

**SERVICE MANUAL**

**MPS 1230**

**JULY, 1989**

**PN-314998-01**

 **commodore**  
COMPUTERS

# **SERVICE MANUAL**

## **MPS 1230**

**JULY, 1989**

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### **INTERNATIONAL EDITION**

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**PREFACE**

**PRE-REQUISITES**

This manual is intended for technicians with previous experience in servicing dot matrix printers.

**SUMMARY**

The manual is divided into Chapters and Appendices.

The initial chapters describe unpacking of the printer, set up and testing.

The remaining chapters provide information about fault tracing and elimination.

Further technical information, command codes, graphic sets and interfaces can be found in the relevant appendices.

**BIBLIOGRAPHY**

MPS 1230 User's manual

**FIRST EDITION:** October 1988

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## 1. GENERAL INFORMATION

### 1.1 INTRODUCTION

The MPS 1230 is an impact dot matrix printer with 9 needle miniballistic head. The printer is intended for connection to:

- Commodore C64, C128, C128D
- AMIGA-series Computer
- Commodore Personal Computer (MS-DOS) and IBM compatible

They are very compact units, compatible with leading application software standars.

It offers a wide choice of printing styles: normal (Draft), Near Letter Quality, six different character pitches, bold type, underline, double width, superscripts, subscripts, italics (epson emulation), etc.

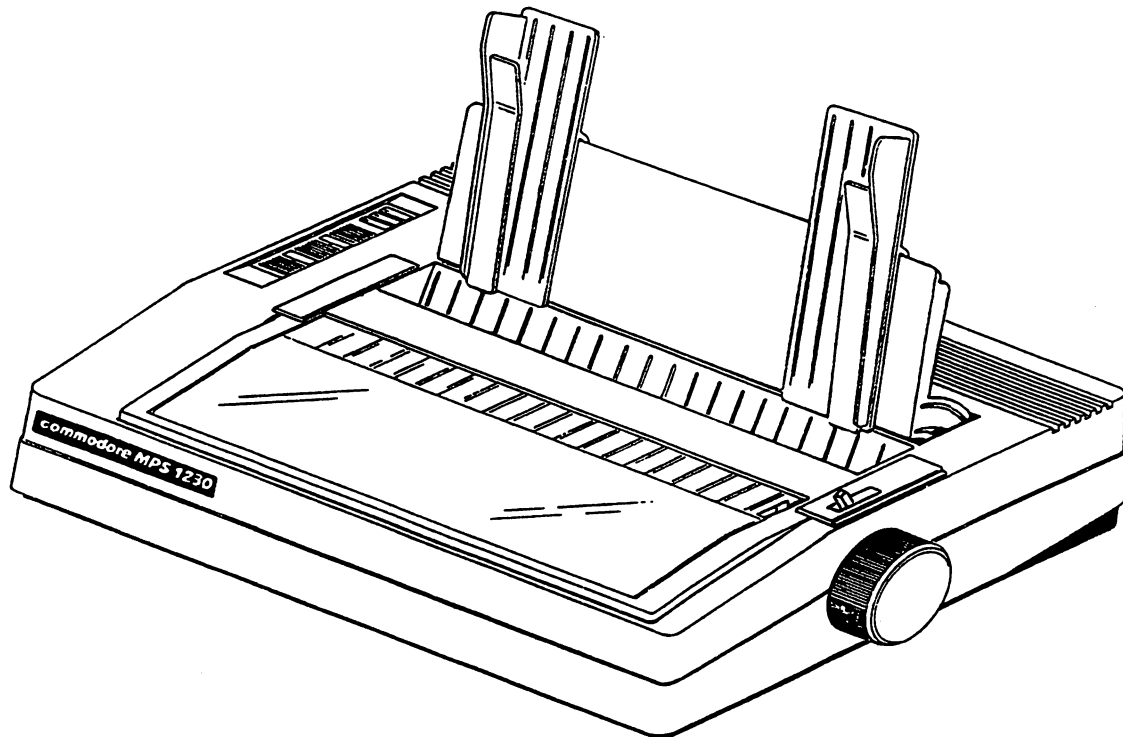


Fig. 1-1 MPS 1230 Desk-top Printer



The hardware-firmware structure of the MPS 1230 is as follows:

HARDWARE INTERFACE

SOFTWARE INTERFACE  
(Printer Emulation)

**Parallel Centronics**

- . IBM GRAPHICS PRINTER
- . IBM PROPRINTER
- . EPSON FX80

**Serial Commodore      Adress 4**

- . IBM GRAPHICS PRINTER
- . IBM PROPRINTER
- . EPSON FX80
- . COMMODORE Command Set

**Adress 5      . COMMODORE Command Set**

VARIABLE CHARACTERISTICS

1. Mains cables (with socket and plug)

ALI 010	EUROPE
ALI 011	SWITZERLAND
ALI 012	GREAT BRITAIN
ALI 013	AUSTRALIA
ALI 014	U.S.A.

2. National versions of the User Manual

CBM part numbers

LIG 001	FRENCH language	363154-01
LIG 002	GERMAN language	363156-01
LIG 003	ENGLISH language	363153-02
LIG 005	SPANISH language	363157-01
LIG 006	ITALIAN language	363155-01
LIG 007	DANISH language	363159-01
LIG 008	DUTCH language	363158-01

EMULATIONS AVAILABLE ON THE MPS 1230 Rel. 2.1A:

PARALLEL INTERFACE

- |   |                      |                       |
|---|----------------------|-----------------------|
| 1 | Epson FX-80          | (MPS 1200P/1250)      |
| 2 | IBM Proprinter       |                       |
| 3 | IBM Graphics Printer | (MPS 1000/1200P/1250) |

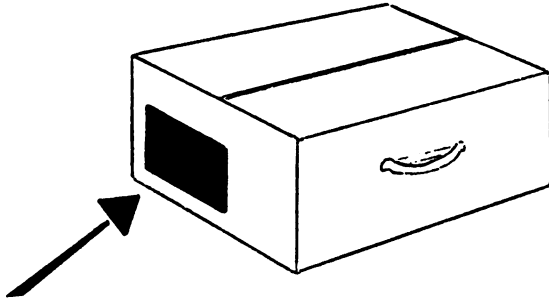
SERIAL INTERFACE

- |   |  |                  |
|---|--|------------------|
| 1 | Epson FX-80                            | (MPS 1200S/1250) |
| 3 | IBM Proprinter                         |                  |
| 5 | IBM Graphics Printer                   | (MPS 1000)       |
| 6 | Commodore (MPS 801 + Epson FX Escapes) | (MPS 1200S/1250) |
| 7 | Commodore (MPS 801 + IBM P.P. Escapes) |                  |
| 8 | Commodore (MPS 801 + IBM G.P. Escapes) |                  |

In the Serial interface all the emulations are available in standard mode (ASCII) or in PET-ASCII mode.

1.2 PRINTER IDENTIFICATION

To identify the model and the characteristics of the product contained in the packaging, refer to the accompanying card (Fig. 1-2).






product - produit <b>MPS 1230</b>		serial number - matricule <b>5980025</b>		random code code d'identification <b>49360T</b>		card code code fiche	
destination <b>COMMODORE XXXXXXX</b>				n° order - commande <b>597607/01</b>		qty - q te <b>XX</b>	
model modèle		random code code d'identif.		serial number matricule		characteristics code code caractéristiques	
<b>MPS 1230</b>		<b>49360T</b>		<b>XXXXXX</b>		<b>ALI XXX LIG XXX</b>	
							
made in italy fabriqué en italie							

Fig 1-2 Product Identification Card

Further information for identification purposes can be found in the string of characters printed with the PRINT TEST (See chapter 4).

The meaning of these characters is as follows:

**DUAL - INTERFACE**

**RELEASE R - X.XX**

(Firmware release update level)

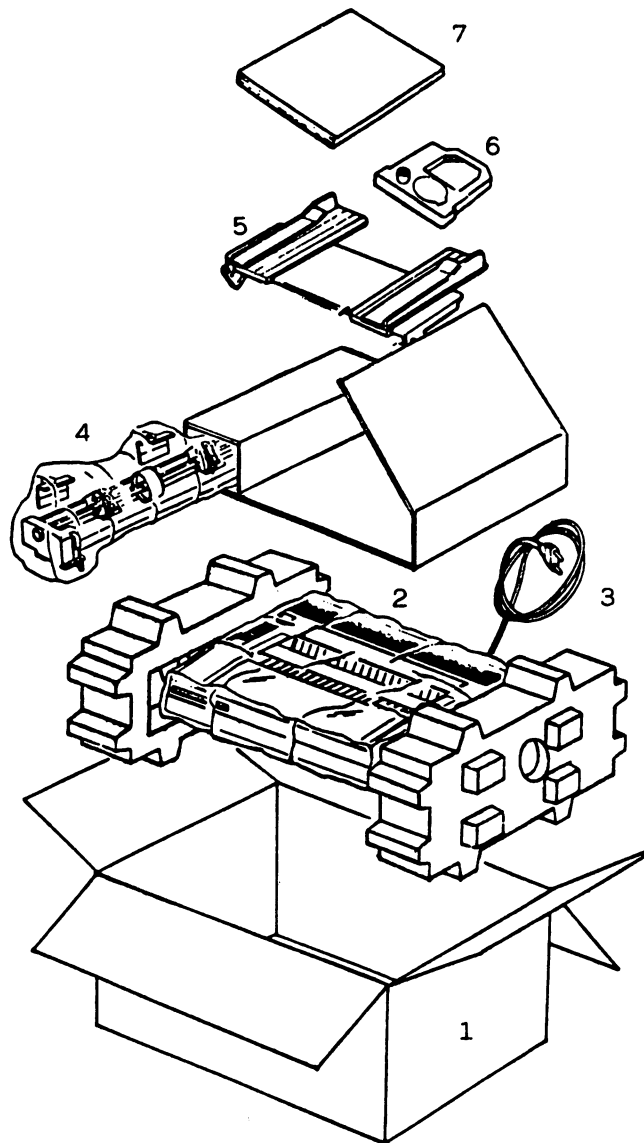
1.3 UNPACKING

Fig. 1-3 Packing Assembly

<u>ITEM</u>	<u>DESCRIPTION</u>
1	Shipping container
2	Printer in plastic cover
3	Supply cable
4	Sprocket in plastic cover
5	Paper feed
6	Ribbon cartridge
7	User manual



## 2. PRESENTATION OF THE PRINTER

This chapter gives the operator commands and indicators of the printer. Location of the main groups of the printer is illustrated.

### 2.1 OPERATOR COMMANDS AND INDICATORS

The operator controls of the basic unit are shown in Fig. 2-1 and 2-2. The various indicators are grouped together on a console (Fig 2-5).

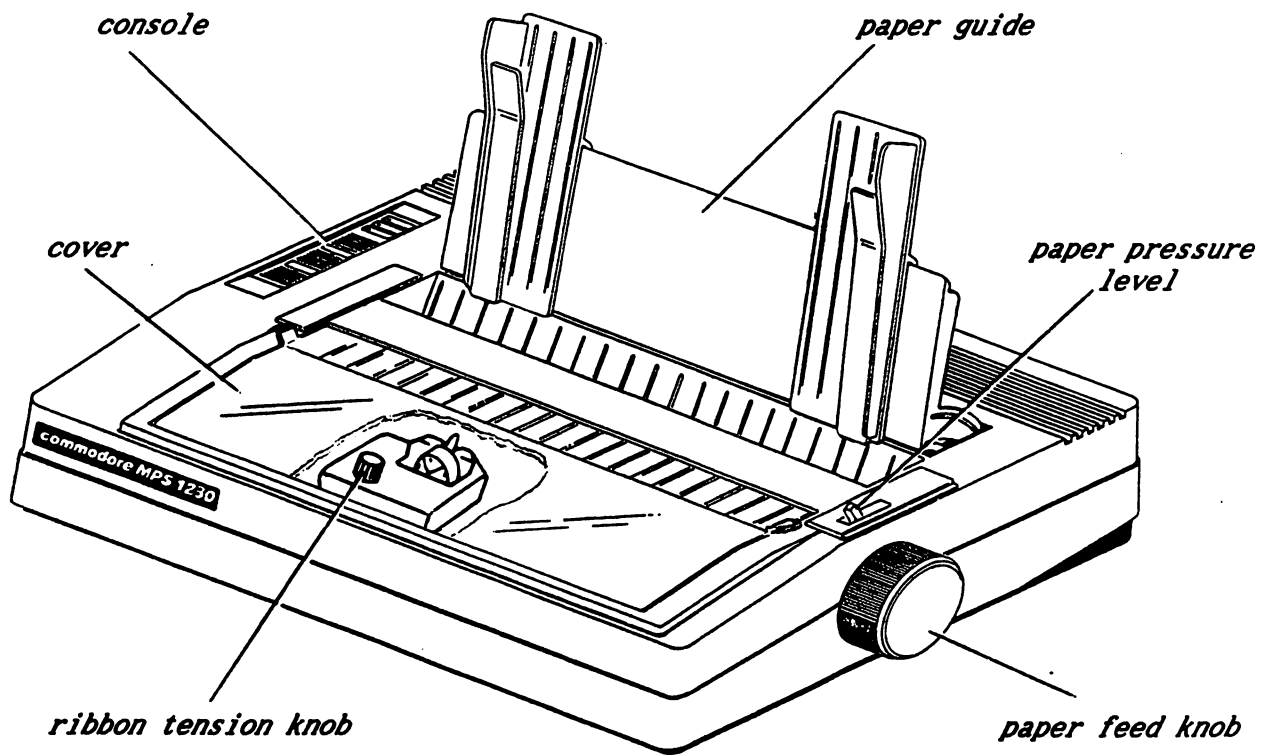


Fig. 2-1 MPS 1230

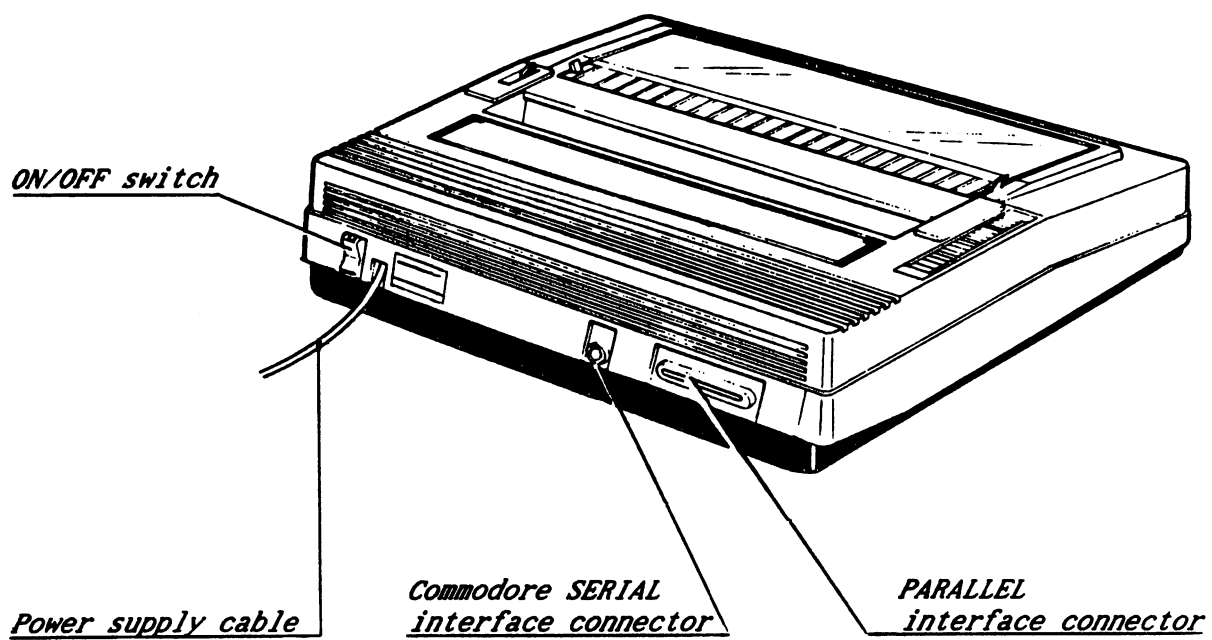


Fig. 2-2 MPS 1230 (rear view)

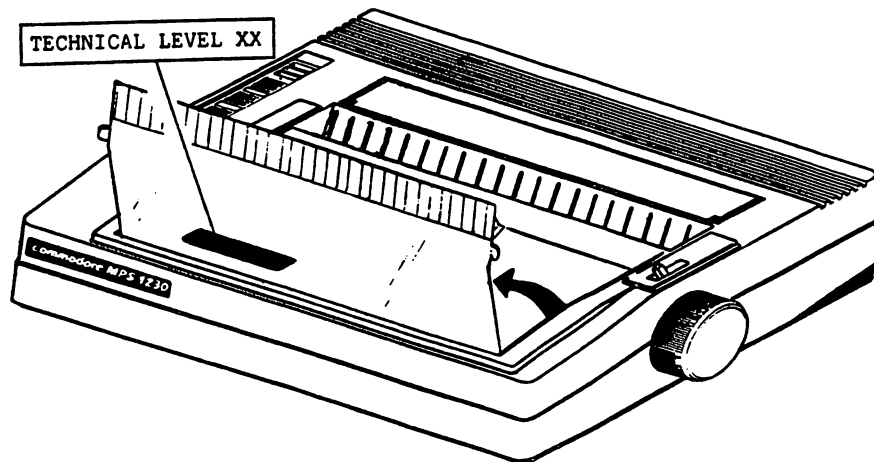


Fig. 2-3 MPS 1230 (technical level label)

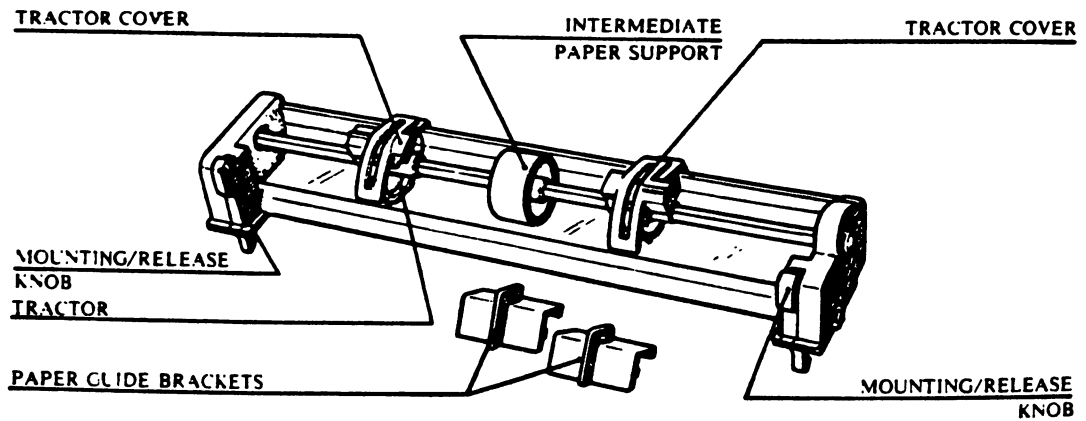


Fig. 2-3 Tractor Carriage (Sprocket)

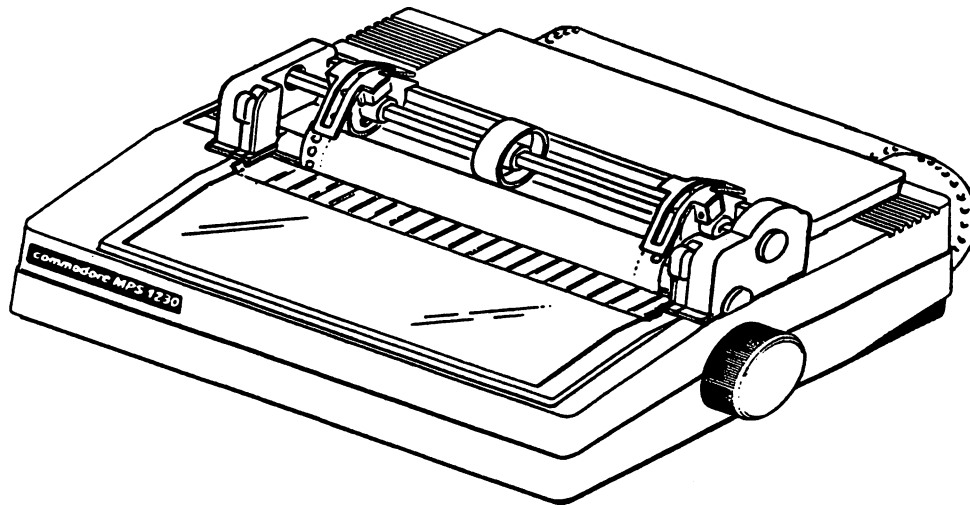


Fig. 2-5 MPS 1230 with Sprocket Device



2.2 FUNCTIONS

2.2.1 OPERATOR CONSOLE

- |                         |  |
|-------------------------|--|
| LEDs "FAILURE" (yellow) | - Lit: printer fault (hardware fault)<br>- Blinking: minor fault (mechanical fault)  |
| LEDs "ON" (green)       | Machine powered on   |
| LEDs "LOCAL" (yellow)   | - Machine in LOCAL mode (printer off line)<br>- The paper is out   |
| KEY "LOCAL"             | Auto/local mode  |
| KEY "LINE FEED"         | Enable only when the printer is in LOCAL mode<br>Advances paper one line feed.<br>If held down at printer switch on, the printer self-test is performed.               |
| KEY "FORM FEED"         | Enable only when the printer is in LOCAL mode<br>Advances paper to next form.<br>If held down at printer switch on, the printer will operate in DATA SCOPE print mode. |

If the LINE FEED and FORM FEED keys are held down together at switch-on, the printer will be set in the programming mode (SET-UP).

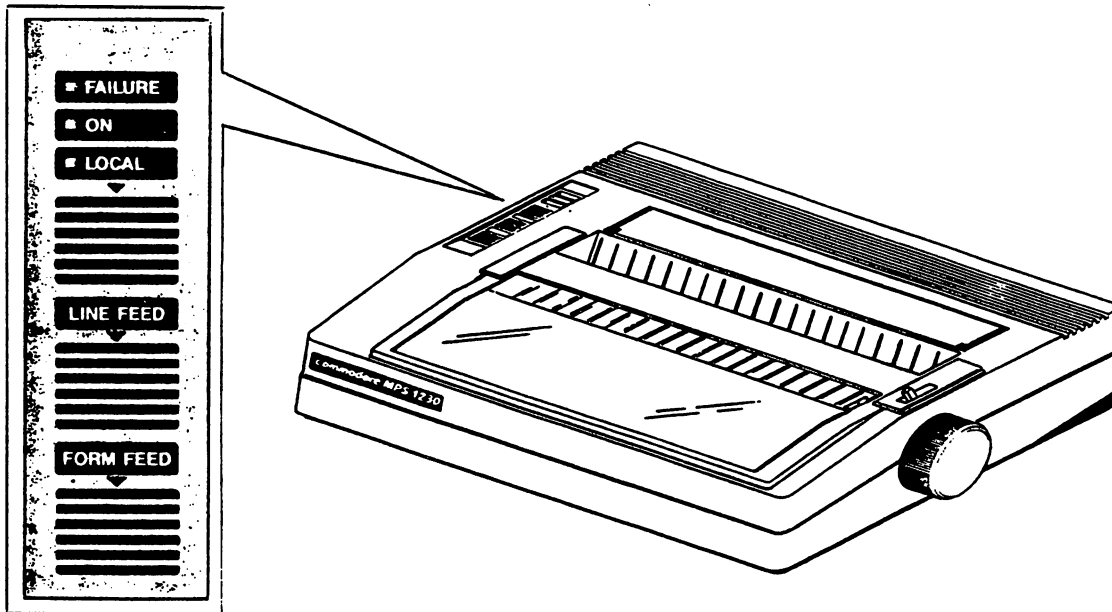
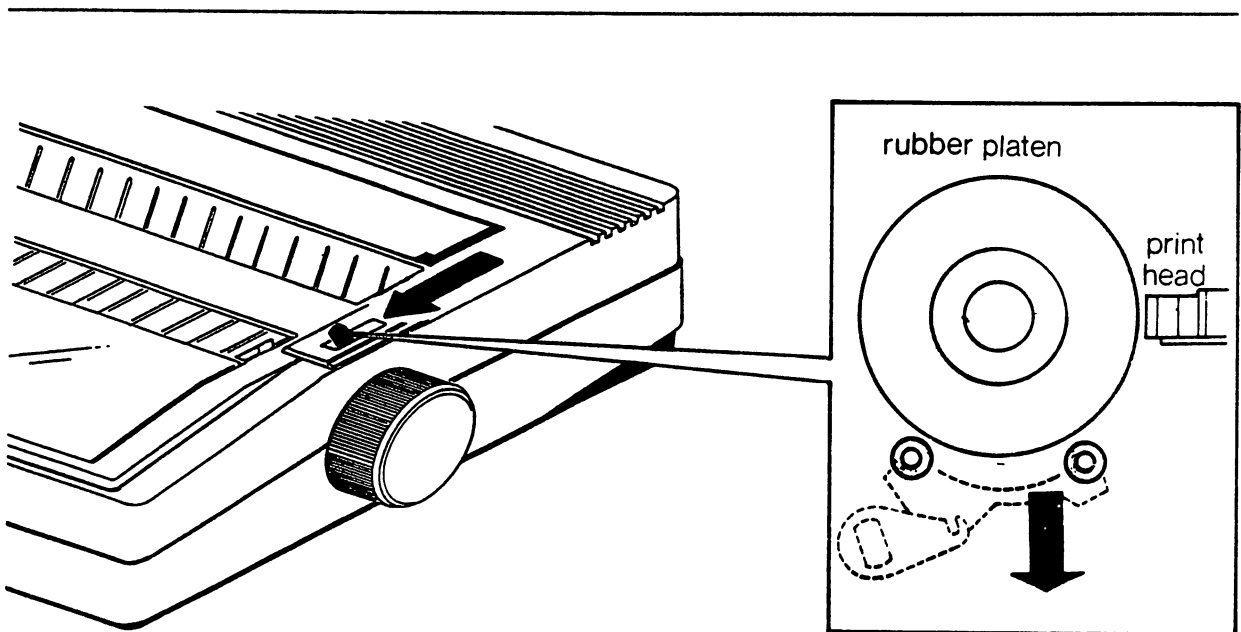


Fig. 2-5 Console

**2.2.2 PAPER RELEASE LEVER**

Pulls back the paper pressure rollers from the platen to allow insertion of the sheet of paper.

This lever must be in the rollers OPEN position to allow mounting of the SPROCKET device.



**Fig. 2-6 Paper pressure rollers in the "OPEN" position.**

**2.2.3 PAPER FEED KNOB**

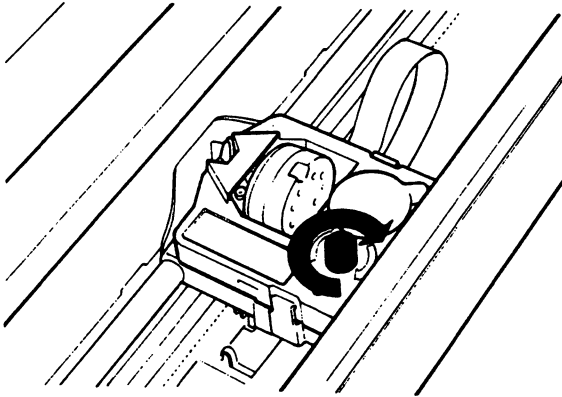
Allows manual feeding of the sheet or fan-fold form. This operation can be performed with the printer ON or OFF.

Functions only if the paper release lever is pushed toward the rear of the printer.

**2.2.4 RIBBON TENSION KNOB**

This knob, present on the black cartridge, allows adjustment of correct ribbon tension after insertion of the cartridge.

---



---

**Fig. 2-7 Ribbon Cartridge knob**

**2.2.5 INTERFACE CONNECTORS**

The MPS 1230 have the main board with the following interface connectors:

- Centronics Parallel interface, 18x2 pins connector Female.  
For connections to Commodore Amiga, Commodore PC, IBM Compatible PC.
- Commodore Serial interface, 6 pins connector Female.  
For connections to Commodore C 64, C 128, C 128D.

2.3 ELECTRO-MECHANICAL GROUPS

The mains group vary according to the local mains voltage and are available in five versions like variant ALI XXX (see page 1-2).

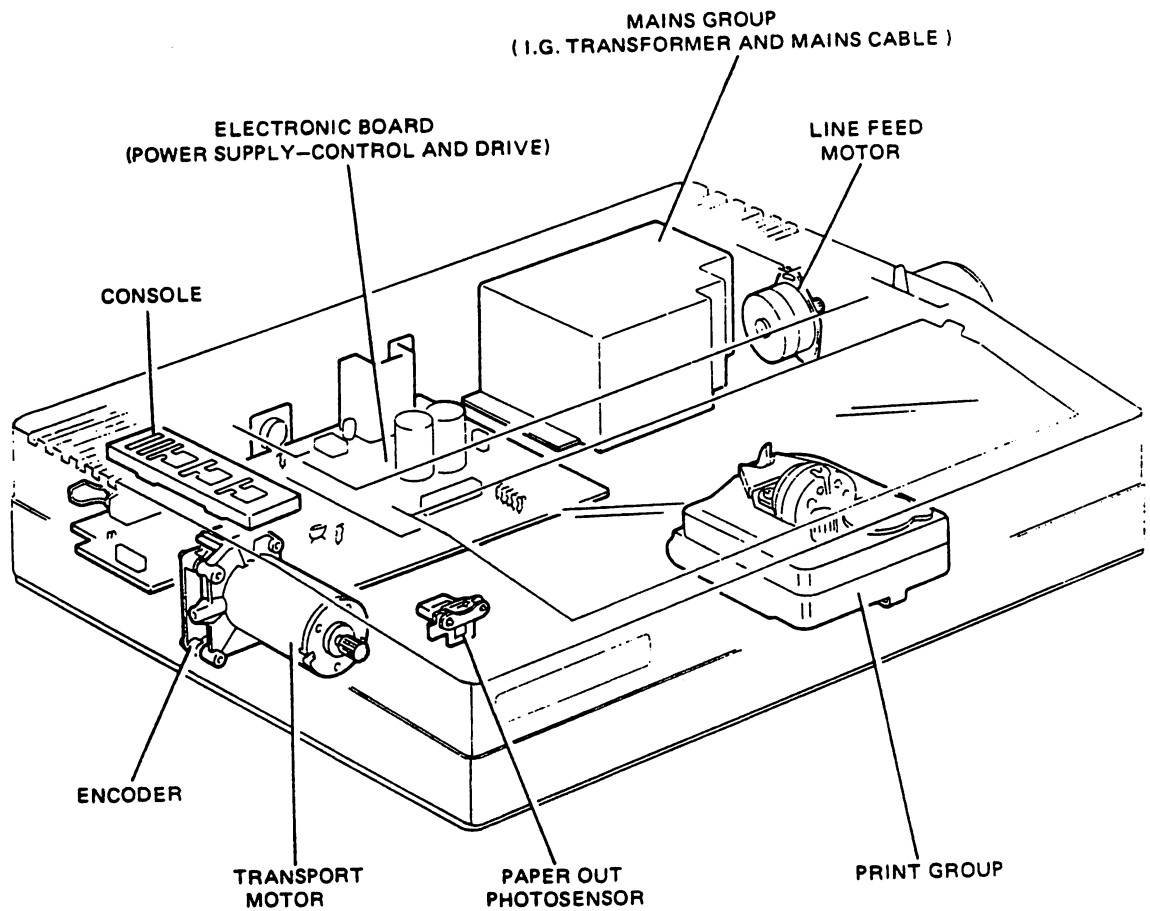


Fig. 2-8 Location of the electro-mechanical groups



### 3. INSTALLATION

This chapter supplies the information required to insert the single sheet, the fan-fold forms and to program new Default Parameters.

