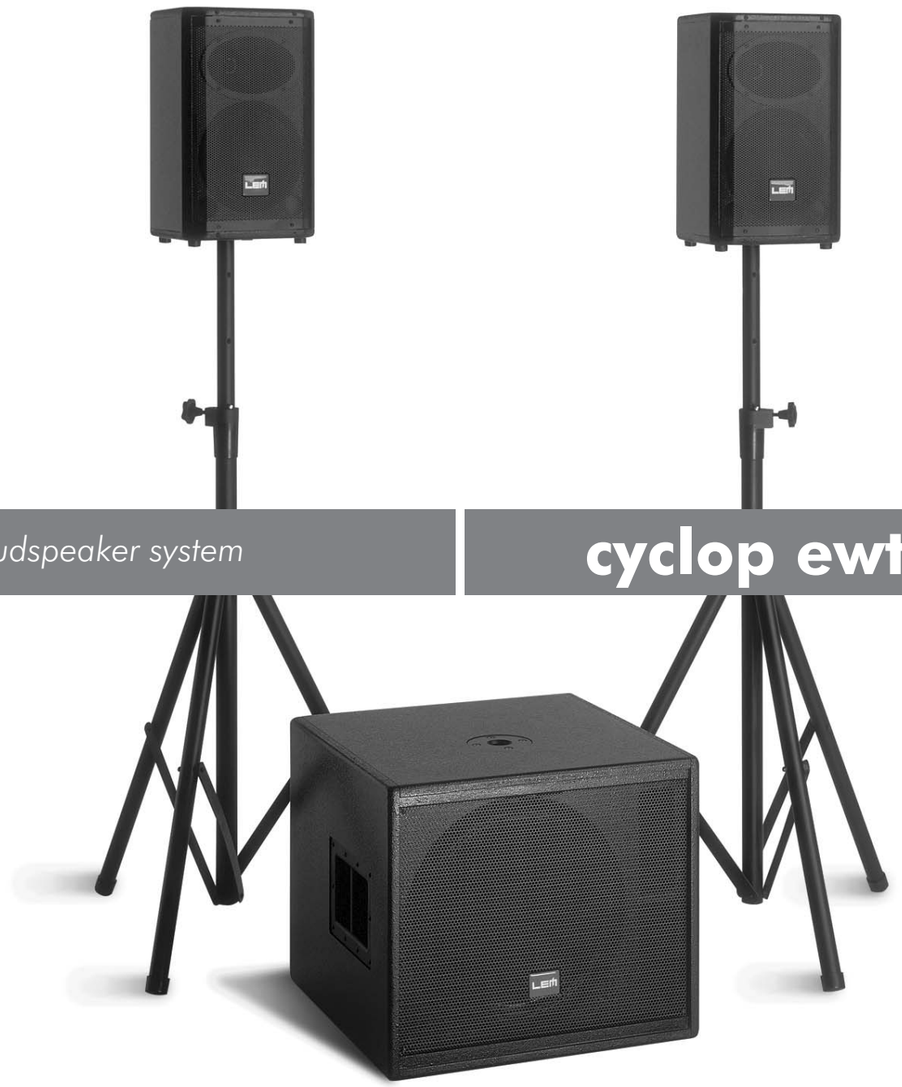
PROFESSIONAL SOUND



active loudspeaker system

cyclop ewt

service manual
schematic diagrams

Index

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 1/8W unless otherwise specified.

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

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

ATTENTION Observe precautions when handling electrostatic sensitive devices.

CODE: 270310

GENERALMUSIC

GENERALMUSIC S.p.A. Sales Division: 47842 S.Giovanni in Marignano (RN) ITALY - Via delle Rose, 12

Phone +39(0)541/959511 - Fax +39(0)541/957404 - Internet: www.generalmusic.com

CYCLOP EWT Technical Data

loudspeaker models		CYCLOP SAT	CYCLOP SUB
components	High	1" Compression driver on EWT horn	-
	Low	8" mid-woofer	15" woofer
power handling (EIA RS-426A)	W continuous W peak	150 300	300 600
impedance	Ohms	8	-
passive crossover	Hz	3500 @ 12-18dB/oct.	-
connections	-	1 x SPEAKON	-
constructions	-	MDF with black scratch-resistant paint - Protection metal grid	
dimensions	mm (WxHxD)	274x430x242	546x476x545
weight	kg	10	41.5

amplifier specifications			
power output EIA (1kHz, max THD 1%)	W	2 x 150	300
input sensitivity	dB (V)	+4dB (1.23V)	
input impedance	kohms	30 (balanced) - 15 (unbalanced)	
active crossover	Hz	-	180 @ 24dB/oct.
distortion	%	<0.02 (THD+Noise)	
controls	-	Power output volume (SAT) - Shield ON/OFF	
connections	-	2 x JACK + 2 x XLR-F (signal input) - 2 x SPEAKON (power output)	
power supply	-	See label on apparatus	

system specification		
MAX SPL continuous	dB	120
frequency response	Hz (-10dB)	40 - 20k
dispersion (OxV)	°	90 x 60

TEST PROCEDURES & ADJUSTMENTS

These procedure are relative to all system amplifiers inside the Sub woofer cabinet.

General 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 supply capacitors.
• If your measurement on any of the caps is greater than 10Vdc, connect a 100W 30W 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 amplified speaker.
• Do not check the amplifier with the speakers connected use the appropriate load resistors only.
• BE CAREFUL increasing the Variac you must not exceed the nominal mains voltage plus its tolerance (see specifications) any upper voltage can be cause of damage.

Remarks

• The internal LOW speaker is connected to two amplifiers working in bridge configuration.
• The MID-HIGH speakers (POWER OUTPUT sockets) are connected to two separate amplifiers.

Visual Check

• Check the speakers for any damaging (cone-breaking, interruption or further).
• 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
• Oscilloscope
• Digital Multimeter
• Temperature Meter
• 4Ω 150W, 8Ω 300W, 100Ω 30W resistors
• Variac (0÷250Vac)

TECHNICAL SPECIFICATIONS

Power Requirements:	(230Vac±10% 50Hz)	690VA
or	(115Vac±10% 50/60Hz)	690VA
Max Low Out Power*:	(8Ω)	300W
Max High Out Power*:	(4Ω)	150W
Low Limited Out*:	(8Ω)	140Vpp
High Limited Out*:	(4Ω)	76Vpp
Frequency Response	(LOW amplifier+speaker)	25Hz÷180Hz
	(MID-HIGH amp+speaker)	180Hz÷20kHz
Frequency X-Over	(Low/Mid-High)	180Hz
Line In Sensitivity:	(+4dBu)	1.229VRMS
Input Impedance:	(balanced)	30KΩ
	(unbalanced)	15KΩ
Voltage Gain:	(average)	30±1dB
IMD:	(SMPTE 60Hz/7KHz 4:1)	<0.1%
THD:	(THD+N)	<0.1%
S/N Ratio:	(unweighted)	>100dB

* Note: measured with the IHF standard method and just before the limiters became operative.

