Panel printer

P 150

User's Manual

COD. DOME - P150 REV. 1.10

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GENERAL INFORMATION REGARDING SAFETY

- Read and keep the following instructions.
- Observe all warnings and follow all instructions attached to the printer.
- Before cleaning the printer, disconnect the feed cable.
- Clean the printer with a damp cloth. Do not use liquid or spray products.
- Do not operate the printer near to water.
- Do not place the printer on unsteady surfaces. It could fall and get seriously damaged.
- Use the type of electricity supply marked on the printer label. In the event of uncertainty, contact the seller.
- Position the printer in such a way as to ensure that the cables connected to it will not be damaged.
- Ensure that the maximum absorbed current of the printer does not exceed the maximum acceptable current for the type of feed cable used.
- Do not put objects of any kind inside the printer as they could cause a short circuit or damage parts which could affect its performance.
- Do not spill liquids on the printer.
- Do not carry out technical operations on the printer with the exception of the scheduled maintenance operations specifically indicated in the user's manual.
- Disconnect the printer from the electricity supply and have it repaired by a specialized technician should any of the following conditions occur:
    A. The feed connector has been damaged;
    B. LIQUID has penetrated to the inside of the printer;
    C. The printer has been exposed to rain or water;
    D. The printer is not operating normally despite the instructions in the user's manual having been followed;
    E. The printer has been dropped and its case damaged;
    F. The performance of the printer is poor;
    G. The printer does not work.

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A. POWER SUPPLY

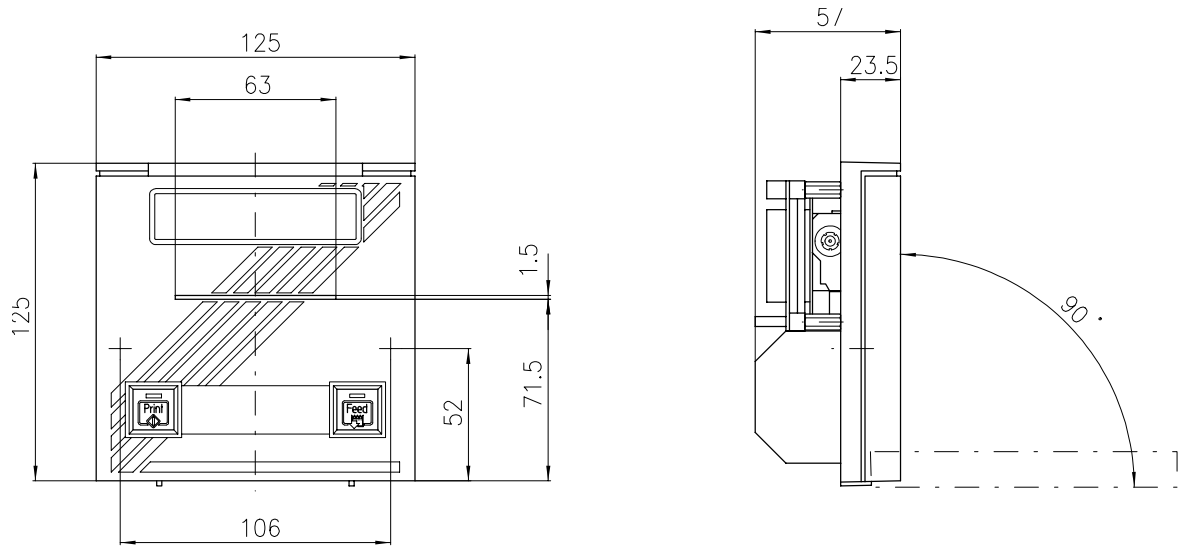
B. CONNECTION EXAMPLES

1.1 General features

The P150 (figure 1) is an extremely simple and functional panel printer. It is the ideal solution for applications which require the immediate printing of data on a ticket, whether they be of an industrial, professional or laboratory nature. It is suitable for POS, weighing systems, receipts (not for tax purposes), as well as for security, controlling and diagnostics purposes.

It has an 8-needle, rapid impact printing mechanism and uses 57.5 mm wide paper rolls.
The P 150 printer is so light-weight and compact that it can be easily fitted on any kind of machinery. It can be personally programmed and is thus able to meet all possible requirements. It has a 150-byte print buffer. It has TTL serial and parallel interfaces as standard or RS232 serial and CENTRONICS parallel interfaces as options. It can, in addition, be equipped with a Real Time Clock . It comes in three colours and two models, with 24 and 42 columns.

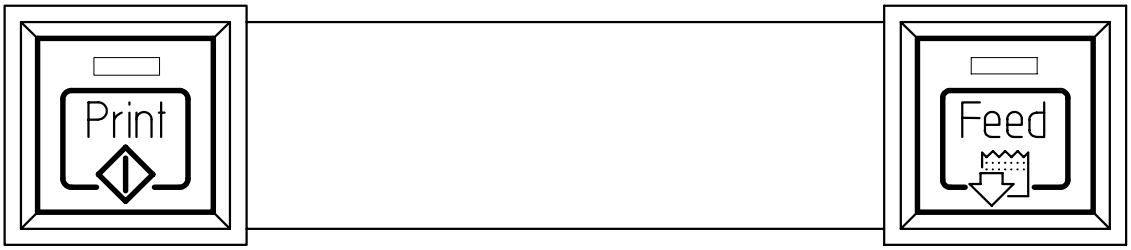
Figure 1



1.2 Product description

The P 150 printer (figure1) has an ABS casing with a top covering the paper roll and print head.
The dimensions of the printer are shown in Figure 1.
The keyboard, located on the front of the printer, consists of the PRINT and FEED keys with their respective LEDs.

Figure 2



PRINT key
When this key is pressed, if the printer is in parallel pin 2 of J7 comes out of logic state “0”, while in serial it transmits control character “$0D”; this only happens if it has been enabled by DATA4 to logic “0” or if switch 5 of the RS232 option is in the ON position. The PRINT key LED only lights up during printing.

FEED key
This enables the manual paper feed. If pressed briefly, when the RTCK option is installed, the time and date are printed. When the FEED key LED lights up, it is to indicate that the logic card power supply is correct, i.e. that it is over 3.7 V (minimum threshold below which the printer is reset and the LED goes out).

1.3 Technical specifications

Table 1 lists the main features of the two printer models: P 150 24 and 42 columns.

Table 1

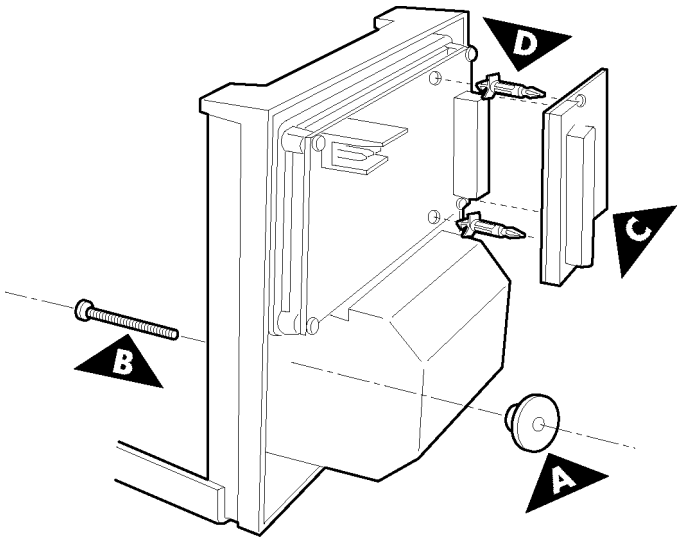
Columns	**24**	**40**
Characters (L x H mm)		
Normal	1,7 x 2,6	1,1 x 2,6
Double height	1,7 x 5,2	1,1 x 5,2
Double width	3,4 x 2,6	2,2 x 2,6
Expanded	3,4 x 5,2	2,2 x 5,2
Graphic point	0,33 x 0,38	0,19 x 0,38
Point for line	144	252
Printing speed		
Lines/sec	2,5	1,5
Characters/sec	60	60
Feed (lines/sec)	6	3,6
Line buffer	24 byte	42 byte
Printing buffer	150 byte	
Printing method	Impact dot matrix	
Character matrix	6 x 10 points	
Printing mode	Normal or Reverse	
Character set	Normal and extended	
Standard interface	Serial and parallel TTL	
Optionally interface	Current Loop RS232 serial, Centronics	
Supply	Double or single 5Vcc ± 10%	
Absorptions		
Medium in stand by	38 mA	
Medium in printing	880 mA	
Impulsive in printing	3.0A (600 µSec.)	
Environmental conditions		
Operating temperature	0°C - +50°C	
Operating humidity	35% - 85%	
Storage temperature /humidity	-20°C - +70°C / 10%-90%	

