



SERVICE MANUAL

promega 3



code 270278

Index

- 2 Introduction, Checks & Adjustments.
- 3 RS232 PC - RS422 MAC Cables.
- 4 Block Diagram.
- 5 Pot Motor Supply & Standby Board Schematic & Timing Table.
- 6 Keyboard Interface & L/R Contact Board Schematics.
- 7 Left Controls Panel Board Schematic.
- 8 Right Controls Panel Board (part 1/2) Schematic.
- 9 Right Controls Panel Board (part2/2) & Lower Controls Panel Board Schematics.
- 10 Cpu & Sound Generator Board (part 1/2) Schematic.
- 11 Cpu & Sound Generator Board (part 2/2) Schematic.
- 12 256+256Mb Dual Drake Sound Board (part 1/2) Schematic.
- 13 256+256Mb Dual Drake Sound Board (part 2/2) Schematic.
- 14 In/Out Board Schematic.
- 15 In/Out, Pot Motor Supply & Standby & Keyboard Interface PCB Layouts.
- 16 Left & Lower Controls Panel PCB Layouts.
- 17 Right Controls Panel & 256+256Mb Dual Drake Sound PCB Layouts.
- 18 Cpu & Sound Generator PCB Layout.
- 19 Spare Part List.



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.

↑ Supply voltage.

⊥ Logic supply ground.

• Male connector.

▣ Test point.

⊥ Analog supply ground.

⊖ Female connector.

⬭ Flag joined with one or more flags with the same signal name inscribed.

⊥ Chassis ground.

⚡ M/F faston connector.

⊥ Earth ground.



ATTENTION

Observe precautions when handling electrostatic sensitive devices.



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

INTRODUCTION

The Promega 3 is a complex instrument and to be repaired requires a detailed knowledge especially on digital boards as 761257 - CPU & SOUNG GENERATOR BOARD and 256+256Mb DUAL DRAKE SOUND BOARDS. If you need to repair these parts by yourself we suggest to replace them entirely, otherwise the following information can be useful to locate a specific problem.

FUNCTIONAL DESCRIPTION

The new keyboards 2000 series, of which PROMEGA 3 is the first keyboard developed by GM, are designed around the new processor DRAKE (Dsp Risc Advanced Keyboard Engine). Inside PROMEGA3 5 DRAKE have assembled on, the first one on the main board and the others are mounted on 2 sound boards. The first DRAKE controls the general management, all the I/Os and the sound processing (mixer and digital effects) while the others are used for sounds generation. All sounds and operating system are stored inside NAND FLASH memories, the FLAH memory content is decompressed and transferred in the SDRAM memories to allow fast elaboration. The decompression task requires about 1 minute, to avoid this time the SDRAMs have been endowed of a battery supply circuit (+VBAT, +VBRAM); under normal conditions, after 3/4 working hours, the batteries are completely re-charged and they allow the data retention for over 1 week. *The numbers between parentheses are referred to the same points reported on the schematic diagrams.*

[1] MASTER RESET

Starting from the switch ON event the keyboard remains in reset condition; when the 5V supply rail reaches about 4.75V IC35 (MAX709) set high the VOK after 200mS, which enters in the DRAKE pin 209; the RST is delayed of further 100uS respect VOK and it goes in the DRAKE pin 161, it is synchronized to the PLL internally, goes out through pin 213 and enters in pin 206 of the same DRAKE; besides it is also sent to the same pins of each DRAKE connected by the SLOT BUS, in this way all DSP are synchronized. The RST is also sent to other ICs to initialize the I/O circuitry, see also the schematics and timing table.

[2] MASTER CLOCK

The Master clock (MCLK) produced by the oscillator XT1 (11.2896MHz) is sent through IC31 and IC26 (DS90 LVDS Low voltage differential signaling) to each DRAKE, DAC, ADC and expansion SLOT. The LVDS receivers placed at each termination of the balanced signal (REFCLK) are used to get a perfect synchronism between all the devices. By means of IC25 (74lvc74) also the sample frequency FS (44.1KHz), deriving from IC54 (ADCL/RCLK) or from a SLOT (EX_FS), is synchronized with MCLK.

[3] START UP SETTING

During the rising slope of RST, DRAKE configure itself reading the state of address pins between AD0...AD30-A and A0...A2-D, if the configuration doesn't match to a valid one, a malfunction could happen. Check these in the CPU and SOUND BOARD schematics. **[4] BOOTSTRAP** The jumper J1 can be set on two positions: **UART =** The DRAKE bootstrap happens from the COMPUTER serial port. **E² =** The DRAKE bootstrap happens from the eeprom device (IC15).

Initially, when the eeprom is empty, this jumper must be set on UART, after the bootstrap is uploaded into eeprom, the jumper J1 must be set to E². N.B. The 761257 spare parts already have the bootstrap installed into eeprom.

[5] OPERATING SYSTEM & WAVE MEMORY

Often it happens that a malfunction of the instrument is to investigate between the software rather than the hardware. Consequently it is necessary to know which Operating System (OS) version is loaded in the instrument and eventually upgrade it with the last one available; if the malfunction persists even if the instrument is upgraded, please send a detailed report to GM Italy.

The OS is contained in the NAND FLASH (IC7 and CN1) devices; these memories are managed in similar way of a hard disk, for this reason GM supplies as spare part 761257 (CPU BOARD) including 761235 (NAND FLASH MODULE).

As discussed above to speed up the instrument OS and Waves are transferred on SDRAM memory at the first startup, and are maintained on it by means of an internal battery; till the battery is charged, or you does not force a restore as described further, OS and waves are maintained on SDRAM. To load for the first time or to upgrade with the last OS release, you need the 'O.S.UPGRADE CD-ROM' that is sent from GM upon request. When you ask it please note your instrument serial number (SN#), it is written on the label applied on the instrument backside, please also check the OS version and notify both these information with the request. To check the OS version proceed as follows: Press the SPLIT P. button and, holding it down, press the "+" key at the side of the LCD: on display appears the OS version number and date. Pressing again the "+" button the display will show the filenames loaded into the instrument. The OS version contained in the CD is specified by suffix in the filename (e.g. Upgrade_PROMEGA3_v.1.01.exe); obviously, if the version installed on the instrument is the same, the upgrade is not required. **IMPORTANT:** When an instrument OS is upgraded, or when you want to restore the initial manufacturer OS from NAND FLASH into SDRAM memories, **you must press the STANDBY button and, holding it down, turn on the instrument from the main power switch.** Firstly the display shows the result of the DRAM memory checksum (WCKS OK or WCKS BD) secondly the state of the battery charge (BATT OK Or BATT BD), where OK means good and BD means BAD; then the instrument will continue forcing the decompression in the DRAM that requires about 1 min.; finally 5 OK will be visualized to confirm the correct memorization on the SDRAMs of each DRAKE.

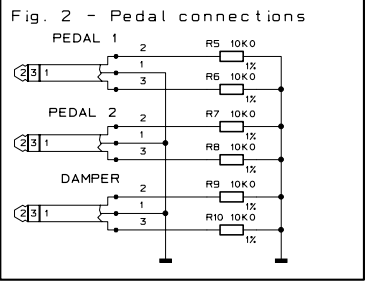
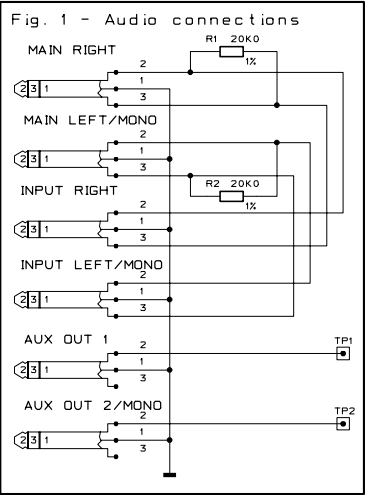
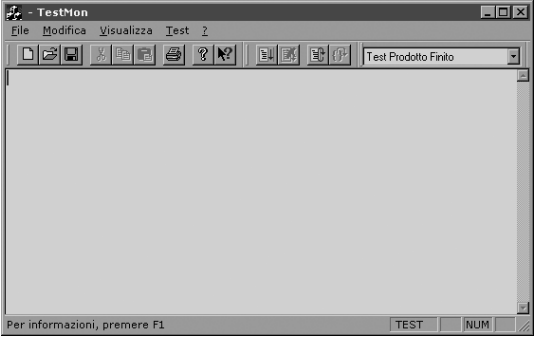
[6] RAM BACKUP & POT'S MOTORS SUPPLY RAIL

The board 731050-POT MOTOR SUPPLY & STAND-BY BOARD handles the supply rail of the motorized potentiometers and, at the same time, the battery recharge; however the 731011 - SWITCHING SUPPLY UNIT doesn't have enough current for both circuit simultaneously, two current limiters are connected in series (TR2, TR5 and TR3, TR4), that privilege the motors supply (IC4) on request instead the recharging of the battery (IC2). IC1 inhibit the complete discharge of the batteries to extend their life, IC3 stabilizes the 3.3V supply rail for the SDRAMs and TR1, by means of an impulse from the CPU, handles to re-start the recharge circuitry every around 15min. and each time that the state of the batteries charge is checked by CPU.

[7] SOUND BOARD (SLOT), PEDALS, AUDIO, PANEL checks using TESTMON tool.

- To perform these tests you must have a PC (Windows 95 or more) and the TESTMON program with the follows precautions:
- A suitable serial cable (GM code 130429) is required.
 - A suitable hardware (not provided) is necessary, see schematic figures 1 and 2.
 - A complete re-loading of OS is necessary after using this program.
 - The TESTMON program can be request to GM Italy only.
 - The TESTMON program must be used only in the form specified here, other functional test without the suitable hardware (not provided) could compromise the CPU BOARD.

- Proceed as follows:
- 1) Connect the PC serial port COMx to the instrument COMPUTER port by means of the suitable cable. Both apparatus must be switched OFF.
 - 2) Turn on the PC install and run the TESTMOM program, the following window appears on PC screen:



- 3) Set the right COMx through the "Test/Serial port" menu.
- 4) Turn on the instrument and the test will start automatically visualizing:

Name of test and current date: _____ **Test 4, today, time** _____

The sound modules first test will start:

- **[9] Testing Ext. Modules (CN2, 6, 7, 8) :**

Test result:

	Chip_0 (IC4)	Chip_1 (IC19)
Slot_0 (CN8)	No	No
Slot_1 (CN7)	Yes	Yes
Slot_2 (CN6)	Yes	Yes
Slot_3 (CN2)	No	No

Testing VOK -> OK

Testing BID -> OK

- **Pass!**

The pedal inputs second test will start:

- **[11] Testing Pedal Inputs :**

Test result:

- **Pass!**

The audio I/O third test will start:

- **[12] Testing Audio Loop :**

Verify that AUX OUT signals respect the specifications.

Verify, using an oscilloscope, that a sinusoidal signal of about 5Vpp is present on every output.

The controls panel fourth test will start:

- **[20] Testing Panel :**

Use the controls on the instrument to perform the test and verify on the display the reading values.

The panel test doesn't send messages on this window, with the exception of last test that signals the end of all test.

- Press STAND-BY to advance the test of a step:
- Step 1/15 lights on all the leds of the panel.
 - Step 2/15 lights off all the leds of the panel.
 - Steps 3/15 to 12/15 the digits vary from 0 to 9 and a led couple of each encoder flows.
 - Step 13/15 the digits return to 0 and the display shows: "Pi =... Mo =... Vo =... In =..."

Operating the Pitch, Modulation, Volume and Input controls from minimum to maximum excursion verify that the reading values vary accordingly from 0 to 127. Pressing each button on the panel the correspondent led lights on or causes a variation on the nearest digits and finally that rotating the encoders, the leds of the corresponding wheel light on in the same sense of rotation. - Step 14/15 the display shows:

- "AT =... Ct =... PC =..."; Pressing the note keys beyond the end stroke the aftertouch value (AT) varies from a minimum of 0 to a maximum of 127. N.B. it is possible to set the AT by means of VR1 on the CPU BOARD, with the purpose to get the optimum variation with the wishes pressure, in any case this setting always remains subjective for 2 reasons: the first one is that being the strip in conductive rubber the same one for all the keys, you can feel notably changes if a single note or an accord is pressed, besides in the PROMEGA 3 the preset sounds that make possible to set the AT are BRASS1 and BRASS2.
- Step 15/15 verifies the uniform motion of the motorized potentiometers.

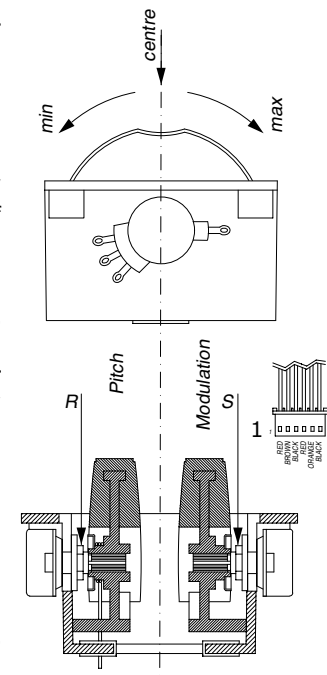
- ******* TEST PASSED *******

End of the test, switch off and on again the instrument.