Setup

• Connect the Variac between the mains and the amplifier and set it at zero voltage.
• Disconnect all the speakers.
• Turn full clockwise all the VOLUME potentiometers.
• Connect the audio generator to each channel input and set it to 100Hz 775mVRMS (0dBu) sinusoidal signal.
• Connect the oscilloscope probe to the LOW OUT, clip to - and tip to + before RL2, set it to 20V/div. 2mS/div.
• The load resistor is disconnected.
• The procedures that follow must be executed subsequently in the order specified.

Supply Check

• Verify with the Multimeter the insulation between the heatsink and all transistor collectors (TR49,47,48,50,32,51,28,17,29,12,5,13).
• Verify with the Multimeter the PTC resistor value, it must be between 50Ω and 200Ω.
• Remove the transformer secondary fuses, set the Variac to the nominal mains voltage, check with the Multimeter the AC supply voltages:
F1-F2=70±2Vac.
• Re-set the Variac at zero voltage, turn off the amplifier and put the fuses back on its holders.
• Set up the Variac slowly monitoring the oscilloscope screen, it should display the input signal amplified with distortion but without any DC voltage; starts from half of nominal mains voltage it should display the sinusoidal signal amplified without distortions, if a distortion occur or the protection trips check the amplifier as suggested in the ADVICES section; if a protection trips without any reason, also check the two MID-HIGH amplifiers connecting the oscilloscope probe to the respective output before the relay (tip at + clip at -).
• During the previous check the fan must run at its lower speed (15Vdc) till the input signal reaches about -3dBu.
• When the Variac ac voltage reaches the nominal voltage verify the DC supplies as follow:

TR49 collector pin 2 (+Vcc)	=+49±2Vdc
TR51 collector pin 2 (-Vcc)	=-49±2Vdc
IC2 pin 2	=+17±1Vdc
IC1 pin 3	=-17±1Vdc

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

LOW AMPLIFIER Check

• Increase the input signal, the channel output signal must be symmetrical without visible distortion and oscillation as shown in Fig.1 (note: the figure is representative don't refer to its level). If there is a distortion read the section ADVICES.
• During the test when the amplifier output reaches about 30Vp the fan turns at its maximum speed (24Vdc).
• When the input signal reaches about +6dBu (1.55VRMS) the amplifier output reaches its maximum output at about 90Vp (70Vp with load attached), increasing the input at +10dB the output signal must remain at the same level.
• Connect the 8Ω 300W load on the output and repeat the check.
• BIAS ADJUSTMENT:
Set the generator level at zero, connect the Multimeter across the R5 resistor, then adjust VR2 trimmer to read 2±0.5mVdc.
Verify the same voltage across R52.
Connect the Multimeter across the R141 resistor, then adjust VR4 trimmer to read 2±0.5mVdc.
Verify the same voltage across R142.

MID-HIGH AMPLIFIERS Check and Level Adjustments

• Set the generator to 1KHz 775mVRMS (0dBu) sinusoidal signal.
• Move the oscilloscope probe tip on LEFT/RIGHT OUTPUT, clip to - and tip to + before RL1, set them to 10V/div. 200µS/div.
• The channel output signal must be symmetrical without visible distortion and oscillation as shown in Fig.2. If there is a distortion read the section ADVICES.
• Adjust VR3/VR4 for Left/Right channels, the trimmers are located on INPUTS BOARD, to obtain an output level of 22Vp.
• During the test when the amplifier output reaches about 15Vp the fan turns at its maximum speed (24Vdc).
• When the input signal reaches about +5dBu (1.38VRMS) the amplifier output reaches its maximum at about 44Vp (38Vp with load attached), increasing the input at +10dB the output signal must remain at the same level.
• Connect the 4Ω 150W load on each output and repeat the check without re-adjust VR3 and VR4.
• BIAS ADJUSTMENT (LEFT/RIGHT):
Set the generator level at zero, connect the Multimeter across the R4 resistor, then adjust VR1 trimmer to read 2±0.5mVdc.
Verify the same voltage across R22.
Set the generator level at zero, connect the Multimeter across the R113 resistor, then adjust VR3 trimmer to read 2±0.5mVdc.
Verify the same voltage across R94.

BANDWIDTH Check

• As a reference we report the x-over curve (Fig.3) obtained with the generator level at -10dBu (0,245VRMS), check it if necessary.

TEMPERATURE PROTECTION Check

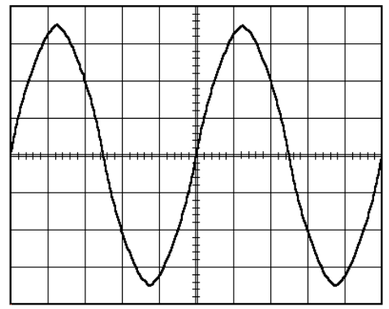
• Placing a welder tip close to a PTC (R13 and R14) the fan must turn to the maximum speed and the relais disconnect the loads.

Advices

• 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 low rail. Refer to the schematics.
• If you have determinate that the problem is a short on a supply 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.

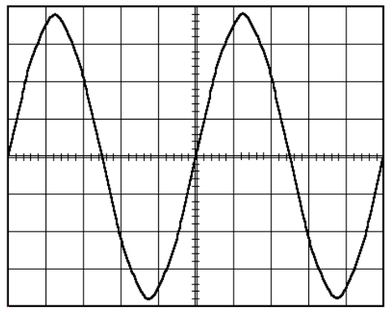
Figures

FIG 1



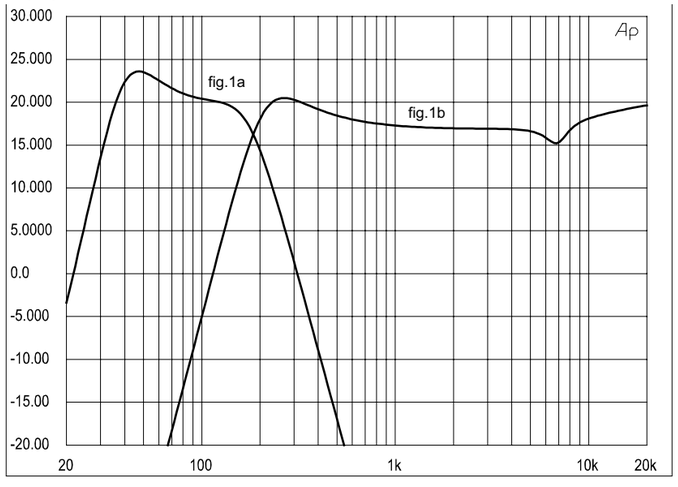
TRACE setting.
TIMEBASE. 2mS/div.
AMPLITUDE: 20V/div

