Dansk Data Elektronik A/S

Technical Service Manual

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NOTICE

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Support - Hints

This description explains the installation of the Supermax operating system (SMOS) and the Basic utilities on an empty Supermax. These procedures are used on new machines or on machines where the root disk for some reason have to be totally reinstalled. Please carefully read this guide before starting the installation. If you do run into any troubles during reading or installion, please contact your local Supermax representative.

WARNING **WARNING**

If the tape is to be used as an updating for a running root - **DO NOT USE THIS INSTALLATION GUIDE!!!**
In this case refer to the description of release for :
SUPERMAX BASIC UTILITIES

1) Select "Minimal boot" diskette.

The Supermax Boot package contain three minimal boot floppies :

A) Console Sioc unit 8 , /dev/console is located on sioc unit 8 plug 0 (plug 0-7).

B) Console Sioc2 unit 8 , /dev/console is located on sioc2 unit 8 plug 0 (plug 0-31 or 0-63).

C) Console dioc2 unit 14 ,/dev/console is located on dioc2 unit 14 plug 0 (plug 0-3).

Select the minimal boot for your configuration and label it MINIMAL BOOT.
Select one of the remaining minimal boot and label it NORMAL BOOT.

2) Boot, using the diskette marked "Minimal boot".

Reset/power up the Supermax and insert the diskette marked "Minimal boot" in the floppy drive. The display on the Supermax should change from bo (or b0) to 90, 91 and after a few seconds to -3 or =3. Please note that if the Supermax is equipped with more than one main cpu (MCU), only MCU no.3 is booted, which means that the other MCU's normally are displaying 90.

3) Insert the diskette marked "Primitive root".

When the following message:

Press RETURN when root disk is inserted!

is displayed at the console, the diskette marked 'Primitive root' should be placed in the floppy drive. Please note that the diskette must **NOT** be write protected. Shortly after the shell prompt will be displayed on the console. The operating system is now 'alive' on the primitive root on the floppy, and it is vital important **NEVER TO REMOVE THE FLOPPY** from the drive unless explicit told by the program.

4) Change the hardware configuration tables on the two boot diskettes marked "Minimal boot" and "Normal boot".

The Supermax is a very modular and flexible computer. This is reflected in setting up the operating system, where the command **chhw** (short for 'change hardware') is used to change a special table in the operating system kernel, describing all the different modules supplied with the Supermax. This table should be changed in accordance to the actual hardware configuration.

Normally the table on the diskette marked "Minimal boot" should NOT be changed since the default **chhw** table on this diskette is sufficient for installing the rest of the system. The **chhw** table on the diskette marked "Normal boot" contains a setup to the one on the other minimal boot diskette.This table should now be changed to a "Normal boot" tabel,
using **chhw**:

chhw /dev/dsk/root

The special file **/dev/dsk/root** is pointing at the floppy drive, where the primitive root remain placed !!. When the **chhw** command is captured from the floppy and **chhw** begins executing the following message is displayed:

Insert the boot diskette and press return:

Remove the primitive root diskette and replace it with the normal boot diskette followed by <CR> on the console. The operating system kernel will now ask for the primitive root diskette and the following message is displayed at the console:

Insert the root diskette and press return:

Remove the boot diskette and replace it with the primitive root diskette followed by <CR>. The **chhw** prompt: * will be displayed on the console and the setup should be changed accoording to the hardware configuration. Quite a lot of different changes can be performed, but the following changes should always be made (checked):

-- The root diskette should be changed from (normally) **/dev/dsk/u14c3** to (normally) **/dev/dsk/u14c8s0** which means that the first logical subdisk on the first hard disk on the first controller located on disk I/O controller (DIOC) no.14 is used as root disk.

-- The console should be setup on the same unit as in the minimal boot configuration , correct baud rate , correct number of data bits, parity etc.

-- The streamer should be changed to the correct type:

Option	Type
1	20MB streamer
2	40MB streamer
3	120MB streamer

When all the necessary changes have been made the altered table should be written to the boot disk giving the **chhw** command 'save'. When the following message:

Insert boot diskette and press RETURN!

appears again, please insert the boot diskette followed by <CR> on the console. Shortly after the following message:

Insert root diskette and press RETURN

will be displayed and the primitive root diskette should again replace the boot diskette. When the **chhw** prompt * is displayed,

give the command abort and the normal shell prompt # indicates that you are back in the shell.

For a short list of possible commands in **chhw** type 'help'. If you are uncertain with **chhw** command refer to **chhw**(1m) in the Reference Manual. Please note that the changes made on the boot diskette will be used the next time the Supermax is booted.

5) Boot using diskette marked "Minimal boot".

If any changes has been made to the "Minimal boot" the Supermax should be rebooted by repeating step 1 and 2 in this guide. This should be done to insure that the changes made will take immediate effect.

6) Change the physical partitionering of the hard disk(s).

The physical hard disk(s) should now be divided into one or more logical subdisk(s). This is done by using the **chlds** (short for 'change logical disk sizes') command. For a description of how to use this command please refer to **chlds**(1M) in the Reference Manual.

The first hard disk should normally be divided into at least 3 subdisks:

Subdisk no:	Usage:
0	Root disk
1	User work disk
2	Swap disk

The swap disk is used by the operating system kernel to store memory partitions when no more main memory is free. Note that each MCU (main cpu) require its own swap disk, which means that if the Supermax is equipped with for example 3 MCU'es there should be 3 logical subdisks reserved for swap purpose.

No special files should point to the swap disk(s), since the operating system is not using special files for the swap disks and no user should be able to read or write to a swap disk since this can crash the Supermax !!

7) Boot using diskette marked "Minimal boot".

When any changes have been made to the logical disk partitioning, the Supermax should be rebooted by repeating step 2 and step 3 in this installation guide. This ensures that the changes made are brought into effect.

8) Create a minimal root on the hard disk.

Everything should now be ready for creating a file system on the hard disk. This file system is going to be used as the root file system when the Supermax is booted with the "Normal boot" diskette (but don't do it now !!). The filesystem is filled with a few different commands copied from the primitive root diskette, and some special files are created, making it a minimal hard disk root. This is done by giving the following command with no parameters:

initroot

After a while (please be patient!) the 3 following questions are displayed on the console:

```
Enter dioc-no (typical 14):
Enter channel no (typical 8):
Enter subdisk-no (- if none):
```

The answers to the three questions should be the unit number of the DIOC, the channel number and the subdisk number where the new hard disk root should be placed. When the answer are given the building of the new root is executing and will continue for some time (depending on the size of the logical disk), where the system is running with no operator interaction. When the shell prompt appears again please check that no error messages are on the console. If no errors are detected continue this installation, otherwise try to figure out what went wrong and correct the problem.

9) Flush the internal buffers to hard disk.

To ensure that nothing is left (it will be lost!!) in the internal buffers in the kernel and the disk caches give the following command:

sync

This flushes the buffers to the hard disk.

10) Boot using the diskette marked "Normal boot".

Now the Supermax should be reset by turning the key, and the diskette marked "Normal boot" should be inserted into the floppy drive. The display should after a while change from bo (or bO) to -3 or =3, this indicates that MCU with unit number 3 is installed in both the hardware and the software. If the Supermax is equipped with more than one MCU the rest of them should display their MCU number in the display as well, if they don't you probably had made a mistake when you run the **chhw** command.

The console should now display the shell prompt # indicating that the system are ready for continuing installation of the software system.

11) Create the special files in /dev.

Before any installation of the rest of the utilities the special files for at least the following devices, should be made:

- floppy drive
- the streamer drive
- the logical disks
- the terminals
- the printers

These special files should be made by using a combination of the four commands **gendev, ttygen, mknod** and **config.** Note that if automatic setup of the LP printer spooler system is required then make a special file **/dev/print0** and make it point at the first printer.

Please be very careful when making/changing special files since this can cause very strange problems and could have influence on the behaviour of your Supermax, if done wrong.

12) Initialize the logical disks.

All the disks for containing a file system should be initialized by using the command **mkfs:**

```
mkfs /dev/dsk/u14c8s1 %        (WARNING THIS IS AN EXAMPLE!!!)
```

Note that the first parameter is the special file pointing at the logical subdisk where the filesystem is build, and should of course be changed to point at the right one. The second parameter is normally a procent sign (%) telling **mkfs** to use some default

values. For further information please refer to **mkfs**(1M).

The swap disk(s) and the logical disk(s) used for winchester boot do not require a file system, using mkfs on those devices will be a waste of time.

13) Create mount directories.

If any logical disks are going to be mounted (for example the user work disk) the relevant directory should be created by giving the following command:

mkdir /abc **(WARNING THIS IS AN EXAMPLE!!!)**

Where /abc is an example of the name for the new directory.

14) Mount all the logical disks.

All the logical disks used later as mounted filesystems should be mounted at this time by giving the following command:

mount /dev/dsk/u14c8s1 /abc **(WARNING THIS IS AN EXAMPLE!!!)**

The first parameter is the name of the special file pointing to the logical subdisk and the second parameter is the name of the directory whereto the disk should be mounted.

15) Installing the Basic utilities from tape.

The rest of the commands and utilities should now be transferred to the disk(s) by inserting the tape marked "Basic Utilities" into the streamer drive and giving the following command:

newpkg /dev/stream

This installation will take some time with no operator interaction. This is due to rewinding the tape and reading all the files from tape into the disk(s). The tape has cpio format which is handled by the newer versions of **newpgk**.

16) Change the systemfiles.

Normally some changes need to be made in all or some of the following files using an editor such as **vi**:

/etc/inittab
/etc/rc.d/InitTerm
/etc/gettydefs
/etc/fstab
/etc/checklist
/etc/passwd
/etc/group

/etc/issue

These files are normally refered to as the System files since they are depending of the actual setup and configuration of the system. For the usage of each of these files please refer to the delivered dokumentation.

Note that if you are using the vi editor, you need to setup a proper terminal environment by giving the following commands:

```
TERM=T3-24-C80
export TERM
/etc/setvti dk/dde400a.t /dev/console
```

This is only an example of how to setup the terminal environment for a **dde400a** terminal, for other terminals use different **sioc** tables.

17) Flush the internal buffers to hard disk.

To flush the internal buffers execute the command:

sync

18) Boot using the diskette marked "Normal boot".

The Supermax should now be reset by turning the key and the diskette marked "Normal boot" should be inserted into the floppy drive. When asked for please specify current time and date. The system should now boot-strap itself into an normal System V system with login picture displayed at all terminals.

19) Login as root.

Login as super-user on the console by giving the user name:

root

No password is needed for the root or all the other users in the passwd file (**/etc/passwd**). When succesfully logged in you will receive the shell prompt.

20) Check all the terminals and printers on the system.

Check that all terminals configurated to the system is working by login. Note that it is only possible to login in as super-user (root) on the console and not on the other terminals.

Check whether it is possible to print out on all printers configurated to the system, by sending a printout to a printer, but do not use the LP spooler system at this stage !

21) Install the winchester boot.

The Supermax computer is able to boot from the hard disk if the following procedure is followed:

Create a special file called **/dev/boot.0** by giving the following commands:

mknod /dev/boot.0 b x y

Where **x** is the major and **y** is the minor number of the logical subdisk, where the Operating System (SMOS) should be placed, the size of the logical disk should be at least 1 Mb. The major and minor numbers can be generated by using **gendev**.

Insert the diskette marked "Normal boot" in the floppy drive and copy the contents of the floppy to the logical disk by giving the following command:

cp /dev/flop /dev/boot.0

Where **/dev/flop** is assumed to point at the flopy drive and /dev/boot.0 is the special file created by the previous command.

Enable the winchester boot by giving the following command:

mkwboot /dev/boot.0

22) Setup the LP spooler system.

Normally the system will as described earlier in this installation guide automatic setup the LP printer spooler system for one printer called: **print0 (/dev/print0)** with a spooler model named "**dde**". If you do not agree or want more than one printer make the changes to the LP spooler system at this stage of the installation. For more information of how to do that you are advised to take a look at the description in System Administrators Guide.

23) Add passwords to all users.

No password is needed for root and all other users in the passwd file (**/etc/passwd**). But for reasons of security it is recommended that at least the super-user should be given a password, by using the command:

passwd root

The **passwd** command will ask some questions, please answer them and do not forget the new password(s) ! The ordinary users are free to change their own passwords by using the **passwd** command.

24) Install The Supermax Streams Package.

To ensure the smallest possible operating system kernel it is supplied with the essentiel facilites , but some program require a extension in the operating system kernel (e.g. TCP/IP, X.29). To get this extension it is necessary to relink the operating system kernel by installing the Supermax Streams Package.

Installation of the Supermax Streams Package require a winchester boot, as described in item 21 above.

A) Insert the diskette containing the Supermax Streams Package in the drive and type the following:

/etc/newpkg

B) Change the working directory to read:

cd /etc/boot.d

C) Execute the self-explaining script 'makeos' to link the new operating system.
If your system contains a CIOC , you will have to confirm with 'yes' to CIOC.

makeos

D) The new operating system should be copied to the winchester boot by using the following command:

bootgen -c /dev/boot.0 os00 (for 68000 MCU)
or
bootgen -c /dev/boot.0 os20 (for 68020 MCU)

25) Reboot using winchester boot.

To ensure that the Supermax is able to boot from the hard disk (winchester boot), please shutdown the system by giving the command:

init 0

This brings the system down to run level 0, which is a controlled way to stop the system (do not try simply to turn the key or remove the power when the system is running. You will for sure be punished !!). When the following message:

The system is down.

is displayed on the console, reboot the system by turning the key and ensure that no floppy is placed in the floppy drive, since the Supermax will try then to boot from the floppy drive. After a few seconds the system should bootstrap itself from the hard disk and the system will be ready again.

Note that eventhough there is no more use for the three floppies we recommand that you keep them in a safe place, just in case....

The Supermax is now ready for normal use and installation of other software packages such as e.i:

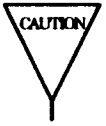
ACCT Accounting

UUCP Unix to Unix communication
SWD Software development package

If one or more of these packages should be installed it is normally done by using **newpkg**, but please refer to the installation guide for the specific package.

New Installation

This description explains the installation of the Supermax Operating System (SMOS) and the Basic Utilities on an empty Supermax. These procedures are used on new machines or on machines, where the root disk for some reason have to be totally reinstalled. Please carefully read this guide before starting the installation. If you do run into any troubles during reading this installation guide, please contact your local Supermax representative.



Do NOT use this installation guide if you are updating an already installed system. In this case, please refer to the updating section in this manual, and to the *Description of Release* for Supermax Basic Utilities.

Notation Conventions

Whenever the text includes examples of output from the computer and/or commands entered by you, we follow the standard notation scheme that is common throughout SUPERMAX system documentation:

- Commands that you type in from your keyboard are shown in **bold type**.
- Text that is printed on your terminal by the computer is shown in constant width type. constant width type is also used for code samples because it allows the most accurate representation of spacing. Spacing is often a matter of coding style, but is sometimes critical.
- Comments added to a display to show that part of the display has been omitted are shown in *italic* type and are intended to separate them from the text that represents computer output or input. Comments that explain the input or output are shown in the same type font as the rest of the display. *Italics* are also used to show substitutable values, such as, *filename*, when the format of a command is shown.

- There is an implied RETURN at the end of each command and menu response you enter. Where you may be expected to enter only a RETURN (as in the case where you are accepting a menu default), the symbol **<CR>** is used.
- In cases where you are expected to enter a control character, it is shown as, for example, **CTRL-D**. This means that you press the **D** key on your keyboard while holding down the **CTRL** key.
- The Dollar sign, **$**, and Pound sign, **#**, symbols are the standard default prompt signs for an ordinary user and **root** respectively. **$** means you are logged in as an ordinary user. **#** means you are logged in as **root**.
- When the **#** prompt is used in an example, it means the command illustrated may be used only by **root**.

Command References

When commands are mentioned in the text, a reference to the manual section where the command is formally described is included in parentheses: *command*(section).

New Installation

The new installation is performed by following these instructions carefully step by step:

Step 1: **Select the 'Minimal boot' diskette**

The Supermax Boot package contains three minimal boot diskettes, all without the NIOC I/O module:

1) Console SIOC unit 8, /dev/console is located on SIOC unit 8, plug 0 (plug 0 – 7).

2) Console SIOC2 unit 8, /dev/console is located on SIOC2 unit 8, plug 0 (plug 0 – 31).

3) Console DIOC2 unit 14, /dev/console is located on DIOC2 unit 14, plug 0 (plug 0 – 3).

Please be aware that there is no NIOC module on the minimal boot diskette due to problem with limited space on 560Kb diskettes. The NIOC is later installed on the winchester boot.

Select the minimal boot diskette for your configuration and label it MINIMAL BOOT.

Select one of the remaining minimal boot diskettes and label this one NORMAL BOOT.

Refer to the description for the specific minimal boot configuration in Appendix 'A'.

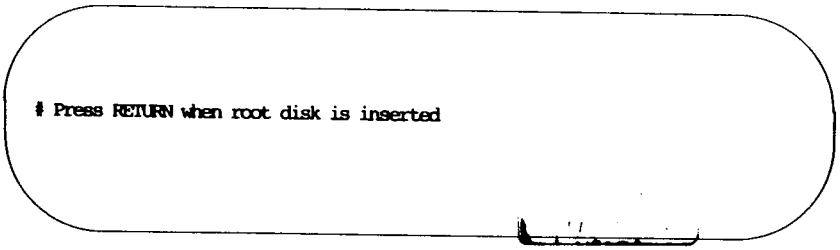
Step 2: **Boot using the diskette marked 'Minimal boot'**

Reset or power up the Supermax and insert the diskette marked 'Minimal boot' into the floppy drive. The display on the Supermax will change from **bo** (or **bO**) to **90**, **91**, and shortly after to **3** or **=3**.

Please note that if the Supermax is equipped with more than one main cpu (MCU), only MCU no. 3 is booted, which means that the remaining MCU's normally are displaying 90.

Step 3: **Insert the diskette marked 'Primitive root'**

When the following message:



is displayed on the console, the diskette marked 'Primitive root' should be placed in the floppy drive.

Please note that this diskette must NOT be writeprotected. Shortly after the shell prompt will be displayed on the console. The operating system is now 'alive' on the primitive root on the floppy, and it is vital important **NEVER TO REMOVE THE FLOPPY** from the drive unless explicit told by the program.

Step 4: **Change the hardware configuration tables on the boot diskettes marked "Minimal boot" and "Normal boot".**

The Supermax is a very modular and flexible computer. This is reflected in setting up the operating system, where the command *chhw*, (abbreviation for **ch**ange **h**ard**w**are), is used to change a special table in the operating system kernel, describing all the different modules supplied with the Supermax. This table should be changed in accordance to the actual hardware configuration.

