OSMOSIS DOUBLE DENSITY KIT

USER MANUAL

SINGLE-SIDED DOUBLE DENSITY

APPLICATIONS

MARCH 1983

Contents   PAGE

Tools required

Installation into Osborne 1 Mk I.

1 #0 Phillips Screwdriver.
1 #1 Phillips Screwdriver.
1 0.050 (1/20) Allen Key.
1 Flat-head screwdriver.
1 New copy of your Osborne CP/M system disk.

Installation into Osborne 1 Mk II.

1 #1 Phillips Screwdriver with long shaft (4" or longer).
1 Flat-head screwdriver.
1 New copy of your Osborne CP/M system disk.

INTRODUCTION

Installing the Osmosis board is relatively easy providing you follow the step by step instructions and give care and thought to the job. Many of these boards have been installed in Europe by end-users like yourself and this Manual has been re-compiled based on the questions they raised.

We suggest you read generally through the installation instructions before you start the installation.

A table or bench large enough to accomadate the dismantled Osborne 1 is required first. Mistakes will be made if you try to install the board on the floor or where there is not enough room to work.

Start by creating a new copy of your CP/M System disk by using the copy program or PIP and SYSGEN. This newly created disk will become your new Double Density System Master.

Collect all the tools required (they are itemized at the foot of the contents page) then turn to the section for installation appropiate to your model. Generally the Osborne 1 mkI is a brown case and the Osborne 1 mkII a blue case. If your model does not fit either circumstance then follow Osborne 1 mkI installation.

The Double Density expander board has been well proven. However we operate a hot-line telephone service (in office hours) on (415) 864 - 6372 which you should use if you have any problems.

KIT CONTENTS

1. Double Density Board
2. 1.4.x ROM
3. Double Density Distribution Diskette
4. Emulation Diskette (if included)
5. Single Sided Double Density Manual
6. Stamped addressed envelope
7. Registration form
8. Shipping letter

INSTALLATION OF DOUBLE DENSITY KIT INTO OSBORNE 1 MK I

NOTE:Ensure you have copied the Osborne CP/M System disk before
you start.

1. Disconnect from the power source.

2. Disconnect the keyboard connector (and any other connectors
such as modem or external video) place keyboard to one side
and ensure keyboard connector latches are pushed back in.

NOTE: When removing screws separate or mark them so you will know
which to reinsert. The screws for the handle are different
from the others you will remove.

3. Release and remove the 7 phillips head screws as shown in
fig. 1.1.

4. Turn the contrast and brightness control knobs fully counter
-clockwise unscrew and remove using a 0.05" (0/20) Allen
key.

5. The front black plastic moulding can now be removed.

6. Working from the back of the unit, the phillips screws
either side of the handle can be removed. Do not remove the
six phillips head screws around the power plate (fig 1.2).
Should you find that the internal frame cannot be slid
clear of the plastic case (as step 8.) because the internal
cables have been clipped together, then the 6 phillips
screws around the power plate can be removed.

7. Now release and remove the phillips screws shown in fig 1.3.

8. The internal frame can now be slid out of the plastic case.

9. Turn the frame upside down so that the underside of the main
printed circuit board (PCB) is uppermost, release and remove
the 4 cross phillips screws that hold the PCB to the frame.
The PCB can now be laid flat with the component side on top.
Take care not to bend any component legs.

10. Remove any jumpers fitted to J3, J4 & J5, the position of
which can be seen on fig 1.4. The jumpers should be kept in
a safe place because sometime in the future you may wish to
return your Osborne 1 to its original state.

11. Locate connector P8 (on Osborne board) and carefully unplug it, taking care not to bend the contacts. Plug the connector into the side of J1 (OSMOSIS board). The Osborne cable has a red leader. When connecting into J1, the red leader should be on the same side as the red mark on the Osmosis board and to the left when viewed from the front.

12. Plug J1 (OSMOSIS board) onto P8 (Osborne board). This connection is all the board needs to support it.

13. Now locate J3, J4 & J5 again (Osborne board) and fit the 10 pin connector from the left hand side of the OSMOSIS board (J2) onto the 8 pins at J4 & J5. Note that the connector is keyed and can only be fitted correctly.

14. The 2 pin connector is plugged onto J3 (Osborne board).

15. Locate the monitor ROM (fig. 1.4). This ROM can be carefully removed by placing the flat-head screwdriver under either end and gently turning the screwdriver until the ROM lifts from its socket at that end. Repeat this procedure at the other end until it is removed altogether.

    Now take the ROM supplied. The small semi-circular cut-out in the ROM must be on the LEFT looking from the front (fig 1.4). If the ROM pins will not fit into the socket then place the ROM on a flat surface and gently bend the pins inwards on both side until the pins fit the socket correctly.

16. Replace the Osborne PCB with the 4 screws, turn the frame the right side up and slide into the plastic case. Replace the screws either side of the handle, making sure the correct screws are used as incorrect screws may damage the drive harness running behind the handle assembly.

    If you removed the screws from around the power plate replace them at this time taking care to mount the power plate the right side up.

