



*Butterfly Additional Disk
Technical Reference
ND-06.033.1 EN*



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PREFACE

The product

The Butterfly Additional Hard Disk option increases the amount of disk file storage available on the Butterfly Workstation and Teamstation.

Depending upon the configuration, the file storage is increased to give storage capacities of:

5Mb MS-DOS and 77Mb SINTRAN
or
33Mb MS-DOS and 49Mb SINTRAN.

The name of the product is:

Additional Disk Option ND-110296

About the manual

This manual is a technical reference manual to be read by service engineers and system supervisors. The initial chapter also contains information that may be of use to the end user.

If your computer is part of a Norsk Data installation, there should be a company system supervisor who is responsible for all the computers. If you have any problems, consult him or her before ringing Norsk Data.

Related documentation

Butterfly-110 Technical Reference Guide -
ND-06.025

The Butterfly-110 Technical Reference Guide is written for service engineers and designers. It contains a complete description of the Butterfly-110's hardware and system software, as well as details of some advanced supervisory functions.

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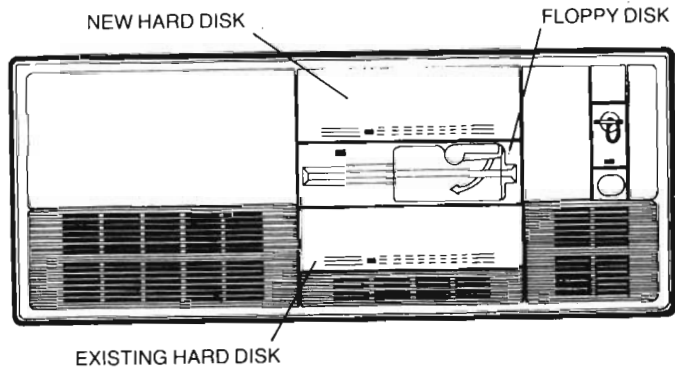
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1 USER INFORMATION

This chapter describes the differences in operation between using a standard OWS-110 or Teamstation, and an OWS-110 or Teamstation with the additional hard disk option installed.

1.1 The new hard disk

The new disk drive is placed at the top of the disk drive bay in your workstation, with the old hard disk at the bottom of the bay and the floppy disk separating them. The disk has a light on the lower right hand side that lights when the drive is selected.



1.1.1 Increased storage capacity

Before the disk upgrade, your workstation had a hard disk file storage capacity of 5MB MS-DOS storage and 36Mb SINTRAN storage.

With your upgrade there are two options. One option increases the file storage capacity of the SINTRAN operating system, while keeping the file storage of the MS-DOS operating system the same. The other option increases both the SINTRAN and the MS-DOS file storage capacities.

The storage options are:

5Mb MS-DOS and 77Mb SINTRAN
or
33MB MS-DOS and 49Mb SINTRAN

Note

The choice of option is decided at installation; remember to specify which option you require when ordering your upgrade. You cannot change options after the upgrade.

1.2 New logical disk names

The new SINTRAN logical disk name is:

DISC-77MB,0 if you have the 77Mb of SINTRAN storage

or

DISC-49MB,0 if you have the 49Mb of SINTRAN storage.

Unlike normal SINTRAN disk storage, the SINTRAN logical disk is physically spread over both disks. This does not cause any problems in normal SINTRAN operation.

1.2.1 MS-DOS partition names

As usual the MS-DOS hard disk partition is called C:. All user files are stored on this partition. The C: partition physically resides on the original hard disk.

A small partition (D:) is present on the second hard disk; this only contains system information and should not be used to store any other files.

1.3 Using dual hard disks

Operationally, there is no difference when using your new disk. All software will work without change.

You will notice that the amount of free space available for file storage on your disks has increased, when you invoke a command such as:

@DIRECTORY-STATISTICS or

C:dir (when the 33Mb DOS option is chosen)

1.3.1 Backups to floppy disk

Your existing backup procedure will still work with the new configuration.