2.1 Removing the printer from its packaging

Open the package and check that:

a) none of the parts have been damaged during transportation;
b) that the ink cartridge is fitted on the printing mechanism and the paper roll is in place;
c) the two brass screws and washers necessary for installing the printer are, in fact fitted on it

Figure 3



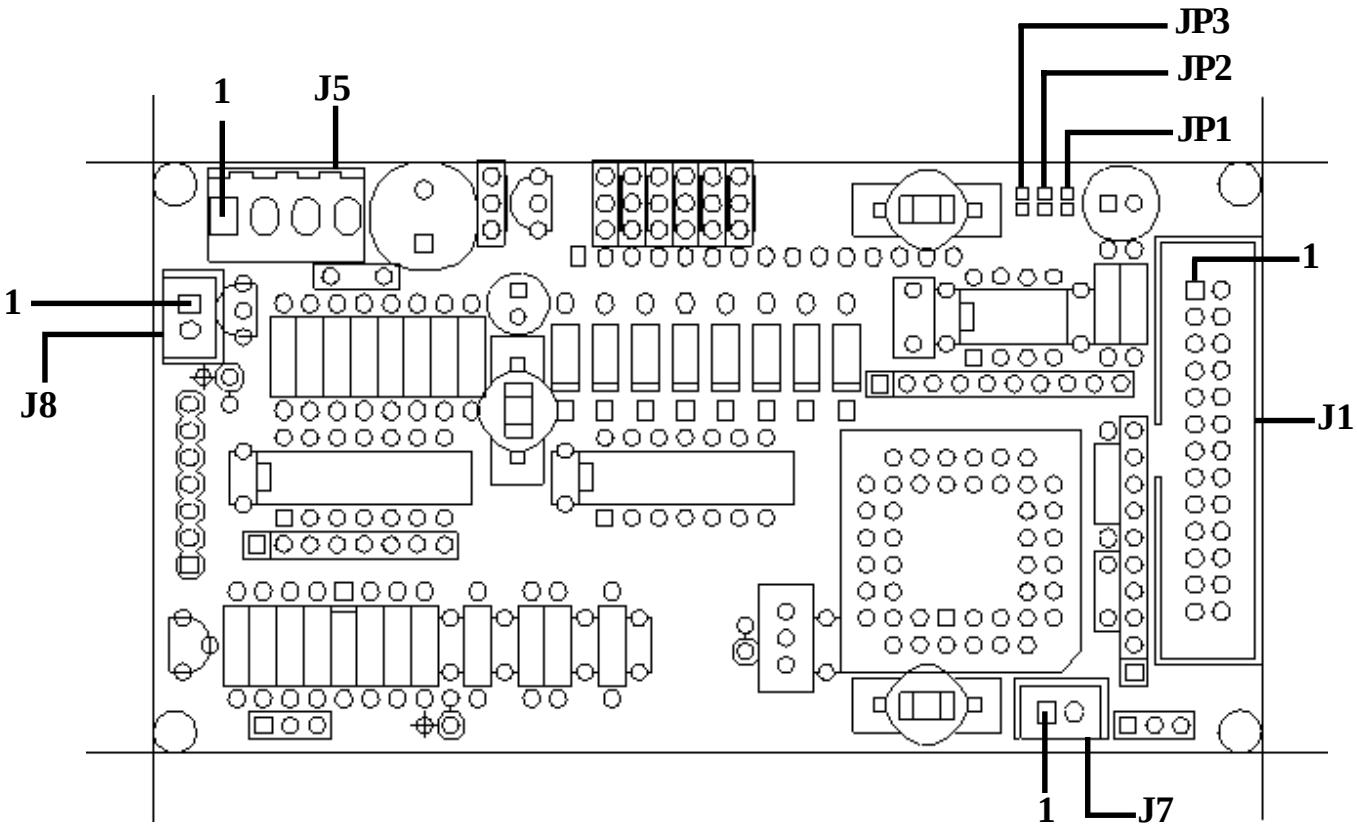
2.2 Installation procedure

1. Make a 112 mm x 112 mm square hole in the wall where the printer is to be installed (see Figure 3). Unscrew the two brass washers “A”, leaving the screws “B” in their holes.
2. Insert the printer into the hole on the wall, open the front panel and, from the back, manually screw in the two brass washers, until the printer is firmly in place.
3. Insert the interface and the power supply connectors, located on the logic card.

2.3 Connections

The Figure 4 shows the layout of the interface card of printer P150 and the position of the connectors mentioned in this manual. The card can be accessed from the back of the printer, as shown in Figure 3. The functions of the connectors are described follows.

Figure 4



J5 : Power supply

With regard to power supply, the P 150 printer has a standard AMPMODU1 4-pin male type connector J5(see the figure 4). The power supply connector pins are marked as follows:

1 GND
2 GND
3 +VT: 5 Vcc ± 15% (printer needle power supply)
4 +VCC: 5 Vcc ± 7% (logic card power supply)

Connecting with the power supply connector (J5) can be avoided by using the flat 20-pin connector (J1) of the logic or by replacing the latter, by special request at the order stage, with a similar 26-pin one, thus connecting the power supply and the printer signals with a single cable. In this case, however, the maximum length of the flat cable must not exceed 30 cm for the 20-pin version and 70 cm for the 26-pin version. The reason for this is that current running along inside narrow wires can lead to power failures which could interfere with the correct functioning of the printer.

If the printer has the Current Loop RS232 or CENTRONICS options, it must be supplied by means of the J5 connector.

For the pin pattern required for supplying power through the logic flat cable, please refer to the following paragraph.

J2 : Logic

In the J1 20-pin connector, the signals are arranged as follows:

PIN	Signal	PIN	Signal
1	+VT	2	+VT
3	+VCC	4	+VCC
5	GND	6	GND
7	TD	8	D6
9	D5	10	D4
11	D3	12	D2
13	D1	14	D0
15	D7 *	16	RESET
17	S-EN	18	READY/RTS
19	FEED	20	STB/RD

The J1 26-pin connector can be used if the flat cable does not exceed 700 mm in length and has a diameter of at least 0.12 mm^2. The corresponding signals are :

PIN	Signal	PIN	Signal
1	GND	**2**	GND
3	GND	**4**	TP
5	+VT	**6**	+VT
7	+VT	**8**	+VT
9	+VCC	**10**	+VCC
11	GND	**12**	GND
13	TD	**14**	D6
15	D5	**16**	D4
17	D3	**18**	D2
19	D1	**20**	D0
21	D7 *	**22**	RESET
23	S-EN	**24**	READY/RTS
25	FEED	**26**	STB/RD

*The D7 signal is not taken into consideration in cases of 7-bit programming of the parallel port.
In order to configure the P 150 with the extended character set, 8-bit programming of the parallel interface is required.

The signals indicated have the following functions:

GND: signal ground and power supply;
+VT: power supply to the printer needles;
+VCC: power supply to the logic card;

S-EN (input): serial/parallel interface selection.
If shortcircuited to ground (0), it enables serial communication; if free (1) it enables parallel communication;

D0, ..., D7 (inputs): data bus. In parallel configuration, these correspond to the printer input data bus (the high level indicates the binary digit 1). In serial communication, these are utilized to determine speed of communication and transmission protocol; normally the data bus is at logic level 1: in order to obtain logic level 0, it has to be shortcircuited to ground (GND).

The serial baud rate can be selected from the following table:

D0	D1	D2	BAUD
0	0	1	300
1	0	1	600
1	1	1	1200
0	1	1	2400
0	0	0	4800
1	0	0	9600

All the other combinations select a speed of 1200 bauds.

D3 = 1: flag-type transmission protocol. When the print buffer is full, the printer sends a low level on the RTS signal, which interrupts transmission; when the buffer is able to receive further data, the level of the RTS signal is then changed to 1.

D3 = 0: XON/OFF type transmission protocol. When the print buffer is full, the printer sends an XON$13 (DC3) which interrupts transmission; when the buffer is able to receive further data, the command XON$11 (DC1) is transmitted.

D4 = 1: when the PRINT key is pressed, nothing happens.

D4 = 0: when the PRINT key is pressed, the signal $0D (CR) is transmitted to the TD pin, if the serial interface has been configured.

D5, D6, D7: the selection of these bits results in the serial being configured with the transmission format listed in the table below:

D7	D6	D5	Format
1	1	1	N,8,1 (8 bits without parity and 1 stop bit)
0	1	1	E,8,1 (8 even parity bits and 1 stop bit)
0	1	0	O,8,1 (8 odd parity bits and 1 stop bit)
1	1	0	N,7,1 (7 bits without parity and 1 stop bit)
1	0	1	E,7,1 (7 even parity bits and 1 stop bit)
1	0	0	O,7,1 (7 odd parity bits and 1 stop bit.)