17. Replace the screws in the side of the case. Then replace the front black plastic cover ensuring that all the connectors come through their holes before replacing the last seven screws.

INSTALLATION OF DOUBLE DENSITY KIT INTO OSBORNE 1 MK II

NOTE: Ensure you have copied the Osborne CP/M System disk before you start.

1. Turn on your machine but do not boot. The message on the screen will indicate if you have a 1.4.x or 1.3 monitor ROM installed. If yours is 1.4 then do not replace the ROM as indicated in 15.

2. Disconnect from the power source.

3. Disconnect the keyboard connector (and any other connectors such as modem or external video), place keyboard to one side and ensure connector latches are pushed back in.

4. Release and remove the 6 phillips screws as shown in fig. 2.1.

5. Pull off the contrast and brightness control knobs.

6. The front blue plastic moulding can now be removed.

7. Close the air cooling door if open, and carefully turn the unit upside down and release the 5 screws shown in fig 2.2

8. Remove the plastic case bottom (now on top) and place it to one side.

9. Release and remove the 4 phillips screws that hold the main Printed Circuit Board (PCB) to the frame. Carefully lift out the plastic power plate and put it to one side. It may be necessary to unplug cables in order to lay the PCB flat, do so taking a careful note of where they came from and where they plug-in. The PCB can now be laid flat with the component side on top. Take care not to bend any component legs.

10. Remove any jumpers fitted to J3, J4 & J5, the position of which can be seen on fig 2.3. The jumpers should be kept in a safe place because sometime in the future you may wish to return your Osborne 1 to its original condition.

11. Locate connector P8 (on Osborne board) and carefully unplug it, taking care not to bend the contacts. Plug the connector into the side of J1 (OSMOSIS board). The Osborne cable has a red leader. When connecting into J1, the red leader should be on the same side as the red mark on the OSMOSIS board and to the left when viewed from the front.

12. Plug J1 (OSMOSIS board) onto P8 (Osborne board). This connection is all the board needs to support it.

13. Now locate J3, J4 & J5 again (Osborne board) and fit the 10 pin connector from the left hand side of the OSMOSIS board (J2) onto 8 pins at J4 & J5. Note that the connector is keyed and can only be fitted correctly.

14. The 2 pin connector can be plugged onto J3 (Osborne board).

15. Locate the monitor ROM (fig 2.3). If yours is already 1.4 then go to number 16. This ROM can be carefully removed by placing the flat head screwdriver under either end and gently turning the screwdriver until the ROM lifts from its socket at that end. Repeat this procedure at the other end of the ROM until it is removed altogether.

    Now take the ROM we supplied. The small semi-circular cut-out in the ROM must be on the LEFT looking from the front (fig 2.3). If the ROM pins will not fit into the socket then place the ROM on a flat surface then gently bend the pins inwards on either side until the pins fit the socket correctly.

16. Replace the power plate and cover remembering to plug-in any cables which were unplugged earlier. Replace the 4 screws which hold the main PCB in place. The power plate cover is positioned with the hinge nearest the work surface and clips into small plastic inserts at the lower end.

17. Replace the case bottom screw it down. Take care when screwing down the case not to over-tighten the screws. Then turn the unit the right side up and replace the front blue plastic cover and secure it with the 6 screws.

SINGLE-SIDED DOUBLE DENSITY (SSDD) SOFTWARE

REQUIREMENTS

1. Your newly created copy of the Osborne CP/M system disk.

2. Your Osborne Utilities disk.

3. The distribution disk we supplied (Note: We do not supply CP/M on this disk hence it will not boot).

(ret) = Press return key

1) Place your newly created system disk in drive A (left hand drive) and the disk we supplied in drive B. Boot the system then press ESC key to arrive at the CP/M prompt on the screen.

2) Enter PIP a:=b:*.*[v] (ret)

3) When the programs have transferred sucessfully from B to A, take out the disk in drive B and insert your Osborne Utilities disk in drive B.

4) Enter B:SUBMIT PATCH (ret). The computer will respond by carrying out a series of commands. (If you are interested in how the computer is able to carry out commands on its own an explanation is given in chapter 12).

5) When these commands have finished and the screen shows:

```
-R3e80
NEXT PC
2800 0000
-
```

Press ctrl C i.e. Enter Control C

6) Enter SYSGEN (ret)

7) The computer will respond

   SOURCE drive (A or B)

8) Press return key ONLY

9) The computer will respond

   DESTINATION (A,B or RETURN to exit)

10) Enter A (ret)

11) The Double Density System Master has now been created – this disk should be marked accordingly. Use the reset button to restore the system.

USING SINGLE SIDED DOUBLE DENSITY SOFTWARE

1)   You have now created your new Double Density system master disk. This disk should be marked accordingly. Similarly any disks which you wish to retain as a single density system must also be marked accordingly.

FORMATTING A DISKETTE

2)   To format a disk place your Double Density System Master in drive A and a new certified double density disk in drive B.

