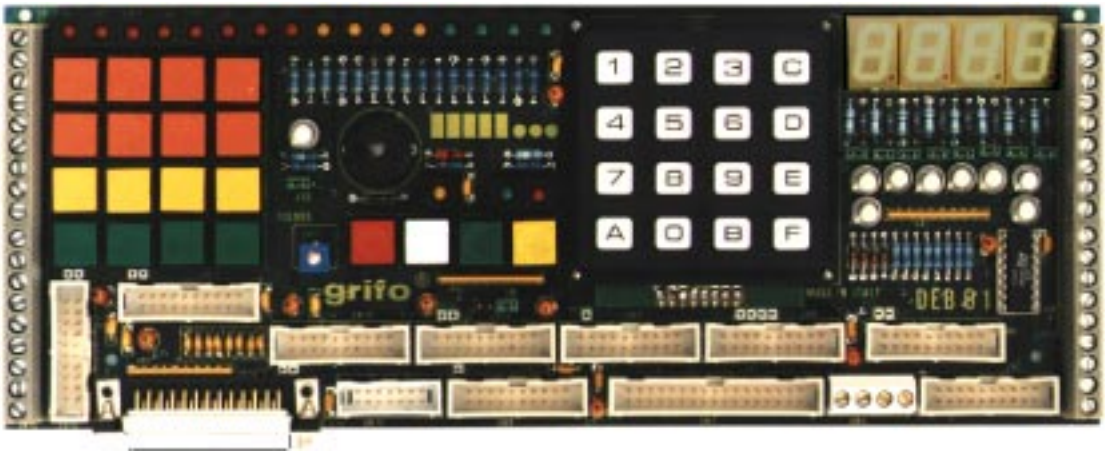
DEB 01

Didactic Experimental Board

TECHNICAL MANUAL



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DEB 01 Edition 5.00 *Rel. 25 January 2001*

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Didactic board that supports several sections to interact with typical devices useful in industrial automation.
The sections support interfaces to the following features: 16 TTL I/O lines visualized through 16 LEDs and settable on board through 16 keys; four 7 segments displays and a 16 keys matrix keyboard; LCD display plus four keys and buzzer; fluorescent display; actuators and trasductors; CENTRONICS parallel printer; **GPC® 68** I/O connector.

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IMPORTANT

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For specific informations on the components mounted on the card, please refer to the Data Book of the builder or second sources.

SYMBOLS DESCRIPTION

In the manual could appear the following symbols:

Attention: Generic danger

Attention: High voltage

Trade Marks

abaco®, **GPC**®, **grifo**® : are trade marks of **grifo**®.
Other Product and Company names listed, are trade marks of their respective companies.

GENERAL INDEX

FIGURES INDEX

INTRODUCTION

The use of these devices has turned - IN EXCLUSIVE WAY - to specialized personnel.

The purpose of this handbook is to give the necessary information to the cognizant and sure use of the products. They are the result of a continual and systematic elaboration of data and technical tests saved and validated from the manufacturer, related to the inside modes of certainty and quality of the information.

The reported data are destined- IN EXCLUSIVE WAY- to specialized users, that can interact with the devices in safety conditions for the persons, for the machine and for the enviroment, impersonating an elementary diagnostic of breakdowns and of malfunction conditions by performing simple functional verify operations , in the height respect of the actual safety and health norms.

The informations for the installation, the assemblage, the dismantlement, the handling, the adjustment, the reparation and the contingent accessories, devices etc. installation are destined - and then executable - always and in exclusive way from specialized warned and educated personnel, or directly from the TECHNICAL AUTHORIZED ASSISTANCE, in the height respect of the manufacturer recommendations and the actual safety and health norms.

The devices can't be used outside a box. The user must always insert the cards in a container that rispect the actual safety normative. The protection of this container is not threshold to the only atmospheric agents, but specially to mechanic, electric, magnetic, etc. ones.

To be on good terms with the products, is necessary guarantee legibility and conservation of the manual, also for future references. In case of deterioration or more easily for technical updates, consult the AUTHORIZED TECHNICAL ASSISTANCE directly.

To prevent problems during card utilization, it is a good practice to read carefully all the informations of this manual. After this reading, the user can use the general index and the alphabetical index, respectly at the begining and at the end of the manual, to find information in a faster and more easy way.

CARD VERSION

This handbook makes reference to boards version **110792** and following ones. The validity of the information contained in this manual is subordinated to the card version, so the user must always verify the correct correspondence beetween the notations. On the card the release number is present in more points both on printed diagram (serigraph) and printed circuit (for example above the matrix keyboard contacts on the solder side).

GENERAL INFORMATION

DEB 01 (Didactic Experimental Board) is a very intresting experimental, development and support board for the **ABACO®** serie industrial cards. The board is made of seven independent sections, each one involving parallel interfaces, that give the possibility to test those procedures which use two 8 bits I/O ports. **DEB 01** is provided with a set of comfortable connectors to interface to the several sections on the board from **grifo®** standard I/O connectors.
Matching **DEB 01** to one of the **grifo®** intelligent control cards (**GPC®** serie) allows to learn and experiment the several hardware and software techniques that must be employed in the industrial automation field. Being provided with a very wide range of example programs written in many languages for a great number of different CPU's, **DEB 01** constitues a good "launchpad" to enter with competence in the articulate world of microelectronics.
The seven DEB 01 sections are designed to solve the basic problems of the industrial automation filed like keyboard scanning, seven segments display refresh, signals acquisition and setting, printer management, sound generation through buzzer, LCD and fluorescent display driving, etc.

- Size: **100 x 260 mm** con with holes for mechanical mounting.
- Section for generic I/O management: **16 keys** + **16 LEDs** + **field signals** connected to the same input/output lines of the control card.
- Section to manage **four 7 segments digits** + 4 x 4 matrix hexadecimal **keyboard**.
- Section to manage **LCD display** + **4 keys** + **Buzzer**. Display that can be driven is **LM 40x21A** manufactured by **SHARP**.
- Section to manage **fluorescent display** + **3 keys** + **Buzzer**. Displays that can be driven are family **MxxxSD** manufactured by **FUTABA**.
- Section to manage **CENTRONICS** printer output.
- Section to manage **I/O signals from external world** provided with screw terminal connectors to duplicate the I/O signals.
- Section to manage standard **grifo®** 20 pins I/O connectors to interface to **GPC® 68** board.
- **LEDs** to visualize signals statusand **keys** of different colors to make esier the signals recgnition, the signals come from standard **grifo®** 20 pins I/O connectors.
- Unique **+5 Vdc** power supply that can be provided through the command card interfacement connectors.

Here follows a description of the seven sections on the board, including the operations that each section performs. To easily understand the description and to verify their connections please refer to figure 1.

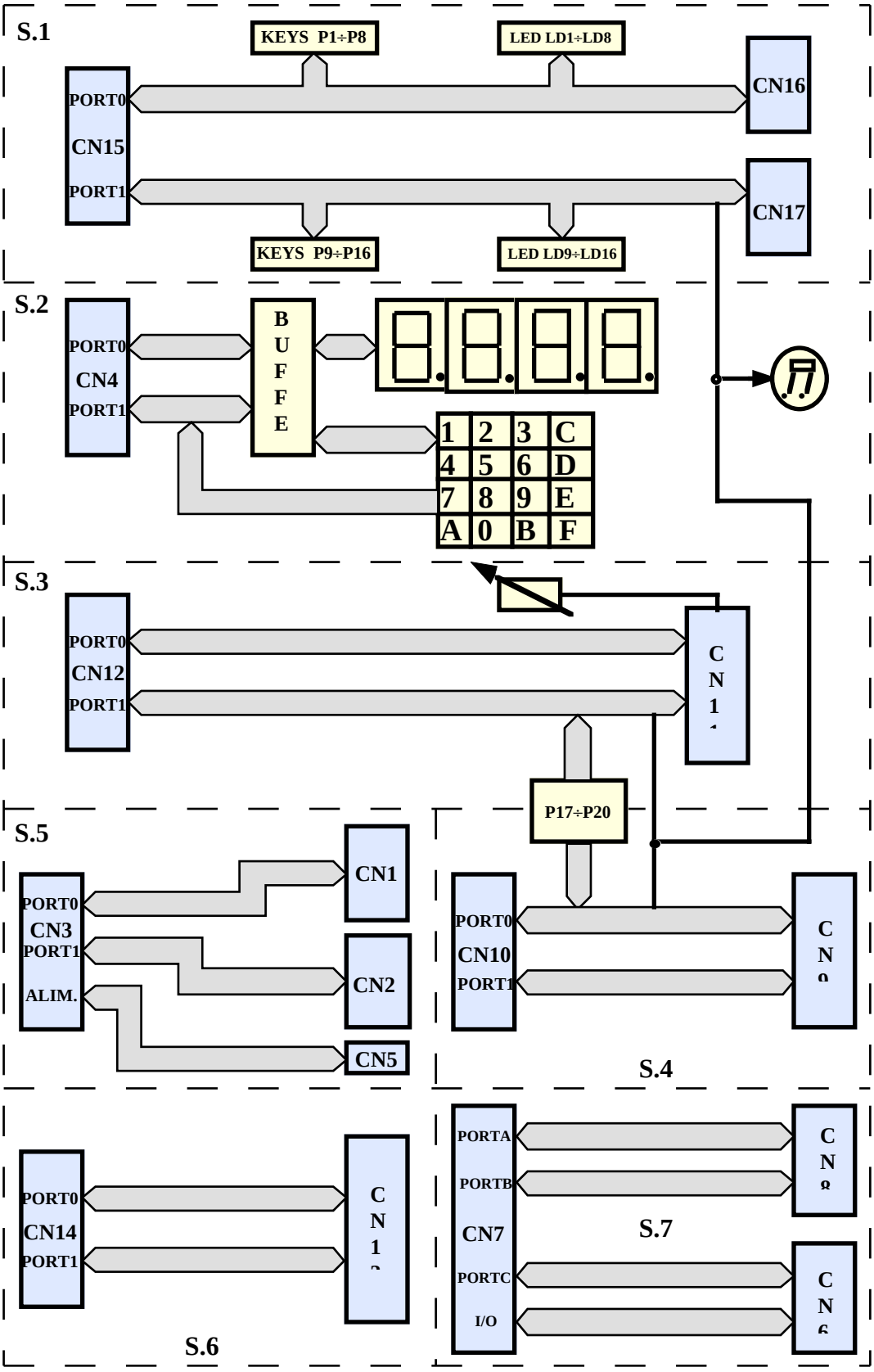

FIGURE 1: BLOCK DIAGRAM

SECTION 1

Section 1 is composed by a standard 20 pins **ABACO®** I/O connector that features two 8 bits ports which are connected to 16 LEDs, 16 keys, the buzzer and two screw terminal connectors. Connectors CN15, CN16 and CN17 belong to this section. Its main purpose is to simulate common operations of logic signals setting and/or acquisition to/from the external world. LEDs always visualize the lines status (both as inputs and as outputs) making easier the debug phase even when interfacing signals from the external world. Buzzer management can be actived through a jumper, as described in the paragraph “3 PINS JUMPERS”.

SECTION 2

Section 2 is composed by a standard 20 pins **ABACO®** I/O connector whose two 8 bits ports are used to drive a four 7 segments displays and to acquire a 16 keys matrix keyboard (hexadecimal keyboard) made up by 4 rows and 4 columns. Connector CN4 belongs to this section, its main purpose is to perfrom a low level user interfacement providing the possibility to read data, to visualize values and messages, etc.

SECTION 3

Section 3 is composed by a standard 20 pins **ABACO®** I/O connector (CN12) whose two 8 bits ports are used to drive an intelligent LCD display (model SHARP LM 40x21A) featuring 2 rows by 40 characters. A 14 pins connector (CN11) belongs to this sectin, this connector has a pin out compatible to the described display and a trimmer to set the contrast level plus 4 input keys and a buzzer. The main purpose of this section is to provide an high level user system interface to visualize values, messages, information, etc.

SECTION 4

Section 4 is composed by a standard 20 pins **ABACO®** I/O connector (CN10) whose two 8 bits ports are used to drive intelligent FUTABA fluorescent displays (models M204SD01AA, M202SD01BA, M40SD04GJ, etc.) featuring from a minimum of 2 row by 20 characters to a maximum of 2 rows by 40 characters. A 20 pins connector (CN9) belongs to this section, it has a pin out compatible to the described displays, 3 input keys and a buzzer. The main purpose of this section is to provide an high level user system interface to visualize values, messages, information, etc.

SECTION 5

Section 5 is composed by a standard 20 pins **ABACO®** I/O connector (CN3) whose two 8 bits ports are duplicated on three screw terminal connectors (CN1, CN2, CN5) for easier connections to the external world. The main purpose of this section is to provide an interface to the external world easy to use and capable to fit for any purpose.

SECTION 6

Section 6 is composed by a standard 20 pins **ABACO®** I/O connector (CN14) whose two 8 bits ports are duplicated on a D type 25 pins connector featuring a CENTRONICS compatible pin out (CN13). The main purpose of this section is to drive directly a CENTRONICS compatible parallel printer (for example printers for Persoal Computers) to achieve permanent representation of values, messages, data, graphics, etc.

SECTION 7

Section 7 is composed by a 34 pins I/O connector (CN7) compatible to **GPC® 68** I/O connector that duplicates all the signals to two standard 20 pins **ABACO®** I/O connectors (CN8 and CN6). The main purpose of this section is to provide to the **GPC® 68** users the possibility to employ all the boards provided with **ABACO®** I/O connectors, including the remaining six sections of **DEB 01**.

COLORS USED

All the keys and LEDs installed on **DEB 01** have different colors to easy the recognition of their connection. The colors create correspondances amongst port signals, LEDs and keys so are useful to individuate each signal and its directionality. For further information please refer to the paragraphs “VISUAL FEEDBACK” and “KEYS”.

TECHNICAL FEATURES

GENERAL FEATURES

Interface type: Parallel using two 8 bit ports TTL

I/O signals: 16 digital I/O

Sections:
1) Interface to 16 LEDs and 16 keys + screw terminal + buzzer
2) Interface to 4 digits + matrix keyboard + buzzer
3) Interface to display LCD + 4 keys + buzzer
4) Interface to display FUTABA + 4 keys + buzzer
5) Interface to screw terminal connectors
6) Interface to CENTRONICS printer
7) Interface to **GPC® 68**

Buzzer type: Electromagnetic

ELECTRIC FEATURES

Power supply: +5 Vdc

Current consumption: depends on which section is used and on I/O signals status.

PHYSICAL FEATURES

Size: 100 x 260 mm

Weight: 270 g

Connectors:
CN3: low profile 20 pins vertical male.
CN4: low profile 20 pins vertical male.
CN6: low profile 20 pins vertical male.
CN8: low profile 20 pins vertical male.
CN9: low profile 20 pins vertical male.
CN10: low profile 20 pins vertical male.
CN12: low profile 20 pins vertical male.
CN14: low profile 20 pins vertical male.
CN15: low profile 20 pins vertical male.
CN1: 9 pins screw terminal connector.
CN2: 9 pins screw terminal connector.
CN16: 9 pins screw terminal connector.
CN17: 9 pins screw terminal connector.
CN5: 4 pins screw terminal connector.
CN7: low profile 34 pins vertical male.
CN11: low profile 14 pins vertical male.
CN13: D type 25 pins 90° female.

Temperature range: from 10 to 40 Centigrad degreeses.

Relative humidity: 20% up to 90% (without condensing).

INSTALLATION

In this chapter there are the information for a right installation and correct use of the board. The user can find the location and functions of each connectors, trimmers, jumpers and some explanatory diagrams.

CONNECTIONS

The board has seventeen connectors that can be linkeded to other devices or directly to the field, according to system requirements. In this paragraph there are connectors pin outs, a short signals description (including the signals direction) and connectors location. Please remark that most of connectors feature a standard **ABACO®** I/O 20 pins connector pin out, installed on all **grifo®** boards, in this standard the ports are called port 0 (pin 1÷8) and port 1 (pin 9÷16). It is a generic indication that can be replaced with other ones on boards with the same type of connector (e. g. port A, port B). To easily locate the connectors please refer to figure 17.
NOTE: For all the connectors the standard pin enumeration has been assumed, that is the orrdinal number grows from left to right on the solder side.

CN5 - SUPPLY SCREW TERMINAL CONNECTOR FROM CN3

CN5 is a 4 pins screw terminal connector directly connected to the signal of connector CN3 (please see section 5) that are not connected to connectors CN1 and CN2. The screw terminals allow to hold with extreme safety all the conductors with diameter lower that 3 mm and to perform a comfortable connection to the external world.

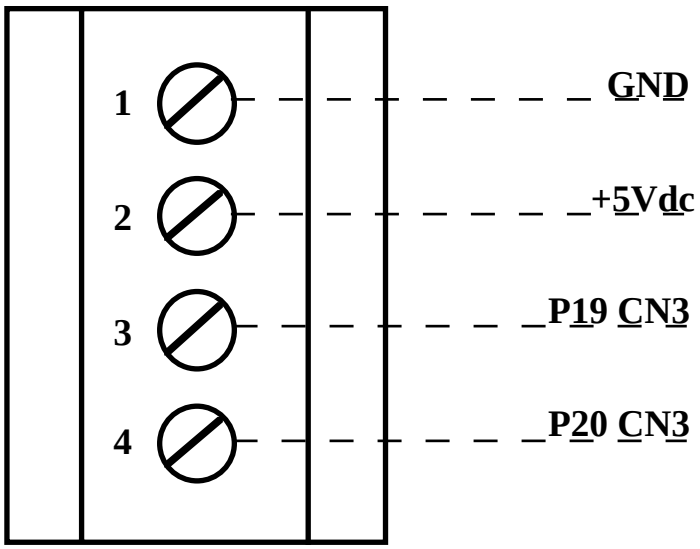

FIGURE 2: CN5 - SUPPLY SCREW TERMINAL CONNECTOR FROM CN3

Signals description:

GND	=		- Ground
+5Vdc CN5	=	I	- +5 Vdc power supply
P19 CN3	=	I/O	- Pin 19 of connector CN3
P20 CN3	=	I/O	- Pin 20 of connector CN3

CN1 - SCREW TERMINAL CONNECTOR FROM PORT 0 OF CN3

CN1 is a 9 pins screw terminal connector directly connected to the signals of port 0 on connector CN3 (please see section 5). The screw terminals allow to hold with extreme safety all the conductors with diameter lower that 3 mm and to perform a comfortable connection to the external world.

