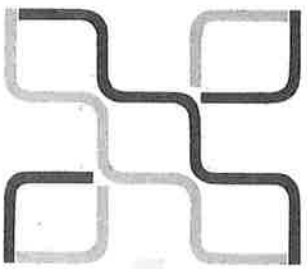
PROTEUS
computer
user manual



PROTEUS

computer user manual

POLYCORP

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PROTEUS COMPUTER

WITH CP/M CONTROL PROGRAM

USER MANUAL

Contents

1. INTRODUCTION

The PROTEUS computer system is an efficient single user computer especially suited to a wide variety of uses in commerce and industry. PROTEUS features outstanding flexibility in application, ease of operation and reliable performance.
The PROTEUS Business System comprises two portable units, computer and visual display unit, which are connected by a 2 m. cable.

Proteus Computer

The PROTEUS features dual 8 bit processors, type Z80A and type 6809, only one of which may run at a time.

PROTEUS reads the first sector on a disk when inserted in Drive A. If the system on disk is FLEX or POLYSYS the 6809 operates, if CP/M the Z80A operates and the system continues loading and executes automatically.

Both processors operate at 4Mhz clock frequency ensuring application programs run quickly.

Internal memory totals 68 kBytes, 4 kBytes ROM and 64 kBytes RAM which is available to the user.

PROTEUS is available in two versions, model "S" fitted with a single 8" floppy disk drive and model "D" fitted with dual 8" floppy disk drives. The drives are Shugart model SA860 Slimline, which are half normal height and help to minimise the package size of the PROTEUS. Double sided single density recording is employed as standard but single sided may be configured for compatibility.

Capacities available are:

CP/M	630 kBytes per disk, (604 kBytes user available, 1.2 MBytes with dual drives).
FLEX POLYSYS	580 kBytes per disk, (560 kBytes user available, 1.1 MBytes with dual drives).

PROTEUS features a wide range of interface ports, for use with printers (serial as well as parallel), joystick/paddles, scientific instruments, A/D converter, modem, memory extension etc.

Standard port arrangement is as follows:

3 - RS232C serial, individually baud rate adjustable, (300 - 9600). Each port assigned individually, visual display unit, printer and modem.

1 - Parallel, Centronics standard.

1 - Memory Extension, 50 way for dual disk drive extension.

Appropriate connection of terminal and printer facilitates multi-tasking, which is a feature of programs such as the wordprocessor, "WORDSTAR".

The modem port may be used to communicate with another mainframe computer, to facilitate offline distributed processing and online terminal functions. Customised software is currently available for PRIME and medium systems BURROUGHS and may be provided for other systems by PROGENI programming staff.

CP/M Control Program

CP/M for PROTEUS is supplied complete with PROTEUS utilities written by POLYCORP, to format disks, quality check newly formatted or used disks for CRC errors, copy disks (mirror) etc. PROTEUS CP/M also features sector buffering to achieve maximum operating speed and auto verify after write to ensure the lowest possible error incidence.
A wide range of application programs are available with the CP/M control program.

FLEX Control Program

POLYCORP can provide the FLEX Control Program which supports a number of utilities offering facilities similar to those offered by CP/M.
Use of the FLEX control program dramatically expands the range of application programs which may be run on PROTEUS.

Lear Seigler Terminal

The PROTEUS System is supplied with Model ADM-23 terminal as standard.

The ADM 23 features a 30.5cm (12") non glare green phosphor screen with display format 80 character/line, 24 lines. Exceptional font clarity and wide bandwidth circuitry provide a display that minimises eye fatigue.

128 ASCII character set, reduced intensity, reverse video, blinking cursor, underlining and protect fields are all available.

Automatic Self-Test executed at time of switch on.

The QWERTY keyboard features 87 keys, separate numeric pad, cursor controls and function and edit key.

Interface, RS232C 75 - 19200 Baud, selectable. Extension port, RS232C transparent print.

Optional Disk Extension Unit

Dual 8" floppy Disk Drives in a separate case are available and provide an additional 1.2 MBytes on line, addressed as Drive "C" and "D". Complete with data bus cable.

Printers

PROTEUS will support a wide selection of printers, with either serial or parallel interface. Select the model with print quality and speed appropriate to the particular application.