#### 3.1 RIBBON CARTRIDGE INSERTION

Lift up the transparent cover.

Remove the cartridge from its plastic bag.

Pull the ribbon taut by turning the knob provided and then insert the cartridge in the relevant housing on the carriage.

Press the cartridge down slightly to lock it in place, as indicated in Fig. 3-1. Turn the ribbon tension adjustment wheel on the cartridge clockwise to take up any ribbon that has come out of the cartridge during insertion.

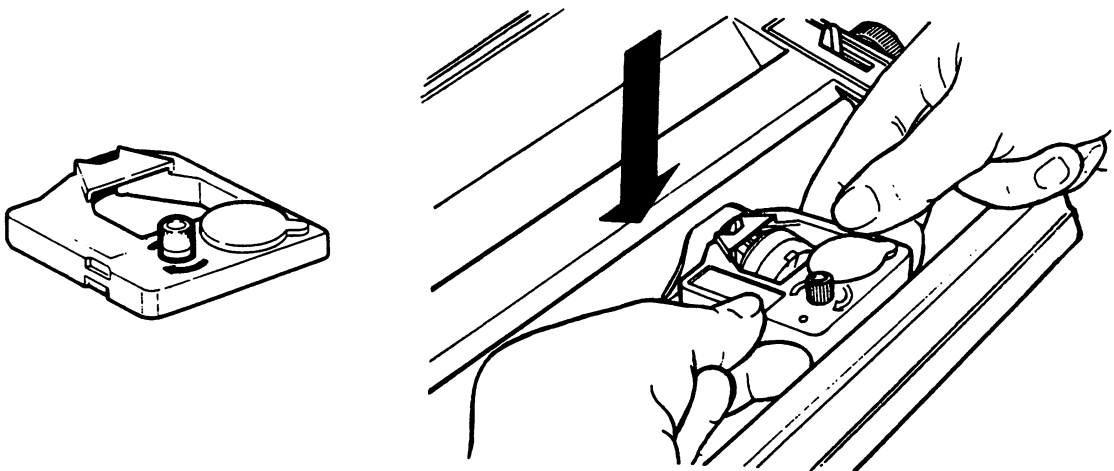


Fig. 3-1 How to insert the ribbon cartridge

### 3.2 INSERTION OF THE SHEET FEED

Position the paper feed support vertically on the rear of the printer, inserting its pins in the appropriate slots in the printer casing, and pushing it down until it is against the stops.

Pressing the two flexible hooks on the paper feed support, insert them in the grooves and tip the paper feed back so that it is against them.

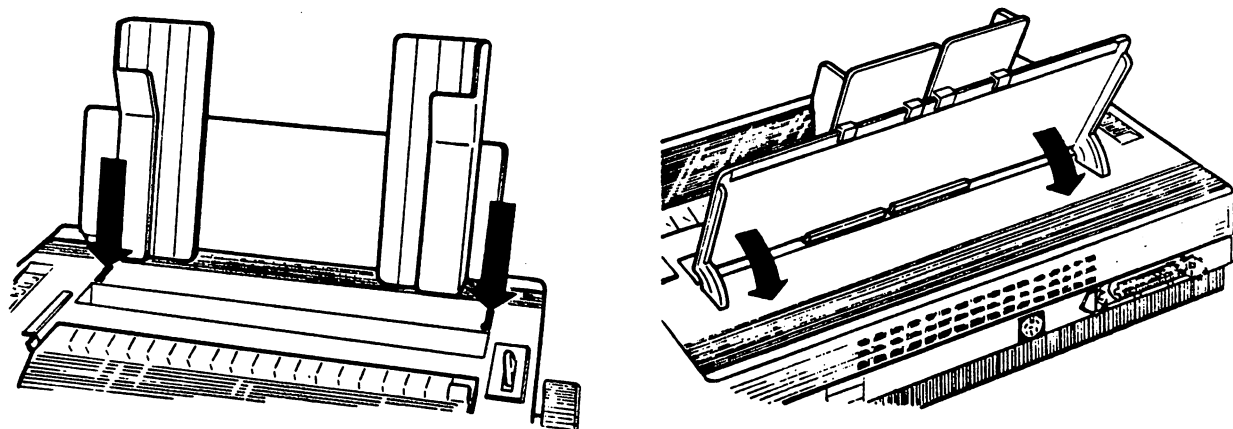


Fig. 3-2 Insertion and positioning of the sheet feed

Set the paper release lever toward the rear of the printer, so that the paper is fed by the platen.

### 3.3 INSERTION OF SINGLE SHEETS

Adjust the left hand guide of the paper feed so that the left hand edge of the paper is to the left of the first character position on the print line.

Adjust the right hand guide according to the width of the sheet of paper, with respect to the left hand guide.

Insert the paper (single sheet or original + one copy) between the guides, pushing it into the slot that gives access to the platen.

### Manual insertion of single sheet

Turn the paper feed knob clockwise until the paper is in the print position, between the platen and the paper guide in front of it.

### Automatic insertion of single sheet

With the printer switched on, the paper is fed in by pressing the FORM FEED key on the operating console.

### 3.4 MOUNTING THE SPROCKET

Using a screwdriver, paper knife or similar tool, remove plates A and B (Fig. 3-3) to access the points in which the sprocket is to be fixed.

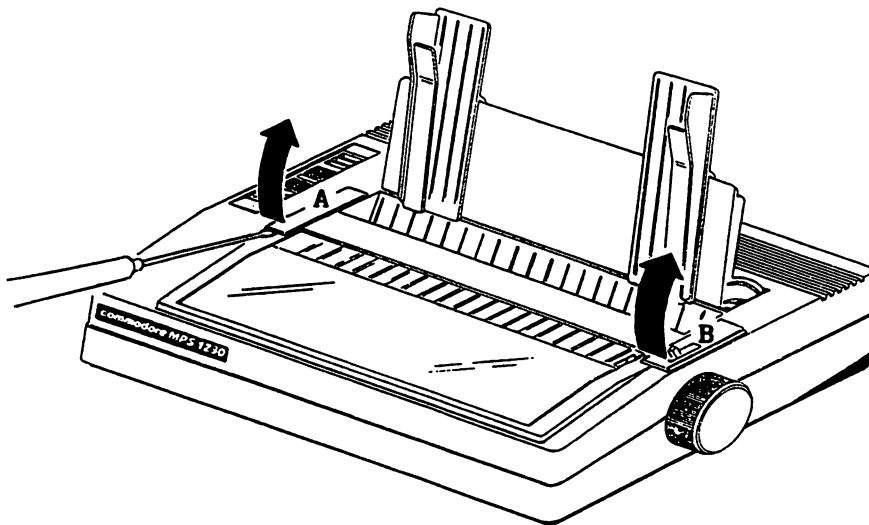
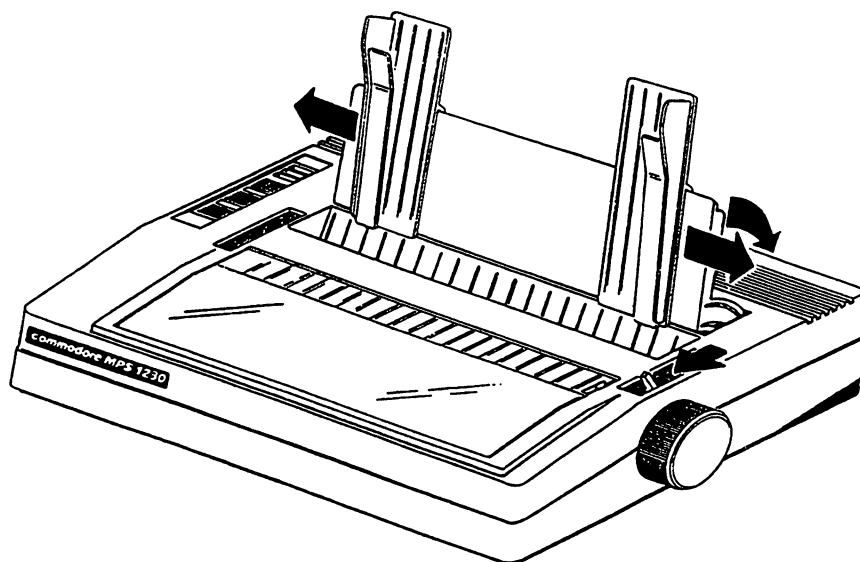


Fig. 3-3 Removal of plates A and B

Remove the two side guides from the sheet feed and rotate it downwards to its horizontal position (Fig. 3-4).

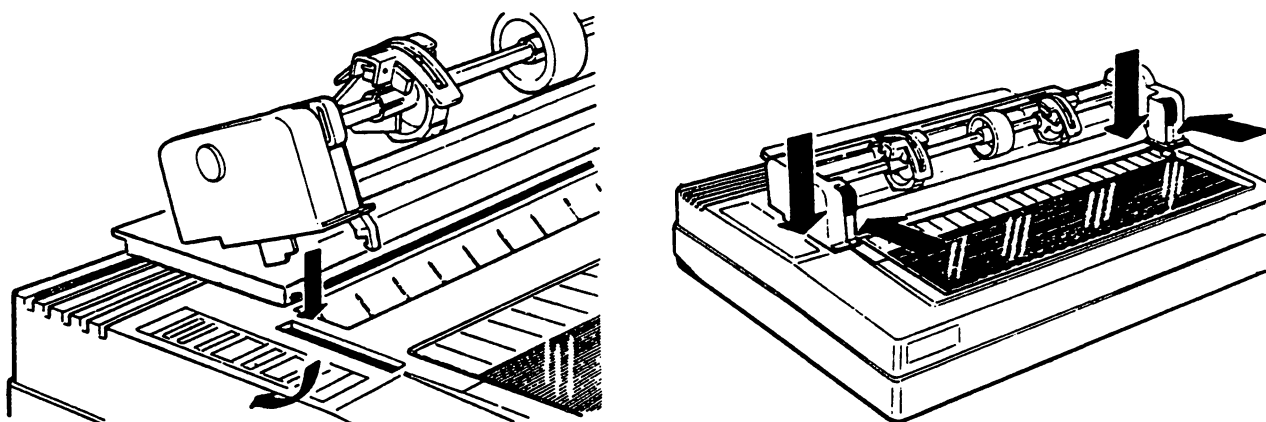
To mount the sprocket, the paper release lever must be in the "rollers open" position.





**Fig. 3-4 Removing of the two side guides and positioning the sheet feed.**

Insert the pins of the sprocket in the two rear slots, sliding them into the guides provided. Pressing the knobs on either side of the front of the sprocket, pull it forward until it is against the front flexible stops.



**Fig. 3-5 Mounting and fixing the sprocket in position.**

Press the two paper guide brackets into the groove on the rear of the printer casing. It is not necessary removing the paper guide brackets when the sprocket is removed.

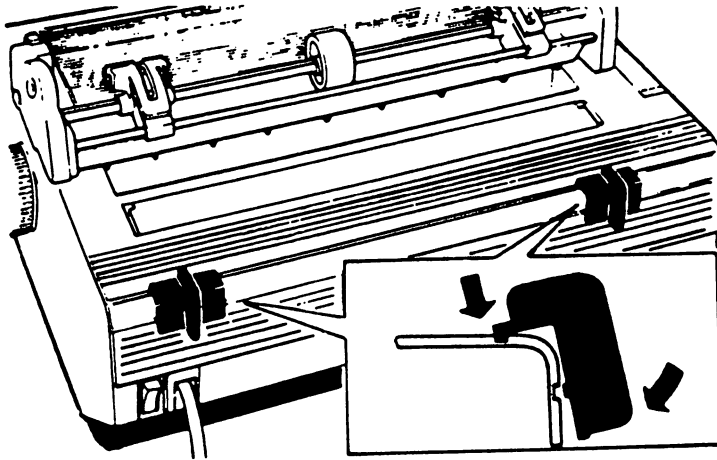


Fig. 3-6 Inserting the paper guide brackets

### 3.5 INSERTION OF CONTINUOUS FORM

Inserting the paper in the slot behind the platen, feed it under the tractors. Guide the paper by hand until the leading edge feeds out between the platen and the paper guide (Fig. 3-7).

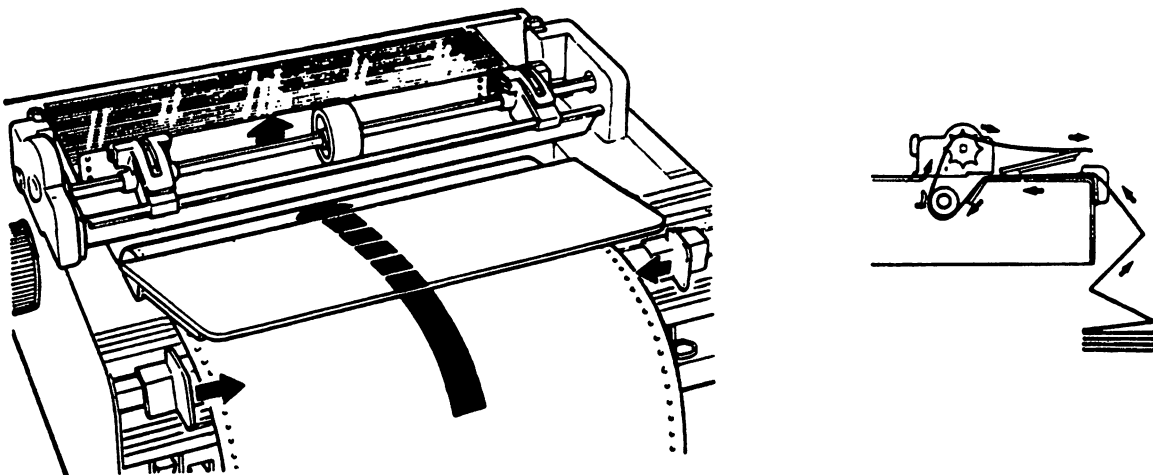


Fig. 3-7 Inserting the continuous form

### 3.6 PROGRAMMING THE PRINTER FUNCTION

The printer settings can be modified by confirming or refusing via console a series of parameters that are printed when the SET-UP mode is accessed.

To activate the SET-UP mode, proceed as follows:

- Turn OFF the printer and remove the sprocket.
- Press the FORM FEED and the LINE FEED keys and turn on the printer without releasing them for about 3 sec.
- Insert a sheet of paper (manually with the paper feed knob or automatically with the FORM FEED key)

In this mode, the possible programming parameters will be automatically printed, one at a time; at each alternative the operator will respond pressing: the LINE FEED key (= YES) to confirm the proposed parameters, or the FORM FEED key (= NO) to choose a different parameter.

The programming procedure can be stopped at any time pressing the LOCAL key.

The programming menu ends with the message "WOULD YOU LIKE TO STORE THESE PARÁMETERS ?". Depending on whether you enter "YES" or "NO", the final printout will be as follows:

- CHANGES EXECUTED if you enter "YES". In this case the new parameters you have selected have been stored to the printer's EEPROM.
- NO CHANGES EXECUTED if you have entered "NO".

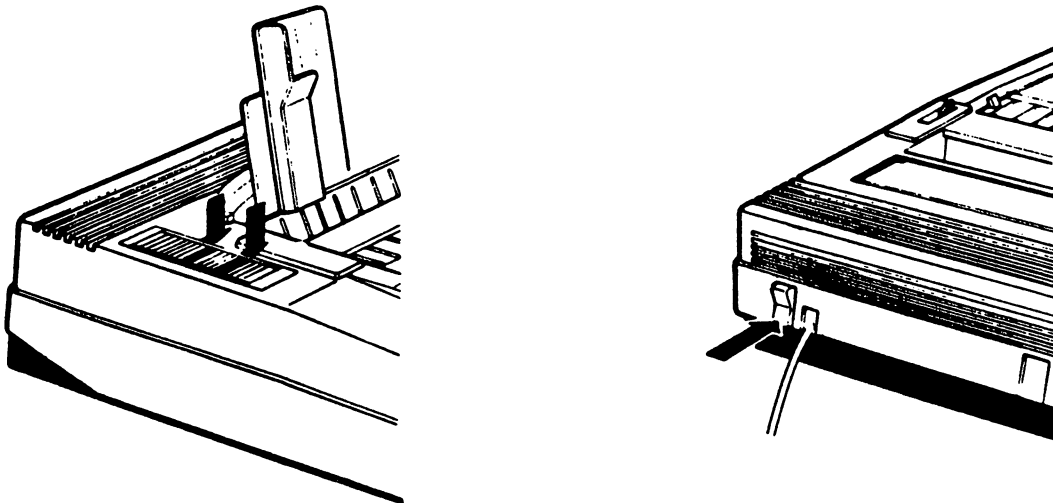


Fig. 3-8 How to activate the SET-UP mode

3.7 AVAILABLE PARAMETER SETTINGS

TO CONFIRM PRESS LF. TO CHANGE PRESS FF. TO END PRESS LOCAL

INTERFACE  
SERIAL COMMODORE            PARALLEL

PRINTER EMULATED IN PARALLEL AND SERIAL COMMODORE  
EPSON FX 80            PROPRINTER            IBM G. P.

CHARACTER SET IN PARALLEL MODE  
INTERNATIONAL 1 INTERNATIONAL 2 SPAIN            PORTUGAL            GREECE  
ISRAEL

CHARACTER SET IN COMMODORE MODE  
SPAIN    USA/UK    DENMARK    SWEDEN    GERMANY    FRANCE    ITALY    SWITZERLAND

OPEN MODE  
          5    COMMODORE COMMANDS            4    COMMODORE COMMANDS  
          4    P . C .    COMMANDS            5    COMMODORE COMMANDS

AUTOMATIC SHEET FEEDER  
NO            YES

DOUBLE STRIKE PRINTING  
MONODIRECTIONAL BIDIRECTIONAL

CHARACTER RESOLUTION  
N.L.Q. DRAFT

CHARACTER SPACING  
10        12        15        17.1     20        24

ENABLE D.L.L.  
NO 7K DB    L.B    YES 4K DB    L.B

LINE FEED    \*  
LF=LF+CR            LF = LF

CARRIAGE RETURN    \*  
CR = CR            CR=CR+LF

PAPER END DETECTION  
YES        NO

LINE SPACING    \*  
1/6        7/72     1/8

SLASHED ZERO  
YES        NO

DC1/DC3 PROCEDURE    \*  
YES        NO

FORM LENGTH  
5        12        11        10        9        8        7        6

SKIP OVER PERFORATION (BOF)  
1/3        1/2        2/3        1        2        0

BIDIRECTIONAL B.I.M.  
YES        NO

PROPORTIONAL SPACING  
YES        NO

CHARACTER LENGTH    \*  
7 BITS    8 BITS

WOULD YOU LIKE TO STORE THESE PARAMETERS ?  
YES        NO

NO CHANGES EXECUTED

MPS 1230 (Release 2.1A ,06 Dec. 1988)

1. PROMPTING

TO CONFIRM PRESS LF, TO CHANGE PRESS FF, TO END PRESS LOCAL

INTERFACE  
PARALLEL SERIAL COMMODORE

PRINTER EMULATED IN PARALLEL AND SERIAL COMMODORE  
IBM G. P. EPSON FX 80 PROPRINTER

CHARACTER SET IN PARALLEL MODE  
INTERNATIONAL 1 INTERNATIONAL 2 SPAIN PORTUGAL GREECE  
ISRAEL

CHARACTER SET IN COMMODORE MODE  
USA/UK DENMARK SWEDEN GERMANY FRANCE ITALY SWITZERLAND SPAIN

NEW { DEVICE SELECTED  
4 5 4 P . C . COMMANDS 5 COMMODORE COMMANDS

ASCII TRANSLATION  
PETASCII ASCII

AUTOMATIC SHEET FEEDER  
NO YES

DOUBLE STRIKE PRINTING  
MONODIRECTIONAL BIDIRECTIONAL

CHARACTER RESOLUTION  
DRAFT N.L.Q.

CHARACTER SPACING  
10 12 15 17.1 20 24

ENABLE D.L.L.  
YES 4K BYTE LINE BUFFER NO 7K BYTE LINE BUFFER

LINE FEED \*  
LF LF+CR LF = LF

CARRIAGE RETURN \*  
CR = CR CR=CR+LF

PAPER END DETECTION  
YES NO

continue as Rel. 1.1

### 3.8 EXAMPLE OF PROGRAMMING FOR CONNECTION TO COMMODORE C 64, C 128

Parameter settings for the Commodore SERIAL interface.

The Commodore BASIC uses the device numbers either 4 or 5 (printer address) for the printer. The MPS 1230 is always open to receive the data for both device numbers.

- In the address 5 the COMMODORE COMMANDS sets are always selected (Commodore MPS 801/803 printer commands and, to increase the capability of interaction between computer and printer, Escape sequences).
- In the address 4 it is possible to select one of the following command sets:
  - .COMMODORE COMMANDS
  - .EPSON FX 80
  - .IBM PROPRINTER
  - .IBM GRAPHICS PRINTER

#### 3.8.1 COMMODORE COMMANDS and NATIONAL CHARACTERS TABLES

Possible printer settings (Address 4 and 5):

<u>TO CONFIRM PRESS LF, TO CHANGE PRESS FF, TO END PRESS LOCAL</u>					
- INTERFACE					
SERIAL COMMODORE					
PRINTER EMULATED IN PARALLEL AND SERIAL COMMODORE					
EPSON FX 80					
CHARACTER SET IN PARALLEL MODE					
U.S.A.					
- CHARACTER SET IN COMMODORE MODE					
DENMARK	SWEDEN	GERMANY	FRANCE	ITALY	SWITZERLAND
					SPAIN
					USA/UK
- OPEN MODE					
	5	COMMODORE	COMMANDS	4	COMMODORE
					COMMANDS
WOULD YOU LIKE TO STORE THESE PARAMETERS ?					
YES					
CHANGES EXECUTED					

3.8.2 EPSON FX-80 COMMANDS and NATIONAL CHARACTERS TABLES

Possible printer settings (Address 4):

```
TO CONFIRM PRESS LF, TO CHANGE PRESS FF, TO END PRESS LOCAL

- INTERFACE
  SERIAL COMMODORE

- PRINTER EMULATED IN PARALLEL AND SERIAL COMMODORE
  EPSON FX 80

- CHARACTER SET IN PARALLEL MODE
  FRANCE GERMANY U.K. DENMARK SWEDEN ITALY SPAIN U.S.A.

  CHARACTER SET IN COMMODORE MODE
  USA/UK

- OPEN MODE
      4 P . C . COMMANDS      5 COMMODORE COMMANDS

WOULD YOU LIKE TO STORE THESE PARAMETERS ?
YES

CHANGES EXECUTED
```

3.8.3 IBM PROPRINTER COMMANDS and NATIONAL CHARACTERS TABLES

Possible printer settings (Adress 4):

```
TO CONFIRM PRESS LF, TO CHANGE PRESS FF, TO END PRESS LOCAL

- INTERFACE
  SERIAL COMMODORE

- PRINTER EMULATED IN PARALLEL AND SERIAL COMMODORE
  PROPRINTER

- CHARACTER SET IN PARALLEL MODE
  INTERNATIONAL 2 SPAIN PORTUGAL GREECE ISRAEL
  INTERNATIONAL 1

  CHARACTER SET IN COMMODORE MODE
  USA/UK

- OPEN MODE
      4 P . C . COMMANDS      5 COMMODORE COMMANDS

WOULD YOU LIKE TO STORE THESE PARAMETERS ?
YES

CHANGES EXECUTED
```

3.8.4 IBM GRAPHICS-PRINTER COMMANDS and NATIONAL CHARACTERS TABLES

Possible printer settings (Address 4):

```

TO CONFIRM PRESS LF, TO CHANGE PRESS FF, TO END PRESS LOCAL

- INTERFACE
  SERIAL COMMODORE

- PRINTER EMULATED IN PARALLEL AND SERIAL COMMODORE
  IBM G. P.

- CHARACTER SET IN PARALLEL MODE
  INTERNATIONAL 2 SPAIN          PORTUGAL          GREECE          ISRAEL
  INTERNATIONAL 1

  CHARACTER SET IN COMMODORE MODE
  USA/UK

- OPEN MODE
      4  F . C .  COMMANDS      5  COMMODORE COMMANDS

WOULD YOU LIKE TO STORE THESE PARAMETERS ?
YES

CHANGES EXECUTED

```

3.9 EXAMPLE OF PROGRAMMING FOR CONNECTION TO AMIGA AND IBM COMPATIBLE

Parameter settings for the Centronics PARALLEL interface.

It is possible to select one of the following command sets:

- .EPSON FX 80
- .IBM PROPRINTER
- .IBM GRAPHICS PRINTER



**3.9.1 EPSON FX-80 COMMANDS and NATIONAL CHARACTERS TABLES**

**Possible printer settings:**

```
TO CONFIRM PRESS LF, TO CHANGE PRESS FF, TO END PRESS LOCAL

INTERFACE
PARALLEL

PRINTER EMULATED IN PARALLEL AND SERIAL COMMODORE
EPSON FX 80

CHARACTER SET IN PARALLEL MODE
U.S.A.  FRANCE  GERMANY U.K.  DENMARK SWEDEN  ITALY  SPAIN

WOULD YOU LIKE TO STORE THESE PARAMETERS ?
YES

CHANGES EXECUTED
```

**3.9.2 IBM PROPRINTER COMMANDS and NATIONAL CHARACTERS TABLES**

**Possible printer settings:**

```
TO CONFIRM PRESS LF, TO CHANGE PRESS FF, TO END PRESS LOCAL

INTERFACE
PARALLEL

PRINTER EMULATED IN PARALLEL AND SERIAL COMMODORE
EPSON FX 80  PROPRINTER

CHARACTER SET IN PARALLEL MODE
INTERNATIONAL 1 INTERNATIONAL 2 SPAIN  PORTUGAL  GREECE
ISRAEL

WOULD YOU LIKE TO STORE THESE PARAMETERS ?
YES

CHANGES EXECUTED
```

3.9.3 IBM GRAPHICS-PRINTER COMMANDS and NATIONAL CHARACTERS TABLES

Possible printer settings:

```
TO CONFIRM PRESS LF. TO CHANGE PRESS FF. TO END PRESS LOCAL

INTERFACE
PARALLEL

PRINTER EMULATED IN PARALLEL AND SERIAL COMMODORE
PROPRINTER      IBM G. P.

CHARACTER SET IN PARALLEL MODE
ISRAEL           INTERNATIONAL 1 INTERNATIONAL 2 SPAIN          PORTUGAL
GREECE

WOULD YOU LIKE TO STORE THESE PARAMETERS ?
YES

CHANGES EXECUTED
```



4. SELF-TEST AND TESTING

This chapter describes the self test messages and the printer test procedures.

4.1 SELF-TEST

A self-test is performed automatically at printer power-on. If no faults are found, the printer is set to ON LINE status. If fault are found or if there is no paper on the printer, this will be indicated by the LEDs on the console (see table).

If the printer does not switch on or if the configuration of the LEDs is different from that shown in the table, refer to the fault tracing flow charts of chapter 5.

LED			MEANING
FAILURE	ON	LOCAL	
	ON		Machine ready
	ON	ON	Machine set to LOCAL, or paper out, or dark paper in front of photosensor
BLINKING	ON		RAM or GATE ARRAY failure
ON	ON		fuse on board blown <sup>(1)</sup>

(1) The LEDs remain for approx. 2 minutes following power-on.

4.2 OPERATOR TEST

This test can be run by the operator with the machine connected or disconnected to the computer.

To start the test, power off the printer, insert a single sheet of paper or a fan-fold form, press the LINE FEED key and power on the printer.

The LINE FEED key can be released when printing begins.

The test indicates the Release number of the firmware version present in the printer. The following lines contain the printer's graphic set. The test printing can be in either the normal mode (Draft) (Fig. 4-1) or in quality mode (NLQ).

To stop this test, press the LOCAL key; to restart it, press the same key again. Turn the printer off to end the test.

DUAL - INTERFACE IBM CHARACTER SET

RELEASE R - 1.1D 10/NOV/1988

! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p q
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p q r
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p q r s
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p q r s t
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p q r s t u
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p q r s t u v
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p q r s t u v w
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p q r s t u v w x
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p q r s t u v w x y
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p q r s t u v w x y z
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p q r s t u v w x y z {
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p q r s t u v w x y z { }
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p q r s t u v w x y z { } ~
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p q r s t u v w x y z { } ~ ¢
! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p q r s t u v w x y z { } ~ ¢ ¢

Fig. 4-1 Self Test in DRAFT mode

5. FAULT TRACING GUIDE

This chapters contains two flow charts designed to help less expert technicians to trace printer faults.

