 11 and 12 of OC1 on Driver board, the fan must run at max. speed (20÷23Vdc on its tips).
  Short circuit pins 9 and 10 of OC1 on the same board, the PROTECT led must turn on immediately, the fan must run at max. speed. The PROTECT led of the other channel must also turn on after 2 Sec. and the relay must disconnect the transformers from the mains.
  Remove the short circuit, after 3 Sec. both PROTECT leds must turn off and the relay must re-connect the transformers to the mains.
  Temporarily short the emitter and the collector of TR7 (Driver board) the PROTECT led must turn on and the relay must disconnect the transformers from the mains.
  Turn off the amplifier to reset it, wait a minute to let the supply caps discharged.
- **OFFSET SENSOR CHECK:**
  Set the Variac to zero voltage output, disconnect the amplifier load and the supply connection to the Power board (CN1,2,7,8), turn on the amplifier, connect temporarily (by means of a suitable conductor wire) CN6 to +15Vdc, the PROTECT led must turn on immediately; the fan must run at maximum speed).
  Reset the protection turning off the amplifier, turn it on again, connect temporarily (by means of a suitable conductor wire) CN6 to -15Vdc, the led PROTECT must turn on again.
- **SOA ADJUSTMENT:**
  Set the scope sensitivity at 5V/div. (both channels) and connect the CH1 probe on D12 cathode and the CH2 probe on D11 anode on Driver board, check the voltage across D12 and D11 zener diodes: it must be 14.8±0.1V; increasing 10dB the generator level this voltage does not decrease more than 0.5V.
  Connect the 4Ω 1000W load, set the scope sensitivity at 2V/div. and connect the CH1 probe tip at R43 side CN3 and the CH2 probe tip at R36 side CN2. Decrease the signal level until two sinusoid appear on the scope as shown in *Fig 4 Trace AB*.

Fig. 4



Their max. amplitude must be 5.5Vp (the outer) and 1.5Vp (the inner) as shown in *Fig 5 Trace A,B*; increasing a bit the generator signal, the inner sinusoid must produce spikes on its peaks as shown in *Fig 5 Trace A,B*.
Connect the 2Ω 1000W load, set the scope sensitivity at 1V/div. (both channels) and connect its probes to the collectors of TR8 (CH1) and TR11 (CH2) on Driver Board.

Fig. 5



Disconnect the fan; wait until the temperature is 90°C (require some minutes) then decrease the input to zero.
Adjust the trimmers R20 and R40, until the scope traces go respectively at -2.2Vdc and +2.3Vdc; turn on the cooling fan and wait until the temperature goes down to 80°C; then turn it off.
Reconnect the 4Ω 1000W load, adjust the level for the maximum displacement of the scope tracks toward the centre of the scope screen (-3dB approx.); the SOA control circuit (Protect led light on) will start at 90±2°C.
Reconnect the cooling fan and check with the Multimeter its supply voltage: it must be 20V or more (max speed).
At 70°C heatsink temperature, short circuit the amplifier output and check the scope traces: they must displace 1V toward the centre of the screen, respect to the previous position with 4Ω load.
Remove the short and decrease the input level to zero. The temperature will decrease: at 65..75°C the speed of the cooling fan must change from max to min speed. In case of a fan misbehaviour try to replace the D10 zener diode: if speed change at 75°C or more replace with a lower voltage zener diode, if speed change at 60°C or less replace with a higher voltage zener diode.

- **BIAS ADJUSTMENT:**
  Connect the Multimeter across R54 of Power board, when the heatsink temperature rises at 50°C, turn off the cooling fan and adjust R31 to read 2mV.
  Set the scope sensitivity at 1V/div.(CH1), and connect the GND clip to the amplifier GND (CN5) and the probe tip on the output (CN6). Adjust the generator level until the sinewave appears at full screen amplitude, No crossover distortion must be detectable: if necessary re-adjust R31. Re-connect the fan.
- **BANDWIDTH CHECK:**
  Sweep the generator frequency from 20Hz to 20KHz, the output level must have not detectable level changes.
- **SLEW RATE CHECK:**
  Set the scope sensitivity to 10V/div. 1mS/div. and set the generator to 1KHz square wave mode. Check the output square wave rising and falling edge slopes: both must be 12V/µS or more.
- Disconnect the Variac and re-connect the transformer primaries to the PROTECTIONS board (be careful to connect the two transformers out of phase).