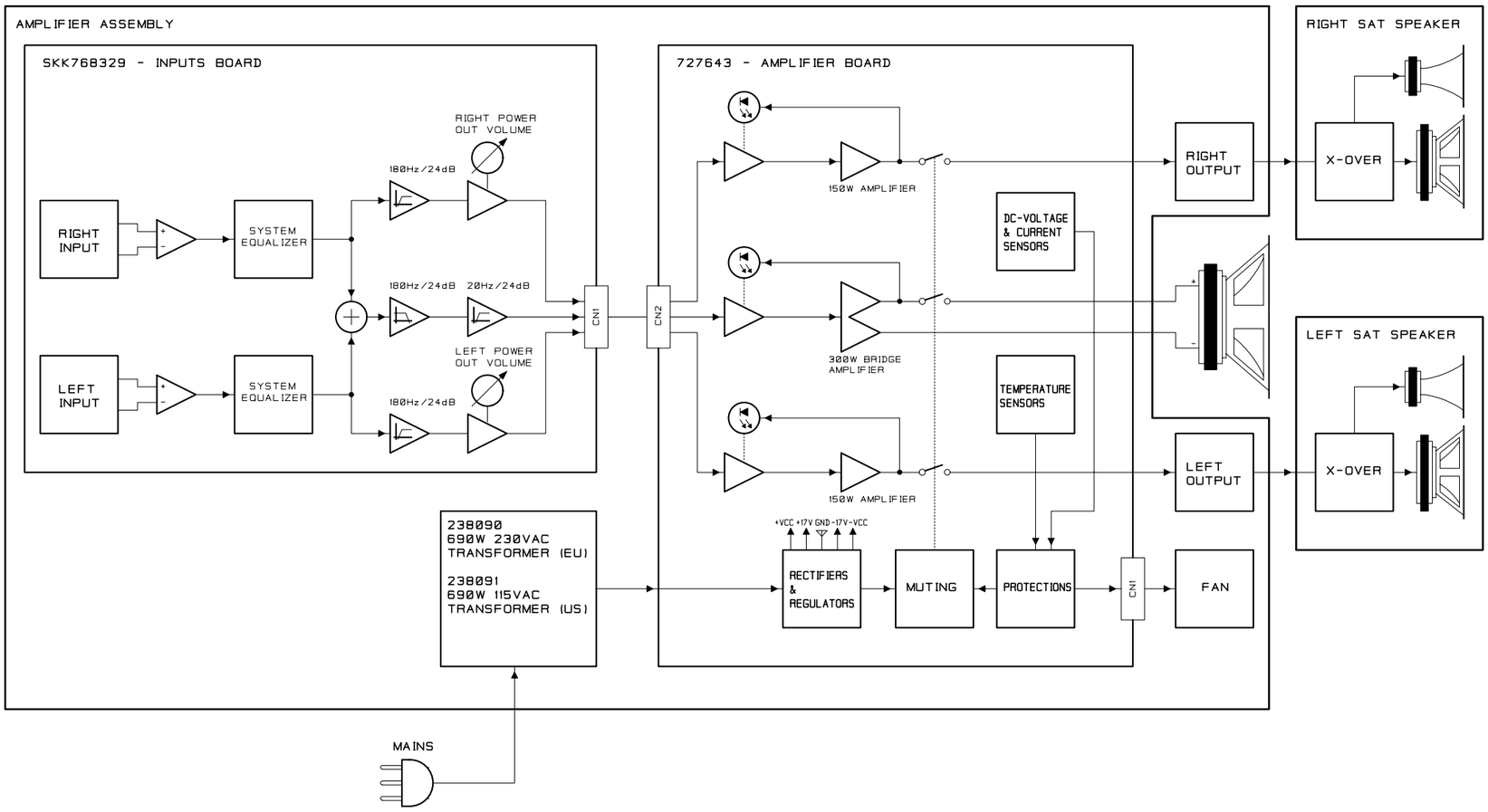
FIG 2



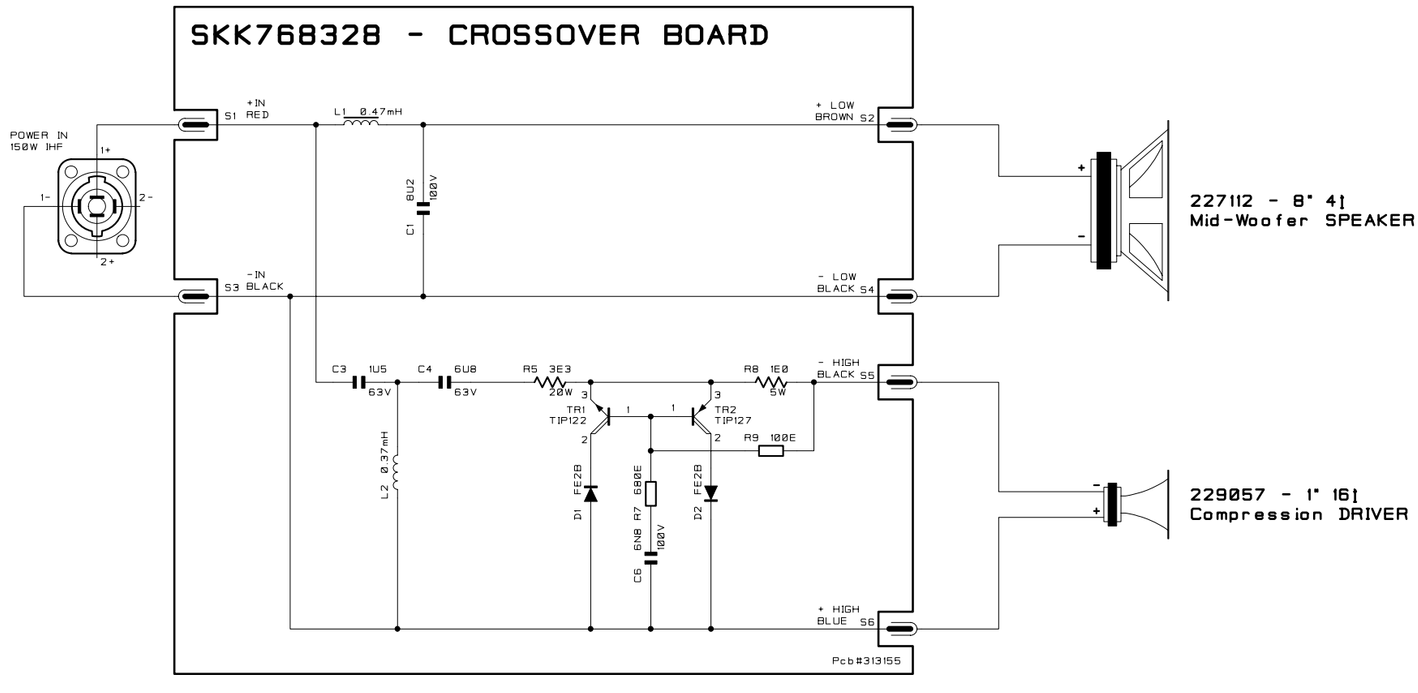
TRACE setting.
TIMEBASE. 200uS/div.
AMPLITUDE 10V/div