[8] Pitch and Modulation Adjustment procedure:

If, during point 7 test, one of the Pitch or Modulation wheels doesn't sweep its entire range from 0 to 127, or with the Pitch centered it doesn't position between 63 and 65, you must execute again the Pitch and Modulation adjustments as follows:

- a) Make sure that the potentiometer is positioned as in figure and well fastened to the plastic loom.
- b) Connect a good stabilized continuous voltage of 5V (±5mV) between 1 and 3 or 4 and 6 pins of connector, connect the multimeter at pin 2 or 5 according to the wheel that you are regulating.
- c) Extract the wheel, rotate the potentiometer shaft up to read around 2.5V on the multimeter, re-insert the wheel centered as in figure.
- d) Keeping still the wheel centered and using a spanner on nuts R or S each potentiometer will rotate jointly with the respective nut; rotate it till to have a voltage of 2.5V±25mV at pin 2 and 5 of connector.
- e) Rotating the PITCH wheel all along its excursion, verify that the voltage starts from a minimum less than 250mV to a maximum higher than 4.75V.
- f) Rotating the MODULATION wheel all along its excursion, verify that the voltage starts from a minimum less than 25mV to a maximum higher than 4.75V.
- g) If the point "e" or "f" is not verified repeat the adjustment.



[9] MIDI and Computer ports check

Press LOCAL OFF, the keyboard doesn't play anymore but continues to send the MIDI signal through channel 1, connecting with a suitable cable MIDI IN and MIDI OUT ports, the keyboard plays (section PIANO=CH1); disconnecting the cable the keyboard doesn't play again, inserting an RS232 loopback plug (pin 1-2 and 3-5 shorted) in the Computer port the keyboard plays again. Check that it works well also setting PC1 or PC2 modes and when in MAC mode goes out from pin 1 a 1MHz signal.

[10] Pedals check

Even if in the point 7 the pedal inputs have been already checked, due to their particular effects it's a good idea to give an ulterior explanation about them: All three inputs are analog and they accept pedals normally closed as such normally open, as well as potentiometer pedals.

The kind of pedal is recognized at the power on or when it is plugged in.

In the PROMEGA 3 the pedals by default are assigned in Grand Piano mode:

- PEDAL1 (left) = SOFT,
- PEDAL2 (central) = SUSTAIN,
- DAMPER (right) = DAMPER.

In practice they act in the following way:

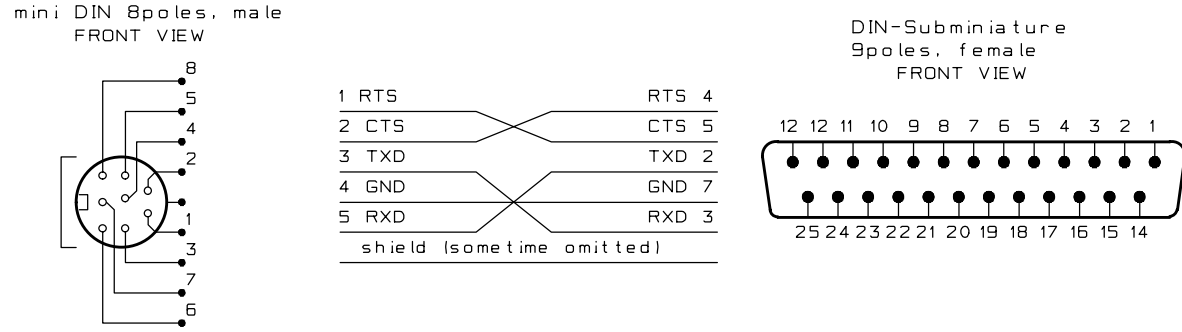
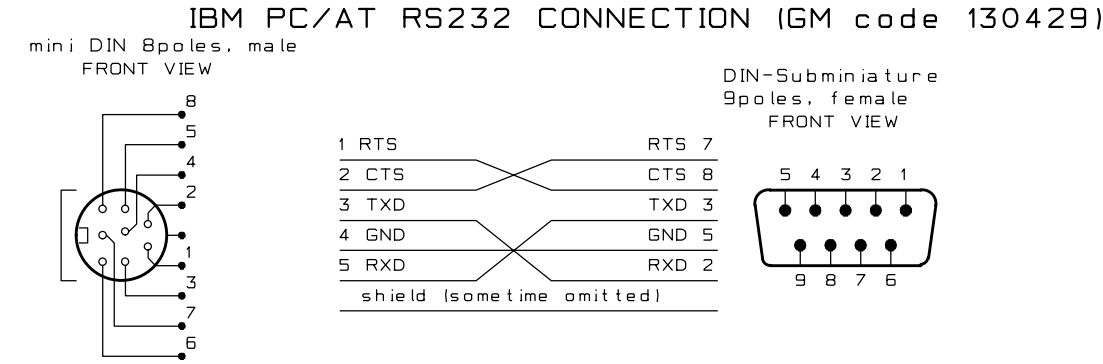
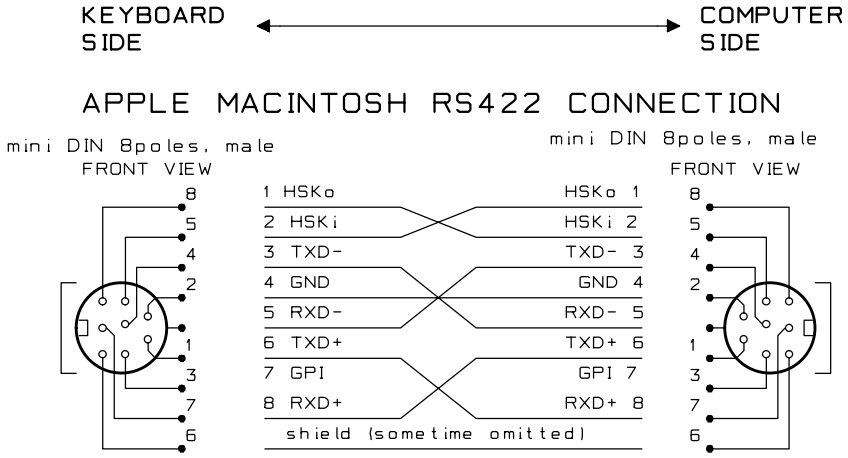
SOFT = it attenuates the notes simulating the moving away of all hammers, **SUSTAIN** = it holds up the dampers of the notes pressed simultaneously to the pedal, if it remains pressed the notes previously pressed maintain the sustained effect, when the pedal is released the notes are not sustained anymore.

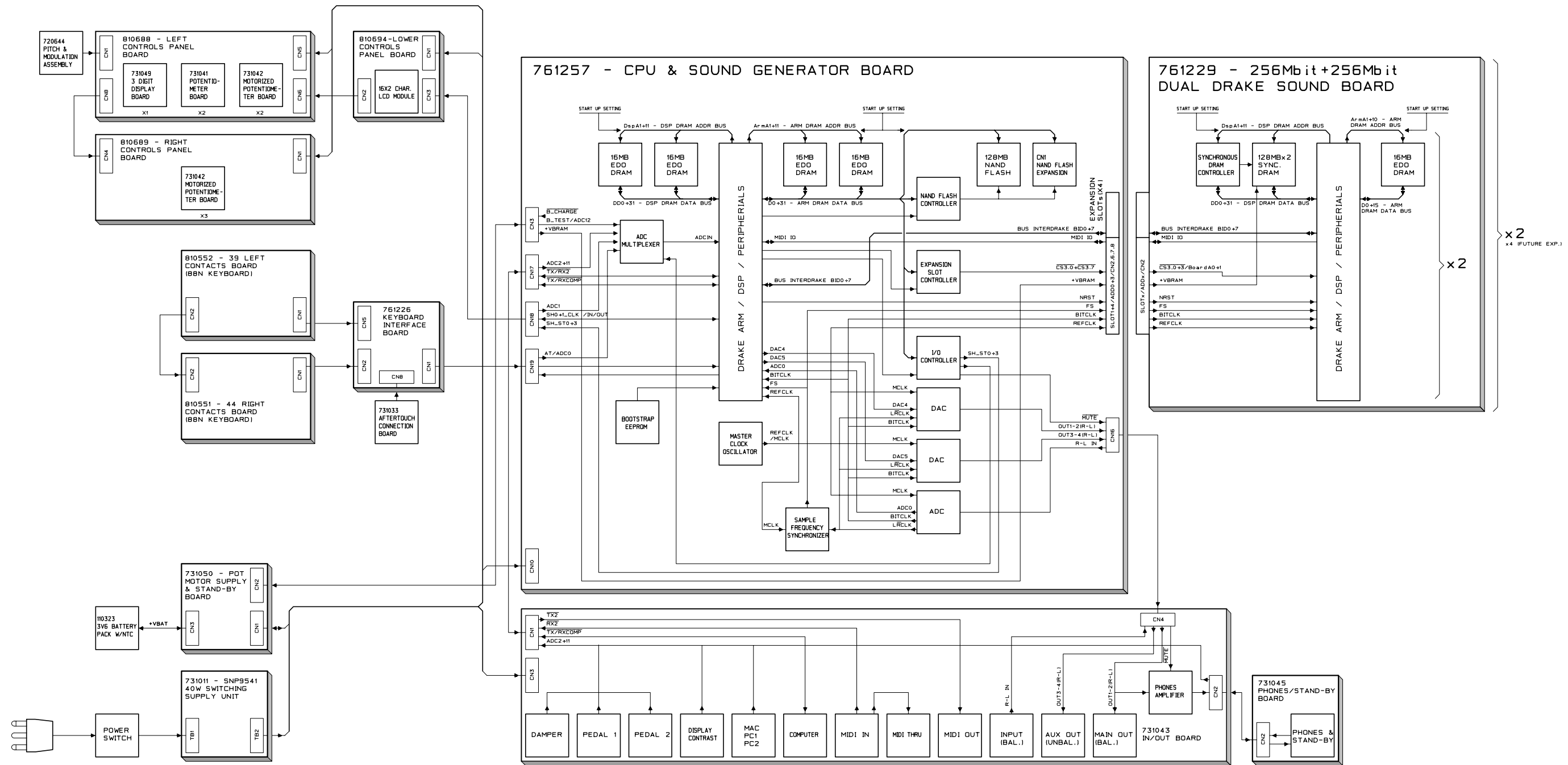
DAMPER = it holds up the dampers of the whole keyboard and activates the sympathetic resonance of strings near to the pressed notes, in practice an enrichment of the sound on the decadence of the pressed notes is the audible effect.

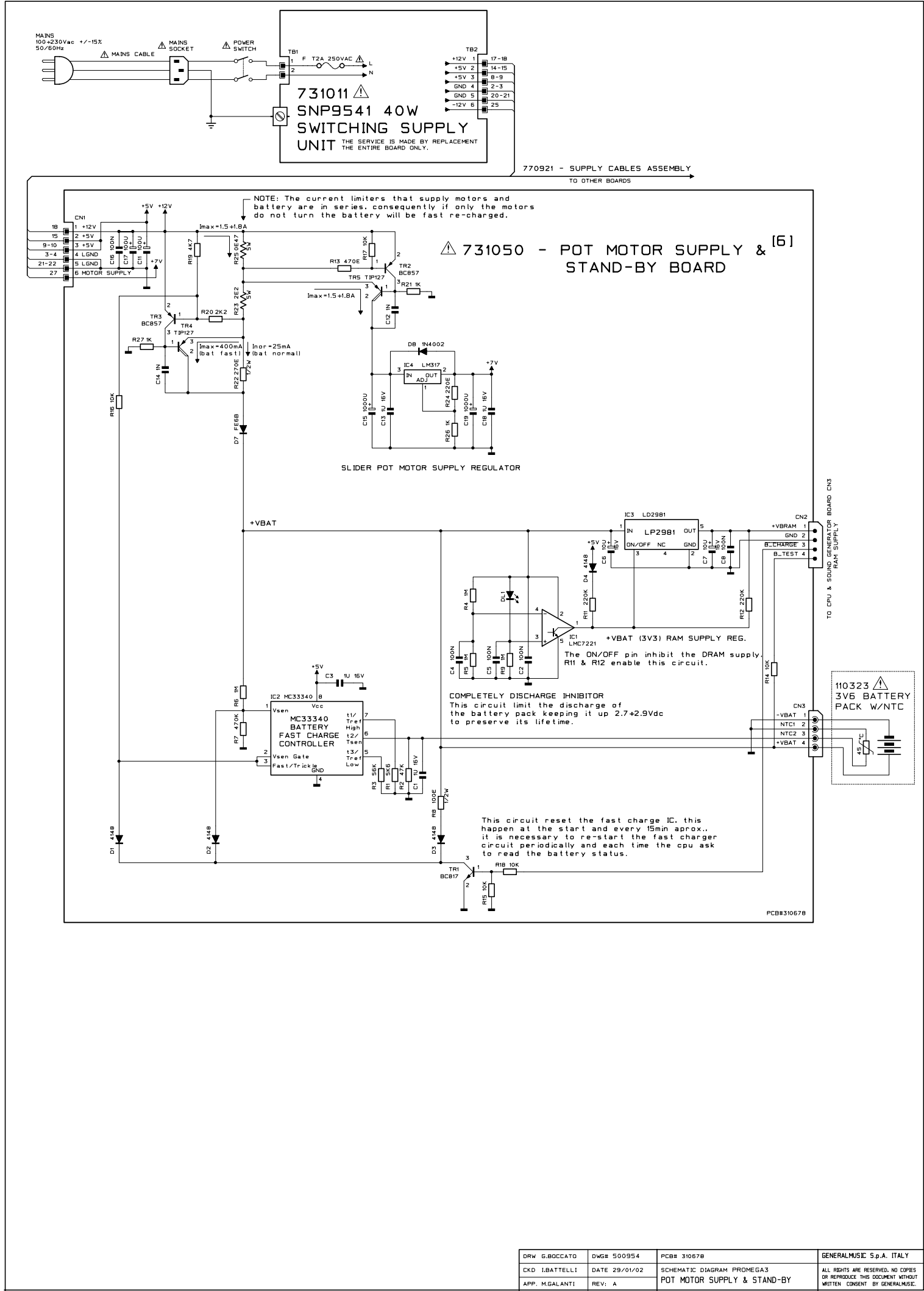
If a potentiometer pedal is inserted it is possible to simulate also the intermediary damper positions.