Inputs Board Check

- These procedures are intended for one channel at a time, repeat these operations for the other channel.
- **SETUP:**
  Connect the CH1 probe to amplifier input of the channel under test and set both at 500mV/div. 200mS/div.
  Connect the CH2 probe to amplifier output of the channel under test and set it at 10mV/div. 200mS/div.
  Set the audio generator at 1KHz sinus. $775mV_{RMS}$ (0dB).
  Set the LEVEL potentiometers full clockwise.
  The load resistor is disconnected.
- **CMRR ADJUSTMENT**
  Temporarily disconnect pin 3 from pin 1and short the pin 2 (positive input) and pin 3 (negative input) of XLR input socket.
  Adjust the trimmer R10 (channel A) or R21 (channel B) to obtain the minimum output level.
- **GAIN ADJUSTMENT**
  Re-set the input signal at pin 2 (positive input) and pin 3 (negative input) short with pin 1 (GND) of XLR input socket
  Set CH2 scope at 500mV/div. and connect it to the output of INPUTS board (CN3 pin9 for channel A or CN3 pin7 for channel B).
  Set the input SENSITIVITY (SW1) at 2.25Vrms, adjust the trimmer R5

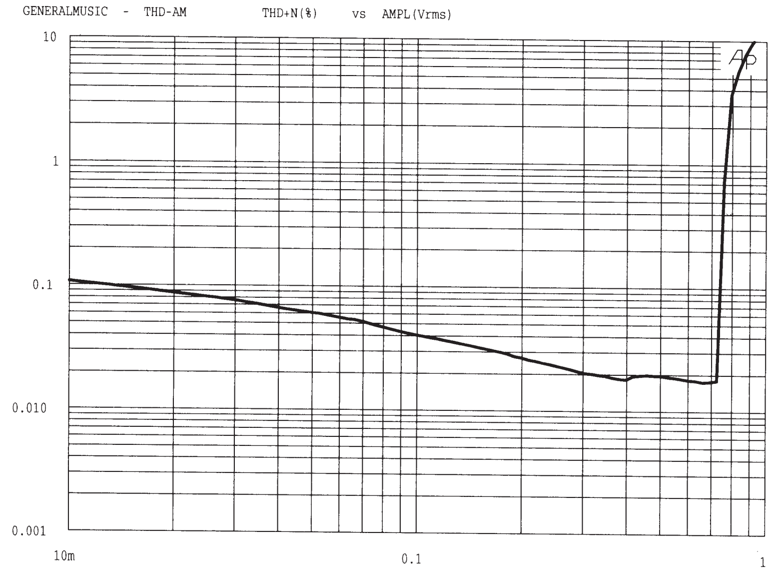
(channel. A) or R17 (channel B) to obtain the same amplitude of the scope signals.

- **AMPLIFIER GAIN CHECK**
  Set CH2 scope at 50V/div. and connect it to the amplifier output of the channel under test. By means of the SENSITIVITY switch check the output levels: at 775mV position the output voltage must be 63±1.5Vp and at 2.25V position must be 22.5±0.5Vp.
- **AMPLIFIER BRIDGE MODE CHECK**
  Set the amplifier in BRIDGE mode (input signal to channel A), connect the CH2 probe to the bridge output: the output voltage must be 124±3Vp.
- **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 1mV.

