F 190
Panel printer
User's manual

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.

1.1 GENERAL FEATURES

The F190 (fig. 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 F190 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 and, is equipped with a 2-Kbyte EEPROM. It has TTL serial and parallel interfaces as standard. It can, in addition, be equipped with a Real Time Clock.
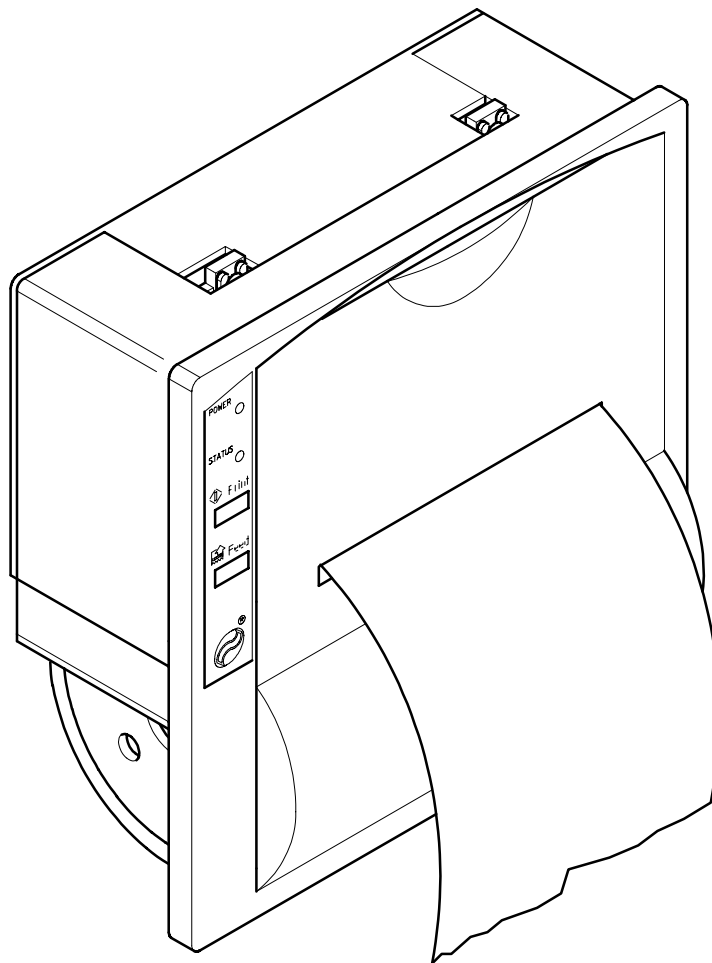
(Figure 1)

1.2 PRODUCT DESCRIPTION

The F190 printer has an ABS casing with a top covering the paper roll and print head.
The keyboard, located on the front of the printer, consists of the PRINT and FEED keys and two Power and Status LEDs.
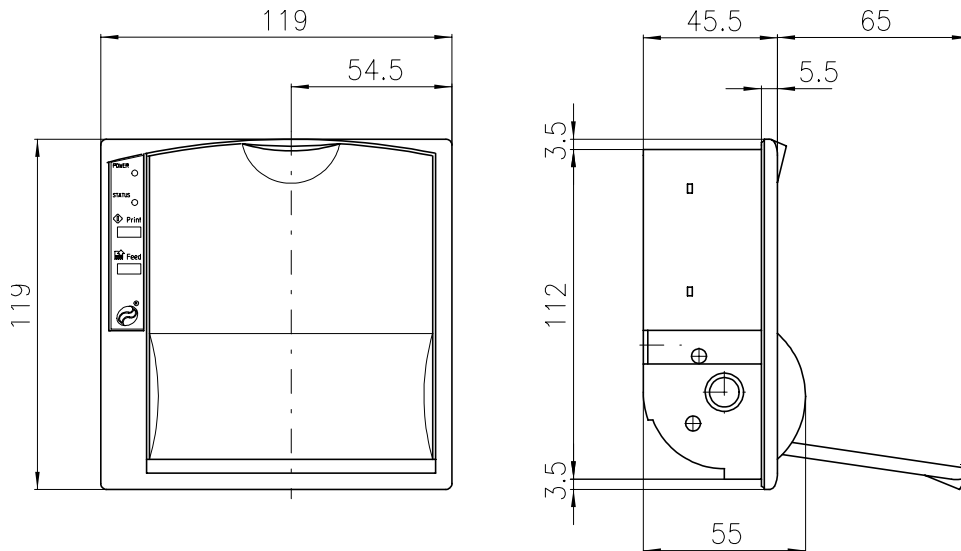
(Figure 2)

- 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". The contents of the memorized blocks are only transmitted if the function has been enabled.

- FEED key. This enables the manual paper feed. If pressed briefly, when the RTCK option is installed, the time and date are printed. The POWER LED indicates that digital power is being supplied to the printer.

The STATUS LED, when lit, signals that the paper is finished or that the cover is open.

1.3 TECHNICAL SPECIFICATIONS

Table 1 lists the main features of the two printer models: F190 24 and 40 columns.