   NOTE: Your response is shown in a box i.e. [B]
         (ret) = Press return key

   Enter FORMAT (ret)

   The computer will respond:

   Osmosis Ltd
   disk formatting program for the osborne 1 microcomputer

   Enter disk code to format A-P[B] *(drive B)*
   Enter format type :-
   Single Sided Single Density - 0
   Single Sided Double Density - 1
   Double Sided Double Density - 2
   Double Sided Double Density extended - 3

   Enter ctrl C to exit [1]

   Load disk in drive - press return when ready [(ret)]

   Drive B will be formatted showing the tracks in hexidecimal code on the screen. Then the computer should respond:

   Disk successfully formatted

   Enter disk code to format A-P[ctrl C]

COPYING A CP/M SYSTEM

3)   Having now formatted the disk in drive B the CP/M system can be written onto the formatted disk:

   Enter SYSGEN (ret)

   The computer will respond:

   <u>SOURCE</u> drive (A or B)

Enter A

The computer will respond:

<u>DESTINATION</u> (A,B or return to exit)

Enter B

If the computer responds:

system written successfully (if not return to step 4)

Enter (ret)

4) When using SYSGEN always be sure you have used the DOUBLE DENSITY CP/M as the source, rather than an unpatched Osborne distributed single density CP/M.

OPERATING UNDER DOUBLE DENSITY

5) The disk in drive B is now formatted and contains a Double Density version of CP/M. The next step is to place some programs on this disk.
(REN Help.Com)

Enter DD14 (ret) – This command initializes the Double Density System.

Enter PIP b:=a:pip.com[v] (ret)

When pip.com has copied successfully from drive A to B, take out the disk from B and insert it in A. Take a data or program disk which you wish to transfer to Double Density format and insert it in B.

Enter ctrl C

Enter PIP a:=b:*.*[v] (ret)

When the files have copied successfully, the disk in drive A is complete.

6) Repeat from step 2 for more program and data disks.

AUTO-BOOTING TO DOUBLE DENSITY

7) The system will not autoboot Double Density from a cold start i.e. from power-up or use of the reset button. Therefore the Double Density System Master diskette must always be used on a cold start. For convenience and speed the program DD14.COM can be initialized to autoboot:

Place the Double Density System Master in drive A and boot the system.

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Enter ERA autost.com (ret)

Enter REN autost.com=dd14.com (ret)

When the disk is now used to re-boot, the system will automatically run the Double Density System.

8)   It is NOT necessary to re-boot the system every time you wish to change diskettes:

Enter ctrl C when you wish to change diskettes. Ctrl C is used after the new diskette is inserted. This is known as a "warm-boot".

This proceedure will work providing the diskette you insert has a CP/M system i.e by using the command SYSGEN.

IMPORTANT NOTE When using SYSGEN to copy the CP/M system to a Double Density Diskette:

1. Make sure the source is a Double Density System.

2. SYSGEN and SETUP will not work when running under the Double Density System. Make sure you have not entered DD14 or auotbooted the Double Density system. If you cannot remember, use the reset button or power off.

9)   Should you wish to take the "autoboot" facility further then use the Osborne program called SETUP (under the single density system). The following describes this facility for Wordstar, it can equally be used for any other programs:

a.   Create a Double Density version of your Wordstar programs ie. Follow from step 2.

b.   Reboot with your Double Density system disk in drive A. Be certain that the Double Density file DD14.COM is not run or autobooted.

NOTE: Your response is shown in a box i.e. $\boxed{A}$

c.   Enter $\boxed{\text{SETUP}}$ $\boxed{\text{(ret)}}$

The computer will respond:

Which diskette do you wish to configure

Drive (A or B)

Enter $\boxed{A}$

The computer will respond:

Press "A-F" to change values

Enter $\boxed{\text{E}}$

The computer will respond:

Press "0-9" to program keys

Enter $\boxed{0}$

Enter $\boxed{\text{ctrl C} \mid \text{WS} \mid \text{(ret)} \mid \text{(esc)} \mid \text{(esc)}}$

The space between control C and WS is important.

The computer will respond:

Press "0-9" to program keys

Enter $\boxed{\text{x}}$ to exit

If you need to setup other functions such as arrow keys and printer selection, do it at this point, if they have not been amended Wordstar arrow keys and possibly the printer will not work.

Enter $\boxed{\text{x}}$ to exit

The computer will respond:

Destination (A,B or "x" to exit)

Enter $\boxed{\text{A}}$

d. To use the facility you have created, go to step 8 and use the autoboot option to autoboot the Double Density CP/M.

e. Reset using the reset button and boot with the Double Density System Master.

f. Then insert the your Double Density version of Wordstar:

Enter $\boxed{\text{ctrl O}}$ i.e. Control O

The diskette should automatically log in and run Wordstar.

NOTE: The arrow keys will be set for Wordstar on the Double Density System Master. If you are running CP/M or a program that does not require the Wordstar arrow keys you must make another Double Density System Master using the functions you need.