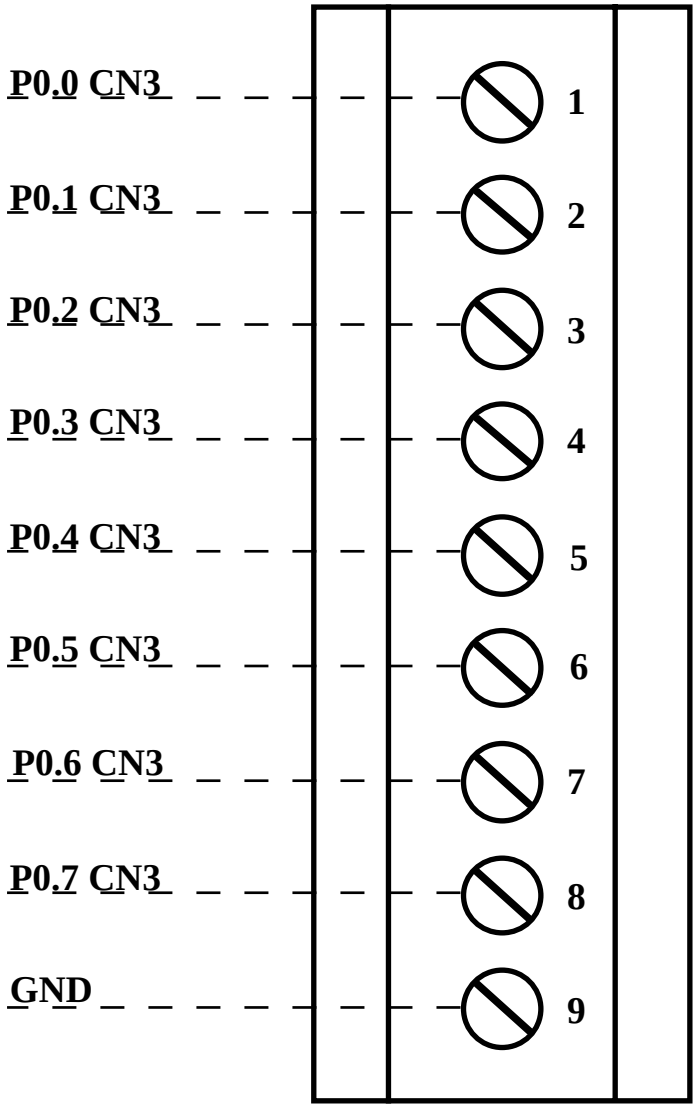

FIGURE 3: CN1 - SCREW TERMINAL CONNECTOR FROM PORT 0 OF CN3

Signals description:

P0.x CN3 = I/O - Signal x of port 0 on connector CN3
GND = - Ground

CN2 - SCREW TERMINAL CONNECTOR FROM PORT 1 OF CN3

CN2 is a 9 pins screw terminal connector directly connected to the signals of port 1 on connector CN3 (please see section 5). The screw terminals allow to hold with extreme safety all the conductors with diameter lower that 3 mm and to perform a comfortable connection to the external world.

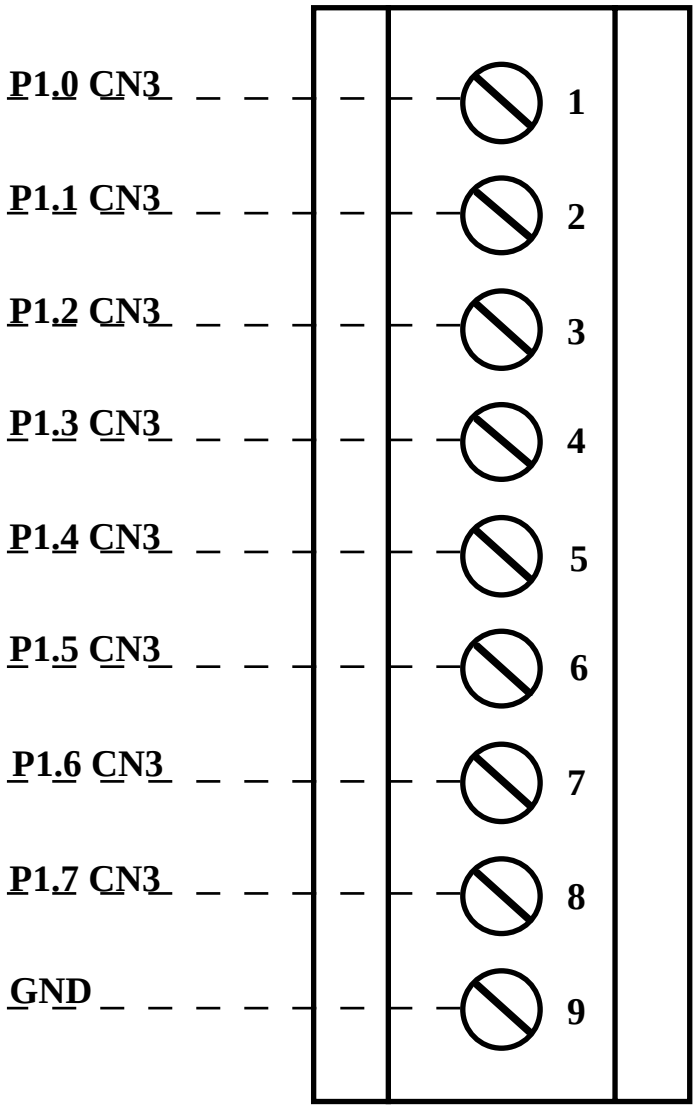

FIGURE 4: CN2 - SCREW TERMINAL CONNECTOR FROM PORT 1 OF CN3

Signals description:

P1.x CN3 = I/O - Signal x of port 1 on connector CN3
GND = - Ground

CN3 - SECTION 5 I/O CONNECTOR

CN3 is a 20 pins low profile vertical male connector used for digital I/O to the intelligent control card. It features **ABACO®** I/Ostandard pin out and its signals are duplicated to connectors CN1, CN2 and CN5.

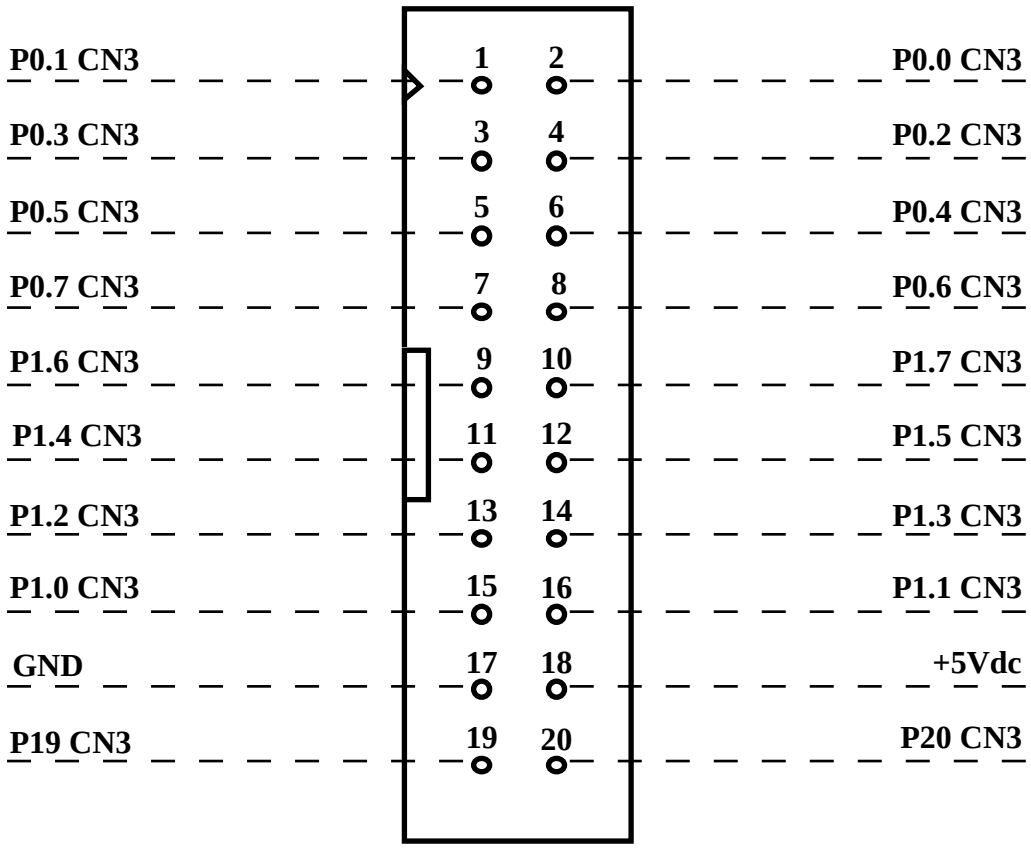

FIGURE 5: CN3 - SECTION 5 I/O CONNECTOR

Signals description:

P0.x CN3	=	I/O	-Signal x of port 0
P1.x CN3	=	I/O	- Signal x of port 1
+5Vdc	=	I	- Power supply +5 Vdc (please see jumper J9)
GND	=		- Ground
P19 CN3	=	I/O	- Pin 19 of connector CN3
P20 CN3	=	I/O	- Pin 20 of connector CN3

CN4 - SECTION 2 I/O CONNECTOR

CN4 is a 20 pins low profile vertical male connector used for digital I/O to the intelligent control card. It features **ABACO®** I/Ostandard pin out and its signals are duplicated to connectors CN1, CN2 and CN5.

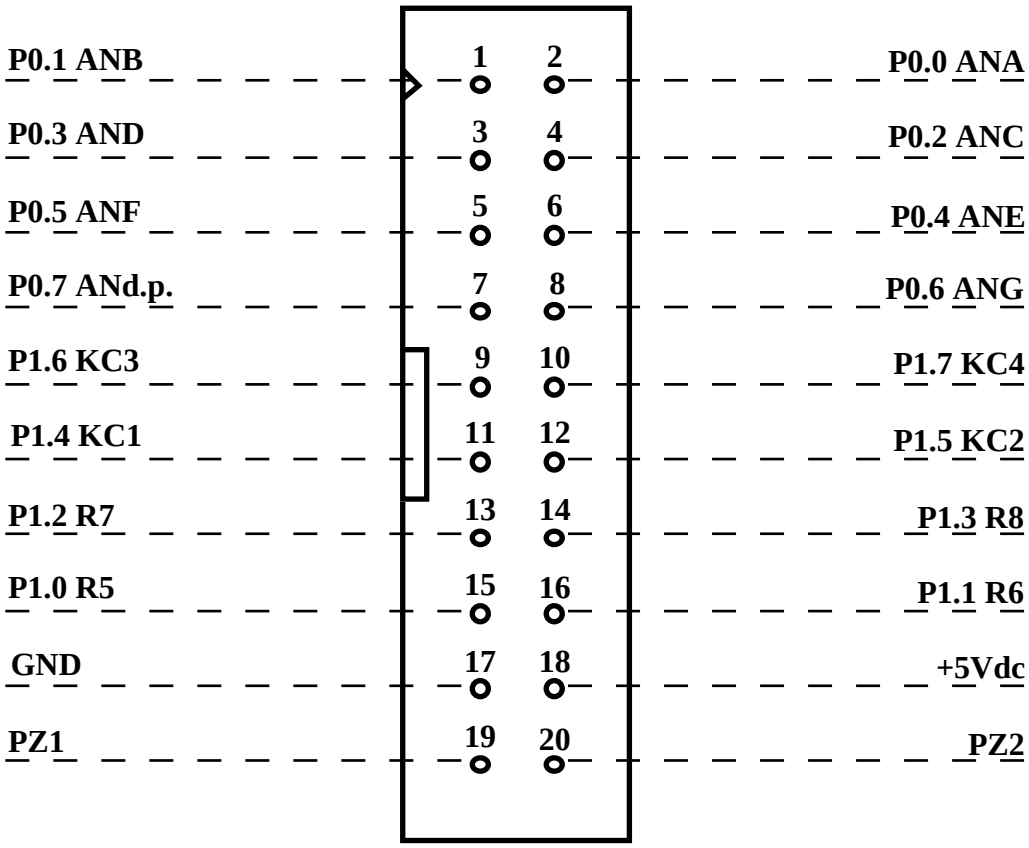

FIGURE 6: CN4 - SECTION 2 I/O CONNECTOR

Signals description:

P0.x ANy	=	O	- Signal x of port 0 connected to anod y of 7 segments display
P1.x KCy	=	O	- Signal x of port 1 connected to cathod y of 7 segments display and to column y of matrix keyboard
P1.x Ry	=	I	- Signal x of port 1 connected to row y of matrix keyboard
+5Vdc	=	I	- Power supply +5 Vdc
GND	=		- Ground
PZ1	=	I/O	- Signal connected to pod PZ1
PZ2	=	I/O	- Signal connected to pod PZ2

CN6 - SECTION 7 I/O CONNECTOR

CN6 is a 20 pins low profile vertical male connector used for digital I/O to the intelligent control card. It features **ABACO®** I/Ostandard pin out and part of its signals are the same available on the 34 pins connector to interface **GPC® 68**.

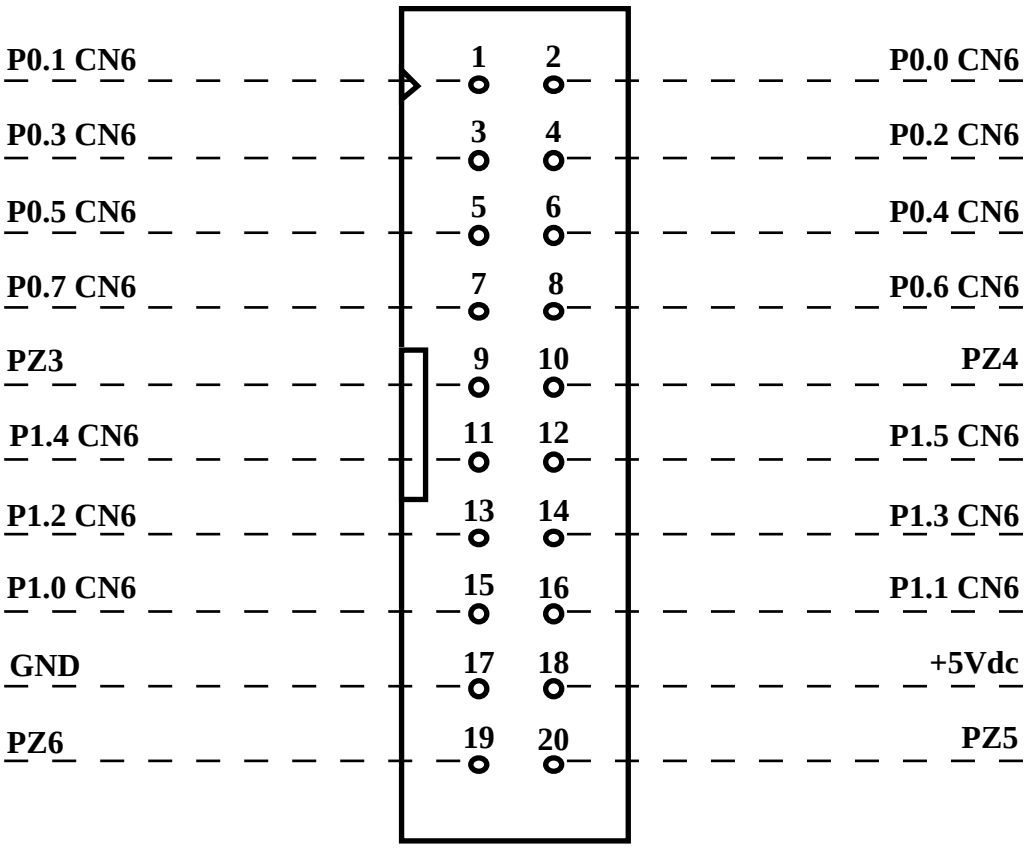

FIGURE 7: CN6 - SECTION 7 I/O CONNECTOR

Signals description:

P0.0 CN6 = I/O - Signal PC.0 of CN7
P0.1 CN6 = I/O - Signal PC.1 of CN7
P0.2 CN6 = I/O - Signal PC.2 - TIN of CN7
P0.3 CN6 = I/O - Signal PC.3 - TOUT of CN7
P0.4 CN6 = I/O - Signal PC.4 - DMAREQ of CN7
P0.5 CN6 = I/O - Signal PC.5 - PIRQ of CN7
P0.6 CN6 = I/O - Signal PC.6 - PIACK of CN7
P0.7 CN6 = I/O - Signal PC.7 -TIACK of CN7
P1.4 CN6 = O - Signal OP6 of CN7
P1.5 CN6 = O - Signal OP7 of CN7
P1.3 CN6 = I/O - Signal H4 of CN7
P1.2 CN6 = I/O - Signal H3 of CN7
P1.1 CN6 = I/O - Signal H2 of CN7
P1.0 CN6 = I/O - Signal H1 of CN7
PZx = I/O - Signal connected to pod PZx
+5Vdc = O - Power supply +5 Vdc
GND = - Ground

CN7 - SECTION 7 I/O CONNECTOR

CN7 is a 34 pins low profile vertical male connector used for digital I/O to the intelligent control card **GPC® 68**. Its signals are duplicated to connectors CN6 and CN8 that allow to dinterface directly to all the boards provided with **ABACO®** I/O 20 pins standard connector.