If the printer remains OFF: unplug the printer mains cable and where possible plug it into another mains socket or plug another electrical device that is know to be functioning correctly into the same socket.

In this way, you can determine whether the fault has occurred in the printer or is due to the local mains system.

If mains power is present, refer to the flow chart of page 5-2.

If the machine fails to print: check that the LOCAL LED is off. If this LED is on, check that the sheet of paper has been inserted correctly.

If after making the above checks, the machine still does not print, make a local test on it.

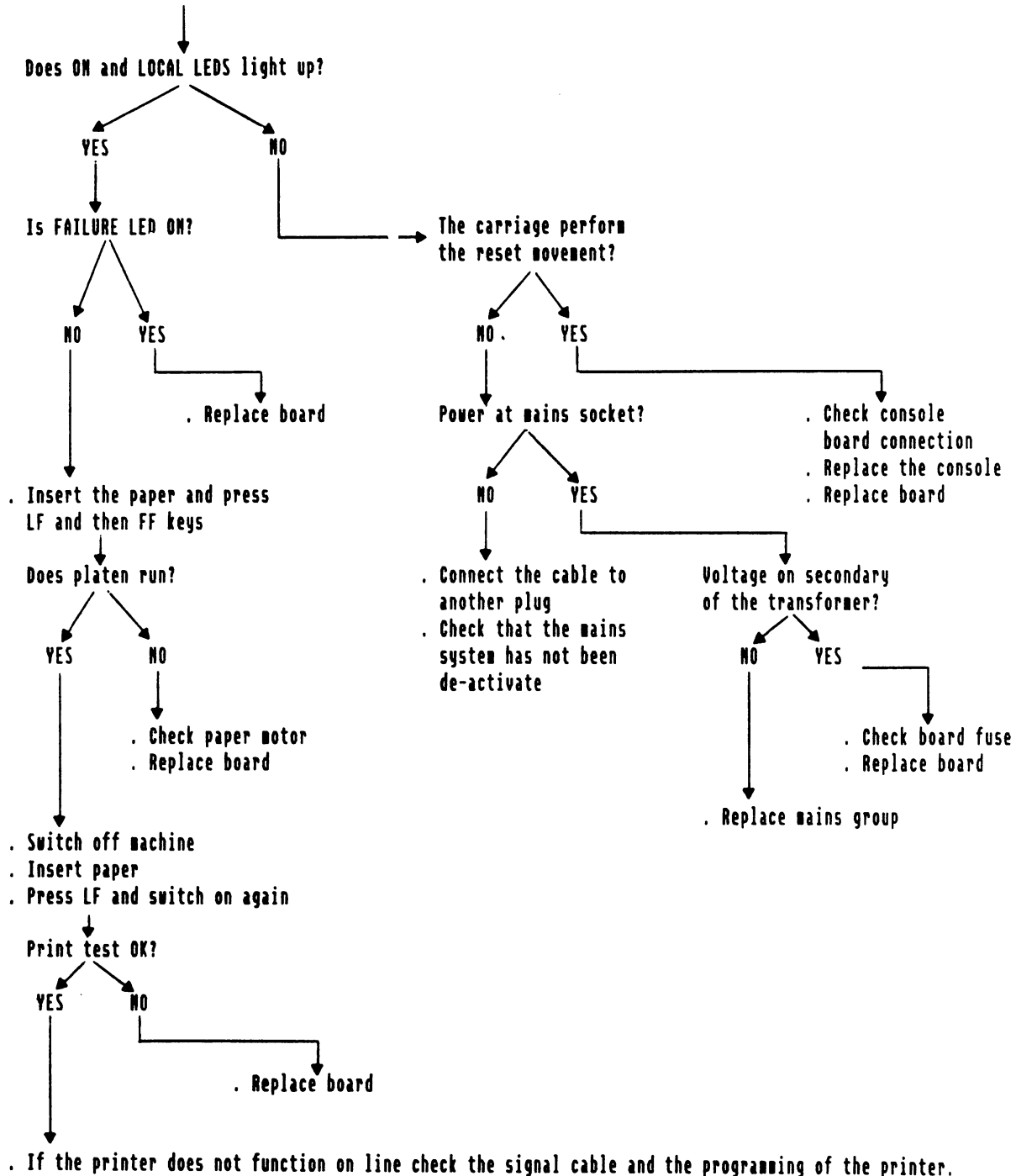
The printer can not perform a local-test or the Set-up procedure if the Computer connected by the serial interface (C64/128) is OFF.

If the printer passes the local test, check the hardware setting of the printer.

Also check that the parameters set on the system are coherent with those of the printer (interface, printer emulation, open mode, character set, ecc.).

**MPS 1230 DIAGNOSTIC FLOW CHART**

- . Disconnect signal interface cable from printer
- . Remove paper from machine
- . Switch printer ON again



6. GENERAL POWER SUPPLY AND ELECTRICAL CONNECTIONS

This chapter describes the electro-mechanical components (motors, console, printhead, power supply) that interface the electronic board.

6.1 MAINS POWER AND VDC VOLTAGE

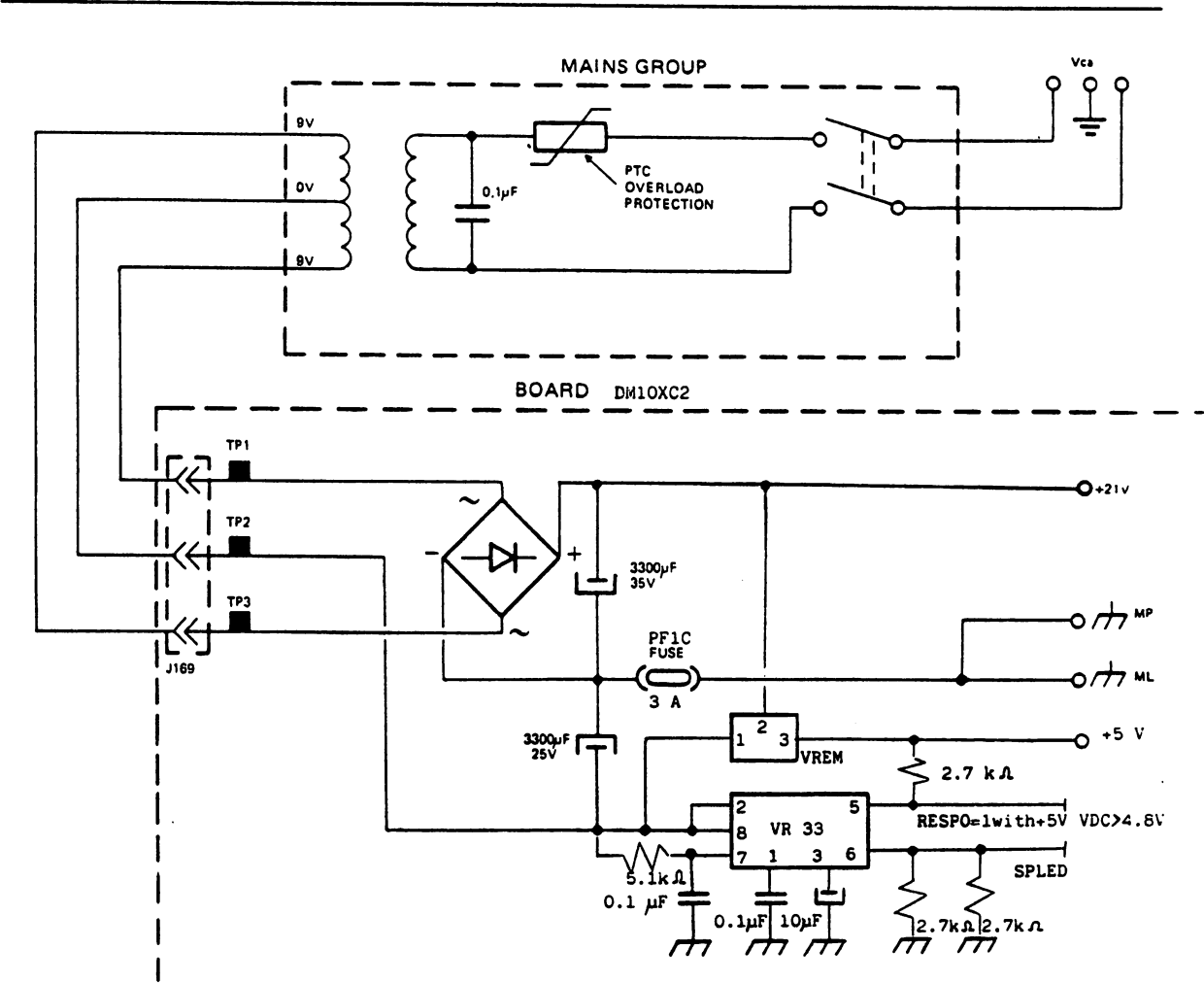


Fig. 6-1 Wiring diagram of the power supply on electronic board (DM10XC2).



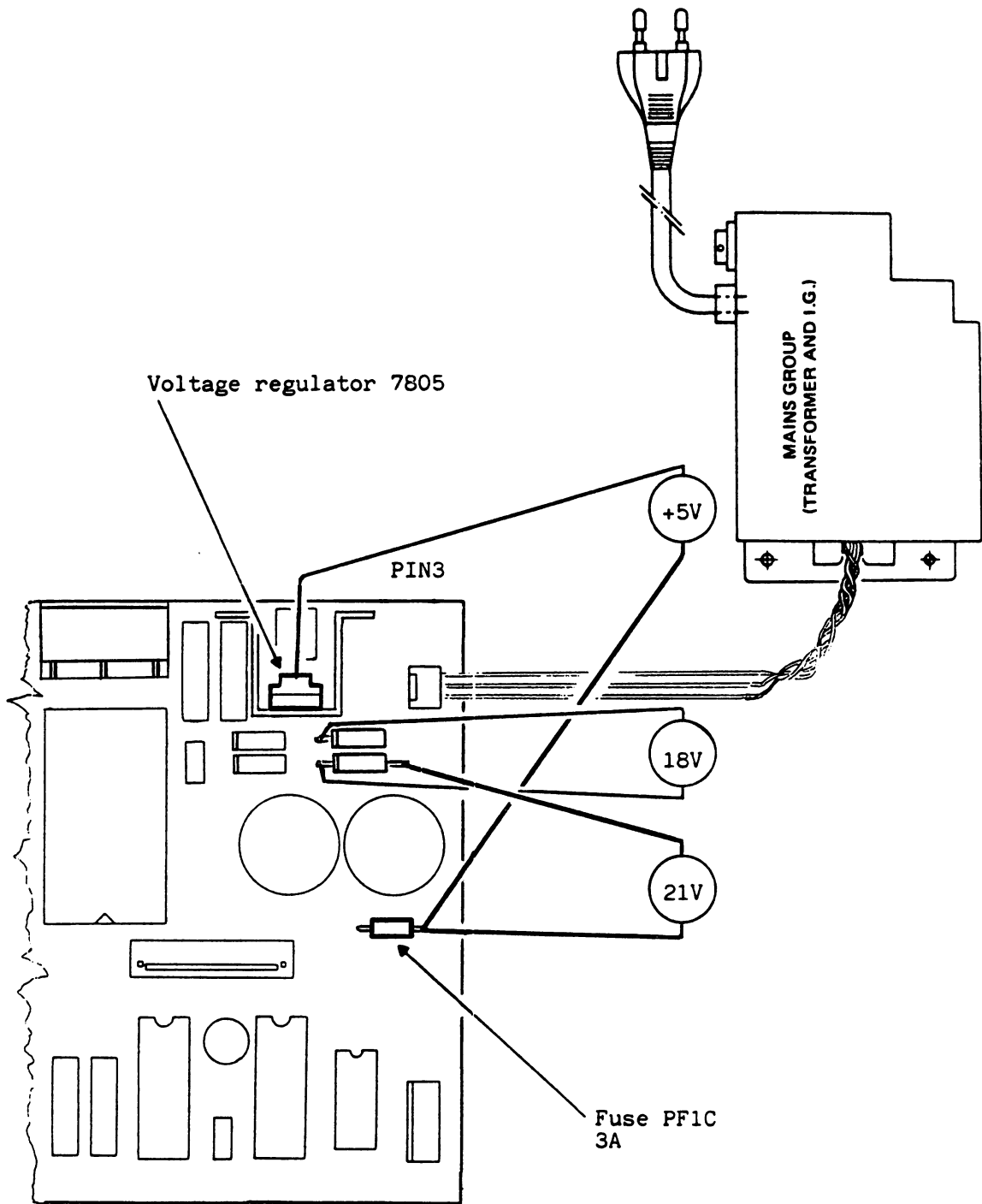


Fig. 6-2 Location of the components of the mains and DC power supply circuit on electronic board (DM10XC2)

6.2 CONNECTIONS

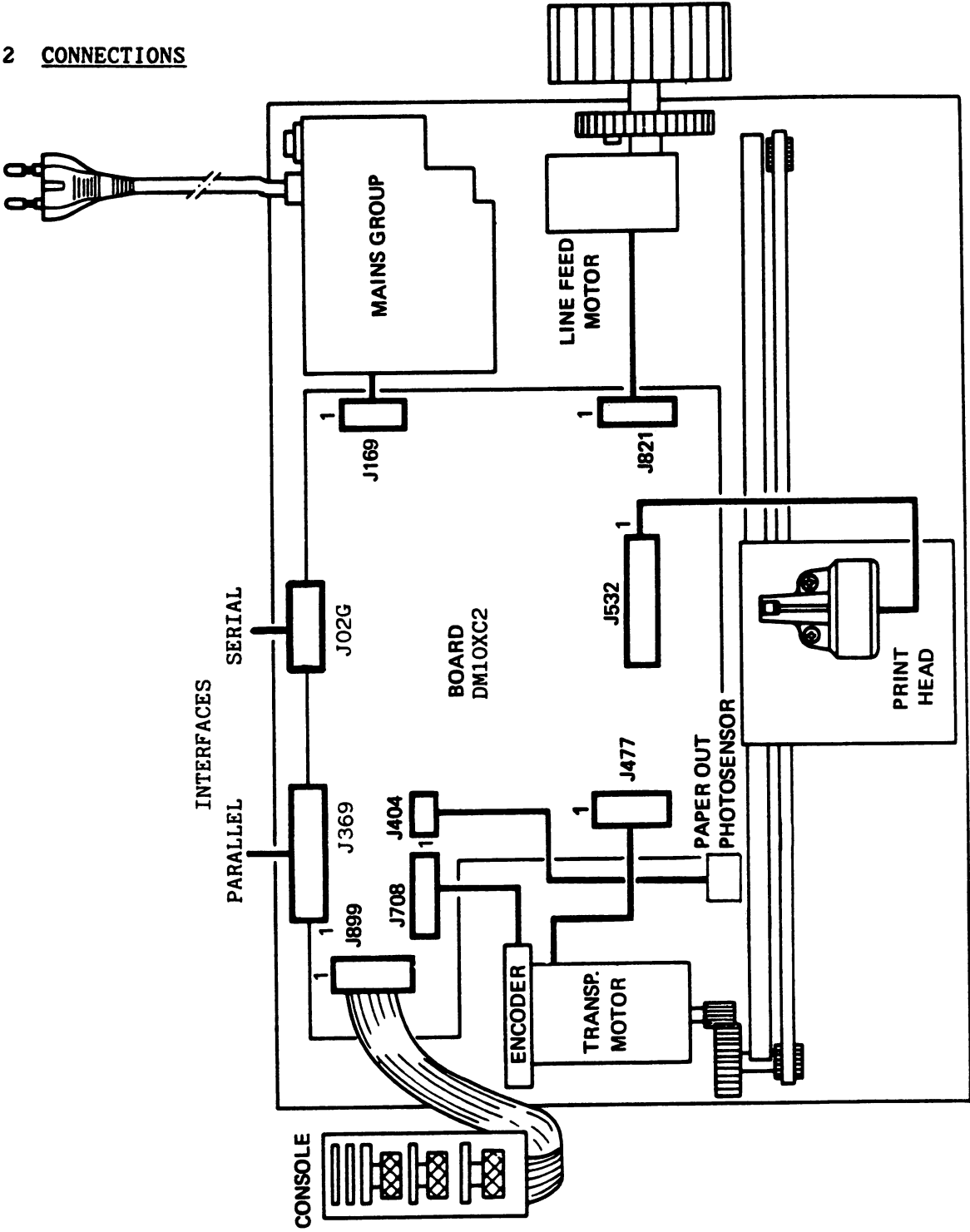
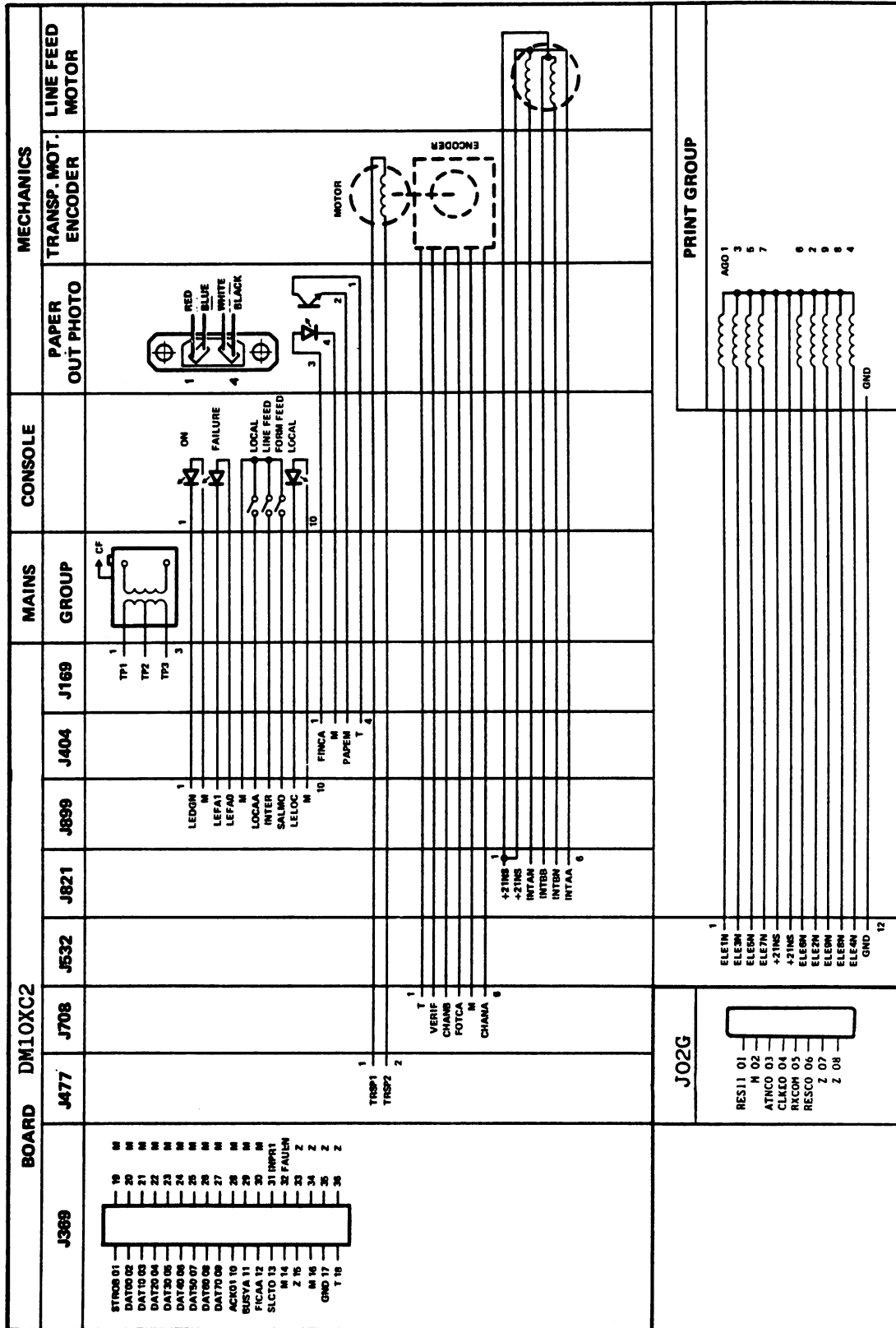


Fig. 6-3 Electronic board wiring and connectors

6.3 LIST OF SIGNALS MPS 1230 (DM10XC2 board)



## 7. CHANGING THE MAIN PARTS

This chapter describes how to replace the main parts of the printer.

Before accessing the inside of the machine, always unplug the mains cable.

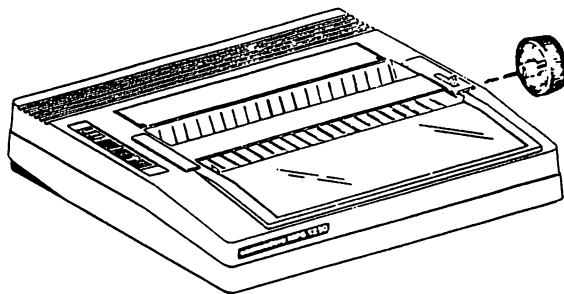
To re-assemble perform the operations indicated in the reverse order.

### 7.1 REMOVAL OF THE CASING

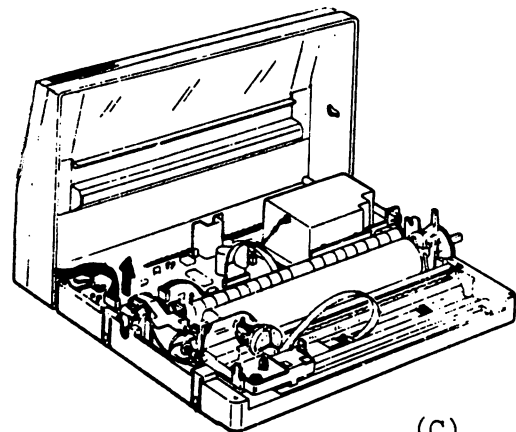
- Remove the sheet feed and the sprocket.
- Remove the knob of the platen (Fig. A).
- Release the right-hand side of the casing, pulling it slightly outwards, away from the machine (Fig. B).
- Release the left-hand side and remove the casing, tilting it as shown in figure B.

**Note:** Take care not to pull out the console cable.

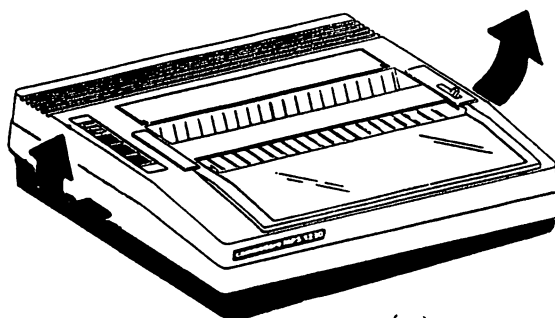
- Unplug the console cable (Fig. C), remembering how it was inserted (black contacts to the right).



(A)



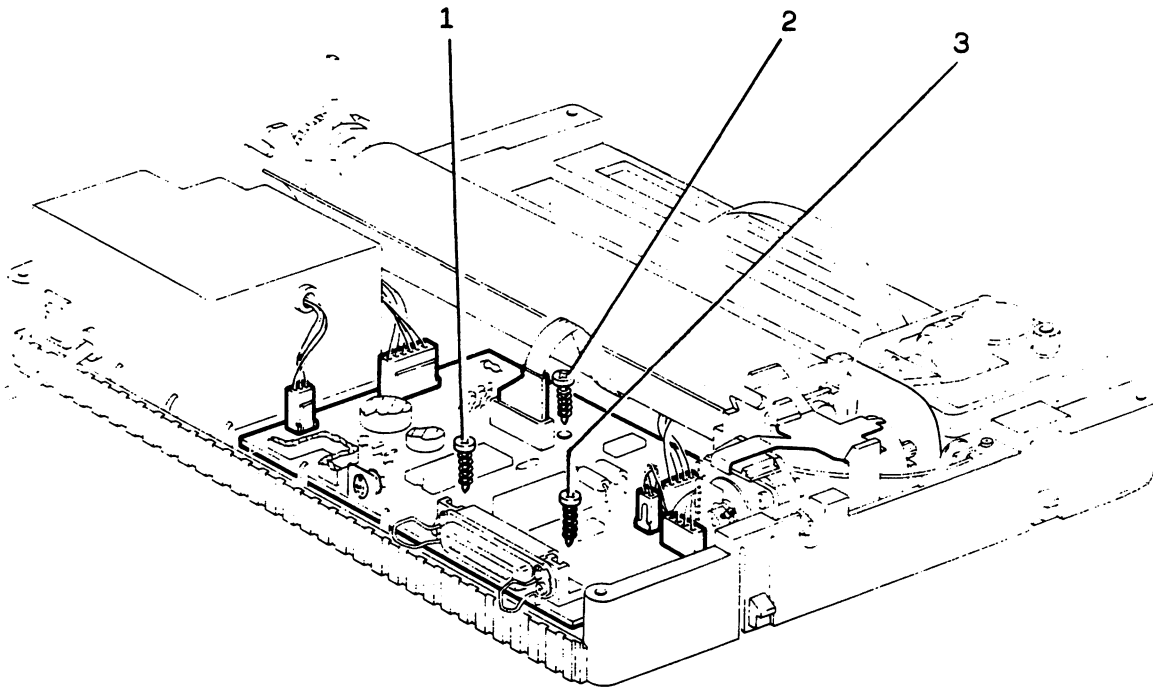
(C)



(B)

**7.2 REMOVAL OF ELECTRONIC BOARD**

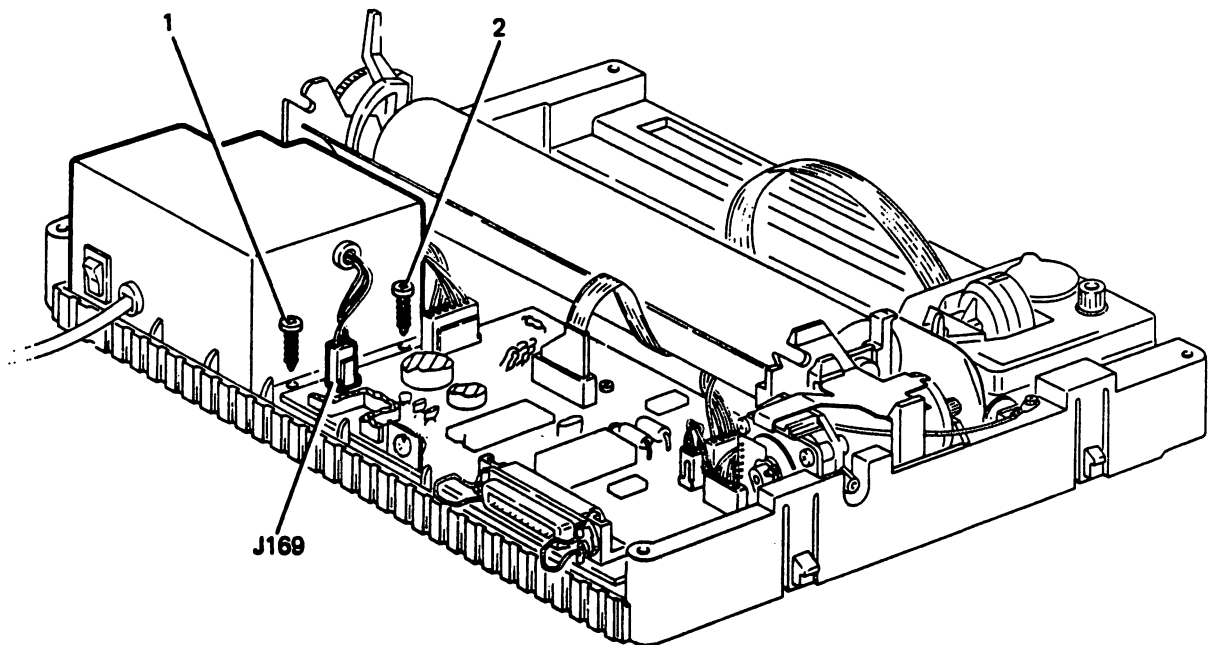
- Remove casing (see point 7.1)
- Unplug connectors JXXX from the board
- Remove screw 1-2-3



7.3 REMOVAL OF MAINS GROUP

- Remove casing (see point 7.1)
- Unplug connector J169 from the board
- Remove screw 1-2

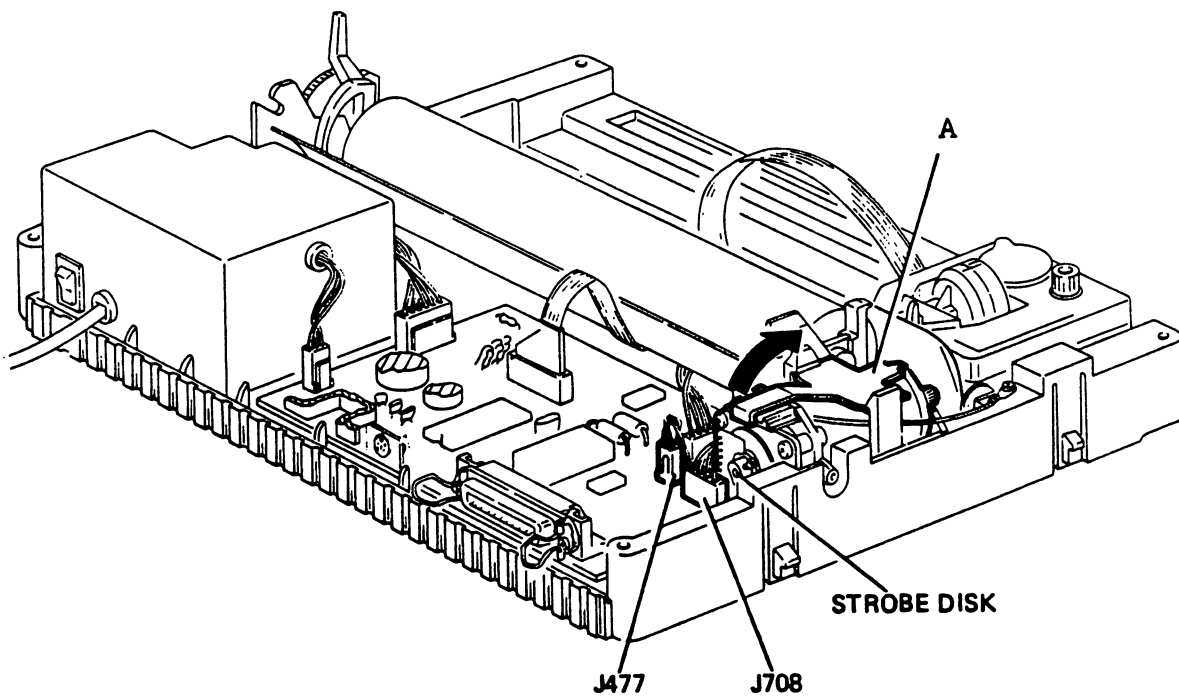
**Note:** During re-assembly, fix the ground wire to screw 2.