Applications

PROTEUS provides for a wide variety of application programs ranging from commercial uses;

for example: Database, Inventory, Debtors Creditors Private and General Ledger, Word Processing, Mail Labels, Sorting, Financial modelling, Invoicing, Payroll etc.

to industrial uses;

for example: Production control, monitoring and annunciation, systems management, sampling, recording, simulation etc.

Application programs to run under CP/M and FLEX are available from PROTEUS distributors.
Programs for specialised applications may be written in a number of operating languages by PROGENI contract programmers. (See Technical Manual).

2. SETTING UP THE SYSTEM

Connecting the Equipment

1. Connect PROTEUS to the Terminal using one of the RS232 ribbon cables supplied with the system. On the terminal, connect to the Modem Port. On the PROTEUS, connect to the Terminal Port (See Appendix C).

2. Connect the PROTEUS to the Printer using the second RS232 ribbon cable. On the PROTEUS connect to the Printer Port. On the printer connect to the RS232 Port.

   Note that the RS232 plugs and sockets are polarised. DO NOT use force.

3. Plug the PROTEUS, the terminal and the printer into the 230V.a.c. power supply. If necessary use extension cord and/or junction box (power board).

Turn On Procedure

1. Switch on at the 230V power supply.

2. Switch on the toggle switch on the back of the PROTEUS. (See diagram, Appendix C).

3. Switch on the rocker switch at the back of the ADM 23 terminal.

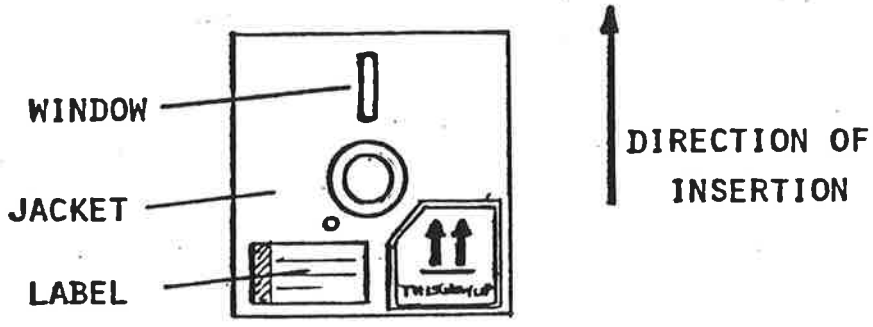
4. Printer - check user manual.

Inserting Disks

1. Ensure that the label is facing upwards.

2. Insert into Drive A, notched end first, until resistance is felt.

3. Secure the disk by depressing the latch lever.



At this stage the PROTEUS will recognise the Control Program and the red disk activitiy light will be on for a short period. The following information will appear on the screen.

PROTEUS CP/M Version 2.2

BIOS V3.3 for 512 byte sectors

Following this is one line of information describing the system configuration and underneath the symbol....

A>

The system is now ready to accept and execute system commands.

Turn Off Procedure

1. Remove disk from the PROTEUS, making sure that the red disk activity light is extinguished.

   The latch will not open if this light is on - DO NOT FORCE the latch, wait until the light extinguishes.

2. Turn off the PROTEUS, terminal and printer.

3. Turn off at the 230V outlet.

3. STANDARD CP/M COMMANDS AND OPERATION SUMMARY

File References

A file reference identifies a particular file or group of files.

File references consist of two parts:

- the primary filename
- the filetype

The two names are separated by a ".", for example:

filename.type

Although the filetype is optional, some are conventionally used, for example:

the filetype "BAS" is used to denote a BASIC language source file.

NOTE:

1. The filename should be of no more than 8 characters in length.
2. The filetype should be of no more than 3 characters in length.

Throughout CP/M the "?" symbol matches the character of a filename in the "?" position. For example:

D X?Z.C?M

Will show on screen

XYZ.COM or X3Z.CAM

NOTE: * IS A GLOBAL FILENAME.
* WILL FILL THE REMAINDER OF THE FILENAME OR FILETYPE WITH ?s.

1. *.* is equivalent to ????????.???
2. filename.* is an abbreviation for filename.???
3. *.type is an abbreviation for ????????.type

For example:

WS*.* is an abbreviation for WS??????.???

D *.* is interpreted as a command to list the names of all disk files in the directory.

Similarly

D X.Y searches only for a file by the name X.Y

NOTE: If a file shows on the directory with an extension of .$$$ it means that the copying of a file was unfinished.

Switching Default Disk Drive

The user can switch the currently logged disk by typing the disk drive name followed by a colon.