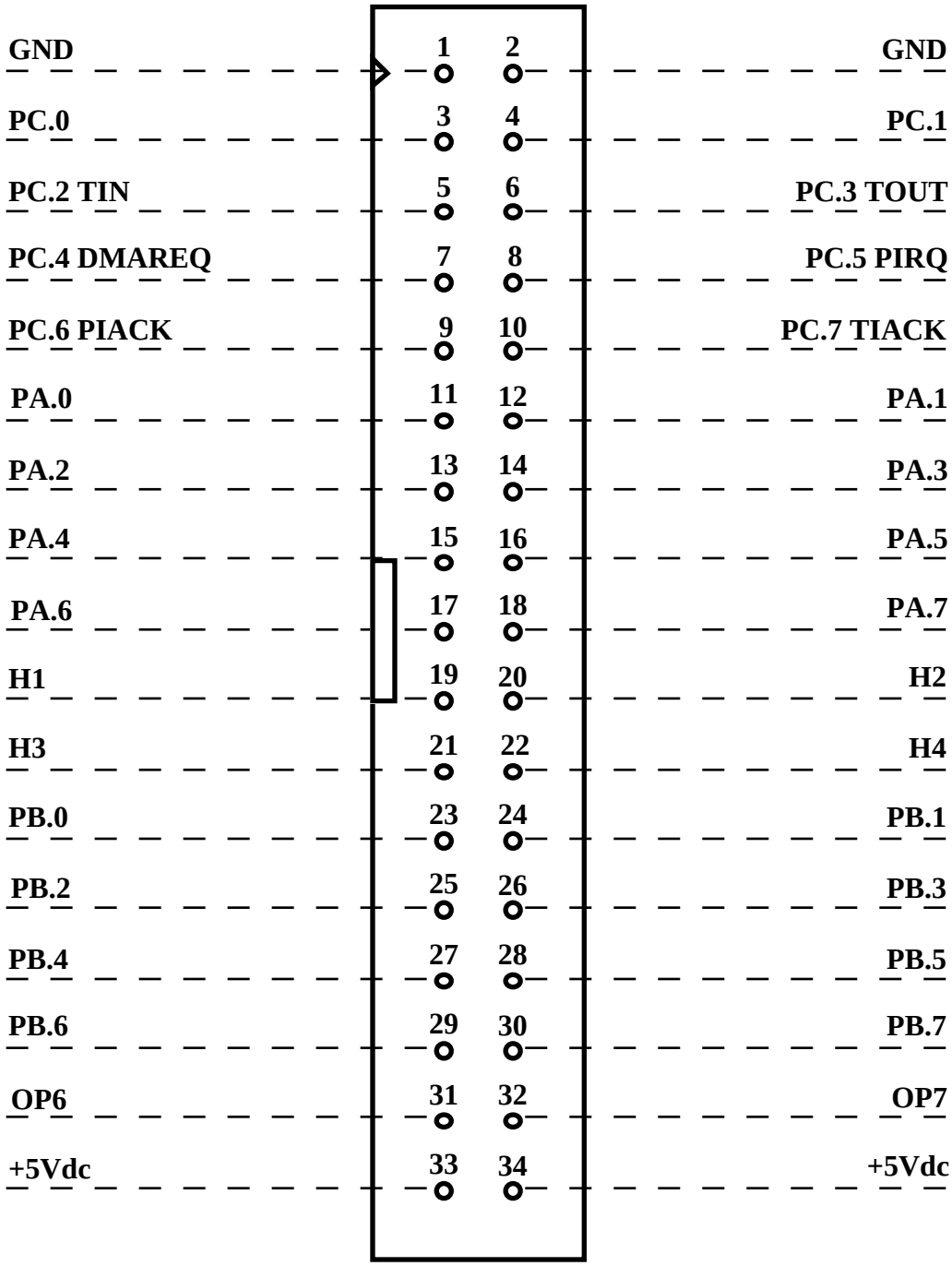

FIGURE 8: CN7 - SECTION 7 I/O CONNECTOR

Signals description:

PA.x	=	I/O	- Signal x of port A
PB.x	=	I/O	- Signal x of port B
PC.0	=	I/O	- Signal 0 of port C

PC.1	=	I/O	- Signal 1 of port C
PC.2 TIN	=	I/O	- Signal 2 of port C, or signal TIN
PC.3 TOUT	=	I/O	- Signal 3 of of port C, or signal TOUT
PC.4 DMAREQ	=	I/O	- Signal 4 of port C, or signal DMAREQ
PC.5 PIRQ	=	I/O	- Signal 5 of port C, or signal PIRQ
PC.6 PIACK	=	I/O	- Signal 6 of port C, or signal PIACK
PC.7 TIACK	=	I/O	- Linea 7 del port C, oppure linea TIACK
OPx	=	O	- Linea OPx
Hx	=	I/O	- Linea Hx
+5Vdc	=	I	- Linea di alimentazione a +5 Vdc
GND	=		- Linea di massa di riferimento della scheda

CN8 - SECTION 7 I/O CONNECTOR

CN8 is a 20 pins low profile vertical male connector used for digital I/O to the intelligent control card. It features **ABACO®** I/Ostandard pin out and part of its signals are the same on connector CN7.

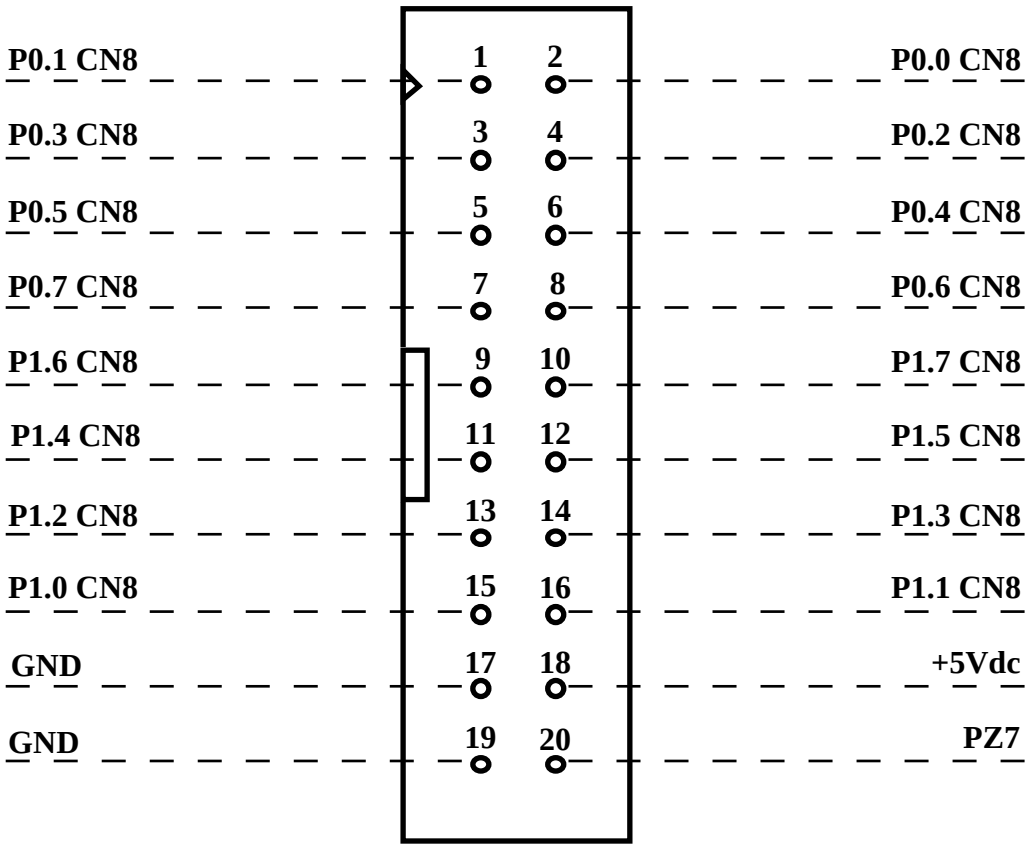

FIGURE 9: CN4 - SECTION 7 I/O CONNECTOR

Signals description:

P0.x CN8	=	O	- Signal x of port 0 connected to anod y of 7 segments display
P1.x CN8	=	I	- Signal x of port 1 connected to row y of matrix keyboard
+5Vdc	=	I	- Power supply +5 Vdc
GND	=		- Ground
PZ7	=	I/O	- Signal connected to pod PZ7

CN9 - SECTION 4 FLUORESCENT DISPLAY INTERFACE CONNECTOR

CN9 is a 20 pins low profile vertical male connector used to interface FUTABA fluorescent displays of family MxxxSD. The selection of the supply voltage for this displays, which depends also on the type of intelligent control card used, is performerd through Jumper J9 and is described in the paragraph “FUTABA FLUORESCENT DISPLAY SUPPLY SELECTION”.

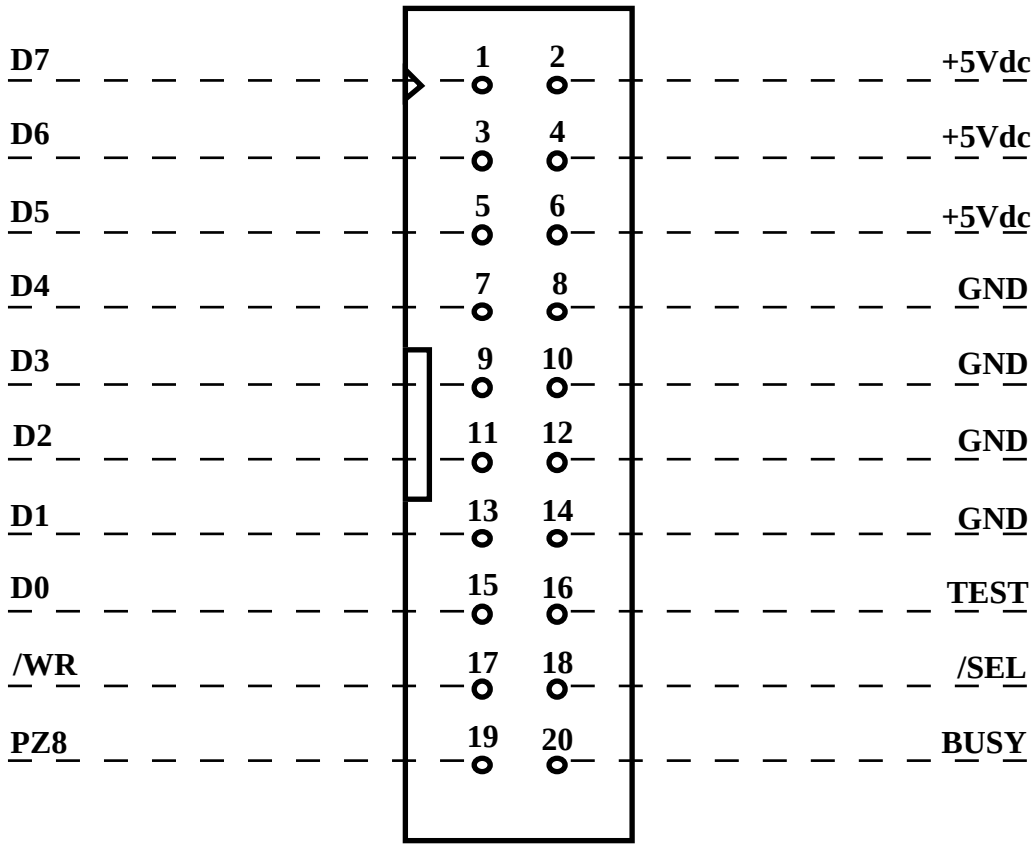

FIGURE 10: CN9 - SECTION 4 FLUORESCET DISPLAY INTERFACE CONNECTOR

Signals description:

Dx	=	O	- Data signal x of display
/SEL	=	O	- Display activation signal
/WR	=	O	- Display write enable signal
BUSY	=	I	- Display status check signal
TEST	=	O	- Display test signal
+5Vdc	=	O	- Power supply +5 Vdc
GND	=		- Ground
PZ8	=	I/O	- Signal connected to pod PZ8

CN10 - SECTION 4 I/O CONNECTOR

CN10 is a 20 pins low profile vertical male connector used for digital I/O to the intelligent control card. It features **ABACO®** I/Ostandard pin out and its signals are used to manage the intelligent fluorescent display connected to CN9.

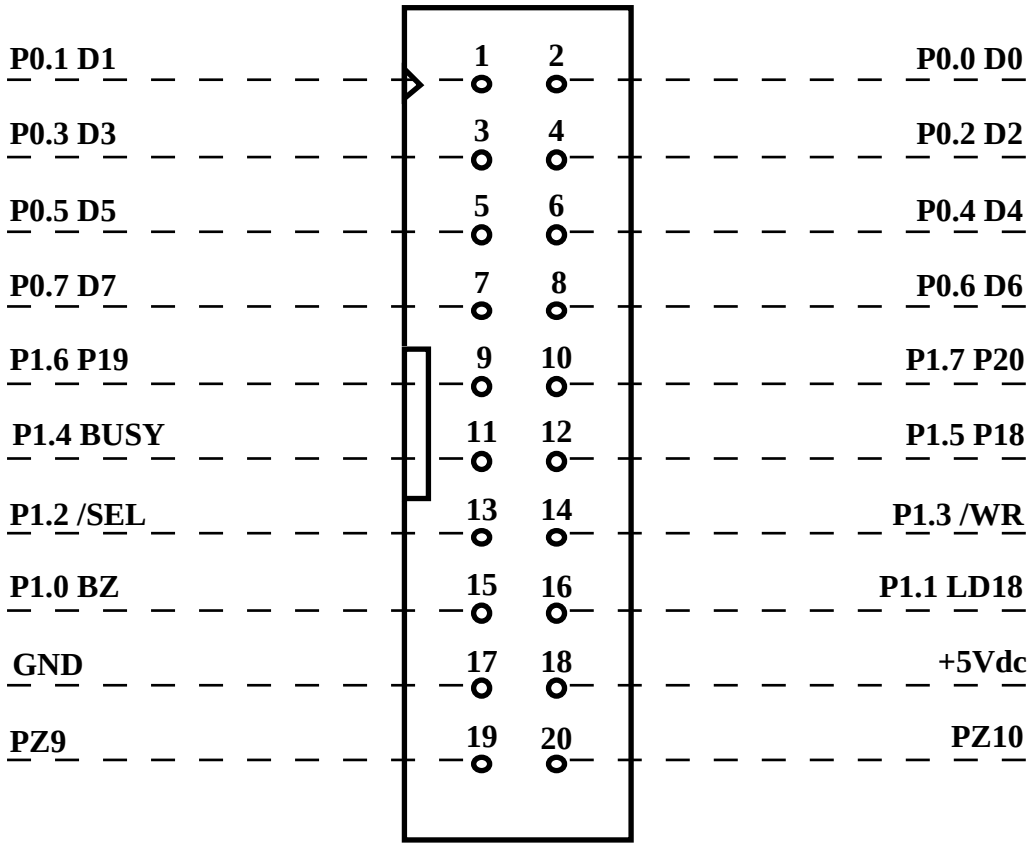

FIGURE 11: CN10 - SECTION 4 I/O CONNECTOR

Signals description:

P0.x Dx	=	O	- Signal x of port 0 connected to signal Dx of CN9
P1.2 /SEL	=	O	- Signal 2 of port 1 connected to signal /SEL of CN9
P1.3 /WR	=	O	- Signal 3 of port 1 connected to signal /WR of CN9
P1.4 BUSY	=	I	- Signal 4 of port 1 connected to signal BUSY of CN9
P1.x Px	=	I	- Signal x of port 1 connected to button Px
P1.0 BZ	=	O	- Signal 0 of port 1 connected to buzzer BZ1
P1.1 LD18	=	O	- Signal 1 of port 1 connected to activity LED LD18
+5Vdc	=	I	- Power supply +5 Vdc
GND	=		- Ground
PZx	=	I/O	- Signal connected to pod PZx

CN11 - SECTION 3 LCD DISPLAY INTERFACE CONNECTOR

CN11 is a 14 pins low profile vertical male connector used to interface SHARP LCD display oLM 40x21A. The voltage for backlighting this display is settable through trimmer TR1.

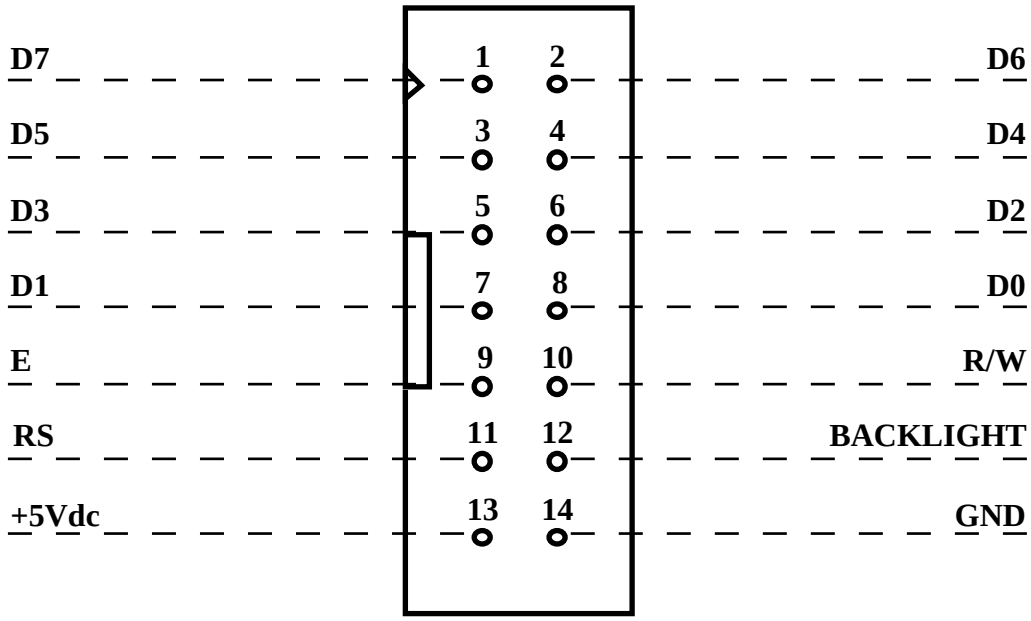

FIGURE 12: CN11 - SECTION 3 LCD DISPLAY INTERFACE CONNECTOR

Signals description:

Dx	=	O	- Display data signal x
E	=	O	- Display activation signal
R/W	=	O	- Display read/write enable signal
RS	=	O	- Display command/data enable signal
+5Vdc	=	O	- Power supply +5 Vdc
GND	=		- Ground
BACKLIGHT	=	O	- Display voltage backlight driving signal

It is easy to see that the pin out of this connector is “reverse’ of the display pin out (pin 1 of CN11 is connected to pin 14 on the display, pin 2 of CN11 is connected to pin 13 on the display, etc.). This location has been chosen to ease the connection between board and display when strip connectors are used. If a low profile connector is used it is enough to reverse the connection when crimping the two connectors to the flat cable.

CN12 - SECTION 3 I/O CONNECTOR

CN12 is a 20 pins low profile vertical male connector used for digital I/O to the intelligent control card. It features **ABACO®** I/Ostandard pin out and its signals are used to manage the intelligent display connected to CN11.