Normally the table on the diskette marked "Minimal boot" should NOT be changed since the default *chhw* table on this diskette is sufficient for installing the rest of the system. The *chhw* table on the diskette marked "Normal boot" contains a set up to the one on the other minimal boot diskette.

The table should now be changed to a "Normal boot" tabel, using the *chhw* command as follows:

chhw /dev/dsk/root <CR>

The special file **/dev/dsk/root** is pointing at the floppy drive, where the primitive root remain placed. When the *chhw* command is loaded from the floppy and *chhw* begins executing the following message is displayed:

```
# Insert the boot diskette and press RETURN
```

Remove the primitive root diskette and replace it with the normal boot diskette followed by RETURN on the console. The operating system kernel will now ask for the primitive root diskette and the following message is displayed at the console:

```
# Insert the root diskette and press RETURN
```

Remove the boot diskette and replace it with the primitive root diskette followed by RETURN.

The *chhw* prompt: * will be displayed on the console and the set up should be changed accoording to the hardware configuration. Different changes can be performed, but the following changes should always be made (checked):

- The root diskette should be changed from (normally) **/dev/dsk/u14c3** to (normally) **/dev/dsk/u14c8s0** which means that the first logical subdisk on the first hard disk on the first controller located on disk I/O controller (DIOC) no. 14 is used as root disk.
- The console should be set up on the same unit as in the minimal boot configuration, correct baud rate, correct number of data bits, parity etc.
- The streamer should be changed to the correct type using the following command:

  dioc <unit number> d7-X <CR>

  where **X** is any number of the following for disk channels:

  d7 – 0 (to disable)
  d7 – 1 (to enable – 20 Mb streamer)
  d7 – 2 (to enable – 45 Mb streamer)
  d7 – 3 (to enable – 120 Mb streamer)
  d7 – 4 (to enable – 60 Mb streamer)
  d7 – 5 (to enable – 150 Mb streamer)
  d7 – 6 (to enable – 320 Mb streamer)

  Special for Video Streamer device:

  d17 – 2000 (to enable – 2000 Mb on channel 17)

When all the necessary changes have been made the altered table should be written to the boot disk giving the *chhw* command **save**.

When the following message:

```
# Insert boot diskette and press RETURN
```

appears again, please insert the boot diskette followed by RETURN on the console.

Shortly after the following message:

```
# Insert root diskette and press RETURN
```

will be displayed and the primitive root diskette should again replace the boot diskette.

When the *chhw* prompt * is displayed, give the command abort and the normal shell prompt # indicates that you are back in the shell. For a short list of possible commands in *chhw* type **help**. If you are uncertain with the *chhw* command refer to *chhw*(1M) in the System V Reference Manual. Please notice that the changes made on the boot diskette will be effective the next time the Supermax is booted.

Step 5: **Boot using diskette marked 'Minimal boot'**

If any changes have been made to the "Minimal boot" the Supermax should be rebooted by repeating Step 1 and Step 2 in this guide. This should be done to insure that the changes made will take immediate effect.

Step 6: **Change the physical partitionering of the hard disk(s)**

The physical hard disk(s) should now be divided into one or more logical subdisk(s). This is done by using the command *chlds*, (short for **ch**ange **l**ogical **d**isk **s**ize) command. For a description of how to use this command please refer to *chlds*(1M) in the Reference Manual. The first hard disk should normally be divided into at least 5 subdisks:

Subdisk no.:	Usage:
0	45Mb Root disk
1	1.2Mb Winchester boot
2	1.2Mb Diagnostic boot
3	Swap disk (*)
4	User work disk

(*) Swap disk size:

68020:
swap disk size = 2 * installed memory (max. 8Mb).

68030:
minimum swap disk size = 2 * installed memory.

The swap disk is used by the operating system kernel to store memory partitions when no more main memory is free. Note that each MCU (main cpu) require its own swap disk, which means that if the Supermax is equipped with for example 3 MCU'es there should be 3 logical subdisks reserved for swap purpose.

No special files should point to the swap disk(s), since the operating system is not using special files for the swap disks and no user should be able to read or write to a swap disk since this can crash the Supermax.

Step 7: **Boot using diskette marked "Minimal boot"**

When any changes have been made to the logical disk partitioning, the Supermax should be rebooted by repeating Step 2 and Step 3 in this installation guide. This ensures that the changes made are brought into effect.

Step 8: **Create a minimal root on the hard disk**

Everything should now be ready for creating a file system on the hard disk. This file system is to be used as the root file system when the Supermax is booted with the "Normal boot" diskette. The filesystem is loaded with a few commands copied from the primitive root diskette, and some special files are created, making it a minimal hard disk root file system.

This is done by giving the following command without parameters:

initroot <CR>

After a few seconds the following three questions are displayed on the console:

```
Enter dioc-no (typical 14)?   :
Enter channel no (typical 8)? :
Enter subdisk-no (- if none)? :
```

The answers to the three questions should be the unit number of the DIOC, the channel number and the subdisk number where the new hard disk root file system should be placed. When the answers are given, the building of the new root is executed. This will continue for some time (depending on the size of the logical disk), where the system is running with no operator interaction. When the shell prompt appears again please check that no error

messages are on the console. If no errors are detected continue this installation, otherwise try to figure out what went wrong and correct the problem.

Step 9: **Flush the internal buffers to hard disk**

To ensure that nothing is left (it will be lost!) in the internal buffers, in the kernel, or in the disk caches give the following command:

sync <CR>

This flushes the buffers to the hard disk.

Step 10: **Boot using the diskette marked "Normal boot"**

Now the Supermax should be reset by turning the key, and the diskette marked "Normal boot" should be inserted into the floppy drive. The display should after a while change from **bo** (or **bO**) to **90, 91** and shortly after to **3** or **=3**, indicating that MCU with unit number 3 is installed in both the hardware and the software. If the Supermax is equipped with more than one MCU the rest of them should display their MCU number in the display as well, if they don't you probably have made a mistake when you performed the *chhw*(1) command.

The console should now display the shell prompt # indicating that the system is ready for continuing installation of the software system.

Step 11: **Create the special files in /dev**

Before any installation of the rest of the utilities the special files for at least the following devices, should be made:

- the floppy drive
- the streamer drive
- the logical disks
- the terminals
- the printers

These special files should be made by using a combination of the three commands *gendev*(1), mknod(1) and *config*(1).

Note that if automatic set up of the LP printer spooler system is required then make a special file **/dev/print0** and make it point at the first printer.

Please be very careful when making/changing special files since this can cause very strange problems and may have influence on the behaviour of your Supermax, if done wrong.

Step 12: **Initialize the logical disks**

All the disks for containing a file system should be initialized by using the *mkfs* command:

EXAMPLE:

mkfs /dev/dsk/u14c8s4 % <CR>

Note that the first parameter is the special file pointing at the logical subdisk where the filesystem is build, and should of course be changed to point at the right one. The second parameter is normally a procent sign (%) telling *mkfs* to use some default values. For further information please refer to *mkfs*(1M).

The swap disk(s) and the logical disk(s) used for winchester boot do not require a file system, using *mkfs* on those devices will be a waste of time.

Step 13: **Create mount directories**

If any logical disks are going to be mounted (for example the user work disk) the relevant directory should be created by giving the following command:

EXAMPLE:

mkdir /usr1 <CR>

Where **/usr1** is an example of the name for the new directory.

Step 14: **Mount all the logical disks**

All the logical disks used later as mounted filesystems should be mounted at this time by giving the following command:

EXAMPLE:

mount /dev/dsk/u14c8s4 /usr1 <CR>

The first parameter is the name of the special file pointing to the logical subdisk and the second parameter is the name of the directory whereto the disk should be mounted.

Step 15: **Installing the Basic Utilities from tape**

The rest of the commands and utilities should now be transferred to the disk(s) by inserting the tape marked "Basic Utilities" into the streamer drive and giving the following command:

newpkg /dev/stream <CR>

This installation will take some time with no operator interaction. This is due to rewinding the tape and reading all the files from tape into the disk(s). The tape has **cpio** format .

Step 16: **Change the systemfiles**

Normally some changes need to be made in all or some of the following files using an editor such as **vi**:

/etc/checklist
/etc/fstab
/etc/gettydefs
/etc/group
/etc/inittab
/etc/issue
/etc/passwd
/etc/rc.d/InitTerm

These files are normally refered to as the System files since they are depending of the actual set up and configuration of the system. For the usage of each of these files please refer to the delivered dokumentation.

Note that if you are using the **vi** editor, you need to set up a proper terminal environment by giving the following commands:

TERM=T3-24-C80 export TERM

/etc/terminology -i int/dde450.t /dev/console <CR>

This is only an example of how to set up the terminal environment for a **dde450** terminal, for other terminals use different SIOC tables.

Step 17: **Flush the internal buffers to hard disk**

To flush the internal buffers execute the command:

sync <CR>

Step 18: **Boot using the diskette marked "Normal boot"**

The Supermax should now be reset by turning the key and the diskette marked "Normal boot" should be inserted into the floppy drive. Please specify current time and date. The system should now boot-strap itself into a normal System V system with login picture displayed at all terminals.

Step 19: **Login as root**

Login as super-user on the console by giving the user name:

root <CR>

No password is needed for the user 'root' or 'bin' in the passwd file (*/etc/passwd*). When succesfully logged in you will receive the shell prompt.

Step 20: **Check all the terminals and printers on the system**

Check that all terminals configurated to the system are working by login. Note that it is only possible to log in as super-user (root) on the console and not on the other terminals.

Check whether it is possible to print out on all printers configurated to the system, by sending a printout to a printer, but do not use the LP spooler system at this stage.

Step 21: **Install the winchester boot**

The Supermax computer is able to boot from the hard disk if the following procedure is followed.

Create a special file called **/dev/boot.0** by giving the following command:

EXAMPLE:

ln /dev/dsk/u14c8s1 /dev/boot.0 <CR>

Where **/dev/dsk/u14c8s1** is the second logical disk on dioc unit 14 chanal 8, where the Operating System (SMOS) should be placed, the size of the logical disk should be at least 1.2 Mb. The major and minor numbers can be generated by using *gendev*. **/dev/boot.0** is the special file created by the previous command.

Install The Supermax Boot Package.

Please read the enclosed description of release for Supermax Boot package before continuing. Insert the first diskette containing the Supermax 5X0 Boot package in the drive and type the following:

/etc/newpkg <CR>

Enable the winchester boot by giving the following command:

mkwboot −b0 −s/dev/boot.0 −a <CR>

Step 22: **Setup the LP spooler system**

Normally the system will as described earlier in this installation guide automatically set up the LP printer spooler system for one printer called: **print0 (/dev/print0)** with a spooler model named "**dde**". If you do not agree or want more than one printer make the changes to the LP spooler system at this stage of the installation. For more information of how to do this you are advised to take a look at the description in System Administrators Guide.

Step 23: **Add passwords to all users**

No password is needed for root and all other users in the passwd file (/etc/passwd). But for reasons of security it is recommended that at least the super-user should be given a password, by using the command:

passwd root <CR>

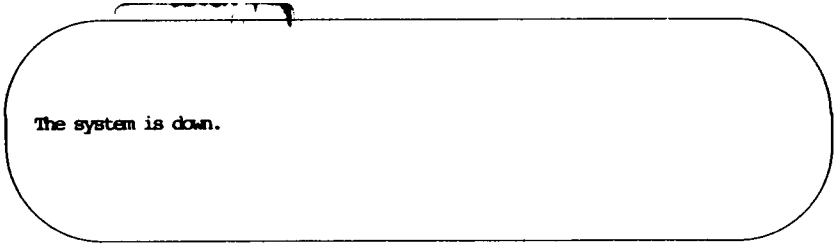
The *passwd* command will ask some questions, please answer them and do not forget the new password(s). The ordinary users are free to change their own passwords by using the *passwd* command.

Step 24: **Reboot using winchester boot**

To ensure that the Supermax is able to boot from the hard disk (winchester boot), please shutdown the system by giving the command:

init 0 <CR>

This brings the system down to run level 0, which is a controlled way to stop the system (do not try simply to turn the key or remove the power when the system is running. You will for sure be punished). When the following message:



is displayed on the console, reboot the system by turning the key and ensure that no floppy is placed in the floppy drive, since the Supermax will try then to boot from the floppy drive. After a few seconds the system should bootstrap itself from the hard disk and the system will be ready again.

Note that there is no more use for the three floppies, but we recommand that you keep the floppies in a safe place.

The Supermax is now ready for normal use and installation of other software packages such as for instance:

- ACCT Accounting
- UUCP Unix to Unix communication
- SWD Software development package

If one or more of these packages should be installed it is normally done by using **newpkg**, but please refer to the installation guide for the specific package.

Makeos and bootgen.

With new versions of the operating system new parameters to the program */etc/chhw* have been added. These are used when you need the stream package. In order to install versions of this operating system you must have.

- normal boot disk.
- disk with the boot modules.
- winchester boot on the hard disk.

The disk with the boot modules is in the newpg format and is read with the command newpkg. The modules is then loaded to the directory */etc/boot.d*. Be aware of that each version of operating system demands a special version of the boot modules.

When you want to generate a new operating system you change directory to */etc/boot.d*, and uses the program *makeos*. This program generates a file named *os20* or *os00* depending on whether you got the 68020 or 68000 MCU. This os file is then added to you winchester boot with the program *bootgen*.

The procedure is the following.

- generate a copy of the actual configuration.
- install the new modules.
- install the normal boot disk on the winchester disk
  ```
  # config -h | chhw /dev/flop
  # cp /dev/flop /dev/boot.0
  ```
  where /dev/boot.0 is the name of the winchester boot.
- use makeos to generate the osXX file.
- use bootgen to add the osXX file to the winchester boot.

Before using the makeos your TARGETMC variable must be set. Using bootgen is done with:

```
# bootgen -c /dev/boot.0 osXX
```

Please notice that you will have a discrepancy between your normal boot disk and the winchester boot.

SUPERMAX GENERAL CONFIGURATION RULES

Supermax System V

ken 07.06.88

This paper describes a number of general rules made to make it more easy to configurate the Supermax computer with the 'correct' number of hardware modules and calculate the values of the operating system parameters.

The rules are split into two main sections, the first section containing rules related to calculating the number of MCU's, DIOC's, SIOC's, etc..., the second section containing rules related to calculation of the operating system parameter values set by the *chhw* program.

Please note that all the rules in this paper are only rules of thumb and therefore are not totally exact, but experience shows that the rules normally give a very good indication of the number of modules and values of the operating system parameters.

The rules are valid for all the current versions of the System V operating system for the Supermax.

HARDWARE CONFIGURATION RULES:

The following rules are made in an attempt to make it more easy to determine the number modules a Supermax should be configurated with. The main parameters used by the rules are the number of users on the machine and the total sum of the sizes of the harddisks in MB.

The hardware configuration rules are general and should normally be used by sales people to make an estimate of the number of each of the various modules a Supermax should be equipped with.

Module	Calculation rule
CPU 0101	MCU = USER / 8
CPU 3400	MCU = USER / 20
RAM 3x00	MEM = (USER / MCU * 0.4) + 1.5
DIOC 1100	DIOC = ((MCU / 2) + (SUM / 250MB)) / 2
SIOC 0300	SIOC = (TERM + PRINT) / 8
SIOC 3600	SIOC-2 = (TERM + PRINT) / 32
NIOC 1600	NIOC = (TERM + PRINT) / 32
CIOC 0900	CIOC = (Physical channels) / 2

The following abbrevations are used:

USER: The total number of users.
SUM: The total size of all the hard disks (MB).
TERM: The total number of terminals.
PRINT: The total number of printers.
MCU: The total number of MCU'es.

OPERATING SYSTEM CONFIGURATION RULES:

The Operating system configuration rules are made to determine the value/size of the various parametres used by the operating system kernel and set by the *chhw* program.

The rules are general and should normally be used by system administrators, technicians and other people responsible for installing and adjusting the operating system on the Supermax, to calculate the values of the various parametres.

The rules can be used to check one or more parameters of an existing configuration or can be used to calculate all the values in which case the rules should be used in sequence from the top to the bottom of the scematics.

Note that for some of the parameters the rule is just returning a constant value. Those parameters should normally be set to the constant value but in 'special' cases this value should be increased to satisfy requirements from 'special' applications. For example, when running various Cobol programs where a lot of record locking is used, the number of lock elements (LOCKELEMENTS) should be increased.

GLOBAL PARAMETRES:

Resource	Calculation rule
LOCKELEMENTS	10
MESSAGES	10
MAX I/O	32
GLOBALS	(USER * 3) + 15
FILES	GLOBALS * 2
OPENS	FILES * 3
SHARED	> = 10
SEMAPHORE	10

LOCAL PARAMETRES:

Resource	Calculation rule
ALLOWED MEM	1 MB
LOCALS	GLOBALS / MCU + 10
PART DESC	3 * LOCALS
TEXT DESC	1 * LOCALS
ITEM	(FILES/MCU * 4 KBytes) + (LOCALS * 1 KBytes)

The abbrevations used are the same as for the hardware configuration rules.