PROBLEM SOLVING

PROBLEM	SOLUTION
1. SETUP will not work.	(1) You are running under Double Density System.
2. SYSGEN will not work.	(1) Same as above. (2) Bad diskette
3. Boot error.	(1) No system on disk. (2) Bad disk. (3) Bug in Monitor OCC Monitor ROM — switch off at POWER and retry.
4. Will not log another disk.	(1) No system on disk. (2) Bad disk. (3) System not Double Density.
5. Random BDOS errors when less than 50% full.	(1) Dirty read/write heads — Purchase head cleaning diskette. (2) Possible mains filter problems. (3) Osmosis board fault.
6. BDOS errors more than 50% full.	(1) Disk drive problem. (a) Speed (b) alignment (c) index sensor.
7. Computer locks-out when logging new diskette.	(1) System not Double Density.
8. Double Density will not work.	(1) Osmosis board fitted incorrecly (2) Diskette not formatted double density. (3) System not Double Density (4) Osmosis board failure. (5) DD14.COM not run.
9. Will not read a Double Density formatted diskette.	(1) DD14.COM not run. (2) Not an Osmosis formatted disk. (3) Bad diskette. Retry formatting.
10. Copy program will not work.	(1) Because a new ROM was inserted — use PIP (and SYSGEN if required) (2) We will issue a new COPY soon.
11. There is no jumpers at J3, J4 or J5.	(1) You have a Double Rom machine — contact Osmosis.
12. Where do the jumpers go at J4 and J5 if the Osmosis board is to be removed.	(1) The rear two pins on each side position front to rear.
13. Cannot generate a Double density system master.	(1) The Distribution Disk is defective (2) Power off for 10 seconds and try again.

14. Double Density will not cold boot.

(1) Because of poor quality disk drives it is not implemented by Osmosis. This method always allows booting.

15. Will not write to diskette.

(1) Diskette not logged with ctrl C.
(2) Diskette files read only use:
STAT *.* $R/W (ret)

16. Printer will not work with density density disks.

(1) Use SETUP on the double density diskette (without running DD14).

THEORY OF OPERATION AND SPECIFICATION

HARDWARE

If you are interested in how Double Density format is achieved the following description will give you a guide:

Information is recorded on a diskette using binary format. Usually a technique called NRZ (Non Return to Zero) is used, where each bit position is magnetized in one direction - 0 or 1. There is no intermediate state hence NRZ.

Frequency Modulation encoding is used and as this is self clocking each bit appears exactly between two successive clock pulses which is called a "frame". So each frame includes a clock bit (always a 1) and a data bit (either 1 or 0).

Every frame is 4 microseconds and equates to 250 bits per second transfer rate. The BPS is derived from the rotational speed of a diskette which is 360 RPM plus/minus 2%.

The basic principle in achieving Double Density is to eliminate as many "superfluous" clock or data bits as possible. Modulated Frequency Modulation (MFM) is used in this case.

Firstly the data bit must appear in the middle of a frame. Secondly the clock bit is written at the beginning of a frame only if no data will appear in that frame and there is no data bit in the previous frame. i.e. a clock bit is inserted only if two consecutive frames will contain 0.

Reading data requires the FM code be converted to digital with absolute accuracy and separate detection for clock and data bits.

SOFTWARE

In order to achieve Double Density the CP/M Basic I/O system (BIOS) must be altered. The BIOS is the only module in CP/M dependant on hardware. The alteration is called a "patch".

The patch is a small program to change various areas in the BIOS which deal with:

1. The block code and blocking pars
2. Sectors per track
3. Sector Blocking and Deblocking
4. Number of directory enteries
5. Directory allocation
6. Allocation vector size
7. Cluster Sector Mapping

In addition because the new BIOS has to recognize if the diskette

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is single or double density a byte must be written to the diskette when formatted to show the diskette is double density rather than single. The patch contains the recognition code to determine if the byte is there or not.

The patch is a file contained on the distribution diskette "patch.hex" which is the BIOS overlay. The program dd14.com initiates the overlay.

The utilities SUBMIT, XSUB, SAVE, DDT, SYSGEN and MOVCPM are all used to generate the new CP/M. The utilities are very useful:

SUBMIT: Allows CP/M commands to be batched together for automatic processing. The commands are "given" to CP/M by a file created by an editor such as Wordstar (using the Non Document option). This file type must be ".SUB". The .SUB file for this generation is PATCH.SUB.

XSUB: Allows the commands batched in the .SUB file to work within a CP/M utility program. In this case commands are issued within DDT. Submit could also be modified to accept ctrl commands.