In the dual drive PROTEUS the drives are labelled "A" and "B", where "A" is the default drive.

To change the logged drive from A to B, simply type

B:

and then press RETURN. The screen will then show B> instead of A>.

The user may enquire on the status of the disk in drive B at any time by typing, for example:

STAT B:E*.*

This will list all filenames beginning with E on the disk in drive B.

SWITCHING DISKS

When changing disks in a drive, type CONTROL C to perform a warm start, so that the CP/M Control Program will read the directory of the new disk and update the free space map.
If this is not done the disk will be Read Only.
If changing from a single sided to a double sided disk in drive B: or vice versa, this is particularly important.

Utilities

ERA — The erase command removes files from the currently logged disk.

The following are valid uses of ERA.

```
ERA X.Y                 ERA X?Y.C?M
ERA X*                  ERA A.*
ERA *.BAK               ERA B:*.PRN
```

D — The directory command lists the files on the currently logged disk.

Valid D commands are:-

```
D X.Y
D X?Y.C?M
D ??.Y
D ?I??????.???
```

or

```
D B:
D B:X.Y
D B:*.B?K
```

REN — The Rename command allows the user to change the names of the files on disk.

Valid uses of the REN command are:

```
REN X.Y=Q.R                 The file Q.R is changed to X.Y

REN XYZ.COM=XYZ.XXX         The file XYZ.XXX is changed to
                            XYZ.COM.
```

or

```
REN A:X.ASM=Y.ASM
REN B:ZAP.BAS=ZOT.BAS
REN B:A.BAS=B:A.BAK
```

In other words: REN NEWNAME=OLDNAME

TYPE — The TYPE command displays, on the screen, the contents of the source file on the currently logged disk.

Valid commands are:

```
TYPE X.Y            TYPE X.BAS
TYPE XXX            TYPE B:X.PRN
```

To stop and start listings, use CONTROL S.

STAT

This command provides general statistical information about file storage. It is initiated by typing one of the following:

```
STAT
STAT command line
```

The following are valid command lines:

```
STAT ?A*.*
STAT B:A*.*          where B is the non-default drive
STAT *.*
```

STAT can be used to write protect a file, for example:

```
STAT filename $R/O
```

or, conversely to return a file to read/write status:

```
STAT filename $R/W
```

PIP

This is the CP/M Peripheral Exchange Program or, file copy utility. It implements the basic media conversion operation necessary to load, print, copy and combine disk files.

When the drive name is not included, the current drive is assumed.

The following are valid command lines:

`PIP X=Y`	Copy to file X from file Y. File Y remains unchanged.
`PIP X=Y,Z`	Concatenates files Y and Z and copies to file X with Y and Z unchanged.
`PIP X.BAS=Y.BAS,Z.BAS,FIN.BAS`	Create the file X.BAS from the concatenation of the Y, Z and FIN files with the type BAS.
`PIP NEW.ZOT=B:OLD.ZAP`	Move a copy of OLD.ZAP from drive B to the currently logged disk. Name the file NEW.ZOT.

PIP B:A.U=B:B.V,A:C.W,D.X	Concatenate file B.V from drive B with C.W from drive A and D.X from the logged disk; create the file A.U on drive B.
PIP B:=A:WS*.*	All WS files to be copied from drive A to drive B.
PIP TTY:=filename.type	Copies a file straight to the screen.
PIP LST:=PB1059.MAC	Will print the file PB1059.MAC to the printer. Type any key to stop the print.
PIP filename=TTY:"That's all for now."	Puts this message into filename.

NOTE: BUILT IN AND TRANSIENT COMMANDS

1. ERA, REN and TYPE are commands 'built in' to the CP/M Control program and are known as BUILT IN COMMANDS.

2. D, STAT and PIP are loaded from disk for execution and are known as TRANSIENT COMMANDS.

Error Messages

(A) There are THREE error situations that the BASIC Disk Operating System (BDOS) recognises and intercepts during file processing. When one of these conditions is intercepted, the BDOS prints the message:

BDOS ERR ON d: error

where d is the drive name and "error" is one of the three error messages:

BAD SECTOR

SELECT

READ ONLY

1. BAD SECTOR — indicates the disk controller has detected an error in reading or writing to the diskette. It could be caused by a malfunctioning disk controller or an badly worn diskette.