Configuration - 20 users :

Master MCU:	3	Filedescr:	256
Lockelems:	10	Global processes:	290
Opens:	256	Shared memory descr:	160
Message queues:	10	Semaphore descr:	64
Maxio:	32		

dump disk:	/dev/dsk/ul4c3s0	
root disk:	/dev/dsk/ul4c8s0	
Initial program:	/etc/init	
console:	/dev/term/ul4c0w1	
	9600 baud	8 data bits
	Send one stop bit	Parity disable

Streams:

Event cells:	92	Queue pairs:	128
Links:	32	Message blocks:	2724
Low fraction:	80	Med fraction:	90

Number of message blocks:

4 bytes: 128	16 bytes: 512	64 bytes: 1024
128 bytes: 512	256 bytes: 256	512 bytes: 96
1024 bytes: 128	2048 bytes: 64	4096 bytes: 4

Module definitions:

nioc	32	0	0	0
arp	4	0	0	0
ip	6	0	0	0
tcp	32	0	0	0
udp	32	0	0	0
loop	1	0	0	0
echo	1	0	0	0
timo	32	0	0	0
ntym	10	0	0	0
ntys	10	0	0	0
vti	10	0	0	0

MCU: Motorola 68020

MCU £	option	inst. memory	allow. memory	local procs	text desc.	part desc.	items	swapdis /dev/dsk
3		6.00 M	2.00 M	125	72	300	450 k	u14c8s10

```
Sioc2 £6:
 0: normal terminal/printer              1: normal terminal/printer
 2: normal terminal/printer              3: normal terminal/printer
 4: normal terminal/printer              5: normal terminal/printer
 6: normal terminal/printer              7: normal terminal/printer
 8: normal terminal/printer              9: normal terminal/printer
10: normal terminal/printer             11: normal terminal/printer
12: normal terminal/printer             13: normal terminal/printer
14: normal terminal/printer             15: normal terminal/printer
16: normal terminal/printer             17: normal terminal/printer
18: normal terminal/printer             19: normal terminal/printer
20: normal terminal/printer             21: normal terminal/printer
22: normal terminal/printer             23: normal terminal/printer
24: normal terminal/printer             25: normal terminal/printer
26: normal terminal/printer             27: normal terminal/printer
28: normal terminal/printer             29: normal terminal/printer
30: normal terminal/printer             31: normal terminal/printer

Dioc2 £14:
Terminals:
 0: normal terminal/printer
Disks:
 3: First  560 KB 5.25" floppy
 7: Streamer tape length: 42.75 MB
 8: First  hard disk on first  controller, length: 321.00 MB
                subdisk  0: 174080 k bytes
                subdisk  1:   2048 k bytes
                subdisk  2:   2048 k bytes
                subdisk  3:  15360 k bytes
                subdisk  4:  46080 k bytes
                subdisk  5:  15360 k bytes
                subdisk  6:  46080 k bytes
                subdisk  7:    512 k bytes
                subdisk  8:    512 k bytes
                subdisk  9:  11264 k bytes
                subdisk 10:  15360 k bytes
20: First  360 KB  floppy - 40 tracks, 9 sectors
```

```
22: First  720 KB  floppy - 80 tracks, 9 sectors
24: First  320 KB  floppy - 40 tracks, 8 sectors
26: First  640 KB  floppy - 80 tracks, 8 sectors

Cioc     channel 0  channel 1
15        in use      in use

Nioc £5:
 0: normal terminal/printer          1: normal terminal/printer
 2: normal terminal/printer          3: normal terminal/printer
 4: normal terminal/printer          5: normal terminal/printer
 6: normal terminal/printer          7: 5-window terminal
 8: 5-window terminal                9: normal terminal/printer
10: normal terminal/printer         11: 5-window terminal
12: 5-window terminal               13: normal terminal/printer
14: normal terminal/printer         15: 5-window terminal
16: 5-window terminal               17: normal terminal/printer
18: normal terminal/printer         19: normal terminal/printer
20: normal terminal/printer         21: normal terminal/printer
22: normal terminal/printer         23: normal terminal/printer
24: normal terminal/printer         25: normal terminal/printer
26: normal terminal/printer         27: normal terminal/printer
28: normal terminal/printer         29: normal terminal/printer
30: normal terminal/printer         31: normal terminal/printer
```

Configuration - 200 users (constantly 100 users) :

Master MCU:	0	Filedescr:	1024
Lockelems:	100	Global processes:	800
Opens:	2000	Shared memory descr:	92
Message queues:	32	Semaphore descr:	128
Maxio:	32		

dump disk:	/dev/dsk/u14c3s0	
root disk:	/dev/dsk/u11c28s0	
Initial program:	/etc/init	
console:	/dev/term/u8c0w1	
	19200 baud	8 data bits
	Send one stop bit	Parity disable

Streams:

Event cells:	64	Queue pairs:	64
Links:	16	Message blocks:	750
Low fraction:	80	Med fraction:	90

Number of message blocks:

4 bytes: 64	16 bytes: 128	64 bytes: 128
128 bytes: 128	256 bytes: 64	512 bytes: 64
1024 bytes: 28	2048 bytes: 16	4096 bytes: 8

Module definitions:

ioct	0	0	0	0
sp	14	0	0	0
vti	10	0	0	0

MCU: Motorola 68030

MCU £	option	inst. memory	allow. memory	local procs	text desc.	part desc.	items	swapdisk /dev/dsk
0		16.00 M	3.00 M	200	100	600	804 k	u12c30s0
1		16.00 M	3.00 M	200	100	600	800 k	u12c30s1
2		16.00 M	3.00 M	200	100	600	804 k	u12c30s2
3		16.00 M	3.00 M	200	100	600	800 k	u12c30s3

Sioc2 £8:

0: normal terminal/printer	1: normal terminal/printer
2: normal terminal/printer	3: normal terminal/printer
4: normal terminal/printer	5: normal terminal/printer
6: normal terminal/printer	7: normal terminal/printer

```
 8: normal terminal with ass. printer    9: normal terminal with ass. printe
10: normal terminal with ass. printer   11: normal terminal with ass. printe
12: normal terminal with ass. printer   13: normal terminal with ass. printe
14: normal terminal with ass. printer   15: normal terminal with ass. printe
16: normal terminal/printer             17: normal terminal/printer
18: normal terminal/printer             19: normal terminal/printer
20: normal terminal/printer             21: normal terminal/printer
22: normal terminal/printer             23: normal terminal/printer
24: normal terminal/printer             25: normal terminal/printer
26: normal terminal/printer             27: normal terminal/printer
28: normal terminal/printer             29: normal terminal/printer
30: normal terminal/printer             31: normal terminal/printer

Dioc3 £11:
Disks:
28: Mirror hard disk (channel  8/9 ), length: 321.00 MB
                subdisk  0:  32768 k bytes
                subdisk  1: 102400 k bytes
                subdisk  2: 102400 k bytes
                subdisk  3:  81920 k bytes
                subdisk  4:   9216 k bytes
29: Mirror hard disk (channel 10/11), length: 321.00 MB
                subdisk  0: 131072 k bytes
                subdisk  1:  98304 k bytes
                subdisk  2:  30720 k bytes
                subdisk  3:  16384 k bytes
                subdisk  4:  16384 k bytes
                subdisk  5:  16384 k bytes
                subdisk  6:  19456 k bytes
30: Mirror hard disk (channel 12/13), length: 321.00 MB
                subdisk  0: 131072 k bytes
                subdisk  1: 174080 k bytes
                subdisk  2:   5888 k bytes
                subdisk  3:  17664 k bytes
31: Mirror hard disk (channel 14/15), length: 321.00 MB
                subdisk  0: 153600 k bytes
                subdisk  1: 175104 k bytes

Dioc3 £12:
Disks:
28: Mirror hard disk (channel  8/9 ), length: 321.00 MB
                subdisk  0: 311296 k bytes
                subdisk  1:   9216 k bytes
                subdisk  2:   2048 k bytes
                subdisk  3:   2048 k bytes
```

```
                subdisk  4:   2048 k bytes
                subdisk  5:   2048 k bytes
29: Mirror hard disk (channel 10/11), length: 321.00 MB
                subdisk  0: 236544 k bytes
                subdisk  1:  92160 k bytes
30: Mirror hard disk (channel 12/13), length: 321.00 MB
                subdisk  0:  49152 k bytes
                subdisk  1:  49152 k bytes
                subdisk  2:  49152 k bytes
                subdisk  3:  49152 k bytes
                subdisk  4: 132096 k bytes
31: Mirror hard disk (channel 14/15), length: 643.00 MB
                subdisk  0:  65536 k bytes
                subdisk  1:  40960 k bytes
                subdisk  2:  40960 k bytes
                subdisk  3:  40960 k bytes
                subdisk  4:  32512 k bytes
                subdisk  5:   4096 k bytes
                subdisk  6:  12864 k bytes
                subdisk  7: 328704 k bytes
                subdisk  8:   2048 k bytes
                subdisk  9:   2048 k bytes
                subdisk 10:  87040 k bytes

Dioc2 £13:
Terminals:
Disks:
 1: First  1 MB 8" floppy
 7: Streamer tape length: 120.25 MB
10: First  hard disk on second controller, length: 321.00 MB
                subdisk  0: 328704 k bytes
17: Tape/Optical device on eigth controller. Length:  2000.00 MB

Dioc2 £14:
Terminals:
Disks:
 3: First  560 KB 5.25" floppy
 7: Streamer tape length: 42.75 MB
17: Tape/Optical device on eigth controller. Length:  2000.00 MB
20: First  360 KB  floppy - 40 tracks, 9 sectors
22: First  720 KB  floppy - 80 tracks, 9 sectors
24: First  320 KB  floppy - 40 tracks, 8 sectors
26: First  640 KB  floppy - 80 tracks, 8 sectors

Cioc     channel 0  channel 1
```

15 in use in use

Nioc £5:

0: 5-window terminal	1: 5-window terminal
2: 5-window terminal	3: 5-window terminal
4: 5-window terminal	5: 5-window terminal
6: 5-window terminal	7: 5-window terminal
8: 5-window terminal	9: 5-window terminal
10: 5-window terminal	11: 5-window terminal
12: 5-window terminal	13: 5-window terminal
14: 5-window terminal	15: normal terminal/printer
16: normal terminal/printer	17: normal terminal/printer
18: normal terminal/printer	19: normal terminal/printer
20: normal terminal/printer	21: normal terminal/printer
22: normal terminal/printer	23: normal terminal/printer
24: normal terminal/printer	25: normal terminal/printer
26: normal terminal/printer	27: normal terminal/printer
28: normal terminal/printer	29: normal terminal/printer
30: normal terminal/printer	31: normal terminal/printer
32: normal terminal/printer	33: normal terminal/printer
34: normal terminal/printer	35: normal terminal/printer
36: normal terminal/printer	37: normal terminal/printer
38: normal terminal/printer	39: normal terminal/printer
40: normal terminal/printer	41: normal terminal/printer
42: normal terminal/printer	43: normal terminal/printer
44: normal terminal/printer	45: normal terminal/printer
46: normal terminal/printer	47: normal terminal/printer
48: normal terminal/printer	49: normal terminal/printer
50: normal terminal/printer	51: normal terminal/printer
52: normal terminal/printer	53: normal terminal/printer
54: normal terminal/printer	55: normal terminal/printer
56: normal terminal/printer	57: normal terminal/printer
58: normal terminal/printer	59: normal terminal/printer
60: normal terminal/printer	61: normal terminal/printer
62: normal terminal/printer	63: normal terminal/printer

Nioc £6:

0: 5-window terminal	1: 5-window terminal
2: 5-window terminal	3: 5-window terminal
4: 5-window terminal	5: 5-window terminal
6: 5-window terminal	7: 5-window terminal
8: 5-window terminal	9: 5-window terminal
10: 5-window terminal	11: 5-window terminal
12: normal terminal/printer	13: normal terminal/printer
14: normal terminal/printer	15: normal terminal/printer

16: normal terminal/printer
17: normal terminal/printer
18: normal terminal/printer
19: normal terminal/printer
20: normal terminal/printer
21: normal terminal/printer
22: normal terminal/printer
23: normal terminal/printer
24: normal terminal/printer
25: normal terminal/printer
26: normal terminal/printer
27: normal terminal/printer
28: normal terminal/printer
29: normal terminal/printer
30: normal terminal/printer
31: normal terminal/printer
32: normal terminal/printer
33: normal terminal/printer
34: normal terminal/printer
35: normal terminal/printer
36: normal terminal/printer
37: normal terminal/printer
38: normal terminal/printer
39: normal terminal/printer
40: normal terminal/printer
41: normal terminal/printer
42: normal terminal/printer
43: normal terminal/printer
44: normal terminal/printer
45: normal terminal/printer
46: normal terminal/printer
47: normal terminal/printer
48: normal terminal/printer
49: normal terminal/printer
50: normal terminal/printer
51: normal terminal/printer
52: normal terminal/printer
53: normal terminal/printer
54: normal terminal/printer
55: normal terminal/printer
56: normal terminal/printer
57: normal terminal/printer
58: normal terminal/printer
59: normal terminal/printer
60: normal terminal/printer
61: normal terminal/printer
62: normal terminal/printer
63: normal terminal/printer

Nioc £7:

0: 5-window terminal
1: 5-window terminal
2: 5-window terminal
3: 5-window terminal
4: 5-window terminal
5: 5-window terminal
6: 5-window terminal
7: 5-window terminal
8: 5-window terminal
9: 5-window terminal
10: 5-window terminal
11: 5-window terminal
12: normal terminal/printer
13: normal terminal/printer
14: normal terminal/printer
15: normal terminal/printer
16: normal terminal/printer
17: normal terminal/printer
18: normal terminal/printer
19: normal terminal/printer
20: normal terminal/printer
21: normal terminal/printer
22: normal terminal/printer
23: normal terminal/printer
24: normal terminal/printer
25: normal terminal/printer
26: normal terminal/printer
27: normal terminal/printer
28: normal terminal/printer
29: normal terminal/printer
30: normal terminal/printer
31: normal terminal/printer
32: normal terminal/printer
33: normal terminal/printer
34: normal terminal/printer
35: normal terminal/printer
36: normal terminal/printer
37: normal terminal/printer

38: normal terminal/printer
39: normal terminal/printer
40: normal terminal/printer
41: normal terminal/printer
42: normal terminal/printer
43: normal terminal/printer
44: normal terminal/printer
45: normal terminal/printer
46: normal terminal/printer
47: normal terminal/printer
48: normal terminal/printer
49: normal terminal/printer
50: normal terminal/printer
51: normal terminal/printer
52: normal terminal/printer
53: normal terminal/printer
54: normal terminal/printer
55: normal terminal/printer
56: normal terminal/printer
57: normal terminal/printer
58: normal terminal/printer
59: normal terminal/printer
60: normal terminal/printer
61: normal terminal/printer
62: normal terminal/printer
63: normal terminal/printer

Nioc £9:

0: 5-window terminal
1: 5-window terminal
2: 5-window terminal
3: 5-window terminal
4: 5-window terminal
5: 5-window terminal
6: 5-window terminal
7: 5-window terminal
8: 5-window terminal
9: 5-window terminal
10: 5-window terminal
11: 5-window terminal
12: 5-window terminal
13: 5-window terminal
14: 5-window terminal
15: normal terminal/printer
16: normal terminal/printer
17: normal terminal/printer
18: normal terminal/printer
19: normal terminal/printer
20: normal terminal/printer
21: normal terminal/printer
22: normal terminal/printer
23: normal terminal/printer
24: normal terminal/printer
25: normal terminal/printer
26: normal terminal/printer
27: normal terminal/printer
28: normal terminal/printer
29: normal terminal/printer
30: normal terminal/printer
31: normal terminal/printer
32: normal terminal/printer
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35: normal terminal/printer
36: normal terminal/printer
37: normal terminal/printer
38: normal terminal/printer
39: normal terminal/printer
40: normal terminal/printer
41: normal terminal/printer
42: normal terminal/printer
43: normal terminal/printer
44: normal terminal/printer
45: normal terminal/printer
46: normal terminal/printer
47: normal terminal/printer
48: normal terminal/printer
49: normal terminal/printer
50: normal terminal/printer
51: normal terminal/printer
52: normal terminal/printer
53: normal terminal/printer
54: normal terminal/printer
55: normal terminal/printer
56: normal terminal/printer
57: normal terminal/printer
58: normal terminal/printer
59: normal terminal/printer

60: normal terminal/printer
61: normal terminal/printer
62: normal terminal/printer
63: normal terminal/printer

Back-up procedures - file management

/bin/cpio - one tape

Output to removable media (tape/floppy) :

find <dir> -print -depth | cpio -ovaM > /dev/stream
or
find <dir> -print -depth | cpio -ovaM -O /dev/stream

Input from removable media (tape/floppy) :

cpio -idumvM < /dev/stream [file1 file2 ..]
or
cpio -idumvM -I /dev/stream [file1 file2 ..]

Read the removable media (tape/floppy) :

cpio -itvM < /dev/stream [file1 file2 ..]
or
cpio -itvM -I /dev/stream [file1 file2 ..]

Back-up procedures - file management

/etc/bcpio - multiple tapes

Output to removable media (tape/video) :

find <dir> -print -depth | bcpio -ova > /dev/stream

or

find <dir> -print -depth | bcpio -ova -O /dev/stream

Input from removable media (tape/video) :

bcpio -idumv < /dev/stream [file1 file2 ..]

or

bcpio -idumv -I /dev/stream [file1 file2 ..]

Read the removable media (tape/video) :

bcpio -itv < /dev/stream [file1 file2 ..]

or

bcpio -itv -I /dev/stream [file1 file2 ..]

Back-up procedures - file management

/bin/tar - one tape

Output to removable media (tape/floppy) :

```
tar -cvf /dev/stream [file1 file2 ..]
```

Input from removable media (tape/floppy) :

```
tar -xvf /dev/stream [file1 file2 ..]
```

Read the removable media (tape/floppy) :

```
tar -tvf /dev/stream
```

Back-up procedures - file & disk management

/etc/btar - multiple tapes

Output to removable media (tape/video) :

btar -cvf /dev/stream [file1 file2 ..]
and
btar -cvfR /dev/stream [disk1 disk2 ..]
- eg. total disk back-up
btar -cvfR /dev/video `echo /dev/dsk*`

Input from removable media (tape/video) :

btar -xvf /dev/stream [file1 file2 ..]
and
btar -xvfR /dev/stream disk
- eg. total disk restore
btar -xvfR /dev/stream

Read the removable media (tape/video) :

btar -tvf /dev/stream

Back-up procedures - disk management

/etc/dskback - multiple tapes

Output to removable media (tape/video) :

dskback -c -v -r [disk] /dev/stream (20 & 45 Mb)
or
dskback -B -c -v -r [disk1 disk2 ..] /dev/stream
- eg. total disk back-up (max. 56 disks)
dskback -B -c -v -r `echo /dev/dsk/*` /dev/video

Input from removable media (tape/video) :

dskback -v -r /dev/stream [disk] (20 & 45 MB)
or
dskback -R -v /dev/stream [No:disk] [No:RESTORE]

Read the removable media (tape/video) :

dskback -T -v /dev/stream

ORACLE 6 backup.

4th September 1990. HE/ISS

Following document describes backup routines for ORACLE 6 as recommended by DDE A/S.

Fundamentally, there are two ways of backing up an ORACLE 6 database. These are, making an export-file which is included in the normal backup-routine (incremental or total backup) or taking a raw copy of all ORACLE special files. If a raw copy is chosen it is extremely important also to backup the control-files.

Backup strategies.

1. btar or dskback.

These two programs provide means for a fast backup. ORACLE must be shut down while these copies are made.

The output made by these two commands will be a true copy of the disk contents.

bcpio - one way to copy control-files to tape, ex.:

find <controlfile1 controlfile2 ...> -print ¦ bcpio -ova -O /dev/stream

In this case you also have to copy the raw disks onto a different tape, using for example:

btar - if used with option **R**, copies raw disks onto tape.

btar cvRf /dev/stream <diskname1 diskname2 ...>

Or you could use:

dskback - a program that copies logical disks onto tape, using f.ex. this syntax:

dskback -B -c <diskname1 diskname2 ...> /dev/stream

for this last command the option **c** signifies an automatic check read of the tape copy. For all commands mentioned here you are advised to consult your manual for the precise syntax for the individual customer.