**7.4 REMOVAL OF CARRIAGE TRANSPORT MOTOR AND ENCODER**

- Remove casing (see point 7.1)
- Unplug connectors J708 and J477 from the board
- Release the leaf spring of the motor (A)
- Remove the motor with its encoder lifting it up on the encoder side

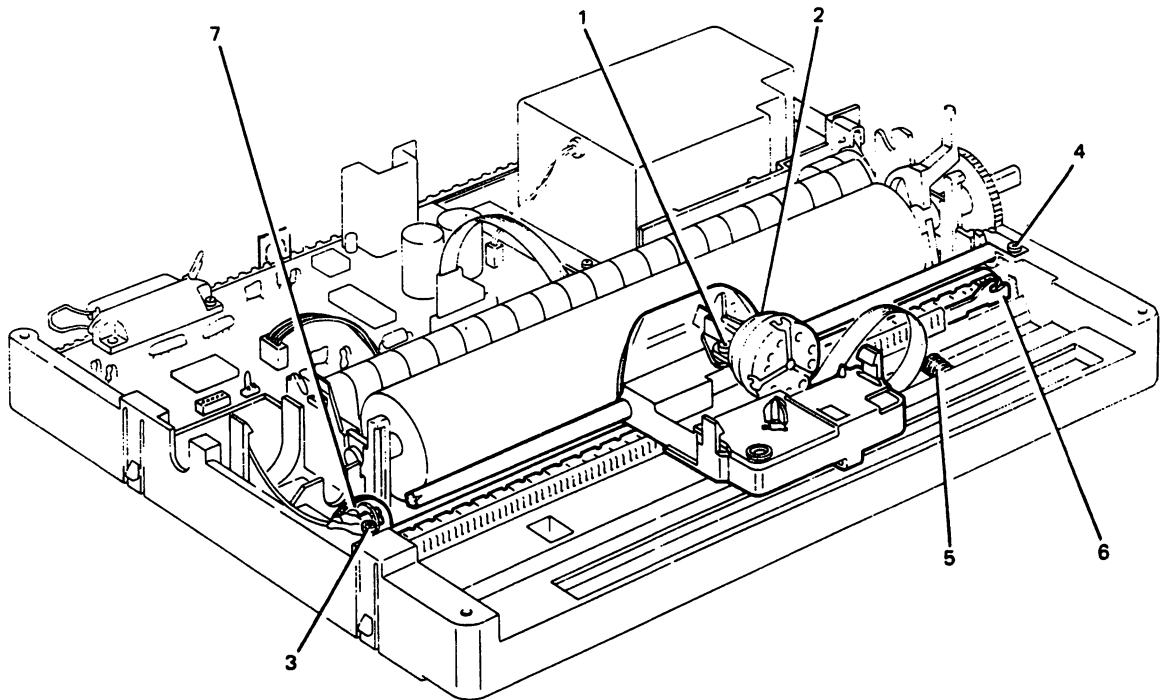
**Note:** When re-assembling the motor, check correct timing of the strobe disk of the encoder, as described on page 8-2.



### 7.5 REMOVAL OF PRINT GROUP AND TIMING BELT

- Remove casing and carriage transport motor (see point 7.1 and 7.4)
- Remove the ribbon cartridge
- Remove screw 1-2 and separate the printhead from the carriage
- Remove screw 3-4, slide the shaft first of all out of its housing and then remove out of the carriage
- Remove spring 5 of the belt stretcher 6, move this to the left and then remove it from the base plate of the printer
- Tip up the carriage and slide out the timing belt
- Remove the LH pulley 7 from its housing

During re-assembly of the motor (point 7.4), adjust the strobe disk of the encoder. In the case of gripping between the gear of the motor and that of the LH pulley, check that the pulley has been correctly inserted in its housing.

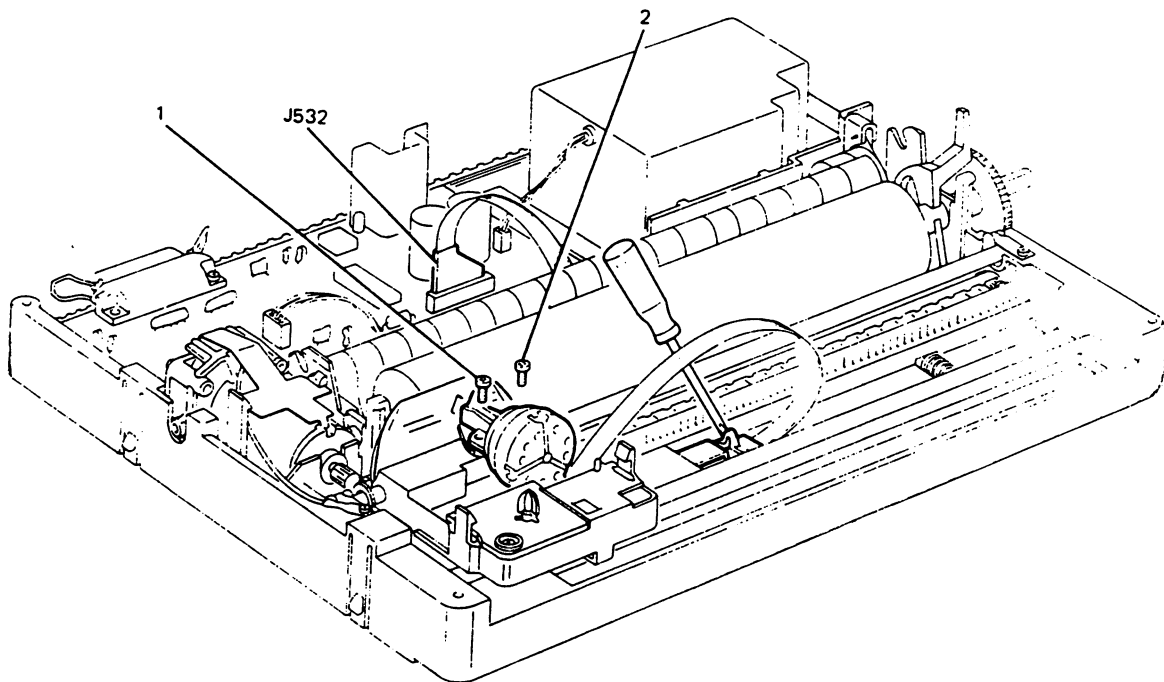




**7.6 REMOVAL OF PRINTHEAD**

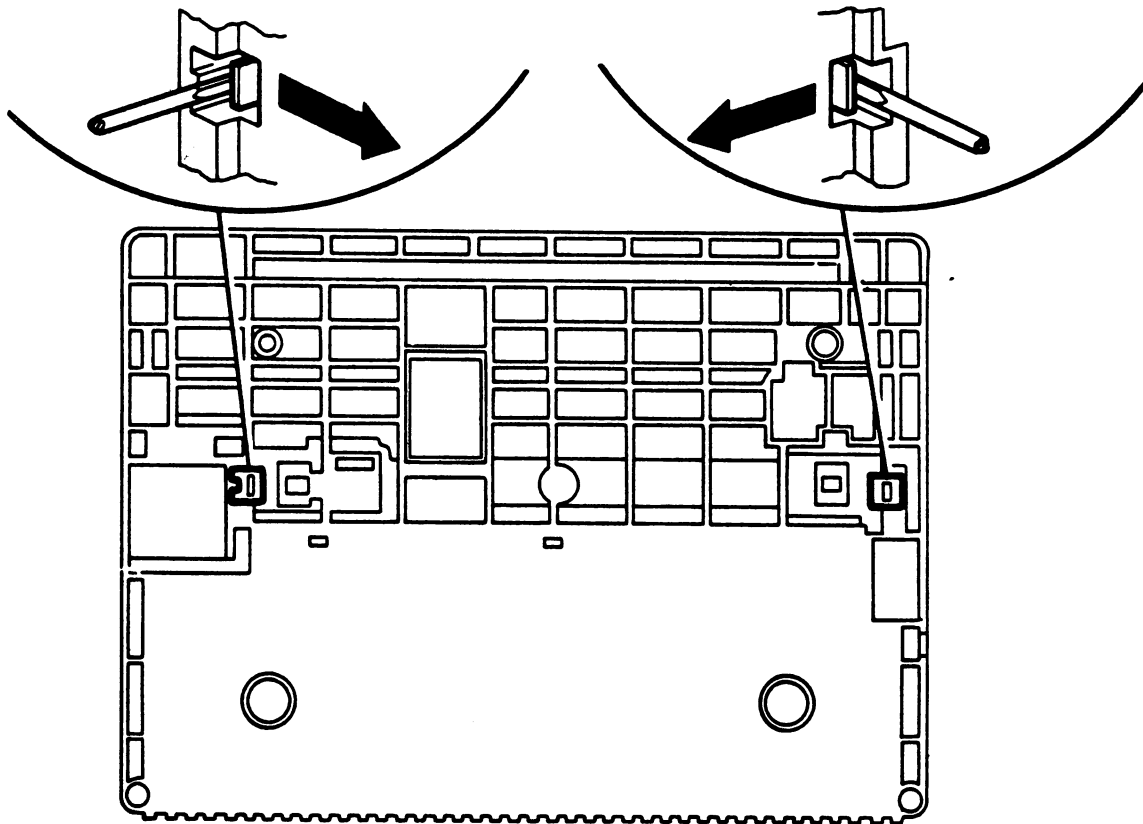
- Remove casing (see point 7.1)
- Remove the ribbon cartridge
- Remove screw 1-2
- Unplug J532
- Remove the cable clip
- Remove the lower cover

During re-assembly, make adjustment undicated in point 8.1.



**7.7 REMOVAL OF PLATEN AND PRESSURE ROLLER TRAY**

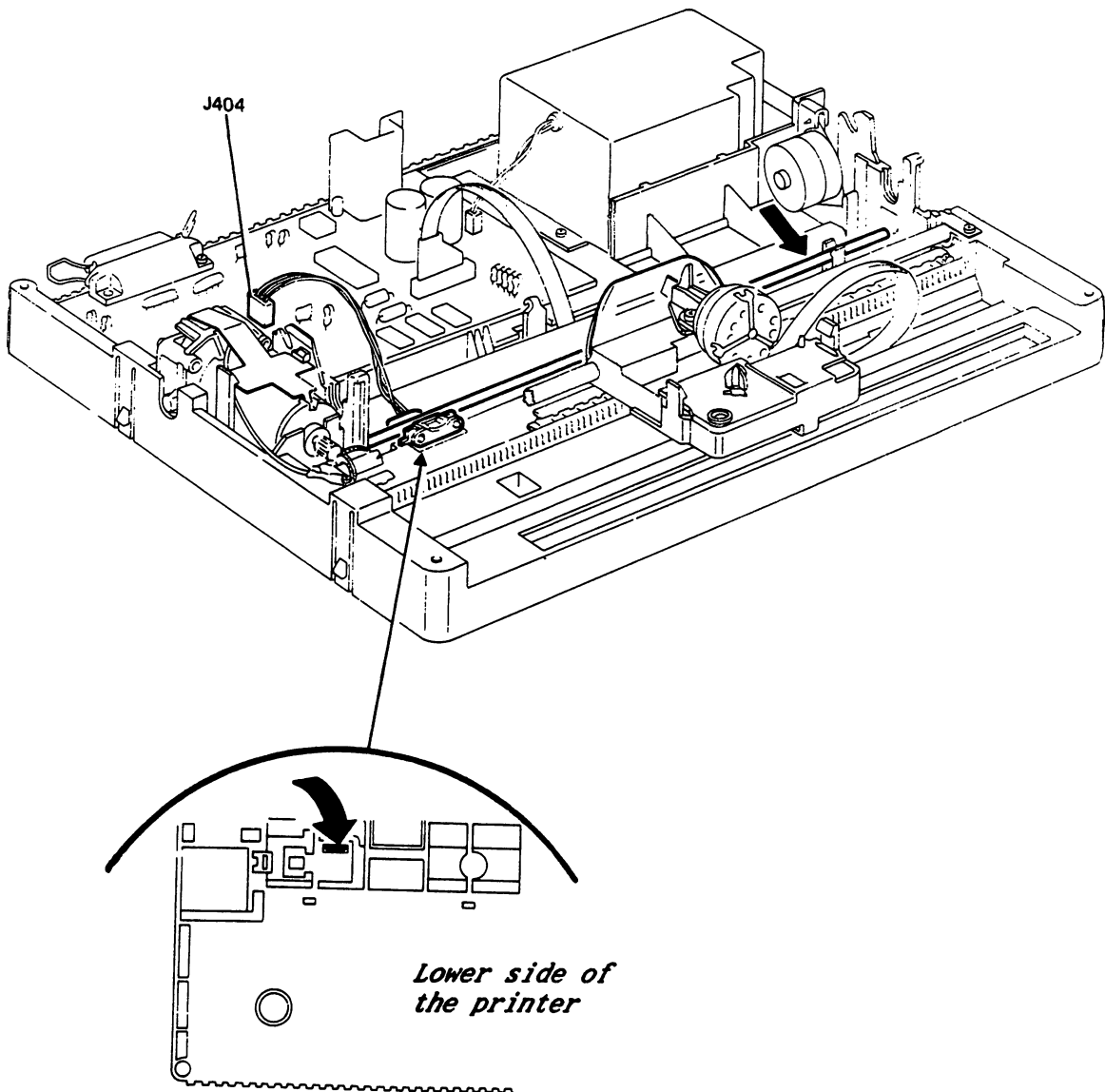
- Remove casing (see point 7.1)
- Remove the platen from its housing, lifting it at the points shown in the figure
- Remove the tray with the paper pressure rollers



Lower side of the printer

**7.8 REMOVAL OF PAPER PRESENT PHOTODIODE**

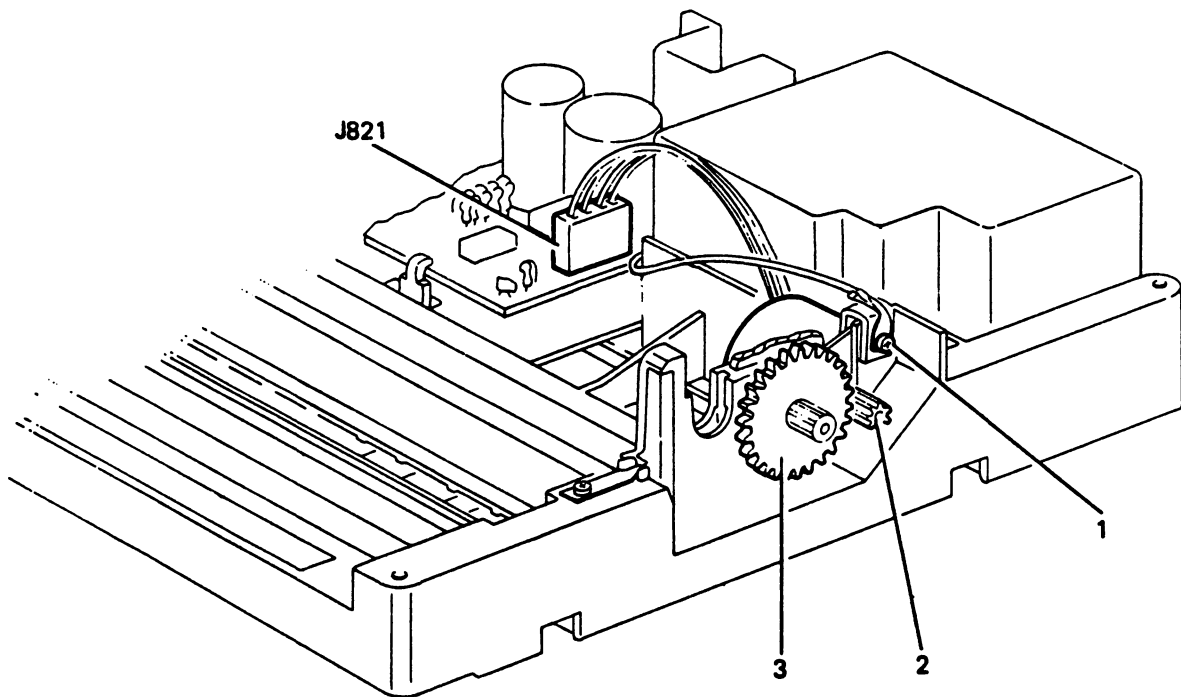
- Remove casing and platen (see point 7.1 and 7.7)
- Remove the ribbon cartridge
- Remove the shaft of the pressure roller tray lifting it up at the point indicated by the arrow
- Unplug connector J404
- Release the photodiode from its housing, with a slight pressure in the direction indicated in the insert.



7.9 REMOVAL OF PAPER FEED MOTOR

- Remove casing and platen (point 7.1 and 7.7)
- Remove screw 1
- Unplug connector J821

**Note:** During re-assembly, tighten the screw and check correct coupling of gear wheels 2-3.





## 8. ADJUSTMENTS

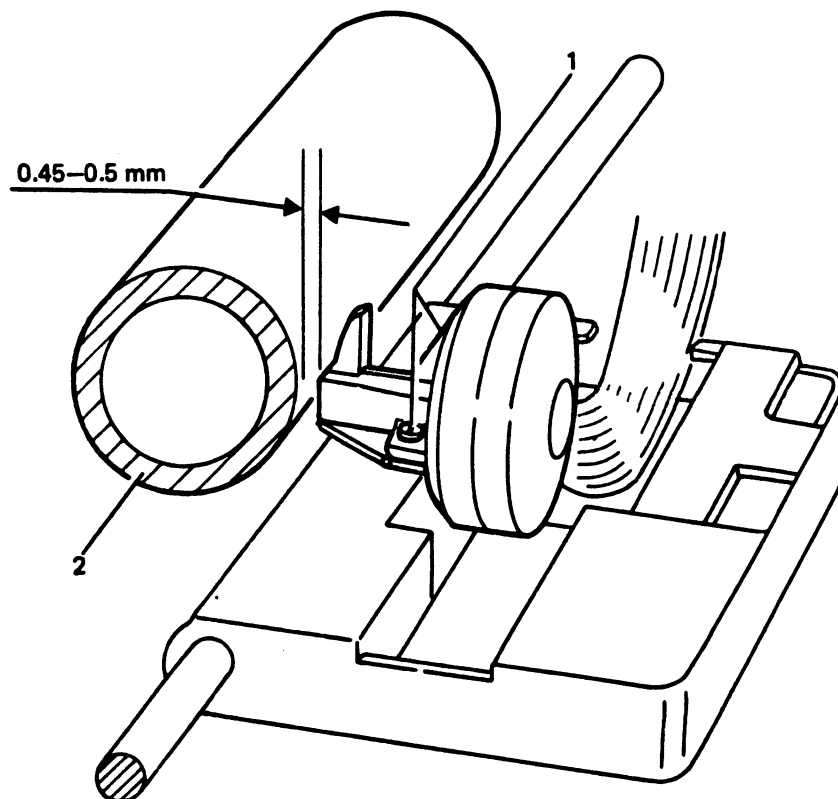
### 8.1 ADJUSTMENT OF PRINthead-PLATEN DISTANCE

This adjustment must be made each time the printhead has been removed and also when print quality deteriorates.

Fix the printhead in place using the two screws (1) so that the needles are at 0.45 - 0.5 mm from the platen (2).

**Note:** A wider gap between the print head and the platen than that indicated above will cause a deterioration in printing quality; if, however, the gap is too narrow, the following drawbacks may be encountered:

- Tearing or mark on the paper
- Excessive wear on the needles and ribbon
- Irregular movement of the carriage



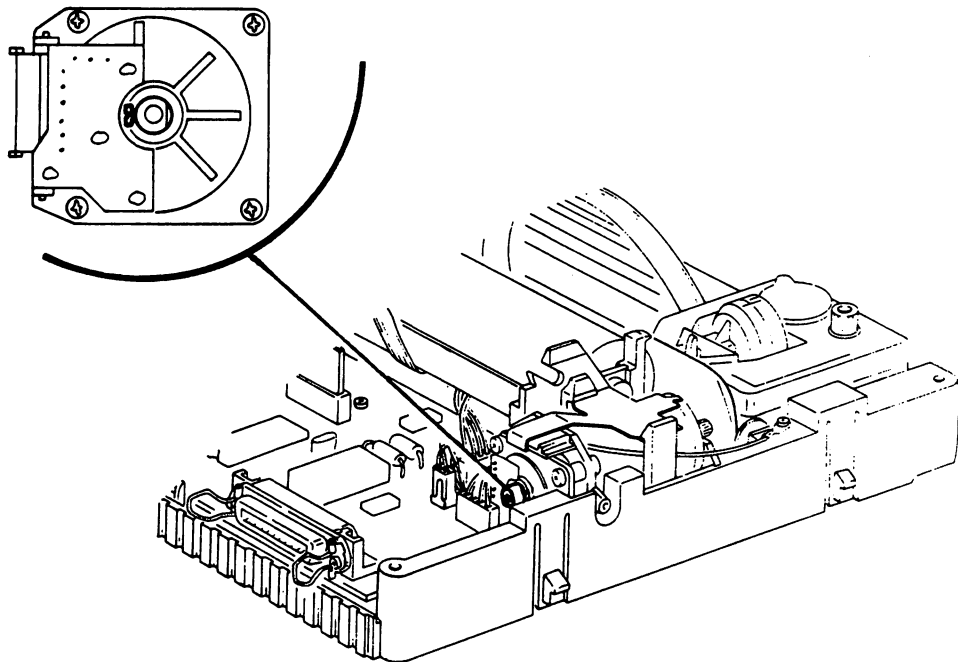
## 8.2 ADJUSTMENT OF THE STROBE DISK OF THE CARRIAGE

This operation must be performed each time the carriage motor, the encoder group and the print group has been removed. The adjustment should also be made in the case of carriage rebound at the end of its stroke.

To time the strobe disk contained in the encoder of the motor, proceed as follows:

- power OFF the printer
- bring the print carriage to the left side of the printer (console side)
- disconnect the motor pinion
- turn the disk of the encoder so that its retention screw is in a horizontal position, towards the direction of the electronic board.

**Note:** Incorrect timing of the strobe disk may cause blockage at the RH end of stroke position of the carriage.



### 8.3 ADJUSTMENT OF THE PAPER DETECTOR PHOTODIODE

When you change the board, or you change the EPROM firmware with a new release, you must perform the paper detector adjustment.

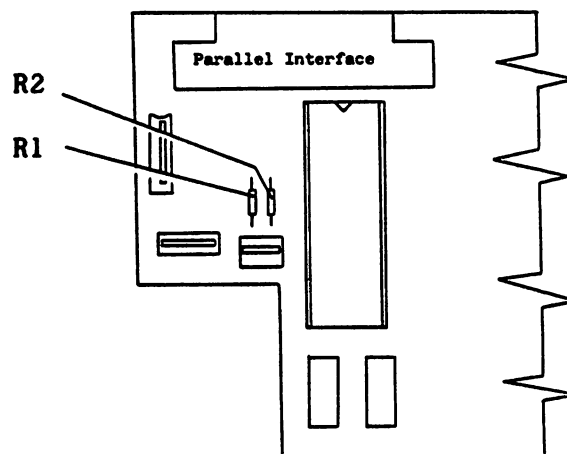
In order to perform this adjustment follow this procedure:

- A. Press LOCAL and LINE FEED keys and turn on the printer without releasing them for about 10 sec.  
This operation must be carried out without paper in the printer.  
The LOCAL led will blink now.
- B. Press the LINE FEED key for about 2 sec.  
The platen will perform a complete revolution.  
The LOCAL led will blink rapidly now.
- C. Insert manually a sheet of paper.  
Press the LINE FEED key for about 2 sec.  
The blinking stops and the printhead carriage moves to the left to perform the reset. At this point the printer has written the output value of the Photosensor in the EEPROM.

If the platen does not perform the revolution described on point B, switch OFF the printer and cut the R1 resistor on the board (see board lay-out). Therefore repeat the operations beginning from point A.

If the carriage does not move (point C), switch OFF the printer and cut the R2 resistor on the board (see board lay-out). Therefore repeat the operations beginning from point A.

This adjustment allows you to and/or vary the sensitivity of the Photosensor. The R1 works on the photoemitter diode, whereas the R2 works on the transistor (receiver). It is true that the regulation procedure provides two cases, one of light and one of dark, but one excludes the other. On following the procedure described, it is necessary to cut only one of the resistor concerned.







9. SPARE PARTS CATALOGUE

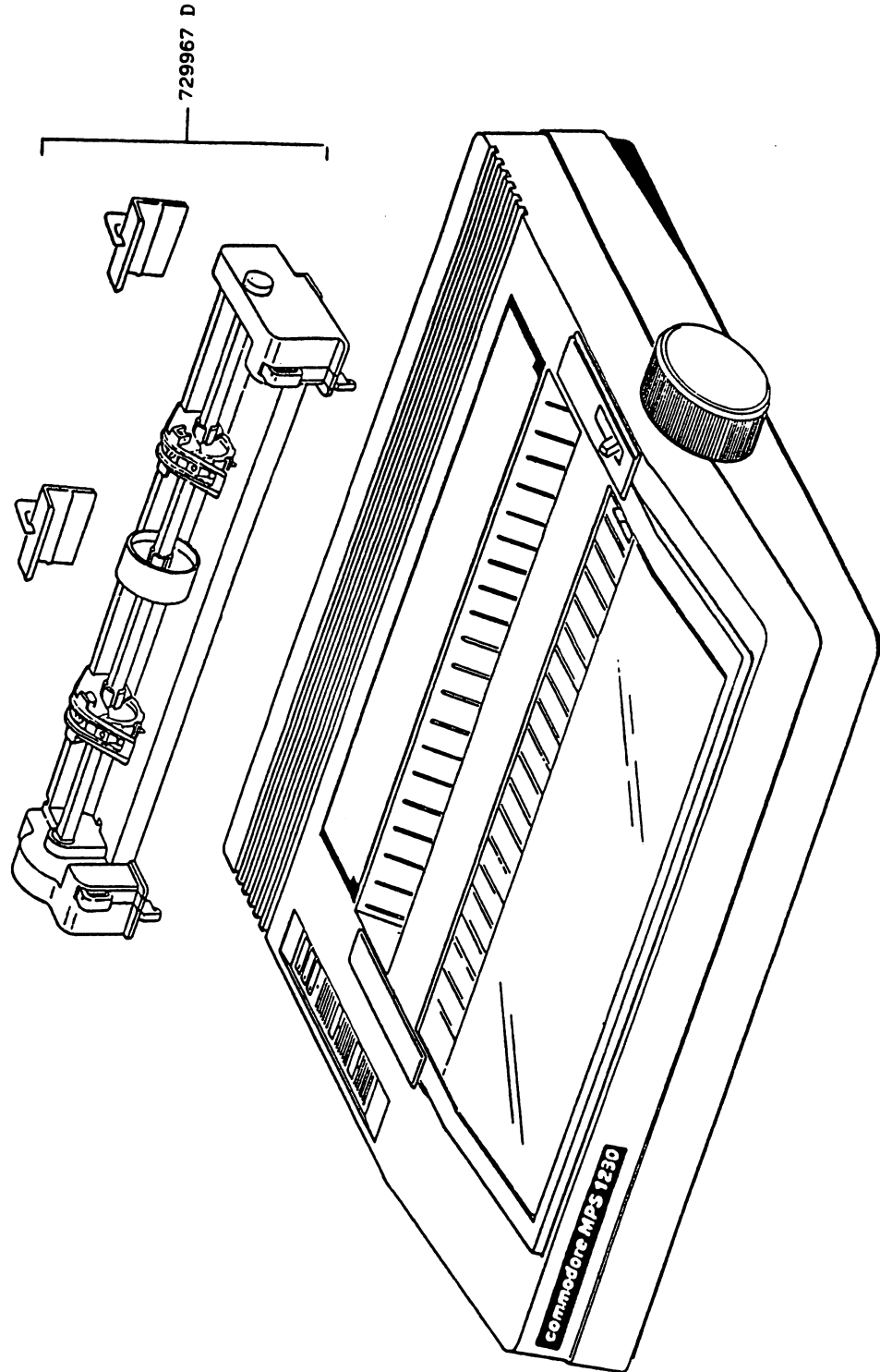
Note:

The SPARE PARTS CATALOGUE and the electronic components catalogue are the only reference documents for ordering the spare parts from "Ing. C. Olivetti & C. S.p.A., Spare Parts Dept. DATC/DRS, Via Jervis 77, 10015 Ivrea, Italy" (Facsimile n. +39 125 52 1122).