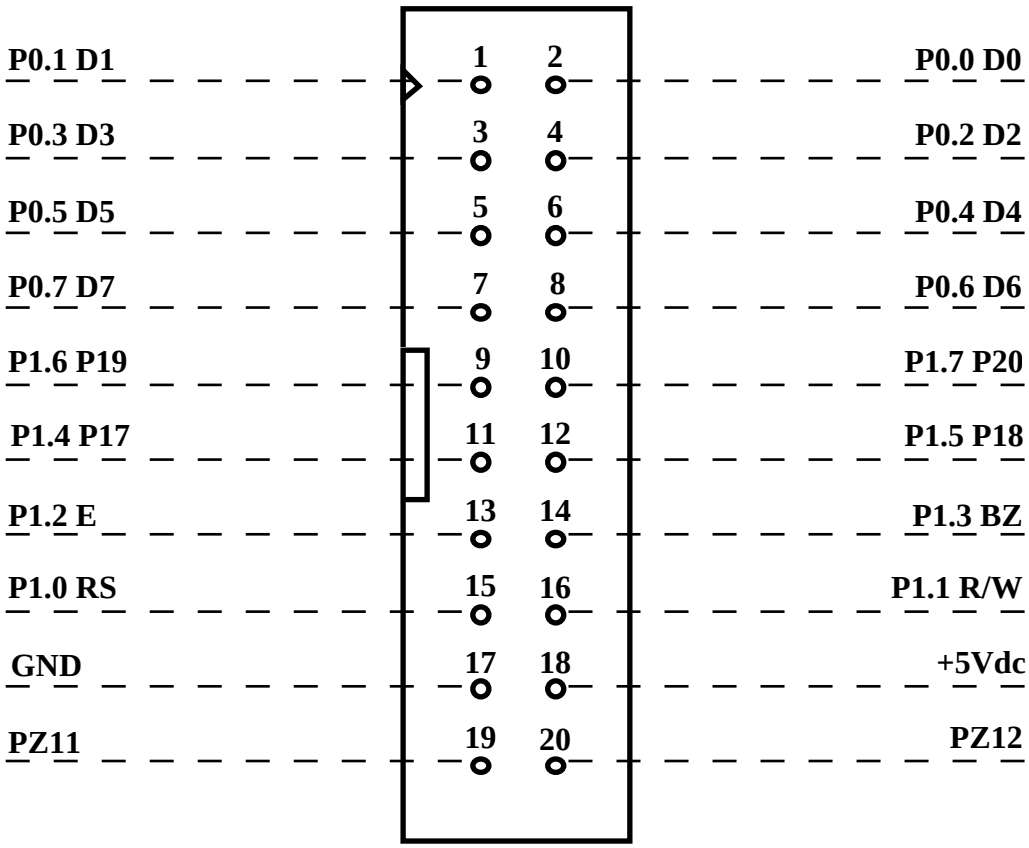

FIGURE 13: CN12 - SECTION 3 I/O CONNECTOR

Signals description:

P0.x Dx	=	I/O	- Signal x of port 0 connected to signal Dx of CN11
P1.2 E	=	O	- Signal 2 of port 1 connected to signal E of CN11
P1.0 RS	=	O	- Signal 0 of port 1 connected to signal RS of CN11
P1.1 R/W	=	O	- Signal 1 of port 1 connected to signal R/W di CN11
P1.x Px	=	I	- Signal x of port 1 connected to button Px
P1.3 BZ	=	O	- Signal 0 of port 1 connected to buzzer BZ1
+5Vdc	=	I	- Power supply +5 Vdc
GND	=		- Ground
PZx	=	I/O	- Signal connected to pod PZx

CN13 - SECTION 6 CENTRONICS PRINTER INTERFACE CONNECTOR

CN13 is a 25 pins D type 90° female connector used to interface a parallel printer provided with CENTRONICS compatible interface. The pin out of this connector is compatible with the pin out of every personal computer, so a standard printer cable can be used to connect to the printer. For further information about the signals on the connector, please refer to the technical manual of the printer.

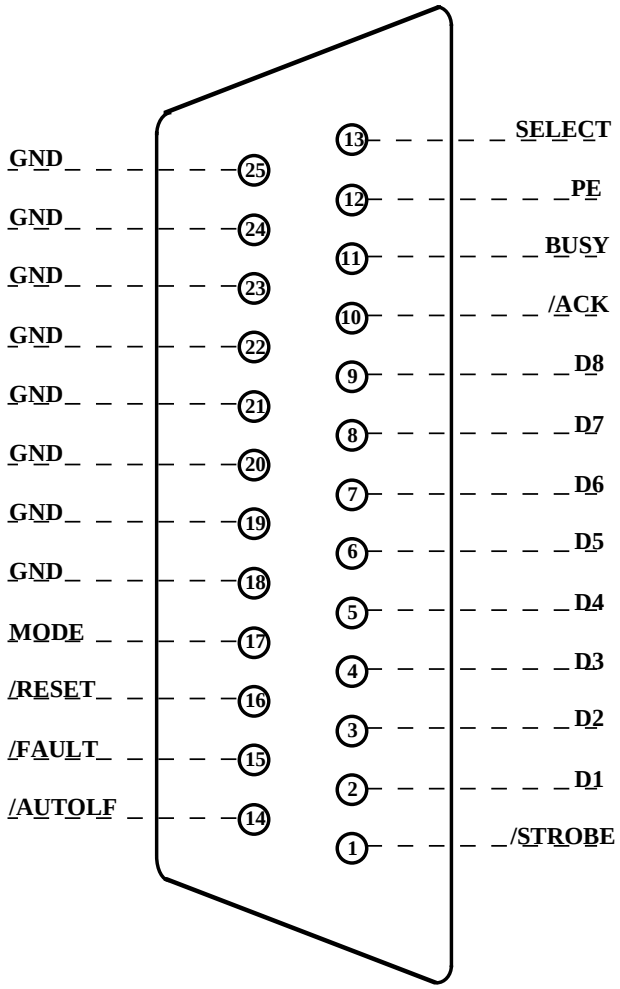

FIGURE 14: CN13 - SECTION 6 CENTRONICS PRINTER INTERFACE CONNECTOR

Signals description:

Dx	=	O	- Data signal x of the printer
/STROBE	=	O	- Valid data to the printer
/ACK	=	I	- Request for more data
BUSY	=	I	- Verify of printer overall status
PE	=	I	- Paper presence
SELECT	=	I	- Printer selection status
/AUTOLF	=	O	- Automatic Line Feed activation
/RESET	=	O	- Printer reset
MODE	=	O	- Working mode selection
/FAULT	=	O	- Fault indication provided with pull up to +5 Vdc.
GND	=		- Ground

CN14 - SECTION 6 I/O CONNECTOR

CN14 is a 20 pins low profile vertical male connector used for digital I/O to the intelligent control card. It features **ABACO®** I/Ostandard pin out and its signals are used to manage a CENTRONICS compatible parallel printer connected to CN13.

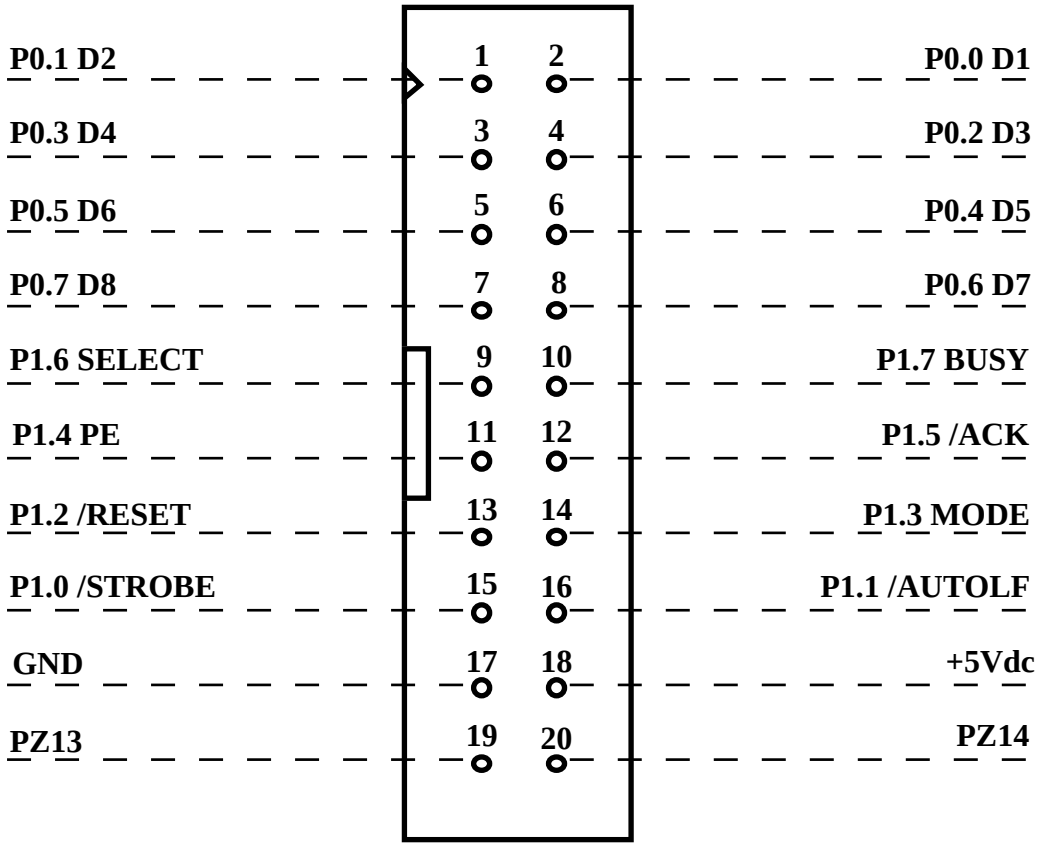

FIGURE 15: CN10 - SECTION 6 I/O CONNECTOR

Signals description:

P0.x Dx	=	O	- Signal x of port 0 connected to signal Dx of CN13
P1.0 /STROBE	=	O	- Signal of port 1 connected to signal /STROBE of CN13
P1.1 /AUTOLF	=	O	- Signal of port 1 connected to signal /AUTOLF of CN13
P1.2 /RESET	=	O	- Signal of port 1 connected to signal /RESET of CN13
P1.3 /MODE	=	O	- Signal of port 1 connected to signal /MODE of CN13
P1.4 PE	=	I	- Signal of port 1 connected to signal PE of CN13
P1.5 /ACK	=	O	- Signal of port 1 connected to signal /ACK of CN13
P1.6 SELECT	=	O	- Signal of port 1 connected to signal SELECT of CN13
P1.7 BUSY	=	O	- Signal of port 1 connected to signal BUSY of CN13
+5Vdc	=	I	- Power supply +5 Vdc
GND	=		- Ground
PZx	=	I/O	- Signal connected to pod PZx

CN15 - SECTION 1 I/O CONNECTOR

CN15 is a 20 pins low profile vertical male connector used for digital I/O to the intelligent control card. It features **ABACO®** I/Ostandard pin out and its signals are used to manage 16 LEDs, 16 keys, the buzzer and the direct interfacement to the external world.

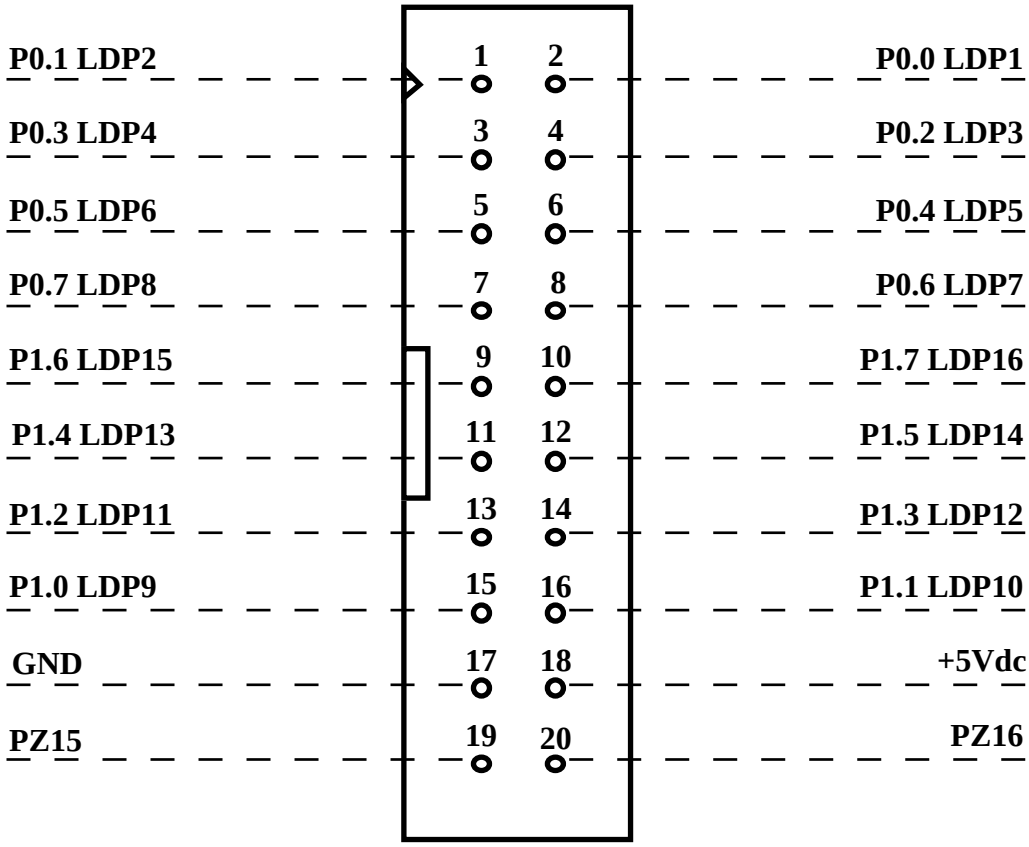

FIGURE 16: CN15 - SECTION 1 I/O CONNECTOR

Signals description:

P0.x LDPy	=	O	- Signal x of port 0 connected to LED y and key y
P1.x LDPy	=	O	- Signal x of port 1 connected to LED y and key y
+5Vdc	=	I	- Power supply +5 Vdc
GND	=		- Ground
PZx	=	I/O	- Signal connected to pod PZx

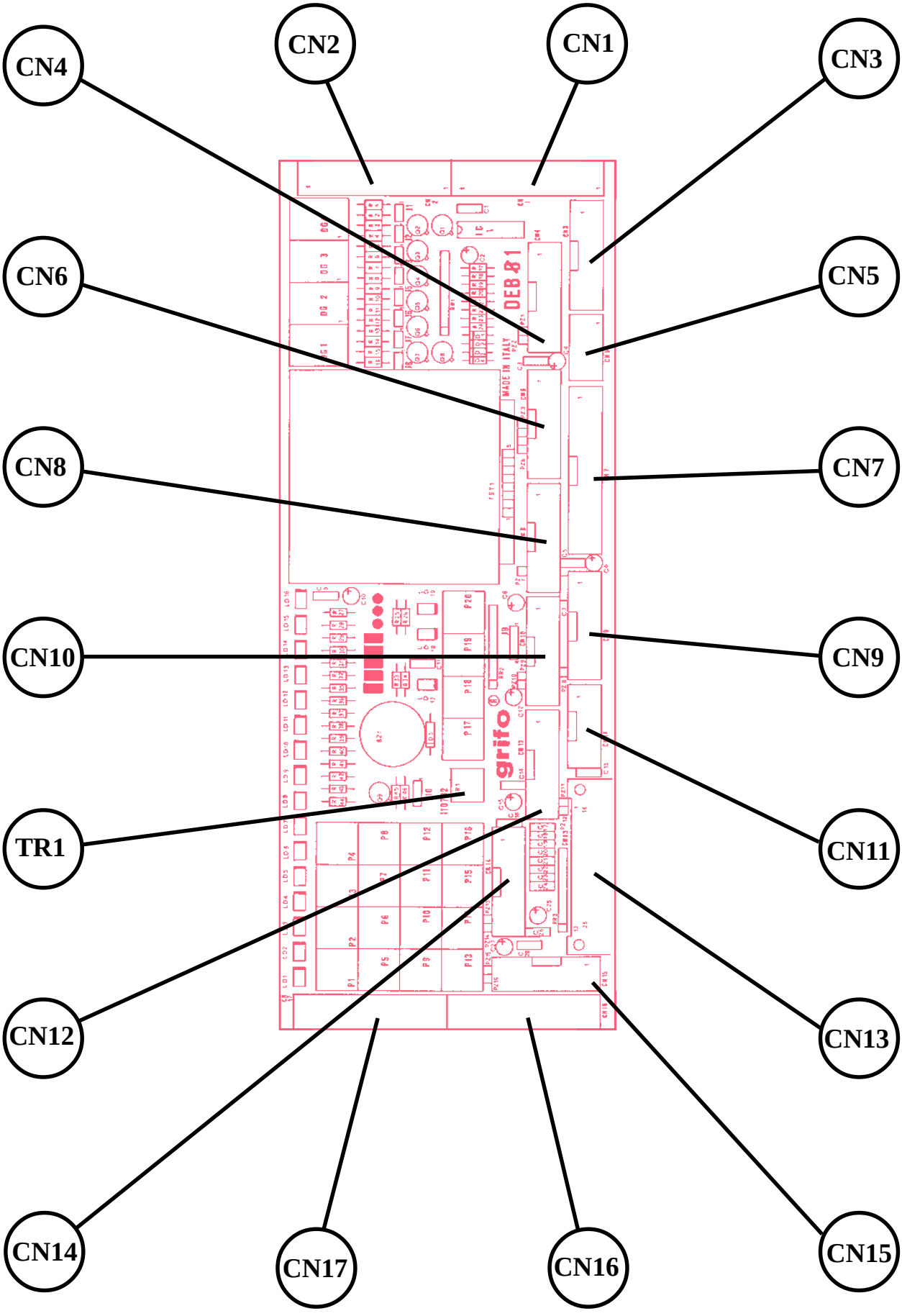

FIGURE 17: CONNECTORS AND TRIMMER LOCATIONS

CN16 - SECTION 1 SCREW TERMINAL CONNECTOR

CN16 is a 9 pins screw terminal connector that duplicates 9 out of 16 I/O signals of connector CN15 (section 1). The screw terminals allow to hold with extreme safety all the conductors with diameter lower that 3 mm and to perform a comfortable connection to the external world.

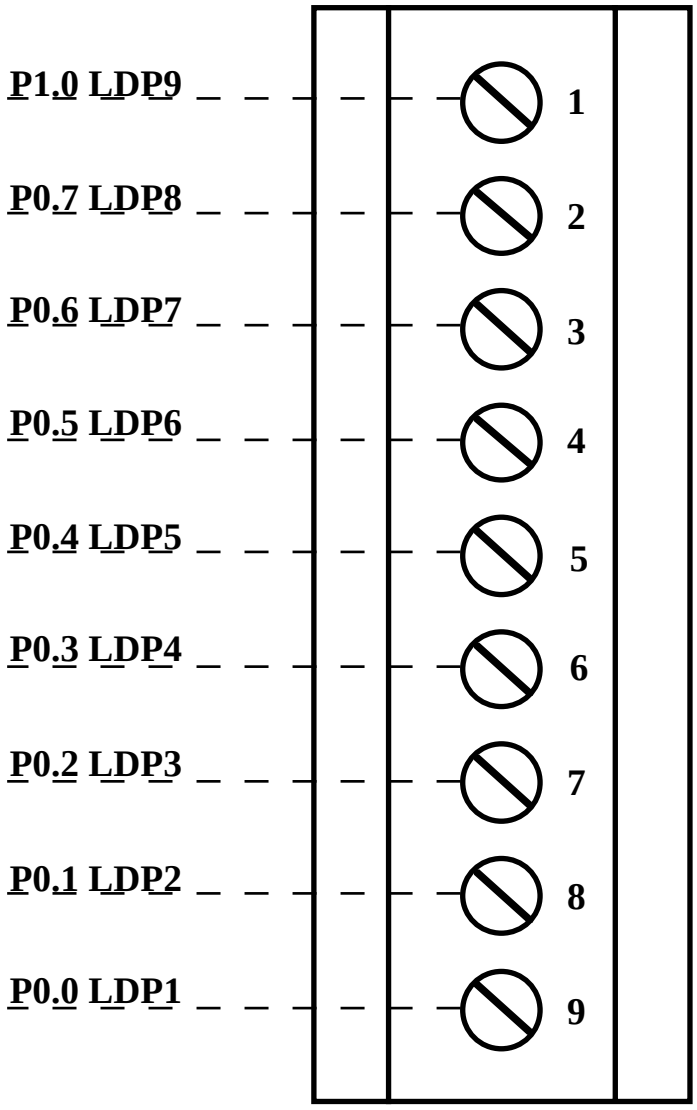

FIGURE 18: CN16 - SECTION 1 I/O CONNECTOR

Signals description:

P0.x LDPy = I/O - Signal x of port 0 connected to CN15
P1.x LDPy = I/O - Signal x of port 1 connected to CN15

CN17 - SECTION 1 SCREW TERMINAL CONNECTOR

CN17 is a 9 pins screw terminal connector that duplicates 7 out of 16 I/O signals of connector CN15 (section 1). The screw terminals allow to hold with extreme safety all the conductors with diameter lower that 3 mm and to perform a comfortable connection to the external world.