   BAD SECTOR errors are further categorised by BIOS: NOT READY, NOT FOUND, CRC, WRITE PROTECT.
   NOTE: BIOS stands for BASIC INPUT OUTPUT SYSTEM.

2. SELECT — Occurs when there is an attempt to address a drive beyond the range supported by the BIOS. In this case the value of d in the error message gives the selected drive.

3. READ ONLY — Occurs when there is an attempt to write to a file that has been designated Read Only in a STAT command or has been set to Read Only by the BDOS. Reboot by using warm start (CONTROL C) or by using a cold start whenever diskettes are changed.

(B) The C or Check facility in PUTSYS

PUTSYS is described in Chapter 4 of this manual. Its C facility will show the following error messages:

NOT READY — Disk not in drive or single sided disk inserted instead of double sided.

NOT FOUND — Can't find track and sector. (Formatting destroyed or incorrect)

CRC — Reading back different information than recorded. (Go to another drive, or clean heads)

WRITE PROTECT — No disk tab. This is the silver or cream coloured stick-on tab placed over the Write Protect notch which may be on the end of the disk. Some disks do not have this notch.

4. COMMANDS IMPLEMENTED BY POLYCORP NZ LTD

UTE — Includes sub-commands for formatting and checking disks.

When UTE is typed, a menu will appear on the screen and the user is asked to input choice, for example:

M to Mirror(copy) an entire disk
F to format a blank disk
C to check the disk
CONTROL C to reboot CP/M

PUTSYS — For copying the CP/M operating system on to a blank formatted disk. It includes sub-commands to configure the operating system to suit a particular installation. The PUTSYS Menu appears as follows:

TYPE R TO READ SYSTEM FROM DISK VERSION 3.0 OR >

T TO USE SINGLE PORT HARDWARE WITH TELEVIDEO TERMINAL
A TO USE SINGLE PORT HARDWARE WITH ADM-21 TERMINAL
B TO USE SINGLE PORT HARDWARE WITH ADM-31 OR ADM-42
C TO USE MULTI PORT HARDWARE WITH SERIAL PORT PRINTER
P TO USE MULTI PORT HARDWARE WITH PARALLEL PORT PRINTER

W TO WRITE SYSTEM ON TO DISK

X TO EXIT

?

NOTE: Please read the explanation at the top of the screen.

UDLL — This is a specialised command for up and down-line loading of files to/from a Burroughs Mainframe.

Other software may be made available from time to time to facilitate communication and file exchange with other mainframe systems. (Refer Dealer)

5. FORMATTING AND CONFIGURING OF DISKS

To Format a Blank Disk

1. For a Double-sided disk:

Ensure that a disk containing the CP/M operating system is in Drive A.

Type UTE

When the Menu appears make the following choices in this order:

F
A,B,C, or D (the Drive number)
Y (to answer the question)
C (to check the newly formatted disk)
A,B,C, or D (the Drive number)

Press CONTROL C to exit from UTE when formatting and checking is complete.

2. For a Single-sided disk:

A single sided disk will automatically be formatted in IBM 3740 format. (Standard CP/M 128 byte sectors).

To Install CP/M Operating System

Ensure that a disk containing the CP/M Operating System is in Drive A.

Type PUTSYS

When the menu appears on the screen make the following choices in this order:

R	To read the system from disk
Drive?	Disk from which system is read
T,A,B or C	The appropriate configuration
W	To write the system to disk
Drive?	Disk to which sytem is written
X	To exit from PUTSYS

The comment "Done" will appear after each choice, with a question mark prompting the next choice.

The Drive response may be the same each time - that is, you may be reading the system from the disk in Drive A and writing it back on to the same disk in Drive A. This will occur when you are altering the system on disk to cope with a different configuration.

NOTE: When you are installing the CP/M operating system you also configure it to suit your particular installation, so make your second choice carefully.

Transferring Files To and From Single-Sided Disks

The user is able to copy files from double-sided disks in drive A to single-sided disks in drive B and vice versa.

Insert the single- sided disk in drive B

Press CONTROL C (This is important as it selects the standard CP/M 8" format rather than the PROTEUS double-sided format. It does this automatically once CONTROL C is pressed and is useful for transferring files to and from other systems.)

Use the normal copy facility, that is, the PIP command.

When you put a double sided disk in drive B, type CONTROL C again.