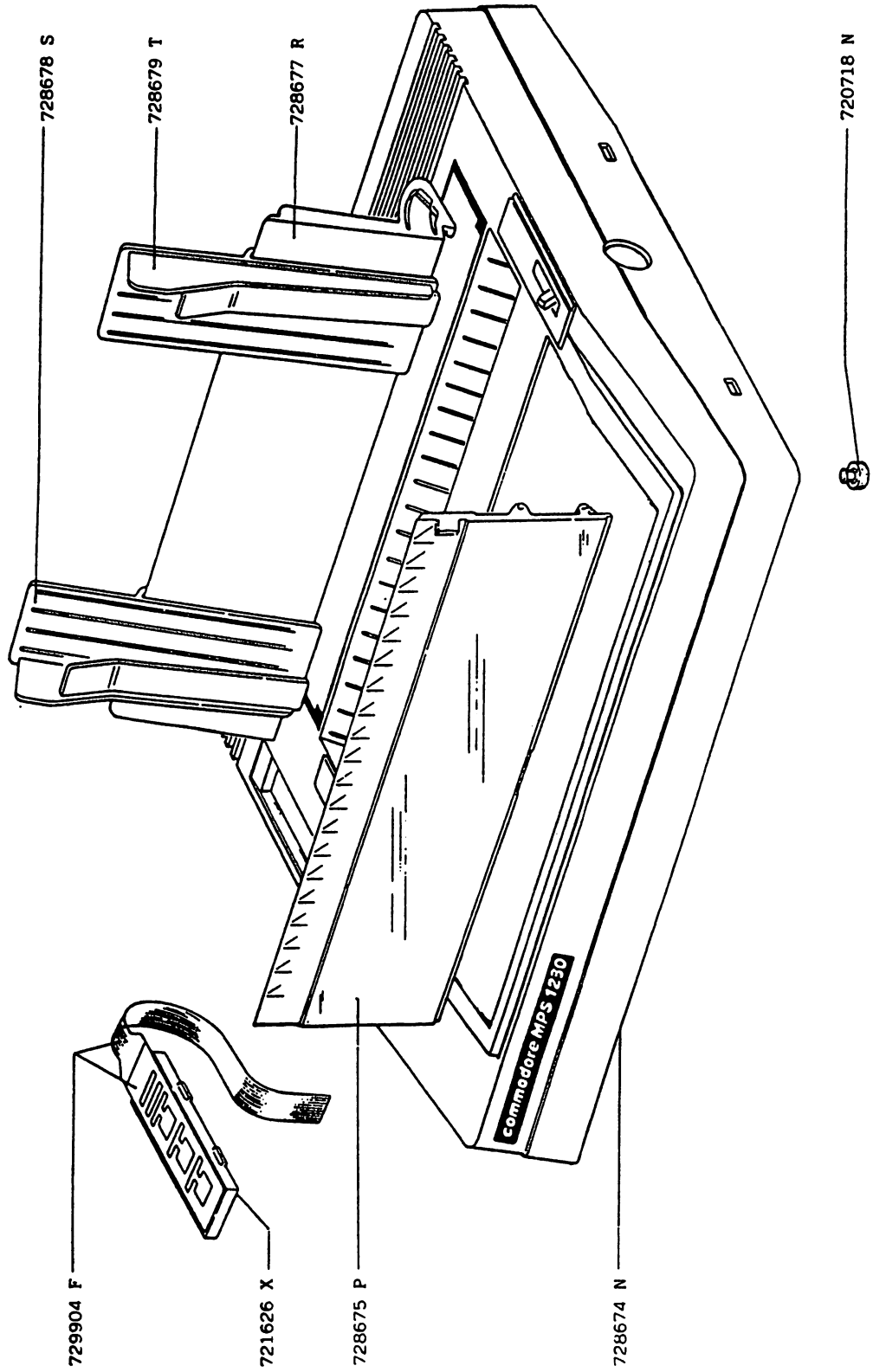
Other part numbers reported in different documentation are not delivered.

COMPLEX . . . . .	Page	9-2
UPPER CASING . . . . .	"	9-3
PAPER FEED PLATEN . . . . .	"	9-4
BASE POWER SUPPLY . . . . .	"	9-5
POWER SUPPLY GROUP-CODE LIST . . . . .	"	9-6
CARRIAGE AND PRINT HEAD TRANSPORT UNIT . . . . .	"	9-7
GENERAL CODES INDEX . . . . .	"	9-8

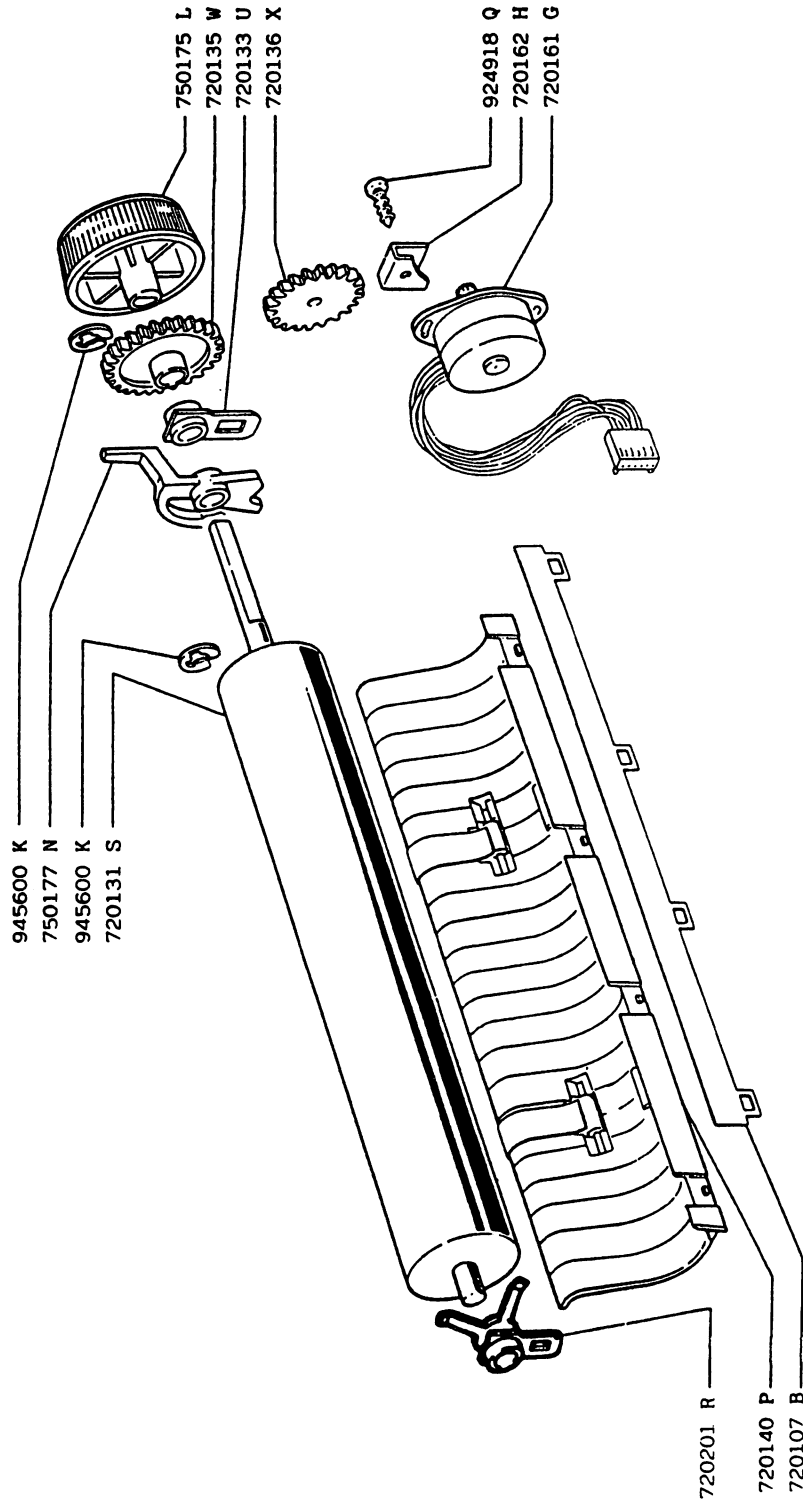
COMPLEX



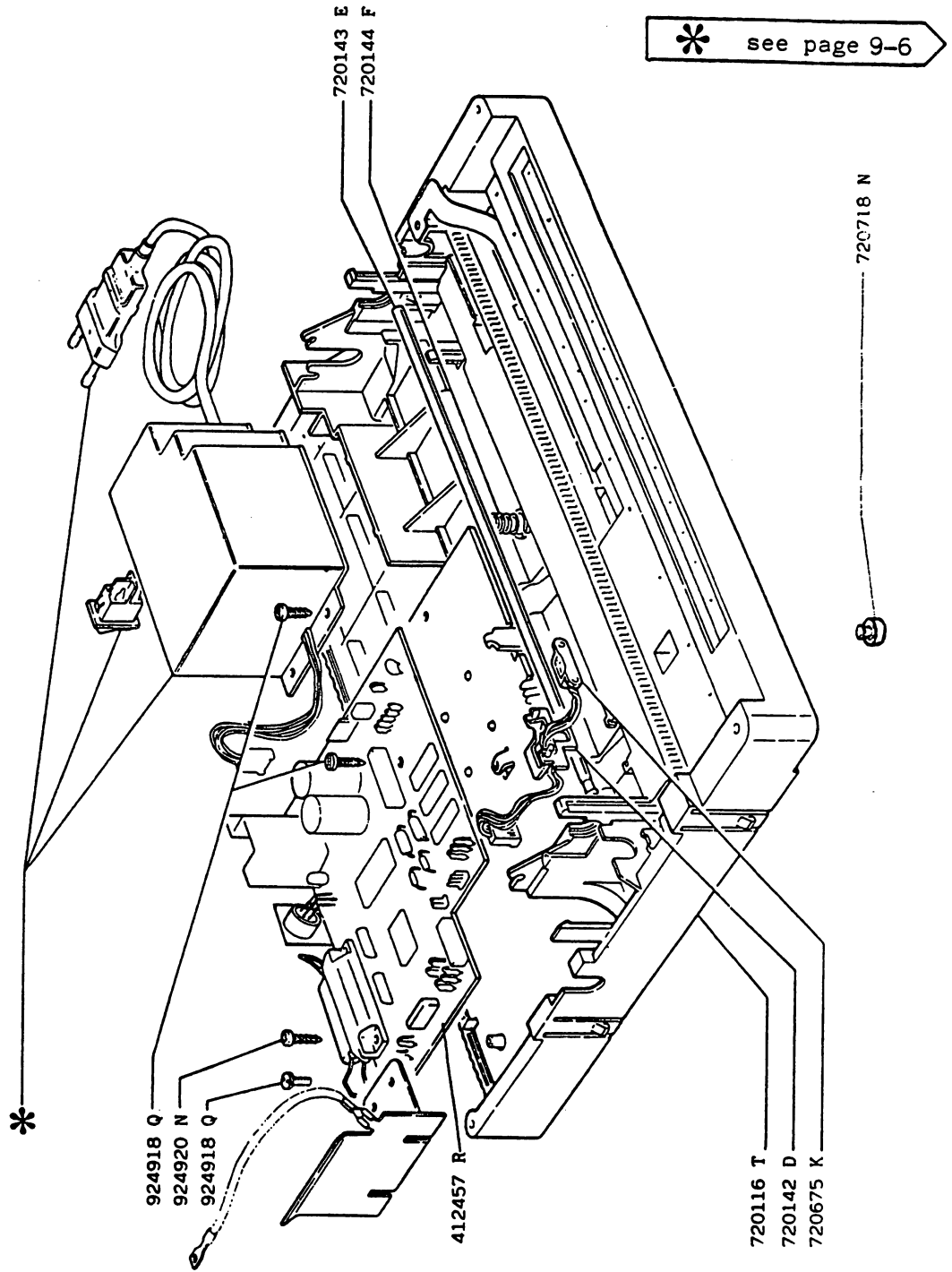
UPPER CASING




PAPER FEED PLATEN



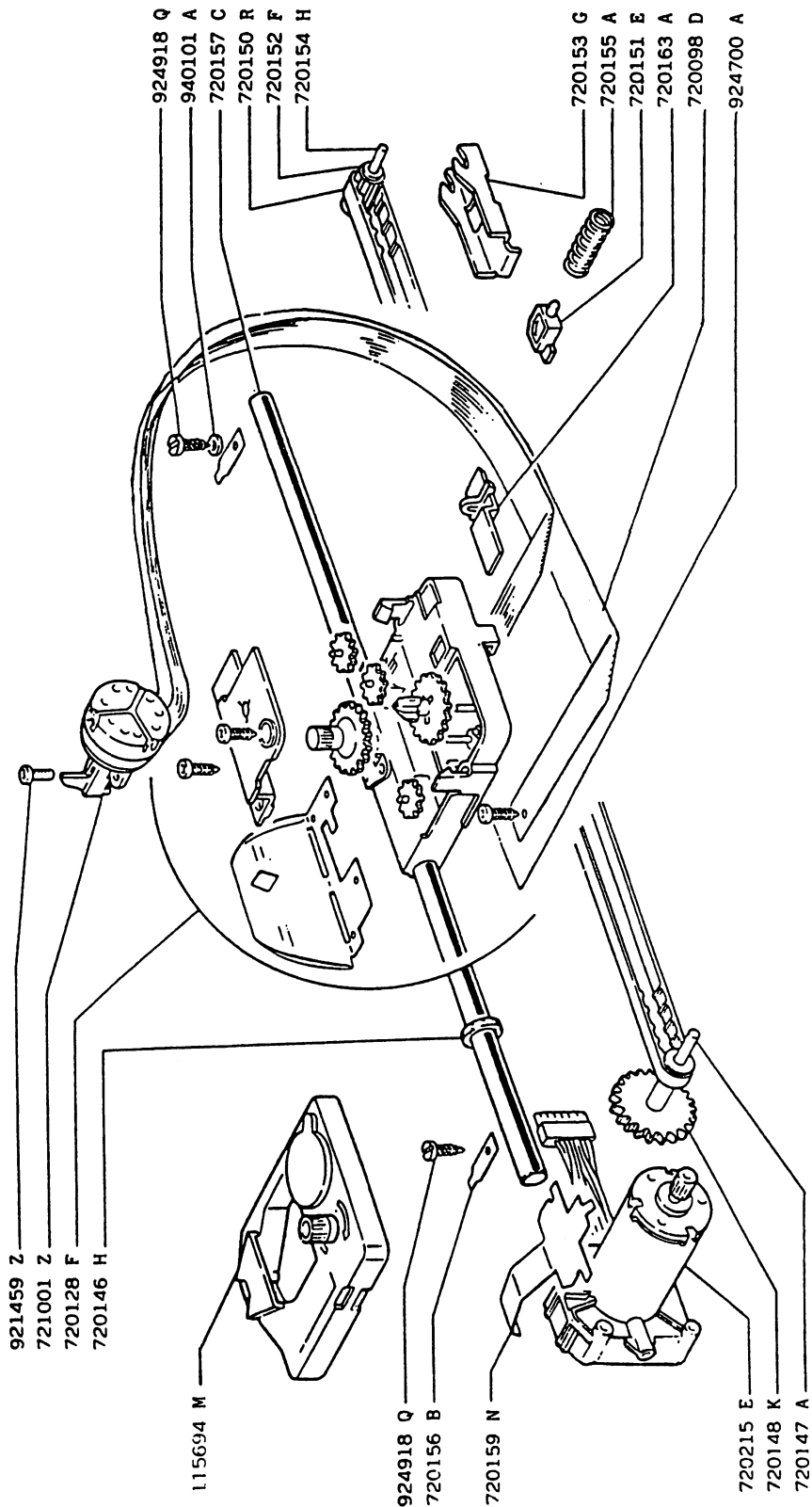
BASE POWER SUPPLY



**POWER SUPPLY GROUP-CODE LIST**

			
<b>CODE</b>	<b>POWER-SUPPLY</b>	<b>POWER-CABLE</b>	<b>PART NUMBER</b>
720169 Q	220V/50 Hz	Europe	601240-29
720170 M	115V/60 Hz	U.S.A./Canada	601240-30
720172 B	240V/50 Hz	Great Britain	601240-31
720174 D	220V/50 Hz	Switzerland	601240-32

CARRIAGE AND PRINT HEAD TRANSPORT UNIT





GENERAL CODES INDEX

PART NUMBER	PART DESCRIPTION	Q. TY	PAGE
412457 R	MAIN BOARD	1	9-5
720098 D	FLAT SCREEN	1	9-7
720107 B	PAPER PRESSURE BAND	1	9-4
720116 T	* RESIN STRUCTURE	1	9-5
720128 F	CARRIAGE GROUP	1	9-7
720131 S	PLATEN GROUP	1	9-4
720133 U	PLATEN SHAFT BUSHING	1	9-4
720135 W	GEAR	1	9-4
720136 X	GEAR	1	9-4
720140 P	PAPER GUIDE AND ROLLERS	1	9-4
720142 D	PHOTOSENSOR SUPPORT	1	9-5
720143 E	PAPER GUIDE SUPPORT SHAFT	1	9-5
720144 F	COMPRESSION SPRING	1	9-5
720146 H	FELT	1	9-7
720147 A	CARRIAGE DRIVING GEAR SHAFT	1	9-7
720148 K	CARRIAGE TRANSPORT GEAR	1	9-7
720150 R	CARRIAGE TRANSPORT TIMING BELT	1	9-7
720151 E	BELT TENSION SUPPORT CONTRAST	1	9-7
720152 F	BELT IDLER PULLEY	1	9-7
720153 G	BELT TENSION ADJUSTMENT SUPPORT	1	9-7
720154 H	IDLER PULLEY SHAFT	1	9-7
720155 A	BELT TENSION ADJUSTMENT SPRING	1	9-7
720156 B	CARRIAGE SHAFT STOP	1	9-7
720157 C	CARRIAGE SHAFT	1	9-7
720159 N	MOTOR FIXING LEAF SPRING	1	9-7
720161 G	PAPER FEED MOTOR	1	9-4
720162 H	MOTOR FIXING PLATE	1	9-4
720163 A	FLAT CABLE LOCKING	1	9-7
720169 Q	EUROPE POWER SUPPLY GROUP	1	9-5
720170 M	USA POWER SUPPLY GROUP	1	9-5
720172 B	U.K. POWER SUPPLY GROUP	1	9-5
720174 D	SWITZERLAND POWER SUPPLY GROUP	1	9-5
720201 R	BUSH PLATEN	1	9-4
720215 E	CARRIAGE TRANSPORT MOTOR GROUP	1	9-7
720675 K	PAPER PHOTOSENSOR GROUP	1	9-5
720718 N	RUBBER	8	9-3, 5
721001 Z	PRINT HEAD	1	9-7
721626 X	CONSOLE SUPPORT	1	9-3
728674 N	* CASING	1	9-3
728675 P	TRANSPARENT COVER	1	9-3

PART NUMBER	PART DESCRIPTION	Q.TY	PAGE
728677 R	PAPER FEED	1	9-3
728678 S	LEFT PAPER GUIDE	1	9-3
728679 T	RIGHT PAPER GUIDE	1	9-3
729904 F	CONSOLE	1	9-3
729941 B	PACKAGING BOX	1	-
729967 D	* SPROCKET	1	9-2
750177 N	ROLLERS OPEN LEVER	1	9-4
750175 L	PAPER FEED KNOB	1	9-4
921459 Z	PRINT HEAD FIXING SCREW	2	9-7
924700 A	SELF TAPPING SCREW	1	9-7
924918 Q	SELF TAPPING SCREW	8	9-4, 5, 6
924920 N	SELF TAPPING SCREW	2	9-5
940101 A	WASHER	1	9-7
945600 K	ELASTIC RING	2	9-4

## SUPPLY:

115694 M	RIBBON CARTRIDGE	1	9-7
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\* Parts which require almost four months to supply from the time ordered. Demand for these parts is small and they should therefore be ordered only when absolutely essential and in strictly minimum quantities.

**COMMODORE STOCKED PARTS**

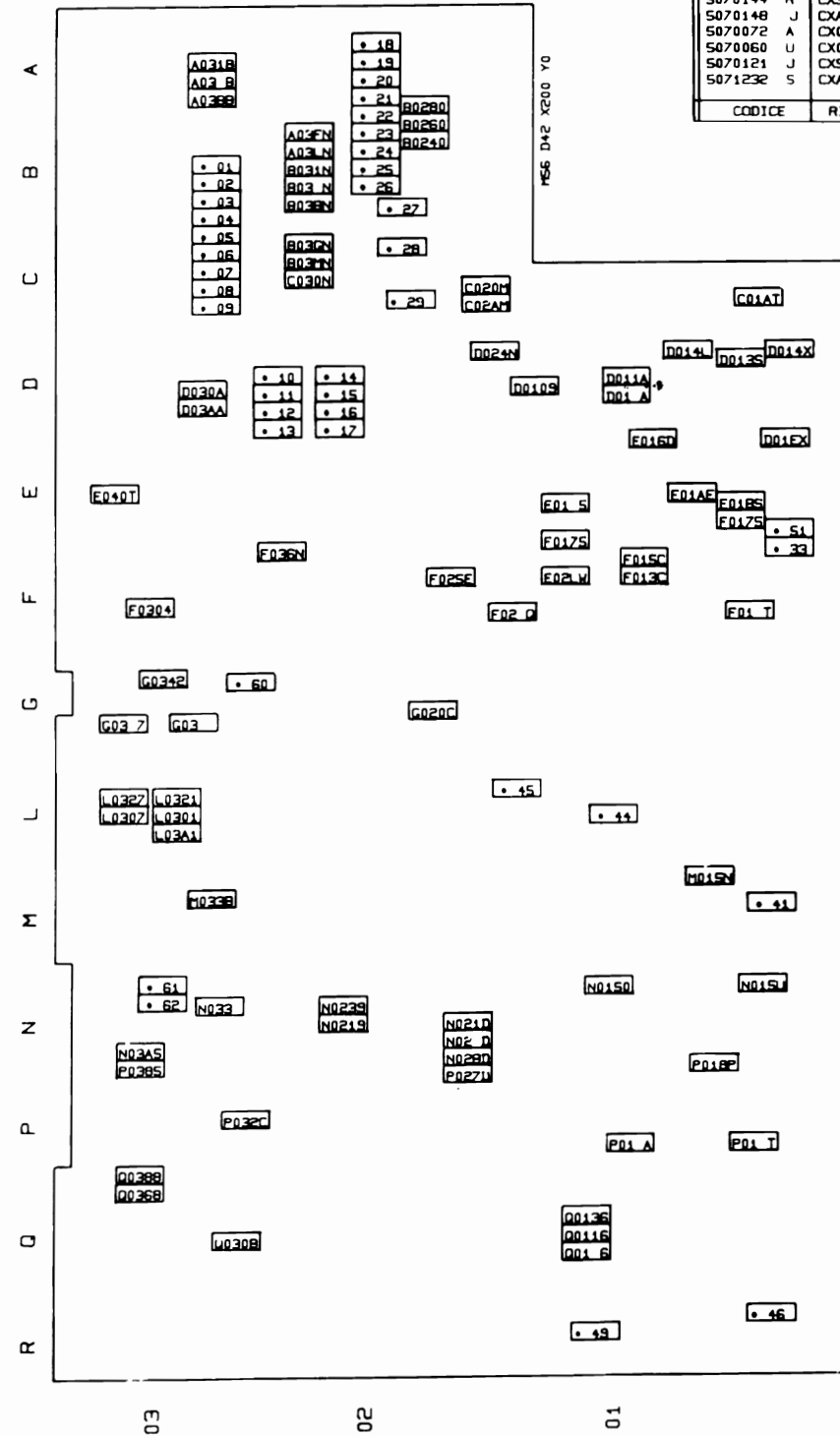
<b>CBM PART NUMBER</b>		<b>DESCRIPTION</b>	<b>OEM PART NUMBER</b>
314998-01		Commodore Service Manual	
363153-01		User's Manual (English)	
363154-01		User's Manual (French)	
363155-01		User's Manual (Italian)	
363156-01		User's Manual (German)	
363157-01		User's Manual (Spanish)	
363158-01		User's Manual (Dutch)	
363159-01		User's Manual (Danish)	
601240-01	C	Main Board DM10XC2	412457 R
601240-05	C	Carriage Group	720128 F
601240-07	C	Platen Shaft Bushing	720133 U
601240-08	C	Gear	720135 W
601240-09	C	Gear	720136 X
601240-16	C	Carriage Transport Gear	720148 K
601240-22	C	Belt Tension Adjust Spring	720155 A
601240-26	C	Paper Feed Motor	720161 G
601240-29	C	Europe Power Supply Group	720169 Q
601240-30	C	USA Power Supply Group	720170 M
601240-31	C	U. K. Power Supply Group	720172 B
601240-32	C	Switzerland Power Supply Group	720174 D
601240-33	C	Bush Platen	720201 R
601240-34	C	Carriage Transport Motor Group	720215 E
601240-35	C	Paper Photosensor Group	720675 K
601240-37	C	Print Head	721001 Z
601240-38	C	Console Support	721626 X
601240-40	C	Transparent Cover	728675 P
601240-45	C	Sprocket (Paper Feed Mech)	729967 D
601240-46	C	Rollers Open Lever	750177 N
601240-47	C	Paper Feed Knob	750175 L
601240-52	C	Console	729904 F
601240-55	C	Ribbon Cartridge	115694 M
601240-64	C	IC MB674213V Gate Array D64S	4858636 T
601240-95	C	IC Eprom FW Rel 1.1D	750744 W

PCB COMPONENT LIST

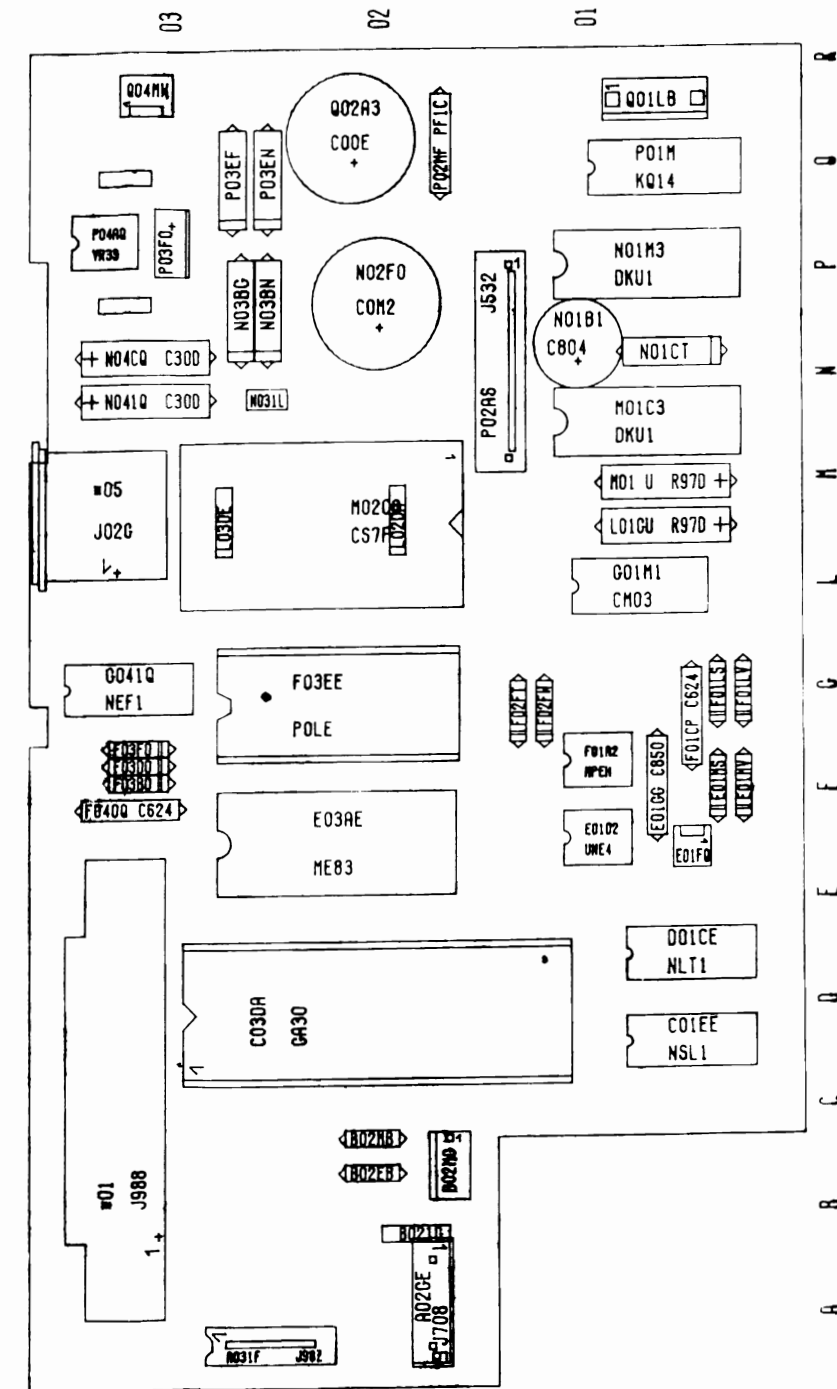
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601240-01	C	Main Board DM10XC2	412457 R	
601240-56		Diode, Rect, IN4002 100V 0.5A	4800230 M	D242
601240-57		Diode, Sig Ger AAZ18 20V	4802280 F	D302
601240-58		Diode Zener 1N5349B 12V 5W	4825151 E	D370
601240-59		IC NE555 Do8 Timer No-St	4853655 T	UNE4
601240-60		IC ULN2801A Darlington Array D18	4853812 X	KQ14
601240-61		IC L293B Mot. Drive 4CH D16	4854042 X	CM03
601240-62		Regulator, Volt 7805 TO220 5V 1A	4855804 L	VREN
601240-63		Regulator, Volt TL 7705	4856005 C	VR33
601240-64	C	IC MB674213V Gate Array D64S	4858636 T	GA30
601241-65		IC MPD7810HG Q64 M.Sin-Ch. 8B. 15Mhz	4863195 W	CS7F
601240-67		IC UCN5801A D22 Latched Driv. Bimos	484013 Z	DKU1
601240-68		IC 74LS05 Inverter D14	485228 F	NSL1
601240-69		IC 7407 Buffer D14	485258 A	NEF1
601240-70		IC 74LS14 Inverter S-Trig D14	4866315 P	NLT1
601240-71		IC RAM 6264LP-15 8KX8 CMOS	4870888R	ME83
601240-72		OSC 11.0600 Mhz Cer.	4889031 S	UCRF
601240-73		IC NMC9306 256B E2PROM	4897220 T	MPEH
601240-74		Resistor 680 Ohm 1/4W	4923870 P	R901
601240-75		Resistor 33 Ohm 3W	4962716 C	R97D
601240-76		Cap 22000 PF 160V FI.AS	5001676 L	C850
601240-77		Cap 10.00 UF 25V T-10 + 50	5037454 E	C30D
601240-78		Cap 3300UF 16V AL.VE	5053393 L	COOE
601240-79		Cap 3300 UF 35V EL. RA	5054756 A	COM2
601240-80		Cap 100.00 UF 50V AL.NR	5056337 C	C804
601240-81		Cap 1.00 UF 50V CE.AS	5070756 E	C624
601240-82		Fuse 3Amp 125V Fast Blow P = .600	5373783 J	PF1C
601240-83		Jumper Dyn.P400	5701217 F	P014
601240-84		Socket Dil 28P	5775451 S	POLE
601240-85		Conn Molex, 6P	5782130 D	J708
601240-86		Conn CBM Serial 6P	5783279 A	J02G
601240-87		Conn Cntl Panel	5783768 P	J982
601240-88		Conn Molex, 4P	5785206 K	J404
601240-89		Conn Molex, 6P P100 SN	5785208 C	J821
601240-90		Conn 12P Card Edge	5785349 S	J532
601240-91		Conn Molex, 3P	5785723 N	J169
601240-92		Conn Molex, 2P	5785738 D	J477
601240-93		Conn 39P Parallel Port	5788095 N	J988
601240-94		IC ROM CBM Rel 2.1	-Not Released	
601240-95	C	IC Eprom FW Rel 1.1D	750744 W	FO3EE