For your SINTRAN backup the logical disk drive name has to be changed, depending on which option has been chosen:

DISC-77MB,0 if you have the 77Mb of SINTRAN storage

or

DISC-49MB,0 if you have the 49Mb of SINTRAN storage.

Backing up your MS-DOS partition is done as before, the drive designation is C:

Because of the increased storage capacity, it is recommended that you use Butterfly Tape Streamer for backups; this reduces the complexity and length of the backups. The Butterfly tape streamer option is available for purchase from Norsk Data.

2 HARDWARE INSTALLATION

This chapter details the procedure used to install the additional hard disk option. The steps shown here are intended to be a guide only, it is assumed that the reader is familiar with Butterfly workstation hardware.

If you have just received a new Butterfly workstation and there are two fixed disks in the system unit, then the fixed disk hardware has already been installed. If the hardware is already installed you can skip the first section of this chapter and follow the installation from section 2.2 "Readying the disk drive".

Warning

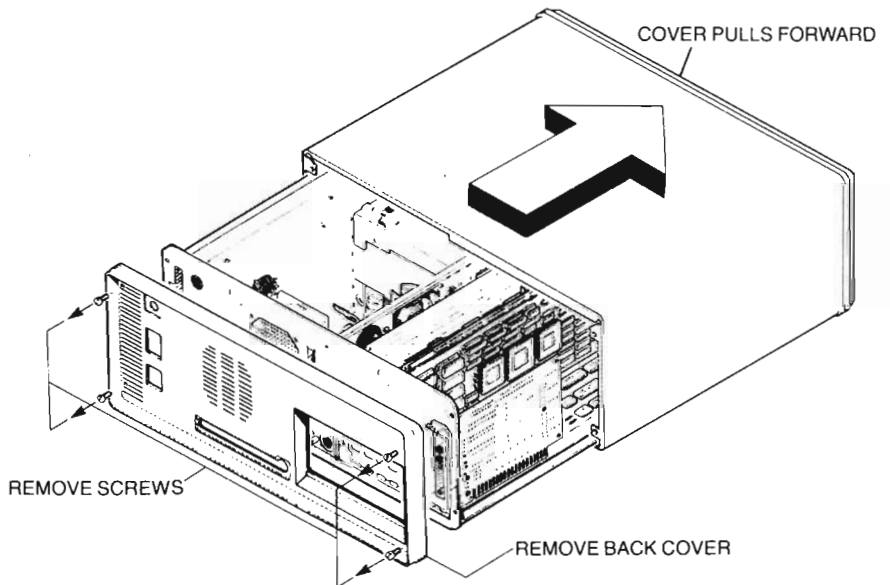
If you are not experienced at installing disks on the workstation you should not attempt to install the hard disk, instead call your Norsk Data service centre.

Warning

Mains voltages are dangerous. You should always switch off the workstation and remove the mains lead from the wall socket before you open the workstation covers.

2.1 Installing the disk drive

- 1 Unplug and remove the keyboard and the display from the system unit.
- 2 Remove all leads and connections from the sockets on the rear panel of the system unit. Make a note of the cabling connections.
- 3 Ensure that the key lock is set to the unlocked position and that the key is removed.
- 4 Use a small flat blade screwdriver to remove the four screws from the corners of the rear panel of the system unit.
- 5 Gently pull the rear panel away from the unit.