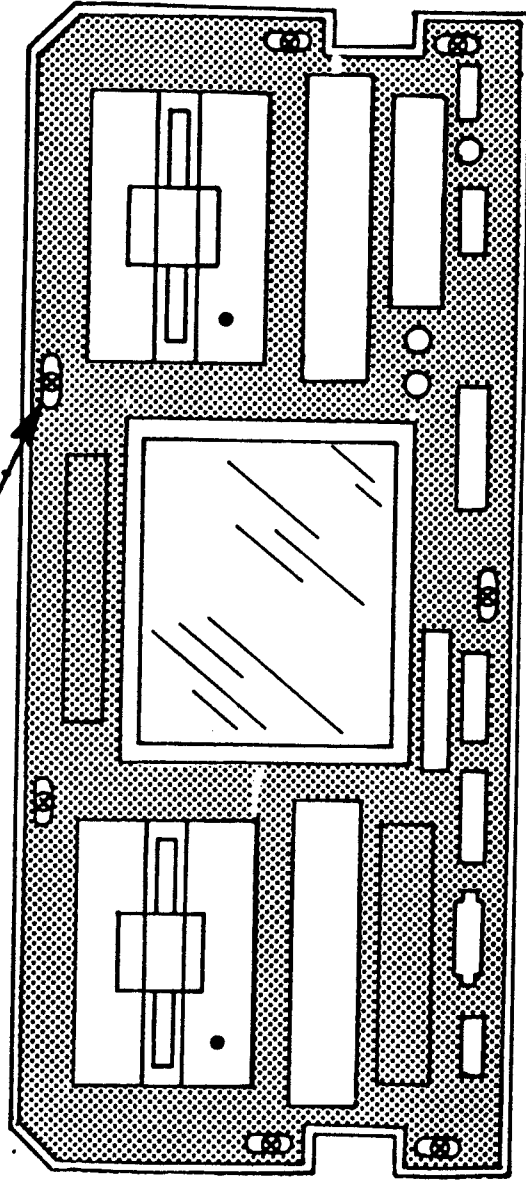SAVE: Saves to disk in 256k byte blocks from the Transient Program Area (TPA).

DDT: Dynamic Debugging Tool, a program to aid with the debugging of a program

SYSGEN: A program to copy a CP/M system from one place to another, either from disk to disk or memory (TPA) to disk.

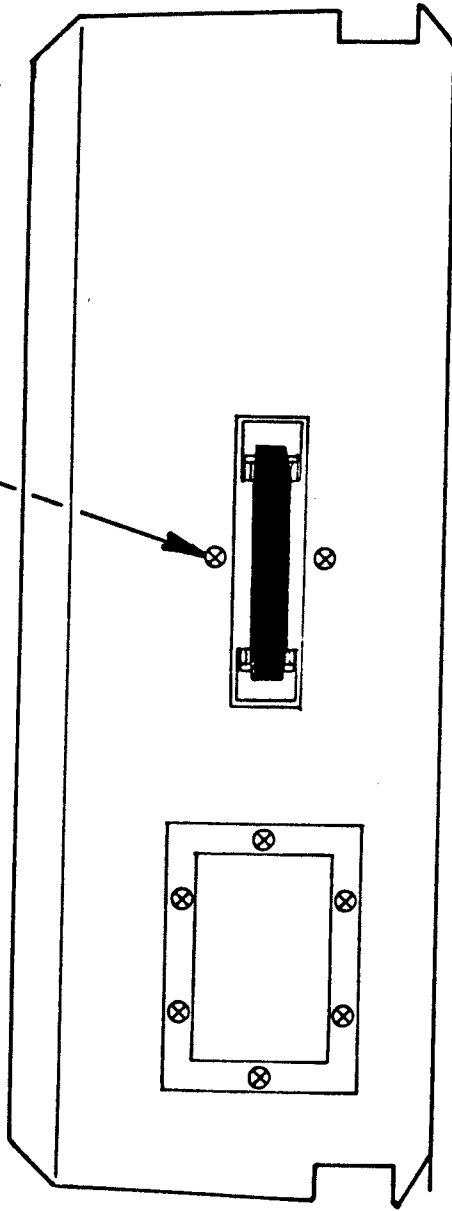MOVCPM: To regenerate the CP/M system for a particular size.