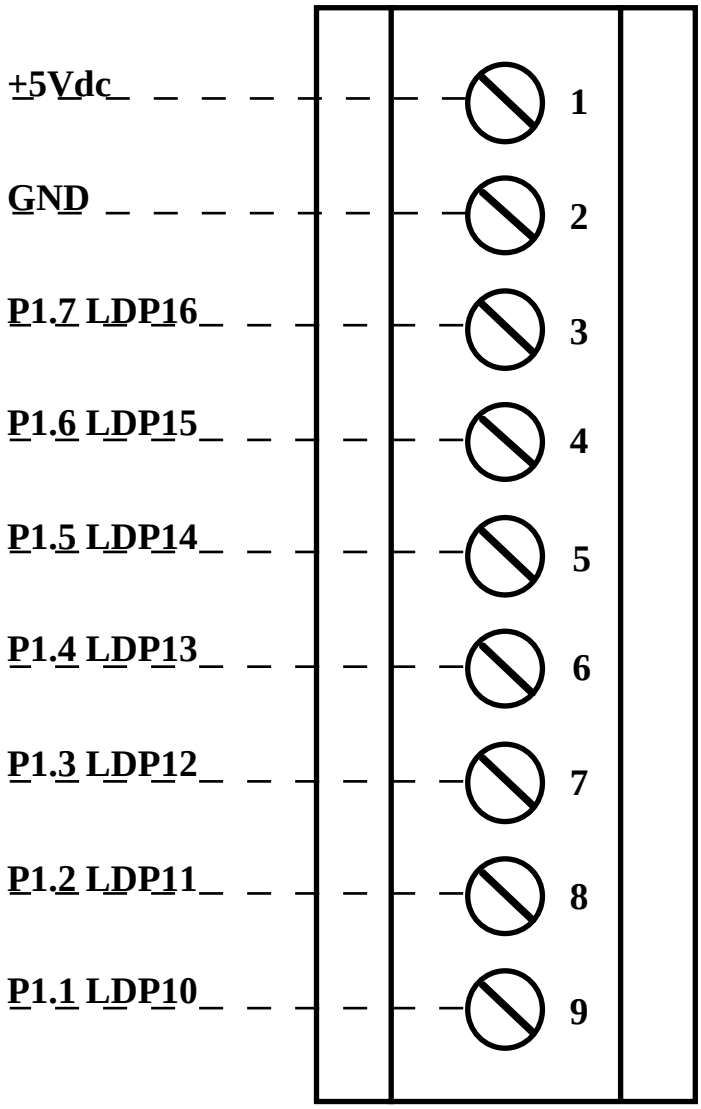

FIGURE 19: CN17 - SECTION 1 I/O CONNECTOR

Signals description:

P1.x LDPy	=	I/O	- Signal x of port 1 connected to CN15
+5Vdc	=	I	- Power supply +5 Vdc
GND	=		- Ground

VISUAL FEEDBACK

DEB 01 board is provided with 19 LEDs to signal status condition and visualize the status of I/O signals on sections 1 and 4, plus four 7 segments commin kathod displays, as briefly described in the following table:

LEDs	COLOUR	PURPOSE
LD1÷8	Red	Visualize the status of port 0 section 1 I/O signals.
LD9÷12	Yellow	Visualize the status of low nibble port 1 section 1 I/O signals.
LD13÷16	Green	Visualize the status of high nibble port 1 section 1 I/O signals.
LD17	Yellow	Vusualizes the status of buzzer activation signal. It can be used to detect the presence of subsonic signals.
LD18	Green	Visualizes the status of P1.1 signal of section 4 (connector CN10). It can be used as generic signalation LED.
LD19	Red	Visualizes the eventual presence of an external +5 Vdc power supply voltage on connector CN5 section 5.
GD1÷4	Red	Four 7 segments display that make the output part of section 2 and are completely driven through I/O signals on connector CN4.

FIGURE 20: VISUAL FEEDBACK TABLE

All the visual signalations described above can be comfortably software managed (through the control card) and used to signal status conditions, visualize I/O lines status, figures, messages, etc. For the activation modalities of these devices, complemented logic is normally used (low level= 0V means LED on and viceversa); for further information please refer to the electric diagrams in appendix A of this manual. To easily locate LEDs and displays, please refer to figure 22.

KEYS

DEB 01 features 20 coloured keys that simulate the staus of some I/O signals on the card. Each key (as can be seen on the electric diagram) corresponds to a normally open contact that closes when the key is pressed connecting to the ground (logic é) its I/O signal. That is:

key pressed -> 0 V = logic 0
key not pressed -> +5 Vdc = logic 1

KEYS	COLOUR	PURPOSE
P1÷8	Red	Set the status of port 0 section 1 I/O signals.
P9÷12	Yellow	Set the status of low nibble port 1 section 1 I/O signals.
P13÷16	Green	Set the status of high nibble port 1 section 1 I/O signals.
P17	Red	Sets the status of signal P1.4 on CN12 and signal TEST on CN9.
P18	White	Sets the status of signal P1.5 on CN12 and signal P1.5 on CN10.
P19	Green	Sets the status of signal P1.6 on CN12 and signal P1.6 on CN10.
P20	Yellow	Sets the status of signal P1.7 on CN12 and signal P1.7 on CN10.

FIGURE 21: KEYS TABLE

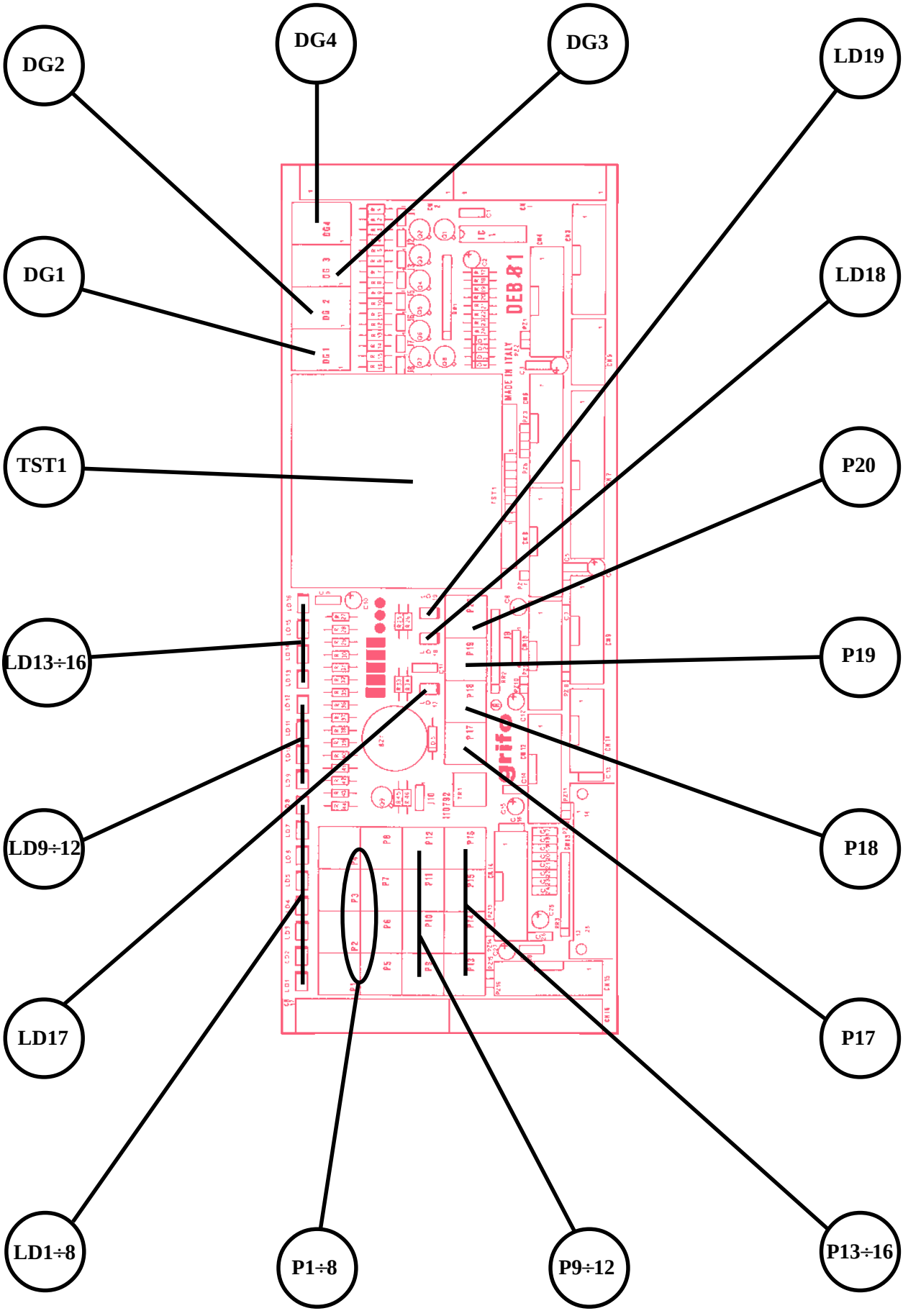

FIGURE 22: LEDS AND KEYS LOCATION

TRIMMER

DEB 01 features a trimmer, called TR1, that is used to set the backlight voltage for section 3 of the board. This voltage decides the backlighting level for the SHARP LM 40x21A LCD display that can be connected to the card through connector CN1. When regulating TR1 remember that clockwise rotation increases backlighting level and viceversa. To easily locate trimmer TR1 please refer to figure 17.

PODS

DEB 01 features 16 pods connected to as many pins of the connectors installed on the board. The purpose of these pods is to keep available an high number of generic (and so definible) generic I/O from each of the 7 sections. Possible applications are: test signals connection, auxiliary control signals connection, connection of any other kind of signal normally not available for the **DEB 01** sections. Here follows a summary of all the pods connections:

POD	SECTION	PIN N.	CONNECTOR
PZ1	2	19	CN4
PZ2	2	20	CN4
PZ3	7	9	CN6
PZ4	7	10	CN6
PZ5	7	20	CN6
PZ6	7	19	CN6
PZ7	7	20	CN8
PZ8	4	19	CN9
PZ9	4	19	CN10
PZ10	4	20	CN10
PZ11	3	19	CN12
PZ12	3	20	CN12
PZ13	6	19	CN14
PZ14	6	20	CN14
PZ15	1	19	CN15
PZ16	1	20	CN15

FIGURE 23: PODS CONNECTIONS TABLE

To easily locate the pods, please refer to figure 24.

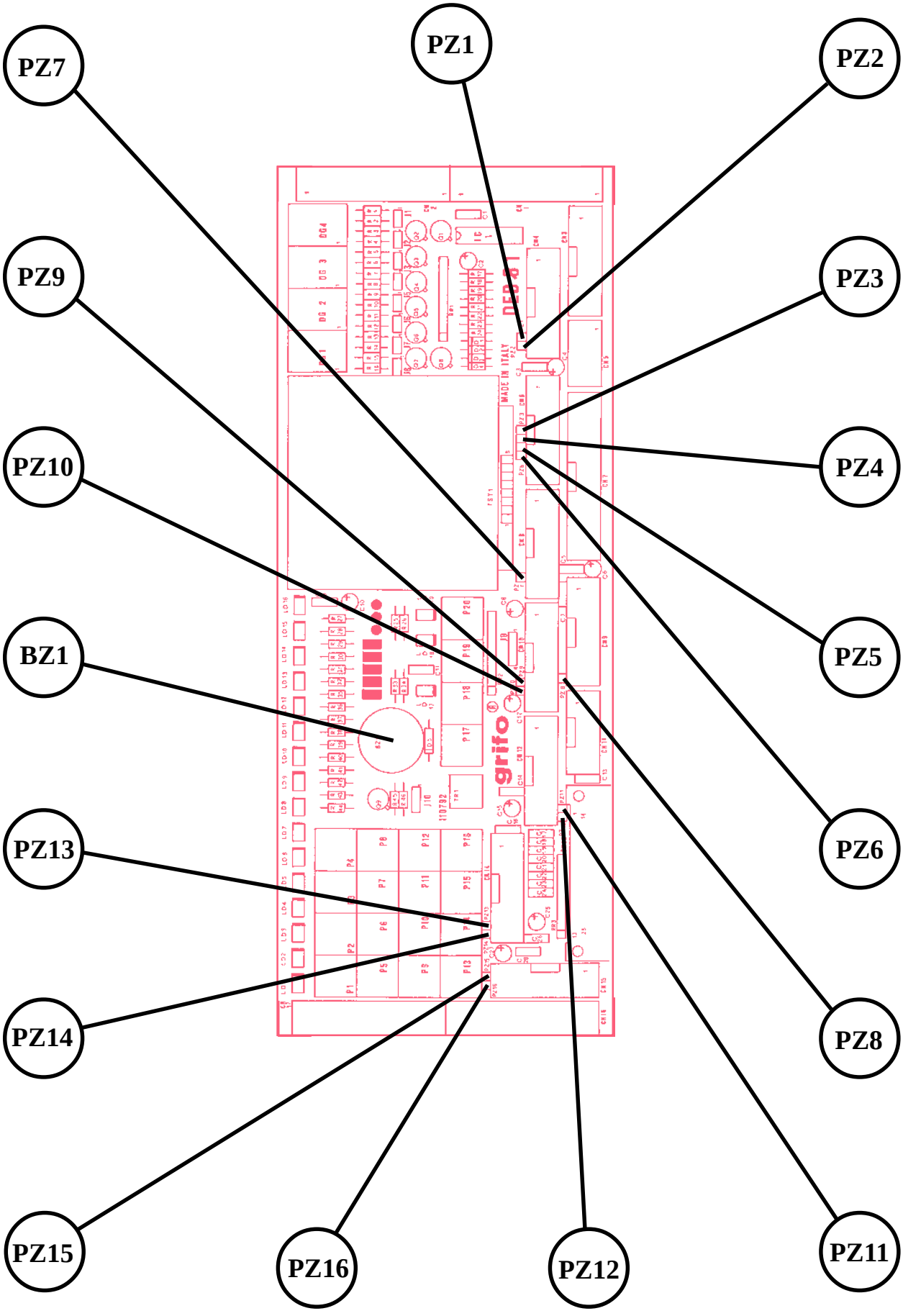

FIGURE 24: PODS AND BUZZER LOCATION

JUMPERS

On **DEB 01** there are 10 jumpers for card configuration. Below there is the jumpers list, location and function:

JUMPERS	N. PINS	PURPOSE
J1	2	Selects the supply current for the decimal point.
J2	2	Selects the supply current for segment G.
J3	2	Selects the supply current for segment F.
J4	2	Selects the supply current for segment E.
J5	2	Selects the supply current for segment D.
J6	2	Selects the supply current for segment C.
J7	2	Selects the supply current for segment B.
J8	2	Selects the supply current for segment A.
J9	4	Selects supply source for FUTABA fluorescent display.
J10	3	Selects command section for on board buzzer.

FIGURE 25: JUMPERS SUMMARIZING TABLE

The following tables describe all the right connections of **DEB 01** jumpers with their relative functions.
To recognize these valid connections, please refer to the board printed diagram (serigraph) or to figure 30 of this manual, where the pins numeration is listed; for recognizing jumpers location, please refer to figure 26.
The "*" used in the following tables, denotes the default connection, or on the other hand the connection set up at the end of testing phase, that is the configuration the User receives.

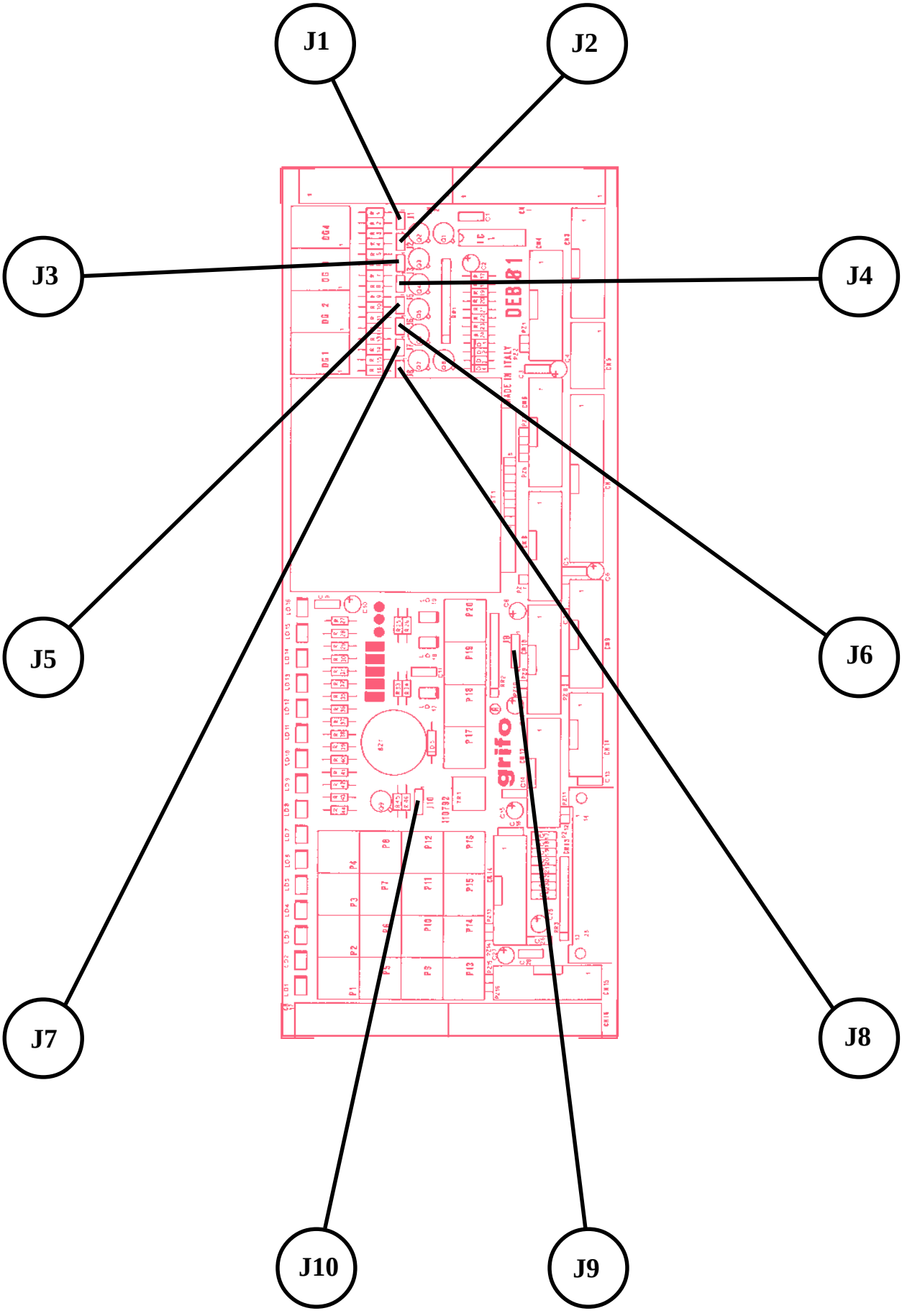

FIGURE 26: JUMPERS LOCATION

2 PINS JUMPERS

JUMPERS	CONNECTION	PURPOSE	DEF.
J1	not connected	Decimal point supplied with strength of current limitation.	*
	connected	Decimal point supplied with strength of current for high intensity light.	
J2	not connected	Segment G supplied with strength of current limitation.	*
	connected	Segment G supplied with strength of current for high intensity light.	
J3	not connected	Segment F supplied with strength of current limitation.	*
	connected	Segment F supplied with strength of current for high intensity light.	
J4	not connected	Segment E supplied with strength of current limitation.	*
	connected	Segment E supplied with strength of current for high intensity light.	
J5	not connected	Segment D supplied with strength of current limitation.	*
	connected	Segment D supplied with strength of current for high intensity light.	
J6	not connected	Segment C supplied with strength of current limitation.	*
	connected	Segment C supplied with strength of current for high intensity light.	
J7	not connected	Segment B supplied with strength of current limitation.	*
	connected	Segment B supplied with strength of current for high intensity light.	
J8	not connected	Segment A supplied with strength of current limitation.	*
	connected	Segment A supplied with strength of current for high intensity light.	