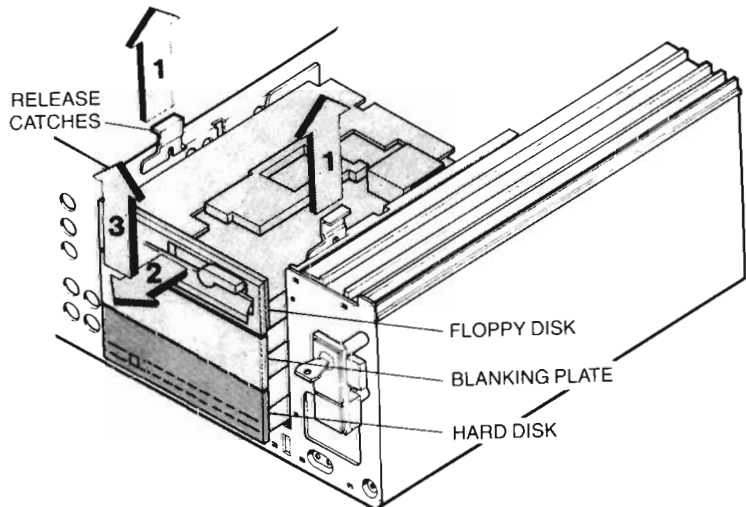


6 Firmly pull the system unit cover towards the front of the unit. The cover slides out on a rail.

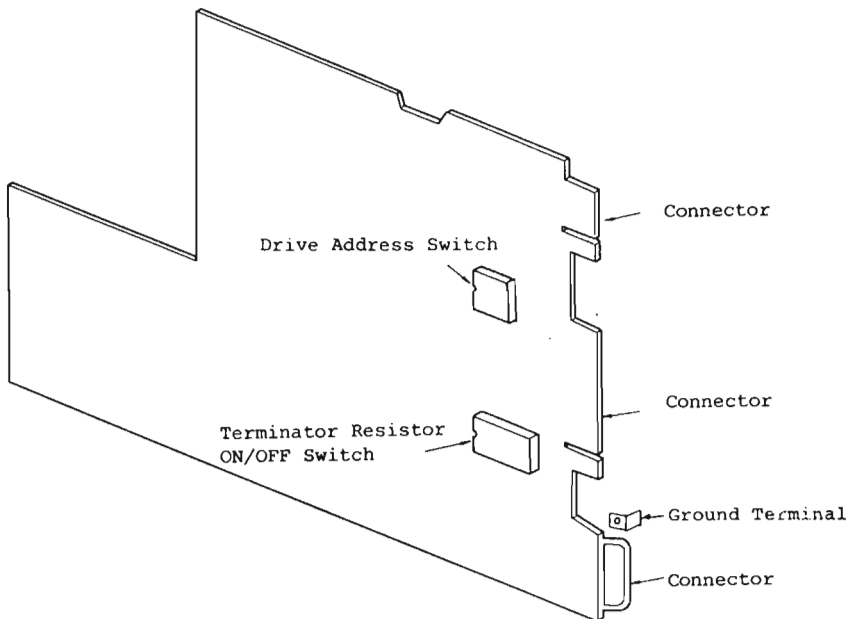
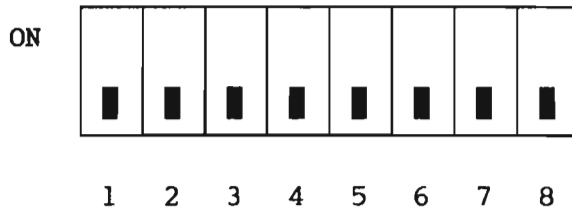
7 Remove the floppy disk drive:

Lift the two catches at each side of the disk drive bay.

Remove the floppy disk by pulling it towards you and then upwards out of the top of the bay. Carefully position it away from the bay.