Remember that, in order to configure the printer in serial mode, it is necessary to shortcircuit the signal S-EN to ground on connector J1.

RESET (input): card controller reset, active at a low level.
Resetting initializes the printer's parameters and has the following effects:
- erasure of the line buffer and printer buffer;
- selection of printing format according to programming;
- reading of the S-EN pin of J1 for serial or parallel configuration;
- printing of the self-test if the PRINT key is pressed;
- functionality check of the option cards installed, if any.

READY/RTS (output): in parallel configuration the high level indicates that the printer is ready to receive data. The low level indicates that it is on standby (bus Y). In serial communication, if the CTS/RTS protocol is enabled the high logic state (1) indicates that the printer is ready to receive data; the low logic state (0) indicates that the print buffer is full and cannot receive data. If the serial protocol XON/OFF is enabled, the signal is always high.

FEED (input and output): paper feed key, active at low level.
This signal is in parallel with the contacts of FEED key on the front panel of the printer.

STB/RD (input): in parallel configuration a low level tells the printer that there is valid data on the data bus (D0, ..., D7). In serial configuration this corresponds to the data reception pin.

TP (input and output): PRINT key, active at low level. This signal is in parallel with the contacts of the PRINT key on the front panel of the printer.

J7 : external push button
Connector parallel to push button “PRINT”, to be used as TTL output for the external push button.

Pin 1 = GND
Pin 2 = 1 push button released; 0 push button pressed.

J8 : take-up device
Connector used to connect the take-up device.

Pin 1 = +5 V driver
Pin 2 = +5 V at rest; 0 V in print max. available current = 300 mA

2.4 Self-test

To enable the self-test, hold down the FEED key (paragraph 1.2) while switching on the printer. The self-test consists of the printing of the printer’s currently set data, a memory check and the printing of the entire set of ASCII characters.

Figure 5

```
* AUTOTEST *
MOD. P150 - 24

ROM OK
ROM RELEASE  3.0
PRINT MODE = NORMAL
EXTERNAL DEVICE :
NONE
*
PARALLEL PORT SELECTED
BITS PER CHAR.= 7
PORT IN = $FF
```

2.5 Precautions

a) Do not print when there is no paper and/or ribbon: this leads to rapid deterioration of the needles.
b) Do not put objects inside the printer.
c) Do not pull the printer carriage manually when the printer is ON.
d) Before connecting the printer to the mains, check that the power supply or system ON/OFF switch is in the OFF position.
e) Avoid blows to any part of the printer, both during and after installation.

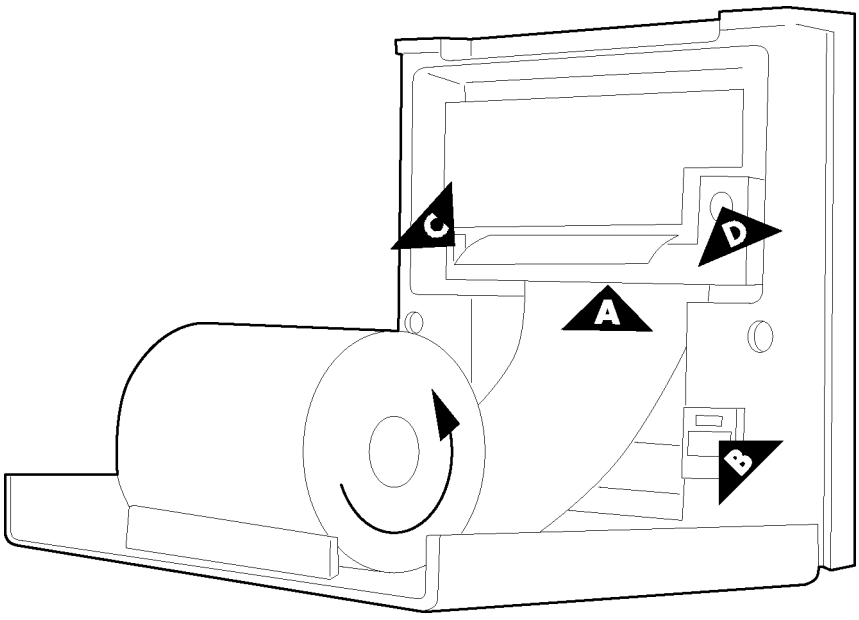
2.6 Maintenance

Warning : Before to start any handling with top cover open it is recommended to turn off the printer. If it is not possible make sure to take the necessary care preventing electrostatic discharge.

Changing the paper roll

To change the paper roll, proceed as follows:
1. open the top of the printer and place the paper roll in position, following the arrow, as indicated in figure 6;
2. insert the end of the roll in the slit (A) of the print mechanism;
3. press the FEED key (B) so that a few centimetres of paper come out of the printer;
4. insert the end into the slit on the top of the printer and close it.

Figure 6



Changing the ribbon. Proceed as follows:

1. open the top of the printer and remove the old ribbon cartridge, by pressing down at point (C), as shown in figure 6;
2. insert the new ribbon, making sure that it is correctly positioned;
3. pull the ribbon tight by turning the knurled knob (D) and close the top down again.

2.7 CONFIGURATION OF THE JUMPERS

The jumpers are located on the component side of the controller card, on the left of connector “J1” (see figure 4). They can be shortcircuited by soldering the two contacts.

The functions of the jumpers are as follows.

JP1
If open, in the parallel configuration it sets the data reading on the 7-bit bus and disregards the D7 status (small characters). If it is shortcircuited, the complete bus is read (including D7) making the complete set of characters available.
In the serial configuration JP1 does not produce any effects.

JP2
If open, it sets the “normal” writing mode. If shortcircuited, it sets the “reverse” writing mode (see Figure 10). This configuration can always be modified by using the software controls “ESC R” ($1B $52) for the “reverse” mode and “ESC N” ($1B $4E) for the “normal” mode.

JP3
If shortcircuited, it enables setting of the Real Time Clock (if the clock-calendar option has been installed); this operation may also be carried out by pressing the “PRINT” and “FEED” push buttons on the front panel of the printer. If open, it disables the possibility to set the Real Time Clock with the “PRINT” and “FEED” push buttons.
Regardless of the status of JP3, it is always possible to set the Real Time Clock using the software controls (see paragraph 3.5).

INTERFACES

Selection of the standard interface, TTL serial and parallel, is given by the status of the S-EN pin of J1 (see paragraph 2.3).

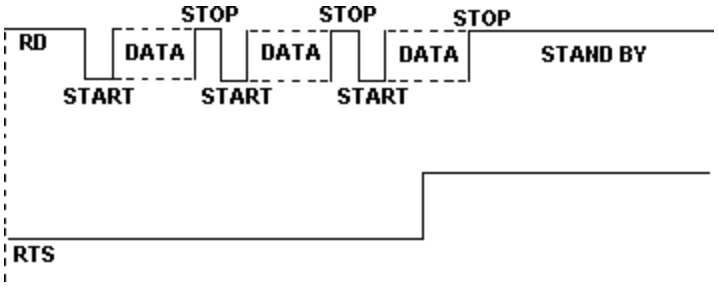
3.1 TTL Serial

In the serial protocol, the signals which characterize communication are TD, RD and RTS if the RTS/CTS protocol has been selected; alternatively, if the XON/OFF protocol has been selected, the signals are TD and RD. The reception and transmission format is fixed at 8 data bits, 1 stop bit, without parity bits. It is possible, however, to vary the transmission speed, as indicated in paragraph 2.3.