Important!!!

It is vitally important that ORACLE is not running when performing either btar or dskback to raw copy the ORACLE disks. Also always remember to backup both database and redolog disks + control files.

2.totexp.

totexp is a script provided on the distribution tape in the **$ORACLE HOME/bin** directory. It is a slower way to backup than the first method, but it produces less output (as the data is compressed, and views are stored as definitions), and the script also ensures optimal placing of data, when read back in using the script **totimp**.

ORACLE must be running when these scripts are used, but no heavy or ramified transactions must take place.

Syntax:

totexp <block-device> <password>

where block-device could be /dev/stream, and password is the ORACLE-user **system**'s password, default is **MANAGER**.

totexp uses the **streamexp** script, this program works more or less like **exp**. This means that the command line syntax from exp is supported. In fact the only difference is that for streamexp the file-parameter must always be a block-device.

NOTE!! You have to have current directory set to $ORACLE HOME/bin when invoking totexp, else you will receive following error message: "Must be superuser...".

totimp <block-device> <password>

the same as for totexp.

3.exp.

It is also possible to backup using the exp script to create a file in the filesystem to be copied out on tape, f.ex. in an automatic backup procedure. It is worth to note that on ORACLE 6 it is possible to invoke exp with the options given on a command line f.ex.:

exp system/manager full=y file=ora.dmp grants=y indexes=y rows=y compress=n

some of these options are default, and are not necessary per se. It is worth to note that compress=n, this is recommended in ORACLE hints p.18.

Recovering a database.

If a database needs recovery using an exp file it is necessary to perform 4 actions:

1. Create the database.

sqldba @?/dbs/crea[SID]

where [SID] f.ex. is DE. You need to be UNIX super-user to use this command.

2. Create the data dictionary.

sqlplus sys/<PASSWORD> @?/dbs/catalog

where <PASSWORD> is the PASSWORD of the ORACLE user **sys**.

3. Creating export views.

sqlplus sys/<PASSWORD> @?/dbs/expvew

same as above.

4. Reading the export file.

As usual with the import program **imp**. Please refer to the "ORACLE RDBMS Utilities User's Guide".

If the scripts toexp/toimp are used, they will perform above mentioned procedure automatically.

It is possible on an ORACLE 6 database to make a raw disk copy of a running database, but it is beyond the scope of this document to descripe this.

NB! 15.

0. Hints about OKI printer.
1. How to tell the difference between Ora5 and Ora6 export.
2. When going backwards in Basic Utility.

0. Hints about OKI printer.

The terminolgy ver. 4.1 (Bas. Util 2.70 el 2.69) or sooner uses a default bottom off 6 lines. The Supportdepartment is able to deliver a beta verison which should solve this problem.

When merging text in SM-text ver. 6.1 the program sets the line distance to 48/48 inch, then 0/48 and at last a linefeed. Oki 293 can't use 0/48, so it will use 48/48 corresponding to one third of a label. This has been corrected in SM-text 6.2.

llp.

1. How to tell the difference between Ora5 and Ora6 export.

In case you might need it, the exp program from Ora5 uses a big R when writing the number of exported Rows, as opposed to Ora6 exp which uses small r, for telling the number of exported rows.

he.

2. When going backwards in Basic Utility.

If you for some obscure reason should think of going backwards in the version of Basic Utility, you should consider doing this only by using the backup of your root disk before you installed the newer version. The right way too do this should include a minimal boot, initroot, and then installing the old backup copy with the cpio program.

crb.

NB! 14.

0. Backup of rootdisk and Oracle controlfiles.
1. SNA 5.5 protocol.
2. OS 520 and Gigapacksystem.
3. SM text and column formating.
4. Terminology from /etc/rc.d/InitTerm and new Bas. Util.
5. SM calc and graphics.
6. Backup of Oracle using set -k in script.
7. Init in single usermode.

0. Backup of rootdisk and Oracle controlfiles.

Using the Unix Utility dskback of database disk and redolog disks you have to remember the controlfiles. Also you have to be carefull about the backup of your rootdisk, as this one normally will contain your controlfiles. When restoring your old rootdisk, you will overwrite the controlfiles with old versions, and this will ruin your database.

mmj/he.

1. SNA 5.5 protocol.

When mounting the SNA protocol version 5.5 you may experience that you are able to mount the SDLC-line but can't mount the SNA-line. This can be due to the fact that the file /tmp/DALRT.<line_name> exists. This file can be removed and you should now be able to startup whit the command.

/alib/cioc/reset line=<line_name>

peo.

When installing the version 5.5 or newer you must remember to make certain that the host has reconfigured the ru-size. This can be done by talking to the VTAM programmers on the host, where inbound should be 85 and outbound should be c7. Normally this can be done in a weekend before installing the new version.

mmj/dho.

2. OS 520 and Gigapacksystem.

Problem may arise when you try to install the Gigapack on a 520 OS-system. The following should be taken into account.

Primitive root version 4.1 or later due to the initroot program.

mkwboot version 1.3 or later which is found on Util. Update 3.5 or later. Do not install the Util. Update 3.5 because some of the utilities are only for an 530 OS-system.

po/crb.

3. SM text and column formating.

This feature only works if you got the product SM spell and you use this in the user standard.

ksa.

4. Terminology from /etc/rc.d/InitTerm and new Bas. Util.

When updating with Bas. Util. 2.70 the option -I is inserted in the file /etc/rc.d/InitTerm. Unfortunately the program /bin/prod isn't placed in front, so you might experience a hangup when trying to download character sets to terminals which aren't switched on.

ksa.

5. SM calc and graphics.

When using danish number conventions you will experience a error when trying to make a graphic representation of your spreadsheet. When using english notation there is no problem.

ksa.

6. Backup of Oracle using set -k in script.

We have seen a number of scripts using set -k in the start. This will mean trouble when using the new notation for the export program.

If for instance you write.

```
exp system/manager FILE=expdat.dmp FULL=y
```

the shell will first interpret the statement FILE=expdat.dmp and FULL=y, and place these as variables in the environment. The solution is simply to eliminate the set -k from the script.

ksa.

7. Init in single usermode.

When running in runlevel 1 you might experience a problem with init, if you turn off the terminal. Sometimes init will go through the sequence.

```
init 1 -> init 2 -> init 5.
```

this is an error in init and has been reported as such.

For the moment you can avoid the problem of going to runlevel 5, by placing the line with runlevel 0 before the lines with runlevel 5.

Original version.

```
s2:2:wait:/etc/rc2 >/dev/console 2>&1 </dev/console
fl:056:wait:/etc/led -f >/dev/console 2>&1 </dev/console
```

s0:056:wait:/etc/rc0 >/dev/console 2>&1 </dev/console
DP:5:wait:echo "\n Diagnostics will be started." >/dev/console 2>&1
dp:5:wait:/etc/boot 1 >/dev/console 2>&1 < /dev/console
of:0:wait:/etc/uadmin 2 0 >/dev/console 2>&1 </dev/console
Modified.
s2:2:wait:/etc/rc2 >/dev/console 2>&1 </dev/console
fl:056:wait:/etc/led -f >/dev/console 2>&1 </dev/console
s0:056:wait:/etc/rc0 >/dev/console 2>&1 </dev/console
of:0:wait:/etc/uadmin 2 0 >/dev/console 2>&1 </dev/console
DP:5:wait:echo "\n Diagnostics will be started." >/dev/console 2>&1
dp:5:wait:/etc/boot 1 >/dev/console 2>&1 < /dev/console

bbo/crb.

NB! 13.

In order to support our foreign customers we now present NB in english. You are still welcome to send hints in danish.

0. Concorde Modems and the Supermax TTY program.

When setting up the Concorde modem, check wether or not the MNP link is set. If set, the modem will use approx 10 seconds to find out (if the case) that the other modem is not using the MNP link. These extra 10 seconds could easily lead to a timeout in the Supermax TTY autodial script (timeout max. 30 seconds in version 2.0, 2.1 and 2.2).
The MNP link is set in the modem parameter S111. I will recommend it to be set to 1 or 0.

PUS sg.

1. Different Oracle hints.

When you make an export of Oracle you normally see the export counting how many rows has been exported. This can be rather annoying, especially if you use cron to do the job, and then have to read the corresponding mail. In order to have *exp* (and *imp*) just reporting the total numbers of rows for each table you can use the environment variable **ORACLE_STANDARD**. This variable just have to initialized and then exported like:

ORACLE_STANDARD= ; export ORACLE_STANDARD

In order to go from a database disk consisting of 2 small logical disks for instance 100Mb and 210Mb to one large, you have to make an export to a file or tape and afterwards import into the newly created larger database. This can be quite time consuming because you have to wait for the expot to terminate before you make the import. If you got enough disk space, you can start initializing your new database, make a named pipe, do the export to this pipe in the background, and start up your import taking its input from the named pipe.
This scheme has worked for different kinds of database, but there might be a problem with tables containing longs.

CRB sg.

2. Supermax text hints.

The following hints all refer to SM-text 5.3.
Sometimes it isn't possible for the user to get the summary picture. This slight feature can be worked around, by altering the stmenu, so that the call i changed from */alib/st/stfile* to */alib/st/stfile* --.
If some of your users dumps at print time, the problem might be solved by making a dummy variable in the environment, and thereby change the size of the environmemt.
When at start time you get the error 302 and dump, you should check the environment variable NLSPATH, which musn't contain : at start.

BV sg.
MMJ sg.

3. Dskback and new mkwboot.

When taking a dskback of large logical disks to videostreamer, you should notice, that if you want to recover a disk different from the first, you might geet a seek error, while seeking beyound the first disk. We recommend that you place small disks at the start of your entire dskback. Please notice, that the data on tape is ok.

BKN bp.

On Basic Utility tape 2.66 and later there is a new version of mkwboot.
This version uses a different syntax from the former and, this can be viewed by just calling the command.

Usage: mkwboot [-d] [-bX [-a] [-c¦-s disk]]
-d Display bootdisks
-bX Bootdisk number X
-a Activate bootdisk entry X
-c Clear bootdisk entry X
-s Set bootdisk entry X to disk

In order to make /dev/boot.0 the active boot-disk you have to enter:
$ mkwboot -b0 -a s /dev/boot.0

MMJ sg.

SUPERMAX SOFTWARE PRODUCTS - OVERVIEW

Dansk Data Elektronik a/s, 12-JUN-92

productno	text	version	versdate	number of disks	tapes	init	dep
14100arL	ORACLE, 1-4 run.	1.4	06-AUG-90				
14101	PRO * C	1.3	06-AUG-90				
14102	PRO * Cobol (RM)	1.4	06-AUG-90				
14111	Supermax OCI*Pascal	1.2	06-AUG-90				
14151	SQL * Menu	1.4	06-AUG-90				
14152	SQL * Loader	1.3	06-AUG-90				
14153a	Oracle SQL*Calc	1.3	06-AUG-90				
14180	SQL * Net Aync. Driver	1.2	06-AUG-90				
14181	SQL*Net TCP/IP Driver	1.2	06-AUG-90				
30011990	Supermax Boot 500	500.8L7	06-JUN-90				
30011991	Supermax Boot 500	500.8L7	03-JAN-90				
30021990	Supermax Boot 520	4.3	16-AUG-91				
30021991	Supermax Boot 520	4.3	16-AUG-91				
30031990	Supermax Boot	5.07	01-MAR-92				
30031991	Supermax Boot 530	5.07	01-MAR-92				
30040991	SWD (Motorola)	3.51	28-APR-92				
30050990	Basic Networking Util.	2.1	01-FEB-92				
30050991	Basic Networking Util.	2.1	01-FEB-92				
30060991	Accounting Utilities	4.0	15-JAN-91				
30070990	Job Spooling Utilities	1.2	09-OCT-91				
30070991	Job Spooling Utilities	1.2	09-OCT-91				
30090990	MTools	1.1	30-APR-89				
30090991	MTools	2.1	17-SEP-91				
30110990	TAR Back-up System	1.4	29-JUN-89				
30110991	TAR Back-up System	1.4	29-JUN-89				
30120991	Modem Logon System	1.4	13-FEB-92				
30130990	Basic Util. (Motorola)	3.10	01-JUL-91				
30130991	Basic Util. (Motorola)	3.10	01-JUL-91				
30150991	Supermax Magtape Prg. V	1.0	01-FEB-88				
30160990	SM Overvågn.system SOS	2.0	01-FEB-92				
30160991	System Supervision	2.0	01-FEB-92				
30180991	X11/Motif Dev. System	2.2b	04-DEC-91				
30190991	SMOS Primitive Root	4.4	01-FEB-92				
30291990	Supermax Skærmbilledgen.	4.2	02-SEP-91				
30308990	Supermax NFS 8 CPUs	1.7	01-FEB-92				
30308991	Supermax NFS 8 CPUs	1.7	01-FEB-92				
30313991	LP Spooler Release 3.2	1.15	16-JUL-91				
30340991	SWD (Heterogen)	3.14	04-FEB-91				
30430990	Basic Util. (Heterogen)	3.51	24-APR-92				
30430991	Basic Util. (Heterogen)	3.51	24-APR-92				
30480991	X11/Motif Dev. System MI	2.3	14-NOV-91				
30482991	X11/Motif Run. System MI	2.3	14-NOV-91				
30951991	Master Generating Util.	2.0	21-JUN-89				
31000991	Supermax COMAL80 Int.	3.4	04-JUL-89				
31010990	Supermax Comal80 Graphic	3.4	04-JUL-89				
31010991	Supermax Comal80 Graphic	3.4	04-JUL-89				
31020990	Supermax Pascal Com. 500	2.2	27-JUN-89				
31020991	Supermax Pascal Com. 500	2.2	27-JUN-89				

SUPERMAX SOFTWARE PRODUCTS - OVERVIEW

Dansk Data Elektronik a/s, 12-JUN-92

31030991	Supermax Pascal Com. 520	2.3	08-AUG-91				
31040990	SupermaxSVSPascal f.68020	1.1	26-JUN-89				
31040991	SupermaxSVSPascal f.68020	1.1	26-JUN-89				
31050990	Supermax SPC1-Pascal	1.0	12-JUL-88				
31050991	Supermax SPC1-Pascal	1.0	12-JUL-88				
31060990	SvS-Fortran, 68000	0.3	25-APR-88				
31060991	SvS-Fortran, 68000	1.1	27-JUN-89				
31080990	Documenter's Workbench 2	1.0	12-SEP-88				
31080991	Universe Basic Develop.	1.0	12-SEP-88				
31081990	SM Universe Basic Runt.	1.0	12-SEP-88				
31081991	SM Universe Basic Runt.	1.0	12-SEP-88				
31100991	RM-COBOL Development	1.1	24-JUL-87				
31101991	RM/Cobol runtime	1.1	01-AUG-87				
31110001	RM/Cobol 85 Developm. 4	5.1	05-MAR-92				
31110111	RM/Cobol 85 Dev.Ext A->B	5.1	05-MAR-92				
31110991	RM/COBOL-85 Development	1.4	26-SEP-90				
31111001	RM/Cobol 85 Runtime 4	5.1	05-MAR-92				
31111111	RM/Cobol 85 Run Ext.A->B	5.1	05-MAR-92				
31111991	RM/Cobol-85 Runtime	1.4	26-SEP-90				
31140991	SVS Pascal 68020	1.2	05-FEB-91				
31145991	SVS-Fortran, 68000	1.1	27-JUN-89				
31146991	SVS-Fortran 68020	1.2	04-FEB-91				
31150991	Universe Basic Develop.	1.0	12-SEP-88				
31151991	Universe Basic Runtime	1.0	12-SEP-88				
33005000	Supermax Label	2.2	01-SEP-89				
33010000	Supermax Kontor	8.3	15-APR-91				
33020000	Supermax Vinduer	3.3	07-MAY-92				
33030000	Supermax Tekst	6.3	14-NOV-91				
33031990	Orddeling & Stavekontrol	3.1	01-APR-90				
33032000	SM Tekst ORACLE Interf.	1.1	15-NOV-91				
33033000	Supermax Tekst Font	1.2	12-NOV-91				
33040000	Supermax Regneark	5.2	01-OCT-91				
33041000	SQL*Calc Graf Interface	2.0	01-OCT-91				
33042000	Regneark Oracle Interf.	1.2	01-SEP-91				
33060000	Supermax Kalender	4.2	01-NOV-91				
33070000	Supermax Label	2.2	01-SEP-89				
33080000	Supermax Kartotek	3.4	03-MAY-91				
33090010	Supermax Tele	4.0	01-NOV-91				
33120000	Supermax GRAF	2.1	19-NOV-91				
33130999	Supermax DCA ASCII Conv.	1.5	02-OCT-90				
33140000	Supermax Tegnesystem	2.9	28-OCT-91				
33141000	Tegnesystem runtime	1.1	07-NOV-91				
33150000	Supermax Overlay	1.0	01-DEC-90	1		phn	
33160991	Supermax Licence Control	1.0	01-NOV-91				
33170999	Supermax EDIFACT	1.1	01-NOV-91				
33440000	Supermax Tegnesyst."R" H	2.9	28-OCT-91				
33610000	Supermax Kontor "R"	8.3	15-APR-91				
33620000	Supermax Vinduer "R"	3.2	01-DEC-90				
33630000	Supermax Tekst "R"	6.2	10-OCT-90				
33650000	Supermax POST "R"	6.2	11-OCT-90				
35000819	ORACLE RDBMS V1	1.4	31-OCT-91				