7 X CROSS HD SCREWS
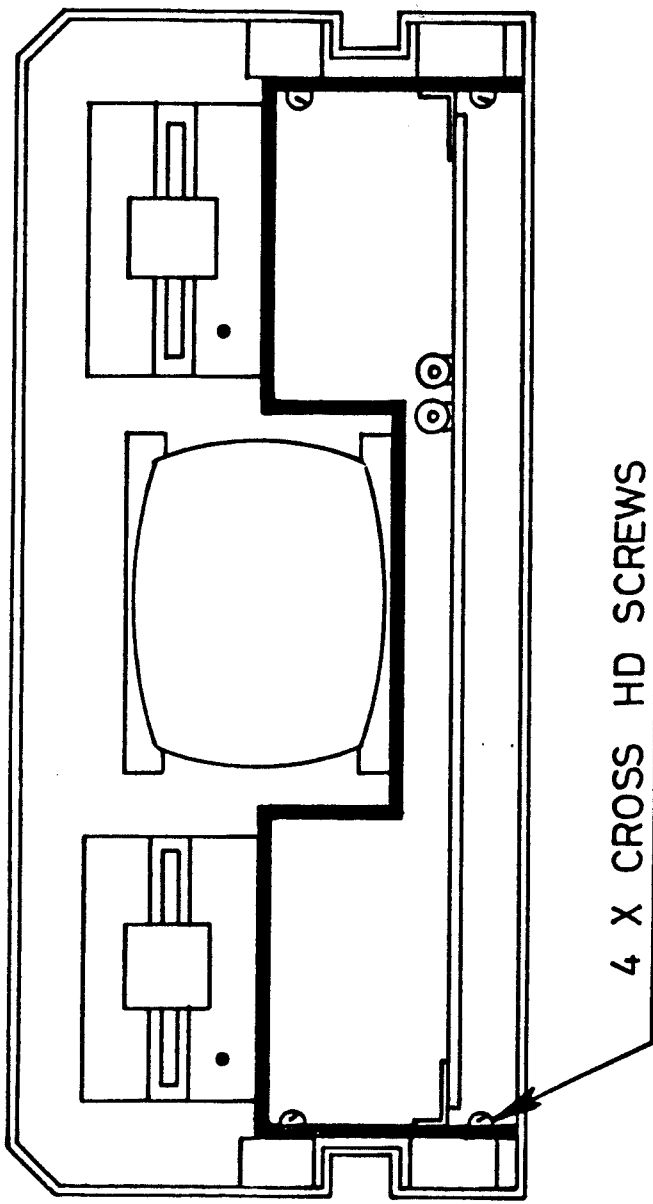
FRONT VIEW WITH KEYBOARD
REMOVED.

FIG. 1·1

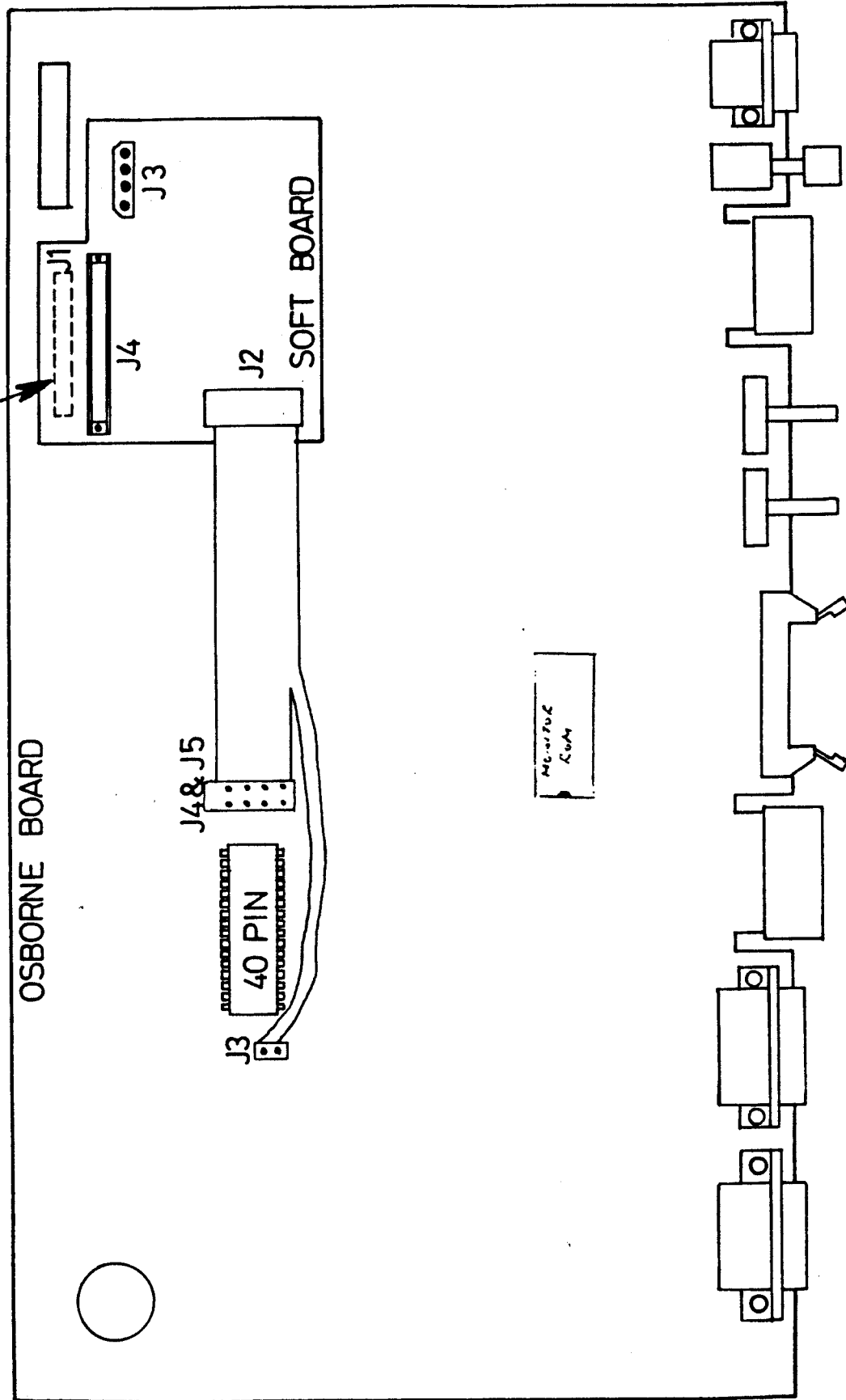8 X CROSS HD SCREWS.