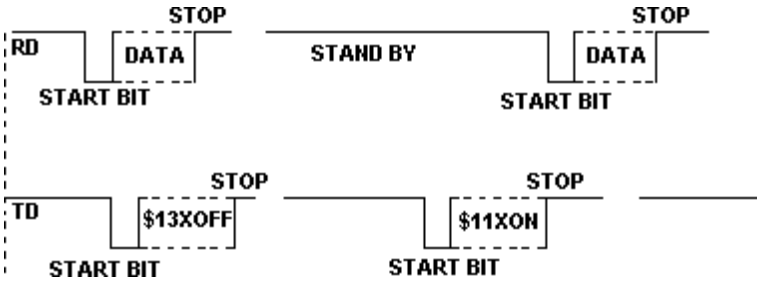
Figure 7

Transmission format

RTS/CTS protocol



XON/OFF protocol

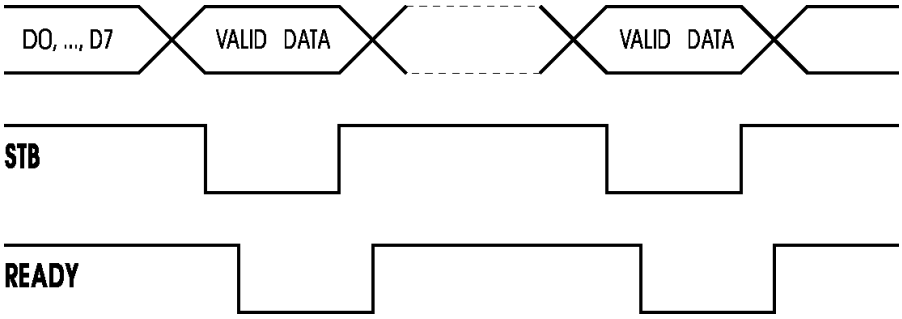


3.2 TTL parallel

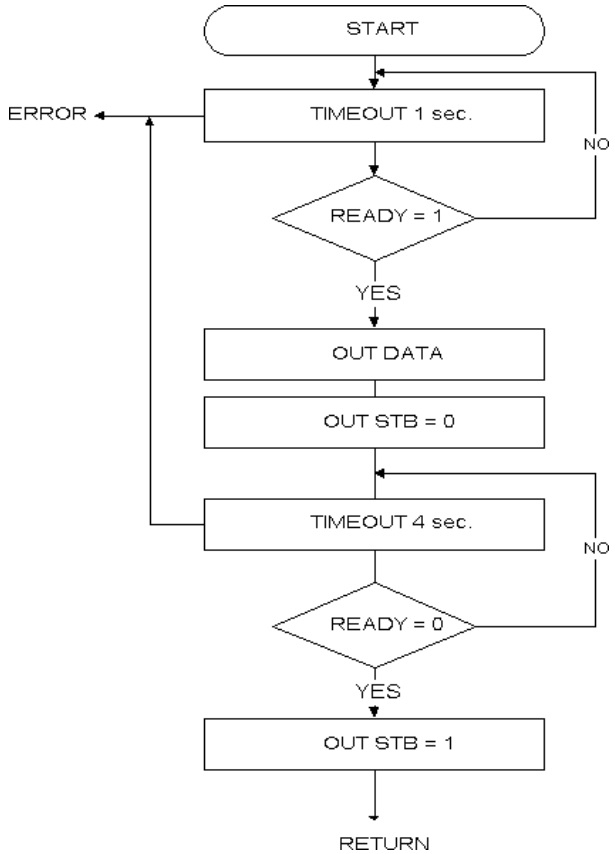
In parallel communication the useable signals are:
- 7 or 8 bit data bus;
- STROBE signal indicating data validity;
- READY signal indicating that the printer is ready to receive data.

Figure 8

Transmission format



Flow diagram



3.3 Current Loop RS232 SERIAL (option)

The printer has an RS232 serial interface and current loop to be installed on the P 150 controller.
The connection is made with a 25-pin rectangular female connector.
The signals on the connector pins are indicated in Table 2.
The pins which are not indicated are not connected. Figure 6 shows how to select the operating modes.

Table 2

Pin	Signal	Direction	To	Description
1,7	GND	OUT	GND	Signal ground
2	TXD	OUT	RXD	Receive Data. Serial output (from Host)
3	RXD	IN	TXD	Transmit Data. Serial data input (towards Host)
4	DTR	OUT	DSR	Data Set Ready.
			DCD	Printeron and operating. (active at RS232 level high).
9	LOOP RD +		IN	Data reception in current loop.
10	LOOP RD -	-		LOOP RD return.
11	LOOP RTS+	OUT		Current loop: ready to receive data.
12	LOOP RTS-	-		LOOP RTS return.
13	LOOP DTR+	OUT		Current loop: indicates that the printer is ON.
14	LOOP DTR-	-		LOOP DTR return.
15	LOOP TD+	OUT		Current loop: positive level data transmission
16	LOOP TD -	-		LOOP TD return
20	RTS	OUT	CTS	Clear to Send. Ready to receive data (active at RS232 level high)

The following personalizations may be obtained, relative to transmission format and the PRINT key on the P 150's front panel, by using the dip-switch on the RS232 card:

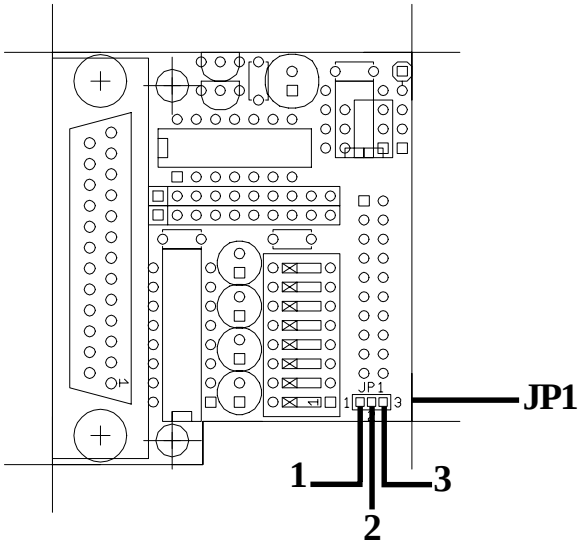
DIP 1	DIP 2	DIP 3	Baud rate
ON	ON	OFF	300
OFF	ON	OFF	600
OFF	OFF	OFF	1200
ON	OFF	OFF	2400
ON	ON	ON	4800
OFF	ON	ON	9600

DIP 4	Description
OFF	RTS/CTS Protocol
ON	XON/XOFF Protocol

DIP 5	Description
OFF	Inhibits $0D transmission by pressing PRINT key
ON	Enable $0D transmission

DIP 6	DIP 7	DIP 8	Protocol
OFF	OFF	OFF	N,8,1 (8 bits without parity and 1 stop bit)
OFF	OFF	ON	E,8,1 (8 even parity bits and 1 stop bit)
ON	OFF	ON	O,8,1 (8 odd parity bits and 1 stop bit)
ON	OFF	OFF	N,7,1 (7 bits without parity and 1 stop bit)
OFF	ON	OFF	E,7,1 (7 even parity bits and 1 stop bit)
ON	ON	OFF	O,7,1 (7 odd parity bits and 1 stop bit.)

Figure 9



SERIAL INTERFACE
To select operating mode, proceed as follows :
Current Loop : solder together points 1 and 2
RS232 : solder together points 2 and 3

3.4 Centronics parallel (option)

The printer can be equipped with a CENTRONICS parallel interface to be installed on the P150 controller. The connection is made with a 25-pin rectangular female connector. The signal layout is exactly the same as that used by personal computers which use the same connector, as shown in Table 3. The pins which are not indicated are not connected.

Table 3

PIN	Signal	Direction	Description
1	STROBE	IN	A low level impulse on this line indicates that there is data ready to be read by the printer
2	DATA1	IN	Data transmitted to the printer: the low level indicates binary digit 1
3	DATA2	IN	
4	DATA3	IN	
5	DATA4	IN	
6	DATA5	IN	
7	DATA6	IN	
8	DATA7	IN	
9	DATA8	IN	
10	ACK	OUT	a low level impulse indicates that the printer is ready to receive further data
11	BUSY	OUT	High level active signal: indicates that the printer cannot receive data
12	PE	OUT	Paper out (always to GND)
13	SELECT	OUT	Connection to Vcc with 4.7 ohm resistance
15	SELECT	OUT	
16	RESET	IN	-
17	GND	-	Pin connected to GND
18	GND	-	Pins connected to GND
19	GND	-	
20	GND	-	
21	GND	-	
22	GND	-	
23	GND	-	
24	GND	-	
25	GND	-	

3.5 Real Time Clock (option)

The Real Time Clock is available as an option. Printing and adjustment of the clock are managed by a series of control characters:

$12	Prints clock
$13	Sets clock
$14	RTCK transmission in serial
ESC T	Enters the time in the print buffer
ESC D	Enters the date in the print buffer
ESC U	Enters the date (American-style) in the print buffer

How to adjust the clock using the keyboard

The time and date can be adjusted by using the PRINT and FEED keys on the front panel of the printer. Setting procedure is as follows:

1. hold down the FEED key and simultaneously press the PRINT key.
The printer will print the time and date with an arrow indicating a digit to be changed;
2. each time the PRINT key is pressed, the digit by the arrow will increase and the updated version will be printed;
3. to select the next digit which requires adjusting press the FEED key again.
On completion of each operation, the printer will print the updated time and date, highlighting by means of an arrow the digit currently being selected;
4. to terminate setting, press PRINT and FEED at the same time, or run through all the parameters.