FIGURE 27: 2 PINS JUMPERS TABLE

3 PINS JUMPERS

JUMPERS	CONNECTION	PURPOSE	DEF.
J10	position 1-2	Connects the on board buzzer to the signals of sections 3 and 4.	*
	position 2-3	Connects the on board buzzer to the signals of section 1.	

FIGURE 28: 3 PINS JUMPERS TABLE

The "*" used in the following tables, denotes the default connection, or on the other hand the connection set up at the end of testing phase, that is the configuration the User receives.

4 PINS JUMPERS

JUMPER	CONNECTION	PURPOSE	DEF.
J12	position 1-2	FUTABA fluorescent display is supplied through CN10.	*
	position 2-3	FUTABA fluorescent display is supplied through CN5.	
	position 3-4	Connects +5Vdc power supply of connector CN3 to the same signal of connector CN5.	*

FIGURE 29: 4 PINS JUMPERS TABLE

The "*" used in the following tables, denotes the default connection, or on the other hand the connection set up at the end of testing phase, that is the configuration the User receives.

POWER SUPPLY

DEB 01 can be supplied through an unique voltage:

+5 Vdc: Supplies the on board devices; must be in the range +5 Vdc ± 5% and must be provided through the specific connectors (see chapters “CONNECTIONS” and “JUMPERS”).

To warrant great immunity to external noise and so a correct working of the board, it is essential that **+5Vdc** tension is galvanically isolated from any other supply tensions available in the system.

BOARD CONNNECTIONS

To prevent possible connecting problems between **DEB 01** board and the external systems, the user has to read carefully the information of the previous paragraphs and he must follow these instrunctions:

- The TTL signals can be connected directly only to a device featuring the same type of interface. About the correspondance between logic signals and TTL output status, remember that a logic **0** generates a TTL 0 Vdc, while a logic **1** generates a TTL +5 Vdc.

SEVEN SEGMENTS DISPLAYS DRIVING CURRENT SELECTION

Jumpers J1÷J8 allow the user to select the strength of current to drive the 7 segments displays DG1÷DG4. To select the current please refer to chapter “JUMPERS”. Remark that the section has been designed for a scansion management of the four displays, that is each display is actived for a short time at regualr intervals. Being the supply of impulsive type, the current can also be greater than the value normally used, obtaining a good level of brightness. This feature (jumpers connected) should be used only in the final stage of development, if a display should be supplied with a greater current non impulsive during debugging it could be damaged. Viceversa, when jumpers are connected the current is limited by a set of resistors, so the displays can be used without risks.

FUTABA FLUORESCENT DISPLAY SUPPLY SELECTION

It is possible to select the supply source for the FUTABA display (connectable through CN9) for its high current consumption. The 5 pins screw terminal connector is to be used as source when the control card, provided with **ABACO®** I/O interface, cannot provide about 400 mA required by the display. Please refer to the technical manual of the control card used for further information.

BUZZER

DEB 01 is provided with an electromagnetic buzzer that can generate any kind of sounds with any duration. Buzzer management is completely software driven, so the user program has to generate the PWM signal setting high and low the logical level of the I/O signal connected to it. This signal can be fetched form some sections of the board through jumper J10, as described in figure 28. To easily located buzzer BZ1, please refer to figure 24.

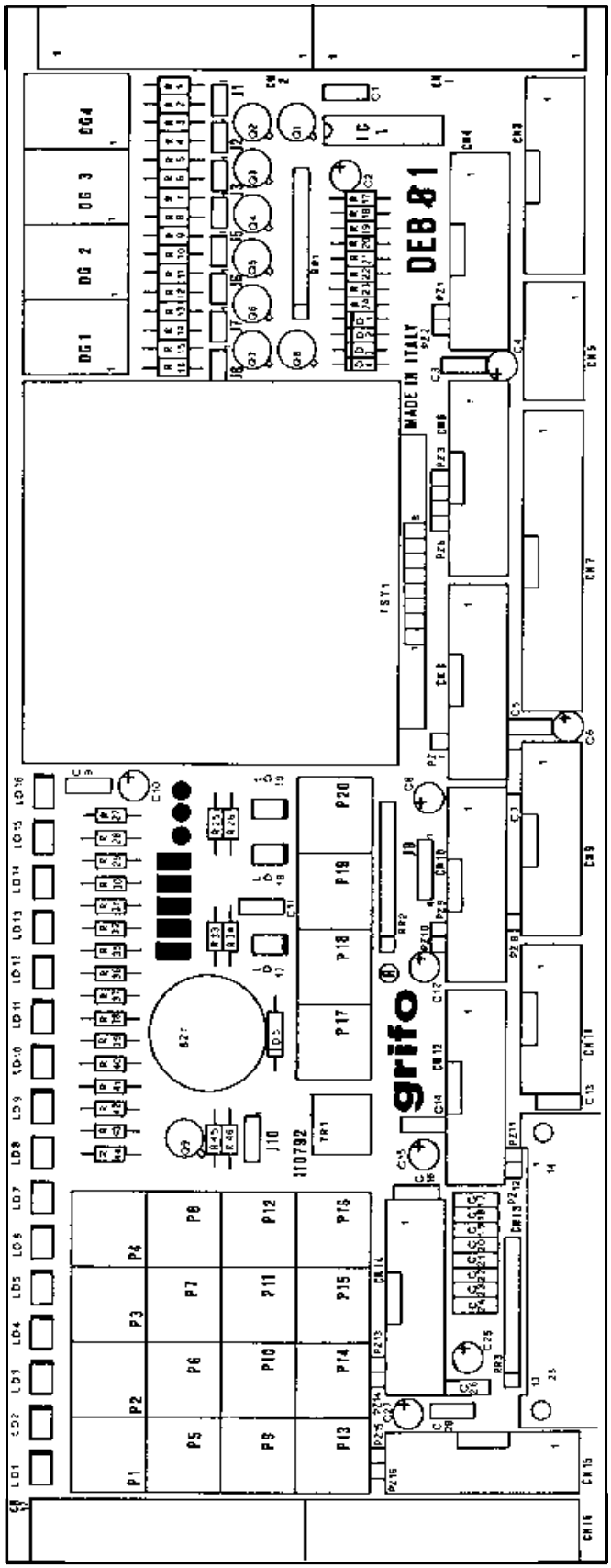

FIGURE 30: COMPONENTS MAP

DIGITAL I/O INTERFACES

Through CN3, CN8 and CN15 (**I/O Abaco®** standard connectors that duplicate screw terminal connectors signals and interface to **GPC® 68**) the **DEB 01** card can be connected to all of the numerous **grifo®** boards featuring the same standard pin out. Installation of these interface is very easy; in fact only a 20 pins flat cable (code **FLT.20+20**) is required, while the software management of these interfaces is as easy; in fact most of the software packages available for **DEB 01** card are provided with the necessary procedures. Remarkable modules are:

- **QTP 16P, QTP 24P**, **KDL x24**, **KDF 224**, etc. that solve all the local operator interfacing problems. These modules are provided with all the resources needed to obtain a high-level human-machine interface (they feature alphanumeric displays, matrix keyboard and visualization LEDs) at a short distance from **DEB 01** card. The available software drivers allow to manage the operator interface resources directly through the high-level instructions for console management. These procedures are software features added to the ones the language already provides and allow to drive the operatore interface directly through instrucions like PRINT and INPUT in BASIC or PRINTF and SCANF in C. This drastcally simplifies the write operations to the display and the input operations from the keyboard.

- **MCI 64**: it a large mass memory support that can directly manage the PCMCIA memory cards RAM, FLASH, ROM, etc.) in their available sizes. About software the developed drivers provide a complete file system interfacing allowing to access the informations stored in the memory carddirectly through the high-level file management instructions.

- **RBO xx**, **TBO xx**, **XBI xx**, **OBI xx**: these are buffer interfaces for I/O TTL signals. With these modules the the TTL input signals are converted in NPN or PNP optoisolated inputs and the TTL output signals are converted in relays or transistor optoisolated outputs.

For more information refer to "EXTERNAL CARDS" chapter and the software tools documentation.

KEYBOARD AND 7 SEGMENTS DISPLAYS MANAGEMENT

Please refer to the electric diagram of section 2 on figure A2.
As you can see, the matrix keyboard has eight connections: four columns, connected to an inverting buffer (ULN 2068), and four rows, connected to the signal of I/O **ABACO®** connector and to a pull up. In addition, each column line is connected to the abilitation pin of a seven segments display. When one of these column signals is at a low logic level, the correspondig display is enabled and can be managed through the eight signals of port 0.
The pull up on the row signals of the matrix warrants the presence of high logic level when no key is pressed or when a key is pressed and the isolation diode (one each column signal) is not conducting because it has the same logic level on both its pins. If the diode has a low logic level when a key is pressed while a key is pressed it will conduct, so the low logic level will be present also on the row signal of the key pressed. This level is directly readable through the low nibble of port 1 (P1.0÷P1.3).
The management of the four displays and four columns of the matrix keyboard happens repeating the above described operations on all the four signals of high nibble of port 1 (P1.4÷P1.7).
Summarizing:

- To manage a display and its matrix keyboard column, the corresponding output of inverting buffer must be set to low logic level, so the signal of high nibble of port 1 that drives such output must be set to high logic level.

- The value shown by the display must be set through all the signals of port 0, so they must be configured as outputs.

- The keys pressed on the selected column are acquired through signal P1.0÷P1.3, so they must be configured as inputs.

- The remain signal of port 0 select the column, so they must be configured as outputs.

This means that the suggested ports configuration for the startup of a program is:

- Port 0 in output, the value is indifferent.
- High nibble of port 1 (P1.4÷P1.7) in output, the value must be 0.
- Low nibble of port 1 (P1.0÷P1.3) in input.

For example, if the user wants to turn on all the segments of display DG1 (including the decimal point) and acqiure the first column of the keyboard (keys 1, 4, 7, A), then he/she must:

- Set P1.4 to low logic level
- Set P1.5 to high logic level
- Set P1.6 to high logic level
- Set P1.7 to high logic level
- Set all signals of port 0 to low logic level
- Read the signals P1.0÷P1.3

If, for example, P1.3 is at low logic level and P1.0, P1.1, P1.2 are at high logic level, key A would be the only key pressed.

For further information please refer to the comments in the source code of example programs.

INTRODUCTION

This chapters gives all the information needed to use the board sections thorugh the user software. These information include board sections functionality and their software management.

BOARD USAGE

Here follows a list of operations that **DEB 01** can perform, with a description of he signals involved and their direction, sorted by section.

SECTION 1

This section can be used to simulate the setting and the acquisition of 16 signals (port 0 + port 1) that are always visualized through LEDs. One of these signals can be used to drive the on board buzzer to generate sound feedback and play complete tunes. The connectors to the external world allow also to drive actuators and acquire transducers. Directionality of the ports is:

Port 0	->	Indifferent
Port 1 low nibble	->	Indifferent
Port 1 high nibble	->	Indifferent

SECTION 2

This section allows to show figures, short messages etc. on the four 7 segments displays and acquire data, numeric values etc. from the matrix hexadecimal keyboard. The 8 signals of port 0 select the segment activation, the high nibble of port 1 select which display to use and which column of the keyboard to test, the low nibble of port 1 acquires the status of keyboard rows. Port directionality is:

Port 0	->	Output
Port 1 low nibble	->	Input
Port 1 high nibble	->	Output

SECTION 3

This section allows to manage an LCD display SHARP LM 40x21A to provide the visualization of messages, figures, numbers, etc. In this section port 0 signals are connected to the display data lines, while port 1 signals are used to manage the display control signals and the buzzer (low nibble) and to read the status of keys P17÷P20 (high nibble). Port directionality is:

Port 0	->	Output
Port 1 low nibble	->	Output
Port 1 high nibble	->	Input

SECTION 4

This section allows to manage a FUTABA fluorescent display to provide the visualization of messages, figures, numbers, etc. In this section port 0 signals are connected to the display data lines, while port 1 signals are used to manage the display control signals and the buzzer (low nibble) and to read the status of keys P18÷P20 and the status of the display (high nibble). Port directionality is:

Port 0	->	Output
Port 1 low nibble	->	Output
Port 1 high nibble	->	Input

SECTION 5

This section allows to connect directly to the external world both port 0 and port 1 to drive actuators and read transductors. Port directionality is:

Port 0	->	Indifferent
Port 1 low nibble	->	Indifferent
Port 1 high nibble	->	Indifferent

SECTION 6

This section allows to drive a CENTRONICS compatible parallel printer. Port 0 set the status of the data signals while low nibble of port 1 manages the control signals and high nibble of port 1 reads the status printer. The main purpose is to print on paper messages, system data, status information etc. Port directionality is:

Port 0	->	Output
Port 1 low nibble	->	Output
Port 1 high nibble	->	Input

SECTION 7

No software management is required for this section, in fact its purpose is to interface the I/O connector of **GPC® 68** to two standard I/O **ABACO®** connectors. This section allows **GPC® 68** users to reach the remaining 6 sections.

DEMO PROGRAMS

Specific demonstration programs have been written for each section. These programs perform several elementary operations at different difficulty levels and provide the user the possibility to use the **DEB 01** sections at their best possibilities.
There is availability of these programs for many different languages and programming environments used by **grifo®** intelligent control cards. The user must make a sharp request directly to **grifo®** for the programs, specifying exactly the control card used and the software package used to program it.
Here follow the names and the functions performed by each of these programs, where are kept separated the programs available for all software packages (normal programs) and the programs available only for some software packages (special programs). This distinction is essentially due to the execution speed of the program which is a critical factor for special programs.
In the following description with “development system” it is meant the system used to develop programs for **grifo®** control cards (usually it is a personal computer). This system allows to load, execute and modify the programs.

SECTION 1

Normal programs

S1DEB1 Writes to port 0 the hexadecimal code of the key pressed on the keyboard of the “development system”.
S1DEB2 Writes on the monitor of the “development system” the status of both the ports.
S1DEB3 Writes to port 0 the status of port 1.
S1DEB4 Writes to port 0 the status of user dip switch, if present.
S1DEB5 Writes to port 0 the status complemented of port 1 if switch 1 of the user dip switch is OFF, ohterwise writes the status not complemented.
S1DEB6 Shifts the lighting of one LED in one direction only.
S1DEB7 Shifts the lighting of one LED in one direction or in the other one according to the status of switch 1 on user dip switch.
S1DEB8 Performs a count loop, showing the counter value on the two ports.
S1DEB9 Shifts the lighting of one LED from the left to the right and the lighting of another LED from the right to the left.

Special programs

S1DEB10 Like S1DEB6, sounding the buzzer at course end.
S1DEB11 Like S1DEB9, sounding the buzzer when the LEDs get together.
S1DEB12 Like S1DEB6, sounding the buzzer whenever a LED is turned on.
S1DEB13 Like S1DEB12, sounding the buzzer a still more shrill sound.
S1DEB14 Like S1DEB13, with a variable LED shifting speed.
S1DEB15 Sounds the on board buzzer.
S1DEB16 Sounds the on board buzzer like a carillon.
S1DEB17 Plays different tunes according to the status of the dip switch on the control card.

SECTION 2

Normal programs

S2DEB1 Shows the status of the hexadecimal keyboard on the “development system” monitor .
S2DEB2 Shows on a selected display, the (not ASCII) code of a character. Both parameters are provided through the keyboard of the “development system” .
S2DEB3 Like S2DEB2, but the hexadecimal number to show is already defined. A table converts it.
S2DEB4 Performs a count loop, and shows it on the display.
S2DEB5 Shows on the display the data input through the hexadecimal keyboard.
S2DEB6 Shows on the monitor of the “development system” a data input through the hexadecimal keyboard and allows to make some operations on it, that is: total clear, last input data clear, data input on decimal point input.
S2DEB7 Emulates a chronometer showing the time on seven segments digits while the keys to use as start, stop, etc. belong to the hexadecimal keyboard.

SECTION 3

Normal programs

S3DEB1 Allows to show on the display LM 40x21A the characters written with the keyboard of the “development system” and to send commands like reset, cursor positioning, etc.
S3DEB2 Shows one out of ten messages stored in memory, according to the numeric code provided through the keyboard of the “development system”.

Special programs

S3DEB3 Like S3DEB2, but the buzzer sounds at the end of the message.
S3DEB4 Selection of one out of four messages stored in memory, according to which key amongst P17÷P20 has been pressed. The buzzer sounds at the end of the message.
S3DEB5 Write to LCD using only P17÷P20. On the first digit of 7 segments display the ASCII code is progressively represented. The four keys editor works like this:

The first key, called START (red), starts the progressive visualization of ASCII codes.

The second key, called STOP (white), stops an ASCII code and confirms it, with generation of a sound.