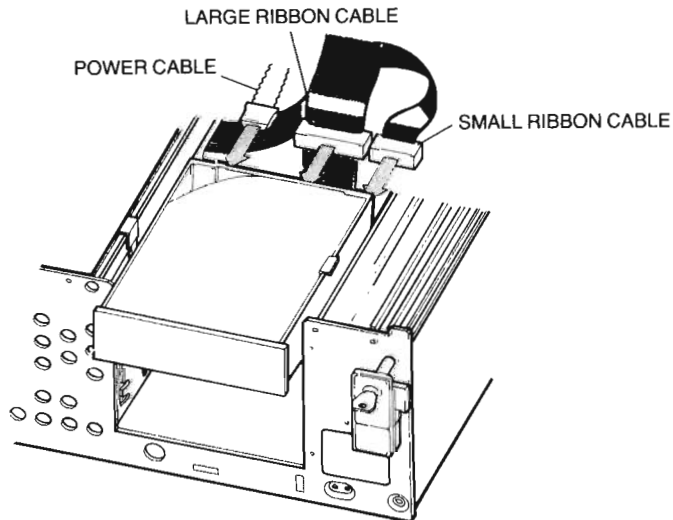
- 8 Remove the blanking plate from the next bay in the same way as the floppy disk drive.
- 9 Slot the floppy disk into the middle slot.
- 10 Take the new disk drive and switch the DIP switches shown in the diagram to OFF. This switches off the termination resistor.



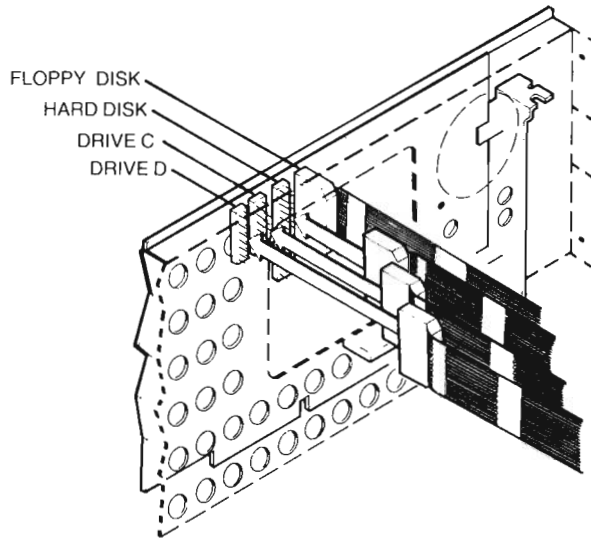
DIP switches on the bottom of the disk drive

- 11 Slot the new disk drive into the top slot.
- 12 Connect the power and data cables to the new disk drive; they follow the same pattern as those on the existing disk drive. The small ribbon cable connector should be fitted so that the cable leaves from the top of the connector. The large ribbon cable connector is keyed so that it only fits one way.

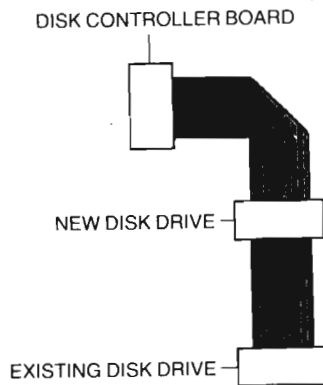
You may find it easier if you connect the cables to the drive before slotting the drive in fully.



Connecting the cables to the new disk drive



How the disk drive cables connect to the controller board



Detail of connections to the controller board

Butterfly additional disk

-
- 13 Connect the other end of the small ribbon cable to the empty socket in the controller board. The other cables are already connected.
 - 14 Push down the two catches at each side of the disk drive bay.
 - 15 Replace the workstation covers.
 - 16 Reconnect the leads to the rear panel.
 - 17 Reconnect and replace the keyboard and the display unit.

2.2 **Readying the disk drive**

Before the new hard disk can be used, the system configuration has to be changed to recognise the new hard disk.

- 1 Insert the Butterfly-110 PC diagnostics disk into the floppy drive and power on, or if the computer is already running press the CTRL, ALT and DEL keys together.
- 2 When the program is loaded type in the SYSTEM password, when you have done this correctly the Diagnostics program main menu is displayed.
- 3 Select the option. "PC Setup Utility". This displays the system setup menu.
- 4 Select the option. "Hard disk D: No drive" by highlighting it with the arrow keys. The parameter "No drive" has to be changed to read "Ericsson type 9", to enable the drive.