For more information on the control characters which manage the clock, see paragraph 4.3.

3.6 Installation options

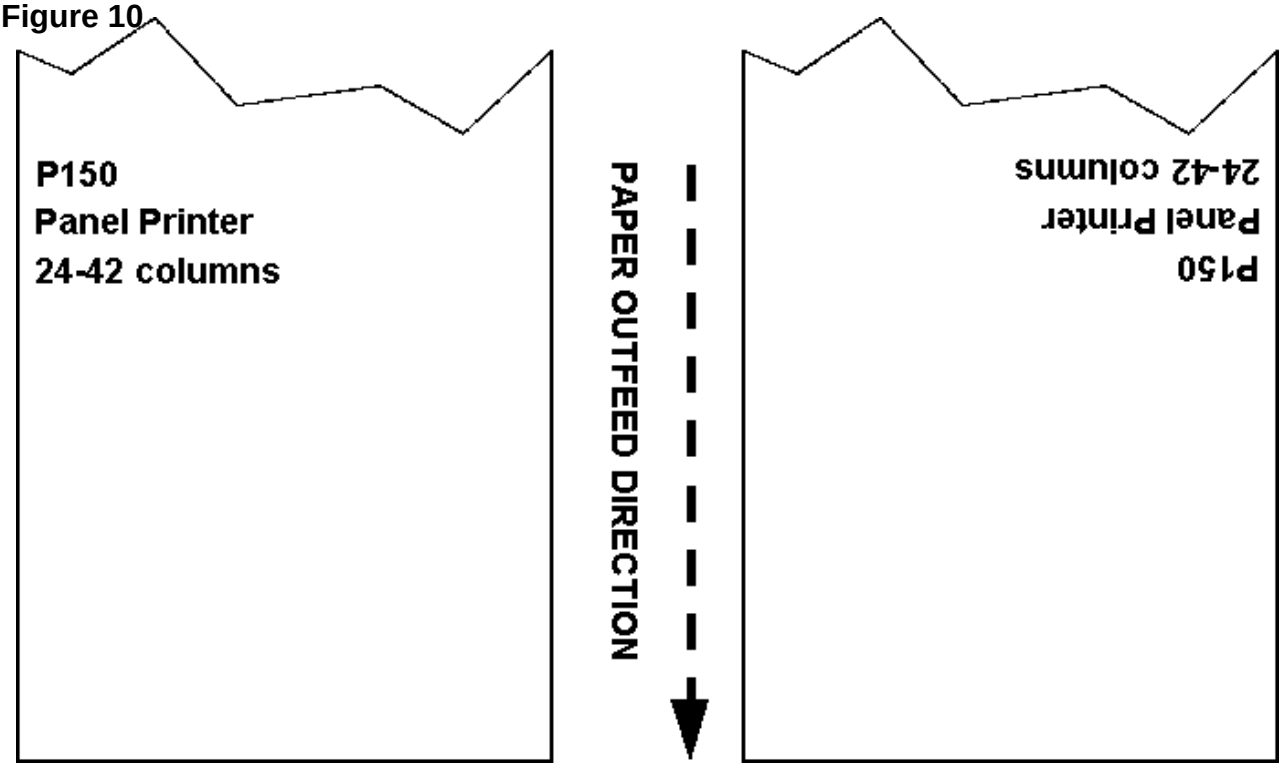
To install the RS232 serial and CENTRONICS parallel options, please refer to figure 3 :

1. insert the plastic spacers provided into the holes on the interface card;
2. insert the option (C) into the connector and its spacers, taking care to centre the pins correctly.

4.1 Printing modes

The P 150 printer has two printing modes which can be selected by means of control characters: normal and reverse. The basic character matrix is 6 x 10 points. Characters may be printed in various formats. The size of the characters for the respective formats, shown in table 1, depending on whether the printer is the 24 or 42 column model.
For further details on the selection of printing modes, please refer to the paragraph covering control characters (paragraph 4.3).

Figure 10



Normal mode **Reverse mode**

4.2 Graphics

The size of the graphic point and the number of points per line vary depending on the number of columns.
To obtain a graphic printout, enter the command $11 at the beginning of each line.
The graphic configuration byte format is as follows:

X	**R**	**P6**	**P5**	**P4**	**P3**	**P2**	**P1**
D7	D6	D5	D4	D3	D2	D1	D0

where:
X is not utilized;
R must be set at 1;
P1, ..., P6 are the data of the graphic points (1 prints, 0 does not print)

The P6 bit of the string of points transmitted is printed on the left and the others (P5, P4, P3, P2, P1) follow from left to right, as shown:

1st byte ➔	**2nd byte➔**	**3rd byte➔**
P6 P5 P4 P3 P2 P1	P6 P5 P4 P3 P2 P1	P6 P5 P4 P3 P2 P1

To print a line of points, transmit:
$11, N x $7F (where N is the number of characters per line), **$OD**.

To print an empty line, transmit:
$11, $40, $OD.

4.3 Control characters

The table below lists all the commands for function management of the P150 printer. These commands can be transmitted to the printer with either the serial or parallel interface; if, however, the parallel interface is used, the user will not be able to receive the data required, since this interface is unidirectional. The commands can be transmitted to the printer at any moment, but they will only be carried out when the characters previously tramsitted have been printed or the commands previously transmitted have been carried out. There are no commands with priority status; all the commands are carried out when the circular buffer is free to do so. They can be one-, two- or three-byte commands.
The table describes each control character in detail (the table lists the page on which the command is described).

Table 4

Com.ASCII	Com.HEX	Descrizione
-	$00(1)	Printing in small characters
-	$01(1)	Printing in double width
-	$02(1)	Printing in double height
-	$03(1)	Expanded printing
-	$04(1)	Restores small character printing
-	$0A	Forward feeds one line
-	(n) $0B(1)	Forward feeds (n) lines
-	$0D	Prints line buffer
-	$0F	Sets CRLF mode
-	$11	Graphic mode
-	$12	Prints time and date
-	$13	Sets time and date in serial
-	$14	Transmits time and date in serial
ESC R	$1B $52	Sets reverse mode printing
ESC N	$1B $4E	Sets normal mode printing
ESC @	$1B $40	Resets printer
ESC D	$1B $44	Enters date in print buffer
ESC T	$1B $54	Enters time in print buffer
ESC U	$1B $55	Enters date (mm:dd:yy) in buffer

NOTES :

(1) This command clears the line buffer and for this reason, it must not sent after an ASCII string not ended with CR or LF character, therefore this string will be deleted.

ASCII: - Hex: $00
Printing in small characters
The command $00 is used for reverting to printing in small characters. If, for example, double height or double width printing had been set and the user wishes to return to printing in small characters, he/she transmits the code $00. This command clears the print buffer. For this reason this command must not be transmitted after an ASCII string, otherwise the string will be erased. It is better, therefore, to transmit the command after a (CR) $0D so that the string is printed first and, on clearing the buffer, small character printing is restored. In many user applications the character $00 is transmitted as a piece of calculation data or as a numerical value, automatically erasing the string preceding it. A small character is 6 dots wide and 10 dots tall.

ASCII: - Hex: $01
Double width printing
The command $01 is used to activate double width printing. This command clears the print buffer and for this reason it must not be transmitted immediately after an ASCII string, otherwise this string will be erased. It is better, therefore, to transmit the command $01 after a (CR) $0D so that the string is printed first and, on clearing the buffer, double width printing is enabled. When this printing mode is set the number of characters per line is exactly halved in comparison with small characters; a printed line of a 24-column printer, therefore, contains 12 characters, and a 42-column printer contains 21. Double width characters are 12 dots wide and 10 dots tall.

ASCII: - Hex: $02
Double height printing
The command $02 is used to activate double height printing. This command clears the print buffer and for this reason it must not be transmitted immediately after an ASCII string, otherwise this string will be erased. It is better, therefore, to transmit the command $02 after a (CR) $0D so that the string is printed first and, on clearing the buffer, double width printing is enabled. When this printing mode is set, the number of characters per line remains 24 for the 24-column printer and 42 for the 42-column printer. Double height characters are 6 dots wide and 20 dots tall.

ASCII: - Hex: $03
Expanded printing
The command $03 is used to activate expanded printing. This command clears the print buffer and for this reason it must not be transmitted immediately after an ASCII string, otherwise this string will be erased. It is better, therefore, to transmit the command $03 after a (CR) $0D so that the string is printed first and, on clearing the buffer, expanded printing is enabled. When this printing mode is set, the number of characters per line is exactly halved in comparison with small characters; a printed line of a 24-column printer, therefore, contains 12 characters, and a 42-column printer contains 21.
Expanded characters are 12 dots wide and 20 dots tall.