Simulating the sympathetic resonance like a real Grand Piano, the notes upper to MI6 (E6) have the effect always audible due to these have not the dampers, at the same time the pedal effect is more audible in the highest notes, to check it press a note close to MI6 (E6).

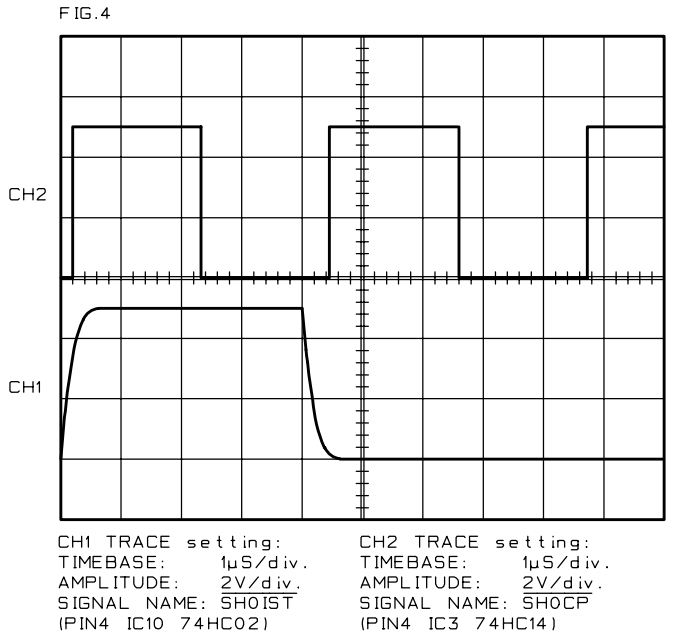
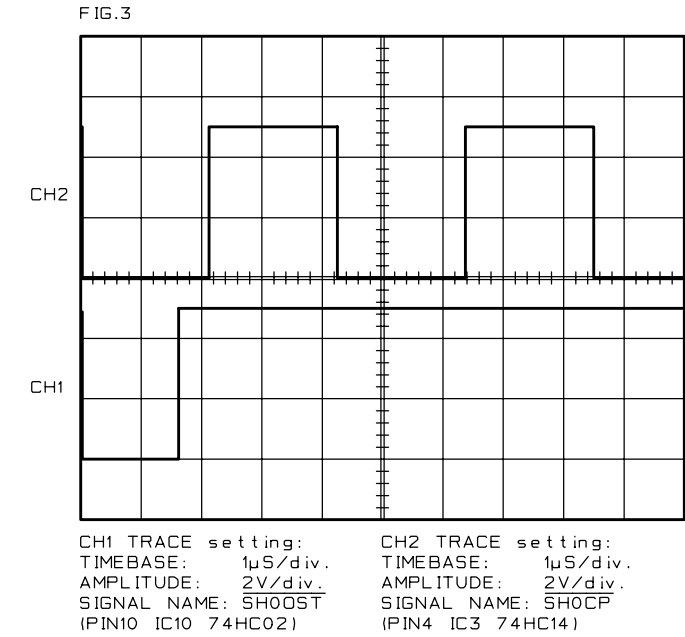
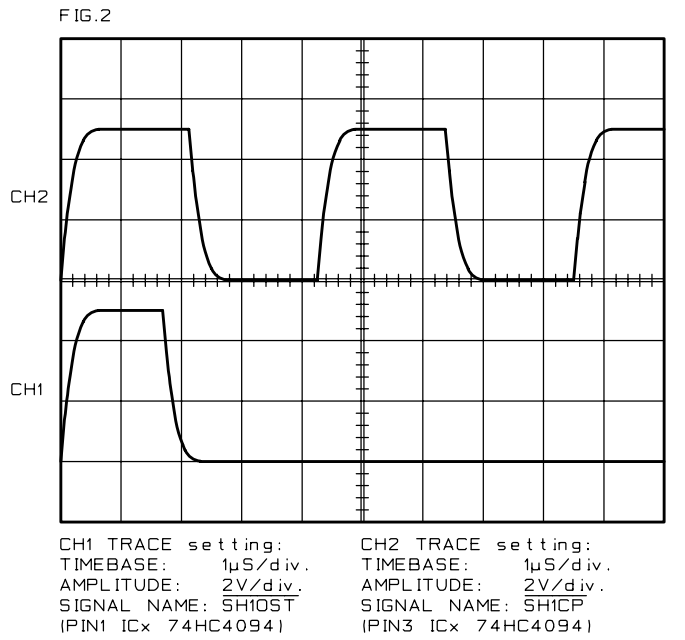
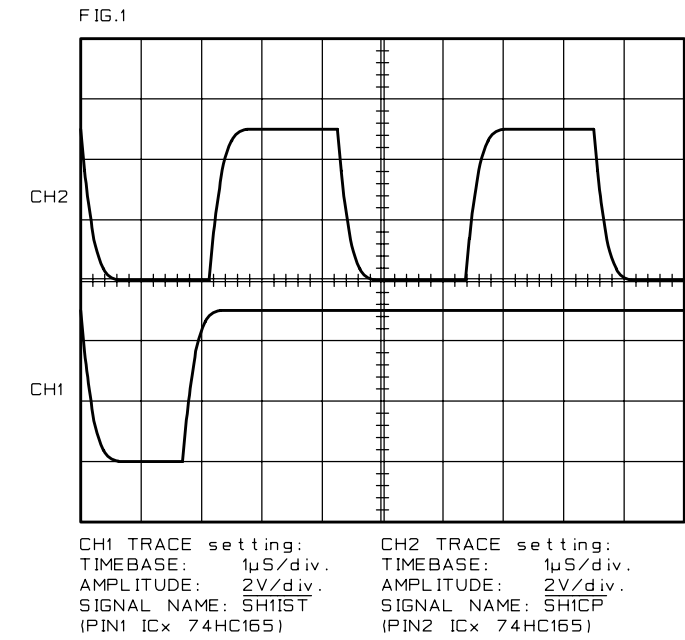
KEYBOARD - COMPUTER CONNECTIONS



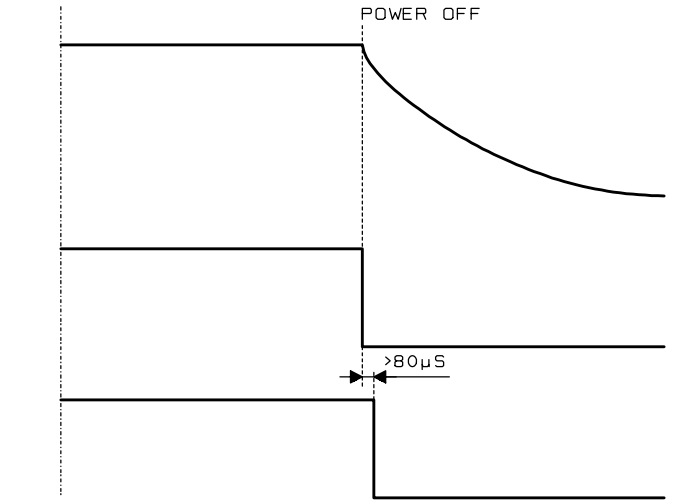
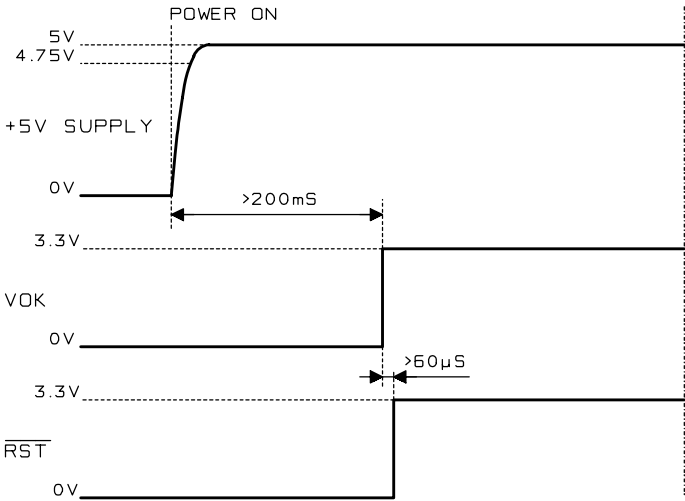




CONTROL PANEL TIMINGS

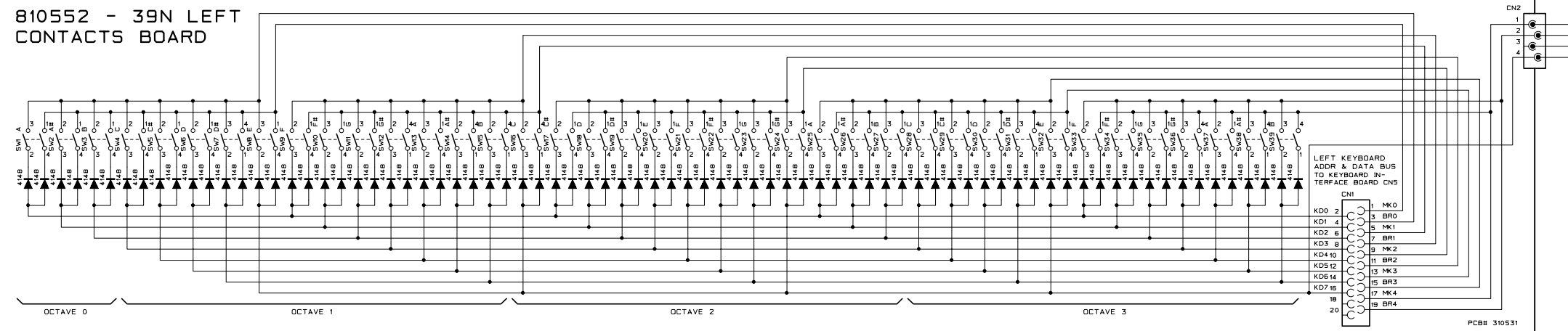


POWER ON/OFF, VOK, RESET TIMINGS

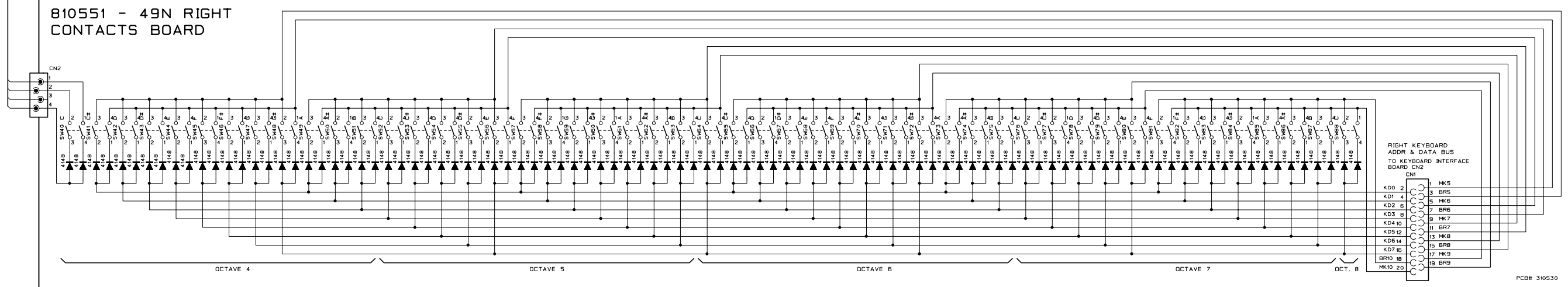


DRW G. BOCCATO	DWG# 500960	PCB#	GENERALMUSIC S.p.A. ITALY
CKD M. GALANTI	DATE 23/04/02	SCHEMATIC DIAGRAM PROMEGA 3	ALL RIGHTS ARE RESERVED. NO COPIES OR REPRODUCE THIS DOCUMENT WITHOUT WRITTEN CONSENT BY GENERALMUSIC.
APP. M. GALANTI	REV: A	TIMING TABLE	