FIG. 3



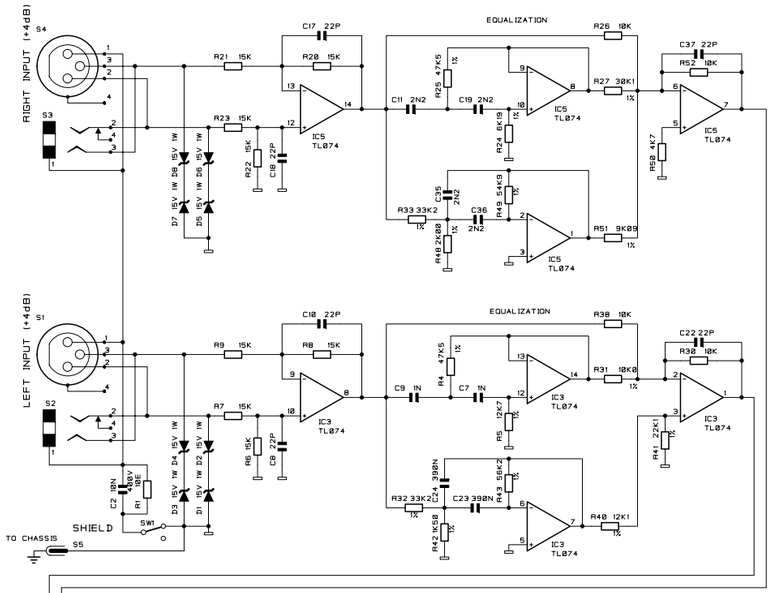


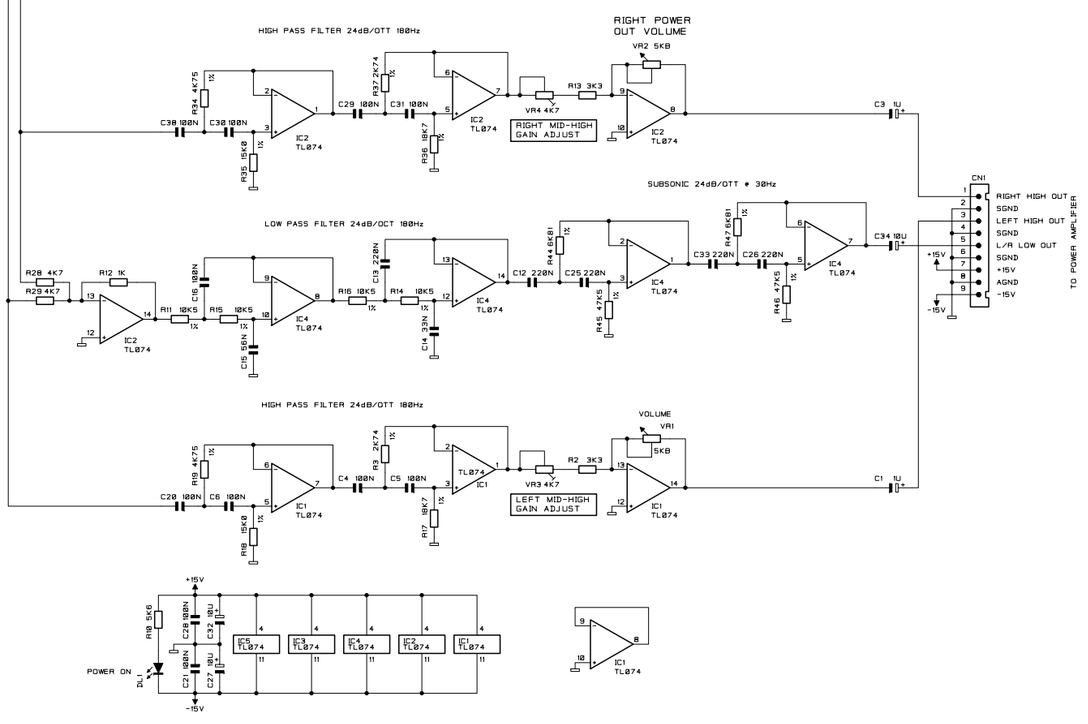
DRW G.BOCCATO	DWG# 550823	PCB#	GENERALMUSIC S.p.A. ITALY
CKD G.RICCI	DATE July 18, 05	SCHEMATIC DIAGRAM	
APP. G.RICCI	REV: A	BLOCK DIAGRAM	



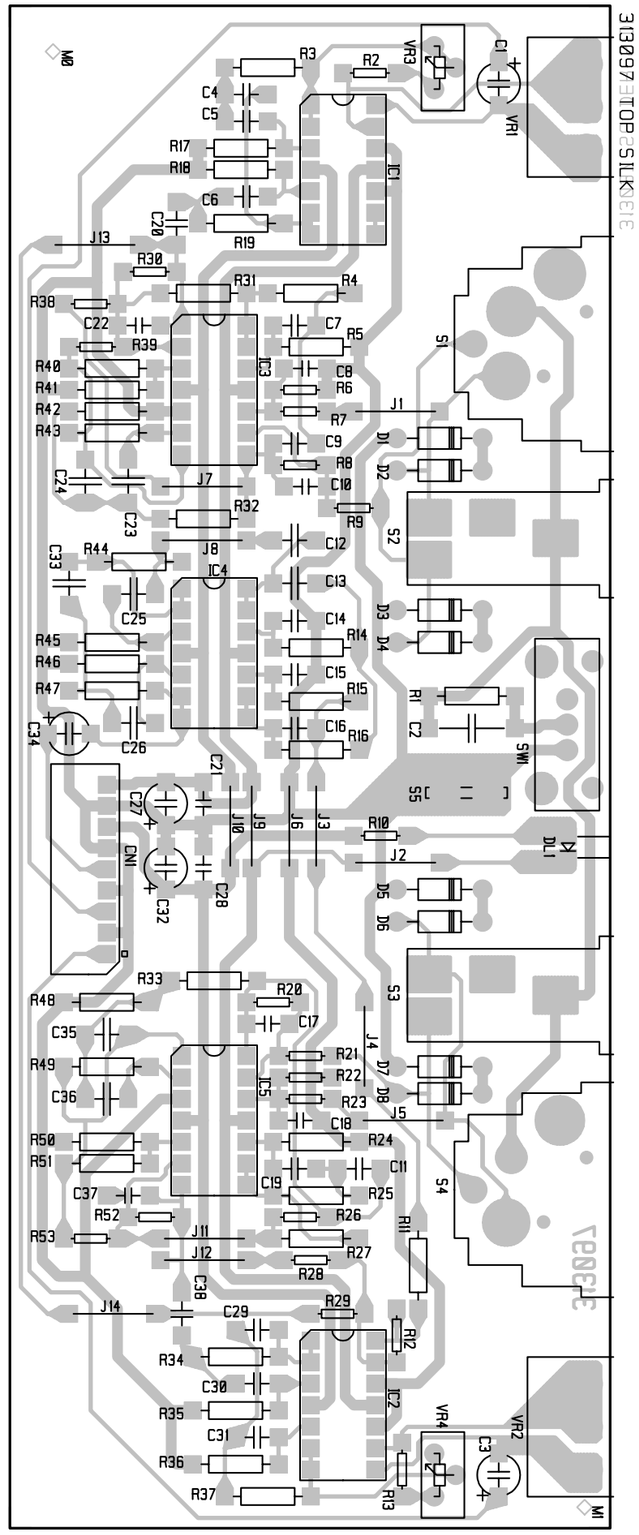
DRW G. RICCI	DWG# 550824	PCB# 313155	GENERALMUSIC S.p.A. ITALY
CKD F. GATTO	DATE Aug.10 '04	SCHEMATIC DIAGRAM	
APP. N. ZAVATTA	REV: A	CYCLOP EWT CROSSOVER BOARD	