Table 1

Columns	24	40
Characters (L x H)		
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 dot	0.33 x 0.38	0.19 x 0.38
Dots per line	144	240
Print speed		
Lines / sec	2.5	1.5
Characters / sec	60	60
Feed (lines / sec)	6	3.6
Line buffer	24 byte	40 byte
Print buffer	150 byte	
Print method	dot matrix impact	
Character matrix	6 x 10 dots	
Print direction	Normal or reverse	
Character set	Normal and extended	
Paper roll size	57.5 .0.5 mm x Ø50 mm max	
Standard interfaces	TTL serial and parallel	
Power supply	Double or single 5 Vdc. ± 10%	
Absorption		
Medium when on standby	38 mA	
Medium when printing	880 mA	
Impulse when printing	3,5 A (600 µSec)	
Environmental conditions		
Operating temperature	0°C - +50°C	
Operating humidity	35% - 85%	
Storage temperature /humidity	-20°C - +70°C / 10%-90%	
Options	Real time clock, Power supply	

2.1 CONNECTIONS

Power supply

With regard to power supply, the F190 printer has a standard AMPMODU1 4-pin male (J2) type connector. The power supply connector pins are marked as follows:

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

Connecting with the power supply connector (J2) can be avoided by using the flat 20 or 26-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.
For the pin pattern required for supplying power through the logic flat cable, please refer to the following paragraph.

Logic

In the J2 20-pin connector, the signals are arranged as follows:

1	+VT	**2**	+VT
3	+VDC	**4**	+VDC
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 mm2. The corresponding signals are:

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 F190 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;

+VDC: 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	8 bits without parity and 1 stop bit
0	1	1	8 even parity bits and 1 stop bit
0	1	0	8 odd parity bits and 1 stop bit
1	1	0	7 bits without parity and 1 stop bit
1	0	1	7 even parity bits and 1 stop bit
1	0	0	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 the print format according to the programming
reading of the S-EN pin of J1 for serial or parallel configuration;
printing of the self-test if the FEED 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 busy (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.

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.

2.2 CONFIGURATION

With the F190 printer default parameters may be configured.
The parameters affected by configuration are:

- enabling of Real Time Clock setting;
- printing modes;
- no. of bits in parallel communication;
- enabling of seconds display;
- CRLF mode;
- enabling of printing of block 1;
- character sets;

The settings made are saved on the 2-Kbyte EEPROM (non volatile memory), containing 3 blocks - one of 300 bytes and two of 700 bytes - is available, in which information of any kind can be stored. For details on memory block management using control characters, please refer to paragraph 4.3.
The printer can either be configured through the PC or by using the front keys on the printer.

Configuration through PC

This can be done by using an IBM or IBM-compatible computer with a serial output, or else by using a programme which can be supplied on request. This programme, with its pull-down menus is user-friendly and prompts the operator at each stage of the input procedure.

Configuration using PRINT and FEED keys

Configuration through the key board is normally enabled. In order to disable it, shortcircuit the JP2 jumper on the printed circuit.

If, when the printer is switched on, both keys are held down simultaneously, the printer enters configuration mode and prints the first modifiable parameter. Each time the PRINT key is pressed subsequent to this, the variation of the parameter is shown and the its current value is printed. After entering the desired parameter, press the FEED key to go on to the next parameter, and so on. Once all the parameters have been entered, the printer prints a message to indicate that setting procedure has been completed.

2.3 SELF-TEST

To enable the self-test, hold down the FEED key 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.

2.4   PRECAUTIONS

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

2.5 MAINTENANCE

Changing the paper roll

To change the paper roll, proceed as follows:

1) open the printer cover and press down on the swinging support of the print mechanism marked with the instruction PUSH;
2) insert the end of the roll in the slit of the print mechanism and position the paper roll so that it runs in the right rotation direction, as shown in figure 3;
3) press the FEED key so that a few centimetres of paper come out of the printer and, pressing down again on the swinging support of the print mechanism marked with the instruction PUSH, bring it back to its original position.
4) tear off the paper and re-close the printer cover.

(Figure 3)
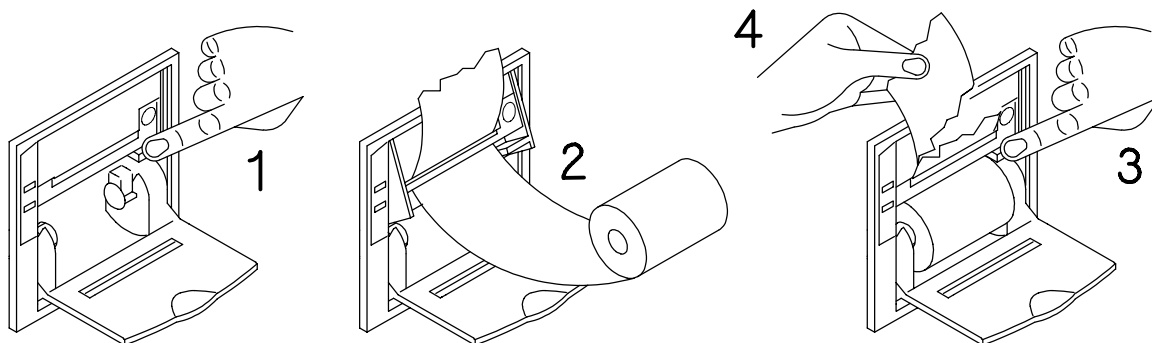
Selection of the standard interface, TTL serial and parallel, is given by the status of the S-EN pin of J1.

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.