- 5 Press the ENTER key, this prompts you to enter the new parameter at the bottom of the screen. Type **e9** and then press the ENTER key. The field now reads "Hard disk D: Ericsson type 9".
- 6 To store this changed parameter, select the option "Store and Exit" by highlighting it with the arrow keys and then pressing the ENTER key.
- 7 Remove the floppy disk from the drive and reboot the computer by pressing the ENTER key.

The new hard disk is now recognised by the computer. The following chapter shows you how to upgrade your software for the new disk.

3 UPGRADE PROCEDURE

With an additional hard disk installed, the workstation can be given two different storage configurations.

For the user who usually only uses the SINTRAN operating system, the disk space is divided into 5Mb MS-DOS storage and 77Mb SINTRAN storage.

For the user who wants to use the MS-DOS operating system regularly, the disk space is divided into 33Mb MS-DOS Storage and 49Mb SINTRAN storage.

This chapter describes the processes that occur during the software installation. The actual installation procedure is detailed on the Program Description sheet for Butterfly Additional Disk.

All user files should be backed up to floppy disk before starting the upgrade procedure.

The utilities CHKDSK (for the MS-DOS filesystem) and TEST-DIRECTORY (for the SINTRAN filesystem), can be used to correct any disk file problems. See the Butterfly Supervisors Guide ND-30.057.2.

Warning

Once an upgrade option has been ordered and installed, you cannot change options.

3.1 Installation overview

The installation processes for both upgrades are similar. They comprise:

- Saving the existing user files.
- Creating a system partition on the new disk.
- Allocating space on the new disk for SINTRAN.
- Patching SINTRAN to recognise the new disk size.

The file HENT-MODE:MODE must be edited BEFORE starting the installation, and references to DISC-36MB-C must be changed to either:

DISC-77MB,0 for the 77Mb SINTRAN option,
or
DISC-49MB,0 for the 49Mb SINTRAN option.

3.2 The installation process for the 5 + 77Mb upgrade

The steps described here detail the processes within the installation procedure. Most of these steps are hidden from the user who follows the directions given in the program description sheet.

1 Testing for a previous disk upgrade

The program checks for the presence of the file D: \bfly-110\bfly\nd-110.

2 Disk Type

The program finds the disk type of the existing hard disk as this effects the partitioning.

3 Configuration option prompt

The user is asked which configuration they want to install: 5Mb MS-DOS and 77Mb SINTRAN or 33Mb MS-DOS and 49Mb SINTRAN.

This is a non-reversable action.

4 Creating a D: partition

A small partition of 5 or 6 cylinders is created at the start of the new drive.

The machine is re-booted to register the partition.

The partition is soft-formatted. This creates a small MS-DOS (D:) partition at the start of the new disk.

The directory structure \BFLY-110\BFLY is created, the config file is created and the badtrack file is created using 'diskprep D'.

5 Installing new system software

The Butterfly PC System Software disk is used to update the system software.

The BFLY-110 directory is updated to the new specification.

The version file is copied from C:\bfly-110 to D:\bfly-110.

The SINTRAN disk layout label, name label and the directory entry are patched.

The upgrade is now complete.

6 Cold Start SINTRAN

Once the upgrade has been completed, the system must be cold started to copy the modified SINTRAN to the image area and then to memory.

3.3 The installation process for the 33 + 49Mb upgrade

The steps described here detail the processes within the installation procedure. Most of these steps are hidden from the user, who follows the directions given in the program description sheet.

1 Test for previous disk upgrade

The program checks for the presence of the file D:\bfly-110\bfly\ndconfig.

2 Disk Type

The program checks the disk type of the existing hard disk as this effects the partitioning.

3 Configuration option prompt

The user is asked which configuration they want to install: 5Mb MS-DOS and 77Mb SINTRAN or 33Mb MS-DOS and 49Mb SINTRAN.
This is a non-reversable action.