SKK768329 - INPUT BOARD





DRW G.RICCI	DWG# 550825	PCB# 313097	GENERALMUSIC S.p.A. ITALY
CKD G.BOCCATO	DATE July 18, 05	SCHEMATIC DIAGRAM CYCLOP EWT SUB	ALL RIGHTS ARE RESERVED. NO COPIES OR REPRODUCE THIS DOCUMENT WITHOUT WRITTEN CONSENT BY GENERALMUSIC.
APP. N.ZAVATTA	REV: A	INPUT BOARD	



DRW: G.DINI	DWG: VARIOUS	PCB Layouts: CYCLOP EWT	ALL RIGHTS ARE RESERVED, NO COPIES OR REPRODUCE THIS DOCUMENT WITHOUT WRITTEN CONSENT BY GENERALMUSIC
CKD: G.RICCI	DATE: 31-08-05	Input Board	
APP: N.ZAVATTA	REV: A		

727643 - AMPLIFIER BOARD

LF AMPLIFIER

MF AMPLIFIER

HF AMPLIFIER

22T083 - 15" 8Ω WOOFER SPEAKER

TO LEFT SATELLITE

TO RIGHT SATELLITE

FAN

PTC SENSORS

INPUTS & SUPPLIES FROM INPUT BOARD CN1

CN2
1 R HIGH OUT
2 SGND
3 L HIGH OUT
4 SGND
5 LR LOW OUT
6 SGND
7 +17V
8 AGND
9 -17V

MAINS
230Vac +/-10% 50/60Hz (EU)
115Vac +/-10% 50/60Hz (US)
CABLE
INLET
POWER ON/OFF
238098 - 698W 230VAC TRANSFORMER (EU)
238091 - 698W 115VAC TRANSFORMER (US)
35VAC RED
0VAC BLK
35VAC RED
T°118°c
F1 T16A
F2 T16A
D01 KBPC25