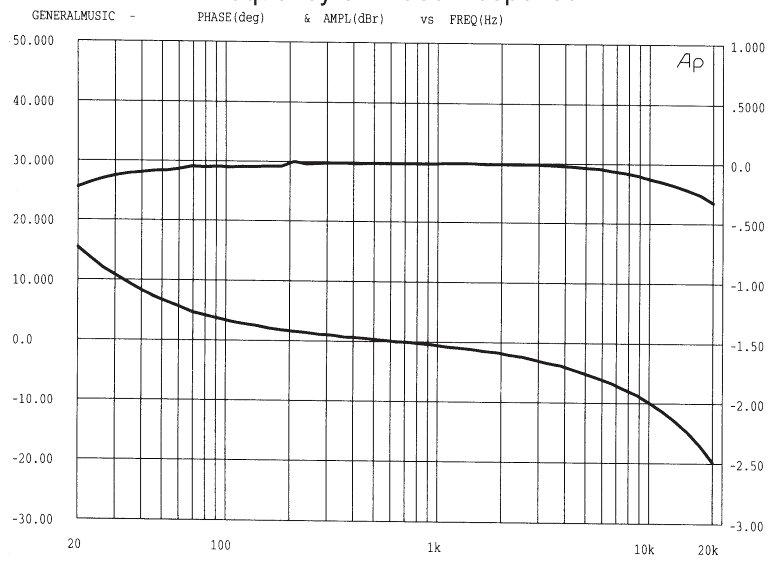
Advices

- Check the channels one at time to determine which is right (note: if you have a spare amplifier module that you know as right, use it).
- If the other channel doesn't work properly, you can replace the DRIVER and POWER board one a time, using those of the right channel, to isolate where is the damage.
- If you have determinate that the problem is a short on a rail, you must check the output transistors. To do this you must remove before the DRIVER board to access at the POWER board.
  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.
- 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 low rail.
  If the positive cycle appears distorted, you can assume that the problem is in the circuitry of the negative low rail.
- If the high rails appear distorted or are not modulating as shown in figure, then the problem probably exists somewhere in the circuitry of the respective (+ or -) defective high rail. Refer to the schematics.