4 De-installation of copy-protected software

You are prompted to de-install any copy-protected software installed on the MS-DOS C: drive.

5 Copying contents of C: to D:

A 6Mb partition is created at the top end of the new disk. The increased size allows for any possible bad sectors on the disk.

The machine is re-booted to register the partition.

The partition is soft-formatted as D:.

Files on the MS-DOS C: partition are copied to the D: partition on the new disk.

6 Moving the SINTRAN partition

The existing SINTRAN partition is extended to occupy the new hard disk, it occupies the whole disk except the small MS-DOS partition. The existing disk still contains an 8MB SINTRAN partition.

7 Changing the C: partition size

The storage capacity of the C: partition is changed to 33Mb.

The partition is registered and the machine re-booted.

The partition is soft-formatted with the /s option to create a system disk.

8 Restoring files on D: to C:

All files on the D: partition are copied to the new C: partition.

9 Creating a new D: partition

A small partition of 5 or 6 cylinders is created at the start of the new drive.

The machine is re-booted to register the partition.

The partition is soft-formatted. This creates a small MS-DOS (D:) partition at the start of the new disk.

The directory structure \BFLY-110\BFLY is created, the config file is created and the badtrack file is created using 'diskprep D'.

10 Installing new system software

The Butterfly PC System Software disk is used to update the system software.

The BFLY-110 directory is updated to the new specification.

The version file is copied from C:\bfly-110 to D:\bfly-110.

The SINTRAN disk layout, name table and directory entry are patched.

11 Re-Installing copy-protected software

The user can now re-install any copy protected software onto the C: partition.

The upgrade is now complete.

12 Cold starting SINTRAN

Once the upgrade has been completed, the system must be cold started to copy the modified SINTRAN to the image area and then to memory.

3.4 Reinstalling SINTRAN from floppy disks

If for any reason you wish to reinstall SINTRAN from floppy disks, you will also have to reinstall the disk upgrade patch file.

The patch file should be implemented before you enter the main directory as the default user.

If your Butterfly has been upgraded to SINTRAN K you do not need to use a patch as you can specify disk size directly.

3.5 Production upgrade procedure

Dual disk Butterfly's are shipped with both MS-DOS and SINTRAN partitions on the hard disks prepared and ready for use.

The disks are installed with SINTRAN using a disk to disk copy procedure (SINCOPY), and with MS-DOS using an installation program.

The production package is very similar to the Field upgrade package, except that no consideration is given to preserving user files on C:, since in production they will not exist. Therefore on the 33+49Mb option there is no copying of MS-DOS partitions D: and C:.

4 REFERENCE INFORMATION

This chapter contains information that will be useful to engineers and programmers. It details the content of the SINTRAN modification patches and explains how the disks are organised.

4.1 The logical SINTRAN disk

The SINTRAN hard disk is made up of a fixed number of defect-free 2048 byte pages.

NDIO

The NDIO resident program, running in the PC, manages the reading, writing and reallocation (of defective sectors) of physical disk sectors, thus providing the SINTRAN logical disk partition (or pack in traditional ND terms).

Additionally NDIO masks SINTRAN from:

- The reallocation of tracks due to known defective media.
- A sector size of 512 bytes.
- The SINTRAN partition not necessarily starting at the beginning of the disk.

SINTRAN Pack

It is not mandatory for an additional disk, intended for SINTRAN usage, to be considered as a second SINTRAN pack. In the Butterfly the two disks are viewed by SINTRAN as one large SINTRAN pack. The mapping of logical disk position to physical disk position is handled by NDIO.

The software for upgrading a 36M byte SINTRAN disk to a 77 or 49M byte SINTRAN disk, alters the existing SINTRAN file system so that the upgraded file system appears unchanged except for the addition of more unused pages.