C — Indicates CBM Stocked Part

4900249	K	RX73	3	10.0	KOHM	TS	'B'	TYPE	WRIT. ONLY
4900215	P	RX66	1	5.10	KOHM	TS	'B'	TYPE	WRIT. ONLY
4900209	T	RX65	8	4.70	KOHM	TS	'B'	TYPE	WRIT. ONLY
4900196	H	RX61	5	3.30	KOHM	TS	'B'	TYPE	WRIT. ONLY
4900189	V	RX59	19	2.70	KOHM	TS	'B'	TYPE	WRIT. ONLY
4900166	W	RX51	20	1.20	KOHM	TS	'B'	TYPE	WRIT. ONLY
4900149	L	RMA2	1	130	KOHM	T2	'B'	TYPE	WRIT. ONLY
4900149	R	RX45	2	580.	OHM	TS	'B'	TYPE	WRIT. ONLY
4900132	S	RX39	1	390.	OHM	TS	'B'	TYPE	WRIT. ONLY
4900155	R	RX14	2	820.	OHM	TS	'B'	TYPE	WRIT. ONLY
4900010	S	RXAB	2	3.00	OHM	TS	'B'	TYPE	WRIT. ONLY
4900144	L	RW23	1	560.	OHM	T2	'B'	TYPE	WRIT. ONLY
5070144	R	CX36	33	0.10	MF	25V	'B'	T.	WR. ONLY
5070148	J	CXAE	3	0.1HF	50V	T-20+80	'B'	T.	WR. ONLY
5070072	A	CX08	7	1000	PF	T-20+80	'B'	T.	WR. ONLY
5070060	U	CX06	2	470	PF	50V T10	'B'	T.	WR. ONLY
5070121	J	CXSA	1	22000	PF	25V T10	'B'	T.	WR. ONLY
5071232	S	CXAD	2	56	PF	25V	'B'	T.	WR. ONLY
CODICE RIF. Q. DESCRIZIONE									



- G020C-CX36
- G03 -CX36
- G03 7-CX36
- G0342-RX51
- L03A1-RX59
- L0301-CX06
- L0307-RX59
- L0327-RX59
- M015N-CX08
- M033B-CX36
- M015U-CX36
- M0150-CX36
- M02 D-RX59
- M0230-RX59
- M0210-RX59
- M0219-CXAD
- M0239-CXAD
- M03A5-RX59
- M033 -RX61
- P01 A-CX36
- P01 T-CX36
- P018P-RX61
- P027D-RX59
- P032C-CX36
- P0365-CX36
- Q01 F-RX59
- Q0116-RX59
- Q0136-RX59
- Q0308-CX36
- Q0358-RX66
- Q0388-CX36
- \*01 -RX51
- \*02 -RX51
- \*03 -RX51
- \*04 -RX51
- \*05 -RX51
- \*06 -RX51
- \*07 -RX51
- \*08 -RX51
- \*09 -RX51
- \*10 -RX65
- \*11 -RX65
- \*12 -RX65
- \*13 -RX65
- \*14 -RX65
- \*15 -RX65
- \*16 -RX65
- \*17 -RX65
- \*18 -CX36
- \*19 -RX59
- \*20 -RX59
- \*21 -RX59
- \*22 -RX59
- \*23 -CX36
- \*24 -RX73
- \*25 -RX73
- \*26 -CX36
- \*27 -RX45
- \*28 -RX45
- \*29 -CX36
- \*30 -CX08
- \*31 -CXAE
- \*32 -CX36
- \*33 -CX36
- \*34 -CXAE
- \*35 -CXAE
- \*36 -CXAE
- \*37 -CX08
- \*38 -CX36
- \*39 -RX59
- \*40 -RX61
- A03 B-RX59
- A036B-CX36
- A03FN-RX51
- A03LN-RX51
- A031B-RX59
- B0240-RW23
- B0250-RX39
- B0290-CX36
- B03 N-RX73
- B038N-CX36
- B038N-RX51
- B03FN-RX51
- B03LN-RX51
- C01AT-RX1+
- C02AM-RX1+
- C020H-CXA
- C030N-CX08
- D01 A-RX51
- D01EX-CX36
- D0109-CX36
- D011A-RX51
- D0135-RX51
- D014L-CX36
- D014X-CX36
- D024N-CX08
- D03A -CX36
- D030A-RX51
- E01 S-RX61
- E01AE-CX06
- E0185-RXAB
- E016D-CX36
- E02LW-CX36
- E040T-CX36
- F01 T-CX08
- F013C-RMA2
- F015C-RX61
- F0175-RXAB
- F0175-CX08
- F02 Q-CX36
- F025E-CX36
- F0304-RX51
- F036N-CX36

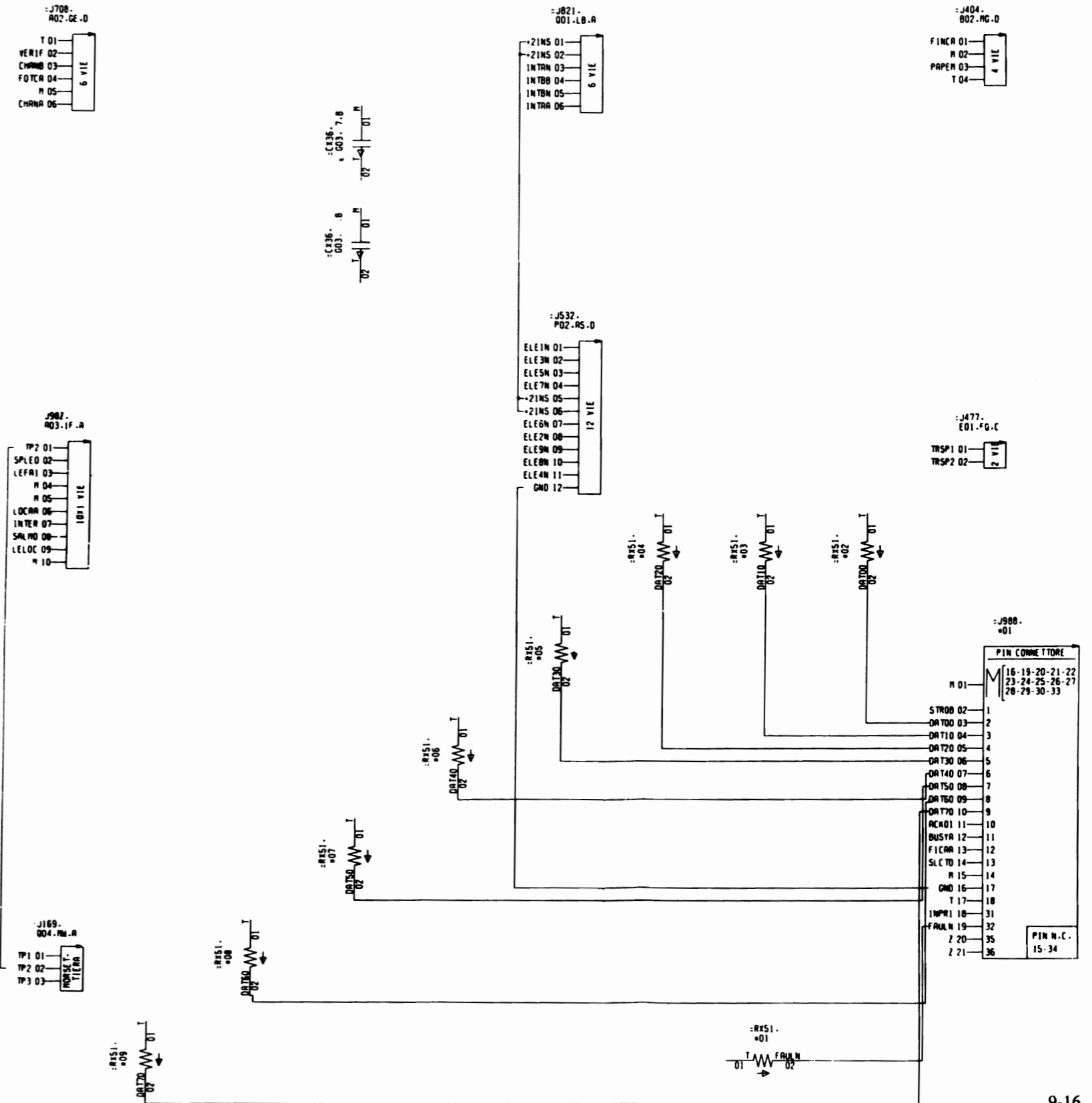


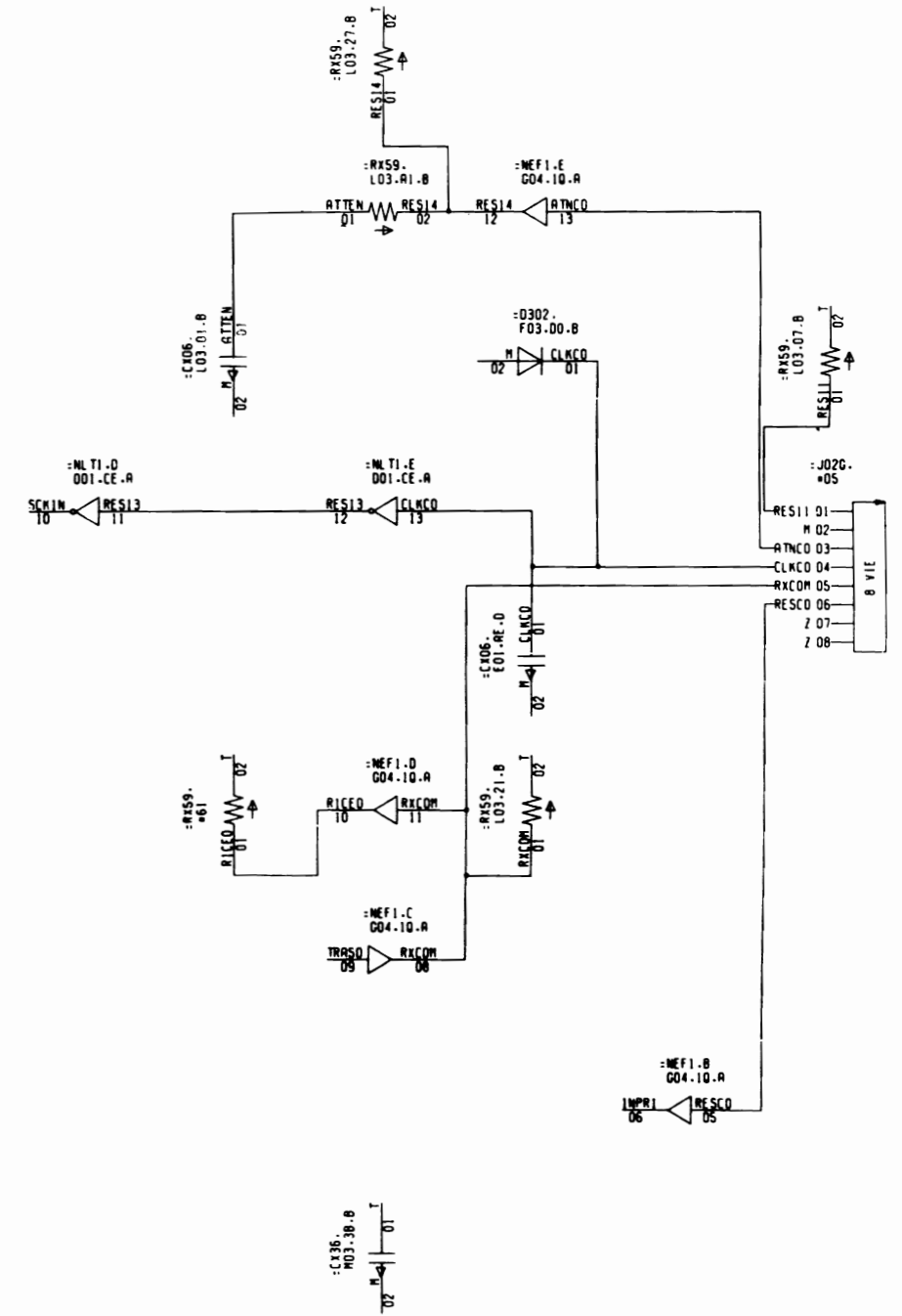
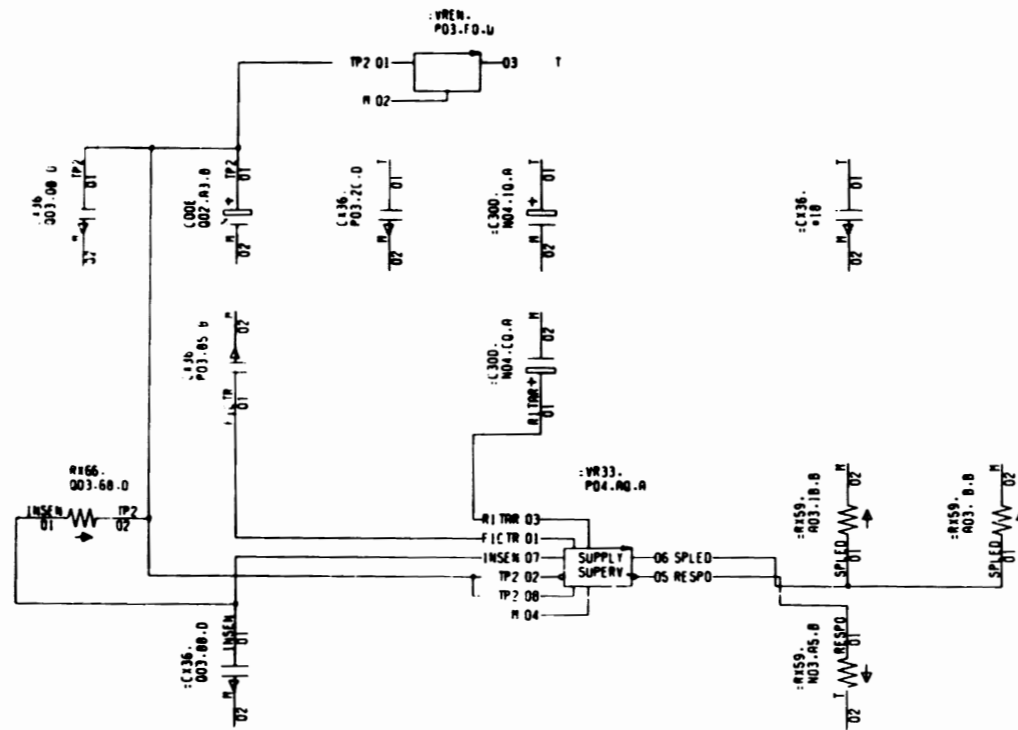
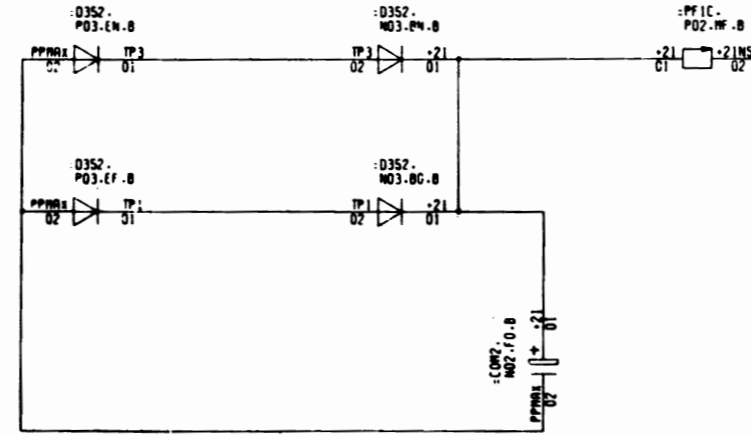














APPENDIXESA. TECHNICAL CHARACTERISTICS**CHARACTER STRUCTURE**

- \* Print technique: impact dot matrix (9 needles)
- \* Character matrix size: 9Vx9(5+4)H in Draft mode  
18Vx9H in Near Letter Quality
- \* Character dimensions:
 

hight	1.49 mm
width	1.99 mm at 10 cpi
	1.71 mm at 12 cpi
	1.42 mm at 15 cpi
	1.29 mm at 17.1 cpi
	1.15 mm at 20 cpi
	1.00 mm at 24 cpi
	0.89 mm at 30 cpi
- \* Vertical centres between dots: 0.365 mm

**FUNCTIONAL SPECIFICATIONS**

- \* Print speed (Draft): 120 cps bi-directional with optimized paths and search for print position with tabulation at 200 cps
- \* Print Speed (NLQ): 25 cps
- \* Form feed speed: 42.3 mm/sec
- \* Line feed time: 100 msec
- \* Input line buffer: 7 Kbytes (DLL OFF)  
4 Kbytes (DLL ON)
- \* Down line loading 3 Kbytes (decrease line buffer size)
- \* Datascope capabilities (HEX DUMP)

**PRINTING FORMAT**

- \* maximum print width: 203 mm (8")
- \* bottom of form print.: within 39 mm (1.4") to bottom of sheet
- \* top of form printing: within 30 mm (1.2") to top of sheet
- \* line spacing: 1/6", 1/8", 7/72", N/216"
- \* min. paper increment: 1/216"
- \* print pitches:
  - Pica 10 char/in
  - Elite 12 char/in
  - Micro 15 char/in
  - Condensed 17.1 char/in
  - Pica compressed 20 char/in
  - Elite compressed 24 char/in
  - Micro compressed 30 char/in
- \* printing styles:
  - boldface
  - double width
  - superscript
  - subscript
  - double strike
  - underlined
- \* characters per line:
  - 40 at 5 cpi
  - 28 at 6 cpi
  - 68 at 8.55 cpi
  - 80 at 10 cpi
  - 96 at 12 cpi
  - 120 at 15 cpi
  - 137 at 17.1 cpi
  - 160 at 20 cpi
  - 192 at 24 cpi
  - 240 at 30 cpi
- \* character sets:
  - A. IBM Mode:
    - Standard 96 ASCII characters
    - 41 international character and symbols
    - Greek and maths symbols
    - Box and line drawing characters

- char. set Tables in 6 national variants:
  - INTERNATIONAL 1
  - INTERNATIONAL 2
  - SPAIN
  - PORTUGAL
  - GREECE
  - ISRAEL
- provision for user - defined down line loaded characters

**B. Epson Mode:**

- Standard 96 characters ASCII
- 32 International characters
- 96 alternate Italic characters
- char. set tables in 8 national variants:
  - USA
  - FRANCE
  - GERMANY
  - GREAT BRITAIN
  - DENMARK
  - SWEDEN
  - ITALY
  - SPAIN
- provision for user - defined down line loaded characters

**C. Commodore mode:**

- character set tables for 8 nations, with secondary address = 7 (Upper/Lower case mode) or secondary address = 0 (Upper case/Graphics mode):
  - USA/UK
  - DENMARK
  - SWEDEN
  - GERMANY
  - FRANCE
  - ITALY
  - SWITZERLAND
  - SPAIN
- provision for user - defined down line loaded characters

**\* Graphics (Bit Image Mode):**

- Horizontal resolution: 60, 120, 240 dots per inch;  
72 (Plotter), 80, 90 (CRT Screens) dpi
- Vertical resolution: 72 dpi, programmable 216 dpi

**PAPER HANDLING**

**\* Continuous Fan-Fold Form (with tractor feed)**

- pin to pin width: from 4" to 9.5"
- paper weight:
  - .original only from 55 to 90 g/m<sup>2</sup>
  - .original plus one copy original from 50 to 60 g/m<sup>2</sup>;  
the carbon paper should weight  
between 20 and 30 g/m<sup>2</sup>

**\* Single Sheet**

- paper width: from 127 to 229 mm
- paper length: 100 mm minimum
- Top of form 35 mm
- Paper Weight form 60 to 80 g/m<sup>2</sup>

**\* Maximum paper thickness 0.18 mm**

**INKED RIBBON**

Black smallcart cartridge with a life of 0.8 million characters. The ribbon is contained in a smallcart disposable cartridge for easy handling.

**PHYSICAL DIMENSIONS**

width	352 mm
depth	257 mm
height	74 mm
weight	4.0 kg

**POWER SOURCE**

220 - 240 V AC,	50 - 60 Hz
100 - 116 V AC,	50 - 60 Hz

consumption: 25 VA

**ENVIRONMENTAL CONDITIONS**

	Operation	Storage	Transport
Temperature	+10/+40 °C	0/+55 °C	-15/+55 °C
Rel. humidity	15/95 %	5/95 %	5/95 %

**B. PROGRAM EPROM AND CHARACTER GENERATOR**

The MPS 1230 printer is equipped with a single 64 kbyte EPROM which contains the program and the character generator (Fig. B-1).

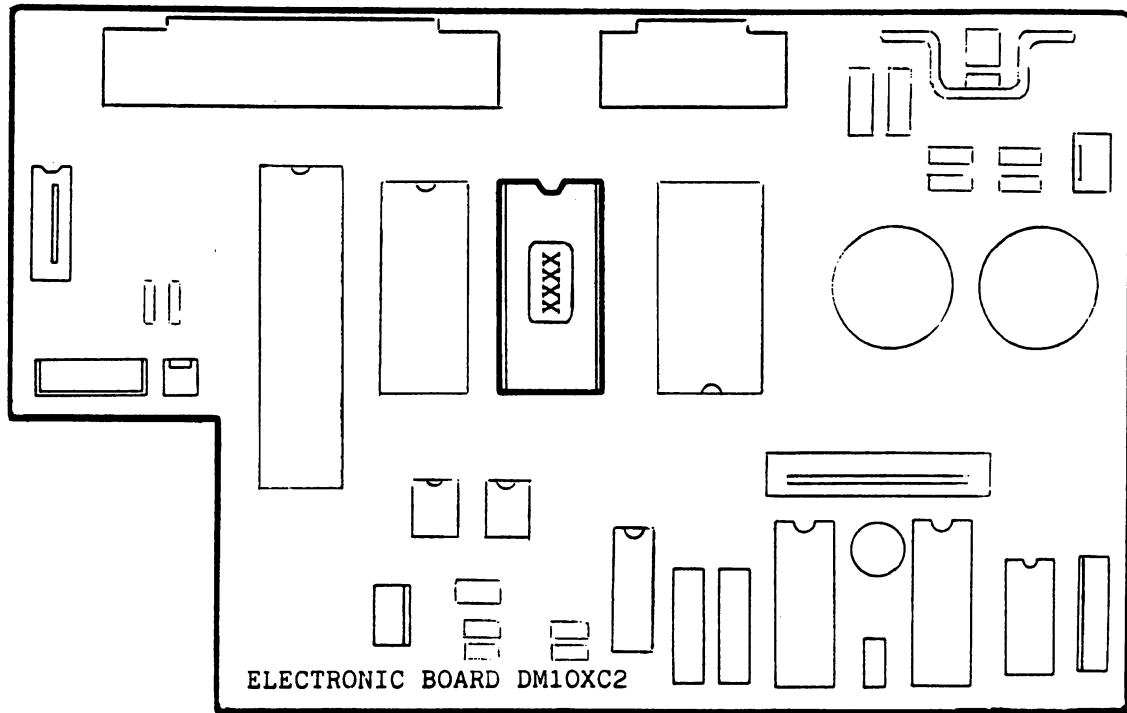


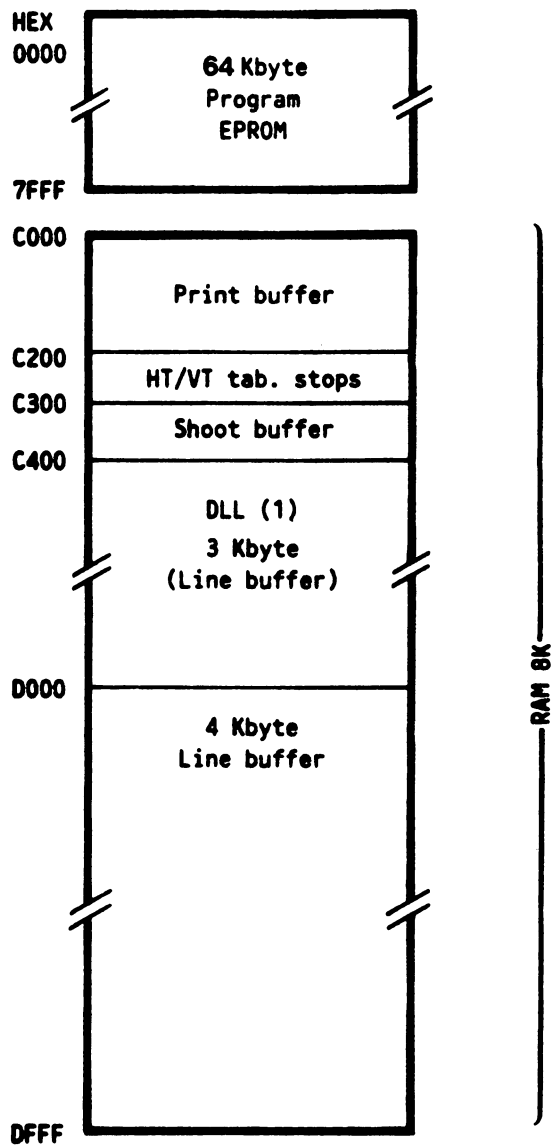
Fig. B-1 Location of the program EPROM

EPROM functional codes are given below:

RELEASE N	EPROM CODE	FUNCTION
1.1D	PDL2	Firmware



ROM-RAM memory map



**C. CENTRONICS PARALLEL INTERFACE**

SIGNAL	PIN N.	SOURCE
Data Strobe	1	CU (Central Unit)
Data 1	2	CU
Data 2	3	CU
Data 3	4	CU
Data 4	5	CU
Data 5	6	CU
Data 6	7	CU
Data 7	8	CU
Data 8	9	CU
Acknowledge	10	PU (Peripheral Unit)
Busy	11	PU
Paper empty	12	PU
Select	13	PU
0 V ground (GND)	16, 19 to 30	PU
Chassis Ground	17	PU
+5 V	18	PU
Input Prime	31	CU
Fault	32	PU

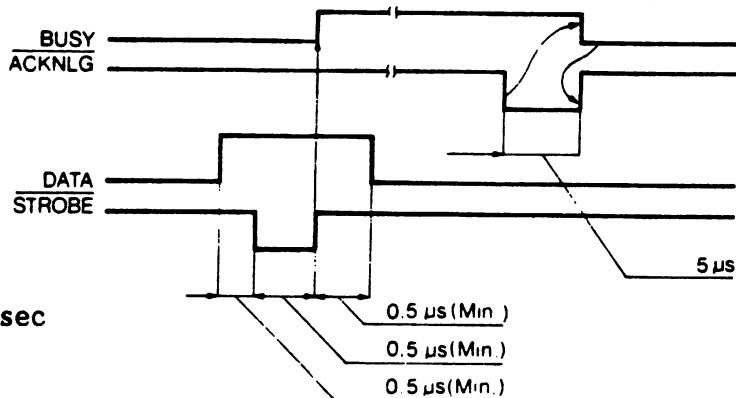
7/8 bit

**ELECTRICAL CHARACTERISTICS**

**VOLTAGE LEVELS** 0 V and +5 V (rated value) TTL logic (series sn 74xx) for input/output signals

**LOGIC LEVELS** Level "1" high defined as voltage value between +2.4 V and +5 V. The +5.5 V peak values must not be exceeded.  
Level "0" (low) between 0 V and 0.7 V; must not exceed a negative peak of -0.5 V.

**Data exchange timing**



Transfer rate: 5 kbytes/sec

**Signal Description**

The **DATA STROBE** signal is a negative pulse that transfers data into the printer electronic circuits. The pulse duration must be longer than 800 ns. The circuit is pulled up with 1 kohm resistance to +5 V.

The eight **DATA LINES** circuits transmit data (characters or control codes) from C.U. to the printer. The logical level of the data item to be transferred must be stable at least 800 nsec before the negative edge of the "strobe" impulse and must remain stable at least 800 nsec after the positive edge of the "strobe". These signals are pulled up with a 1 kohm resistance towards the +5 Volts.

The **INPUT PRIME** signal is a negative impulse and can be used by the C.U. to reset the printer. The impulse must last for at least 10 msec.

The **ACKNOWLEDGE** signal is a negative impulse which is used by the printer to indicate complete transfer of the character and that the next character can therefore be sent.

The **BUSY** signal is active at when high and provides the printer busy and unable to receive data.

The **PAPER EMPTY** signal is active when high and indicates to the C.U. that the paper is almost finished.