SUPERMAX SOFTWARE PRODUCTS - OVERVIEW

Dansk Data Elektronik a/s, 12-JUN-92

35001819	ORACLE T.P.Option V1	1.4	31-OCT-91	
35002819	SQL*PLUS V1	1.3	31-OCT-91	
35003819	SQL*FORMS V1	1.4	31-OCT-91	
35004819	SQL*CALC V1	1.4	15-NOV-91	
35005819	SQL*MENU V1	1.4	31-OCT-91	
35006819	SQL*Reportwriter V1	1.3	31-OCT-91	
35007819	SQL*ReportWriter.Run.	1.2	01-JUL-90	
35008819	CASE*Dictionary V1	1.0	01-JUL-90	
35009819	CASE*Generator (1.0) V1	1.0	01-JUL-90	
35010819	Case*Designer (1.1) V1	1.0	01-JUL-90	
35011819	SQL*FORMS ver3.0	1.0	31-OCT-91	
35012819	SQL*Menu Ver.5.0	1.0	31-OCT-91	
35020819	SQL*NET V1	1.3	31-OCT-91	
35022819	ORACLE TCP/IP V1	1.3	31-OCT-91	
35030819	PRO*C V1	1.3	22-AUG-91	
35032819	PRO*FORTRAN V1	1.2	22-AUG-91	
35039819	OCI*Pascal V1	1.2	22-AUG-91	
35090999	Oracle RDBMS Language	1.3	22-AUG-91	
35093999	Oracle Forms Language	1.3	22-AUG-91	
35200819	ORACLE RDBMS 6 "R"	1.1	22-AUG-91	
35201819	ORACLE TPO 6 "R"	1.1	22-AUG-91	
35222819	SQL*Net TCP/IP "R"	1.1	22-AUG-91	
35239819	OCI*Pascal "R"	1.0	22-AUG-91	
35408819	CASE*Dictionary	1.0	01-JUL-90	
35409819	CASE*Generator	1.0	01-JUL-90	
35410819	CASE*Designer V1	1.0	01-JUL-90	
35700989	RDBMS 6 R	2.0	01-DEC-91	
35701989	TPO 6 R	2.0	01-DEC-91	
35702989	SQL*PLUS 6 R	2.0	01-DEC-91	
35703989	SQL*FORMS 2.3 R	2.0	01-DEC-91	
35704989	SQL*CALC 6 R	2.0	01-DEC-91	
35705989	SQL*MENU 4 R	2.0	01-DEC-91	
35706989	SQL*Rep.wr. 6 R	2.0	01-DEC-91	
35711989	SQL*FORMS 3.0 R	2.0	01-DEC-91	
35712989	SQL*Menu 5.0 R	2.0	01-DEC-91	
35720819	SQL*NET 6 R	2.0	01-DEC-91	
35722819	OR.TCP/IP 6 R	2.0	01-DEC-91	
35730989	PRO*C 6 R	2.0	01-DEC-91	
35790999	NLS Lagua. f.RDBMS 6.0 R	2.0	01-DEC-91	
35793999	Oracle Forms 2.3 Lang. R	2.0	01-DEC-91	
37102731	INFORMIX-4GL RDS CL3	4:1.10.03J	04-AUG-89	
37103731	INFORMIX-4GL RDS Run CL3	4:1.10.03J	04-AUG-89	
37104731	INFORMIX-4GL ID CL3	4:1.10.03J	04-AUG-89	
37105731	INFORMIX-4GL CL3	2.10.00	18-SEP-88	
37106731	INFORMIX-4GL Runtime CL3	4:1.10.03J	04-AUG-89	
37109731	INFORMIX-SQL Runtime CL3	4.2.10.00	04-AUG-89	
37111731	INFORMIX-ESQL/C CL3	4:2.10.03J	04-AUG-89	
37112731	INFORMIX-ESQL/C Run CL3	4:2.10.03J	04-AUG-89	
37114731	INFORMIX-TURBO CL3	4:1.10.03J	04-AUG-89	
37115731	INFORMIX C-ISAM CL3	4:3.10.03J	04-AUG-89	
37116731	INFORMIX C-ISAM Run CL3	4:3.10.03J	04-AUG-89	

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37117701	INFORMIX DEB./CRED.BENCH	4:1.10.03J	04-AUG-89
37118709	INFORMIX-SQL,Transl.Kit	4:3.10.03J	04-AUG-89
37119709	INFORMIX-SQL,Run Trans K	4:3.10.03J	04-AUG-89
39101000	Uniplex II Plus dan	2.2	17-JUN-91
39101001	Uniplex II Plus eng	6.10	14-AUG-90
39101005	UniplexII+ BASE2 sv	6.10	28-NOV-90
39101991	UniplexII+ BASE2eng DEMO	6.10	21-SEP-90
39101995	UniplexII+ BASE2 sv DEMO	6.10	29-NOV-90
39102000	Uniplex udv.kon. dan	2.1	17-DEC-90
39102001	Uniplex adv.off. eng	6.10	14-AUG-90
39102005	Uniplex adv.off. sv	6.10	28-NOV-90
39103001	Uniplex adv.graph.eng	6.10	14-AUG-90
39104009	Uniplex ordbogspakke	1.1	14-JUN-91
39105000	UniplexII+ BASE1 dan	2.2	07-MAY-91
39105001	UniplexII+ BASE1 eng	6.10	14-AUG-90
39105005	UniplexII+ BASE1 sv	6.10	28-NOV-90
39105991	UniplexII+ BASE1eng DEMO	6.10	21-SEP-90
39105995	UniplexII+ BASE1 sv DEMO	6.10	29-NOV-90
39111710	WordPerfect 4.2 dan 1	1.0	02-NOV-90
39120161	Uniplex 6.10f ->7.01 Upg	3.1	08-APR-92
39130001	Uniplex 7.01a BASE	3.1	08-APR-92
39140001	Uniplex 7.01a AOS	3.0	27-JAN-92
39150001	Uniplex 7.01a AGS	3.0	27-JAN-92
39160001	Uniplex7.01a Datalink	3.0	27-JAN-92
39170001	Uniplex 7.01a Windows	3.0	27-JAN-92
39701001	UniplexII+ BASE2 eng	6.10	10-JAN-91
39701991	UniplexII+ BASE2eng DEMO	6.10	14-JAN-91
39702001	Uniplex adv.off. eng	6.10	10-JAN-91
39703001	Uniplex adv.graph.eng	6.10	10-JAN-91
39704009	Uniplex Add.Dict.Pack.	6.10	11-JAN-91
39705001	UniplexII+ BASE1 eng	6.10	10-JAN-91
39705991	UniplexII+ BASE1eng DEMO	6.10	14-JAN-91
40030001	Diagnostic Programs	4.7	07-AUG-90
40030991	Diagnostic Programs	4.7	07-AUG-90
40500999	DDE 3020 Boot Tape	1.0	19-MAR-91
40501999	DDE 3000 Boot Tape	1.0	06-MAR-91
40502999	DDE 3010 Boot Tape	1.0	18-MAR-91
40503999	DDE 3030 BootTape	0.1	30-APR-92
41000990	Supermax TTY-emulator	2.5	20-NOV-91
41000991	Supermax TTY-emulator	2.5	20-NOV-91
41010990	TTY file-transfer option	1.3	09-OCT-87
41010991	TTY file-transfer option	1.2	10-AUG-87
41020990	Supermax VT100 emulator	2.5	20-NOV-91
41020991	VT100 emulator	2.5	20-NOV-91
41030990	Supermax Kermit del.fee	2.1	09-OCT-87
41030991	Kermit protocol	2.1	09-OCT-87
41060990	CIOC Programmel	2.0	29-MAR-90
41060991	CIOC Software	2.0	29-MAR-90
41070000	2780/3780 protocol	1.6	30-MAR-90
41070001	2780/3780 protocol	1.6	30-MAR-90
41080000	3270/BSC protocol; Single	1.17	30-MAR-90

41080001	3270/BSC protocol Single	1.17	30-MAR-90			
41090000	SNA X.21 SHM option	4.19	21-JUN-89			
41095990	3270 disk printer option	5.4	08-AUG-91			
41095991	3270 disk printer option	5.4	08-AUG-91			
41100000	3770/SNA Single	5.3	20-MAR-90			
41100001	3770/SNA Single	5.3	29-MAR-90			
41110991	PCnetTerm 5.25" DOS disc	2.0	01-SEP-88			
41112000	PCTerm DOS, dansk	3.0	06-FEB-91			
41112001	PCTerm DOS, English	2.0	07-FEB-91			
41120000	PC Diskserver Single	3.0	06-FEB-91			
41120001	PC Diskserver Single	3.0	07-FEB-91			
41122000	PC Printerserver single	3.0	07-FEB-91			
41122001	PC Printerserver single	3.0	07-FEB-91			
41130990	X.25 Protocol	1.14	25-JUN-91			
41130991	X.25 protocol	1.14	05-JUL-91			
41131991	X-25 for MIOC	1.3	21-JAN-91			
41135990	UXCONV	1.5	14-MAY-90			
41135991	UXCONV	1.5	14-MAY-90			
41140000	X.3 PAD emulator single	1.14	05-JUL-91			
41140001	X.3 PAD emulator Single	1.14	05-JUL-91			
41142000	X.3PADemul. 1user/add on	2.1	17-JAN-92			
41142001	X.3PADemul. 1user/add on	2.1	17-JAN-91			
41150000	X.29 remote login Single	1.16	27-APR-92			
41150001	X.29 remote login Single	1.16	29-APR-92			
41152000	X29Rem.login 1user/addon	1.3	21-JAN-92			
41152001	X29Rem.login 1user/addon	1.3	21-NOV-92			
41200990	Supermax LAN Admin.	1.2	15-MAR-90			
41200991	Supermax LAN Admin.	1.2	09-MAR-90			
41210990	Supermax NTC2 Software	1.0	04-DEC-89			
41210991	Supermax NTC2 Software	1.0	15-FEB-90			
41220001	Graphical Kernel System	5.0	01-AUG-90			
41230001	GKS Driver	1.1	07-JUL-91			
41290001	SGD 2 Download Software	2.6	08-MAY-91			
41300000	OSI Login, grundmodul	2.3	21-JAN-92			
41300001	OSI Login	2.3	21-JAN-92			
41305991	DLP/Ethernet	3.0	08-NOV-91			
41307991	DLP/HDLC	2.0	22-FEB-92			
41311000	DDE-Term DOS 5¼" 360 kb	1.10	09-JAN-92			
41311001	DDE-Term DOS 5¼" 360 kb	1.10	09-JAN-92			
41313000	DDE-Term DOS 3½" 720 kb	1.10	09-JAN-92			
41313001	DDE-Term DOS 3½" 720 kb	1.10	06-JAN-92			
41321000	DDE-Term G DOS 5¼" 360kb	1.10	09-JAN-92			
41321001	DDE-Term G DOS 5¼" 360 kb	1.10	08-JAN-92			
41323000	DDE-Term G DOS 3½" 720kb	1.10	08-JAN-92			
41323001	DDE-Term G DOS 3½" 720kb	1.10	08-JAN-92			
41340991	Supermax 4224/SNA	1.0	01-APR-91			
41341990	Protocol Object Manager	1.1	24-JAN-92			
41341991	Protocol Object Manager	1.1	24-JAN-92			
42000000	SNA protocol; Single	5.22	01-MAY-92			
42000001	SNA Protocol Single	5.22	01-MAY-92			
42010000	3270/SNA Single	5.23	11-MAY-92			

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42010001	3270/SNA Single	5.23	11-MAY-92
42014000	3270/SNA API	5.20	02-JAN-92
42014001	3270/SNA API	5.04	13-MAR-90
42020000	3179G/SNA Single	5.24	22-JAN-92
42020001	3179G/SNA Single	5.24	22-JAN-92
42030990	SNADS	5.20	02-JAN-92
42030991	SNADS	5.20	27-FEB-92
42031990	SNADS-mail	5.22	08-APR-92
42031991	SNADS-mail	5.22	08-APR-92
42246001	SupermaxTCP Kernel 1-4	5.2	03-MAR-92
42247991	SupermaxTCP r-utils	5.1	03-OCT-91
42248991	SupermaxTCP FTP	3.5	30-APR-91
42249991	SupermaxTCP TELNET	5.1	03-OCT-91
42250991	SupermaxTCP TFTP	5.1	03-OCT-91
42251991	SupermaxTCP SLIP	3.5	24-MAY-91
42252991	SupermaxTCP XIP	3.5	24-MAY-91
42253991	SupermaxTCP bootp	5.1	03-OCT-91
42254000	TCP/IP for NTC single	1.2	09-DEC-91
42254001	TCP/IP for NTC single	1.2	09-DEC-91
42255991	SupermaxTCP NetBIOS	3.6	03-OCT-91
42260991	TCP SLIP Option	1.1	23-JAN-92
42261991	X.400 Mail	1.1	23-JAN-92
42262991	X.400 Gateway API	1.1	07-NOV-91
42270991	FTAM	1.00	07-NOV-91
42300990	OSI LAN Transport	2.0	08-NOV-91
42300991	OSI LAN Transport	2.0	17-DEC-91
42301000	OSI for NTC single	1.2	09-DEC-91
42301001	OSI for NTC single	1.2	09-DEC-91
42302991	OSI NetBIOS Protokol	2.0	17-DEC-91
42308991	X.25 API	1.0	01-NOV-91
42310991	OSI WAN Transport	1.1	01-DEC-91
42320000	IM/X Server Single	1.4	10-APR-92
42320001	IM/X Server single	1.4	10-APR-92
46000000	APEX Programmel	7.3	25-MAY-92
51000000	Supermax Regnskab	3.3	30-NOV-90
51146000	Supermax F A C 1-8	1.0	23-OCT-91
51155000	Supermax Accl- 8 Oracle5	3.4	04-JUN-91
51156000	Supermax Accounting 1-8	3.4	01-JUN-91
55081201	PageMaker College 5¼"	3.0	22-MAR-90
55081311	PageMaker College 3½"	3.0	22-MAR-90
55081400	PageMaker Multipak 5¼"	3.0	22-MAR-90
55081510	PageMaker Multipak 3½"	3.0	22-MAR-90
55083001	MS Windows/286 5¼"	2.11	22-MAR-90
55083111	MS Windows/286 3½"	2.11	22-MAR-90
55083201	MS Windows/386 5¼"	2.11	22-JUL-90
55083311	MS Windows/386 3½"	2.11	22-JUL-90
55084001	Micrografx draw pl. 5¼"	1.0	22-MAR-90
55084111	Micrografx draw pl. 3½"	1.0	22-MAR-90
55086000	Supermax Datatryk 5¼"	1.1	09-JUL-90
55086110	Supermax Datatryk 3 ½"	1.1	09-JUL-90
59112000	Supermax Logsystem	1.4	08-MAR-90

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59210010	Supermax Sag/8	1.3	08-OCT-90
59550090	SIS Document Server	1.0	01-APR-92
67022000	EGW Display ad.-1 br.	2.6	04-DEC-91
67025000	EGW Sideombrydning 1 Br	1.3	10-FEB-92
67776009	TED 24 92/01/27	2.5	20-FEB-92
67777009	EGW 1.2.	1.2	21-NOV-91
67778009	Gcsia 2.b 91/12/04	2.6	20-FEB-92
67779009	Universal RIP Op. System	6.1	11-DEC-91

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				Kevin Bisset

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DDE Sverige AB	Telex	: -		
Kyrkogatan 1	Short #	: 1016		
S-27400 Skurup	Inst.No	: 13731/432		
Sweden	Cust.No	: 223731		
FRANCE:				
Service:	Phone	: + 33-147218524	Mgmt.	: B. Madar
	Fax	: + 33-147291282	Mktg.	:
Power On S.A.R.L.	Telex	: 283155 F	Adm.	:
Immeuble Le Clémenceau 1	Short #	: -	Serv.	: Olivier Metais
205, Avenue Georges	Inst.No	: 13738/1759		
Clémenceau	Cust.No	: 223738		
92024 NANTERRE Cedex				
France				

Status

Supermax Technical Service Manual

Supermax Technical Notes	: 1-18
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December 1990

COMMUNICATION COMMANDS :

UUCP/UXCONV - commands :

```
uucp <file1> <system1>!~/<system2>
                                # sending files to other systems
uucp <system1>!<file1> <file2>
                                # getting files from other systems
uux "!ls -al <system1>!/ > !~/<system1>/<root-directory>"
                                # running commands on other systems
cu [-d] <system>                # log on other system
~.                              # log off other system
uuto [-pm] <file> <system>!<user>
                                # receiving mail, use uupick
uupick                          # type a for all, and directory to use
uuname
uulog <system>                  # log-output of uucp-call to system
uustat [-amq..]                 # uucp status - a : all jobs in queue
                                #               m : accessibility of machines
                                #               q : jobs queued for machines
/usr/lib/uucp/Uutry [-r] <system>
                                # test call with output status
/usr/lib/uucp/uucheck [-v]      # checks the uucp files and directories
```

TTY - communication :

```
/alib/tty/TTY [line=<name>] [device=/dev/ttyXX] [quit=<character>]
  [ready=<prompt>] [printer=<on | off>]
                                # start the tty-emulator
```

PC - communication :

```
/alib/pcnet/pcconnect <02608cxxxxxx> -t /dev/ttyXX -d /dev/dosXX -r
  <read-only disk> -r <read-only disk>... <rw-disk>... -p -d<lpdest> -i
  -T<timeout> -tPC <headline> 2>><pc-log file>
                                # connect a PC to Supermax using network
/alib/pcnet/niocnodes <unitno.>
/alib/pcnet/pcttynod <unitno.> <NIOC port> </dev/tty-no.>
/alib/pcnet/pcdosnode <unitno.> <NIOC port> </dev/dos-no.>
/alib/pcnet/mkpcdisk <size> <diskname>
```

NIOC - communication :

```
/etc/netconfig <datafile | physical name/number on NTC/NIOC>
/etc/niocconnect <net-adr. on NTC/NIOC>
niocctl /dev/ttyXX [-cdpqs]     # -c name : NIOC connection to name
                                # -d      : NIOC disconection on name
                                # -s      : NIOC status for device (address)
```

TCP/IP - communication :

```
telnet <host2>                  # terminal login-emulation on host2
ftp <host2>                     # filetransfer with host2
ftp localhost                   # connection check to oneself
```

COMMUNICATION COMMANDS :


```
remsh <host2> [l username] [n]  # connection to host2, without login-procedure
remsh <host2> cat <remotefile> >> <localfile>
                                # copy localfile to remotefile
remsh <host2> cat <localfile> ¦ lp
                                # printout localfile on remote spooler-printer
ping <host2>                    # connection-check on host2
arp -g                          # list of participates on internet
netd [nt]                       # start netd driver
netstat [-aAn]                  #
rcp <host1.user1:file> <host2.user2:file>
                                # remotecopy
rlogin <host2>                  # remotelogin to host2
ruptime [altu]                  # status line of each machine on the network
rwho [au]                       # who's logged on machines on the network
net [start ¦ status ¦ stop]     # start-, status on- or stop TCP on machine
```

Cioc - communication :

```
/alib/cioc/cc_line.d            # file with line-names and protocols
/alib/cioc/addon                # installing passwd and license
```