Transmission format
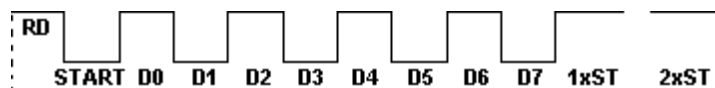
RTS/CTS protocol
dato = data
attesa = standby
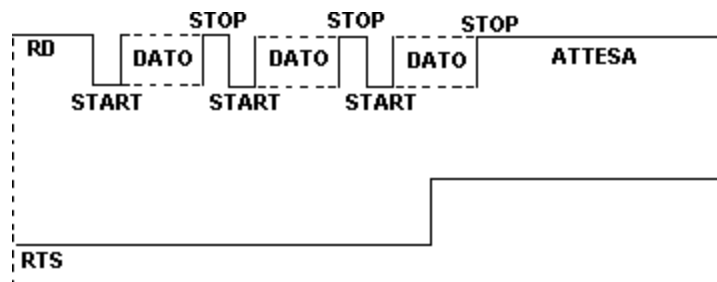
XON/OFF protocol
dato = data
attesa = standby
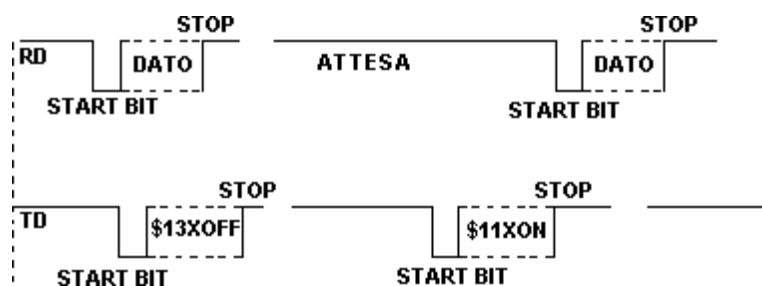
3.2   TTL PARALLEL

In parallel communication the useable signals are:

1) 7 or 8 bit data bus;
2) STROBE signal indicating data validity;
3) READY signal indicating that the printer is ready to receive data.

Transmission format valid data

Flow diagram

3.3   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:

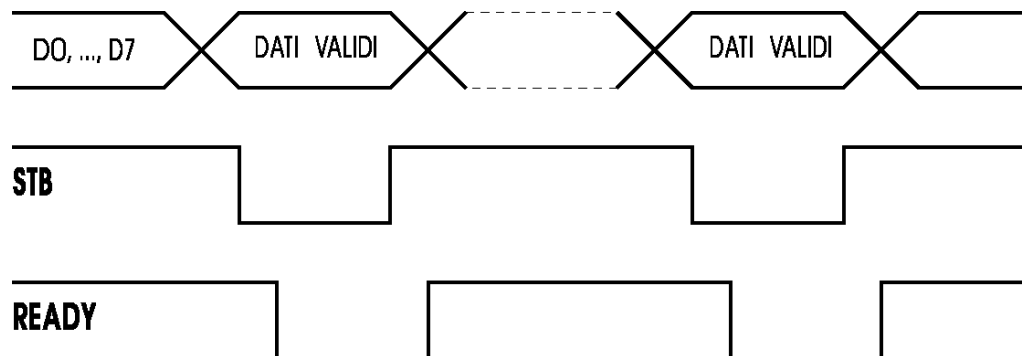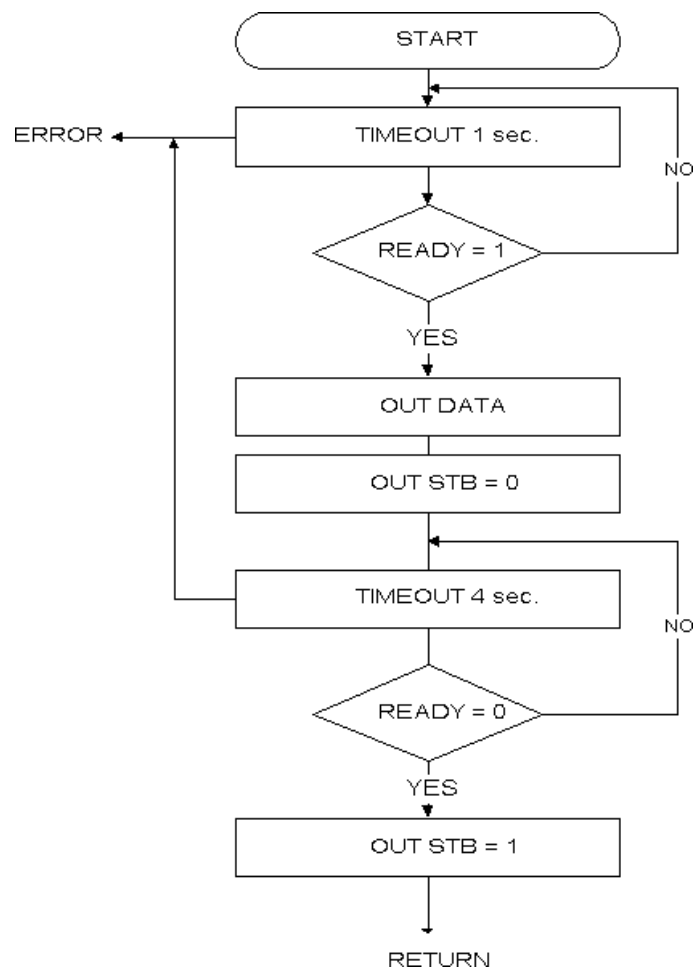|	
$12	Prints clock
$13	Sets clock
$14	RTCK transmission in serial
ESC T	Enters the time in the print buffer
ESC D	Enters the date in the print buffer
ESC U	Enters the date (American-style) in the print buffer

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:

- 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;

- each time the PRINT key is pressed, the digit by the arrow will increase and the updated version will be printed;

- 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;

- to terminate setting, press PRINT and FEED at the same time, or run through all the parameters.

Lapsed time meter

This is managed by three control characters (only if the RTCK is available):

ESC O	Transmits in serial total operating hours.
ESC o	Inserts total operating hours in the line buffer, thus enabling this to be printed in any string.
ESC M	Zero-sets total operating hours.