TRANSISTOR PACKAGES

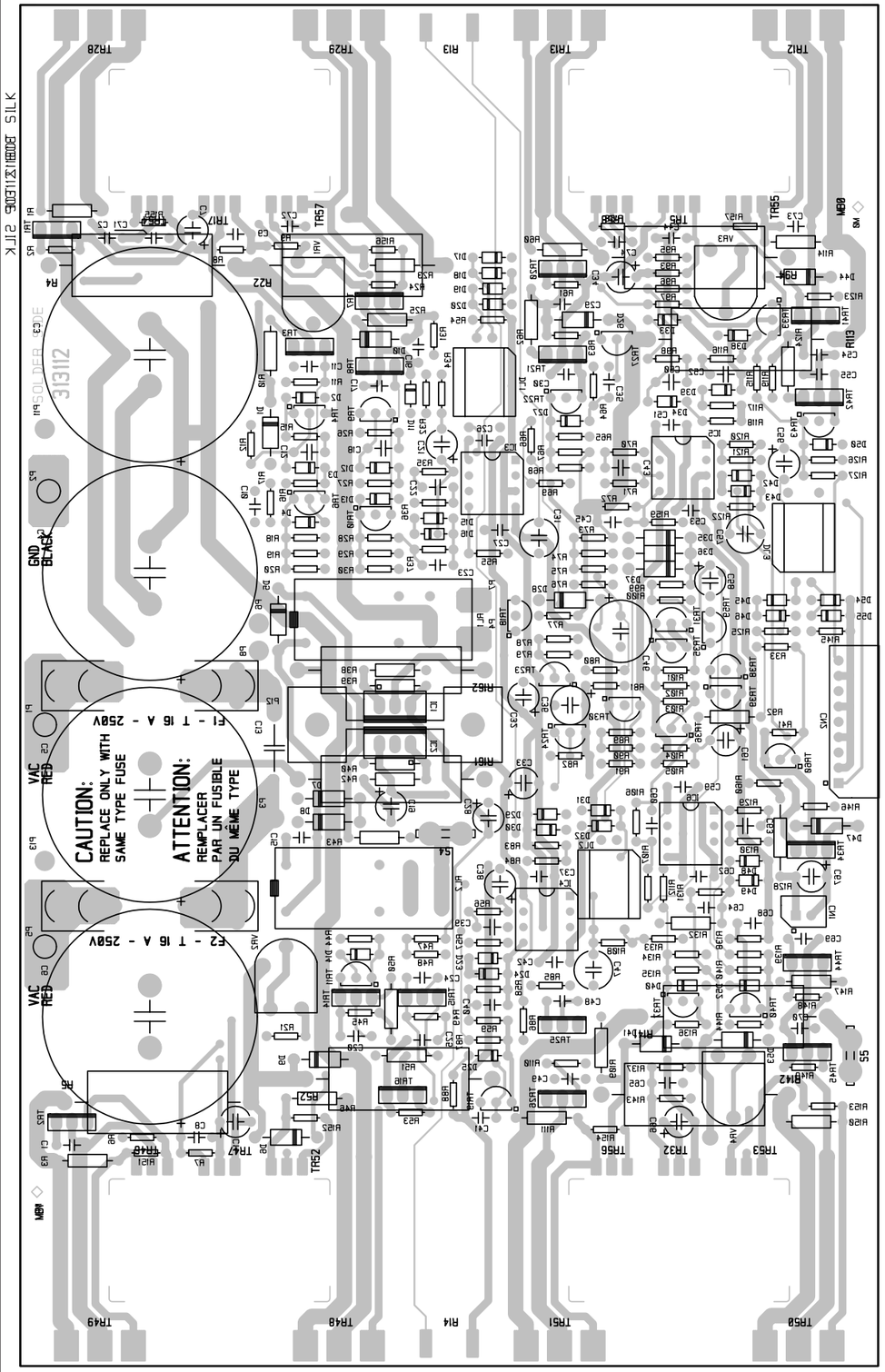
TO92 TO126 TO220 TO264

BOTTOM ---- FRONT VIEWS

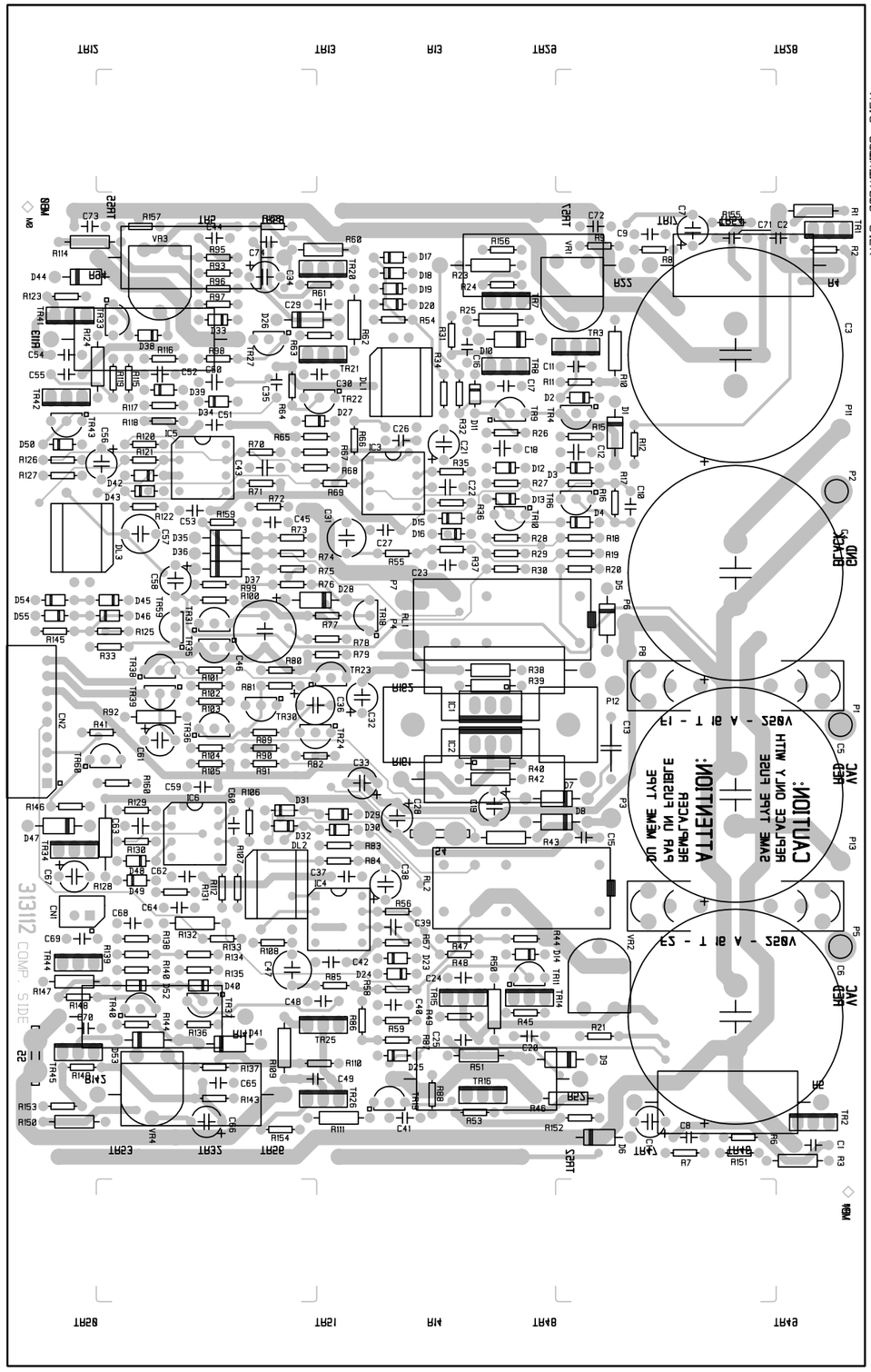
NOTE: ALL DC VOLTAGES ENCLOSED INTO SQUARES ARE MEASURED IN STEADY STATE WITHOUT INPUT SIGNAL AT 25°C AND NOMINAL MAINS VOLTAGE SUPPLY.

DRW G.RICCI	DWG# 550826	PCB# 313112	GENERALMUSIC S.p.A. ITALY
CKD G.BOCCATO	DATE July 19 '25	SCHEMATIC DIAGRAM	ALL RIGHTS ARE RESERVED. NO COPIES OR REPRODUCE THIS DOCUMENT WITHOUT WRITTEN CONSENT BY GENERALMUSIC.
APP. N.ZAVATTA	REV: A	AMPLIFIER BOARD	

727643 - Amplifier Board PCB Layout (mirrored bottom side)



727643 - Amplifier Board PCB Layout (top side)



DRW: G.DINI	DWG: VARIOUS	PCB Layouts: CYCLOP EWT	
CKD: G.RICCI	DATE: 31-08-05	Amplifier Board	
APP: N.ZAVATTA	REV: A		