The third key, called BACK (green), decreases by one the represented code or the cursor position.

The fourth key, called FORWARD (yellow), increases by one the represented code or the cursor position.

Explain the purpose of each key by a screen on the “development system” monitor.

SECTION 4

Normal programs

S4DEB1 Allows to show on the FUTABA fluorescent display the characters written with the keyboard of the “development system” and to send commands like reset, cursor positioning, etc.

S4DEB2 Shows one out of ten messages stored in memory, according to the numeric code provided through the keyboard of the “development system”.

Special programs

S4DEB3 Like S4DEB2, but the buzzer sounds at the end of the message.

S4DEB4 Selection of one out of three messages stored in memory, according to which key amongst P18÷P20 has been pressed. The buzzer sounds at the end of the message.

S4DEB5 Write to fluorescent display using only P18÷P20. On the first digit of 7 segments display the ASCII code is progressively represented. The three keys editor works like this:

The first key, called START (red), starts the progressive visualization of ASCII codes.

The second key, called STOP (white), stops an ASCII code and confirms it, with generation of a sound.

The third key, called FORWARD (yellow), increases by one the represented code or the cursor position.

Explain the purpose of each key by a screen on the “development system” monitor.

SECTION 5

There are no demo programs for this section because it is a simple interface to the external world.

SECTION 6

Normal programs

S6DEB1 Genera tes Centronics signals. Anything typed from the keyboard of the “development system” is sent to the printer. A carriage return is printed afer each line.

S6DEB2 Prints one out of ten messages stored in memory, according to the numeric code provided through the keyboard of the “development system”.

S6DEB3 Graphic print test: istograms.

SECTION 7

There are no demo programs for this section because it is an interface for **GPC® 68** to the external world. However all the above described programs exist for **GPC® 68** and use this section to connect to the other sections of **DEB 01**.

All the above described programs are available for all the **grifo®** intelligent control cards and all the programming languages available for them. Each program is provided with a complete description of cables connections and its functionality to ease and make faster the use of **DEB 01** board.

EXTERNAL CARDS

DEB 01 can be connected to a wide range of block modules and operator interface system produced by **grifo®**, or to many system of other companies.The on board resources can be expanded with a simple connection to the numerous peripheral **grifo®** boards,both intelligent and not, thanks to its standard I/O **ABACO®** connector.
Hereunder some of these cards are briefly described; ask the detailed information directly to **grifo®**, if required.

GPC® 68

General Purpose Controller 68000

1 RS 232 line; 1 RS 232 line or RS 422-485 line with settable Baud Rate up to 38K Baud; 3 8 bits parallel ports and 3 timer counter; 10 MHz 68000 CPU; 768 KByte RAM EPROM; disconnectable Watch dog.

GPC® 51

General Purpose Controller fam. 51

Microprocessor family 51 INTEL including the masked BASIC chip; the board features: 16 I/O TTL lines; dip switch; 3 timer/counter; RS 232; 4 A/D converter signals resolution 11 bit; buzzer; on board EPROM programmer; RTC and 32K SRAM with Lithium battery back up; controlloer for display and keyboard.

GPC® 188F

General Purpose Controller 80C188

80C188 µP 20MHz; 1 RS 232 line; 1 RS 232, RS 422-485 or Current Loop line; 24 TTL I/O lines; 1M EPROM or 512K FLASH; 1M RAM Lithium battery backed; 8K serial EEPROM; RTC; Watch Dog; 8 Dip switch; 3 Timer Counter; 8 13 bit A/D lines; Power failure; activity LEDs; single power supply +5Vdc.

GPC® 150

General Purpose Controller 84C15

Microprocessor Z80 at 16 MHz; implementation completely CMOS; 512K EPROM or FLASH; 512K SRAM; RTC; Back-Up through external Lithium battery; 4M serail FLASH ; 1 serial line RS 232 plus 1 RS 232 or RS 422-485 or current loop; 40 I/O TTL; 2 timer/counter; 2 watch dog; dip switch; EEPROM; A/D converter with resolution 12 bit; activity LED.

GPC® 15R

General Purpose Controller 84C15

84C15 µP, 10÷16 MHz; 1 RS 232 line; 1 RS 232 or RS 422-485 or C. L. line; 16÷24 TTL I/O lines; 16 Opto-in; 8 Relays; 4 Opto Coupled Timers Counters; 512K EPROM or FLASH; 512K RAM and RTC backed; 8K serial EEPROM; 8K Backed RAM modul; Buzzer; 1 Activity LED; Watch dog; 4÷12 readable DIPs; LCD Interface.

GPC® 15A

General Purpose Controller 84C15

Full CMOS card, 10÷20 MHz 84C15 CPU; 512K EPROM or FLASH; 128K RAM; 8K RAM and RTC backed; 8K serial EEPROM; 1 RS 232 line; 1 RS 232 line or RS 422-485 or Current Loop line; 32 or 40 TTL I/O lines; CTC; Watch dog; 2 Dip switches; Buzzer.

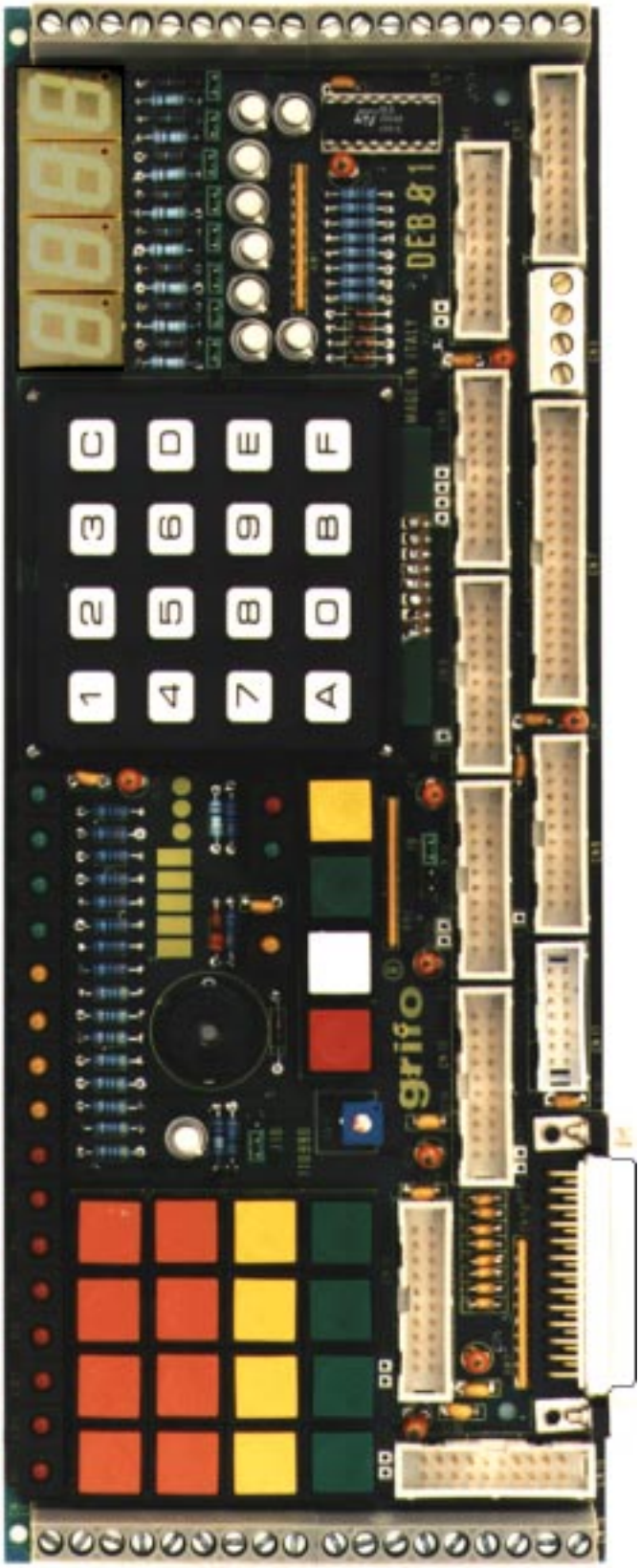

FIGURE 31: CARD PHOTO

GPC® 323

General Purpose Controller 51 family

80C32 µP, 14 MHz; Full CMOS; 1 RS 232 line (software); 1 RS 232 or RS 422-485 or Current Loop line; 24 TTL I/O lines; 11 A/D 12 bits lines; 3 Timers Counters; 64K EPROM; 64K RAM; 32K RAM and RTC backed; 32K DIL EEPROM; 8K serial EEPROM; Buzzer; 2 Activity LED; Watch dog; 5 readable DIPs; LCD Interface.

GPC® 553

General Purpose Controller 80C552

80C552 µP, 22÷33 MHz; 1 RS 232 line (software); 1 RS 232 or RS 422-485 or Current Loop line; 16 TTL I/O lines; 8 A/D 10 bits lines; 3 Timers Counters; 64K EPROM; 64K RAM; 32K RAM and RTC backed; 32K DIL EEPROM; 8K serial EEPROM; 2 PWM lines; 1 Activity LED; Watch dog; 5 readable DIPs; LCD Interface.

GPC® 153

General Purpose Controller Z80

84C15 µP, 10÷16 MHz; Full CMOS; 1 RS 232 line; 1 RS 232 or RS 422-485 or Current Loop line; 16 TTL I/O lines; 8 A/D 12 bits lines; 2÷4 Timers Counters; 512K EPROM or FLASH; 512K RAM and RTC backed; 8K serial EEPROM; Buzzer; 1 Activity LED; Watch dog; 8 readable DIPs; LCD Interface.

GPC® 183

General Purpose Controller Z180

Z180 µP, 10÷16 MHz; Full CMOS; 1 RS 232 line; 1 RS 232 or RS 422-485 or Current Loop line; 24 TTL I/O lines; 11 A/D 12 bits lines; 2 Timers Counters; 512K EPROM or FLASH; 512K RAM and RTC backed; 8K serial EEPROM; Buzzer; 2 Activity LED; Watch dog; 4 readable DIPs; LCD Interface.

GPC® 884

General Purpose Controller Am188ES

Microprocessor AMD Am188ES up to 40 MHz16 bits; implementation completely CMOS; serie 4 format; 512K EPROM or FLASH; 512K SRAM backed with Lithium battery; RTC; 1 RS 232 serial line + 1 RS 232 or RS 422-485 or current loop; 16 I/O TTL; 3 timer/counter; watch dog; EEPROM; 11 signals A/D converter with 12 bit resolution; interface for **ABACO®** I/O BUS.

PIO 01

Peripheral Input Output

96 input output TTL, organized in 12 port featuring 8 bit; 6 standard 20 pins I/O**ABACO®** connectors; Watch Dog monostable and astable; 8 bit BUS; extended addressing mode.