For more information on the control characters which manage the clock, see paragraph 4.3.
By means of this function (option available with the 5.3 software release) implemented in the Real Time Clock, the total operating hours of the printer can be memorized.

4.1 PRINTING MODES

The F190 printer has two printing modes which can be selected by means of control characters: normal and reverse.

(Figure 4)

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F190
Panel printer
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PAPER OUTFEED DIRECTION

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F190
Panel printer
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Normal mode   Reverse mode
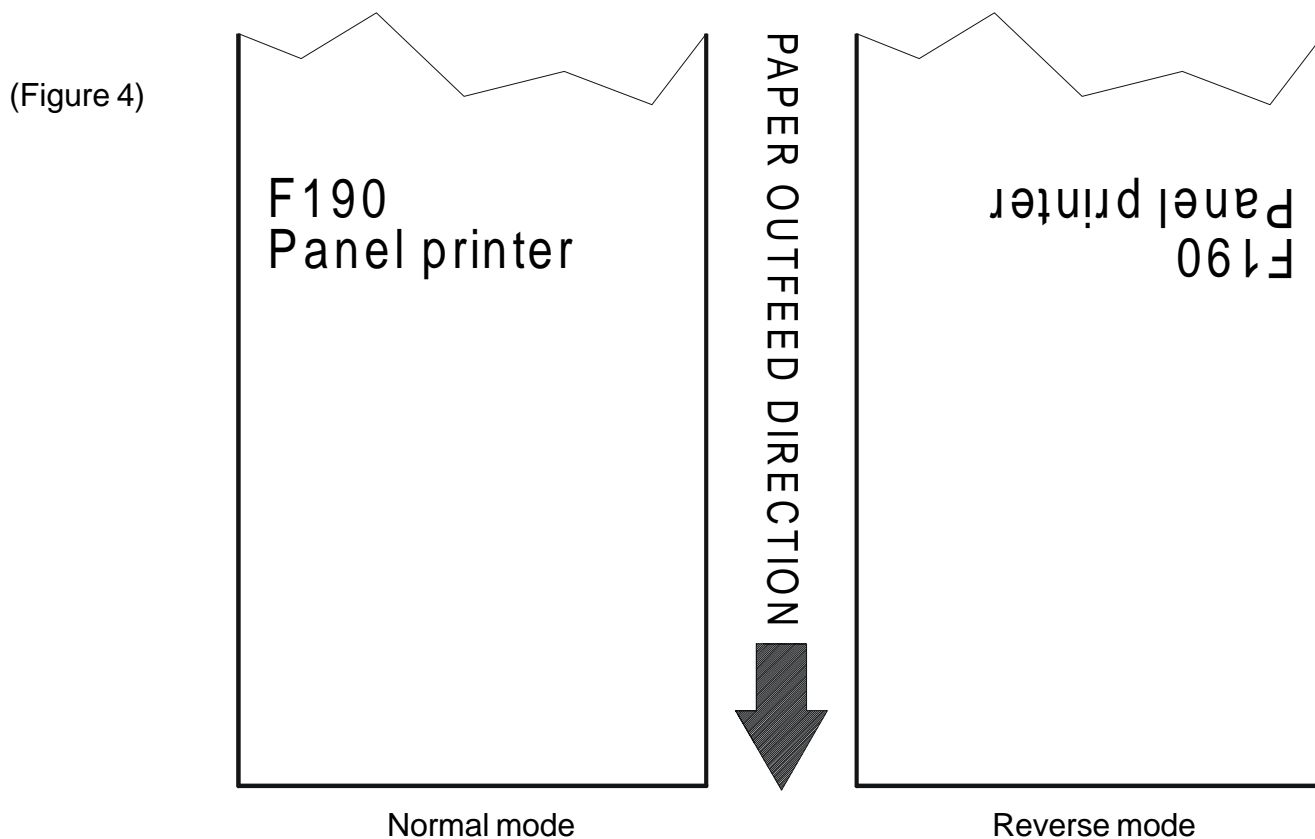
The basic character matrix is 6 x 10 dots. Characters may be printed in various formats. The following table shows the size of the characters for the respective formats, depending on whether the printer is the 24 or 40 column model.

	Character size (L x H mm)	
Print format	**24 column**	**40 column**
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

For further details on the selection of printing modes, please refer to the paragraph covering control characters (paragraph 4.3).

4.2   GRAPHICS

The size of the graphic dot and the number of dots per line vary depending on the number of columns:

	Size of graphic dot	
Print format	**24 column**	**40 column**
Graphic dot (L x H mm)	0.33 x 0.38	0.19 x 0.38
Dots per line	144	240

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 dots (1 prints, 0 does not print)

The P6 bit of the string of dots 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 dots 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

Table 4 lists all the commands for function management of the F190 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 transmitted 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.