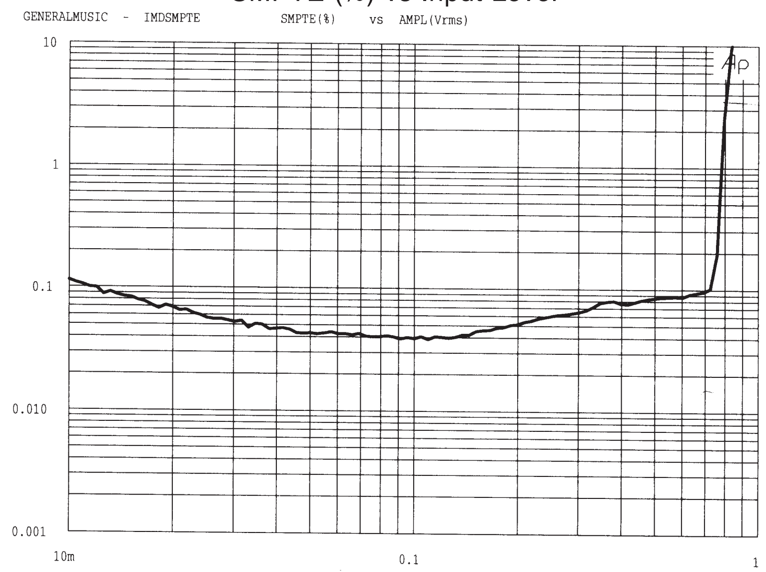
1KHz THD+N vs Input Level



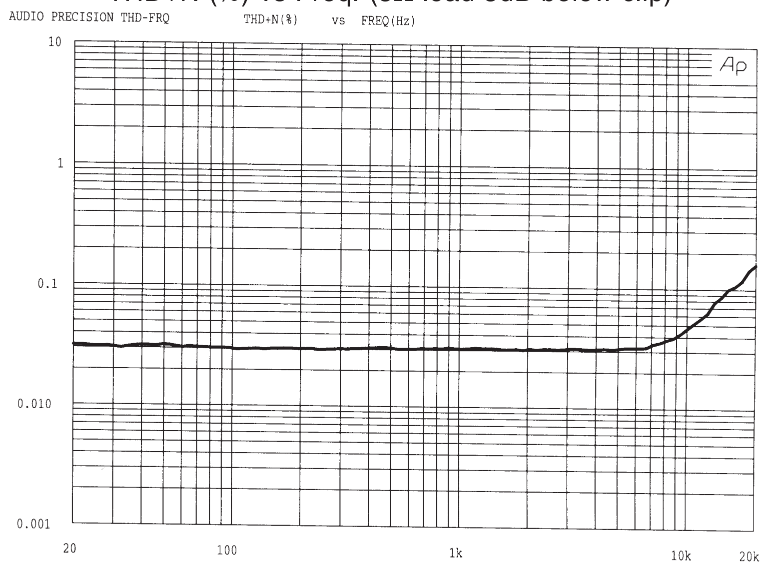
Frequency & Phase Response



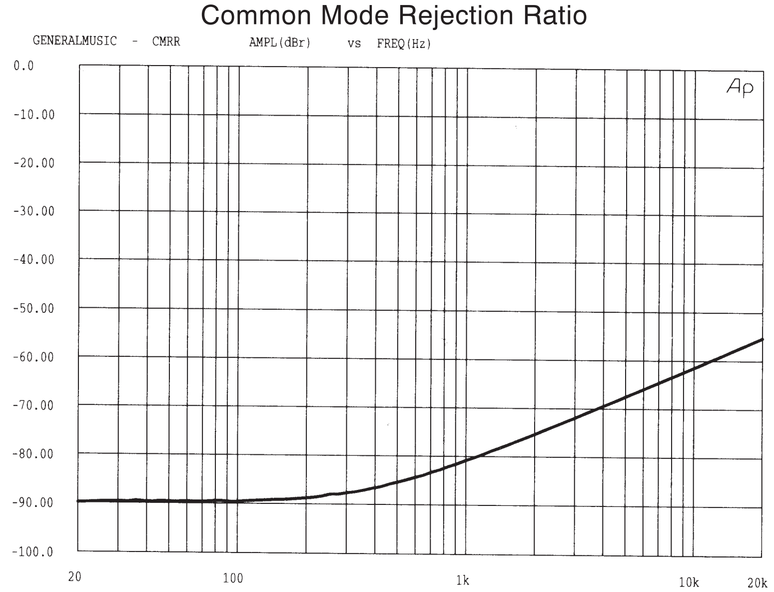
SMPTE (%) vs Input Level



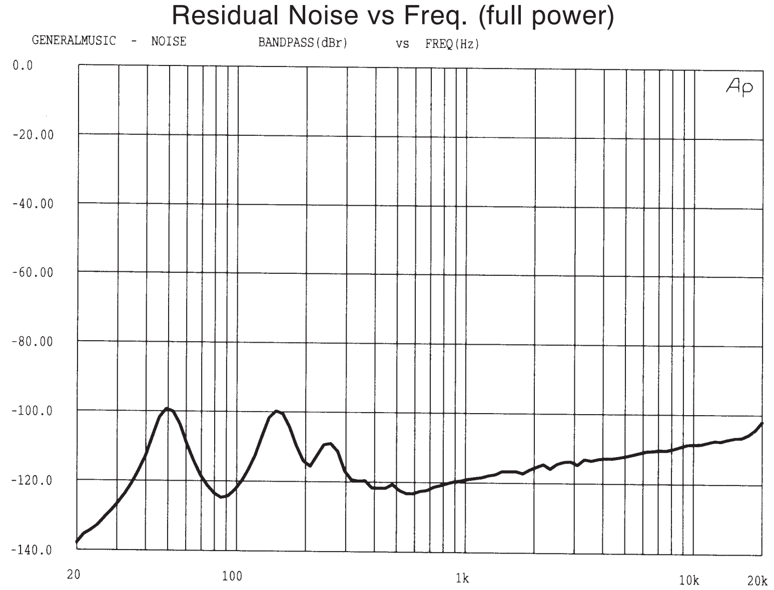
THD+N (%) vs Freq. (8Ω load 3dB below clip)