SNA/BSC communication :

```
/alib/cioc/config line=<linename>
                                # configuration of the line
/alib/cioc/mount line=<linename>
                                # mounting the communicatione line
/alib/cioc/unmount line=<linename>
                                # unmounting the communication line
/alib/cioc/status               # status on the cioc-communication
/alib/cioc/boot                 # CIOC software boot
/alib/bsc3270/3270 [statusline=on] [terminal=<terminalno.>]
                                # starting terminal-emulation
/alib/[bsc3270] ¦ [sna]>/start.print line=<linename>
                                # starting all printer-emulations
/alib/[bsc3270] ¦ [sna]>/stop.print printer=<printerno.> line=<linename>
                                # stopping printer-emulation
/alib/[bsc3270] ¦ [sna]>/reset.printer printer=<printerno.> line=<linename>
                                # resetting printer-emulation
```

X.25 - communication :

```
/alib/cioc/config line=x25      # starting x.25-line configuration
/alib/cioc/mount line=x25       # mounting x.25-line
/alib/cioc/unmount line=x25     # unmounting x.25-line
/alib/cioc/status line=x25      # status on x.25-line
/alib/x3/startx29 [-v] [-q x25-queue] [-Q x29-queue] [-l logfile]
  [line=<linename>] [setupfile]
                                # starting x.29
/alib/x3/stopx29 [-v] [-Q x29-queue] [line=<linename>] [setupfile]
                                # stopping x.29
/alib/x3/pad                    # start the pad (x.25 user-interface)
```

SUPERMAX HARDWARE

Translater

A :	ALPHA	The CPU part of the SGD
	ANSI	American National Standards Institute - represents USA in ISO
	APPC	
	ASCII	American Standard Code for Information Interchange (USASCII) - ISO-7 bit datacode as 8 bit (parity)
	ASN	Address Space Number, see MMU
	ASS	Assembly - Supermax module notation
	Asynchronous	Communication without clock
	AT & T	American Telephone and Telegraph
	Average Latency	Meantime access time
B :	Baud	Figure messured in bps, see Bps
	Baudot Code	5 bit character code - 64 characters - one start bit and 1.5 stop bit
	BERR	Buserror signal (MC68000 series)
	Bit	Binary digit, 0 or 1
	Bps	Bit per secunds, see baud
	BSC	Binary Synchrounous Communication
	BTU	Block Transport Unit, see CIOC, DIOC
	Byte	8 bit long unit (0000 - 1111, 00 - FF)
C :	Cache	Buffer memory between the cpu and ram, cpu and harddisk
	Card cabinet (Rack)	Incl. 12 slots for Supermax modules
	CCITT	Comité Consultatif Internationale de Télégraphique et Téléphonique - interfaces, modem, datanetwork - ex. x.21, x.25, v.11, v.24, v.28
	Ccs	
	CD	Carrier Detect (RLSD or DCD) - RS232
	Cheapernet	Thinnet, IEEE 802.3, - thin Ethernet
	CIOC	Communication Input Output Controller
	CISC	Complex Instruction Set Computer
	Clone	
	Cluster	Amount of terminals, at a single place or terminal control unit
	Compact	The first cabinet in the Supermax family
	Configuration	Changing the setup of the Supermax
	CPU	Central Processing Unit
	CRT	Terminal Display Screen
	CSMA/CD	Carrier Sense Multiple Access with Collision Detection
	Cylinders	Part of the winchester disk drive structure
D :	Datapak	X.25 network, packet-switched network
	Data transfer rate	Transfer speed
	Datel	Public telephone network - data communication
	Datex	Circuit switched network
	DCE	Data Circuit-terminating Equipment - modem, multiplexer
	DC-servo motor actuator	
	DIOC	Disk Input Output Controller

	Disk	Winchester disk drive
	Disk cabinet	Cabinet for disks, - up to 6-8 pcs.
	DMA	Direct Memory Access
	DRAM	Dynamic RAM - chip
	DTACK	DAta ACKnowledge - MC-processors
	DTE	Data Terminal Ready - RS 232 C
	Duarts	SN8251 chip incl. RS 232 / RS 422
	Duplex Transmission	Transmitation in both directions
	DW	Double Word - MC-processors
E :	EBCDIC	Extended Binary Coded Decimal Interchange Code - 8 bit character code (IBM) - 256 bit combinations
	ECC	Error Correction Circuits - 74632
	Eight (8) mm helical	Video Streamer
	Embedded	Controller and drive assembled
	ESDI	Enhanced Small Device Interface - disk interface with high data transfer rate
	ESMD	
	Ethernet network	IEEE 802.3 standard - implemented as one line
F :	FCN	Supermax Field Change Notices
	Formatting	Making sectors/tracks (HD & Floppy)
	Fpc	Floating Point Processor
	Fpu	Floating Point Unit
G :	Gcr	
	Graphic	Includes graphic controller
H :	HDLC	High-level Data Link Control
I :	IEEE	Institute of Electrical and Electronic Engineers
	IEEE 802.3	Physical layer using CSMA/CD in LAN - looks like Ethernet
	INTEL	Chip factory
	Interleaving	Harddisk sector formatting technic
	ISDE	
	ISDN	Integrated Services Digital Network - integrates voice and data
	ISO	International Standards Organisation - ex. OSI communications protocols
J :		
K :		
L :	LAN	Local Area Network - within 10 km and from 100 kbps (kilobitpersec) to 50 mbps (millionsbitpersec) - uses local lines only
	LAPB	Protocol in the link layer for x.25
	Latensy	
	Layer	Level in the OSI model -

Levels	Description
7 Application	Interface for users
6 Presentation	Format/code conversion
5 Session	Conn. - applications

		4 Transport — Error-free delivery
		3 Network — Internetwork adr/route
		2 Data Link — Local adr/route
		1 Physical — Physical signals
	LED	Light-emitting diode
	LSI	Large-Scale Integration
	LW	Long Word - 32 bit
M :	Magtape	Magnetic ½ inch Tape Drive for SCSI - ANSI and IBM compatible
	Mcc	
	MCU	Master Central Unit - Supermax Module
	MIOC	Multiple network I/O Controller - Supermax Module
	Mips	Mega Instructions per seconds - benchmark test results
	MIPS	Chip constructor company
	Motorola	Chip factory
	MMU	Memory Management Unit
	MSI	Medium-Scale Integration
	MTBF	Mean-Time-Between-Failures - availability (Harddisk)
	MTTR	Mean-Time-To-Repair - availability (Harddisk)
N :	Nibble	First or last part of an 8-bit byte
	NIOC	Network I/O Controller - Supermax Module
	Nonvolatile	Keeps the data stored in memory with power off
	NTC	Network Terminal Controller - Supermax Unit
	NTC2	Network Terminal Controller 2 - New Supermax Unit
O :	Optical disk	1 Gb laser optical disk drive, 12 inch disk as storage media (WORM) - SCSI
	OSI	Open Systems Interconnection - see Layer
P :	PAL	Programable Array Logic - chip
	Parity	Compairs 1-bit in a group to be equal
	PCB	Printet Circuit Board - Supermax Module notation
	Peripheral Units	Equipment to be connected to Supermax - Terminals, Printers, Modems, Harddisks, Streamers, etc.
	Priority	Give the rules for a module to use the Supermax I/O bus
	PROM	Programmable Read-Only Memory - chip
	Protocol	Set of rules to run a datacommunication - line diciplin
Q :	QIC - 02	Streamer interface - disk controller to streamer controller
	QIC - 11	Streamer drive data format - 20 Mb
	QIC - 24	Streamer drive data format - 45/60 Mb
	QIC - 120	Streamer drive data format - 120/150 Mb
R :	Rack	Supermax 3- or 5-Rack
	RAM	Random Access Memory - see SRAM or DRAM
	RISC	Reduced Instruction Set Computer - very fast processor technology type for calculations

	"Round Robin"	Supermax Priority algorithm - all parts included have the same rights to rule
	RS - 232 (C)	Standard defines the electical signal characteristics for the 25-pin connector (DB 25) under 20 m distance - identical to CCITT V.24/V.28
	RS - 422 (A)	Standard defines the electical signal characteristics for the 25-pin connector (DB 25) over 20 m distance - identical to CCITT V.11
	RTS	Request To Send - RS 232 signal
S :	SASI	Shugart Associates System Interface
	SA400 (type)	
	SCSI	Small Computer System Interface - used for disk- and tape drive connection
	SDLC	Synchronous Digital Link Control - communication protocol
	Sector defekt handling	
	Sectors	Disk formatting unit
	Seek time	
	Simplex Transmission	Transmitation in only one direction
	SIOC	Serial I/O Controller - Supermax Module
	SGD	Supermax Graphic Display - Supermax Unit
	Slimline	Supermax Model - cabinet
	SMD	
	SN	Supermax Software Notes
	SNA	Systems Network Architecture - IBM communication description
	SOH	Start Of Header
	SRAM	Static RAM - chip
	SSI	Small-Scale Integration - chip design
	ST-506	Seagate Technology - disk interface
	Stop bit	Last bit in asynchonous communication
	Synchronous	Communication with clock
T :	TD	Transmitted Data - RS 232 data signal
	Telefax	Wordprocessed fax includes a telefax controller to be used to interface the computer with the telephone line
	Teletex	New standard from CCITT insted of Telex - 2.400 bps, upper and lower case letters
	Teletype	Teleprinter or terminal, printer, etc.
	Telex	Low-speed data network - Baudot code
	TN	Supermax Technical Notes
	Token Ring Network	IEEE 802.5 standard - implements token bus - explicit access
U :	ULSI	Ultra Large-Scale Integration - chip technology
	USARTS	Universal Synchronous Asynchronous Receiver Transmitter - chip used to interface terminals, printers or modems
V :	v.10	CCITT interface (RS 423 signals)
	V.11	CCITT interface (RS 422 signals)

	V.21	CCITT 300 bps modem - public telephone
	V.22	CCITT 1200 bps telephone - or 2-wire leased line modem
	V.22 bis	CCITT 2400 bps dial - or 2-wire line
	V.23	CCITT 600/1200 bps dial modem
	V.24	CCITT interchange circuitry (RS 232)
	V.25	CCITT dial parallel interface
	V.25 bis	CCITT dial serial interface
	V.26 En	CCITT 2400/1200 bps leased line modem
	V.26 bis	CCITT 2400/1200 bps dial line modem
	V.26 ter	CCITT 2400 bps dial - or 2-wire leased line modem
	V.27 En	CCITT 4800 bps leased line modem - manual equalizer
	V.27 bis	CCITT 4800/2400 bps leased line modem - automatic equalizer
	V.27 ter	CCITT 4800 bps dial modem
	V.28	CCITT interface (V.24 & RS 232)
	V.29 En	CCITT 9600 bps leased line modem
	V.32 En	CCITT 9600 bps dial - or 2-wire leased line modem
	V.35 En	CCITT high speed line (> 19.200 bps)
	Vertical	Supermax system cabinet
	Virtuel memory	Space on harddisk only used as memory when needed
	VLSI	Very Large-Scale Integration
	Voice coil actuator	
W :	WAN	Wide Area Network - uses commen carrier lines
	Word	16 bit
X :	X.3	CCITT interface - Datapak - PAD - asynchronous terminals
	X.21	CCITT digital interface - 15-pin connector (V.11)
	X.21	Datanetwork protocol
	X.21 bis	CCITT digital interface (V.24 - RS 232)
	X.25	CCITT communication protocol - Datapak
	X.28	CCITT communication between PAD and the connected asyncronous terminals PAD's
	X.29	CCITT Communication remote control of PAD's
	X.121	CCITT international numbers in Datapak
	XOFF	Flow control - transmitter closed
	XON	Flow control - transmitter connected
Y :		
Z :		

SECTION 2.0

Supermax Technical & Software Notes

SUPERMAX TECHNICAL NOTE NO. 5.

DATE: 850601.

MODULE/PART: All modules with an unit number switch.

0101 CPU module. 1 priority.
1100 DIOC module. 2 priorities.

DESCRIPTION: The connection between unit numbers and priorities.

Each intelligent Supermax module connected to the common I/O bus has a unique address. The address is called the unit number. The unit number is fixed in a PAL marked UPXXY. XX is the decimal unit number and Y is a version number.

The arbitration scheme used in the common I/O bus is based on fixed priorities. Two units connected to the the I/O bus cannot used the same priority. The priority is fixed in a PAL marked PPXXY. XX is the priority number and Y is a version number. Some modules use two priorities.

Some modules are now equiped with a unit number switch. The switch gives the module a unit number and one or two priorities. The unit number and priorities are not fixed in PALs. Modules with an unit switch are completely compatible with modules with priority PALs marked PPXXY.

The connection between the unit number and priorities are as follows:

Modules with one priority.

Switch position	Unit number	Priority
0	0x00	00
1	0x01	01
2	0x02	02
3	0x03	03
4	0x04	04
5	0x05	10
6	0x06	11
7	0x07	12
8	0x08	13
9	0x09	14
A	0x0a	20
B	0x0b	21
C	0x0c	22
D	0x0d	23
E	0x0e	24
F	0x0f	30

Modules with two priorities.

Switch position	Unit number	Priority 1	Priority 0
0	0x00	14	20
1	0x01	21	22
2	0x02	23	24
3	0x03	30	31
4	0x04	32	33
5	0x05	34	40
6	0x06	41	42
7	0x07	43	44
8	0x08	14	20
9	0x09	21	22
A	0x0a	23	24
B	0x0b	30	31
C	0x0c	32	33
D	0x0d	34	40
E	0x0e	41	42
F	0x0f	43	44

SUPERMAX TECHNICAL NOTE NO. 9.

DATE: 870527.

MODULE/PART: 3400 CPU 68020 module

DESCRIPTION: bootprom CBOOT20 version 861107 is replaced by bootprom CBOOT20 version 870601. This version will boot the CPU even if errors were found during the self test.

Boot procedure for CPU 68020.

Before using the 68020 in a system, you must be sure that the boot proms of the DIOC 0400 and the DIOC2 1100 have the following versions:

DIOC1 0400 - DCBOOT 861107 or later.
DIOC2 1100 - D2BOOT 860210 or later.

Self test after reset.

Included in the boot prom of the CPU 68020 is a thorough self test, which includes the following items:

1. Running MC 68020 internal confidence test.
2. Testing the Address Space Register.
3. Testing the MMU memory, high speed.
4. Initializing and testing memory from 0 - 100000, before copying the content of the prom to the memory.
5. Determining the actual memory size.
6. Initializing and testing memory from 100000 to top of memory, found in 5.
7. Testing program cache, data cache and physical address cache comparator.
8. Running MC 68881 FPC internal confidence test.

During the self test the front panel display will change according to the test currently running and the status of the test. The following table shows the possible display codes. F(n) means that test n has failed. P(n) means that test n has passed.

Test	Failed	Passed
Test stuck at high or low bits	F0	P0
Test data registers	F1	P1
Test control registers	F2	P2
Test address registers	F3	P3
Test status bits	F4	P4
68020 instruction test	F5	P5
Test Address Space Register	F7	P7
Test MMU memory	F8	P8
Test memory 0 - 100000	F9	P9
Just before copying prom		PA
Just after copying prom		PC
Test caches		Pd
Determine memory size		PE
Test memory to top		PF
Test MC 68881 FPC		bo
Data error in memory	FA	
Single error in memory	FC	
Error in cache test	Fd	
Double fault in memory	FE	

When the display shows Pd, the CPU will enable the I/O bus in and then be ready to be booted. However, it will continue the self test until finished. When finished the CPU will start the program, that has been loaded, which could be either the operating system or the diagnostic programs. If no program is loaded the CPU will write 'bo' in the display, indicating that it has passed the self test.

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3. Testing the MMU memory, high speed.
4. Initializing and testing memory from 0 - 100000, before copying the content of the prom to the memory.
5. Determining the actual memory size.
6. Initializing and testing memory from 100000 to top of memory, found in 5.
7. Testing program cache, data cache and physical address cache comparator.
8. Running MC 68881 FPC internal confidence test.

During the self test the front panel display will change according to the test currently running and the status of the test. The following table shows you the possible display codes. F in the first digit means Failed. P in the first digit means Passed.

Test	Failed	Passed
Test stuck at high or low bits	F0	P0
Test data registers	F1	P1
Test control registers	F2	P2
Test address registers	F3	P3
Test status bits	F4	P4
68020 instruction test	F5	P5
Testing Address Space Register	F7	P7
Testing MMU memory	F8	P8
Testing memory 0 - 100000	F9	P9
Just before copying prom		PA
Just after copying prom		PC
Testing caches		Pd
Determining memory size		PE
Testing memory to top		PF
Testing MC 68881 FPC		bo
Data error in memory	FA	
Single error in memory	FC	
Error in cache test	Fd	
Double fault in memory	FE	

When the display shows Pd, the CPU will enable the I/O bus in and then be ready to be booted. However it will continue the self test until finished. If any errors occur the CPU will not execute the program, that has been loaded. If no errors occur the CPU will start the program, which could be either the operating system or the diagnostic programs. If no program is loaded the CPU will write 'bo' in the display, indicating that it has passed the self test If any errors occur, which means the display will not change to 'bo', you should try to type the select sequence. It is possible that you will get further information about the error.

Diagnostic program in the boot prom.

The diagnostic program is contained in the boot prom, and if the CPU passes the self test and you see 'bo' in the display, you can type the select sequence on the terminal. That gives you a debugging program and the following message:

```
DDE 68020 Debugger/Diagnostics Version 2.3 - 861107
FPC passed (failed) test
DDE020bug >
```

If the CPU fails the self test and you have tried to type the select sequence, you should try to type CTRL B and then the select sequence. That should give you the debugger also.

Using the help facility HE gives you an overview of the commands. The command DP will give you the diagnostic program, which is a different version than the one on the floppy disk. The prompt on the terminal is:

cpu020 u prom > , where u is the unit number.

When selecting Q in the menu, you will get back to the debugger instead of booting the computer.

When the diagnostic program has been booted from the floppy disk you can type in the select sequence for the CPU you want to test, and it should respond with the following message on the terminal:

cpu020 u > , where u is the unit number

This message indicates that the initialization was successfully completed and that you can proceed with the more sophisticated parts of the test. In order to get the menu just type M and the menu will be displayed. From this menu you can select several tests.

The following is a list of display values from the diagnostic program.

bE in the display indicates a bus error.
AE in the display indicates an address error.
EE in the display indicates any other exception.

NOTE.

The terminal you use must be configured to:

7 data bits
even parity

Supermax technical note no. 17

Module/part: DIOC3 **Date: 90-11-29**

Description: Dual hosted disks.

Background Information

The purpose of dual hosted disks is to use two Supermax computers as a fault resistant system. Normally the two systems run separately , but in case of a system crash on one of the systems, the users are able to connect to the other Supermax computer. Since the users data is situated on hard disks, these disks must be able to connect to both Supermax computers, this is known as *dual hosted disks*.