(Table 4)

TABLE OF COMMANDS

ASCII Com.	HEX Com.	Description
	$00	Printing in small characters
	$01	Printing in double height
	$02	Printing in double width
	$03	Expanded printing
	$04	Restores small character printing
	$0A	Forward feeds one line
	(n) $0B	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
	$17(*)	Prints 1st programmable character
	$18(*)	Prints 2nd programmable character
	$119(*)	Prints 3rd programmable character
	$1A(*)	Prints 4th programmable character
	$1C(*)	Prints 5th programmable character
	$1D(*)	Prints 6th programmable character
	$1E(*) (**)	Prints 7th programmable character
	$1F(*) (**)	Prints 8th programmable character
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 print buffer
ESC S	$1B $53	Enables printing of seconds
ESC O	$1B $4F	Transmits operating hours in serial
ESC H	$1B $48	Zero-sets total operating hours

ESC o	$1B $6F	Prints total operating hours
ESC B	$1B $42	Sets character font 1
ESC b	$1B $62	Sets character font 2
(aa) ESC r	(aa) $1B $72	Reads a piece of data at an address (aa)
(aadd) ESC w	(aadd) $1B $77	Writes a piece of data (dd) at an address (a)
(dd) ESC G	(dd) $1B $47	Writes value (dd) in option register
(dd) ESC M	(dd) $1B $4D	Writes value (dd) in printing mode
ESC p	$1B $70	Transmits option register in serial
ESC m	$1B $6D	Transmits printing mode in serial
ESC s	$1B $73	Transmits next character in serial
ESC W (n)	$1B $57 (n)	Starts saving block (n)
ESC V (n)	$1B $56 (n)	Prints block (n)
ESC E (n)	$1B $45 (n)	Transmits block in serial (n)
ESC Z	$1B $5A	Block saving completed
ESC J (n)	$1B $4A	Loads programmable character

Notes to table 4
(*) Only software release 5.3
(**) For software release 4.3 1st and 2nd programmable character respectively.

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. The ASCII characters which can be printed, as may be seen from the self-test, start from code $1E through to code $FF (software release 4.3) or from code $17 to code $1F (software release 5.3).

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 40-column printer contains 20. Double width characters are 12 dots wide and 10 dots tall.   The ASCII characters which can be printed, as may be seen from the self-test, start from code $1E through to code $FF (software release 4.3) or from code $17 to code $1F (software release 5.3).

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 40 for the 40-column printer. Double height characters are 6 dots wide and 20 dots tall.   The ASCII characters which can be printed, as may be seen from the self-test, start from code $1E through to code $FF (software release 4.3) or from code $17 to code $1F (software release 5.3).

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 40-column printer contains 20. Expanded characters are 12 dots wide and 20 dots tall. The ASCII characters which can be printed, as may be seen from the self-test, start from code $1E through to code $FF (software release 4.3) or from code $17 to code $1F (software release 5.3).

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. The ASCII characters which can be printed, as may be seen from the self-test, start from code $1E through to code $FF (software release 4.3) or from code $17 to code $1F (software release 5.3).

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, 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. When the printer is switched on, the default value of the CRLF option is contained in the flag of a byte called "option register" which can be manipulated through the configuration by using the two keys on the front panel of the printer or through the programme from the PC.

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 F190 to print in double spacing.

To disable this option, the printer has to be reset, either by switching it off or by transmitting the reset command. When the printer is switched on, the default value of the CRLF option is contained in the flag of a byte called "option register" which can be manipulated through the configuration by using the two keys on the front panel of the printer.

ASCII:
-
Hex:
$11

Graphic mode

The command $11 enables the F190 printer graphic mode, i.e. to print in graphic mode transmit the command $11 at the beginning of each line. One line for the F190 printer (24 column model) corresponds to 144 horizontal dots divided in 24 6-dot blocks. For the F190 printer (40 column model) one line corresponds to 240 horizontal dots divided into 40 6-dot 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:	**Sets the time and date in serial**
-	The command $13 sets the time and date of the clock installed inside the F190. There
Hex:	are two ways of setting it: the first uses the 24-hour clock and the second the 12 hour a.m.,
$13	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
or	$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
or	$41	$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:	**Transmits the time and date in serial**
-	The command $14 transmits the contents of the Real Time Clock to the printer's serial
Hex:	port in the format of 11 ASCII characters:
$14	

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:	**Prints the 1ˢᵗ (2ⁿᵈ) programmable character (software release 4.3)**
-	If the hexadecimal character $1E ($1F) is transmitted to the F190 printer, it will print the
Hex:	corresponding programmable character. In fact, it is possible to programme two characters
$1E	which can be printed at any time with the codes $1E and $1F. There are two ways of
$1F	programming the characters; they can be saved in a non volatile memory which stores all

the data, even when the printer is switched off, or alternatively, in a memory which is
automatically erased when the power is switched off. In the first case, the user can ask the
technicians responsible to programme the two characters, depending on his requirements,
or the user himself can programme the by using the personalized software supplied by
Custom Engineering. In the second case, the user can form the characters at the same
time as he is transmitting the text to be printed; the advantage of this approach is that an
infinite number of symbols can be associated to a character, exactly as the user pleases,
which he can print and modify as he sees fit. If the printer is new (or if the characters have
not been manipulated), the following symbol :|||; will be associated with codes $1E and
$1F; each time the printer is switched on, the above mentioned codes will contain the last
characters programmed in the non volatile memory.

ASCII:
-

Hex:
$17
$18
$19
$1A
$1C
$1D
$1E
$1F

Prints the 1st (...8th) programmable character (software release 5.3)

If the hexadecimal character $17 (...$1F) is transmitted to the F190 printer, it will print the corresponding programmable character. In fact, it is possible to programme eight characters which can be printed at any time with the codes from $17 to $1F. There are two ways of programming the characters; they can be saved in a non volatile memory which stores all the data, even when the printer is switched off, or alternatively, in a memory which is automatically erased when the power is switched off. In the first case, the user can ask the technicians responsible to programme the eight characters, depending on his requirements, or the user himself can programme them by using the personalized software supplied by Custom Engineering. In the second case, the user can form the characters at the same time as he is transmitting the text to be printed; the advantage of this approach is that an infinite number of symbols can be associated to a character, exactly as the user pleases, which he can print and modify as he sees fit. If the printer is new (or if the characters have not been manipulated), the following symbol: ||| will be associated with codes $17, ..., $1F; each time the printer is switched on, the above mentioned codes will contain the last characters programmed in the non volatile memory.