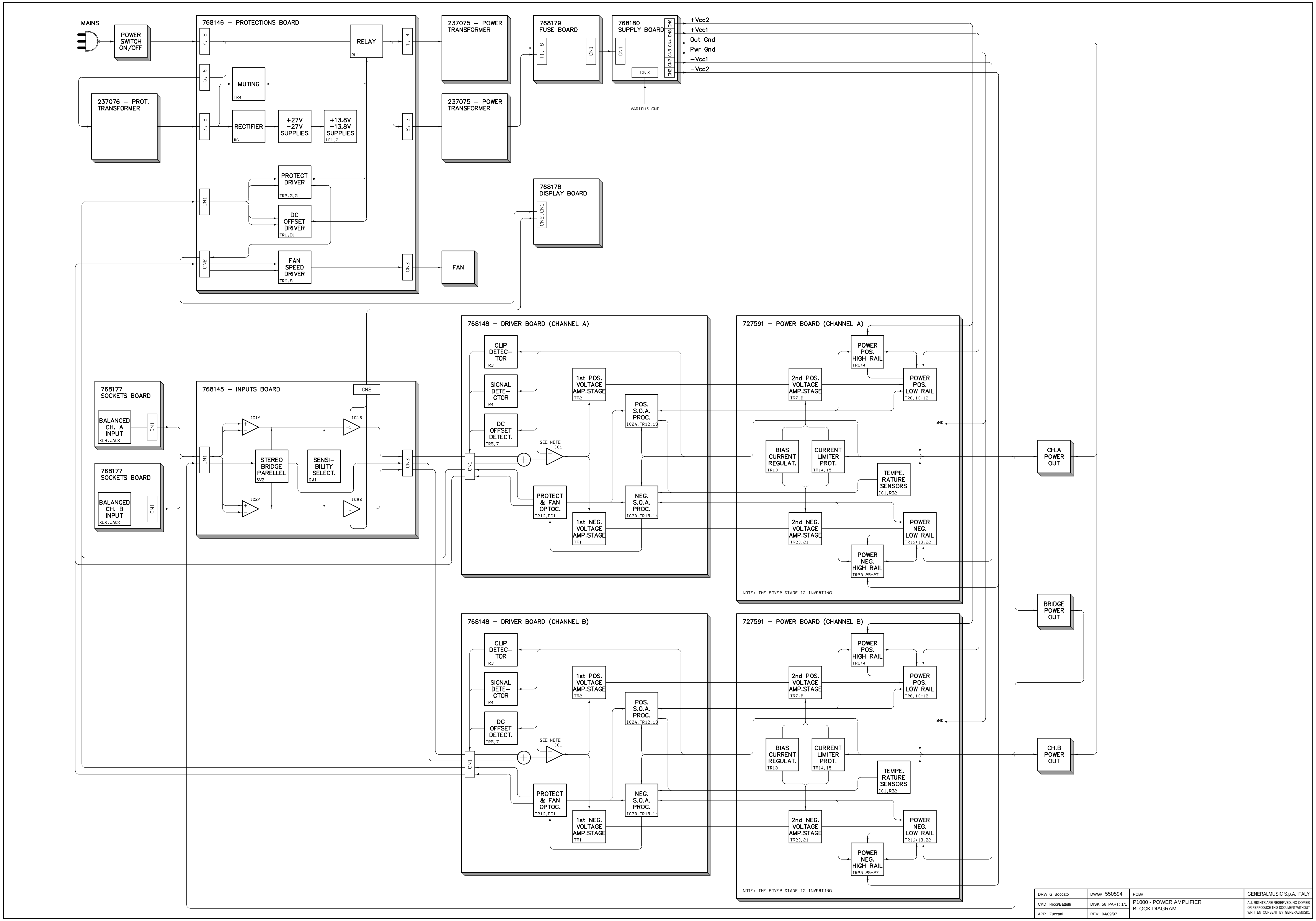


Common Mode Rejection Ratio