The UNIX system is unable to handle two systems running on one file system. To overcome this problem, each physical disk is owned by one DIOC3. If the system that owns the disk crashes, the other system is able to take over the ownership of the disk. When the systems are rebooted the original owner of the disk is able to run on the disk again.

The SCSI interface protocol includes provision for connection of multiple initiators (SCSI devices capable of initiating an operation, i.e. a SCSI port on the DIOC3). Distributed arbitration is built into the architecture of SCSI. Each unit, connected to the SCSI bus, must have a different SCSI id. This id is used when the arbitration take place.

In a standard Supermax installation the disk system is a single initiator system. The SCSI controller on the DIOC3 has SCSI id 7, and the SCSI devices on the bus SCSI id 0 to 6.

In a Supermax utilizing dual hosted disks the two DIOC3's must use different SCSI id numbers.

Configuration of dual hosted disks

When using dual hosted disks on the DIOC3 the configuration sector on the winchester disks must contain information about the validity of the disk system. This information is located in address 0x1000 of all the physical winchester disks.

The owner of the disk is the DIOC3, having normal access to the disk. The unit number of the DIOC3 that owns the disk must be written in the configuration sector.

The two DIOC3's that are connected to a dual hosted disk system must be configured with different unit numbers. One unit number must be even and the other odd. The DIOC3 holding the even unit number uses SCSI id 7, the DIOC3 holding the odd unit number reads the SCSI id from the configuration sector.

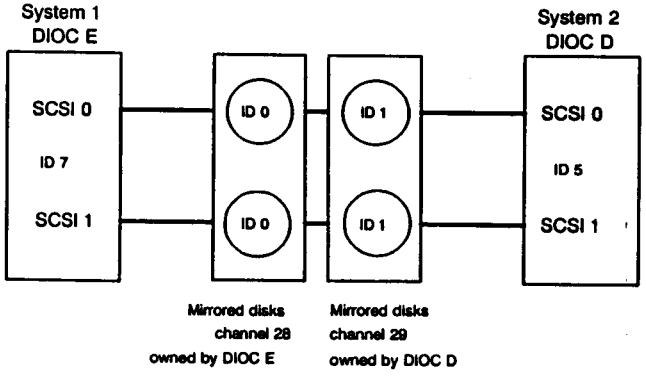
The following example shows a part of the configuration sector from a valid mirrored/striped and dual hosted disk system.

```
      0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F
1000  4D 49 52 4F 7F 32 61 4F 00 00 00 01 00 00 00 00  MIRO.2aO........
1010  53 54 52 50 7F 32 61 4F 00 00 00 41 00 02 00 00  STRP.2aO...A....
1020  44 55 41 4C 00 00 00 05 00 00 00 0E 00 00 00 00  DUAL............
```

Dual hosted disks	
Address	Content
0x1020-0x1023	Four bytes containing the ascii equivalent of "DUAL", 0x4455414C.
0x1024-0x1027	Four bytes containing the SCSI id of the DIOC3 holding the odd unit number.
0x1028-0x102B	Four bytes containing the unit number of the DIOC3 that owns the disk.
0x102B-0x102F	Reserved for future use. Must be 0x00.

Example of Configuration.

Dual hosted disks are able to run as single disks, as mirrored disks or as a disk subsystem. Since the purpose of dual hosted disks is to obtain a fault resistant system, a normal configuration uses mirrored disks.
A typical configuration consists of two Supermax computers (system 1 and system 2), each system equipped with a DIOC3, and a disk cabinet with 4 disk drives. The 4 disk drives are used as two pairs of mirrored disks, one owned by system 1, and the other owned by system 2.



The DIOC3 modules are configured as DIOC3 number 0x0E(even) in system 1, and as DIOC3 number 0x0D(odd) in system 2. The disk cable is daisy chained between the SCSI connector 0 of system 1, two of the disk drives (id 0 and id 1), and finally to SCSI connector 0 of system 2. The other disk cable is daisy chained between SCSI connector 1 of system 1, the other two disk drives (id 0 and id 1), and SCSI connector 1 of system 2.
Since the disk cables are terminated by the two DIOC3 modules, all terminators on the disk

drives must be removed.
Use the Diagnostic Programs to configure the disks as two pairs of mirrored disks.
Now proceed as follows to configure dual hosted disks:

1. Type in the ascii string 'DUAL' on all disks in the system.
2. Type in SCSI id 5 on all disks. This enables DIOC3 0x0D to use SCSI id 5.
3. Configure the first pair of disks to be owned by DIOC3 0x0E (system 1).
4. Configure the second pair of disks to be owned by DIOC3 0x0D (system 2).

Both systems are now ready to be booted. Both systems must be configured (using the *chhw* program), to use disk channel 28 and 29. When running the *config* program both systems will display valid disks on channel 28 and 29. If a system, that does not have ownership of the disks, attempts to access the disks, the DIOC3 returns error code *not ready*.

Example of a system crash.

If a system crash occurs on system 1, and the users wants to connect to system 2 proceed as follows.

1. All users must disconnect from system 1.
2. Wait 15 seconds.
3. Turn off the power on system 1.
4. Switch to system 2.
5. Run the *scrw* program to enable the disks of system 1 to run on system 2.
6. Run *fsck* and *mount* the file systems to system 2.

Before rebooting system 1, system 2 must be rebooted as well. Use the *init* program to reboot system 2, and then reboot system 1. The reason for this is, that system 1 will try to run *fsck* and *mount* its own disks when it is rebooted. If the file systems are still *mounted* to system 2, the file systems may be severely damaged when rebooting system 1.

Notes.

The boot prom on the DIOC3 must be version 4.0 or later. Refer to Supermax Field Change Notice no. 95.

The version of the DIOC3 module must be version 26.09.90 or later.

The terminators on all the disk drives must be removed.

The DIOC3 board must be updated according to Supermax Field Change Notice no. 92.

If the odd DIOC3 uses SCSI id 5, no peripheral unit on the SCSI bus must use the same SCSI id.

If a disk drive is removed from the Supermax, delete all information in the configuration sector in address 0x1000.

Related Documentation.

Supermax technical note no. 12.
Supermax technical note no. 15.
Diagnostic Programs for the Supermax.

Supermax technical note no. 16

Module/part: All DIOC modules **Date: 90-04-18**

Description: Information regarding winchesters.

Background Information.

DDE has used MAXTOR and PRIAM winchester disks in connection with different host adapters.

There are no problems using these winchesters on DIOC2, but if they are used on DIOC3 some minor problems has occur.

When using DIOC3 software version 90-04-04 or future versions of the DIOC3 software, the disconnect/reconnect feature of the SCSI interface is used.

Firmware Revisions

If a MAXTOR or a PRIAM winchester is returned to the repair center, the winchesters are updated with new reversions of the firmware.

MAXTOR XT-3280 is updated to reversion E.3.
Maxtor rev D.11 is unable to run on DIOC3, if disconnect/reconnect is used.

PRIAM 717, 728 and 738 is updated to rev. 2.05.
If PRIAM is running with older rev. of the firmware, some handshake problems may occur. This results in the DIOC3 reporting timeout errors to the errorlog. The DIOC3 resets the SCSI bus, and performs a retry of this command. These errors have no effect on the Supermax.

If any problems occurs when using these winchesters on DIOC3, return the winchester to the repair center, and the winchesters will be updated.

No problems are observed using MICROPOLIS winchesters.

Formatting of Winchesters

Normally it is not necessary to format winchesters in orientation of use. However, it has been observed that reformating of a PRIAM winchester in orientation of use has sometimes solved problems.

PRIAM has released following information to DDE:

We recommend that where it is possible the drive be formatted in the orientation of use. This will give the best margins for normal operation.
The drive has been tested and proved to work satisfactorily by formatting in one plane and operating in another with no degradation of performance.

When a PRIAM winchester is installed or replaced in the field, it is recommended to reformat the drive. This procedure is only concerning PRIAM disk drives.

If a disk drive reports several hard errors during normal use, it should be replaced.

Supermax technical note no. 15

Module/part: DIOC3 **Date: 90-04-05**

Description: Disk Subsystem.

Background Information.

The two SCSI interfaces on the DIOC 4000 module are two separate SCSI interfaces. Each is a single initiator, multi target interface and does support the optional SCSI disconnect/reconnect function.

Each SCSI interface on the DIOC 4000 supports up to 7 SCSI controllers. The total number of peripherals on one DIOC 4000 is 14.

High Performance Disk System.

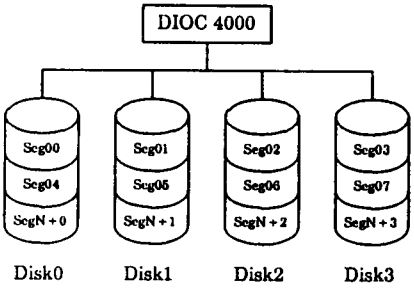
To ensure data safety and improve performance DDE A/S has developed a high performance disk system. By using the DIOC 4000 module two methods to protect data from corruption and increase performance on disk I/O has evolved. They are: Mirrored Disks and Striped Disks. Each of these methods are transparent to the user and the application program. No application software modifications are necessary to take advantage of these features.

Mirrored Disk System.

As the name implies, all data placed on one disk are copied to an additional disk, so the data on both disks are exactly the same - they *mirror* each other. When an application sends a *write* command, the DIOC 4000 will issue a *write* command to both disks simultaneously. The command will not be completed until both disks have returned error free status. In a typical system configuration, when a disk drive fault occurs, the system will crash, and the faulty block must be manually reassigned. The data written in the faulty blocks are lost. With the mirrored disks, the lost data are automatically retrieved from the alternate disk and the system continues to operate. The faulty disk will automatically be disconnected from the system. When the disk has been repaired or replaced, the data will be copied onto the new disk and the mirrored disks are once again in operation. A performance improvement is also accomplished by using mirrored disks. Read accesses will be split onto both mirrored disks, giving a performance of twice the performance of a system without mirrored disks.

Striped Disk System.

The striped disk system combines 4 hard disks into 1 large partition. This is done by distributing data segments (small data blocks) evenly across all disks simultaneously, thus accessing the data according to the order of the assigned segments. Refer to the figure on the next page.



The major benefits of the striped disks are reduced access and seek time for higher performance of I/O operations in the system. However, due to the distribution of data onto 4 hard disks, the striped disk system causes a decrease in data safety. Because of this, a striped disk system is always implemented in combination with a mirrored disk system. Each of the 4 disks have their own mirror disk, and the 4 mirror disks also constitute a striped disk system.

A Mirrored and Striped Disk System consists of 8 hard disks and constitutes a data safe and high performance disk system, featuring 8 times the performance on *read* accesses and 4 times the performance on *write* accesses, when compared to a standard disk system.

Configuration.

When using mirrored/striped disks on the DIOC3 the configuration sector on the winchester disks must contain information about the validity of the disk systems used for mirroring/striping. This information is located in address 0x1000 of all the physical winchester disks.

- The two disks in a mirrored disk system must have the same ID and must be installed with one on each SCSI interface.
- The disks in a striped disk system must have consecutive ID numbers and must be installed on the same SCSI interface.

The following example shows the information saved from a valid mirrored/striped disk system.

```
        0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F
 1000   4D 49 52 4F 7F 32 61 4F 00 00 00 01 00 00 00 00   MIRO
2aO.....
 1010   53 54 52 50 7F 32 61 4F 00 00 00 41 00 02 00 00   STRP
2aO...A....
```

Mirrored and striped disks	
Address	Content
1000-1003	Four bytes containing the ascii equivalent of "MIRO", 0x4D49524F.
1004-1007	Contains a magic number, which must be the same on the two mirrored disks.
1008-100B	This is the status field for the mirrored disk. Note that more than one bit can be set. 0x00000010 (Bit 4) The disk is new. 0x00000008 (Bit 3) The partner disk has failed. 0x00000004 (Bit 2) This disk has failed. 0x00000002 (Bit 1) Write not completed. 0x00000001 (Bit 0) Disk is OK.
1010-1013	Four bytes containing the ascii equivalent of "STRP", 0x53545250.
1014-1017	Contains a magic number, which must be the same on all disks in the striped disk system.
1018-101B	This is the status field for the striped disk. Bit(7-4) indicates the amount of disks in the striped disk system. Bit(3-0) indicates the number of this disk in the striped disk system.
101c-101f	Four bytes containing the block size of the striped disk system. This number must be the same on all disks.

Installation.

Use the Diagnostic Programs to ensure that the configuration of the disk system is valid.

The physical disk size in address 0x300 on the first disks(channel 8 and 9) in a disk system must be set to 4 times the actuel size of the disks. If 380 Mbytes disks are used the physical disk size must be set to 0x50400000 bytes. Remember that the physical disk size on all other disks (channel 10,11,12,13,14 and 15) must contain the actuel size of the disks (0x14100000).

If boot from the disk system is required the version of the boot prom D3BOOT must be version 3.0 or later.

Other Documentation.

Supermax tecnical note nr. 12, and Diagnostic Programs for the Supermax version 4.6 or later.

Disk System på DIOC3

jup 06-04-90
til alle sa, klokkerholm, intern service, support.

Beskrivelse: Hvad skal til for at installere disk system på DIOC3?.

DIOC3 programmel version 90-04-04 understøtter disk system på DIOC3. (gigapack, superdisk, foldede diske, stribede diske er andre ord for det samme)

Fre release vil få følgende betegnelser:
520.4M7
530.1M7
alle XOS systemer (-530.5H).

Version XOS understøtter auto configurering af DIOC3. Det vil sige at det er nok at angive at der er en DIOC3 med chhw. Under boot vil DIOC3 selv finde configurationen, hvadenten det er alm. diske, spejlede diske, eller disk system. Som tidligere vil alm. diske sidde fra kanal 8 til 15 og 3 til 7. Spejlede diske fra kanal 28 til 31, og disksystem på kanal 27.

chhw version 4.2, mkwboot 1.3 og config version 4.0 understøtter disk system.

Testprogrammer version 4.6 indeholder muligheder for at configurerer og checke såvel spejlede diske som disksystem.

Teknisk note nr 12 og 15, samt testprograms manual version 4.6 kan med fordel læses inden installation.

Bootprom D3BOOT version 3.0 understøtter boot fra disk system.

Videostreamer

jup 06-04-90
til alle sa, klokkerholm, intern service, support.

Beskrivelse: DIOC2 version 12-01-90 indeholder ændringer angående videostreamer.

1). Blokstørrelsen er ændret fra 4k til 1k.

Dette er gjort for at standardisere med andre systemer. Version 12-01-90 vil kunne læse bånd skrevet med 4 k blokstørrelse, men ældre versioner af dioc2 kan ikke læse bånd skrevet med 12-01-90.

Når DIOC3 med videstreamer bliver frigivet vil den kun læse 1k bånd.

2). Fejl på videstreamer bliver logget i errlog.

fejlene vil bliver logget i errlog som følger:

byte 1 0x28 hård fejl.

byte 2 0x08 channel nummer (for winchestere er det 0 til 7).

byte 3 0x54 'T' for at indikere tape.

byte 4 fejlcode fra video streamer (se testprograms manual side 9.10).

byte 5 0x01 hvis skriv, ellers læs.

Supermax technical note no. 14

Module/part: DIOC3 4000 ISS 1 and 2 **Date: 90-04-01**

Description:
Boot prom D3BOOT Version 1.0 Date 88.08.31 and
Boot prom D3BOOT Version 2.0 Date 89.06.01 is replaced by
D3BOOT Version 3.0 Date 90.04.01

Boot prom D3BOOT Version 3.0 includes the following features:

1. Boot from the floppy disk on drive 1. Only DIOC3 4000 ISS 2.
2. Boot from the winchester disk including mirrored and striped disk system.

Overview of the different versions of the boot prom.

- **D3BOOT, version 1.0, 88.08.31**
  - Supports boot from the winchester disk, located on SCSI 0 ID 0.
  - Used in DIOC 4000 ISS 1.
- **D3BOOT, version 2.0, 89.06.01**
  - Supports boot from the floppy disk on drive 1. Only DIOC 4000 ISS 2.
  - Supports boot from a mirrored disk system, located on SCSI 0/1, ID 0.
  - Known errors:
    - If a floppy disk drive is installed on the DIOC3 it is not possible to boot from the winchester disk.
    - If booting from a mirrored disk system and the winchester disk, located on SCSI 0 ID 0, was not ready and the winchester disk, located on SCSI 1 ID 0, did not have the partner error bit true on the mirrored information on the winchester disk, the DIOC3 will not boot from the winchester.
  - Used in DIOC 4000 ISS 1 and ISS 2.
- **D3BOOT, version 3.0, 90.04.01**
  - Supports boot from the floppy disk on drive 1. Only DIOC 4000 ISS 2.
  - Supports boot from the winchester disk including mirrored and striped disk system.
  - Used in DIOC 4000 ISS 1 and ISS 2

Self test after reset.

Included in the boot prom of the DIOC3 is a thorough self test, which includes the following items:

- Running MC68020 internal confidence test.
- Testing the SRAM memory.
- Initializing and testing memory from 0 - 0x100000, before copying the content of the EPROM to the memory.
- Determining the actual size of the cache memory.
- Initializing and testing the cache memory.

After reset the red LED3 will be turned **ON**. The self test runs for appx. 20 seconds and if it completes without any errors, the red LED3 will be turned **OFF**. The DIOC3 will wait appx. 7 seconds and then start the boot procedure.

Boot procedure.

The boot procedure includes the following items:

1. Check if another DIOC in the system has booted the system. If so, then the DIOC3 will start the program, that has been loaded into its memory.
2. The DIOC3 will try to boot from the floppy disk drive with drive number 1, using DDE 560 Kb format.
3. If a hard error occurs the DIOC3 will try to boot from the floppy disk drive, using DDE 1.2 Mb AT format.
4. If no floppy disk is inserted in the drive, the DIOC3 will try to access the winchester disk, located on SCSI 0 ID 0. If a disk error occurs, the DIOC3 will try to access the winchester disk, located on SCSI 1 ID 0. The DIOC3 will check for a mirrored disk system. If a mirrored disk system is present, the DIOC3 will boot the system from that winchester disk. If no error occurs, the DIOC3 will check for a mirrored/striped disk system on the disk. If mirrored/striped information is present on the disk, the DIOC3 will try to select all the disks in the disk system. If no error occurs, the DIOC3 will try to boot from the winchester disk(s).
5. If neither the floppy disk drive nor the winchester disk are ready, the DIOC3 will wait for one of three conditionsto occur:
   - Another DIOC will boot the system.
   - The floppy disk drive becomes ready.
   - The winchester disk drive becomes ready.