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 the flag of a location called the "option register"; this flag can be manipulated by programming, using the two keys on the front panel of the printer with which the default value can be changed and it can be decided whether the printer is to be in reverse or normal mode when it is switched on.

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 the flag of a location called the "option register"; this flag can be manipulated by programming, using the two keys on the front panel of the printer with which the default value can be changed and it can be decided whether the printer is to be in reverse or normal mode when it is switched on.

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 elapse 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 line 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.

ASCII:
ESC S
Hex:
$1B $53

Enables the printing of seconds

The command "ESC" S enables the printing of seconds when the time is requested with command "ESC" T.

When the printer is switched on the default value, which determines whether or not the seconds are to be printed, is contained in the flag of a byte called the "option register"; this flag can be manipulated by programming, using the two keys on the front panel of the printer.

ASCII:
ESC O
Hex:
$1B $4F

Transmits operating hours in serial

The command "ESC" O (option of software release 5.3) transmits the total operating hours of the printer to the serial port. These hours are allocated in the battery-driven RAM of the Real Time device fitted inside the printer. If, therefore, there is no Real Time Clock, this command will produce no effect. In addition, if the user utilizes the parallel port, the operating hours will not be transmitted since the parallel port is unidirectional.

The hours begin to increase as soon as the printer is switched on. The increase is, in actual fact, on a minute to minute basis but the printer only counts the completed hours.

The transmission format is in ASCII standard and four characters are transmitted: in order of importance. The transmission protocol is the same as that set by the user on the serial interface.

As there are four characters it can reach a maximum of 9999 operating hours; it then automatically zero-sets and continues counting.

ASCII:
ESC T
Hex:
$1B $48

Zero-sets total operating hours

The command "ESC" T zero-sets the printer's total operating hours.

If you are using the total hours option, it is advisable to use this command immediately after switching on the printer so as to synchronize the operating hours of the printer itself with those of the master device.

ASCII
ESC o
Hex:
$1B $6F

Prints total operating hours

The command "ESC" o enters the total operating hours in the line buffer. These hours are allocated in the battery-driven RAM of the Real Time device fitted inside the printer. If, therefore, there is no Real Time Clock, this command will produce no effect.

The hours begin to increase as soon as the printer is switched on. The increase is, in actual fact, on a minute to minute basis but the printer only counts the completed hours.

As there are four characters it can reach a maximum of 9999 operating hours; it then automatically zero-sets and continues counting. If, for example, you wish to write:

TOTAL HOURS: 0123 TEST OK

you will send: TOTAL HOURS: $1B$6F TEST OK

The hours are printed in four characters and if there is not enough space in the line buffer, they will not be printed.

ASCII:
ESC B
Hex:
$1B $42

Sets character font 1
The command "ESC" B selects the first character font. The complete font is printed during the self-test. Some codes are not standard and are as follows:

$60, $7B, $7C, $7D, $7E, $7F, $8D, $ED, $FA and $FF.

These characters are compatible with earlier printer models. The font may be selected at any time, keeping in mind that the printer cannot print a line containing two different fonts and will print, therefore, the last font selected. When the printer is switched on the default value, which establishes which printing font is to be used, is selected by a flag in a location called the "option register"; this flag can be manipulated by programming, using the two keys on the front panel of the printer, by means of which the default values can be changed.

ASCII:
ESC b
Hex:
$1B $62

Sets character font 2
The command "ESC" b selects the second character font.
The complete font is printed during the self-test. This font contains Cyrillic characters. It may be selected at any time, keeping in mind that the printer cannot print a line containing two different fonts and will print, therefore, the last font selected. When the printer is switched on the default value, which establishes which printing font is to be used, is selected by a flag in a location called the "option register"; this flag can be manipulated by programming, using the two keys on the front panel of the printer, by means of which the default values can be changed.

ASCII:
(aa) ESC R
Hex:
(aa) $1B $72

Reads a piece of data at an address (aa)
The command "ESC" r makes it possible to read in a location of the non volatile memory (EEPROM). This command can only be used with the serial port as it is bi-directional. The communication protocol is defined by the dip-switches on the serial interface. There are 256 legible locations, starting from the $00 location up to the $FF location. The address of the location to be read must be defined before the "ESC" r command is transmitted, i.e. if we wish to read address $01, we have to transmit in ASCII:

0   1 "ESC" r or $30 $31 $1B $72
                1

In reply to this reading, the printer transmits the data of address $01. The reply also is given in ASCII; thus if, for example, address $01 contains $A5, we will receive:

A 5 or $ 41 $35

The entire memory bank contains the value $20 by default. Since it is a non volatile memory, the user can save the data without losing it when the power is switched off.

ASCII:
(aadd)
ESC w
Hex:
(aadd)
$1B $77

Writes a piece of data (dd) in an address (aa)
The command "ESC" w makes it possible to save a piece of data in a non volatile memory. There are 256 locations in which to write, starting from $00 to $FF. The pieces of data too cannot exceed $FF (255)and both the addresses and the data must be expressed in ASCII on two bytes. To save a piece of data, first transmit the address then the data followed by the command "ESC" w. If, for example, you wish to save the data $A5 in address $01, you will transmit:

        0 1 A 5 "ESC" w ovvero $30 $31 $41 $35 $1B $77

The entire memory bank contains the value $20 by default. Since it is a non volatile memory, the user can save the data without losing it when the power is switched off.