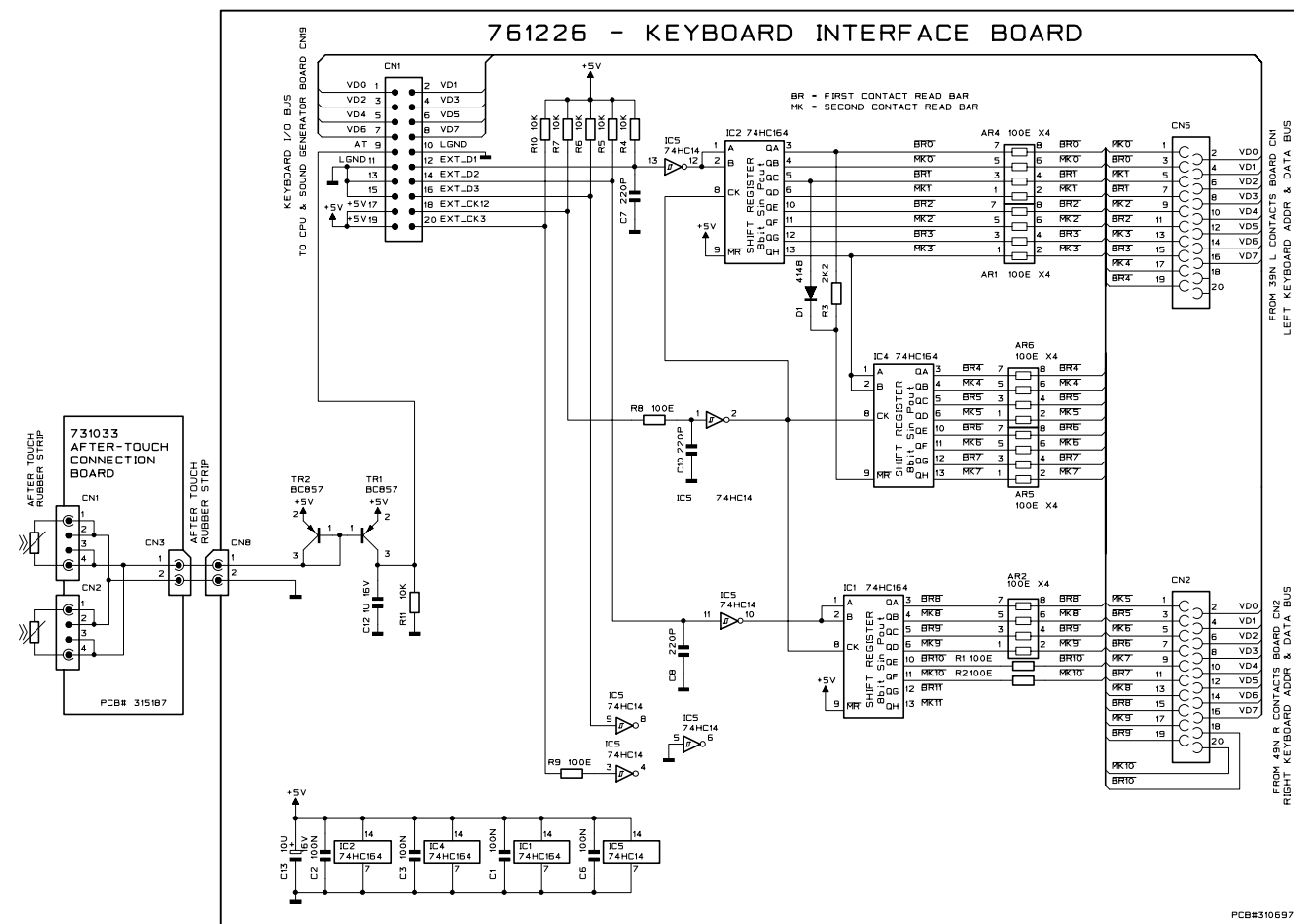
810552 - 39N LEFT
CONTACTS BOARD



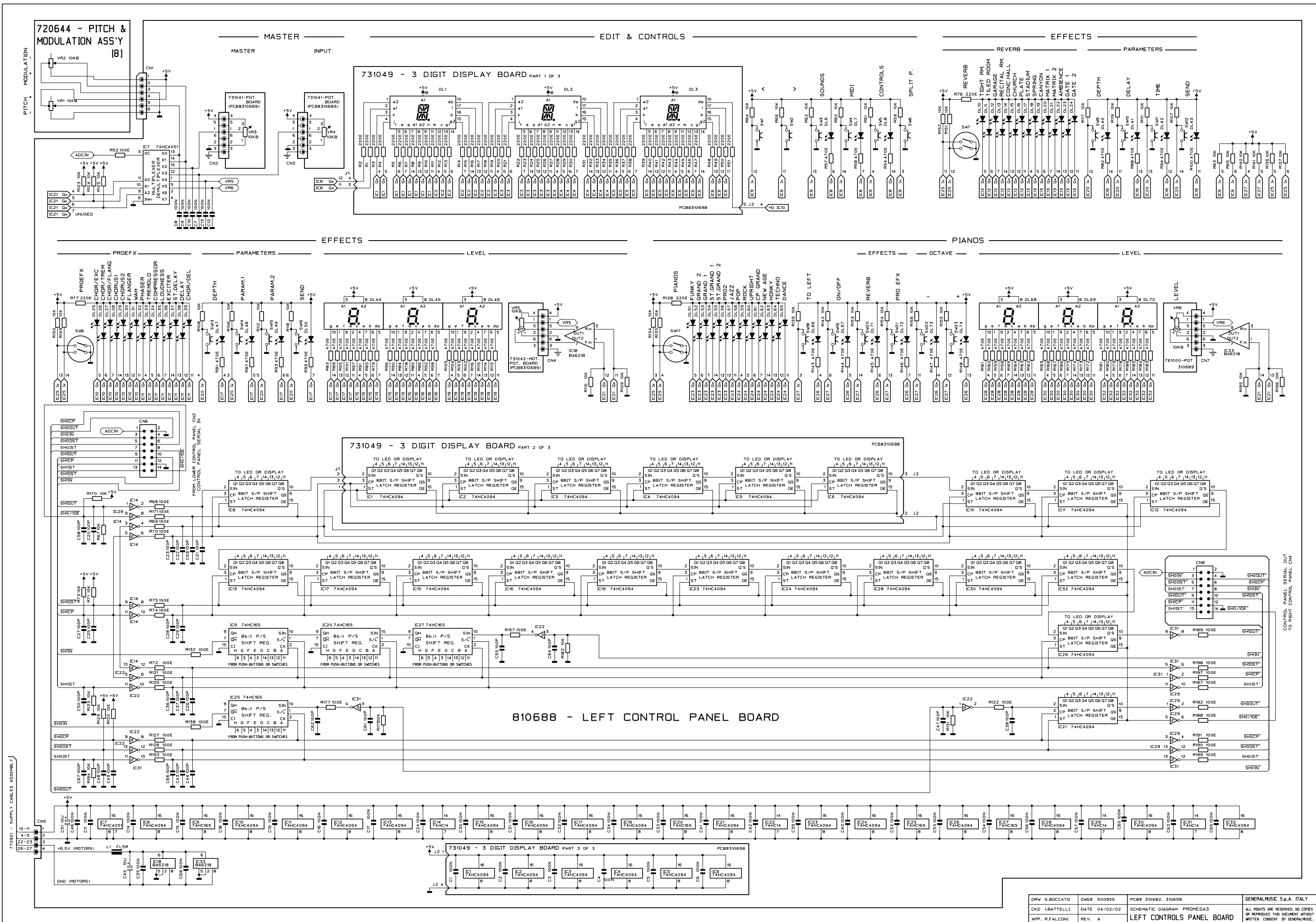
810551 - 49N RIGHT
CONTACTS BOARD

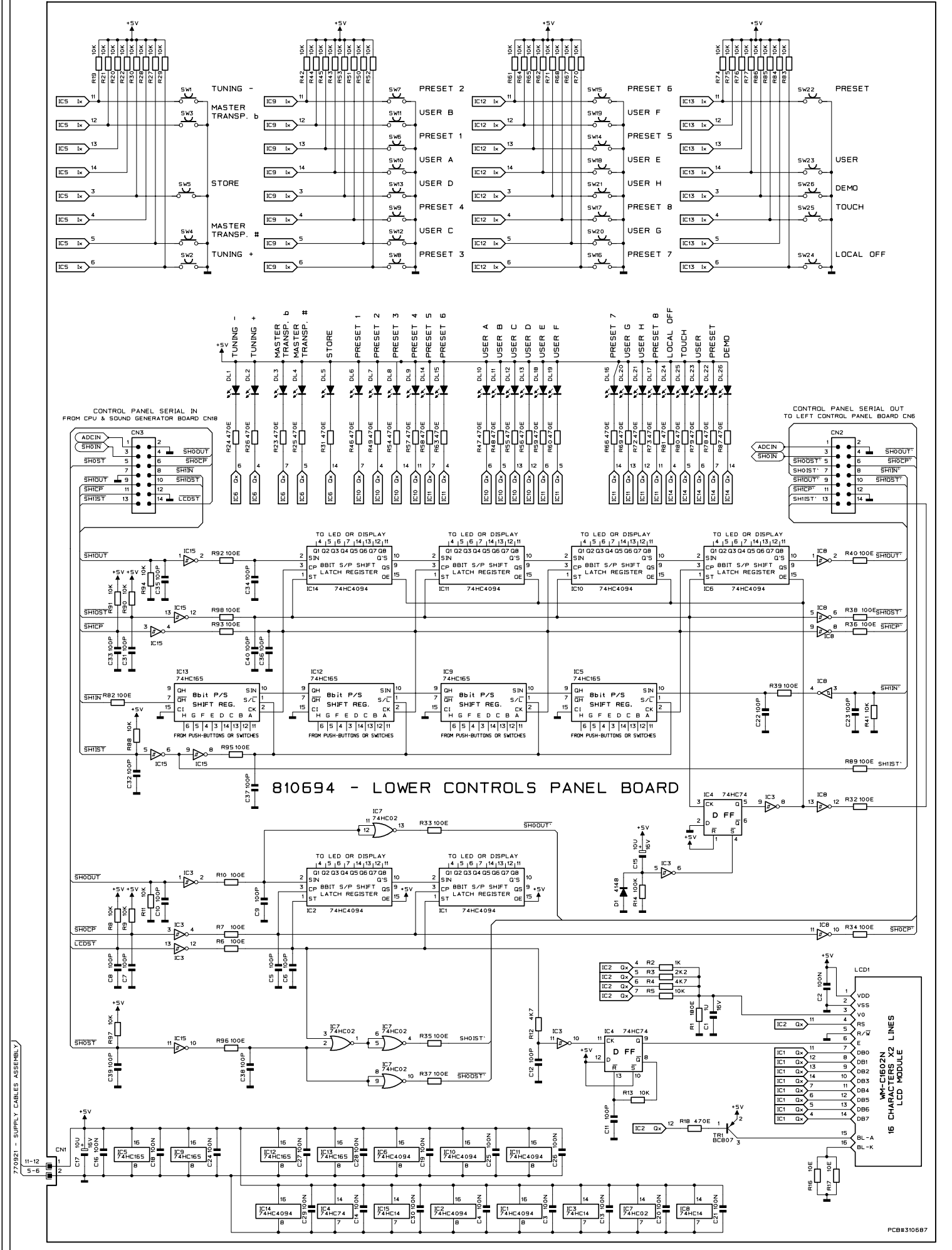
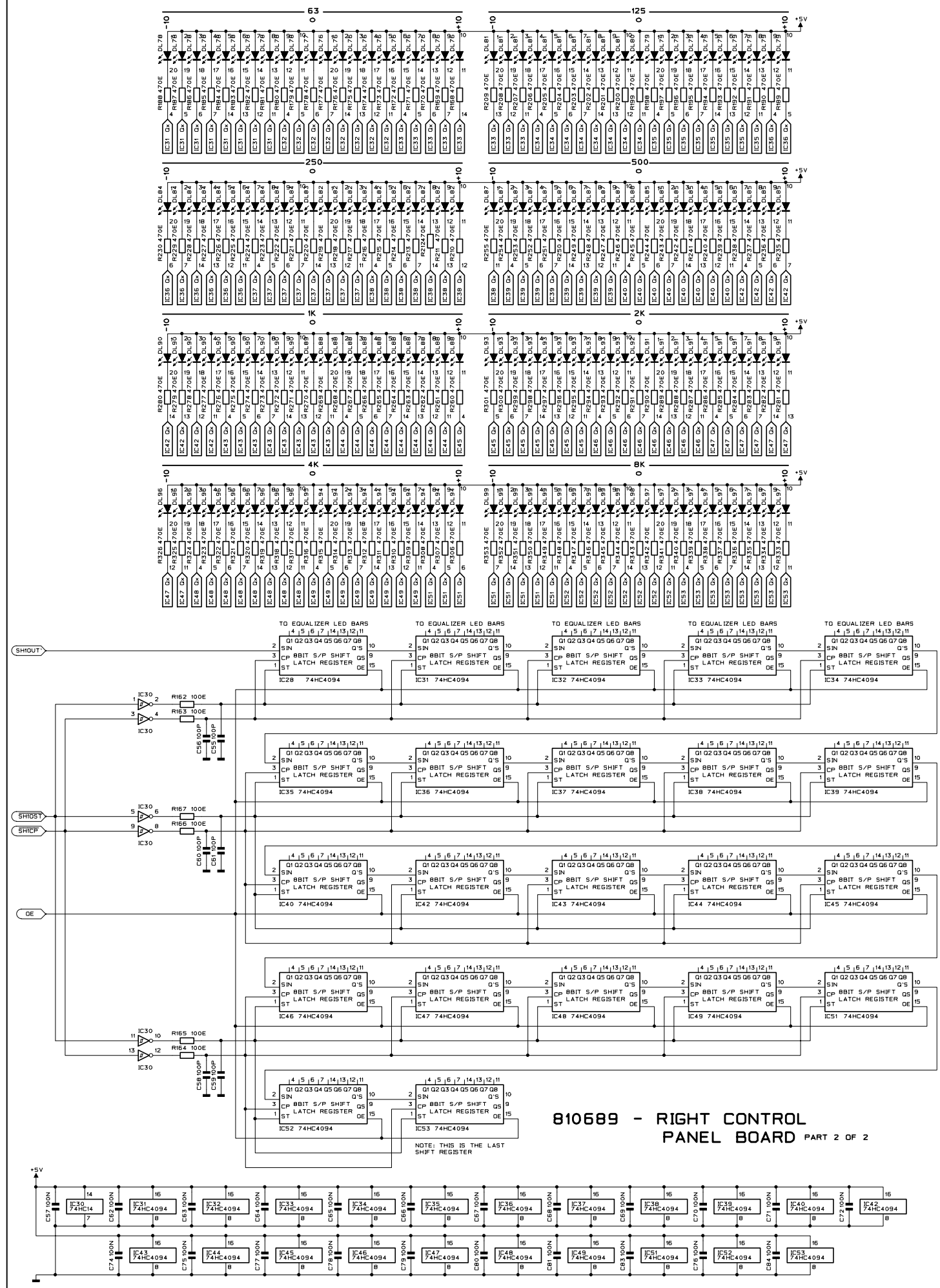