GENERALMUSIC

Spare Part List

Legend

EU	= Europe version 230Vac
US	= United States version 115Vac
Code	Description

Accessories

277417	Cyclop Ewt Sat Owner's Manual (Ita-Eng)
277416	Cyclop Ewt Sub-System Owner's Manual (Ita-Eng)

CYCLOP EWT SAT 4 OHM

Cabinet Assembly

SKK768328		**Crossover Board (Pcb#313155)**
		(the service is made only by replacement of the entire board)
841392		30cm Brown/Black 0.75mm² Faston/Faston Dual Wire
841375		30cm Blue/Black 0.75mm² Faston/Faston Dual Wire
727662		Horn Assembly
347424	*	Horn / Driver Adapter
347407	*	EWT Gray Elliptical Horn
229056	*	1" 16ohm Compression Driver
229057	**	**1" 16ohm Diaphgram for 229056 Compression Driver**
210267	*	Gasket between Horn and Box
120346	*	WL4x20tc Black Screw
120106	*	M5x10tsp Black Screw
727657		Input Panel Assembly
778165	*	Single Speakon Cables Assembly
141200	**	Speakon Socket (NL4MP Neutrik)
717121		Speaker Cabinet Assembly
430127	*	Wooden Cabinet
347420	*	Rubber Foot
347396	*	Belt Handle
323005	*	8x2.5mm Bumpon Rubber (Insertion hole=3.5x6.5)
177325	*	Suspension Flange
120666	*	M8 4-tips Lock Nut
120661	*	M4 4-tips Lock Nut
120359	*	WL5x30ts Black Screw
120336	*	WL4x25tt Black Screw
120141	*	M8x30tsp Black Screw
120102	*	M4x30tsp Black Screw
667745		Speaker Grid
227112		**8" 4ohm Mid-Woofer Speaker**
210217		Black Sealer (specify mt)
210215		Adhesive Rubber Foam 10x1.9mm (Specify mt)
180884		"Cyclop Sat" Adhesive Label
180822		"LEM" Logo Adhesive Plate
150298		100x2.5mm Nylon Cable Tie
129962		WL3.5X25ts Black Screw
120482		4mm Black Shakeproof Washer
120411		WL3.5x20tt Black Screw
120281		WL3x15tt Black Screw
120059		M4x25tc Black Zinc Plated Screw

CYCLOP EWT SUB

Cabinet Assembly

667744		Speaker Grid
227083		**15" 8ohm Woofer Speaker**
210272		Speaker Filler (400gr/m² 30x50x4cm)
210217		Black Sealer (specify mt)
180822		"LEM" Logo Adhesive Plate
120483		5mm Black Shakeproof Washer
120461		5.3x10x1 Black Washer
120414		WL3.5x35tt Black Screw
120341		WL4x20tt Black Screw
120124		M5x30tc Black Screw
841179		80cm Brown/Black 1.50mm² Faston/Faston Dual Wire
717122		Speaker Cabinet Assembly
430128	*	Wooden Cabinet
347420	*	Rubber Foot
190236	*	d=50/60 w=24mm Caster
177783	*	Black Metallic Flange
177328	*	220x160mm Metal Handle
120664	*	M6 4-tips Lock Nut
120662	*	M5 4-tips Lock Nut
120483	*	5mm Black Shakeproof Washer
120461	*	5.3x10x1 Black Washer
120341	*	WL4x20tt Black Screw
120336	*	WL4x25tt Black Screw
120124	*	M5x30tc Black Screw
120111	*	M6x25tsp Black Screw