Backing Up Files and Disks

In case of accidents or disk corruption it is important to have not only each of your files backed up on the same or another disk but also to have back up copies of each disk.

Files are automatically backed up by most Editors. For example, Wordstar files are backed up by the command CONTROL KD and will appear on the directory with a .BAK filetype.

1. TO BACK UP YOUR OWN FILES

Use the PIP Utility as described in Chapter 3.

2. TO BACK UP A DISK

Use the UTE command then follow by choosing the M (Mirror) sub-command. (See page 14).

6. PRINTING A FILE

To Print a File to the Printer

Type PIP LST:=filename.type

Type any key to stop the print.

To Copy a File to the Screen

Type PIP TTY:=filename.type

or

Type TYPE filename.type

To Print the Directory to the Printer

Type CONTROL P DIR (This does not show on screen)

To disable type another CONTROL P

7. TO LOAD AND RUN MICROSOFT BASIC

Note that this is only one example of the programming languages which may be used on PROTEUS and must be purchased separately. Other languages, for example, are Fortran, PL 1, Pascal, and Cobol.

When the BASIC language interpreter is present on disk:

Type MBASIC after the A> symbol, thus:

A>MBASIC

To return to the operating system, type the word:

SYSTEM

NOTE: CONTROL S stops and starts program listings

8. DETAILED SPECIFICATIONS OF RS232C AND PARALLEL PORTS

Multiple Port Operation

One port is dedicated to the terminal, one to the printer and a third RS232 port is available for connection to a mainframe etc.

A parallel port is available for connection to a Centronics-like parallel printer, or to a hard disk interface.

(A) TERMINAL RS232 PORT

Address	04,05 (E004,5 for 6809)
IC	MC6850
CP/M device	CON:
Baud Rate	300,600,1200,2400,4800,9600 Selectable by jumper
Connector	DB25 Female connector on PROTEUS

Connections-

1	GROUND	
2	TXDATA	Data transmitted by terminal to PROTEUS.
3	RXDATA	Data transmitted by PROTEUS to terminal.
5	CLEAR TO SEND	Normally high level output by PROTEUS. Can be set low by software.
6	DATA SET READY	High level output by PROTEUS.
7	GROUND	
8	DATA CARRIER DETECT	High level output by PROTEUS.
20	DATA TERMINAL READY	High level output by terminal when it is ready to receive data. No data will be transmitted by PROTEUS while this line is low.

(B) PRINTER RS232 PORT

Address	08,09 (E008,9 for 6809)
IC	MC6850
CP/M device	LST: (LPT:)
Baud Rate	300,600,1200,2400,4800,9600 selectable by jumper.
Protocol	8 data bits, no parity, 1 stop bit. (Software selectable)
Connector	DB25 Female connector on PROTEUS.

Connections-

1	GROUND	
2	TXDATA	Data transmitted by printer to PROTEUS.
3	RXDATA	Data transmitted by PROTEUS to printer.
5	CLEAR TO SEND	Normally high level output by PROTEUS. Can be set low by software.
6	DATA SET READY	High level output by PROTEUS

7 : GROUND
8 : DATA CARRIER DETECT High level output by PROTEUS
20 : DATA TERMINAL READY High level output by printer when it is ready to receive data. No data will be transmitted by PROTEUS while this line is low.

The CP/M software will allow hardware handshake with pin 20 or software handshake with X-ON, X-OFF protocol.

(C) MODEM RS232 PORT

Address	OC,OD (E00C,D for 6809)
IC	MC6850
CP/M device	RDR:, PUN:
Baud Rate	300,600,1200,2400,4800,9600 selectable by jumper.
Protocol	8 data bits, no parity, 1 stop bit.(Software selectable)
Connector	DB25 Female connector on PROTEUS.

Connections-

1 : GROUND
2 : TXDATA Data transmitted by PROTEUS to modem.
3 : RXDATA Data transmitted by modem to PROTEUS.
4 : REQUEST TO SEND High level transmitted by PROTEUS when it wants to transmit data.
5 : CLEAR TO SEND High level transmitted by modem when it is ready for PROTEUS to transmit data.
7 : GROUND
8 : DATA CARRIER DETECT High level output by modem.
20 : DATA TERMINAL READY High level output by PROTEUS.