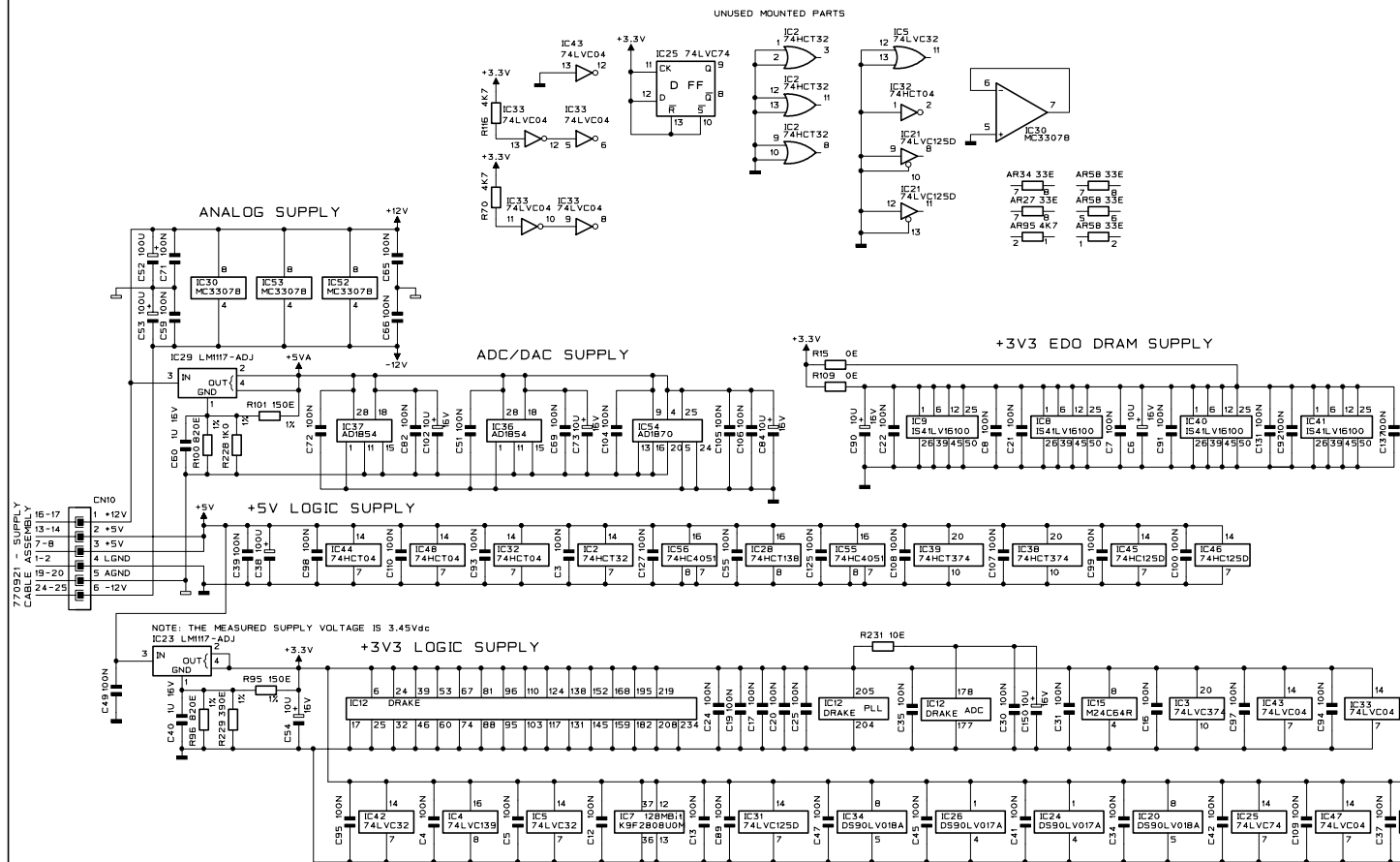
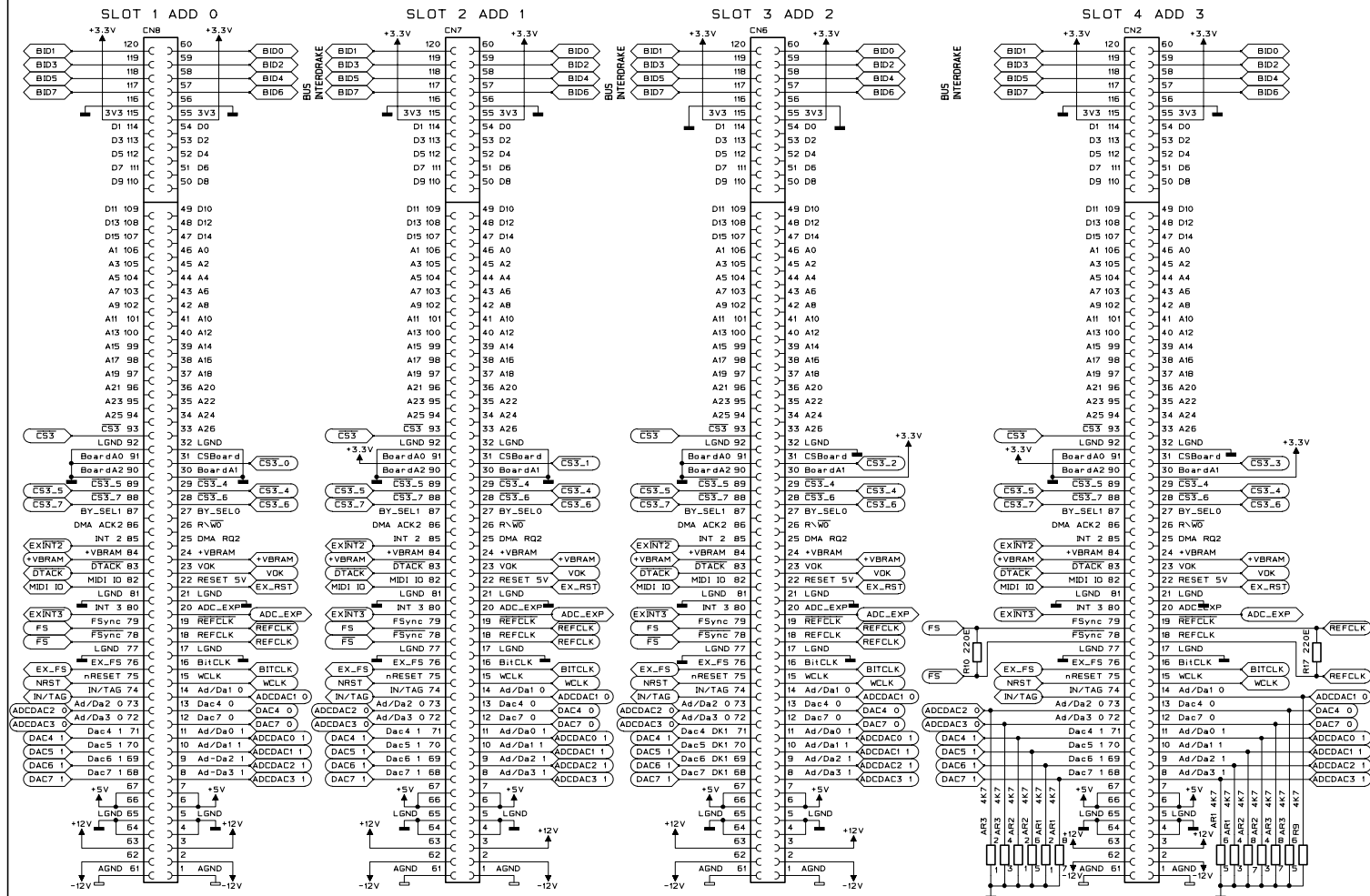
761226 - KEYBOARD INTERFACE BOARD



DRW BOCCATO	DWG# 500955	PCB# 310531 310530 310597	GENERALMUSIC S.p.A. ITALY
CKD FRATERNAI	DATE 29/01/02/1	SCHEMATIC DIAGRAM	ALL RIGHTS ARE RESERVED. NO COPIES OR REPRODUCE THIS DOCUMENT WITHOUT WRITTEN CONSENT BY GENERALMUSIC.
APP. GALANTI	REV: A	CONTACTS BOARD & KEYBOARD INTERFACE BOARD	