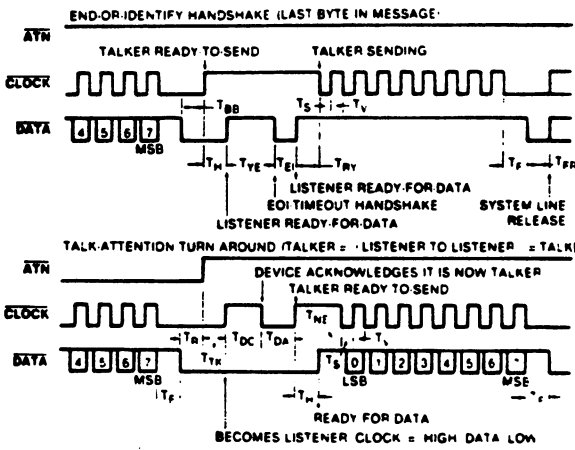
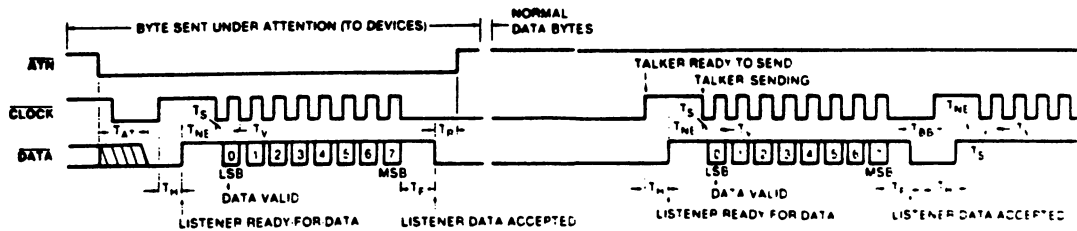
The **SELECT** signal is active when high and indicates that the printer has been selected and is ready for "data transfer".

The **FAULT** signal is active when low and indicates to the C.U. that the printer is faulty.

**D. COMMODORE SERIAL INTERFACE**

SIGNAL	PIN N.	CONNECTOR
SERIAL SRQ (NC)	1	
GROUND	2	
SERIAL ATN	3	
SERIAL CLK	4	
SERIAL DATA	5	
RESET	6	

**Serial interface signals:**



**SERIAL BUS TIMING**

Description	Symbol	Min	Typ	Max
ATN RESPONSE (REQUIRED) <sup>1</sup>	T <sub>AT</sub>	0	—	1000μs
LISTENER HOLD OFF	T <sub>H</sub>	—	—	∞
NON-EOI RESPONSE TO RFD <sup>2</sup>	T <sub>NE</sub>	—	40μs	200μs
BIT SET-UP TALKER <sup>4</sup>	T <sub>S</sub>	20μs	70μs	—
DATA VALID	T <sub>V</sub>	20μs	20μs	—
FRAME HANDSHAKE <sup>3</sup>	T <sub>F</sub>	0	20μs	1000μs
FRAME TO RELEASE OF ATN	T <sub>R</sub>	20μs	—	—
BETWEEN BYTES TIME	T <sub>BB</sub>	—	—	—
EOI RESPONSE TIME	T <sub>VE</sub>	200μs	250μs	—
EOI RESPONSE HOLD TIME	T <sub>EI</sub>	60μs	—	—
TALKER RESPONSE LIMIT	T <sub>RV</sub>	0	30μs	60μs
BYTE-ACKNOWLEDGE <sup>4</sup>	T <sub>PP</sub>	20μs	30μs	—

Notes  
 1 If maximum time exceeded, device not present error  
 2 If maximum time exceeded, EOI response required  
 3 If maximum time exceeded, frame error  
 4 T<sub>V</sub> and T<sub>PP</sub> minimum must be 60μs for external device to be a talker



## E. COMMAND CODES

Instructions for printing are sent to the printer in the form of bytes, i.e. groups of eight bits, transferred simultaneously through the cable connection.

The coding system used is called ASCII and is based on the relationship between bits and characters (for example, the letter A correspond to the byte 01000001). The equivalent code for each character is given in the appendix F. To avoid always writing the full sequence of eight bits, decimal equivalents will be used; the number precedes the letter D, (A = 65 D), or the hexadecimal code - the number precedes the letter H (A = 41 H).

Of the 256 codes available (0 ÷ 155 D; 0 ÷ FF H), some represent normal characters to be printed, others represent special instructions.

The codes from 0 to 31 D are command codes, the codes from 32 D to 255 D are printing characters (numbers, capital letters, punctuation marks, forms, etc.).

Code 27 D (ESC) is a special code and each character immediately following it is also particularly treated. The code ESC n (where n is a character with a code from 0 to 127 D) is called "ESCAPE SEQUENCE".

The codes are described in the User Manual.

### Index of Appendix E

- E.1 Summary of IBM PROPRINTER Command Codes
- E.2 Summary of IBM GRAPHICS PRINTER Command Codes
- E.3 Summary of EPSON FX-80 Command Codes
- E.4 Summary of COMMODORE MPS 801 (ESC Extended) Command Codes

E.1 Summary of IBM PROPRINTER Command Codes

- emulation available in parallel and serial mode (as Europa Rel. 1.1)
- in serial interface mode the ESC sequences are available in ASCII or PET-ASCII mode (Europa FW Rel. 1.1: only ASCII mode, as MPS 1000).

The available command codes are: from Rel. 1.1 (see User-Manual page E.2 or Service Manual page E-2) and the following MPS 1250 codes:

ESC r Reverse print ON  
 ESC t Reverse print OFF  
 ESC ~ 2 N Reverse print ON/OFF  
 ESC ~ 3 N Master Pitch selection  
 ESC ~ 4 N Set/del. slashed zero  
 ESC ~ 5 N Sel. Commodore, IBM, Epson emulation  
 ESC ~ 6 N Plotter ON/OFF  
 ESC e 0 N Sets Hor.Tab. every N column  
 ESC \$ N N Sets absolute dot Tab.  
 ESC £ N N Set relative dot Tab. (only in serial interface mode)  
 ESC e 1 N Sets Vertical Tab. every lines  
 ESC f 1 N Advances N lines

	Code			Description
	ASCII	Dec.	Hex.	
NUL		0	00	Not operative when used alone
BEL		7	07	Not operative
BS		8	08	Print and backspace 1 character
HT		9	09	Horizontal tab stops
LF		10	0A	Line feed
VT		11	0B	Line feed or next programmed tab stop
FF		12	0C	Form feed
CR		13	0D	Print buffer
SO		14	0E	Double width characters: ON
SI		15	0F	17.1 chars/inch (condensed): ON
DC1		17	11	Printer selection
DC2		18	12	17.1 chars/inch (condensed): OFF
DC3		19	13	No operation
DC4		20	14	Double width characters: OFF
CAN		24	18	Clears print buffer
ESC		27	1B	ASCII code for Escape
SP		32	20	Moves the print head one character pitch
ESC -		45	2D	Underline: ON/OFF
ESC 0		48	30	Spacing = 1/8" (3.175 mm)
ESC 1		49	31	Spacing = 7/72" (2.47 mm)
ESC 2		50	32	Spacing = 1/6" (4.23 mm)
ESC 2		50	32	ESC A execution command
ESC 3		51	33	Spacing = n/216" (n x 0.1176 mm)
ESC 4		52	34	Set Top of Form (TOF)
ESC 5		53	35	Automatic LF: ON/OFF
ESC 6		54	36	IBM Table 2 selection
ESC 7		55	37	IBM Table 1 selection
ESC :		58	3A	Print pitch = 1/12"
ESC =		61	3D	Down Line Loading of user characters (DLL)
ESC A		65	41	Spacing = n/72" (n x 0.3528 mm)
ESC B		66	42	Vertical tab stops program
ESC C		67	43	Set form length in number of lines
ESC C NUL	67 0	43 00		Set form length in number of inches
ESC D		68	44	Horizontal tab stops program
ESC E		69	45	Emphasized printing: ON
ESC F		70	46	Emphasized printing: OFF
ESC G		71	47	Double strike printing: ON
ESC H		72	48	Double strike printing: OFF
ESC I		73	49	Select print definition
ESC J		74	4A	Paper skip = n/216"
ESC K		75	4B	60 dots/inch BIM selection
ESC L		76	4C	120 dots/inch BIM selection
ESC N		78	4E	Define bottom of form (BOF)
ESC O		79	4F	Clear bottom of form
ESC Q		81	51	De-select printer
ESC R		82	52	Clear tab stops
ESC S		83	53	Superscript/subscript printing
ESC T		84	54	Clear superscript/subscript printing
ESC U		85	55	Mono/bidirectional printing
ESC W		87	57	Double width characters: ON/OFF
ESC Y		89	59	120 dots/inch BIM selection, double speed
ESC Z		90	5A	240 dots/inch BIM selection
ESC \		92	5C	Print n characters from extended table
ESC ^		94	5E	Print one character from extended table
ESC _		95	5F	Overline: ON/OFF

E.2 Summary of IBM GRAPHICS PRINTER Command Codes

- emulation available in parallel and serial mode (as Rel. 1.1)
- in serial interface mode the ESC sequences are available in ASCII or PET ASCII mode (Europa FW Rel. 1.1: only ASCII mode).

The available command codes are: from Rel. 1.1 (see User-Manual page E.4 or Service Manual page E-3) and the following MPS 1250 codes:

```

ESC r      Reverse print ON
ESC t      Reverse print OFF
ESC ~ 2 N  Reverse print ON/OFF
ESC ~ 3 N  Master Pitch selection
ESC ~ 4 N  Set/del. slashed zero
ESC ~ 5 N  Sel. Commodore, IBM, Epson emulation
ESC ~ 6 N  Plotter ON/OFF
ESC e 0 N  Sets Hor.Tab. every N column
ESC $ N N  Sets absolute dot Tab.
ESC £ N N  Set relative dot Tab. (only in serial interface mode)
ESC \ N N  Relative dot Tab.
ESC e 1 N  Sets Vertical Tab. every lines
ESC f 1 N  Advances N lines
    
```

Code			Description
ASCII	Dec.	Hex.	
NUL	0	00	Not operative when used alone
BS	8	08	Print and backspace 1 character
HT	9	09	Horizontal tab stops
LF	10	0A	Line feed
VT	11	0B	Line feed
FF	12	0C	Paper skip at module beginning
CR	13	0D	Print buffer
SO	14	0E	Double width characters: ON
SI	15	0F	17.1 chars/inch (condensed): ON
DC2	18	12	17.1 chars/inch (condensed): OFF
DC4	20	14	Double width characters: OFF
CAN	24	18	Clears print buffer
ESC	27	1B	ASCII code for Escape
ESC SO	14	0E	Double width characters: ON
ESC -	45	2D	Underline: ON/OFF
ESC 0	48	30	Spacing = 1/8" (3.175 mm)
ESC 1	49	31	Spacing = 7/72" (2.47 mm)
ESC 2	50	32	Spacing = 1/6" (4.23 mm)
ESC 3	51	33	Spacing = n/216" (n x 0.1176 mm)
ESC 6	54	36	IBM Table 2 selection
ESC 7	55	37	IBM Table 1 selection
ESC 8	56	38	Out of paper microswitch: disabled
ESC 9	57	39	Out of paper microswitch: enabled
ESC =	61	3D	Down line loading of user characters (DLL)
ESC A	65	41	Spacing = n/72" (n x 0.3528 mm)
ESC C	67	43	Set form length in number of lines
ESC C NUL	67 0	43 00	Set form length in number of inches
ESC D	68	44	Horizontal tab stops program
ESC E	69	45	Emphasized printing: ON
ESC F	70	46	Emphasized printing: OFF
ESC G	71	47	Double strike printing: ON
ESC H	72	48	Double strike printing: OFF
ESC I	73	49	Select print definition
ESC J	74	4A	Paper skip = n/216"
ESC K	75	4B	60 dots/inch BIM selection
ESC L	76	4C	120 dots/inch BIM selection
ESC M	77	4D	Print pitch = 1/12": ON
ESC N	78	4E	Define bottom of form (BOF)
ESC O	79	4F	Clear bottom of form
ESC S	83	53	Superscript/subscript printing
ESC T	84	54	Clear superscript/subscript printing
ESC U	85	55	Recognized, not operative
ESC W	87	57	Double width characters: ON/OFF
ESC Y	89	59	120 dots/inch BIM selection, double speed
ESC Z	90	5A	240 dots/inch BIM selection
ESC	91	5B	Select horizontal spacing
ESC x	120	78	Print mode DRAFT/NLQ definition



E.3 Summary of EPSON FX-80 Command Codes

- emulation available in parallel and serial mode (as Rel. 1.1)
- in serial interface mode the ESC sequences are available in ASCII or PET ASCII mode (Europa FW Rel. 1.1: only ASCII mode).

The available command codes are: from Rel. 1.1 (see User-Manual page E.6 or Service Manual page E-4) and the following MPS 1250 codes:

- ESC ~ 2 N Reverse print ON/OFF
- ESC ~ 3 N Master Pitch selection
- ESC ~ 4 N Set/del. slashed zero
- ESC ~ 5 N Sel. Commodore, IBM, Epson emulation
- ESC ~ 6 N Plotter ON/OFF
- ESC ! N Master Print mode selection  
(rel.1.1: N from 0 to 127, rel 2.1: N from 0 to 255)
- ESC e 0 N Sets Hor.Tab. every N column
- ESC \$ N N Sets absolute dot Tab.
- ESC £ N N Set relative dot Tab. (only in serial interface mode)
- ESC e 1 N Sets Vertical Tab. every lines
- ESC f 1 N Advances N lines

	Code			Description
	ASCII	Dec.	Hex.	
NUL		0	00	Not operative when used alone
BS		8	08	Print and backspace 1 character
HT		9	09	Horizontal tab stops
LF		10	0A	Line feed
VT		11	0B	Vertical tab stops program
FF		12	0C	Paper skip to top of form
CR		13	0D	Carriage return and print
SO		14	0E	Double width characters: ON
SI		15	0F	17.1 chars/inch (condensed): ON
DC1		17	11	Printer selection
DC2		18	12	17.1 chars/inch (condensed): OFF
DC3		19	13	Printer de-selection
DC4		20	14	Double width characters: OFF
CAN		24	18	Clears print buffer
ESC SO		14	0E	Same as SO
ESC SI		15	0F	Same as SI
ESC !		33	21	Select graphics layout types
ESC #		35	23	Clear bit 2 <sup>7</sup> forcing (MSB)
ESC %		37	25	Select RAM (special characters) and ROM (standard characters)
ESC &		38	26	Define special characters by charging in RAM
ESC *		42	2A	Set graphics layout in different density
ESC -		45	2D	Underline: ON/OFF
ESC /		47	2F	Vertical tab stops program
ESC 0		48	30	Spacing = 1/8" (3.175 mm)
ESC 1		49	31	Spacing = 7/72" (2.47 mm)
ESC 2		50	32	Spacing = 1/6" (4.23 mm)
ESC 3		51	33	Spacing = n/216" (n x 0.1176 mm)
ESC 4		52	34	Italic characters: ON
ESC 5		53	35	Italic characters: OFF
ESC 6		54	36	Extend printable characters set
ESC 7		55	37	Select basic national characters table
ESC 8		56	38	Out of paper microswitch: disabled
ESC 9		57	39	Out of paper microswitch: enabled
ESC :		58	3A	Copy standard character generator (ROM) into RAM
ESC <		60	3C	Set left to right printing for one line
ESC =		61	3D	Force 2 <sup>7</sup> bit (MSB) to "0"
ESC >		62	3E	Force 2 <sup>7</sup> bit (MSB) to "1"
ESC ?		63	3F	Change BIM density selected by graphics commands
ESC @		64	40	Initialize printer (main reset)
ESC A		65	41	Spacing = n/72" (n x 0.3528 mm)
ESC B		66	42	Vertical tab stops program
ESC C		67	43	Set form length in number of lines
ESC C NUL		67 00	43 00	Set form length in number of inches
ESC D		68	44	Horizontal tab stops program
ESC E		69	45	Emphasized printing: ON

Code			Description
ASCII	Dec.	Hex.	
ESC F	70	46	Emphasized printing: OFF
ESC G	71	47	Double strike and NLQ printing: ON
ESC H	72	48	Double strike printing: OFF, normal printing (DRAFT): ON
ESC I	73	49	Extend printable characters set
ESC J	74	4A	Print buffer and skip n/216" of paper
ESC K	75	4B	Set normal density graphics
ESC L	76	4C	Set double density graphics, half speed
ESC M	77	4D	Print pitch = 1/12" (Elite): ON
ESC N	78	4E	Define bottom of form (BOF) in lines
ESC O	79	4F	Clear bottom of form
ESC P	80	50	Print pitch = 1/12" (Elite): OFF
ESC Q	81	51	Define right margin
ESC R	82	52	Select national character set
ESC S	83	53	Superscript/subscript printing
ESC T	84	54	Clear superscript/subscript printing
ESC U	85	30	Mono/Bidirectional printing
ESC W	87	57	Double width characters: ON/OFF
ESC Y	89	59	Double density BIM selection, normal speed
ESC Z	90	5A	Four times density BIM selection
ESC ^	94	5E	9-dot high strips BIM printing
ESC b	98	62	Select up to 8 vertical tab stops programs
ESC i	105	69	Immediate character printing: ON OFF
ESC j	106	6A	Reverse paper feed: n/216"
ESC l	108	6C	Define left margin
ESC p	112	70	Proportional spacing: ON/OFF
ESC s	115	73	Half speed printing: ON/OFF
ESC x	120	78	Print mode DRAFT/NLQ definition
DEL	127	7F	Clear last printable character in print buffer

E.4 Summary of COMMODORE MPS 801 (ESC Extended) Command Codes

- emulation available in serial mode only (as Rel. 1.1)
- the ESC sequences are available in ASCII or PET-ASCII mode (Europa FW Rel 1.1: only ASCII mode)

The available command codes are from MPS 801/803 (see User-Manual page E.1 or Service Manual page E-6) and all the ESC sequences from the emulation selected in the Prompting (Epson or IBM Proprinter or IBM G.P.).

(Europa FW Rel. 1.1: MPS 801/803 Codes + subset of Epson ESC sequences)

(MPS 1000: MPS 801/803 Codes without ESC sequences,  
MPS 1200S and MPS 1250: MPS 801/803 Codes + all Epson ESC sequences)

	Code			Description (Secondary Address = 7)
	ASCII	Dec.	Hex.	
BIT IMG		8	08	Sets the BIM graphics printing
BIT IMG SUB		8 26	08 1A	Sets the repeated printing of BIM data
LF		10	0A	Line feed
FF		12	0C	Starts printing and advances the paper to top of form
CR		13	0D	Starts printing and line feed
EN ON		14	0E	Double width printing: ON and graphics print output
EN OFF		15	0F	Double width printing: OFF
POS		16	10	Sets the horizontal tab in number of characters
CRSR DWN		17	11	Upper/lower case printing
RVS ON		18	12	Reverse printing: ON
ESC		27	1B	ASCII code for Escape
NLQ ON		31	1F	NLQ printing: ON
ESC POS		16	10	Sets the horizontal tab in number of dots
ESC -		45	2D	Underline: ON/OFF
ESC 8		56	38	Out-of-paper microswitch: disabled
ESC 9		58	39	Out-of-paper microswitch: enabled
ESC =		61	3D	Down Line Loading of user characters
ESC c		67	43	Sets form length in number of lines
ESC c NUL.		67 0	43 0	Sets form length in number of inches
ESC e		69	45	Emphasized printing: ON
ESC f		70	46	Emphasized printing: OFF
ESC g		71	47	Double strike printing: ON
ESC h		72	48	Double strike printing: OFF
ESC i		73	49	Selects print definition
ESC n		78	4E	Defines bottom of form (BOF)
ESC o		79	4F	Clear bottom of form (BOF)
ESC s		83	53	Superscript/subscript printing
ESC t		84	54	Clear superscript/subscript printing
ESC l		91	5B	Print style selection
ESC X		120	78	DRAFT/NLQ print mode selection
CS		141	8D	Print and perform a carriage return
CRSR UP		145	91	Upper case printing
RVS OFF		146	92	Reverse printing: OFF
NLQ OFF		159	9F	NLQ printing: OFF

F.1 IBM CHARACTER TABLES

		<table border="1"> <tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td></tr> </table>																0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15																		
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15																
0000	00	NUL	SP	0	@	P	`	p	NUL		á	⌂	L	⌈	α	≡																	
0000	01		!	1	A	Q	a	q		í	⌂	⌈	T	β	±																		
0000	02	DC <sub>2</sub>	"	2	B	R	b	r	DC <sub>2</sub>	ó	⌂	T	T	Γ	≥																		
0000	03		#	3	C	S	c	s		ú	⌂	T	L	Π	≤																		
0000	04	DC <sub>4</sub>	\$	4	D	T	d	t	DC <sub>4</sub>	ñ	⌂	-	L	Σ	Γ																		
0000	05		%	5	E	U	e	u		Ñ	⌂	†	Γ	σ	J																		
0000	06		&	6	F	V	f	v		ä	⌂	†	Γ	μ	÷																		
0000	07		'	7	G	W	g	w		ö	⌂	†	Γ	τ	≈																		
1000	08	BS CAN	(	8	H	X	h	x	BS CAN	¿	⌂	†	Γ	ø	°																		
1000	09	HT	)	9	I	Y	i	y	HT	ç	⌂	†	Γ	Θ	■																		
1000	10	LF	*	:	J	Z	j	z	LF	¬	⌂	†	Γ	Ω	-																		
1000	11	VT ESC	+	;	K	[	k	{	VT ESC	½	⌂	†	Γ	δ	√																		
1000	12	FF	,	<	L	\	l		FF	¼	⌂	†	Γ	∞	∩																		
1000	13	CR	-	=	M	]	m	}	CR	ı	⌂	†	Γ	ø	2																		
1000	14	SO	.	>	N	^	n	~	SO	«	⌂	†	Γ	E	■																		
1000	15	SI	/	?	O	_	o		SI	»	⌂	†	Γ	∩	SP																		

Fig. F-1.1 IBM Table 1 (ESC 7)

		<table border="1"> <tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td></tr> </table>																0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F																		
0000	0	NUL	SP	0	@	P	`	p	Ç	É	á	⌂	L	⌈	α	≡																	
0000	1	DC <sub>1</sub>	!	1	A	Q	a	q	ü	æ	í	⌂	⌈	T	β	±																	
0000	2	DC <sub>2</sub>	"	2	B	R	b	r	é	Æ	ó	⌂	T	T	Γ	≥																	
0000	3	♥ DC <sub>3</sub>	#	3	C	S	c	s	â	ô	ú	⌂	T	L	Π	≤																	
0000	4	♦ DC <sub>4</sub>	\$	4	D	T	d	t	ä	ö	ñ	⌂	-	L	Σ	Γ																	
0000	5	♠	§	%	5	E	U	e	u	à	ò	Ñ	⌂	†	Γ	σ	J																
0000	6	♣		&	6	F	V	f	v	ä	ü	ä	⌂	†	Γ	μ	÷																
0000	7		'	7	G	W	g	w	ç	ù	ö	⌂	†	Γ	τ	≈																	
1000	8	BS CAN	(	8	H	X	h	x	ê	ÿ	¿	⌂	†	Γ	ø	°																	
1000	9	HT	)	9	I	Y	i	y	ë	Ö	ç	⌂	†	Γ	Θ	■																	
1000	A	LF	*	:	J	Z	j	z	è	Ü	¬	⌂	†	Γ	Ω	-																	
1000	B	VT ESC	+	;	K	[	k	{	ï	£	½	⌂	†	Γ	δ	√																	
1000	C	FF	,	<	L	\	l		ı	£	¼	⌂	†	Γ	∞	∩																	
1000	D	CR	-	=	M	]	m	}	ı	¥	ı	⌂	†	Γ	ø	2																	
1000	E	SO	.	>	N	^	n	~	Ä	Pl	«	⌂	†	Γ	E	■																	
1000	F	SI	/	?	O	_	o		Å	/	»	⌂	†	Γ	∩	SP																	

Fig. F-1.2 IBM Table 2 (ESC 6) International 1

				0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0000	0	NUL	SP	0	@	P	`	p	Ç	É	á	␣	␣	␣	␣	␣	␣	␣	␣
0001	1		!	1	A	Q	a	q	ü	æ	í	␣	␣	␣	␣	␣	␣	␣	␣
0010	2		DC <sub>2</sub>	"	2	B	R	b	r	é	Æ	ó	␣	␣	␣	␣	␣	␣	␣
0011	3	♥	#	3	C	S	c	s	â	ô	ú	␣	␣	␣	␣	␣	␣	␣	␣
0100	4	♦	DC <sub>4</sub>	\$	4	D	T	d	t	ä	ö	ñ	␣	␣	␣	␣	␣	␣	␣
0101	5	♠	§	%	5	E	U	e	u	à	ò	Ñ	␣	␣	␣	␣	␣	␣	␣
0110	6	♣		&	6	F	V	f	v	â	û	ö	␣	␣	␣	␣	␣	␣	␣
0111	7			'	7	G	W	g	w	ç	ú	Ö	␣	␣	␣	␣	␣	␣	␣
1000	8	BS	CAN	(	8	H	X	h	x	ê	ÿ	ç	␣	␣	␣	␣	␣	␣	␣
1001	9	HT		)	9	I	Y	i	y	ë	Ö	ä	␣	␣	␣	␣	␣	␣	␣
1010	A	LF		*	:	J	Z	j	z	è	Ü	Ä	␣	␣	␣	␣	␣	␣	␣
1011	B	VT	ESC	+	:	K	[	k	{	ï	ç	è	␣	␣	␣	␣	␣	␣	␣
1100	C	FF		,	<	L	\	l	:	í	£	ñ	␣	␣	␣	␣	␣	␣	␣
1101	D	CR		-	=	M	]	m	}	ï	Ø	i	␣	␣	␣	␣	␣	␣	␣
1110	E	SO		.	>	N	^	n	~	Ä	Ł	³	␣	␣	␣	␣	␣	␣	␣
1111	F	SI		/	?	O	_	o		Å	ı	ı	␣	␣	␣	␣	␣	␣	␣

Fig. F-1.3 IBM Table 2 (ESC 6) International 2

				00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
0000	00	NUL	SP	0	@	P	`	p	Ń	]	á	␣	␣	␣	␣	␣	␣	␣	␣
0001	01		!	1	A	Q	a	q	ı	ı	ı	ı	ı	ı	ı	ı	ı	ı	ı
0010	02		DC <sub>2</sub>	"	2	B	R	b	r	ı	ı	ı	ı	ı	ı	ı	ı	ı	ı
0011	03	♥	#	3	C	S	c	s	ı	ı	ı	ı	ı	ı	ı	ı	ı	ı	ı
0100	04	♦	DC <sub>4</sub>	\$	4	D	T	d	t	ı	ı	ı	ı	ı	ı	ı	ı	ı	ı
0101	05	♠	§	%	5	E	U	e	u	ı	ı	ı	ı	ı	ı	ı	ı	ı	ı
0110	06	♣		&	6	F	V	f	v	ı	ı	ı	ı	ı	ı	ı	ı	ı	ı
0111	07			'	7	G	W	g	w	ı	ı	ı	ı	ı	ı	ı	ı	ı	ı
1000	08	BS	CAN	(	8	H	X	h	x	ı	ı	ı	ı	ı	ı	ı	ı	ı	ı
1001	09	HT		)	9	I	Y	i	y	ı	ı	ı	ı	ı	ı	ı	ı	ı	ı
1010	10	LF		*	:	J	Z	j	z	ı	ı	ı	ı	ı	ı	ı	ı	ı	ı
1011	11	VT	ESC	+	:	K	[	k	{	ı	ı	ı	ı	ı	ı	ı	ı	ı	ı
1100	12	FF		,	<	L	\	l	:	ı	ı	ı	ı	ı	ı	ı	ı	ı	ı
1101	13	CR		-	=	M	]	m	}	ı	ı	ı	ı	ı	ı	ı	ı	ı	ı
1110	14	SO		.	>	N	^	n	~	ı	ı	ı	ı	ı	ı	ı	ı	ı	ı
1111	15	SI		/	?	O	_	o		ı	ı	ı	ı	ı	ı	ı	ı	ı	ı

Fig. F-1.4 IBM Table 2 (ESC 6) Israel

				00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
0000	00	NUL		SP	0	@	P	`	p	A	P	i	⋮	L	⊥	ω	Ω		
0001	01			!	1	A	Q	a	q	B	Σ	K	⋮	⊥	T	α	±		
0010	02		DC <sub>2</sub>	"	2	B	R	b	r	Γ	T	λ	⋮	⊥	T	é	≥		
0011	03	♥		#	3	C	S	c	s	Δ	Υ	μ	⋮	⊥	T	ñ	≤		
0100	04	♦	DC <sub>4</sub>	\$	4	D	T	d	t	E	Φ	v	⋮	⊥	L	i	ρ		
0101	05	♠		%	5	E	U	e	u	Z	X	ξ	⋮	⊥	Γ	i	J		
0110	06	♣		&	6	F	V	f	v	H	Ψ	o	⋮	⊥	Γ	ó	÷		
0111	07			'	7	G	W	g	w	Θ	Ω	π	⋮	⊥	T	ú	=		
1000	08	BS	CAN	(	8	H	X	h	x	ι	α	ρ	⋮	⊥	T	ü	°		
1001	09	HT		)	9	I	Y	i	y	K	β	σ	⋮	⊥	T	ω	ε		
1010	10	LF		*	:	J	Z	j	z	Λ	Υ	ς	⋮	⊥	Γ	A	-		
1011	11	VT	ESC	+	;	K	[	k	{	M	δ	τ	⋮	⊥	⊥	E	√		
1100	12	FF		,	<	L	\	l		N	ε	u	⋮	⊥	⊥	H	η		
1101	13	CR		-	=	M	]	m	}	Ξ	ζ	φ	⋮	⊥	⊥	i	2		
1110	14	SO		.	>	N	^	n	~	O	η	χ	⋮	⊥	⊥	o	■		
1111	15	SI		/	?	O	_	o		Π	θ	ψ	⋮	⊥	⊥	Y	SP		