REAR VIEW OF OSBORNE.

FIG. 1·2

4 X CROSS HD SCREWS

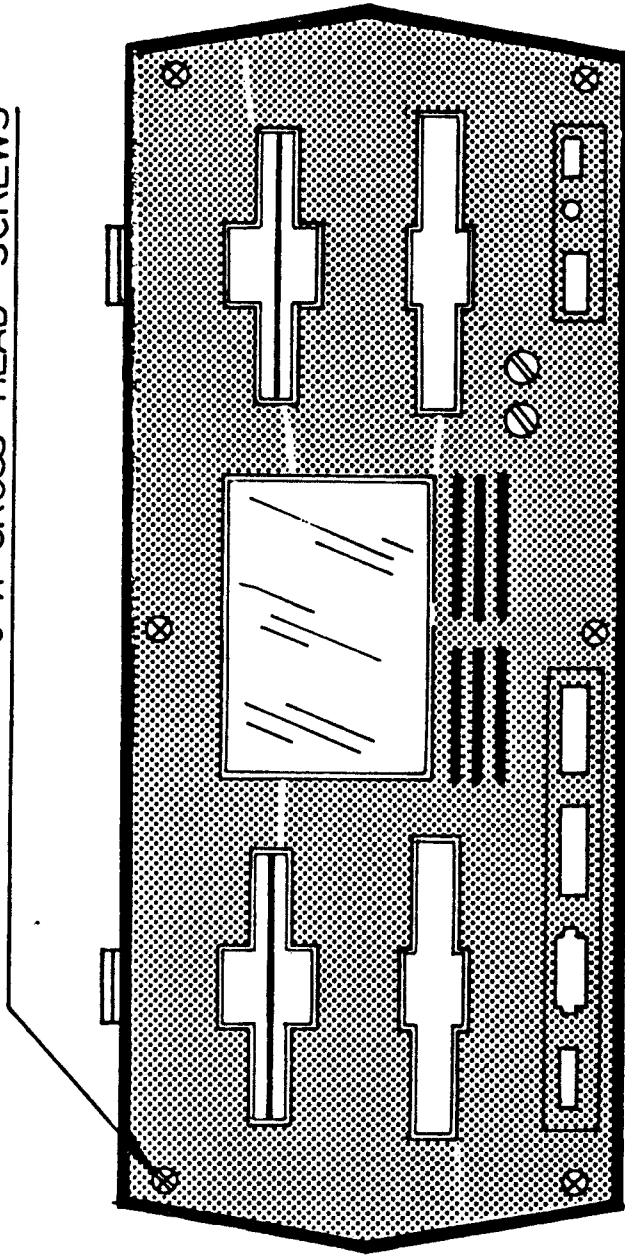FRONT VIEW WITH BLACK PLASTIC

COVER REMOVED.

FIG.13

OSBORNE BOARD

P8 (osborne)

SOFT BOARD

J3

J1

J4

J2

J4&J5

J3

40 PIN

Monitor Rom

PLAN VIEW OF OSBORNE BOARD.