(D) PARALLEL PORT (OPTIONAL PRINTER PORT)

Address		00-03 (E000-E003 for 6809)
IC		MC6821
CP/M Device		LST: (UL1:)
Protocol		Centronics Standard
Connector		Amphenol 57F-36, female on PROTEUS
Pins		
1	STROBE	Low signal to indicate valid data on pins 2-9
2-9	DATA 1-8	Data
11	BUSY	High signal output by printer to when it is not ready to receive data.
16	LOGIC GND	
19-30	LOGIC GND	

All I/O pins of the 6821 are available for connection to a peripheral if required.

(E) NETWORK PORT

HDLC Port for network of POLY computers.
5 pin NEUTRICK microphone connector. Female connector on PROTEUS.

Pin 1 : Data out from PROTEUS
Pin 2 : Clock out from PROTEUS
Pin 3 : Ground
Pin 4 : Data in to PROTEUS

APPENDIX A: TECHNICAL DESCRIPTION

Processors	6809 (Motorola) Z80A (Zilog)
Memory, RAM	64 kBytes
Memory, ROM	4 kBytes
Clock	Z80A 4 MHz (1 wait state per machine cycle) 6809 4 MHz clock, 1 MHz cycle
Disk Drives	One or two 8" floppy drives (Shugart SA860). Double sided single density. Single sided can be used for compatibility. Capacity, CP/M 630 kBytes per disk FLEX, POLYSYS, 580 kBytes per disk.
Ports	3 RS232C Serial 300-9600 Baud, selectable by jumper 1 Parallel, Centronic standard 1 Disk Extension, 50 way 1 POLYNET
Operating Systems	CP/M standard operating system for 8080/Z80A FLEX, standard operating system for 6809 POLYSYS, operating system for POLY network
Dimensions	382 mm wide, 133 mm high, 373 mm deep
Power Requirement	230 Volt AC +-10%, 140 Watts
Operating Temperature	0 C to 35 C
Operating Relative Humidity	20% to 90%, non condensing

DISK OPERATION:

The normal CP/M format used is single density, double sided. 512 byte physical sectors are used with code to block and deblock the 128 byte logical sectors of CP/M. Single sided with 128 byte sectors can be used on drive B: for transfer to other CP/M systems, ie photo typesetter. This format is automatically selected when a warm or cold start is performed with a single sided disk inserted. It is considered that the double sided

blocked format will always be used, except for interchange with other CP/M systems.

With FLEX and POLYSYS single or double sided need only be defined at the time of formatting the disk. 256 byte sectors are used.

DISK CAPACITY (CP/M):

	Single sided 128 byte sectors	Double sided 512 byte sectors
Sides	1	2
Tracks/side	77	77
Sectors/track	26	8
Bytes/sector	128	512
Total formatted capacity per disk	256256	630784

In both systems the sectors on side two are numbered as a continuation of the sectors on the same track on side one.

POLYCORP UTILITIES:

Utility programs have been written to format disks, check newly formatted or used disks for CRC errors, copy entire disks to another etc.

The POLYCORP utilities are in file UTE.COM which displays a menu of the commands available. The command file PUTSYS should be used to copy the operating system onto a disk and reconfigure as necessary. These Utilities are explained in Chapter 4.

Standard CP/M utilities as described in the CP/M manual, except that PUTSYS should be used instead of SYSGEN.

APPENDIX B: INSTALLATION NOTES

(A) PROTEUS INSTALLATION NOTES

The serial printer port is physical device LPT:
The parallel printer port is physical device UL1:

Change the logical LST: device to either with
STAT LST:=LPT: or STAT LST:=UL1:
This will remain in effect until the next cold start.

Change the default setting with PUTSYS.

The baud rate for the modem port is the upper block when looking at the I/O PCB. The baud rate for the printer port is the lower block. The jumper positions are as follows-

2400...1200
4800....600
9600....300

The RDY/BSY jumper is used for controlling the printer hardware handshake. (XON - XOFF is also supported and automatically controlled by software)...
If the printer uses pin 20 (DTR) for handshake (high = ready) then put the jumper in the RDY position. If it uses a signal which is high when busy then put the jumper in the BSY position.
If the printer does not use pin 20 then make a special cable.

(B) INSTALLING SOFTWARE

WORDSTAR:

Select ADM-31 for the ADM-23. Teletype-like printer will always work, however improved spacing may be obtained by selecting the DIABLO option if a DIABLO printer is used.