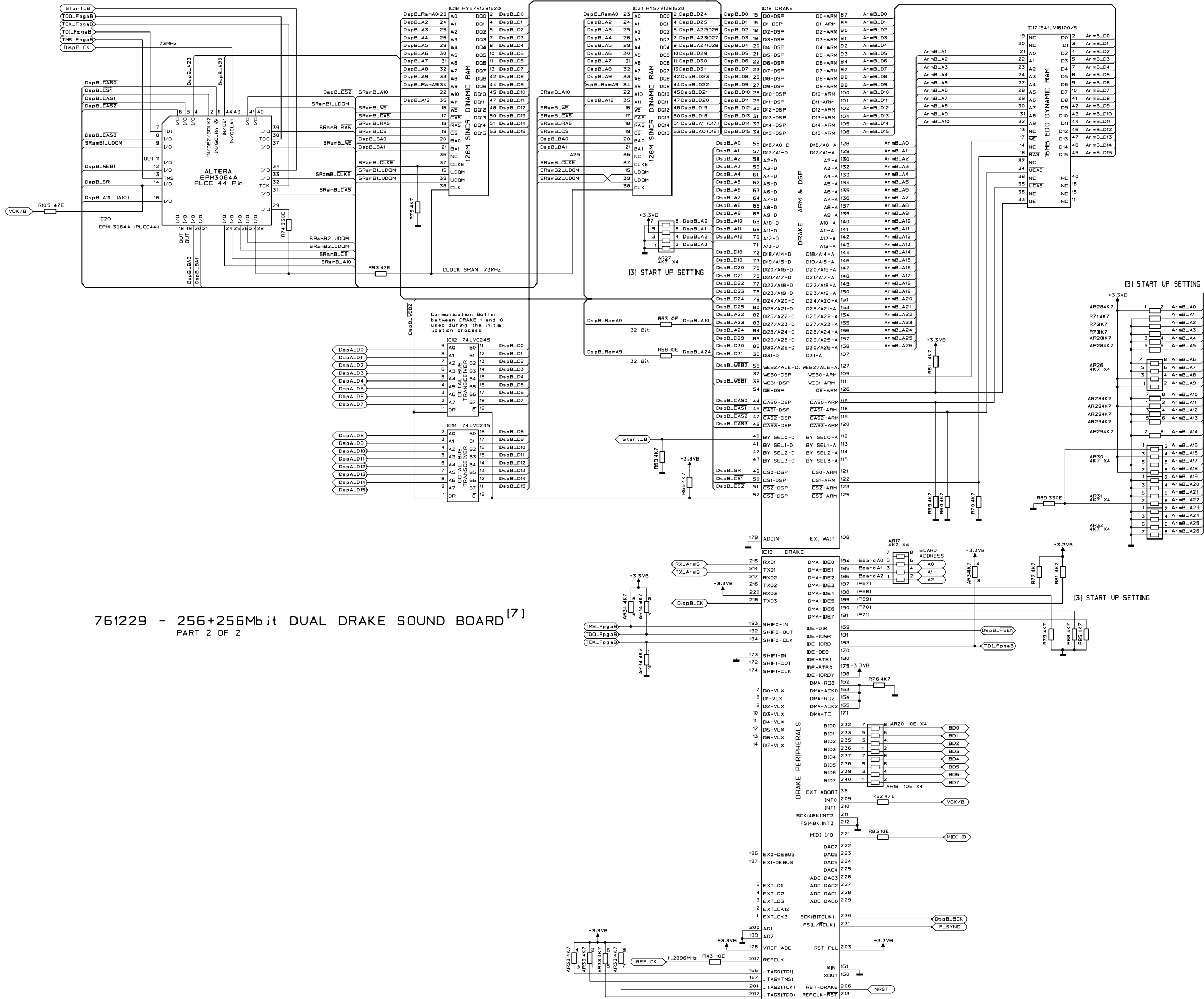


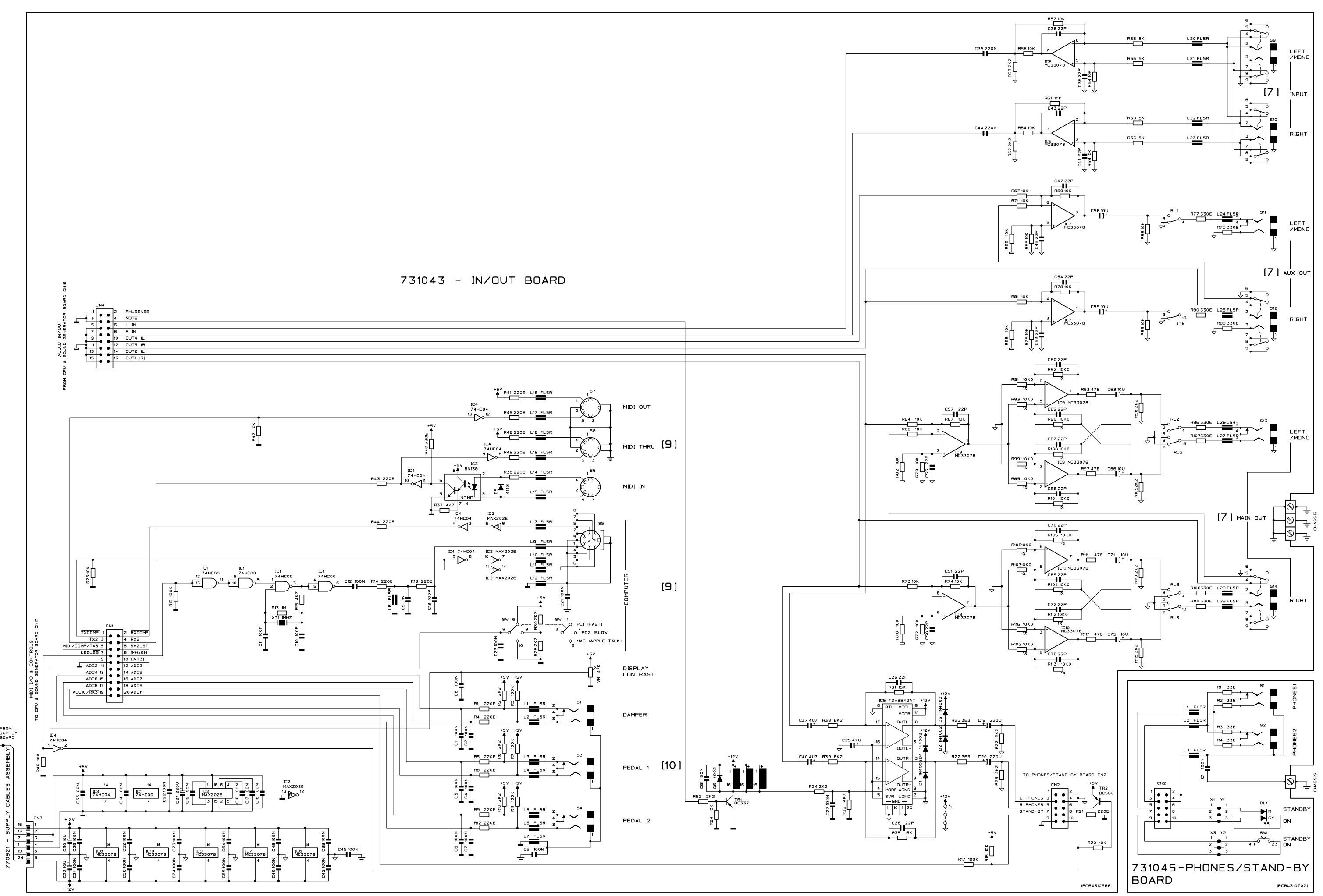
761257 - CPU & SOUND GENERATOR BOARD

PART 2/2

GM SUPPLY ONLY 761257 AS SPARE PART.
IT INCLUDES ALWAYS 761228 (CPU BOARD) AND 761235 (FLASH MEMORY MODULE).

DRW G.BOCATO	DWG# 500961	PCB# 315171	GENERALMUSIC S.p.A. ITALY
CKD M.FRATERALI	DATE 7/3/2002	SCHEMATIC DIAGRAM PROMEGA 3	ALL RIGHTS ARE RESERVED. NO COPIES
APP. M.GALANTI	REV: A	CPU & SOUND GENERATOR BOARD	OR REPRODUCE THIS DOCUMENT WITHOUT
		PART 1 OF 2	WRITTEN CONSENT BY GENERALMUSIC.





770921 - SUPPLY CABLES ASSEMBLY

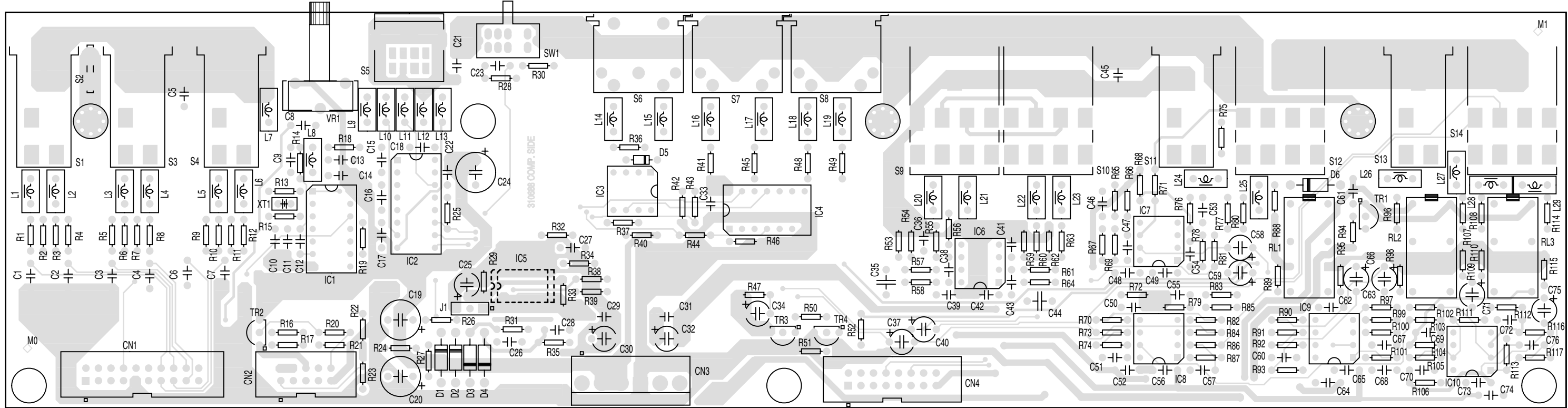
MIDI I/O & CONTROLS
TO CPU & SOUND GENERATOR BOARD CN17

FROM CPU & SOUND GENERATOR BOARD CN16

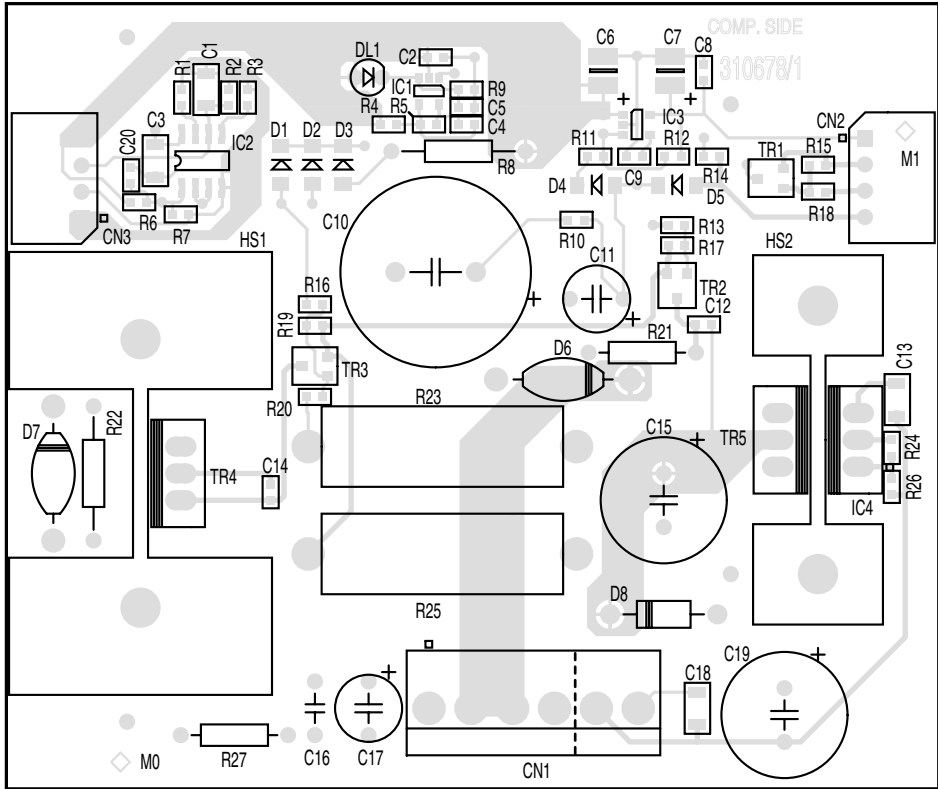
731045 - PHONES/STAND-BY BOARD

DRW G. BOCCATO	DWG# 500959	PCB# 310688, 310702	GENERAL MUSIC S.p.A. ITALY
CKD I. BATELLI	DATE 04/02/02	SCHEMATIC DIAGRAM PROMEGA3	ALL RIGHTS ARE RESERVED. NO COPIES OR REPRODUCE THIS DOCUMENT WITHOUT WRITTEN CONSENT BY GENERAL MUSIC.
APP. M. GALANTI	REV. A	IN/OUT, PHONES/STAND-BY BOARDS	

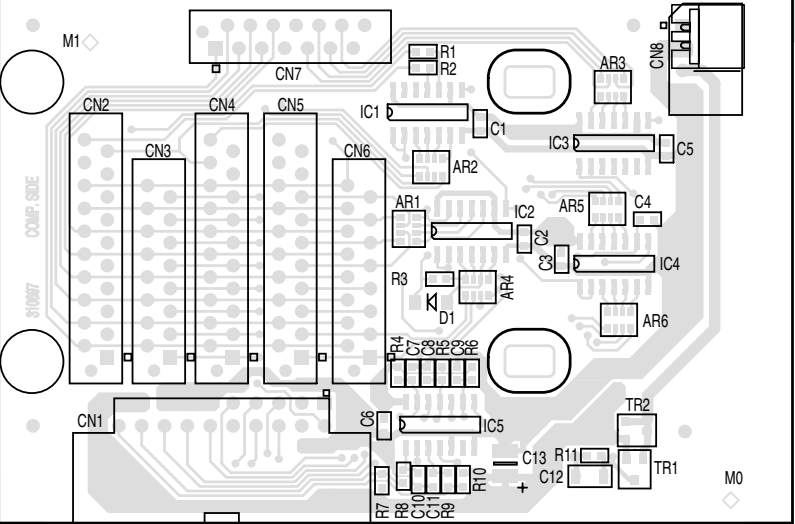
731043 - IN/OUT BOARD



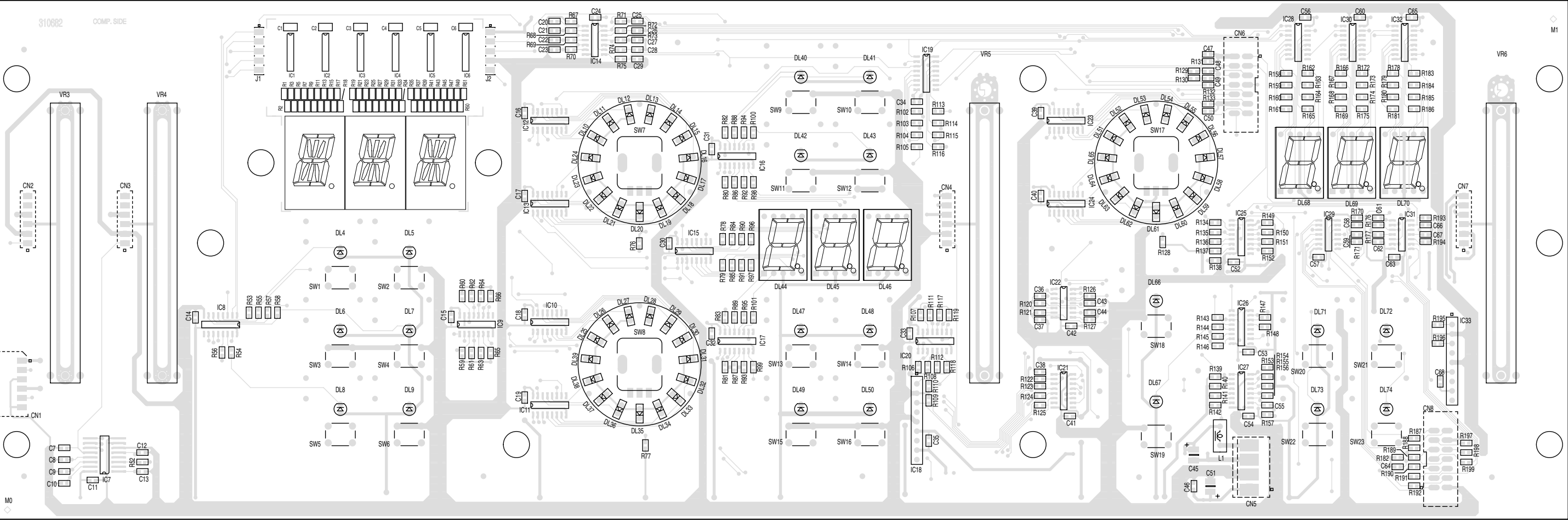
731050 - POT MOTOR SUPPLY & STAND-BY BOARD