FIG. 1·4

6 X CROSS HEAD SCREWS
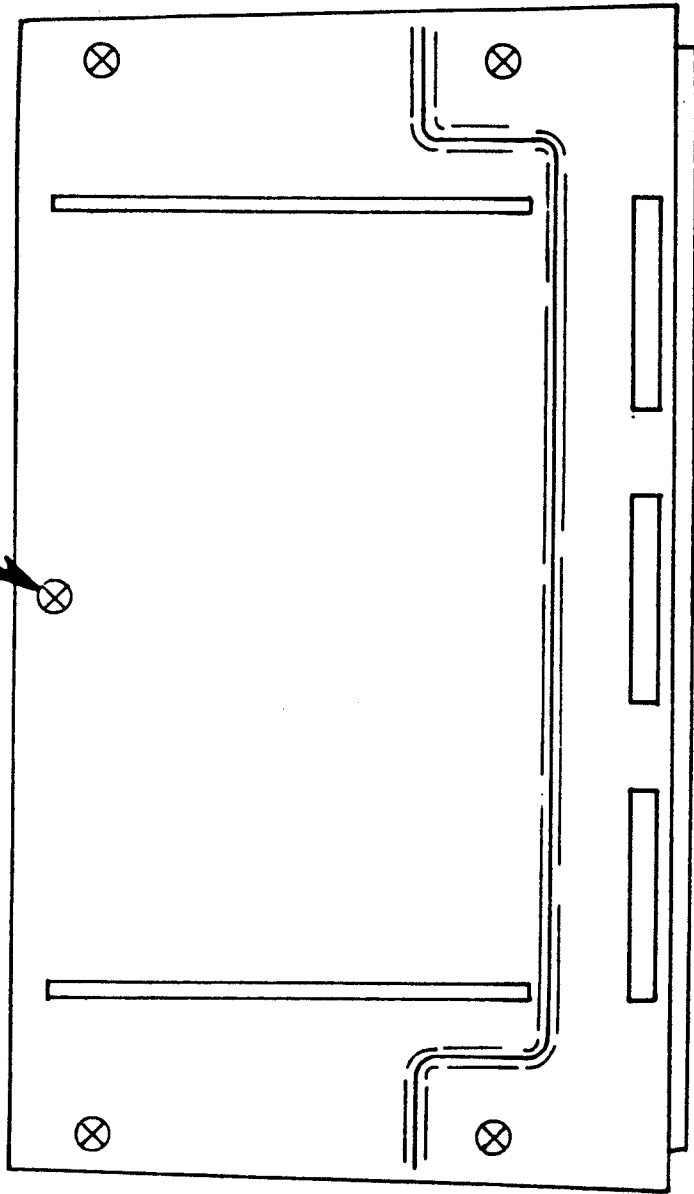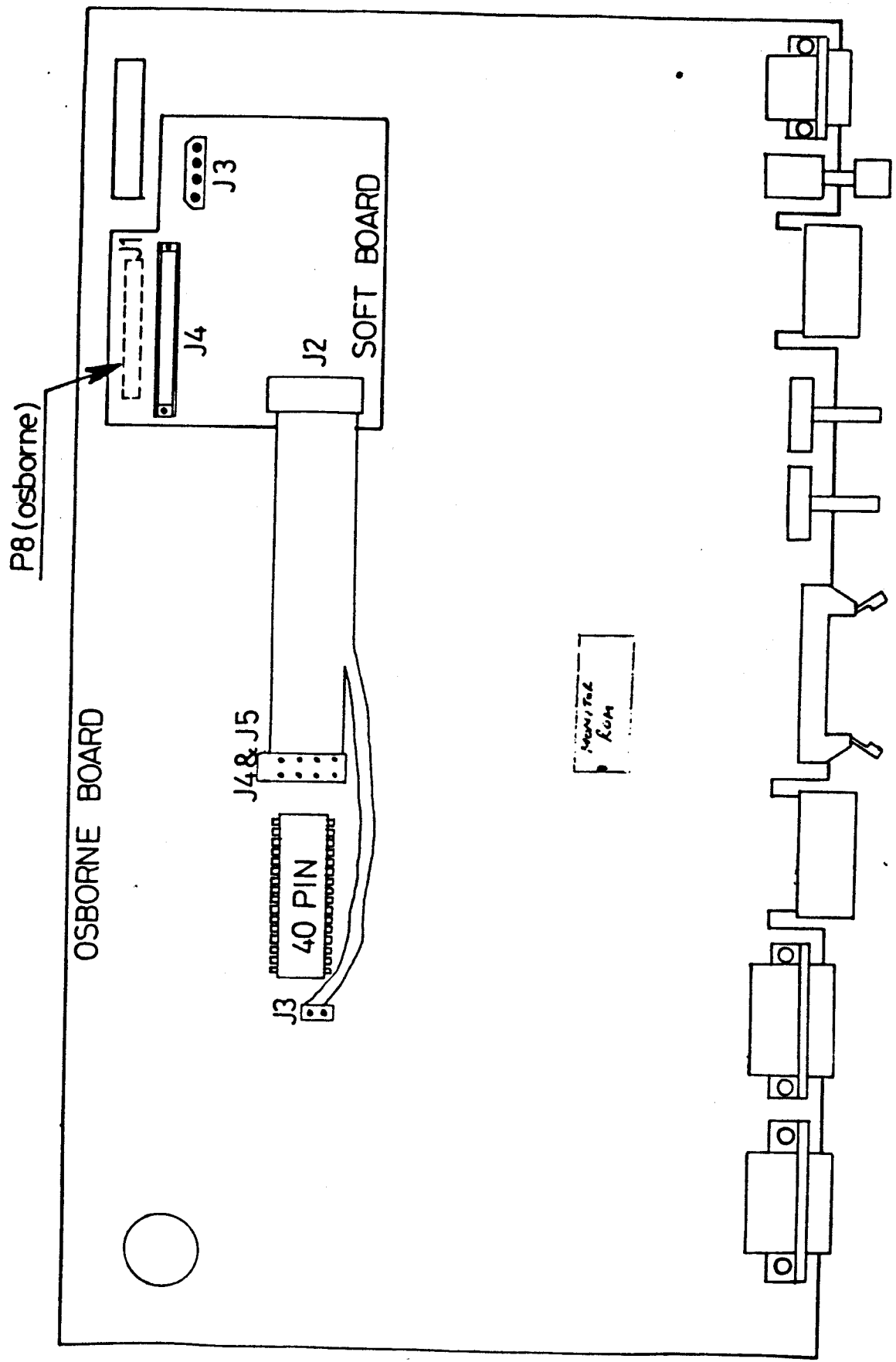
FRONT VIEW WITH KEYBOARD

REMOVED.

FIG 2·1

5 X CROSS HEAD SCREWS

UNDERNEATH VIEW WITH
KEYBOARD REMOVED.

FIG 2·2

OSBORNE BOARD

P8 (osborne)

J1

J3

J4

SOFT BOARD

J2

J4 & J5

40 PIN

J3

Monitor Rom

PLAN VIEW OF OSBORNE BOARD.

FIG 2·3