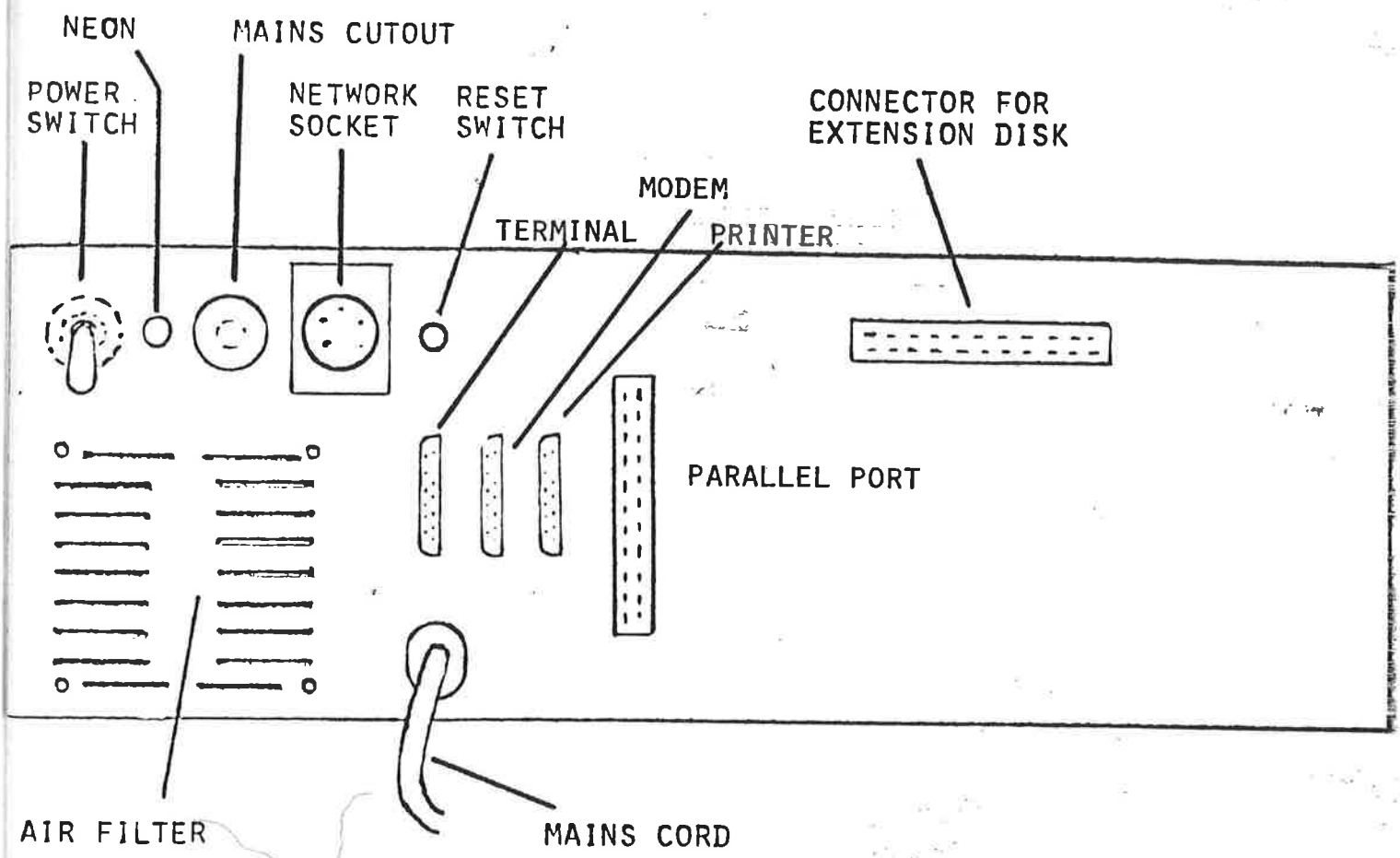
LST: will always work, however for printing and editing at the same time with a serial printer, Wordstar's Port Driver is better.
Install as follows-

```
I/O         (map)
Accept
09          (data port)
Accept
08          (status)
02          (bits)
02          (bits)
```

DBASE II

The ADM-31 selection does not clear the screen on (all) ADM-31s!! It does work on ADM-21 and Televideo terminals. To use an ADM-31 install first for ADM-31 then reinstall and change the code to clear the screen from CONTROL Z to ESC *.

APPENDIX C: DIAGRAMS



PROTEUS COMPUTER (BACK)