ASCII: - Hex: $04
Restores normal printing
The command $04 is used for reverting to printing in small characters (it is identical to $00 and is used when it is impossible to use the latter). If, for example, double height or double width printing had been set and the user wishes to return to printing in small characters, he/she transmits the code $04. This command clears the print buffer. For this reason this command must not be transmitted after an ASCII string , otherwise the string will be erased. It is better, therefore, to transmit the command $04 after a (CR) $0D so that the string is printed first and, on clearing the buffer, small character printing is restored. A small character is 6 dots wide and 10 dots tall.

ASCII : - Hex: $0A
Forward feeds one line
The command $0A forward feeds the printer by one line. If there are any characters in the line buffer, the buffer itself is automatically printed. A line feed is equivalent to 10 dots of normal printing, but the paper moves faster than it would when printing due to the automatic activation of a magnet which speeds up the paper feed.

ASCII : - Hex: (n) $0B
Forward feeds (n) lines
The command $0B forward feeds the printer by the number of lines previously set. This must be an ASCII number from 0-9; obviously if the number is zero, nothing will happen. Take care because the code $0B erases the line buffer and so, if there are any characters in it, they will automatically be erased. If, for example, you want the paper to forward feed by 5 lines, transmit:

$35 $0B (or, alternatively, 5 and the command $0B).

ASCII: - Hex: $0D
Prints line buffer
The command $0D (carriage return) prints the line buffer. If the buffer is empty, nothing happens. If the CRLF option is set, the code $0D is ignored and printing only takes place if the command $0A is transmitted.

ASCII: - Hex: $0F
Sets CRLF mode
The command $0F enables the CRLF option. It inhibits the action of the command $0D, and keeping only the command $0A as a print command. This function can be useful in cases where the RETURN key is associated with the $0D and $0A commands, thus causing the P 150 to print in double spacing. To disable this option, the printer has to be reset, either by switching it off or by transmitting the software command “ESC @”.

ASCII: - Hex:$11
Graphic mode
The command $11 enables the P 150 printer graphic mode, i.e. to print in graphic mode transmit the commamd $11 at the beginning of each line. One line for the P 150 printer (24 column model) corresponds to 144 horizontal points divided in 24 6-point blocks. For the P 150 printer (42 column model) one line corresponds to 252 horizontal points divided into 42 6-point blocks. For byte format in graphic configuration, see paragraph 4.2 (Graphics).

ASCII: - Hex: $12
Prints the time and date
This command prints the time and date in the following format:

hh : mm dd - mm - yy

If the expanded or double width formats are selected (i.e. with less than 15 characters per line), only the time will be printed. If seconds printing is enabled, the format will be:

hh:mm:ss dd - mm - yy

In any event this command resets the line.

ASCII: - Hex $13
Sets the time and date in serial
The command $13 sets the time and date of the clock installed inside the P 150. There are two ways of setting it: the first uses the 24-hour clock and the second the 12 hour a.m., p.m. clock. In the first case the 10 ASCII characters corresponding to the time and date have to be transmitted, followed by the command $13. If, for example, we wish to enter 12.45 of 19.01.93, we have to send the following sequence:

1 2 4 5 1 9 0 1 9 3 $13
i.e.
$31 - $32 - $34 - $35 - $31 - $39 - $30 - $31 - $39 - $33 - $13
In the second case the 10 ASCII characters corresponding to the time and date preceded by “A” or “P”, to indicate ante- or post-meridian, are sent to the printer followed by the command $13. If, for example, we wish to enter A12.45 of 19.01.93, we have to send the following sequence:

A, 1, 2, 4, 5, 1, 9, 0, 1, 9, 3, $13
i.e.
$4-$31-$32-$34-$35-$31-$39-$30-$31-$39-$33-$13

It is advisable to send the command $00 first (normal printing mode) in order to erase the print buffer so

as to ensure that there were no old characters still in it.

ASCII: - Hex: $14
Transmits the time and date in serial
The command $14 transmits the contents of the Real Time Clock to the printer's serial port in the format of 11 ASCII characters:

hour / minutes / day / month / year + CR $0D

If the seconds option is enabled, the seconds will be transmitted after the minutes. This command can only be used if the serial port is being used; if the parallel port is being used, the printer will not be able to print anything.

ASCII: ESC R Hex: $1B $52
Sets the printer in reverse mode
The command "ESC" R selects reverse mode printing. In reverse mode printing, the ticket comes out of the printer with the writing right side up and running from left to right. When the printer is switched on, the default value is selected by jumper "JP2" shortcircuited.

ASCII: ESC N Hex: $1B $4E
Sets the printer in normal mode
The command "ESC" N selects normal mode printing. In normal mode printing, the ticket comes out of the printer with the writing upside down and running from right to left. When the printer is switched on, the default value is selected by jumper "JP2" open.

ASCII: ESC @ Hex: $1B $40
Resets the printer
The command "ESC" @ resets the printer software. This command is identical to the hardware reset command and can be used for re-initializing the printer's parameters. Obviously, after this command the receiving buffer is zero-set and all the data transmitted to the printer is lost. Once the command has been transmitted, approximately 1.5 seconds pass before the printer becomes active again. The reset command can be useful when the system is switched on in order to avoid false characters, which would corrupt the printer's receiving buffer, from being sent during the master device's initializing phases.

ASCII: ESC D Hex: $1B $44
Enters the date in the buffer
The command "ESC" D is used for entering the date of the Real Time Clock fitted inside the printer in the line buffer. The format of the date is dd-mm-yy. This command can be used for entering the date in the context of a sentence without zero-setting the line buffer. If, for example, you wish to write:

DATA : 11-09-93 TEST OK

you will send:

DATA : $1B$44 TEST OK $0D

If you only wish to print the date, it is enough to transmit $1B$44$0D. The date is transmitted in 8 characters and, if there is not sufficient space left in the line buffer, it is not printed.

ASCII: ESC T Hex: $1B $54
Enters the time in the line buffer
The command “ESC” T is used for entering the time of the Real Time Clock fitted inside the printer in the line buffer. The format of the time is hh-mm. This command can be used for entering the time in the context of a sentence without zero-setting the line buffer. If, for example, you wish to write:

TIME : 16.45 TEST OK

you will send:

TIME : $1B$54 TEST OK $0D

If you only wish to print the time, it is enough to transmit $1B$54$0D. The time is transmitted in 5 characters and, if the seconds option is enabled in 8 characters; if there is not sufficient space left in the line buffer, it is not printed.

ASCII: ESC U Hex: $1B $55
Enters the date (mm-dd-yy) in the buffer
The command “ESC” U is used for entering the date, American.style mm-dd-yy, of the Real Time Clock fitted inside the printer in the line buffer. This command can be used for entering the date in the context of a sentence without zero-setting the line buffer. If, for example, you wish to write:

DATE : 09-11-93 TEST OK

you will send:

DATE : $1B$55 TEST OK $0D

If you only wish to print the date, it is enough to transmit $1B$55$0D. The date is transmitted in 8 characters and, if the seconds option is enabled in 8 characters; if there is not sufficient space left in the line buffer, it is not printed.

4.4 Characters set

The printer has a font of 224 characters, as illustrated below.
The example is printed during the self-test.