Amplifier Assembly

737163		**Amplifier Assembly 230Vac (EU)**
737164		**Amplifier Assembly 115Vac (US)**
SKK768329	*	**Input Board (pcb#313097)**
141187	**	Hor Female XLR Socket (NC3FAH Neutrik)
140930	**	9 Contacts Hor Male Connector
140220	**	Jack Slim Horizontal S-F Socket APJ678 Adimpex
120857	**	6.3mm Vertical Male Faston for Pcb
110267	**	1sw 2pos Horizontal Slider Switch
100084	**	TL074 Quad J-Fet Operational Amplifier
080743	**	3mm Wide Diffused Green Led
080293	**	15V 1W 5% Zener Diode
074570	**	5KB RK16 Hor Rotary Potentiometer K15C31
070163	**	4K7 20% Vertical Linear Trimmer
052050	**	15K 1/8w 5% Resistor
052048	**	10K 1/8w 5% Resistor
052045	**	5K6 1/8w 5% Resistor
052044	**	4K7 1/8w 5% Resistor
052042	**	3K3 1/8w 5% Resistor
052036	**	1K 1/8w 5% Resistor
050451	**	4K7 1/4W 5% Resistor
050131	**	10E 1/4W 5% Resistor
043393	**	9K09 1/4W 1% Metalized Film Resistor
042686	**	54K9 1/4W 1% Metalized Film Resistor
042685	**	47K5 1/4W 1% Metalized Film Resistor
042665	**	33K2 1/4W 1% Metalized Film Resistor
042660	**	30K1 1/4W 1% Metalized Film Resistor
042633	**	18K7 1/4W 1% Metalized Film Resistor
042625	**	15K0 1/4W 1% Metalized Film Resistor
042615	**	12K1 1/4W 1% Metalized Film Resistor
042606	**	10K5 1/4W 1% Metalized Film Resistor
042585	**	6K81 1/4W 1% Metalized Film Resistor
042574	**	6K19 1/4W 1% Metalized Film Resistor
042564	**	4K75 1/4W 1% Metalized Film Resistor
042535	**	2K74 1/4W 1% Metalized Film Resistor
042514	**	2K00 1/4W 1% Metalized Film Resistor
030245	**	10u 50V 20% Vert Electrolytic Capacitor
030005	**	1u 50V 20% Vert Electrolytic Capacitor
021028	**	220n 63V 10% MKT Polyester Capacitor
021024	**	100n 63V 10% MKT Polyester Capacitor
021021	**	56n 63V 10% MKT Polyester Capacitor
021018	**	33n 63V 10% MKT Polyester Capacitor
021004	**	2n2 63V 10% MKT Polyester Capacitor
020250	**	10n 400V 10% MKT Polyester Capacitor
010595	**	100n 50V -20+80% Ceramic Cap. Multilayer
010271	**	22p 50V 10% CL2 Ceramic Capacitor
841280	*	Single 15cm AWG18 White Faston/Faston Wire
841272	*	12.5cm Yel/Grn Faston/Faston Wire
841182	*	9 Wires 25cm Crimp Terminal Cable
841006	*	10cm Yel/Grn Faston/Faston AWG18 Wire
727643	*	**Amplifier Board Ass'y (pcb#313112)**
778163	**	Cables Assembly
141200	***	Speakon Socket (NL4MP Neutrik)
768268	**	Amplifier Board without Output Transistors (pcb#313112)
340079	***	TO220 Mica Washer
340078	***	TO220 Insulated Bush
170960	***	TO220 h=25mm Heatsink
140930	***	9 Contacts Hor Male Connector
140917	***	Molex 5267 2 Pos. Vert. Male Connector
120582	***	M3 Black Nut
120521	***	Black Lock-Washer D=3mm
120451	***	3.2x7x0.5 Black Washer
120005	***	M3x10tc Screw
110307	***	Relay 24V / 2 Switch 5A 250Vac
100067	***	LM337T TO220 1.2-37V 1.5A Adjustable Regulator
100066	***	LM317T TO220 1.2-37V 1.5A Adjustable Regulator
100061	***	TL072 Dual J-Fet Operational Amplifier
090920	***	MJE802 TO126 Npn Darl Transistor
090917	***	MJE350 TO126 Pnp Transistor
090916	***	MJE340 TO126 Npn Transistor
090201	***	2N5401 TO92 Pnp Transistor
090200	***	2N5550 TO92 Npn Transistor
090194	***	BC560C TO92 LN Pnp Transistor
090183	***	BC550C TO92 LN Npn Transistor
090153	***	BC327 TO92 Pnp Transistor
080901	***	VTL5C4 Analog Optoisolator
080282	***	13V 1W 5% Zener Diode
080245	***	7V5 1W 5% Zener Diode
080156	***	1N4002 1A 100V Rectifier Diode
080103	***	1N4148 100mA 75V Signal Diode
070106	***	470E 20% Horizontal Linear Trimmer
052062	***	150K 1/8w 5% Resistor
052060	***	100K 1/8w 5% Resistor
052058	***	68K 1/8w 5% Resistor
052056	***	47K 1/8w 5% Resistor
052054	***	33K 1/8w 5% Resistor
052052	***	22K 1/8w 5% Resistor
052051	***	18K 1/8w 5% Resistor
052050	***	15K 1/8w 5% Resistor
052049	***	12K 1/8w 5% Resistor
052048	***	10K 1/8w 5% Resistor
052044	***	4K7 1/8w 5% Resistor
052043	***	3K9 1/8w 5% Resistor
052040	***	2K2 1/8w 5% Resistor
052039	***	1K8 1/8w 5% Resistor
052038	***	1K5 1/8w 5% Resistor
052036	***	1K 1/8w 5% Resistor
052035	***	820E 1/8w 5% Resistor
052033	***	560E 1/8w 5% Resistor
052032	***	470E 1/8w 5% Resistor
052030	***	330E 1/8w 5% Resistor
052024	***	100E 1/8w 5% Resistor
050291	***	220E 1/4W 5% Resistor
050231	***	68E 1/4W 5% Resistor
050131	***	10E 1/4W 5% Resistor
042725	***	100K 1/4W 1% Metalized Film Resistor
042534	***	2K80 1/4W 1% Metalized Film Resistor
042405	***	221E 1/4W 1% Metalized Film Resistor
040221	***	56E 1/2W 5% Resistor
030884	***	10000U 80V 20% Snap-In Electrolytic Capacitor
030715	***	1000u 6v3 20% Vert Electrolytic Capacitor
030485	***	100u 25V 20% Vert Electrolytic Capacitor
030324	***	22u 50V 20% Vert Electrolytic Capacitor
030005	***	1u 50V 20% Vert Electrolytic Capacitor
021012	***	10n 63V 10% MKT Polyester Capacitor
020250	***	10n 400V 10% MKT Polyester Capacitor
010595	***	100n 50V -20+80% Ceramic Cap. Multilayer
010462	***	1n 50V 10% CL2 Ceramic Capacitor
010402	***	330p 50V 10% CL2 Ceramic Capacitor
010387	***	220p 50V 10% CL2 Ceramic Capacitor
010345	***	100p 50V 10% CL2 Ceramic Capacitor
010333	***	82p 50V 10% CL2 Ceramic Capacitor
010293	***	33p 50V 10% CL2 Ceramic Capacitor
347060	**	Nylon Cable Tie with 3mm Eye
340751	**	TO126 Mica Washer
340186	**	Adhesive Cable Fixing
340154	**	TO3P/TO218 Mica Washer
340079	**	TO220 Mica Washer
340078	**	TO220 Insulated Bush
210216	**	Adhesive Rubber Foam 20x5mm (Specify mt)
210215	**	Adhesive Rubber Foam 10x1.9mm (Specify mt)
177790	**	Heatsink
177773	**	Cyclop Amp Right Support
177768	**	Cyclop Amp Left Support
150298	**	100x2.5mm Nylon Cable Tie
120849	**	Hor Pc Male Faston 2.8
120584	**	M4 Black Nut
120522	**	4mm Black Spring Washer
120521	**	Black Lock-Washer D=3mm
120453	**	4.2x9x0.8 Black Washer
120451	**	3.2x7x0.5 Black Washer
120257	**	B2.9x9.5tc Black Zinc Plated Screw
120063	**	M4x20tc Black Screw
120005	**	M3x10tc Screw
110119	**	Universal P.C.B.Fuse Clip 10A 250V
090920	**	MJE802 TO126 Npn Darl Transistor
090919	**	MJE15031 TO220 Pnp Transistor
090918	**	MJE15030 TO220 Npn Transistor
SKK090014	**	2SA1943 TO264 Pnp Transistor
SKK090013	**	2SC5200 TO264 Npn Transistor
090912	**	MJE4342 TO218
080821	**	Ptc 100° PTH9L04BD222TS2F330 Murata
080607	**	KBPC2502 25A 200V Rectifier Diode Bridge
060351	**	82E 5W 10% Wire Resistor
060051	**	0E22 5W 5% Wire Resistor
727632	*	**Fan Assembly**
140919	**	Molex 5264 2 Contacts Housing
140870	**	Molex 5263 Female Crimping Contact
110359	**	24Vdc 80x25mm Fan
667795	*	Frame Panel
238090	*	**Transformer 230Vac (EU)**
238091	*	**Transformer 115Vac (US)**
180707	*	Ground Adhesive Label
150314	*	6.3mm Faston Insulator
150298	*	100x2.5mm Nylon Cable Tie
120841	*	6.3mm Female Faston
120587	*	M6 Black Nut
120584	*	M4 Black Nut
120582	*	M3 Black Nut
120541	*	16x9x1.6 Washer for Jack
120523	*	6mm Black Spring Washer
120522	*	4mm Black Spring Washer
120521	*	Black Lock-Washer D=3mm
120472	*	6.4x24x2 Black Washer
120453	*	4.2x9x0.8 Black Washer
120256	*	B2.9x9.5tsp Black Screw
120131	*	M6x80te Black Screw
120063	*	M4x20tc Black Screw
120025	*	M3x10tsp Black Screw
110614	*	3 Terminal Universal Mains Inlet 10A Faston=6.3mm
110291	*	16A 250Vac Bipolar Power Switch
110038	*	T16A Fuse 6.3x32mm (US)
020491	*	100nF 10% 250Vac Polyester Capacitor

Note:

- All dimensions are in mm unless otherwise specified.
- The screw description is defined as follows:
  type of screw + diameter + X + length + type of head
  where type of screw is one of these:
  M = Metric thread
  B = Self-tapping screw for metal
  WL = Self-tapping screw for wood
  and type of head is one of these:
  tc = cylinder Phillips head
  ts = flared Phillips head
  tt = rounded Phillips head
  te = hexagonal nut head
  tsp = flat flared Phillips head
  tce = cylinder Allen hexagonal head
  tspe = flat flared Allen hexagonal head
- The washer description is defined as follow:
  hole diameter + X + external diameter + X + thick
- 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 with:
  1) Model name,
  2) Section name,
  3) Module code,
  4) Reference name,
  5) Quantity number.