APPENDIX A: ELECTRIC DIAGRAMS

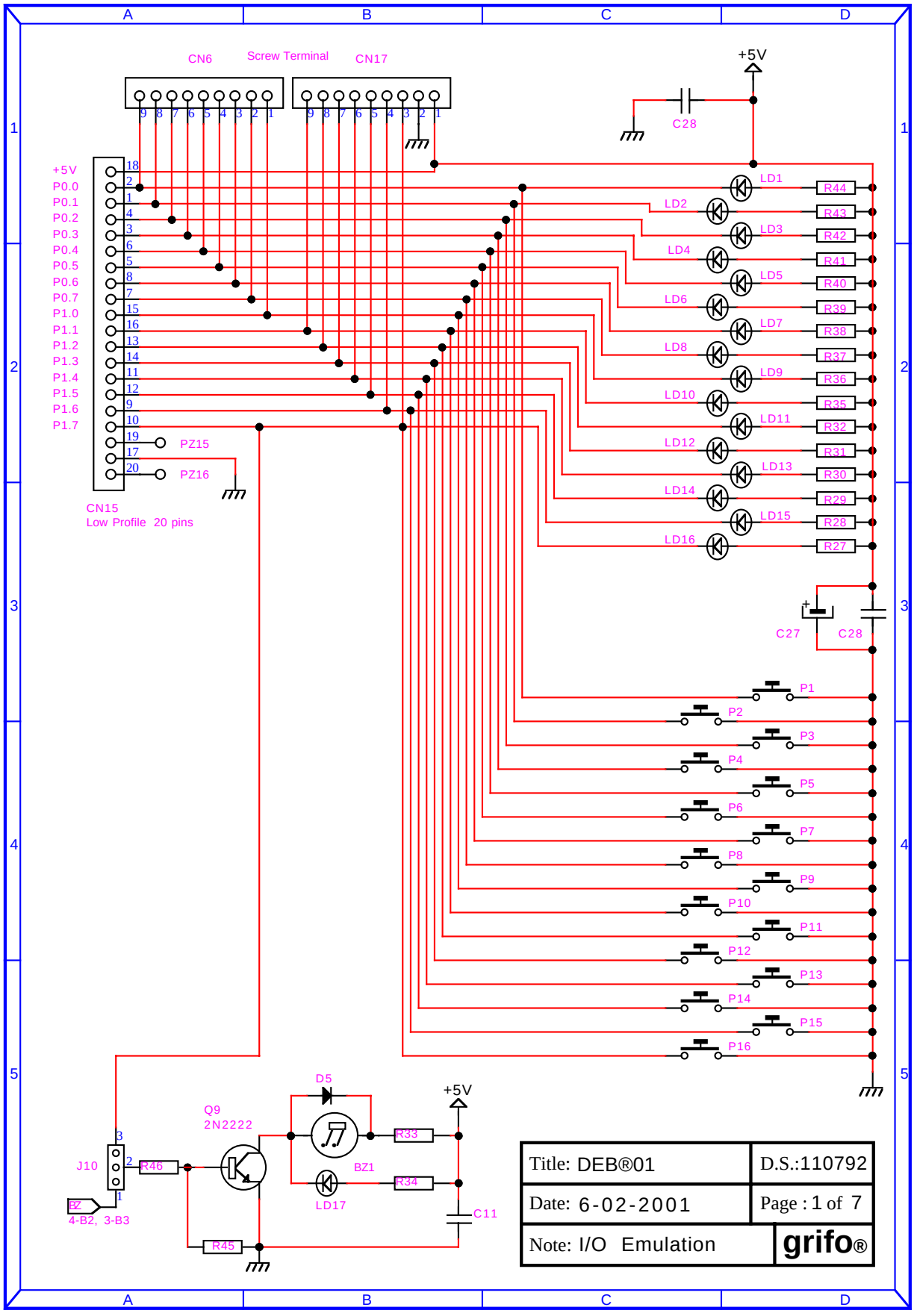

FIGURE A1: SECTION 1 ELECTRIC DIAGRAM

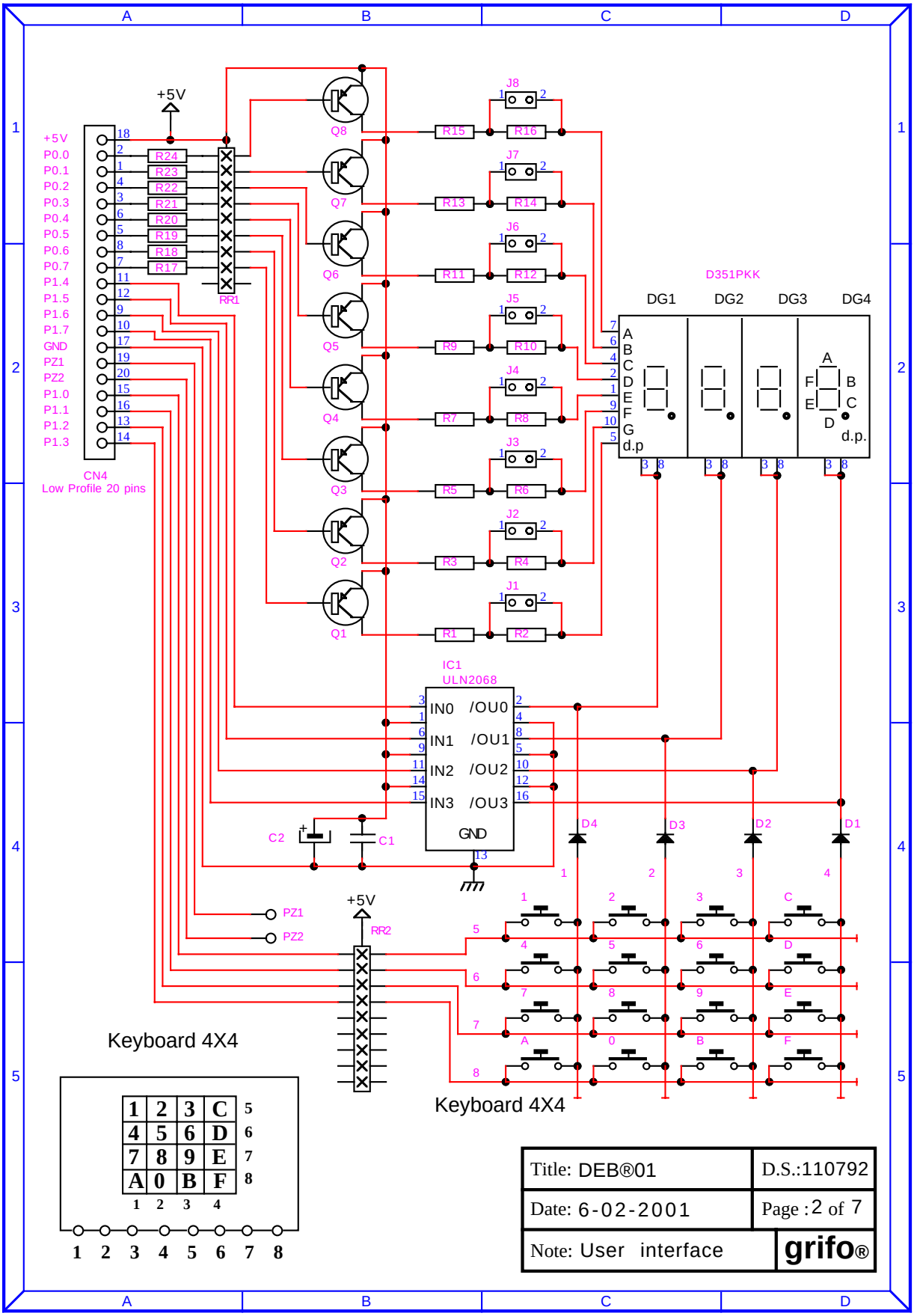

FIGURE A2: SECTION 2 ELECTRIC DIAGRAM

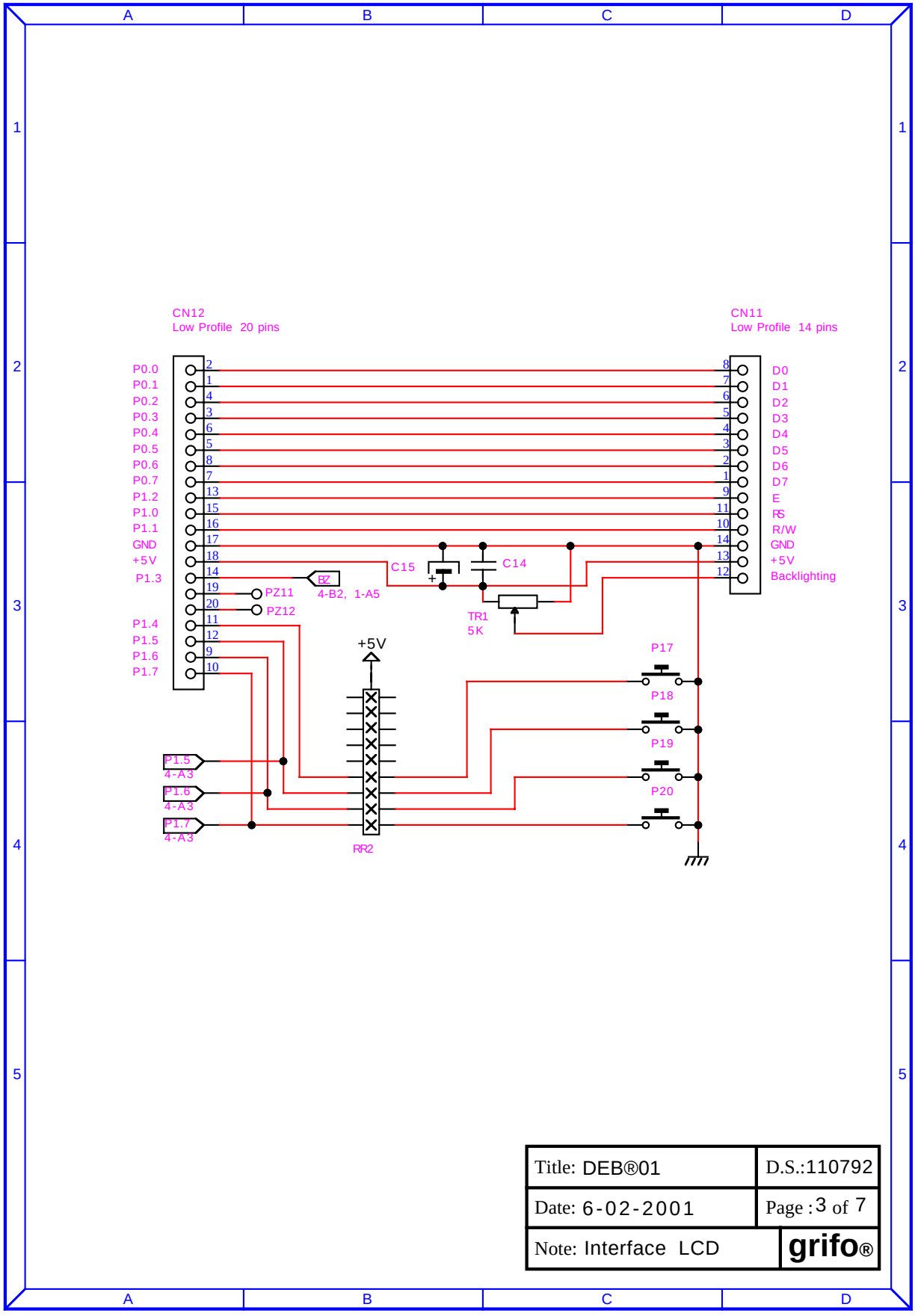

FIGURE A3: SECTION 3 ELECTRIC DIAGRAM

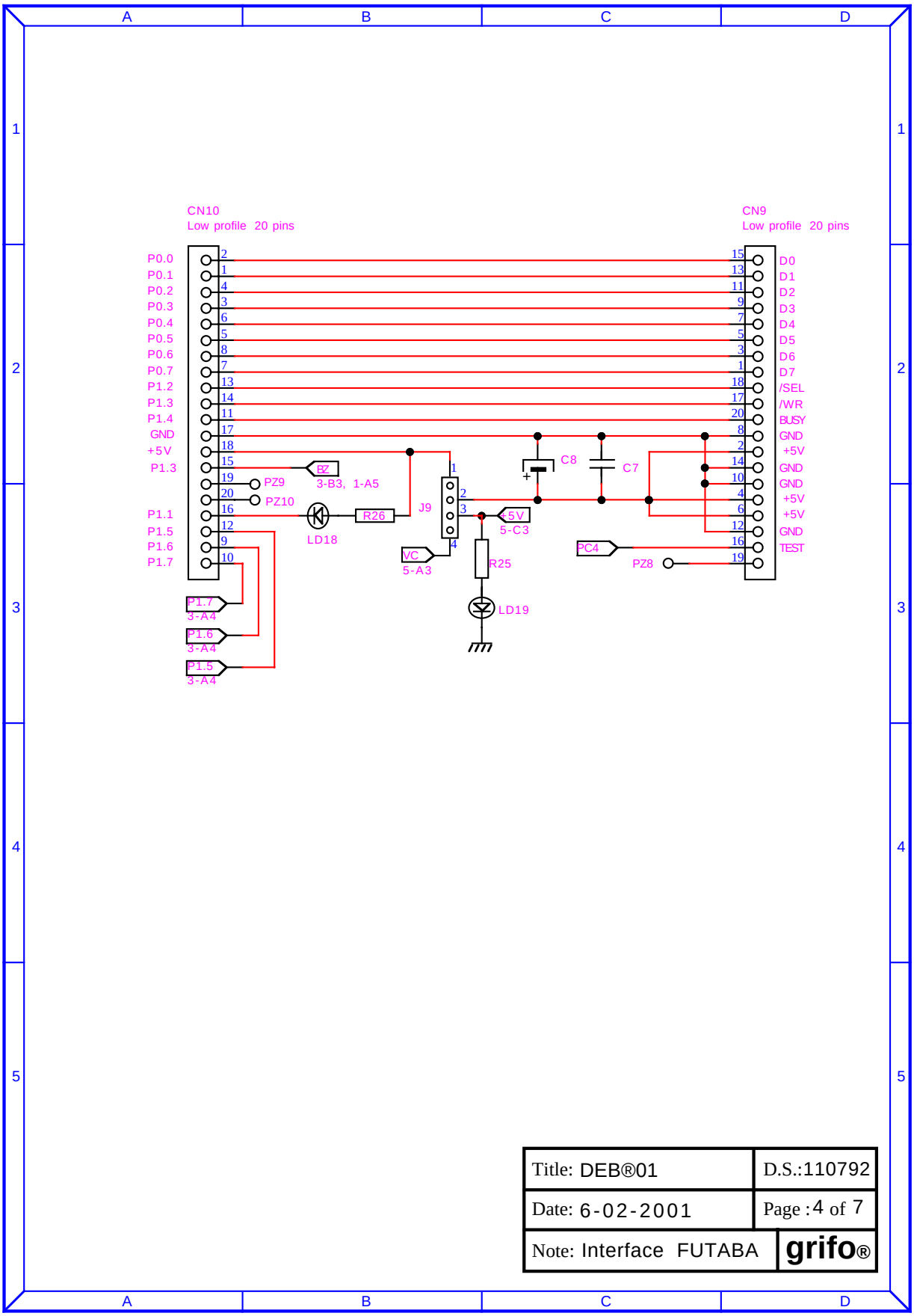

FIGURE A4: SECTION 4 ELECTRIC DIAGRAM

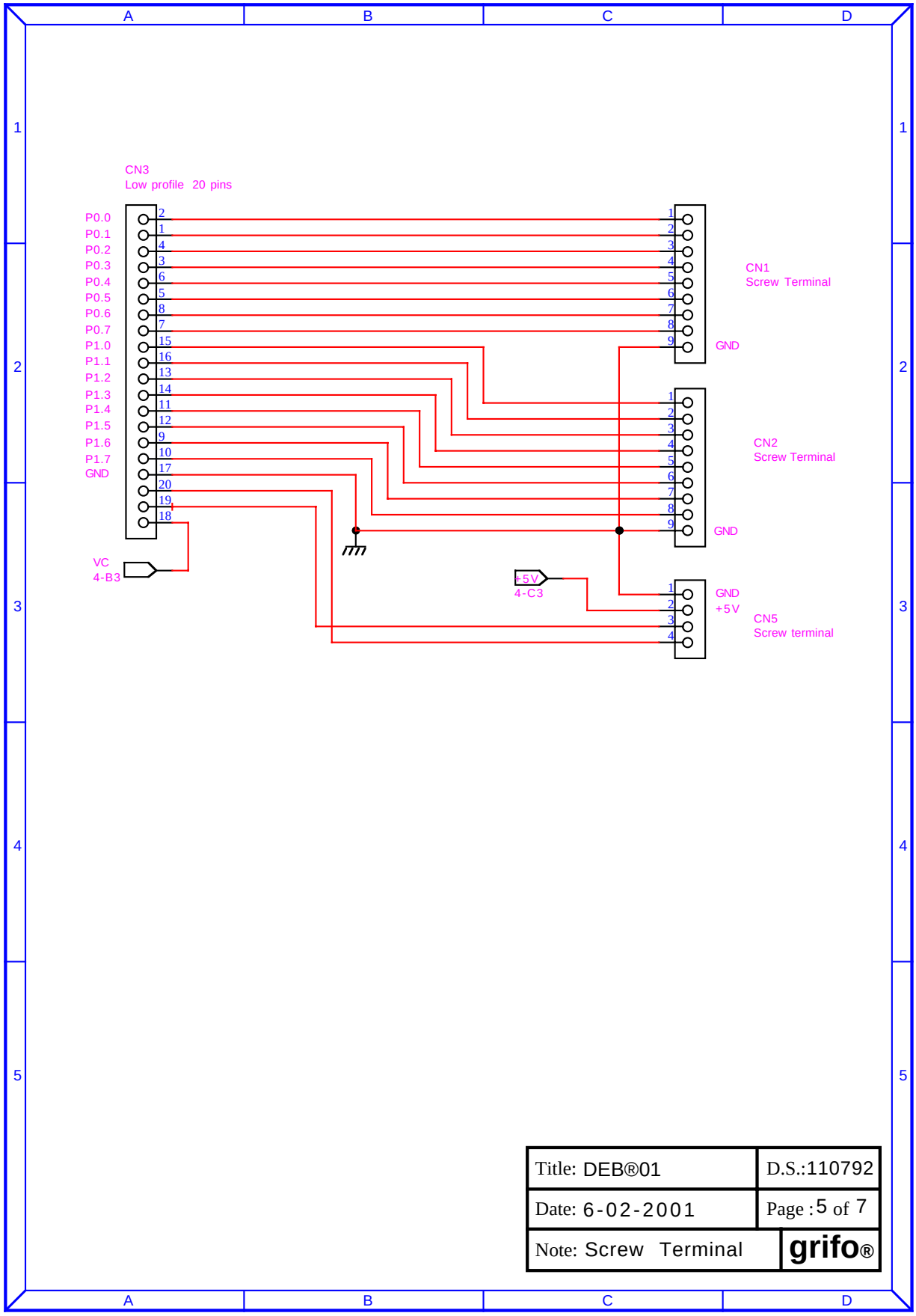

FIGURE A5: SECTION 5 ELECTRIC DIAGRAM

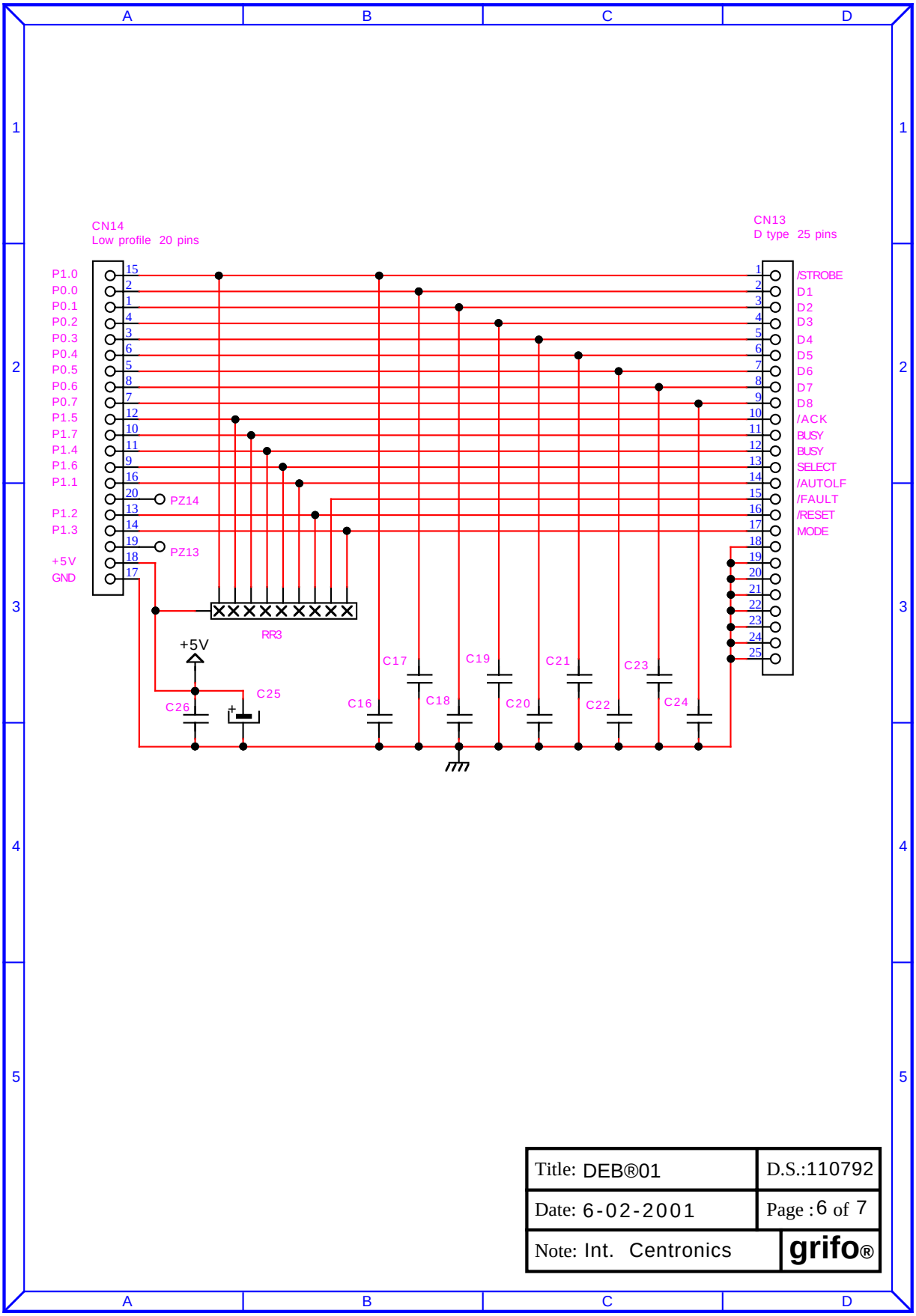

FIGURE A6: SECTION 6 ELECTRIC DIAGRAM

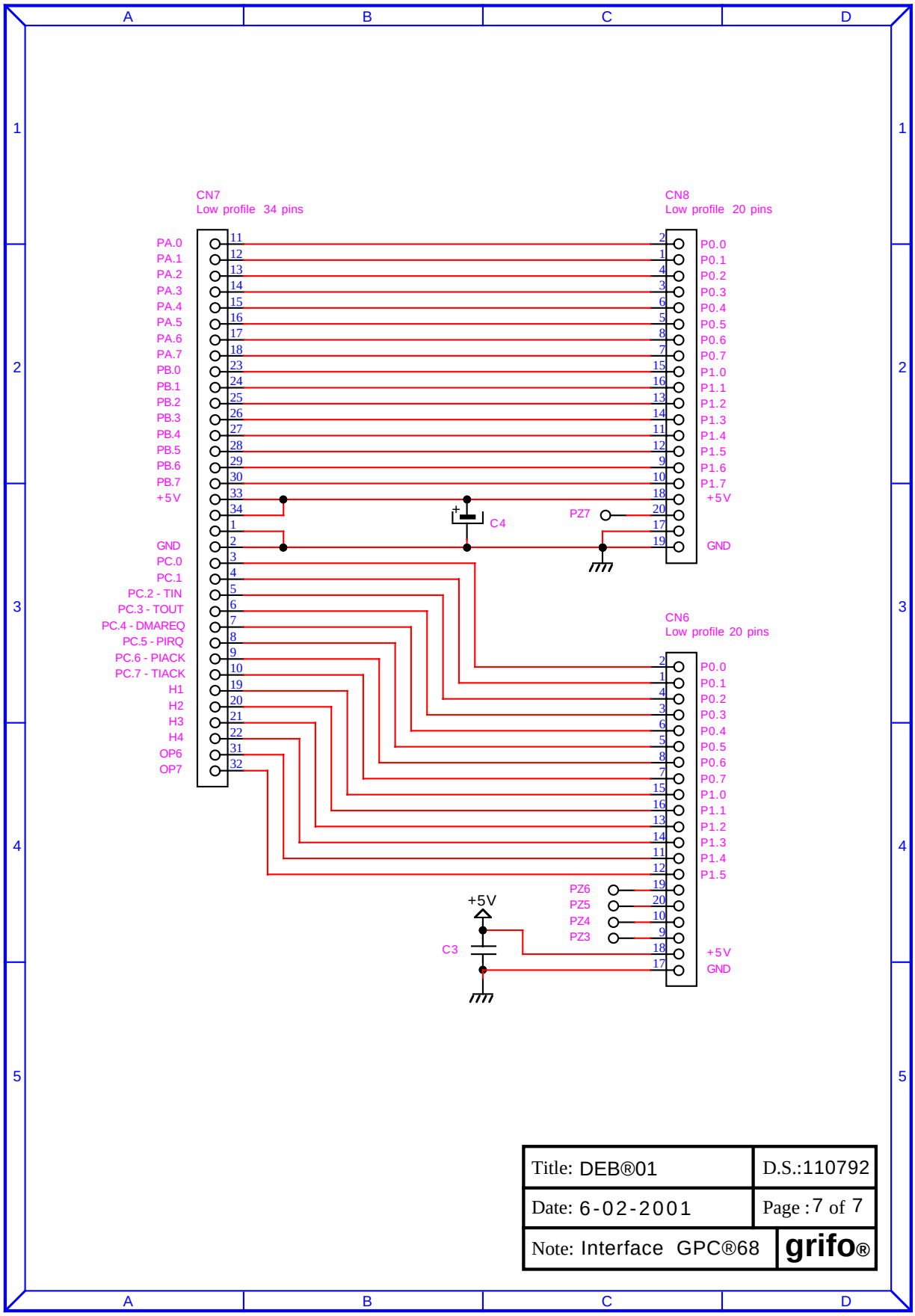

FIGURE A7: SECTION 7 ELECTRIC DIAGRAM

APPENDIX B: ALPHABETICAL INDEX

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