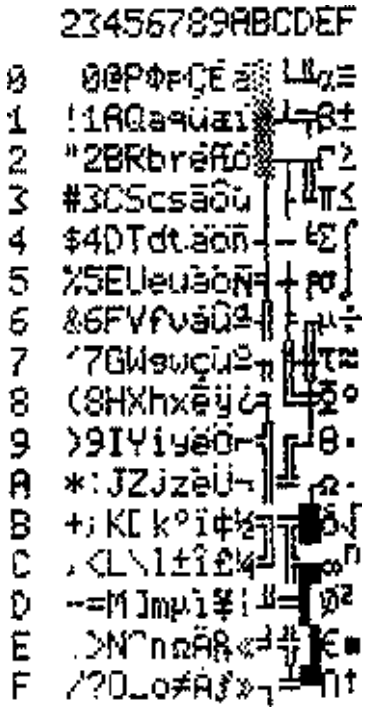
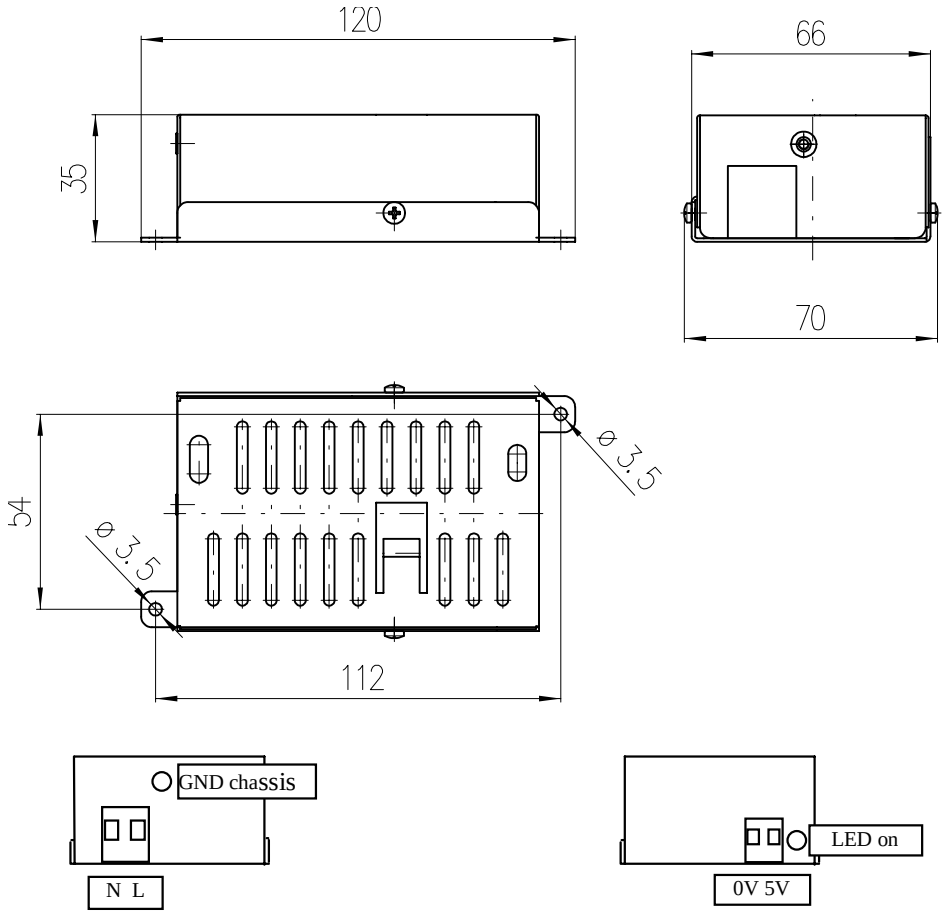


Figure 11

A.1 PSM05 power supply

The following figure shows the model PSM05 power supply, manufactured by Custom Engineering, that can be used to operate the P150 printer. This card is connected to connector J5 of the printer interface card.

Figure



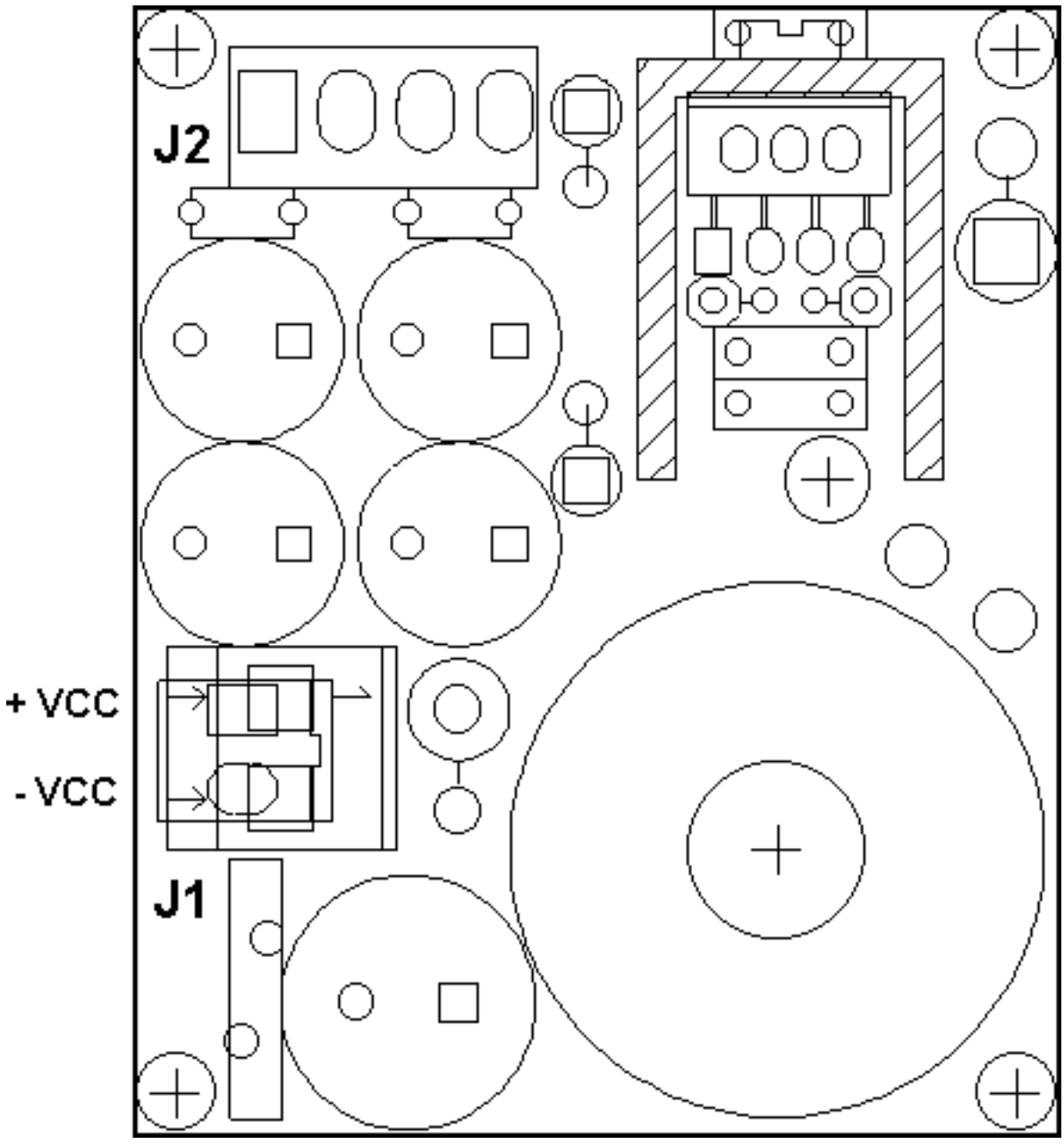
Input specifications	
Input voltage	100 Vac to 240 Vac
Input frequency	50 Hz to 60 Hz

PSM05 Output specifications		
Output voltage		5 V
Output current	Minimum	0 A
	Maximum	3,6 A
	Peak	5 A(1)
	Short Circuit	6 A(2)

A.2 ALI 9/40 power supply

The diagram below shows the layout of the ALI 9/40 power supply card, which supplies the printer with an available voltage ranging from 9 to 40 Vcc, through connector J1.
The card is fitted directly onto the printer interface card, by means of connector J2.

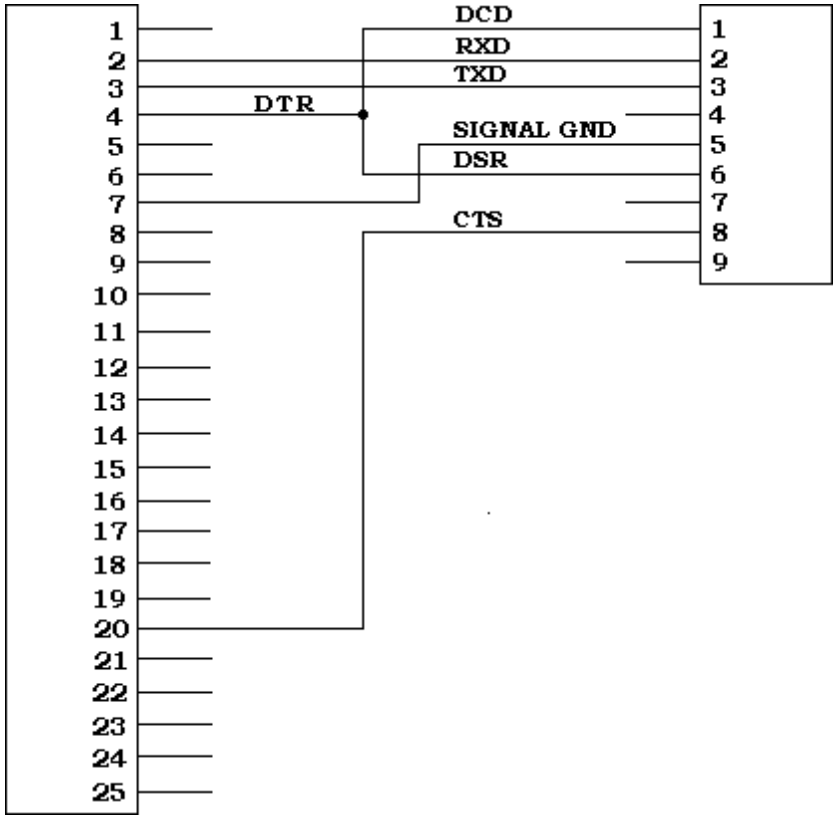
Figure



B.1 Serial RS232 connection to PC (25-9) pin

Serial connection from printer with 25-pin connector to personal computer with 9-pin connector.