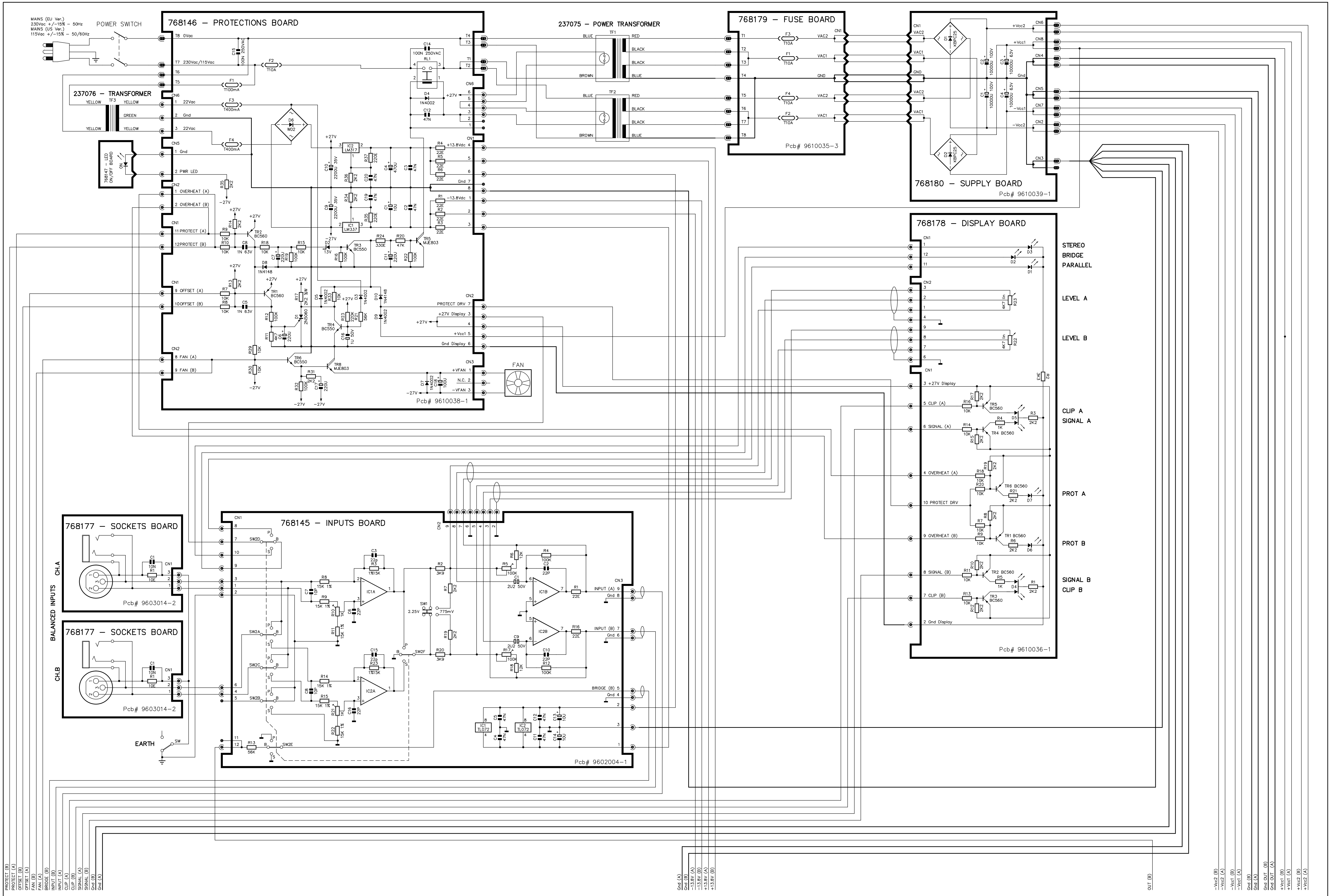


Residual Noise vs Freq. (full power)