ASCII:
(dd) ESC G
Hex:
(dd)$1B$47

Writes value (dd) in option register
By means of the command "ESC" G the printer configuration can be manipulated. To do so, a byte in ASCII containing the configuration must be transmitted to the printer, followed by "ESC" G. The setting byte contains the following bits:

        d7 d6 d5 d4 d3 d2 d1 d0

where:
- **d0** is used to enable the setting of the Real Time Clock using the keys on the front of the printer. If this bit is 0, it disables setting; if it is 1 it enables it. If the user disables this function the clock will not be affected by variations made either accidentally or deliberately by persons not qualified to do so.
- **d1** is used for setting the printing mode: normal or reverse. If this bit is 0 printing is in normal mode; if it is 1 it is in reverse mode.
- **d2** is used in parallel communication and enables the 7 or 8 data bit protocol. If this bit is 0 the parallel port accepts 8 bit data; if it is 1 the port accepts 7 bit data. If the 7-bit protocol is enabled, the printer will only be able to print non extended characters, i.e. those from code $0E to code $7F.
- **d3:** its purpose is to enable the printing of seconds in the clock commands.
  If the bit is 0 the seconds will not be printed; otherwise during the printing phase of the time the seconds will be printed too.
- **d4:** if the bit is 0 command $0D is carried out; if it is 1 the printer ignores the carriage return command.
- **d5:** this bit enables the printing of the first block (heading) as soon as the printer is switched on. If the bit is 0 this function is disabled; if it is 1 the function is enabled.
- **d6:** selects the character fonts during printing.
  A logic state 0 selects font 1, while a logic state 1 selects font 2.
- **d7:** this bit has no effect on the working of the printer for software release 4.3. From software release 5.3 on, 0 disables the lapsed time meter while 1 enables it.

Once the printer has been configured, the above described byte in ASCII is transmitted; for example byte = 00001001 corresponds to $09, the whole string would therefore be:

0 9 "ESC" G   or in Hex $30 $39 $1B $47

All these bits, with the exception of bit 7, can be manipulated by programming using the front keys of the printer.

ASCII:
(dd) ESCM
Hex:
(dd) $1B $4D

Writes value (dd) in printing mode
Using the command "ESC" M it is possible to manipulate the printing mode by default. To do this a byte in ASCII containing the printing mode must be transmitted followed by "ESC" M. The type of writing which can be defined is described in the following table:

$00	small character printing
$01	double width printing
$02	double height printing
$03	expanded printing

If, for example, you wish to print in double height characters, you will send:

0 2 "ESC" M (or $30 $32 $1B $4D)

Automatically the printing mode is changed to the one selected and is stored in the non volatile memory.

ASCII:
ESC p
Hex:
$1B $70

Transmits the option register in serial
The command "ESC p" transmits the "option register" byte to the serial port of the printer. Obviously if the printer is using the parallel protocol, the command will produce no effect. The reply to this question is made in two ASCII bytes containing the option register value. If, for example, we receive:

0 9 (or $30 $39)

this means that the configuration will be 00001001.

ASCII:
ESC M
Hex:
$1B $6D

Transmits the printing mode in serial

The command "ESC" m transmits the byte containing the printing mode by default to the serial port of the printer.

Obviously if the printer is using the parallel protocol, the command will produce no effect. The reply to this question is made in two ASCII bytes containing the option register value. If, for example, we receive:

0 2 (or $30 $32)

this means that the printer is in double height printing mode.

ASCII:
ESC s
Hex:
$1B $73

Transmits next character in serial

The command "ESC" s ($1B $73) sets the printer to transmit the next character it receives. If, for example, we transmit "ESC" s A, the last character, A, will not be printed but will immediately be transmitted in serial. If we use this function in memorizing blocks of text, we can simulate a password which would be transmitted, for example, when the printer is switched on, or command codes on pressing the PRINT key, or connected printer tests.

ASCII:
ESC W (n)
Hex:
$1B $57 (n)

Starts saving block (n)

The command "ESC" W ($1B $57) followed by a number (from 1 to 3) activates the function for saving a file in one of the three blocks defined by the number n. These blocks are contained in a non volatile memory which stores the data even when the power is switched off. The length of the files which can be memorized is of 300 bytes for the first block and 700 bytes for the second and third blocks. The files can contain all kinds of codes; it is therefore possible to store tests, data, executive commands to the printer, auto-headings, graphic files etc. If files exceeding the memory bank capacity are transmitted, the extra characters will be printed directly without being saved. Loading can be done in either serial or parallel. When you have finished loading a block, it is advisable to enter the terminating command "ESC" Z. The three blocks stored in this way can either be printed or transmitted in serial.

If printer commands have been saved, these will be carried out as they would normally.

ASCII:
ESC V (n)
Hex:
$1B $56 (n)

Prints block (n)

The command "ESC" V ($1B $56) followed by a number (from 1 to 3) prints block n. The file continues printing until it reaches the terminating command "ESC" Z. Obviously, if the block is clear, or if all the characters are $20, the printer will not print anything. The first block, also called heading, will automatically be printed when the printer is switched on, if the auto-heading flag is set. The user's logo or the name of his company can, therefore, be printed each time the printer is switched on. The three blocks can also be printed one after the other, there being a total memory bank of 1700 bytes. To recall a block, you must enter the command "ESC" V and the number of the block you wish to recall.

ASCII:
ESC E (n)
Hex:
$1B $45 (n)

Transmits block (n) in serial
The command "ESC" E ($1B $45) followed by a number (from 1 to 3), transmits in serial the memory block defined by n.   If the printer is using the parallel port this command will, of course, produce no effect. The file will be transmitted in its entirety, the first block will contain 300 bytes and the second and third blocks 700 bytes each.