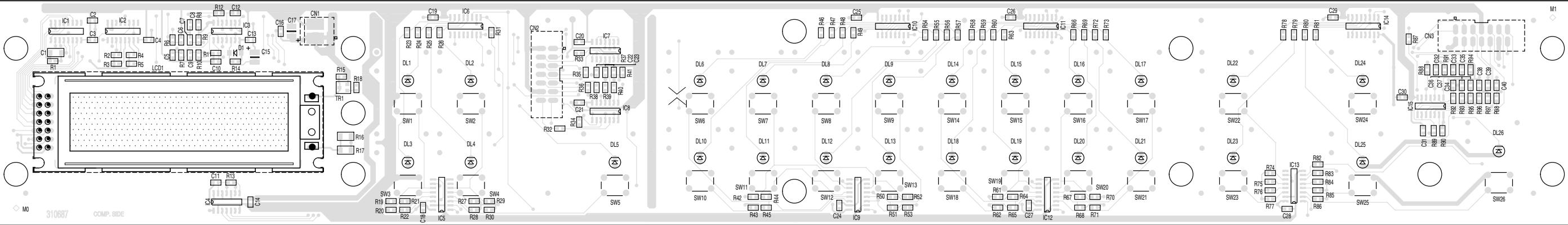
761226 - KEYBOARD INTERFACE BOARD



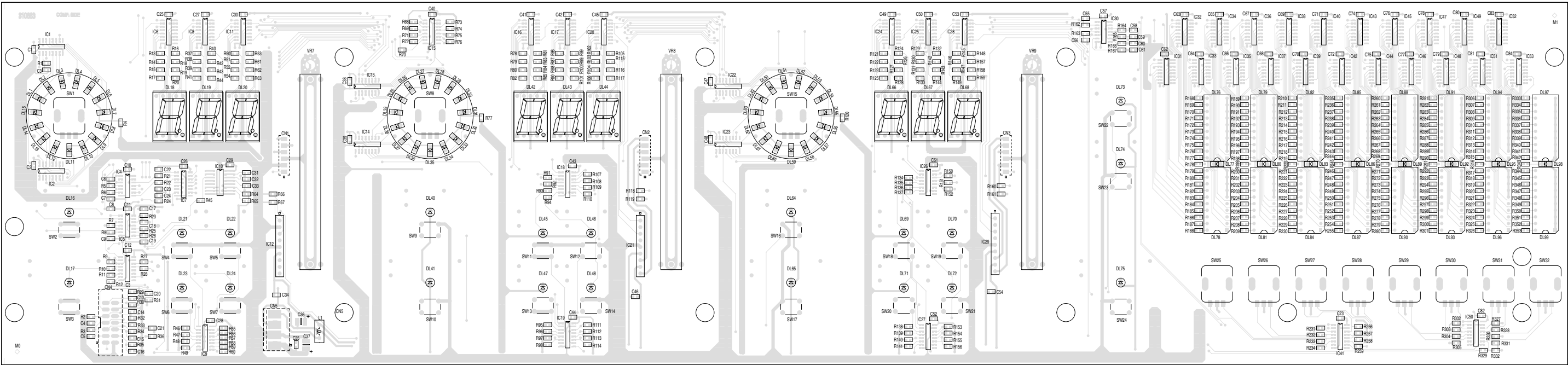
810688 - LEFT CONTROLS PANEL BOARD



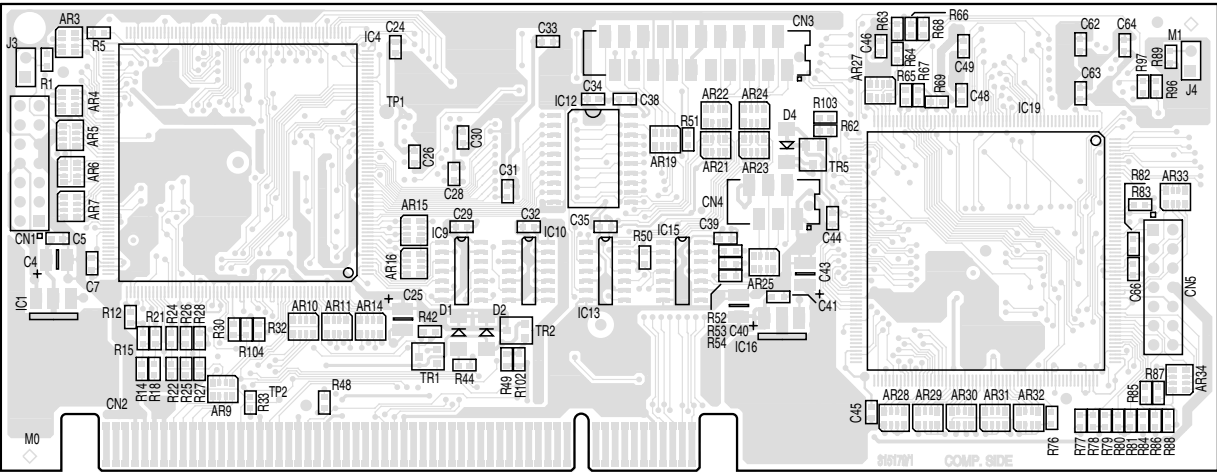
810694 - LOWER CONTROLS PANEL BOARD



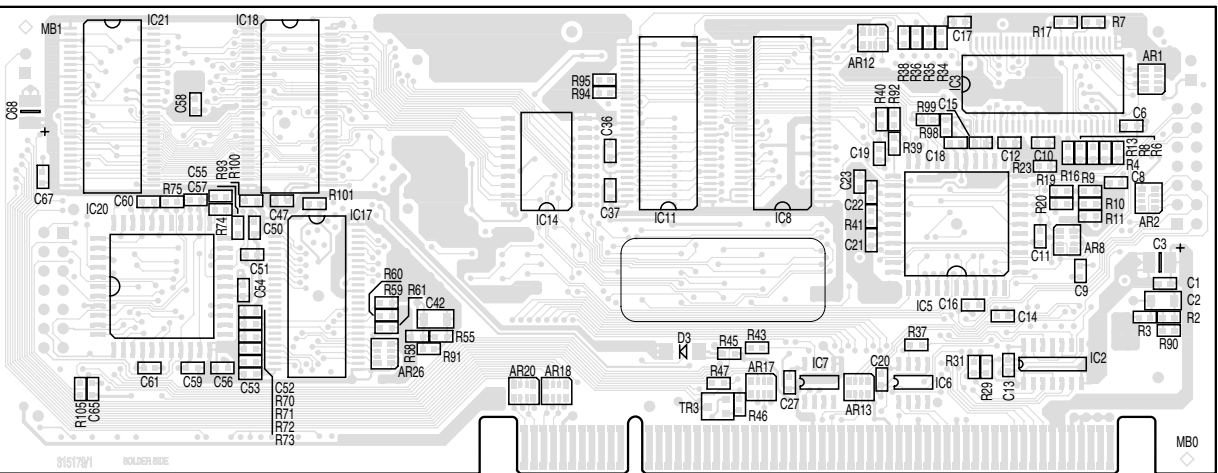
810689 - RIGHT CONTROLS PANEL BOARD



761229 - 256+256Mbit DUAL DRAKE SOUND BOARD (SIDE A)



761229 - 256+256Mbit DUAL DRAKE SOUND BOARD (SIDE B)



Spare Part List	
Code	Description
Legend	
US	= Specify US Version
EU	= Specify EU Version

Optional Accessories

970418	Piano Triple Pedal (Dual Foot Switch + Damper)
130301	2mt Midi Cable

Accessories

970134	Piano Single Foot Switch
271343	Owner's Manual
130283	Mains Cable (US)
130274	Mains Cable (EU)

Top Assembly

660738	Top Panel Chassis
653536	"b-#" Dual Actuator
653534	"ON/OFF" Single Actuator
653533	"RESET" Single Actuator
653532	"SPLIT P." Single Actuator
653531	"< >" Dual Actuator
653530	"TOUCH" Single Actuator
653529	"LOCAL OFF" Single Actuator
653528	"PRESET" Single Actuator
653527	"STORE" Single Actuator
653526	"LOCK" Single Actuator
653525	"TO LEFT" Single Actuator
653524	"CONTR." Single Actuator
653523	"5-6-7-8" Quad Actuator
653522	"1-2-3-4" Quad Actuator
653521	"- +" Dual Actuator
653520	"REVERB-PRO EFX" Dual Actuator
653519	"PARAM2-SEND" Dual Actuator
653518	"DEPTH-PARAM1" Dual Actuator
653517	"TIME-SEND" Dual Actuator
653516	"DEPTH-DELAY" Dual Actuator
653515	"SOUNDS-MIDI" Dual Actuator
653513	"DEMO" Single Actuator
653512	"USER" Single Actuator
653511	"E-F-G-H" Quad Actuator
653510	"A-B-C-D" Quad Actuator
651927	Plexiglass Bargraph Screen
651648	Plexiglass Lcd Display Screen
347409	Dark Gray/Red Slider Knob
341024	Black Knob
340986	D=3.3mm H=9mm Spacer for Metal Panel
340984	Slider Antidust Cover
340982	Plexiglass Green Display Screen
340978	Slider Frame
340976	Plexiglass Red Display Screen
340973	Plexiglass Encoder Led Screen
340426	D=7.5 H=13 Plastic Ferrule for Pitch/Mod Group
340186	Adhesive Cable Fixing
340115	Adhesive Flat Cable Fixing
210020	1.5x12mm Adhesive Red Felt (specify mt)
210017	2x10mm Adhesive Black Felt (specify mt)
210016	1x10mm Adhesive Black Felt (specify mt)
120581	M3 Black Self-Locking Nut

Right Control Assembly

810698	Right Control Assembly
810689 * Right Controls Panel Board (Pcb#310683)	
340971	** Encoder Led Support
340091	** 4mm Led Spacer
230569	** FL5R200PNT EMI Coil For Signal
141101	** 4 Contacts Vert Male Connector
140953	** 6 Contacts P=2.54mm Female Vert Strip
140910	** 14 Contacts Vert Male Connector
140529	** Microswitch 12V 50mA 0.25mm
110262	** Dial Encoder with 15 Snap H=20mm Alps
103032	** 74HC165D SOIC 8bit P To S Shift Register
103028	** 74HC4094M1R SOIC 8bit Shift/Latch Register
103017	** 74HC4051DW SOIC 8ch Analog Multiplexer
103000	** 74HC14D Soic Hex Inverter Schmitt Trigger
100963	** BA6218 SIP Reversible-motor Driver
080760	** SA05-11EWA Kingb. 7 Segments Red Display
080759	** 2x5mm Rect Diffused Green Led
080758	** 2x5mm Rect Diffused Red Led
080736	** DC-10EWA Kingb. 10 Elements Red Led Bar
080723	** 3mm 40deg High Eff Red Led
055048	** 10K 1/16w 5% Smd Resistor 0603
055032	** 470E 1/16w 5% Smd Resistor 0603

055028	** 220E 1/16w 5% Smd Resistor 0603
055024	** 100E 1/16w 5% Smd Resistor 0603
031007	** 10u 16V 20% Smd Electrolytic Tantalium Capacitor
011260	** 100n 16V 10% Cer. Cap. Smd CL2 X7R 0603
011224	** 100p 16V 10% Cer. Cap. Smd CL2 X7R 0603
731042 * Motorized Pot Board (Pcb#310689)	
140956	** 40 Contacts P=2.54mm H=8.5mm Male Vert Strip
130063	** AWG24 Red Cable
130061	** AWG24 Black Cable
072001	** 10KB 60mm Motor Slider Pot. Shaft H=7.1mm
120028	* M3x6tc Black Screw