**SINTRAN
device name**

The SINTRAN device name, once upgraded will no longer be DISC-36MB-C but will be DISC-77MB,0 or DISC-49MB,0 depending upon which configuration is selected. Note that the -C is no longer used since space on both the physical disks that support MS-DOS logical disks C and D is used to make the logical SINTRAN disk.

4.2 Software implications

The existing software requires the addition of some new features to several of the PC programs. However no modifications are needed to the standard SINTRAN software, although a patch file of >4200 is needed. Some of the service tools such as File System Investigator, MACM and DISK-TEMA will need the addition of disk tables for the new SINTRAN disk size.

4.2.1 Bad track handling

The second hard disk in this twin disk option is used exclusively by the user for SINTRAN. However the second disk requires a very small MS-DOS partition to support a MS-DOS file BADTRACK, thereby maintaining compatibility with the badtrack handling procedures used in release A00. This logical drive D: (this new small MS-DOS partition) is intended for system use only.

The BADTRACK file format is enhanced such that the last cylinder of the physical SINTRAN partition is included alongside the start cylinder, i.e:

```
Start cyl. End cyl.  
Bad cyl. Bad Head Good cyl. Good Head  
Bad cyl. Bad Head Good cyl. Good Head  
Bad cyl. Bad Head Good cyl. Good Head  
Bad cyl. Bad Head Good cyl. Good Head
```

4.2.2 Modified software

The following system software has been modified for this product:

NDIO.EXE - PC System Software

DISKPREP.EXE - PC System Software

SUPV.EXE - PC System Software

DIAG.EXE - PC Diagnostics

XDISK.EXE - PC Maintenance Tools

SINCOPY.EXE - PC Maintenance Tools

SINTRAN Patchfile 4200

4.3 Disk physical and logical layout

The two files used to describe the hard disks BADTRACK and NDCONFIG, both reside in the MS-DOS directory: \BFLY-110\BFLY.

BADTRACK describes:

- The physical location of the tracks marked bad and their replacements for SINTRAN purposes.
- The cylinder numbers of where the SINTRAN partition starts and ends.

The file NDCONFIG contains the information that describes the logical layout of the disks.

Each disk fitted to a Butterfly will support a MS-DOS partition that holds the two system files, BADTRACK and NDCONFIG, these should not be altered by the user. BADTRACK is created by the DISKPREP utility and NDCONFIG by the PC software Disk Upgrade Installation package.

The following table describes the defined disk configurations:

```

disk-config = 0 Standard 5+36Mb (single disk)
              1 disk 1 of 2 for 5+77Mb option
              2 disk 2 of 2 for 5+77Mb option
              3 disk 1 of 2 for 33+49Mb option
              4 disk 2 of 2 for 33+49Mb option
              5 Reserved
  
```

disk-config	Disk Type	Start Cylinder	End Cylinder	SIII pages
0	NEC (E9)	80	593	17476
0	CDC (E7)	120	942	17476
1	NEC (E9)	80	593	17476
1	CDC (E7)	120	942	17476
2	NEC (E9)	4	594	20094
2	CDC (E7)	5	950	20094
3	NEC (E9)	481	593	3842
3	CDC (E7)	770	950	3842
4	NEC (E9)	4	594	20094
4	CDC (E7)	5	950	20094

4.4 SINTRAN patches

This section describes the patches to SINTRAN III that are needed to implement the new disk configurations. If your Butterfly has been upgraded to SINTRAN K then you do not need a patch to SINTRAN as the SINTRAN K has already been modified to accept new disk sizes.

Changes

There are four changes that have been made:

- The bitfile size
- The disk layout table
- The nametable
- The directory entry

The Bitfile

The bitfile on the standard Butterfly disk (36Mb) takes up 2 pages. This has to be increased to 3 pages for the largest disk size of 77Mb. The bitfile needs to be contiguous and the page following the bitfile on the 36Mb disk may be used; the solution is to move the bitfile to the new, unused, disk.