Fig. F-1.5 IBM Table 2 (ESC 6) Greece

				00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
0000	00	NUL		SP	0	@	P	`	p	Ç	É	á	⋮	L	⊥	α	≡		
0001	01			!	1	A	Q	a	q	ü	æ	i	⋮	⊥	T	β	±		
0010	02		DC <sub>2</sub>	"	2	B	R	b	r	é	Æ	ó	⋮	⊥	T	Γ	≥		
0011	03	♥		#	3	C	S	c	s	ã	ô	ú	⋮	⊥	T	Π	≤		
0100	04	♦	DC <sub>4</sub>	\$	4	D	T	d	t	ä	ö	ñ	⋮	⊥	L	Σ	ρ		
0101	05	♠		%	5	E	U	e	u	à	ò	Ñ	⋮	⊥	Γ	σ	J		
0110	06	♣		&	6	F	V	f	v	ã	û	õ	⋮	⊥	Γ	μ	÷		
0111	07			'	7	G	W	g	w	ç	ù	Ö	⋮	⊥	T	τ	=		
1000	08	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	⋮	⊥	T	ø	°		
1001	09	HT		)	9	I	Y	i	y	ë	Ö	ã	⋮	⊥	T	Θ	■		
1010	10	LF		*	:	J	Z	j	z	è	Ü	Ä	⋮	⊥	Γ	Ω	-		
1011	11	VT	ESC	+	;	K	[	k	}	ï	À	Ú	⋮	⊥	⊥	δ	√		
1100	12	FF		,	<	L	\	l		í	É	í	⋮	⊥	⊥	∞	η		
1101	13	CR		-	=	M	]	m	{	ì	Á	ì	⋮	⊥	⊥	ø	2		
1110	14	SO		.	>	N	^	n	~	Ä	Ê	³	⋮	⊥	⊥	E	■		
1111	15	SI		/	?	O	_	o		À	Ö	Ó	⋮	⊥	⊥	ñ	SP		

Fig. F-1.6 IBM Table 2 (ESC 6) Portugal

				00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
0000	00	NUL		SP	0	@	P	`	p	Ç	É	á	␣	␣	␣	␣	␣	␣	␣
0001	01			!	1	A	Q	a	q	ü	í	í	␣	␣	␣	␣	␣	␣	␣
0010	02		DC <sub>2</sub>	"	2	B	R	b	r	é	Ó	ó	␣	␣	␣	␣	␣	␣	␣
0011	03	♥		#	3	C	S	c	s	à	ô	ú	␣	␣	␣	␣	␣	␣	␣
0100	04	♦	DC <sub>4</sub>	\$	4	D	T	d	t	ä	ö	ñ	␣	␣	␣	␣	␣	␣	␣
0101	05	♠		%	5	E	U	e	u	á	ò	Ñ	␣	␣	␣	␣	␣	␣	␣
0110	06	♣		&	6	F	V	f	v	À	ù	à	␣	␣	␣	␣	␣	␣	␣
0111	07			'	7	G	W	g	w	ç	ù	ó	␣	␣	␣	␣	␣	␣	␣
1000	08	BS	CAN	(	8	H	X	h	x	ê	Á	¿	␣	␣	␣	␣	␣	␣	␣
1001	09	HT		)	9	I	Y	i	y	è	Ö	Ł	␣	␣	␣	␣	␣	␣	␣
1010	10	LF		*	:	J	Z	j	z	è	U	Ł	␣	␣	␣	␣	␣	␣	␣
1011	11	VT	ESC	+	:	K	[	k	:	ÿ	Ö	½	␣	␣	␣	␣	␣	␣	␣
1100	12	FF		,	<	L	\	l	:	î	£	¼	␣	␣	␣	␣	␣	␣	␣
1101	13	CR		-	=	M	]	m	:	ï	Ú	ı	␣	␣	␣	␣	␣	␣	␣
1110	14	SO		.	>	N	^	n	:	À	Œ	«	␣	␣	␣	␣	␣	␣	␣
1111	15	SI		/	?	O	_	o	:	È	Ÿ	»	␣	␣	␣	␣	␣	␣	␣

Fig. F-1.7 IBM Table 2 (ESC 6) Spain

**F.2 EPSON CHARACTER TABLES**

		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0000	0			SP	0	@	P		p			SP	0	@	P		P
0001	1		DC <sub>1</sub>	!	1	A	Q	a	q		DC <sub>1</sub>	!	1	A	Q	a	q
0002	2		DC <sub>2</sub>	"	2	B	R	b	r		DC <sub>2</sub>	"	2	B	R	b	r
0003	3		DC <sub>3</sub>	#	3	C	S	c	s		DC <sub>3</sub>	#	3	C	S	c	s
0004	4		DC <sub>4</sub>	\$	4	D	T	d	t		DC <sub>4</sub>	\$	4	D	T	d	t
0005	5			%	5	E	U	e	u			%	5	E	U	e	u
0006	6			&	6	F	V	f	v			&	6	F	V	f	v
0007	7			'	7	G	W	g	w	BEL		'	7	G	W	g	w
0008	8	BS	CAN	(	8	H	X	h	x	BS	CAN	(	8	H	X	h	x
0009	9	HT		)	9	I	Y	i	y	HT		)	9	I	Y	i	y
000A	A	LF		*	:	J	Z	j	z	LF		*	:	J	Z	j	z
000B	B	VT	ESC	+	;	K	[	k	{	VT	ESC	+	;	K	[	k	{
000C	C	FF		,	'	L	/	l	/	FF		,	'	L	/	l	/
000D	D	CR		-	=	M	]	m	}	CR		-	=	M	]	m	}
000E	E	SO		.	'	N	^	n	~	SO		.	'	N	^	n	~
000F	F	SI		/	?	O	-	o	DEL	SI		/	?	O	-	o	DEL

National Character Variations

Fig. F-2.1 Basic National Characters (ESC 7)

NATIONAL CHARACTER VARIATIONS												
NATIONS	HEXADECIMAL CODE											
	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
U.S.A.	#	\$	@	[	\	]			{		}	~
FRANCE	#	\$	à	°	ç	§	^		é	ù	è	~
GERMANY	#	\$	§	Ä	Ö	Ü	^		ä	ö	ü	ß
ENGLAND	£	\$	@	[	\	]	^		{		}	~
DENMARK	#	\$	@	Æ	Ø	Å	^		æ	ø	å	~
SWEDEN	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ITALY	#	\$	@	°	\	é	^	ù	à	ò	è	ì
SPAIN	Pt	\$	@	í	Ñ	¿	^			ñ	}	~
JAPAN	#	\$	@	[	¥	]	^		{		}	~

Fig. F-2.2 National Character Variations (ESC R)



F.3 COMMODORE CHARACTER TABLES

				b <sub>7</sub>	o	o	o	o	o	o	o	o	i	i	i	i	i	i	i	i
				b <sub>6</sub>	o	o	o	o	i	i	i	i	o	o	o	o	i	i	i	i
				b <sub>5</sub>	o	o	i	i	o	o	i	i	o	o	i	i	o	o	i	i
				b <sub>4</sub>	o	i	o	i	o	i	o	i	o	i	o	i	o	i	o	i
					0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
b <sub>4</sub>	b <sub>3</sub>	b <sub>2</sub>	b <sub>1</sub>	0				0	a	P	-	7			r	-	7		r	
o	o	o	o	1				!	1	A	Q	♣			┌	±	♣	┌	±	
o	o	o	i	2				"	2	B	R		-		■	┘		-	■	┘
o	o	i	i	3				#	3	C	S	-	♥		▣	┘	-	♥	▣	┘
o	i	o	o	4				\$	4	D	T	-			-		-		-	
o	i	o	i	5				%	5	E	U	-	/				-	/		
o	i	i	o	6				&	6	F	V	-	X		▩		-	X	▩	
o	i	i	i	7				'	7	G	W		o			-		o		-
i	o	o	o	8				(	8	H	X		♣		▩	-		♣	▩	-
i	o	o	i	9				)	9	I	Y	\			▩	-	\		▩	-
i	o	i	o	A				*	:	J	Z	\	♣			┘	\	♣		┘
i	o	i	i	B				+	;	K	Æ	'	+		┘	■	'	+	┘	■
i	i	o	o	C				,	<	L	Ø	L	⌘		■	■	L	⌘	■	■
i	i	o	i	D				-	=	M	Å	\			┘	┘	\		┘	┘
i	i	i	o	F				.	>	N	↑	/	π		┘	■	/	π	┘	■
i	i	i	i	F				/	?	O	←	Γ	▩		-	▩	Γ	▩	-	▩

Fig. F-3.1 DENMARK (Upper case/Graphics mode, secondary address 0)

				b <sub>7</sub>	o	o	o	o	o	o	o	o	i	i	i	i	i	i	i	i
				b <sub>6</sub>	o	o	o	o	i	i	i	i	o	o	o	o	i	i	i	i
				b <sub>5</sub>	o	o	i	i	o	o	i	i	o	o	i	i	o	o	i	i
				b <sub>4</sub>	o	i	o	i	o	i	o	i	o	i	o	i	o	i	o	i
					0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
b <sub>4</sub>	b <sub>3</sub>	b <sub>2</sub>	b <sub>1</sub>	0				0	a	p	-	P			r	-	P		r	
o	o	o	o	1				!	1	a	q	A	Q		┌	±	A	Q	┌	±
o	o	o	o	2				"	2	b	r	B	R		■	┘	B	R	■	┘
o	o	i	i	3				#	3	c	s	C	S		▣	┘	C	S	▣	┘
o	i	o	o	4				\$	4	d	t	D	T		-		D	T	-	
o	i	o	i	5				%	5	e	u	E	U				E	U		
o	i	i	o	6				&	6	f	v	F	V		▩		F	V	▩	
o	i	i	i	7				'	7	g	w	G	W			-	G	W		-
i	o	o	o	8				(	8	h	x	H	X		▩	-	H	X	▩	-
i	o	o	i	9				)	9	i	y	I	Y		▩	-	I	Y	▩	-
i	o	i	o	a				*	:	j	z	J	Z			┘	J	Z		┘
i	o	i	i	b				+	;	k	æ	K	Æ		┘	■	K	Æ	┘	■
i	i	o	o	c				,	<	l	ø	L	Ø		■	■	L	Ø	■	■
i	i	o	i	d				-	=	m	å	M	Å		┘	┘	M	Å	┘	┘
i	i	i	o	e				.	>	n	↑	N	⌘		┘	■	N	⌘	┘	■
i	i	i	i	f				/	?	o	←	O	⌘		-	▩	O	⌘	-	▩

Fig. F-3.2 DENMARK (Upper/Lower case, secondary address 7)



b <sub>7</sub>	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
b <sub>6</sub>	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
b <sub>5</sub>	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
b <sub>4</sub>	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
b <sub>3</sub>	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
b <sub>2</sub>	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
b <sub>1</sub>	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
b <sub>0</sub>	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	ß	p	·	7			ä	·	7	ä		
1			!	1	A	Q	◄	◄			l	μ	◄	◄	l	μ
2			"	2	B	R	-	/			ˆ	à	-	/	ˆ	à
3			#	3	C	S	■	■			±	ù	■	■	±	ù
4			\$	4	D	T	◄	◄			ˆ	à	◄	◄	ˆ	à
5			%	5	E	U	◄	◄			ˆ	è	◄	◄	ˆ	è
6			&	6	F	V	◄	◄			-	f	◄	◄	-	f
7			'	7	G	W	◄	◄			ˆ	ò	◄	◄	ˆ	ò
8			(	8	H	X	◄	◄			r	Q	◄	◄	r	Q
9			)	9	I	Y	◄	◄			ˆ	ı	◄	◄	ˆ	ı
A			*	:	J	Z	◄	◄			ˆ	Σ	◄	◄	ˆ	Σ
B			+	;	K	[	◄	◄			ˆ	Ä	◄	◄	ˆ	Ä
C			,	<	L	\	L	J			é	ö	L	J	é	ö
D			-	=	M	]	◄	◄			£	ü	◄	◄	£	ü
E			.	>	N	↑	◄	◄			è	β	◄	◄	è	β
F			/	?	O	-	◄	◄			'	·	◄	◄	'	·

Fig. F-3.5 GERMANY (Upper case/Graphics mode, secondary address 0)

b <sub>7</sub>	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
b <sub>6</sub>	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
b <sub>5</sub>	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
b <sub>4</sub>	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
b <sub>3</sub>	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
b <sub>2</sub>	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
b <sub>1</sub>	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
b <sub>0</sub>	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
	0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
0				0	ß	p	·	P			ä	·	P	ä		
1			!	1	a	q	A	Q			l	μ	A	Q	l	μ
2			"	2	b	r	B	R			ˆ	à	B	R	ˆ	à
3			#	3	c	s	C	S			±	ù	C	S	±	ù
4			\$	4	d	t	D	T			ˆ	à	D	T	ˆ	à
5			%	5	e	u	E	U			ˆ	è	E	U	ˆ	è
6			&	6	f	v	F	V			-	f	F	V	-	f
7			'	7	g	w	G	W			ˆ	ò	G	W	ˆ	ò
8			(	8	h	x	H	X			r	Q	H	X	r	Q
9			)	9	i	y	I	Y			ˆ	ı	I	Y	ˆ	ı
a			*	:	j	z	J	Z			ˆ	Σ	J	Z	ˆ	Σ
b			+	;	k	[	K	Ä			ˆ	ä	K	Ä	ˆ	ä
c			,	<	l	\	L	Ö			é	ö	L	Ö	é	ö
d			-	=	m	]	M	Ü			£	ü	M	Ü	£	ü
e			.	>	n	↑	N	π			è	β	N	π	è	β
f			/	?	o	-	O	-			'	·	O	-	'	·

Fig. F-3.6 GERMANY (Upper/Lower case, secondary address 7)

b <sub>7</sub>	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
b <sub>6</sub>	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
b <sub>5</sub>	0	0	1	1	0	0	1	0	0	1	1	0	0	1	1	1
b <sub>4</sub>	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
b <sub>3</sub>	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
b <sub>2</sub>	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
b <sub>1</sub>	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
b <sub>0</sub>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	a	P	'	7			g	'	7	g		
1			!	1	A	Q	▾	▾			l	à	▾	▾	l	à
2			"	2	B	R	-	/			l	è	-	/	l	è
3			#	3	C	S	■	■			±	i	■	■	±	i
4			\$	4	D	T	■	~			∫	ò	■	~	∫	ò
5			%	5	E	U	■				†	ù	■		†	ù
6			&	6	F	V	'	-			-	à	'	-	-	à
7			'	7	G	W	'	■			†	é	'	■	†	é
8			(	8	H	X		■			r	f		■	r	f
9			)	9	I	Y		-			τ	ò		-	τ	ò
A			*	:	J	Z		■			∫	ù		■	∫	ù
B			+	;	K	[	\	ë			†	ä	\	ë	†	ä
C			,	<	L	\	L	ÿ			£	ö	L	ÿ	£	ö
D			-	=	M	]	/	°			'	ü	/	°	'	ü
E			.	>	N	↑	-	π			^	β	-	π	^	β
F			/	?	O	-	Γ	Ç			"	é	Γ	Ç	"	π

Fig. F-3.7 ITALY (Upper case/Graphics mode, secondary address 0)

b <sub>7</sub>	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
b <sub>6</sub>	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
b <sub>5</sub>	0	0	1	1	0	0	1	0	0	1	1	0	0	1	1	1
b <sub>4</sub>	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
b <sub>3</sub>	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
b <sub>2</sub>	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
b <sub>1</sub>	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
b <sub>0</sub>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
0				0	a	p	'	P			g	'	P	g		
1			!	1	a	q	A	Q			l	à	A	Q	l	à
2			"	2	b	r	B	R			l	è	B	R	l	è
3			#	3	c	s	C	S			±	i	C	S	±	i
4			\$	4	d	t	D	T			∫	ò	D	T	∫	ò
5			%	5	e	u	E	U			†	ù	E	U	†	ù
6			&	6	f	v	F	V			-	à	F	V	-	à
7			'	7	g	w	G	W			†	é	G	W	†	é
8			(	8	h	x	H	X			r	f	H	X	r	f
9			)	9	i	y	I	Y			τ	ò	I	Y	τ	ò
a			*	:	j	z	J	Z			∫	ù	J	Z	∫	ù
b			+	;	k	[	K	ë			†	ä	K	ë	†	ä
c			,	<	l	\	L	ÿ			£	ö	L	ÿ	£	ö
d			-	=	m	]	M	°			'	ü	M	°	'	ü
e			.	>	n	↑	N	π			^	β	N	π	^	β
f			/	?	o	-	O	Ç			"	é	O	Ç	"	π

Fig. F-3.8 ITALY (Upper/Lower case, secondary address 7)

b <sub>7</sub>				0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
b <sub>6</sub>				0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
b <sub>5</sub>				0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
b <sub>4</sub>				0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
b <sub>7</sub>	b <sub>6</sub>	b <sub>5</sub>	b <sub>4</sub>	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	0	0	0	0				0	@	P	'	7			←	'	7	←		
0	0	0	1	1				!	1	A	Q	◄	◄			À	◄	◄		À
0	0	1	0	2				"	2	B	R	◄	◄		◄	È	◄	◄	◄	È
0	0	1	1	3				#	3	C	S	◄	◄		◄	♠	◄	◄	◄	♠
0	1	0	0	4				\$	4	D	T	◄	◄		◄	ò	◄	◄	◄	ò
0	1	0	1	5				%	5	E	U	◄	◄		◄	♥	◄	◄	◄	♥
0	1	1	0	6				&	6	F	V	◄	◄		◄	Á	◄	◄	◄	Á
0	1	1	1	7				'	7	G	W	◄	◄		◄	É	◄	◄	◄	É
1	0	0	0	8				(	8	H	X	◄	◄		◄	í	◄	◄	◄	í
1	0	0	1	9				)	9	I	Y	◄	◄		◄	Ó	◄	◄	◄	Ó
1	0	1	0	A				*	:	J	Z	◄	◄		◄	Ú	◄	◄	◄	Ú
1	0	1	1	B				+	;	K	[	◄	◄		◄	ÿ	◄	◄	◄	ÿ
1	1	0	0	C				,	<	L	\	◄	◄		◄	Ü	◄	◄	◄	Ü
1	1	0	1	D				-	=	M	]	◄	◄		◄	Ñ	◄	◄	◄	Ñ
1	1	1	0	E				.	>	N	↑	◄	◄		◄	♣	◄	◄	◄	♣
1	1	1	1	F				/	?	O	◄	◄			◄	Ç	◄	◄	◄	Ç

Fig. F-3.9 SPAIN (Upper case/Graphics mode, secondary address 0)

b <sub>7</sub>				0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f	
b <sub>6</sub>				0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f	
b <sub>5</sub>				0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f	
b <sub>4</sub>				0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f	
b <sub>7</sub>	b <sub>6</sub>	b <sub>5</sub>	b <sub>4</sub>	0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f	
0	0	0	0	0				0	@	p	'	P			←	'	P	←		
0	0	0	1	1				!	1	a	q	A	Q			à	A	Q		à
0	0	1	0	2				"	2	b	r	B	R		◄	è	B	R	◄	è
0	0	1	1	3				#	3	c	s	C	S		◄	♠	C	S	◄	♠
0	1	0	0	4				\$	4	d	t	D	T		◄	ò	D	T	◄	ò
0	1	0	1	5				%	5	e	u	E	U		◄	♥	E	U	◄	♥
0	1	1	0	6				&	6	f	v	F	V		◄	á	F	V	◄	á
0	1	1	1	7				'	7	g	w	G	W		◄	é	G	W	◄	é
1	0	0	0	8				(	8	h	x	H	X		◄	í	H	X	◄	í
1	0	0	1	9				)	9	i	y	I	Y		◄	ó	I	Y	◄	ó
1	0	1	0	a				*	:	j	z	J	Z		◄	ú	J	Z	◄	ú
1	0	1	1	b				+	;	k	[	K	i		◄	ÿ	K	i	◄	ÿ
1	1	0	0	c				,	<	l	\	L	l		◄	ü	L	l	◄	ü
1	1	0	1	d				-	=	m	]	M	ñ		◄	ñ	M	ñ	◄	ñ
1	1	1	0	e				.	>	n	↑	N	π		◄	♣	N	π	◄	♣
1	1	1	1	f				/	?	o	◄	O	Ç		◄	ç	O	Ç	◄	π

Fig. F-3.10 SPAIN (Upper/Lower case, secondary address 7)

				b <sub>7</sub>	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
				b <sub>6</sub>	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
				b <sub>5</sub>	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
				b <sub>4</sub>	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
					0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
b <sub>4</sub>	b <sub>3</sub>	b <sub>2</sub>	b <sub>1</sub>	b <sub>0</sub>	0				0	@	P	-	7			r	-	7	r	
0	0	0	0	1	1			!	1	A	Q	♠	●			┌	-	┐	┌	
0	0	1	0	0	2			"	2	B	R		-			└	-	┘	└	
0	0	1	1	1	3			#	3	C	S	=	♥			┌	-	┐	┌	
0	1	0	0	0	4			\$	4	D	T	-				-	-	-	-	
0	1	0	1	1	5			%	5	E	U	-	/				-	/		
0	1	1	0	0	6			&	6	F	V	-	x			▣		-	x	
0	1	1	1	1	7			'	7	G	W		o				-		o	
1	0	0	0	0	8			(	8	H	X		♣			▣	-		▣	
1	0	0	1	1	9			)	9	I	Y	\				▣	-	\		
1	0	1	0	0	A			*	:	J	Z	\	♦				└	\	┐	
1	0	1	1	1	B			+	;	K	Ä	'	+			┌	▣	'	┌	
1	1	0	0	0	C			,	<	L	Ö	L	⊗			▣	▣	L	⊗	
1	1	0	1	1	D			-	=	M	Ä	\				┌	└	\	┐	
1	1	1	0	0	E			.	>	N	↑	/	π			└	▣	/	π	
1	1	1	1	1	F			/	?	o	←	Γ	◊			-	▣	Γ	◊	

Fig. F-3.11 SWEDEN (Upper case/Graphics mode, secondary address 0)

				b <sub>7</sub>	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	
				b <sub>6</sub>	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
				b <sub>5</sub>	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
				b <sub>4</sub>	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
					0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
b <sub>4</sub>	b <sub>3</sub>	b <sub>2</sub>	b <sub>1</sub>	b <sub>0</sub>	0				0	@	p	-	P			r	-	P	r	
0	0	0	0	1	1			!	1	a	q	A	Q			┌	-	A	Q	
0	0	1	0	0	2			"	2	b	r	B	R			└	-	B	R	
0	0	1	1	1	3			#	3	c	s	C	S			┌	-	C	S	
0	1	0	0	0	4			\$	4	d	t	D	T			-	-	D	T	
0	1	0	1	1	5			%	5	e	u	E	U				-	E	U	
0	1	1	0	0	6			&	6	f	v	F	V			▣		-	▣	
0	1	1	1	1	7			'	7	g	w	G	W				-		o	
1	0	0	0	0	8			(	8	h	x	H	X			▣	-		▣	
1	0	0	1	1	9			)	9	i	y	I	Y			▣	-		▣	
1	0	1	0	0	a			*	:	j	z	J	Z				└	\	┐	
1	0	1	1	1	b			+	;	k	ä	K	Ä			┌	▣	'	┌	
1	1	0	0	0	c			,	<	l	ö	L	Ö			▣	▣	L	Ö	
1	1	0	1	1	d			-	=	m	ä	M	Ä			┌	└	\	┐	
1	1	1	0	0	e			.	>	n	↑	N	⊗			└	▣	/	π	
1	1	1	1	1	f			/	?	o	←	O	⊗			-	▣	⊗	⊗	

Fig. F-3.12 SWEDEN (Upper/Lower case, secondary address 7)

				b <sub>7</sub>	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
				b <sub>6</sub>	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
				b <sub>5</sub>	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
				b <sub>4</sub>	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
					0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
b <sub>4</sub>	b <sub>3</sub>	b <sub>2</sub>	b <sub>1</sub>	0				0	a	P	'	7			g	'	7	g		
0	0	0	0	1				1	A	Q	▾	▾			l	à	▾	▾	l	à
0	0	1	0	2				"	2	B	R	-	/		l	è	-	/	l	è
0	0	1	1	3				#	3	C	S	■	■		±	i	■	■	±	i
0	1	0	0	4				\$	4	D	T	■	■		∫	ò	■	■	∫	ò
0	1	0	1	5				%	5	E	U	■	■		†	ù	■	■	†	ù
0	1	1	0	6				&	6	F	V	'	'		-	ä	'	'	-	ä
0	1	1	1	7				'	7	G	W	'	'		†	e	'	'	†	e
1	0	0	0	8				(	8	H	X	■	■		r	i	■	■	r	i
1	0	0	1	9				)	9	I	Y	■	■		τ	ò	■	■	τ	ò
1	0	1	0	A				*	:	J	Z	■	■		∫	Q	■	■	∫	Q
1	0	1	1	B				+	;	K	[	\	ë		†	ä	\	ë	†	ä
1	1	0	0	C				,	<	L	\	L	ÿ		£	ö	L	ÿ	£	ö
1	1	0	1	D				-	=	M	]	/	²		'	ü	/	²	'	ü
1	1	1	0	E				.	>	N	↑	-	π		ˆ	β	-	π	ˆ	β
1	1	1	1	F				/	?	O	-	Γ	ç		"	é	Γ	ç	"	π

Fig. F-3.13 SWITZERLAND (Upper case/Graphics mode, secondary address 0)

				b <sub>7</sub>	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	
				b <sub>6</sub>	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
				b <sub>5</sub>	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
				b <sub>4</sub>	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
					0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
b <sub>4</sub>	b <sub>3</sub>	b <sub>2</sub>	b <sub>1</sub>	0				0	a	p	'	P			g	'	P	g		
0	0	0	0	1				1	a	q	A	Q			l	à	A	Q	l	à
0	0	1	0	2				"	2	b	r	B	R		l	è	B	R	l	è
0	0	1	1	3				#	3	c	s	C	S		±	i	C	S	±	i
0	1	0	0	4				\$	4	d	t	D	T		∫	ò	D	T	∫	ò
0	1	0	1	5				%	5	e	u	E	U		†	ù	E	U	†	ù
0	1	1	0	6				&	6	f	v	F	V		-	ä	F	V	-	ä
0	1	1	1	7				'	7	g	w	G	W		†	e	G	W	†	e
1	0	0	0	8				(	8	h	x	H	X		r	i	H	X	r	i
1	0	0	1	9				)	9	i	y	I	Y		τ	ò	I	Y	τ	ò
1	0	1	0	a				*	:	j	z	J	Z		∫	Q	J	Z	∫	Q
1	0	1	1	b				+	;	k	[	K	ë		†	ä	K	ë	†	ä
1	1	0	0	c				,	<	l	\	L	ÿ		£	ö	L	ÿ	£	ö
1	1	0	1	d				-	=	m	]	M	²		'	ü	M	²	'	ü
1	1	1	0	e				.	>	n	↑	N	π		ˆ	β	N	π	ˆ	β
1	1	1	1	f				/	?	o	-	O	ç		"	é	O	ç	"	π

Fig. F-3.14 SWITZERLAND (Upper/Lower case, secondary address 7)

				b <sub>7</sub>	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
				b <sub>6</sub>	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
				b <sub>5</sub>	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
				b <sub>4</sub>	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
					0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
b <sub>3</sub>	b <sub>2</sub>	b <sub>1</sub>	b <sub>0</sub>	0				0	@	P	-	7			r	-	7		r	
0	0	0	0	1		!	1	A	Q	♠	●			▮	↑	♠	●		↑	
0	0	1	0	2		"	2	B	R	↑	-			▮	↑	↑	-	▮	↑	
0	0	1	1	3		#	3	C	S	-	♥			▮	↑	-	♥	-	▮	
0	1	0	0	4		\$	4	D	T	-	↓			▮	↑	-	↓	-	▮	
0	1	0	1	5		%	5	E	U	-	↘			▮	↑	-	↘	▮	↑	
0	1	1	0	6		&	6	F	V	-	×			▮	↑	-	×	▮	↑	
0	1	1	1	7		'	7	G	W	↓	0			▮	↑	↓	0	▮	↑	
1	0	0	0	8		(	8	H	X	↓	♣			▮	↑	♣	▮	↑	▮	
1	0	0	1	9		)	9	I	Y	↘	↓			▮	↑	↘	↓	▮	↑	
1	0	1	0	A		*	:	J	Z	↘	♠			▮	↑	↘	♠	▮	↑	
1	0	1	1	B		+	;	K	[	↘	+			▮	↑	↘	+	▮	↑	
1	1	0	0	C		,	<	L	£	L	⌘			▮	↑	L	⌘	▮	↑	
1	1	0	1	D		-	=	M	]	↘	↓			▮	↑	↘	↓	▮	↑	
1	1	1	0	E		.	>	N	↑	↘	π			▮	↑	↘	π	▮	↑	
1	1	1	1	F		/	?	0	←	↘	▮			▮	↑	↘	▮	↑	▮	

Fig. F-3.15 USA/UK (Upper case/Graphics mode, secondary address 0)

				b <sub>7</sub>	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	
				b <sub>6</sub>	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
				b <sub>5</sub>	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
				b <sub>4</sub>	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
					0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
b <sub>3</sub>	b <sub>2</sub>	b <sub>1</sub>	b <sub>0</sub>	0				0	@	p	-	P			r	-	P		r	
0	0	0	0	1		!	1	a	q	A	Q			▮	↑	A	Q	▮	↑	
0	0	1	0	2		"	2	b	r	B	R			▮	↑	B	R	▮	↑	
0	0	1	1	3		#	3	c	s	C	S			▮	↑	C	S	▮	↑	
0	1	0	0	4		\$	4	d	t	D	T			▮	↑	D	T	▮	↑	
0	1	0	1	5		%	5	e	u	E	U			▮	↑	E	U	▮	↑	
0	1	1	0	6		&	6	f	v	F	V			▮	↑	F	V	▮	↑	
0	1	1	1	7		'	7	g	w	G	W			▮	↑	G	W	▮	↑	
1	0	0	0	8		(	8	h	x	H	X			▮	↑	H	X	▮	↑	
1	0	0	1	9		)	9	i	y	I	Y			▮	↑	I	Y	▮	↑	
1	0	1	0	a		*	:	j	z	J	Z			▮	↑	J	Z	▮	↑	
1	0	1	1	b		+	;	k	[	K	+			▮	↑	K	+	▮	↑	
1	1	0	0	c		,	<	l	£	L	⌘			▮	↑	L	⌘	▮	↑	
1	1	0	1	d		-	=	m	]	M	↓			▮	↑	M	↓	▮	↑	
1	1	1	0	e		.	>	n	↑	N	⌘			▮	↑	N	⌘	▮	↑	
1	1	1	1	f		/	?	o	←	O	⌘			▮	↑	O	⌘	▮	↑	

Fig. F-3.16 USA/UK (Upper/Lower case, secondary address 7)