Left Control Assembly

810697	Left Control Assembly
810688 * Left Controls Panel Board (Pcb#310682)	
731049 ** 3 Digit Display Board (Pcb#310698)	
103028	*** 74HC4094M1R SOIC 8bit Shift/Latch Register
080761	*** PSA05-12GWA Kingb. 16 Segments Green Display
055032	*** 470E 1/16w 5% Smd Resistor 0603
011060	*** 100n 50V 10% Cer. Cap. Smd CL2 Y5V 0805
340971	** Encoder Led Support
340091	** 4mm Led Spacer
230569	** FL5R200PNT EMI Coil For Signal
141101	** 4 Contacts Vert Male Connector
140953	** 6 Contacts P=2.54mm Female Vert Strip
140935	** 6 Contacts Hor Male Connector
140910	** 14 Contacts Vert Male Connector
140874	** Single In Line Vert Male Strip (specify contacts)
140529	** Microswitch 12V 50mA 0.25mm
110262	** Dial Encoder with 15 Snap H=20mm Alps
103032	** 74HC165D SOIC 8bit P To S Shift Register
103028	** 74HC4094M1R SOIC 8bit Shift/Latch Register
103017	** 74HC4051DW SOIC 8ch Analog Multiplexer
103000	** 74HC14D Soic Hex Inverter Schmitt Trigger
100963	** BA6218 SIP Reversible-motor Driver
080764	** 3mm High Eff Green Led
080760	** SA05-11EWA Kingb. 7 Segments Red Display
080758	** 2x5mm Rect Diffused Red Led
080723	** 3mm 40deg High Eff Red Led
055048	** 10K 1/16w 5% Smd Resistor 0603
055032	** 470E 1/16w 5% Smd Resistor 0603
055028	** 220E 1/16w 5% Smd Resistor 0603
055024	** 100E 1/16w 5% Smd Resistor 0603
031007	** 10u 16V 20% Smd Electrolytic Tantalium Capacitor
011260	** 100n 16V 10% Cer. Cap. Smd CL2 X7R 0603
011224	** 100p 16V 10% Cer. Cap. Smd CL2 X7R 0603
731042 * Motorized Pot Board (Pcb#310689)	
140956	** 40 Contacts P=2.54mm H=8.5mm Male Vert Strip
130063	** AWG24 Red Cable
130061	** AWG24 Black Cable
072001	** 10KB 60mm Motor Slider Pot. Shaft H=7.1mm
731041 * Potentiometer Board (Pcb#310689)	
140955	** 40 Contacts P=2.54mm H=7mm Male Vert Strip
072002	** 10KB 60mm Vertical Slim Slider Pot. Shaft H=10mm
340981	* Spacer for Potentiometer
120028	* M3x6tc Black Screw
120021	* M2x6tc Screw

Lower Controls Panel Board

810694 Lower Controls Panel Board (Pcb#310687)	
340091	* 4mm Led Spacer
141100	* 2 Contacts Vert Male Connector
140910	* 14 Contacts Vert Male Connector
140874	* Single In Line Vert Male Strip (specify contacts)
140860	* 14 Contacts Vert Male Dual In Line Strip
140529	* Microswitch 12V 50mA 0.25mm
103032	* 74HC165D SOIC 8bit P To S Shift Register
103028	* 74HC4094M1R SOIC 8bit Shift/Latch Register
103009	* 74HC02D SOIC Quad 2-In Nor Gate
103007	* 74HC74D SOIC Dual Flip-Flop
103000	* 74HC14D Soic Hex Inverter Schmitt Trigger
091004	* BC807-25L TO236 Smd Pnp Transistor (9FB/G5B)
081000	* PMLL4148 Smd 100mA 75V Signal Diode
080764	* 3mm High Eff Green Led
080762	* WM-C1602N-1GLY Wintek 2x16 Characters Lcd Display
080723	* 3mm 40deg High Eff Red Led
055060	* 100K 1/16w 5% Smd Resistor 0603
055048	* 10K 1/16w 5% Smd Resistor 0603
055044	* 4K7 1/16w 5% Smd Resistor 0603
055040	* 2K2 1/16w 5% Smd Resistor 0603
055036	* 1K 1/16w 5% Smd Resistor 0603
055032	* 470E 1/16w 5% Smd Resistor 0603
055027	* 180E 1/16w 5% Smd Resistor 0603
055024	* 100E 1/16w 5% Smd Resistor 0603
053012	* 10E 1/8w 5% Smd Resistor 1206

031007	* 10u 16V 20% Smd Electrolytic Tantalium Capacitor
011260	* 100n 16V 10% Cer. Cap. Smd CL2 X7R 0603
011224	* 100p 16V 10% Cer. Cap. Smd CL2 X7R 0603
011103	* 1u 16V 10% Cer. Cap. Smd CL2 XTR 1206

Pitch & Modulation Assembly

720644 Pitch & Modulation Assembly	
770923	* Pitch & Modulation Cables Assembly
720647	* Fatar 41918180 Pitch & Modulation Kit (This part is replaced entirely only)

Bottom Assembly

653581	Lateral Block for Keyboard
262319	Wooden Right Side
262318	Wooden Left Side
180643	Phones Adhesive Plate
171838	Right Side Angular Support
171837	Left Side Angular Support
120581	M3 Black Self-Locking Nut
120374	WL4x15tt Black Screw
120147	M4x10tt Black Screw
120034	M4x12tc Black Screw
660751	Option Slot Closer
660740	Bottom Chassis
653514	Stand-By Actuator
340435	Adhesive Foot
340370	Contrast Knob
340186	Adhesive Cable Fixing
340115	Adhesive Flat Cable Fixing
340093	Board Spacer
210042	2x10mm Adhesive Spik (specify mt)
171887	Hinge
171866	Battery Support
171860	Slot Board Holder
150298	100x2.5mm Nylon Cable Tie
120825	6.2mm Spacer Screw
120581	M3 Black Self-Locking Nut
120483	5mm Black Shakeproof Washer
120120	M5x10tc Black Screw
120028	M3x6tc Black Screw

Supply Assembly

110614	Mains Socket
110285	4A 250Vac Bipolar Power Switch

731011 SNP9541M 40W Switching Supply Unit

Pot Motor Supply & Stand-by Board

110323 3.6V 1.3Ah NiMh Battery Pack with NTC	
731050 Pot Motor Supply & Stand-by Board (Pcb#310678)	
340079	* TO220 Mica Washer
340078	* TO220 Insulated Bush
171867	* TO220 h=38mm Heatsink
170960	* TO220 h=25mm Heatsink
141102	* 6 Contacts Vert Male Connector
140873	* 4 Contacts Vert Female Connector
140872	* 4 Contacts Hor Male Connector
120581	* M3 Black Self-Locking Nut
120114	* M3x12tc Black Screw
106012	* LMC7221BIM5 SOT23-5 Cmos Comparator
106011	* LD2981 SOT23-5L 3.3V 0.1A Low Drop Regulator
106010	* MC33340D SO-8 Battery Fast Charge Controllrer
100066	* LM317T TO220 1.2-37V 1.5A Adjustable Regulator
091004	* BC807-25L TO236 Smd Pnp Transistor (9FB/G5B)
091003	* BC817-25L TO236 Smd Npn Transistor (8FB/G6B)
090558	* TIP127 TO220 Pnp Darlington Transistor
081000	* PMLL4148 Smd 100mA 75V Signal Diode
080752	* 3mm Wide Diffused Red Led
080171	* FE6B 6A 100V Fast Recovery Diode
080156	* 1N4002 1A 100V Rectifier Diode
060171	* 2E2 2W 10% Resistor
060087	* 0E47 5W 5% Wire Resistor
055072	* 1M 1/16w 5% Smd Resistor 0603
055068	* 470K 1/16w 5% Smd Resistor 0603
055064	* 220K 1/16w 5% Smd Resistor 0603
055057	* 56K 1/16w 5% Smd Resistor 0603
055056	* 47K 1/16w 5% Smd Resistor 0603
055048	* 10K 1/16w 5% Smd Resistor 0603
055045	* 5K6 1/16w 5% Smd Resistor 0603
055044	* 4K7 1/16w 5% Smd Resistor 0603
055040	* 2K2 1/16w 5% Smd Resistor 0603
055036	* 1K 1/16w 5% Smd Resistor 0603
055032	* 470E 1/16w 5% Smd Resistor 0603
055028	* 220E 1/16w 5% Smd Resistor 0603
050371	* 1K 1/4W 5% Resistor
040302	* 270E 1/2W 5% Resistor
040234	* 82E 1/2W 5% Resistor

031007	* 10u 16V 20% Smd Electrolytic Tantalium Capacitor
030721	* 1000u 25V 20% Vert Electrolytic Capacitor
030485	* 100u 25V 20% Vert Electrolytic Capacitor
011260	* 100n 16V 10% Cer. Cap. Smd CL2 X7R 0603
011236	* 1n 16V 10% Cer. Cap. Smd CL2 X7R 0603
011103	* 1u 16V 10% Cer. Cap. Smd CL2 XTR 1206
010595	* 100n 50V -20+80% Ceramic Cap. Multilayer

Wiring Connection

841289	Single 7.5cm AWG18 White Faston/Faston Wire
841288	2 Wires 12.5cm Faston/Crimp Terminal Cable
841287	20 Wires 55cm Latch Flat Cable
841286	14 Wires 90cm Latch Flat Cable
841285	10 Wires 115cm Latch Flat Cable
841121	20cm Yel/Grn Faston/Faston Wire
841096	4 Wires 7,5cm Flat Cable
841006	10cm Yel/Grn Faston/Faston AWG18 Wire
840616	20 Wires 25cm Latch Flat Cable
840600	16 Wires 85cm Latch Flat Cable
840564	14 Wires 10cm Latch Flat Cable
840560	14 Wires 20cm Latch Flat Cable
770921	Supply Cables Assembly

Keyboard Assembly

720641	TP30 Keyboard Assembly with Interface Board
841084	* 20 Wires 35cm Flat Cable
840838	* 20 Wires 15cm Flat Cable
840791	* 2 Wires 40cm Crimp Terminal Cable
761226 * Keyboard Interface Board (Pcb#310697)	
141018	** 20 Contacts Vert Female Connector
140918	** 2 Contacts Hor Male Connector
140852	** 20 Contacts Hor Male Connector Din41651
103015	** 74HC164D SOIC 8bit S To P Shift Register
103000	** 74HC14D Soic Hex Inverter Schmitt Trigger
091001	** BC857B/C TO236 Smd Pnp Transistor (9BB/C-3F/G)
081000	** PMLL4148 Smd 100mA 75V Signal Diode
055100	** 100E X4 1/16w 5% Smd Resistor Array
055048	** 10K 1/16w 5% Smd Resistor 0603
055040	** 2K2 1/16w 5% Smd Resistor 0603
055024	** 100E 1/16w 5% Smd Resistor 0603
031007	** 10u 16V 20% Smd Electrolytic Tantalium Capacitor
011260	** 100n 16V 10% Cer. Cap. Smd CL2 X7R 0603
011228	** 220p 16V 10% Cer. Cap. Smd CL2 X7R 0603
011103	** 1u 16V 10% Cer. Cap. Smd CL2 XTR 1206
731033 * After-Touch Connection Board (Pcb#315187)	
140918	** 2 Contacts Hor Male Connector
140890	** 4 Contacts Hor Male Single-Strip
720640 * TP30 Keyboard Assembly	(end to SN.142B020250)
720662 * TP30 Keyboard Assembly	(start from SN.142D020497)
810552 ** 39N Left Contacts Board (Pcb#310531)	
340764	*** 3 Dual Contacts Rubber Strip
340211	*** 12 Dual Contact Rubber Strip
141018	*** 20 Contacts Vert Female Connector
141010	*** 4 Contacts Vert Female Connector
080103	*** 1N4148 100mA 75V Signal Diode
810551 * 49N Right Contacts Board (Pcb#310530)	
340212	** 13 Dual Contact Rubber Strip
340211	*** 12 Dual Contact Rubber Strip
141018	*** 20 Contacts Vert Female Connector
141010	*** 4 Contacts Vert Female Connector
080103	*** 1N4148 100mA 75V Signal Diode
151272	** First A Key (TP30)
151271	** Sharp Key (TP30)
151270	** B Key (TP30)
151269	** A Key (TP30)
151268	** G Key (TP30)
151267	** F Key (TP30)
151266	** E Key (TP30)
151265	** D Key (TP30)
151264	** C Key (TP30)
160221	** Key Return Spring (TP30) (720662 only)
340092	* 5mm Board Spacer
120281	* WL3x15tt Black Screw

Cpu & Sound Generator Board

761257 Cpu & Sound Generator Board (Pcb#315171)	
761228	* <i>Cpu & Sound Generator Board (Pcb#315171) not supplied, refer to 761257.</i>
141102	** 6 Contacts Vert Male Connector
140957	** 20 Contacts P=2mm Male Vert Strip
140950	** 120 Contacts Female PCI Edge Connector
140910	** 14 Contacts Vert Male Connector
140877	** Jumper For Contacts Strip (p=2.54mm)
140874	** Single In Line Vert Male Strip (specify contacts)
140872	** 4 Contacts Hor Male Connector