The new bitfile is allocated at the SINTRAN disk pages 111300 to 111302 at the end of the new disk. This makes room for the larger bitfile. After allocation the contents of the old bitfile are moved to the new bitfile. Three additional bits are then set, marking the area as occupied. Finally the bitfile pointer in the directory entry (SINTRAN disk page 0) is set, pointing to the new bitfile.

Disk layout table

SINTRAN holds a table containing a description of the disks. Information about the value of the maximum cylinder is changed when increasing disk size. All other parameters remain the same.

The nametable The file-system uses a table, called NAMETABLE, containing information about the disks. The nametable has two values that are changed, an ASCII string holding the name of the disk, and a word containing the number of 1K word pages on the disk.

The directory entry The directory entry holds a word containing the number of pages unreserved on the directory. This number is increased by the addition of the pages on the new disk.

The new value is calculated by the formula:

$$\text{newpagesunres} = \text{oldpagesunres} + (\text{newtotpages} - \text{oldtotpages})$$

On the 77Mb SINTRAN option, one page is subtracted from this figure, due to the bit file growing from two to three pages.

4.4.1 Parameters for patching

The following table shows the parameters used for the two disk options:

5 + 77Mb Option

Bitfile = Moved
Size 3 pages
Start at SINTRAN page no
111300

Disk layout table = max cylinder : 2023

Name table = Disk name : DISC-77MB
Number of pages : 111302

Directory entry = Pages unreserved updated

33 + 49Mb Option

Bitfile = Not moved
Size 2 pages

Disk layout table = max cylinder : 1230

Name table = Disk name : DISC-49MB
Number of pages : 56600

Directory entry = Pages unreserved updated

4.4.2 The patch program

All patching is done from the PC using a program called PATCH.

The SINTRAN save-area is patched, hence a cold start is needed after installation.

The new disk name is needed in the appropriate places, such as the HENT-MODE:MODE file and when entering the main directory after a cold-start.

The patching of SINTRAN to accept the new disk sizes is performed by a program called PATCH.

The program runs under MS-DOS and is started by typing:

```
C:\>patch <parameter 1>
```

The parameter is one of the following.

Parameter	Action
one	Install 5 + 77Mb option
two	Install 33 + 49Mb option
three	Initialise SINTRAN for 5 + 77Mb option
four	Initialise SINTRAN for 33 + 49Mb option
five	Check the SINTRAN generation
six	Check to see if SINTRAN is version J

Errors

If an error is discovered during execution, the program will stop with an error message. The C library function `exit(i)` is used to terminate the program and the (i) value indicates the error message:

I value	Explanation
0	Normal termination
1	Illegal parameter
2	Read-disk-page call failed
3	Wrong SINTRAN III old values
4	Write-disk-page call failed
5	Machine running SINTRAN K no patching should be done.

4.5 Reinstalling SINTRAN from floppy disks

Whenever you reinstall SINTRAN from floppy disks, you must run the program PATCH to account for the new disk size.

The program PATCH is run after installing and starting SINTRAN with:

```
1560&  
10,0$  
22!
```

The program patches SINTRAN to accept the larger disk size. The parameter is either 3 (77Mb) or 4 (49Mb).

After the patching has finished the installation of SINTRAN continues as normal.

If your machine is running SINTRAN K you do not need the patching program.

For more details refer to the Program description sheet - Butterfly Additional Disk.

4.6 Increasing the segment file space

With the increased disk space you may want to increase the size of the segment files so that more SINTRAN applications can be dumped reentrant.

It is recommended that your segment file should not be larger than 1500 pages, unless you have a specific requirement for more space. Make sure that user SYSTEM has enough space to hold the increased segment file size.

The segment file is increased by using the RT-LOADER and SINTRAN-SERVICE-PROGRAM, full step by step instructions are given in the Program description sheet - Butterfly Additional Disk.

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