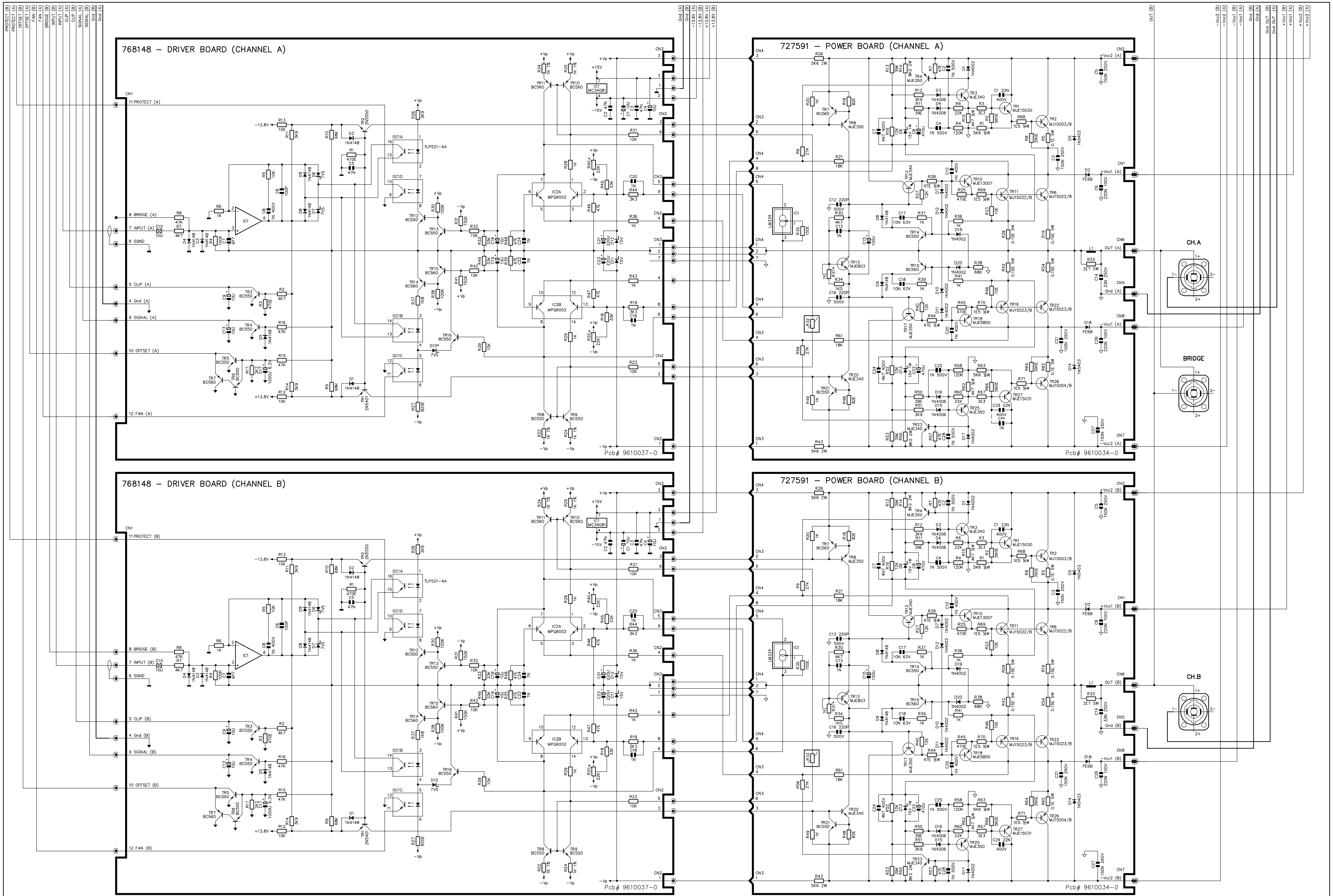




DRW G. Boccato	DWG# 550594	PCB#	GENERALMUSIC S.p.A. ITALY
CKD Ricci/Battelli	DISK: 56 PART: 1/1	P1000 - POWER AMPLIFIER BLOCK DIAGRAM	
APP. Zuccatti	REV: 04/09/97		



DRW BOCCATO	DWG# 550595	PCB# 9610038, 9610035, 9610036, 9602004	GENERALMUSIC S.p.A. ITALY
CKD RICCI/BATTELLI	DISK: 56 PART: 1/1	P1000 POWER AMPLIFIER PROTECTION, FUSE, SUPPLY, DISPLAY, SOCKETS & INPUTS BOARDS	
APP. ZUCCATTI	REV: 02/09/97		



* SEE "SOA ADJUSTMENT" FOR D10 VALUE.
** SOME BOARDS NEEDS THIS CAPACITOR TO PREVENT OSCILLATIONS ON THE SINUSOIDAL HALF WAVE WHEN STARTS HIGH RAIL SUPPLY.

DRW BOCCATO	DWG# 550596	PCB# 9610037 & 9610034	GENERALMUSIC S.p.A. ITALY
CKD RICCI/BATTELLI	DISK: 1 PART: 1/1	P1000 POWER AMPLIFIER CHANNEL A & B DRIVER AND POWER BOARD	
APP. ZUCCATTI	REV: 02/09/97		

Spare Part List

Code	Ref.		Description

Accessories

Code	Ref.		Description
277317			Owner's Manual P-Series

Assembly

Code	Ref.		Description
667335	MEAYA104		Rear Spacer
667648	MSSDDY02		Cover
667647	MSSDDX01		Chassis
667646	MSSEBA01		Front Panel
657232	HRDKBH51		Level Knob
237076	FIN27242		Transformer 230Vac 8W (EU)
237075	FIN27241		Power Transformer 230Vac 400W (EU)
177542	MEATA102		Handle
141200	CONJK351		Speakon Socket
130285			Mains Cable (EU)
110291	SWTPR141		Power Switch
778125	FIN27261		Cables Assembly

Inputs Assembly

Code	Ref.		Description
768177	**FIN27207**		**Sockets Board (Pcb# 9603014)**
140228	CONJK151		Stereo Jack Socket
	CONJK141		XLR Female Socket
768145	**FIN27201**		**Inputs Board (Pcb# 9602004)**
110293		*	2sw 2pos Slider Switch
110255		*	6sw 3pos Vertical Slider Switch
100061		*	TL072 Dual J-Fet Operational Amplifier (Replace BA-4560 For Service)
070245		*	100K 20% Vertical Linear Trimmer
070125		*	1K 20% Vertical Linear Trimmer
042625		*	15K0 1/4W 1% Metalized Film Resistor
030085		*	2u2 50V 20% Vert Electrolytic Bipolar Capacitor

Supply Assembly

Code	Ref.		Description
768179	**FIN27206**		**Fuse Board (Pcb# 9610035)**
110030		*	T10A Fuse 5x20mm (EU)
768180	**FIN27208**		**Supply Board (Pcb# 9610039)**
080607		*	KBPC25 25A 200V Rectifier Diode Bridge
030889		*	10000u 100V -10+50% V Electrolytic Capacitor FS
030891	CAPELJ81	*	10000u 63V -10+50% Vert Electrolytic Capacitor FS