ASCII:
ESC Z
Hex:
$1B $5A

Block saving completed
The command "ESC" Z ($1B $5A) acts as a terminator for the three memory blocks. When the line buffer reads this terminating command during printing, it stops printing the block and reverts to normal functioning. In the absence of the terminating command, the entire block will be printed.

ASCII:
ESC J (n)
Hex:
$1B $4A (n)

Loads programmable character (n)
The command "ESC" J ($1B $4A) followed by a number (1 or 2 for 4.3 software and 1 - 8 for 5.3 software) is used to generate the programmable characters. The programmable characters go from code $1E to code $1F (4.3) or from code $17 to code $1F (5.3). A programmable character consists of 10 lines of 6 dots each; to form a character which corresponds to code $1E, therefore, you must transmit 10 bytes preceded by "ESC" J1. The bytes must have the same characteristics as the graphic mode, i.e.:

x	P7	P6	P5	P4	P3	P2	P1
d7	d6	d5	d4	d3	d2	d1	d0

where: x is not used;
P7 must be fixed at 1;
P1 to P6 = the graphic dot data ; if it is at 1 it prints and if it is at 0 it does not print. The P6 bit of the string of dots transmitted is printed on the left with the other dots running from left to right (P6, P5, P4, P3, P2, P1) as illustrated:

P6	P5	P4	P3	P2	P1	1° byte
P6	P5	P4	P3	P2	P1	2° byte
P6	P5	P4	P3	P2	P1	3° byte
P6	P5	P4	P3	P2	P1	4° byte
P6	P5	P4	P3	P2	P1	5° byte
P6	P5	P4	P3	P2	P1	6° byte
P6	P5	P4	P3	P2	P1	7° byte
P6	P5	P4	P3	P2	P1	8° byte
P6	P5	P4	P3	P2	P1	9° byte
P6	P5	P4	P3	P2	P1	10° byte.

After the tenth byte the function "ESC" J finishes. If, for example, we wish the symbol of code $1F to be #, we must transmit "ESC" J 2 pieces of data, i.e.:

$1B $4A $32 $52 $52 $52 $7F $52 $52 $7F $52 $52 $52

All the data must be transmitted consecutively. This type of loading is allocated to the volatile memory; thus, when the power is switched off the character is zero-set and reverts, when the printer is switched on again, to the default character configured.

4.4 CHARACTER SETS

The printer has two sets, each containing 224 characters (font 1 and font 2), which can be called up from the programme configuration (paragraph 2.4) or through the control characters (paragraph 4.3).

(Figure 5)

FONT 1

FONT 2

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 F190 printer.
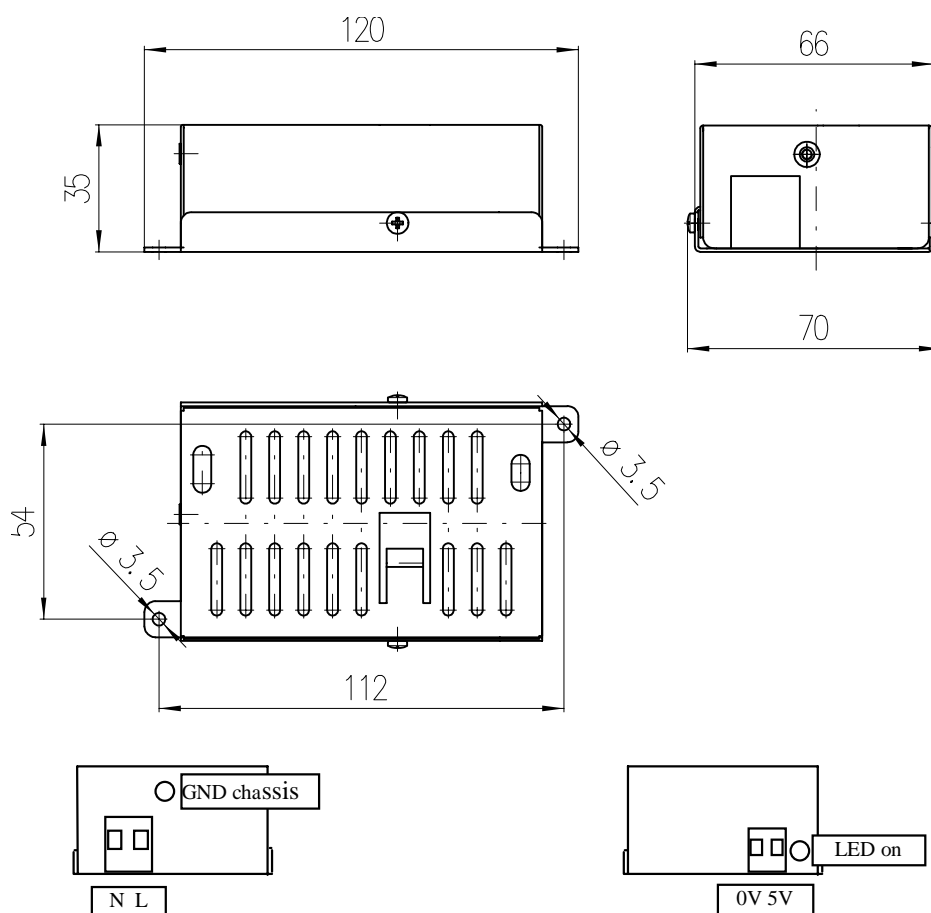
Input specifications

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 Vdc, through connector J1. The card is fitted directly onto the printer interface card, by means of connector J2.