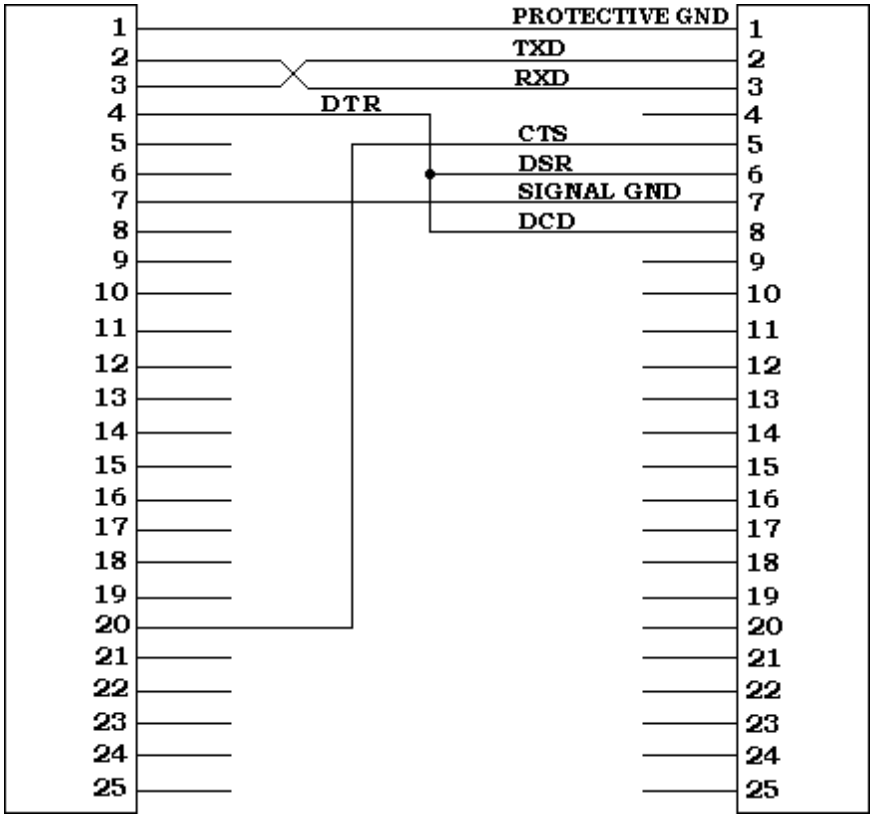
Figure



B.2 Serial RS232 connection to PC (25-25) pin

Serial connection from printer with 25-pin connector to personal computer with 25-pin connector.

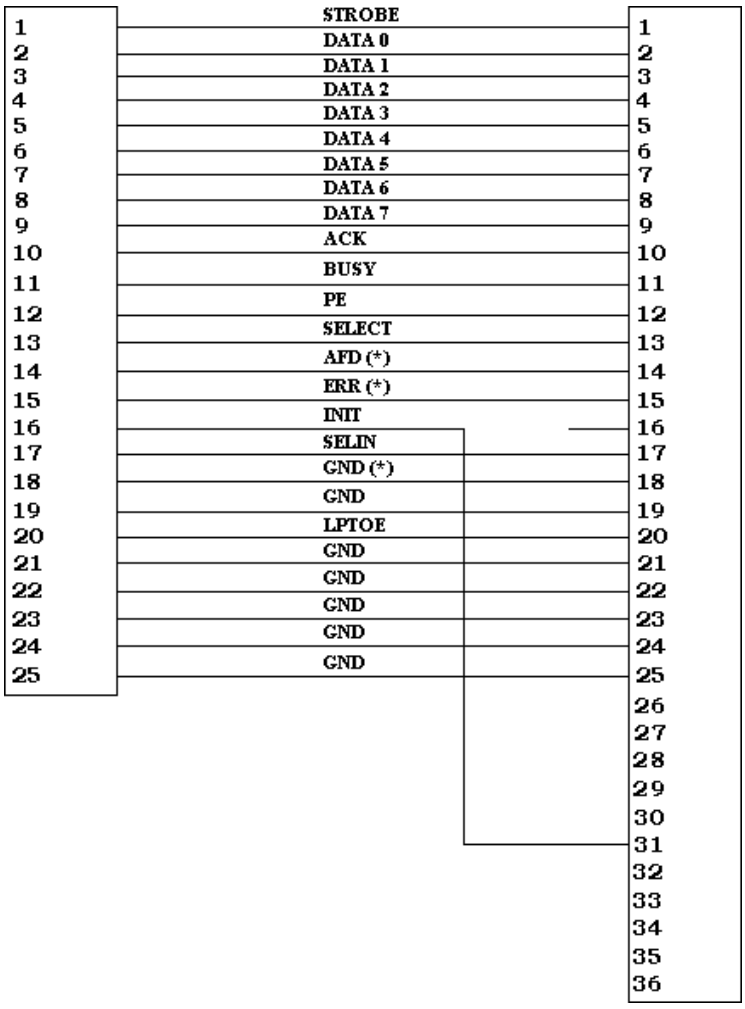
Figure



B.3 Parallel Centronics connection to PC (25-36) pin

Parallel connection from printer with 25-pin connector to personal computer with 36-pin connector.

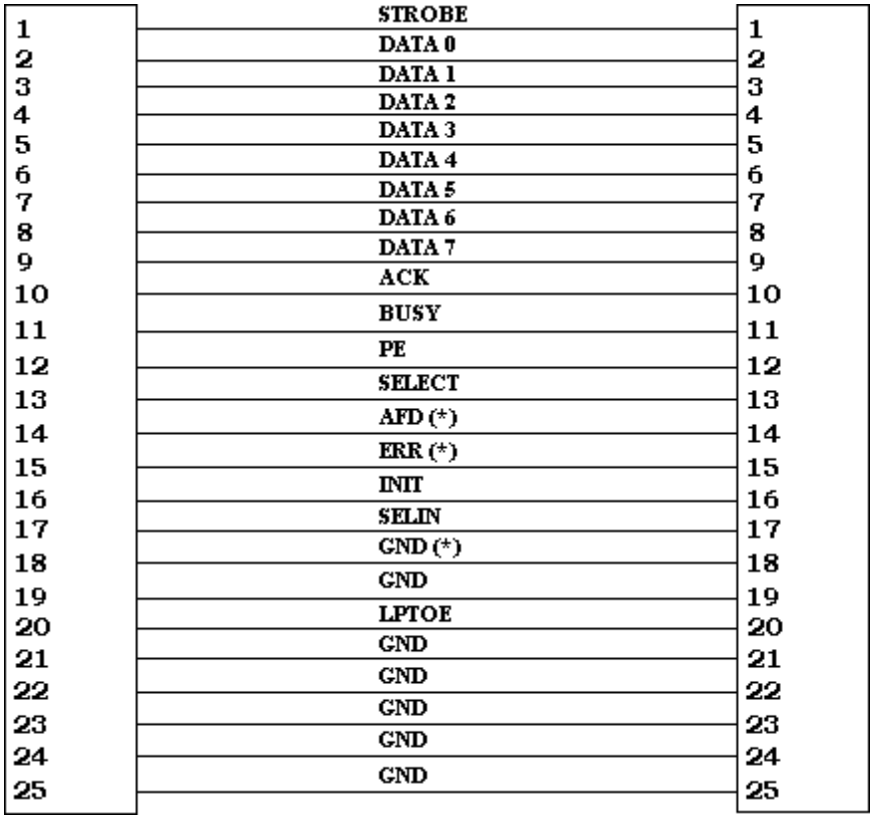
Figure



B.4 Parallel Centronics connection to PC (25-25) pin

Parallel connection from printer with 25-pin connector to personal computer with 25-pin connector.

Figure



The connections marked with an (*) are not essential for the functioning of the interface.