Protections & Display Assemblies

Code	Ref.		Description
768147	**FIN27209**		**Led On/Off Board (Pcb# 9405022)**
768178	**FIN27202**		**Display Board (Pcb# 9610036)**
080742		*	Led 3mm Wide Diffused Red-Grn
080710		*	Led 3mm 60deg Diffused Yel
080705		*	Led 3mm 60deg Diffused Red
090194		*	BC560 TO92 LN Pnp Transistor
	RESVRD01	*	4K7 Linear 16mm Rotary Potentiometer
768146	**FIN27203**		**Protections Board (Pcb# 9610038)**
110308		*	Relay 24V / 1Switch no 20A 250V
110006		*	T100mA Fuse 5x20mm (EU)
110004		*	T400mA Fuse 5x20mm (EU)
100067		*	LM337 1.2-37V 1.5A Adjustable Regulator
100066		*	LM317 1.2-37V 1.5A Adjustable Regulator
090920		*	MJE802 TO126 Npn Darl Transistor
090194		*	BC560 TO92 LN Pnp Transistor
090183		*	BC550 TO92 LN Npn Transistor
080550		*	2N5060 30V 0.8A Scr Thyristor
080282		*	13V 1W 5% Zener Diode
080168		*	W02M 1.5A Rectifier Diodes Bridge
080156		*	1N4002 1A 100V Rectifier Diode
080103		*	1N4148 100mA 75V Signal Diode
020493		*	100n 250Vac MKP EMI Capacitor "Siemens"

Power Channels Assembly

Code	Ref.		Description
737089	**FIN27213**		**Dual Power Channels Assembly**
768148	**FIN27204**	*****	**Single Driver Board (Pcb#9610037)**
100937		**	MPQ6002 Quad Compl Pair Trans
100931		**	MC34081 Single J-Fet Operational Amplifier
100928		**	TLP521-4 Quad Optocoupler
090201		**	2N5401 TO92 Pnp Transistor
090200		**	2N5550 TO92 Npn Transistor
090194		**	BC560 TO92 LN Pnp Transistor
090183		**	BC550 TO92 LN Npn Transistor
080293		**	15V 1W 5% Zener Diode
080245		**	7V5 1W 5% Zener Diode
080103		**	1N4148 100mA 75V Signal Diode
070207		**	22K 20% Vertical Linear Trimmer
042485		**	1K00 1/4w 1% Metalized Film Resistor
030715		**	1000u 6v3 20% Vert Electrolytic Capacitor
030247		**	10u 25V 20% Vert Electrolytic Bipolar Capacitor
727590	**FIN27211**	*****	**Dual Power Assembly**
727591		**	Single Power Board (Pcb#9610034) (with heatsink)
768149		***	Single Power Board (Pcb#9610034) (without heatsink)
230557		****	1uh Hor Coil For Amplifier
140891		****	3 Contacts Hor Male Single-Strip
090917		****	MJE350 TO126 Pnp Transistor
090916		****	MJE340 TO126 Npn Transistor
090194		****	BC560 TO92 LN Pnp Transistor
090183		****	BC550 TO92 LN Npn Transistor
080293		****	15V 1W 5% Zener Diode
080171		****	FE6B 6A 100V Fast Recovery Diode
080167		****	1N5403 3A 300V Rectifier Diode
080158		****	1N4006 1A 800V Rectifier Diode
080156		****	1N4002 1A 100V Rectifier Diode
080103		****	1N4148 100mA 75V Signal Diode
070125		****	1K 20% Vertical Linear Trimmer
060591		****	8K2 2W 10% Resistor
060571		****	5K6 2W 10% Resistor
060174		****	2E7 5W 10% Wire Resistor
060034		****	0E15 5W 5% Wire Resistor
060033		****	0E1 5W 5% Wire Resistor
340752		***	TO3 Mica Washer
340750		***	TO126 Mica Washer
340079		***	TO220 Mica Washer
340078		***	TO220 Insulated Bush
140626		***	TO3 Socket
100925		***	LM334 Adjustable Current Source TO92
090920	SMCTRB21	***	MJE802 TO126 Npn Darl Transistor
090919	SMCTRA01	***	MJE15031 TO220 Pnp Transistor
090918	SMCTR991	***	MJE15030 TO220 Npn Transistor
090917	SMCTRA11	***	MJE350 TO126 Pnp Transistor
090916	SMCTR951	***	MJE340 TO126 Npn Transistor
090915	SMCTRB61	***	MJE5850 TO220 Pnp Transistor
090914	SMCTRB11	***	MJE13007 TO220 Npn Transistor
090911	SMCTR961	***	MJ15023B TO3 Pnp Transistor (Dual Factory Red Selection)
090908	SMCTR971	***	MJ15022B TO3 Npn Transistor (Dual Factory Red Selection)
090905	SMCTR571	***	MJ15004B TO3 Pnp Transistor
090902	SMCTR581	***	MJ15003B TO3 Npn Transistor
080818		***	PTC 70 P341-C100 Siemens
727589	**FIN27212**	*****	**Fan 24Vdc 80x25mm**

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.