Features:

If a diskette, inserted in the floppy disk drive, does not contain any boot information or if a hard error occurs, then the DIOC3 will make 32 attempts to read the diskette before turning the red LED3 **ON**. After that it is not posible to boot the system, neither from the floppy disk drive nor from the winchester disk drive.

If a winchester disk does not contain any boot information, the DIOC3 will not make any attempts to boot from the winchester disk drive.

Error handling.

If any errors are found, the red LED3 will be **ON** and information about the error can be obtained by selecting the DIOC3 on the service port.
When selecting the DIOC3 on the service port, please wait a few seconds between the characters, when typing the select sequence.

Supermax technical note no. 12

Module/part: DIOC3 **Date: 89-06-01**

Description: Mirrored disks.

The purpose of mirrored disks is to keep the Supermax computer running, even if a disk fails. When the DIOC3 is configurated to run with mirrored disks, all write commands are issued to two disks, one on each SCSI interface. If a disk fails with a hard error or a interface error, the DIOC3 will disconnect the defect disk from the system, and continue running on the disk connected to the other SCSI interface.
When using mirrored disks on the DIOC3 a special sector on the winchester disks must contain information about the validity of the disk systems used for mirroring. This information is located in address 0x1000 of both the physical winchester disks. The two disks used for mirroring must have the same ID and must be installed with one on each SCSI interface. The following example shows a valid mirrored disk system.

```
        0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F
1000  4D 49 52 4F 7F 32 61 4F 00 00 00 01 00 00 00 00  MIRO 2aO........
```

Mirrored disks	
Address	Content
1000-1003	Four bytes containing the ascii equivalent of "MIRO", 0x4D49524F.
1004-1007	Contains a magic number, which must be the same on the two mirrored disks.
1008-100B	This is the status field for the mirrored disk. Note that more than one bit can be set. 0x00000010 *new* bit. The disk is new. 0x00000008 *partner error* bit. The partner disk has failed. 0x00000004 *error* bit. This disk has failed. 0x00000002 *dirty* bit. Write not completed. 0x00000001 *clean* bit. Disk is OK.

Installation.

Use the Winchester Diagnostic Programs for the DIOC3 to modify the sector in address 0x1000.
Type in the "MIRO" string, and the magic number on both disks. The magic number must be the last 8 characters of the serial number from the disk on SCSI interface 0.
If both winchesters are empty of data, insert the value 0x00000001 (*clean* bit) in the status field on both disks. If it is necessary to copy existing data insert the value 0x00000001 (*clean* bit)in the status field on the disk that contains the data, and 0x00000010 (*dirty* bit)in the status field on the new disk. When the DIOC3 is booted, it will copy data, and the mirrored disks will be ready for use.

In order to enable the mirrored disks in the *SMOS* use the *chhw* program. Channel 28 equals SCSI id 0, channel 29 SCSI id 1, channel 30 SCSI id 2 and channel 31 SCSI id 3.

Errors.

If both disks are working without problems, the DIOC3 writes data on both disks. If the DIOC3 discovers a problem with one of the disks, it will stop to access the disk. If possible, the DIOC3 will set the *error bit* in the status field. On the other disk, the DIOC3 will set the *partner error* bit. The DIOC3 reports the error to the errorlog, and the system will continue to run, but without mirrored disks. In order to enable the mirroring again use the Diagnostic programs. The error must be fixed, and the *new* bit in the status field must be set. If the Supermax is rebooted without the error fixed, the DIOC3 will report that it is unable to mirror(error code 0x80).

Power failure, system crash.

A write operation to a mirrored disk is completed when both disks reports command completed. If a power failure occurs, a write command may be completed on one disk, but not on the other. In order to detect this situation the DIOC3 maintains a *dirty* bit in the status field. If the DIOC3 discovers that the *dirty* bit is set during a boot, it will copy the disk to ensure data integrity. The *clean* bit in the status field will be set, whenever a *sync* command is issued to the DIOC3, or within 15 seconds after last write operation. If the Supermax crashes, wait 15 seconds to reboot.

Special error codes from mirrored disks..

If the DIOC3 detects a problem with a mirrored disk, a special error code is reported to the errorlog. 0x80; during boot the DIOC detects a error on a mirrored disk. 0x81; during boot the DIOC detects, that it is unable to access a mirrored disk. 0x82; during a copy to a new disk the DIOC detects a error. 0x83; during a copy, due to a inconsistent disk, the DIOC detects a error. Error 0x82, and 0x83 will always be followed by a 'normal' error message.

Notes.

If it is necessary to copy a disk, please note that the MCU must wait to run until the copy is completed. The MCU displays value 0x90 if the boot disk is placed on the same DIOC, and 0x99 if the boot disk is placed on a other DIOC. The time to complete the copy is approximately 11 min./380 Mbyte data. When a copy is started, the DIOC3 will set the *error* bit on the disk it is writing on. If the copy is aborted due to a power failure or a reboot, the system will detect that the *error* bit is set, and an error 0x80 is reported.

It is recommanded to install mirrored disks on separate power supplies. All disks on SCSI interface 0 on one power supply, and disks on SCSI interface 1 on a seperate power supply.

A mirrored pair of disks must have the same sector size. For example, it is not possible to install a PRIAM 170 Mbyte disk, and a MICROPOLIS 1370 disk as mirrored disks. The disks have the same capacity, but the sector size is different.

Even if the Supermax is equipped with mirrored disks, it is still necessary to back up the disks. Mirrored disk do not solve "operator error" problems or hardware errors on Supermax boards, etc.

If a winchester is removed from the Supermax, delete all information in the special sector in address 0x1000. If a disk with this information is installed in another Supermax without mirrored disks, this may result in an error 0x81 in the errorlog every time the Supermax is booted.

If the system administrator uses the *chhw* to disable the mirrored disks, they must only be enabled again, if the *new* bit is set on one of the disks. Otherwise the data may be corrupted.

Supermax technical note no. 11

Module/part: All DIOC modules **Date: 89-05-25**

Description: Disk errors in the errorlog.

Any abnormal condition encountered during command execution to a winchester disk causes the driver program to report an error as completion of the command. If it is possible, the error is reported to the user as *hard error on disk* or *disk not ready*. The error is always reported to the errorlog and this will cause a print out to the console. The error is also written in a file */usr/lib/errlog/log*.

DIOC1 and DIOC2.

Errorlog

Byte	Text
1	If the first byte is 0x28 it indicates a handshake error, otherwise the error is a disk error, and the SCSI error code in byte 4 contains information about the error. A handshake error occurs when the DIOC is unable to 'talk' to the winchester controller, the situation indicates a DIOC problem, a disk problem, a cabling problem or a problem with the power supply.
2	Byte two is the disk number, and it is in the range from 0 to 7. Disk 0 equals channel 8, disk 1 channel 9, f.x.
3	Byte 3 is not used.
4	Byte 4 contains the first information byte from the SCSI request sense command. If the most significant bit is set the next 3 bytes gives information concerning about the logical sector address, which has caused the error. Please refer to the manual 'Diagnostic Programs for Peripheral Units on The Supermax' to translate the error code into an error message. Remember to remove the most significant bit, before translating the error code e.g. 0x91 is turned into 0x11.
5-7	Byte 5 to byte 7 is only valid if the most significant bit in byte 4 is set. Byte 5 is the least significant byte of the address and byte 7 is the most significant byte.

Example.

```
CPU 13: Thu Dec  8 12:10:01 : Disk error  28 00 43 00 00 00 00 00 00 00 00
```

The DIOC reports an error from disk 0 (channel 8), and the error is a handshake error.

```
CPU 13: Thu Dec  8 12:10:01 : Disk error  2a 04 43 91 b7 85 01 00 00 00 00
```

The DIOC reports an error from disk 4 (channel 12). The error information from the controller is valid, the sense byte is 0x11(0x91), and the sector address is 0x0185b7. If the disk is an embedded SCSI disk, the sector address can be used as input to the reassign block command. This command can be executed using the Supermax Diagnostic Programs. If the disk is equipped with a DDE track skiplist the sector address must be divided with the number of sectors on a track. The result is a track address, this address must be added to the skiplist.

DIOC3.

Errorlog	
Byte	**Text**
1	This byte normally contains the SMOS error code. 0xde(222) indicates a handshake error, 0xdf(223) is a disk error. 0x80 to 0x8f is reserved to error messages from mirrored disks.
2	Byte two is the channel number, it is in the range from 2 to 15.
3	Byte 3 is the SCSI command that caused the error. This command is 0x08(read) or 0x0a(write).
4	Byte 4 contains the first information byte from the scsi request sense command. If the most significant bit is set, the next 3 bytes gives information regarding the logical sector address, which has caused the error. Please refer to the manual Diagnostic Programs for Peripheral Units on The Supermax to translate the error code into a error message. Remember to remove the most significant bit, before translating the error code e.g. 0x91 is turned into 0x11. If byte 4 equals 0xde the error is a handshake error, and there is no information from the request sense command.
5-7	Byte 5 to byte 7 is only valid if the most significant bit in byte 4 is set. Byte 5 is the most significant byte of the address, byte 7 the least significant byte. If the error is a handshake error, byte 5 contains either 0xff or information from the SCSI controller chip on the DIOC3. 0xff indicates that the watch dog in the DIOC3 aborted the disk command due to a missing interrupt. All other values are information from the SCSI controller chip(WD33C93). The byte indicates why the command was aborted. If the WD33C93 is unable to select the target(disk) the value is 0x42. All other values indicates a handshake problem (disk, DIOC, cabling, power supply, termination).

Example.

```
CPU 14: Thu Dec  8 06:40:26 : Disk error  df 09 08 91 01 fb d8 00 00 00 00
```

The DIOC reports a disk error(0xdf). The channel number is 9, and the command was a read command(08). The SCSI error code is 0x11(0x91), and the sector address is 0x01fbd8. This address can be used to reassign the sector, using the Diagnostic Programs.

```
CPU 14: Mon Apr 24 14:12:53 : Disk error  de 0b 0a de 42 00 00 00 00 00 00
```

The DIOC reports a handshake error(0xde). The channel number is 11(0x0b), and the command was a write command(0x0a). The WD33C93 aborted the command, because it was unable to select the disk(0x42).

Special error codes from mirrored disks..

If the first byte is 0x80 to 0x8f, the error is a problem concerning mirrored disks. 0x80; during boot the dioc detects a error on a mirrored disk. 0x81; during boot the dioc detects, that it is unable to access a mirrored disk. 0x82; during a copy to a new disk the dioc detects a error. 0x83; during a copy, due to a inconsistent disk, the dioc detects a error. Error 0x82, and 0x83 will always be followed by a 'normal' error message.

Example.

```
CPU 14: Thu Feb 23 13:52:12 : Disk error  80 0a 00 00 00 00 00 00 00 00 00
```

The DIOC detects, that it is unable to run mirrored on channel 10 and 11.

SUPERMAX TECHNICAL NOTE NO. 10.

DATE: 870601.

MODULE/PART: 1100 DIOC2 module, boot prom.

DESCRIPTION: Boot prom D2BOOT version 1104, 100287 is replaced by boot prom D2BOOT version 1105, 010687.

Overview of the different versions of the boot prom:

Version	Date	Error corrected / improvements
1100	300485	Supports boot from floppy disk drive only.
1101	161085	Error handling in the floppy disk driver has been improved.
1102	100286	Supports boot from winchester. Refer to tecnical note number 6. The self test time is set to 15 seconds from reset.
1103	061086	Due to start up problems with some Adaptec ACB 4000 winchester controllers the start up procedure is changed.
1104	100287	Supports boot from embedded SCSI winchester drives.
1105	010687	Error concerning boot from floppy disk drive corrected. If the floppy disk drive was not ready when the selftest was completed, the DIOC was unable to boot from the floppy disk drive. The error only excists in version 1104, and only if a winchester with embedded controller is connected to the DIOC.

Self test after reset

Included in the boot prom of the DIOC2 is a thorough self test, which includes the following items:

1. Initializing and testing memory from 7000 - 0000.
2. Copying the program from PROM to RAM address 7000.
3. Initializing and testing memory from 0000 - 7000.
4. Copying the program from address 7000 to 0000 in RAM.
5. Testing memory mapper.
6. Initializing and testing program memory from 4000 - 40000, with memory mapper.
7. Initializing and testing DMA memory from 0 - 40000.
8. Copying the program from address 0000 to C000 in RAM.
9. Wait until 15 seconds from reset.
10. The DIOC2 will turn LED 3 off. And finally the DIOC2 will enable the I/O bus in and start the boot procedure.

Boot procedure

1. If the first floppy drive is ready the DIOC will boot from the floppy drive.
2. If the operating system or the diagnostic programs is present on the winchester, the system will be booted, when the winchester becomes ready.
3. If neither the winchester nor the floppy are ready, the boot program will wait for one of 3 conditions, boot from another DIOC, floppy ready or winchester ready.

Error handling

If LED 2 turns on or if LED 3 does not turn off within appx. 15 seconds, it is because of an error during the self test. If this happens you should try to type the select sequence. Refer to Diagnostic Programs Manual. Depending upon the error it is possible that you might get some information about the error when selecting the DIOC2.

SUPERMAX TECHNICAL NOTE NO. 8.

DATE: 860502.

MODULE/PART: 0400 DIOC module and 1100 DIOC module

DESCRIPTION: diocmonitor

Any abnormal condition encountered during command execution to a winchester disk causes the driver program running in the DIOC to report an error as completion of the command. Normally this error is reported to the user with such terms as 'disk not ready' ,'hard error on disk',etc. In some cases the DIOC is unable to report a error condition to the user, e.g. updating of the cache. In order to be able to report all errors and more details about the errors, the DIOC will report all winchester disk errors to the diocmonitor.

The diocmonitor is a program that normally is started during execution of the RC-file.

example:
prod /etc/diocmonitor 14 < /dev/null >> /errorlog14

The diocmonitor is now started and all errors will be logged in file /errorlog14. In order to advise the system administrator the diocmonitor will always produce output to /dev/tty00 as well as to a file. If more that one DIOC is installed in the Supermax a diocmonitor must be started for every DIOC.

Example of the format of the information from the diocmonitor:

DIOC 14 ERR may 1 11:51:00 1986: 2A0043FFFFFF91 04FFFFFFDB0000
00000000 00000000 DT=0sek

Each error report consists of 16 bytes. All FF is skipped.
Only 7 bytes out of the 16 are used by the DIOC.
In this example the error information is:
byte 0 1 2 3 4 5 6
2A 00 43 91 04 DB 00
followed by 9 bytes 00. All information is in Hex.

byte 0: is type of error reported from the driver in the DIOC
0x2A = 42 is translated to 'hard error on disk' by the operating system.

byte 1: drive number in range from 0 to 7 0x00 = drive 0

byte 2: is additional information from the driver 0x43 = 'C' which means that the error occurred during a cache operation.

Byte 3-6 is the status information from the SCSI controller, and these bytes gives the information, that is necessary to analyse the error.

byte 3: 0x91 is the error code from the SCSI controller.
If the most significant bit is set the next 3 bytes are a sector address.
0x91 = 1001 0001, since the most significant bit is set the sector address is valid, and the error code is 0x11.
Refer to 'Diagnostic Programs' manual for meaning of error codes.
Most common error codes:

Error	Meaning
0x03	write fault
0x10	I.D. CRC error
0x11	uncorrectable data error
0x15	seek error

byte 4: lsb of the sector address
byte 5: second byte of the sector address
byte 6: msb of the sector address

In this example the sector address is 00DB04. This information can be used to calculate the physical track address which caused the error.

Track address: sector address / number of sectors on a track
In this example number of sectors on a track is 32 = 0x20

0x00DB04 / 0x20 = 0x6d8

If necessary this track address can be inserted in the skip-list using the diagnostic program.

SUPERMAX TECHNICAL NOTE NO. 7.

DATE: 860502.

MODULE/PART: 0400 DIOC module and 1100 DIOC module

DESCRIPTION: two different data formats used by 1/4-inch streaming tape drives on the Supermax.

QIC-11 and QIC-24 data formats.

All 1/4-inch streaming drives on the Supermax are intelligent drives, that automatically formats each data block as it is written on the tape. The QIC-11 format is a non standard format used by most 20 Mbyte streaming drives. The QIC-24 format is a industry accepted standard for information interchange between systems using 1/4-inch streaming tape drives. This format is supported by all 1/4-inch streaming drives available today.(Tandberg, Cipher, Archive, etc) In order to be able to read and write old QIC-11 format most 1/4 inch streaming drives supports both formats. The format select is controlled by the host software (the DIOC).

Three different types of 1/4-inch streaming tape drives are used in the Supermax.

Type	Data format	Tracks	Capacity	Tape speed	Comment
1)3020	QIC-11	4	20Mbyte	30 ips	old 20Mbyte
2)3020L	QIC-11/24	4	20Mbyte	30 ips	new 20Mbyte
3)9045L	QIC-11/24	9	45Mbyte	90 ips	all 45Mbyte

Since the data format select is controlled by software the possibility of data interchange depends on the version of the operating system running on the Supermax.

before system 100.35

DIOC 0400

type 1) write QIC-11 read QIC-11 (4 tracks)
type 2) write QIC-11 read QIC-11 (4 tracks)
type 3) write QIC-11 read QIC-11 (4 and 9 tracks)

DIOC 1100

type 1) write QIC-11 read QIC-11 (4 tracks)
type 2) write QIC-24 read QIC-11 and QIC-24 (4 tracks)
type 3) write QIC-24 read QIC-11 and QIC-24 (4 and 9 tracks)

system 100.35 (or later)

DIOC 0400

type 1) write QIC-11 read QIC-11 (4 tracks)
type 2) write QIC-11 read QIC-11 (4 tracks)
type 3) write QIC-24 read QIC-11 and QIC-24 (4 and 9 tracks)

DIOC 1100

type 1) write QIC-11 read QIC-11 (4 tracks)
type 2) write QIC-11 read QIC-11 (4 tracks)
type 3) write QIC-24 read QIC-11 and QIC-24 (4 and 9 tracks)

In the system 100.35 the QIC selection is controlled by the capacity of the streamer, as defined in chhwll.
WARNING! Unfortunately type 1 streamers do not respond correctly to QIC-11/QIC-24 selection commands. This means that type 1 streamers erase the tape if the capacity of the streamer is defined incorrectly.(type 1 and type 2 must be defined as 20.000.000 bytes and type 3 as 45.000.000 bytes).

If any problems occur in reading tapes while changing the operating system to 100.35 this indicates that the streamer is of type 2. If it is at any point necessary to read tapes which are written under operating system 100.34 or earlier,a simple way to overcome the problem is to boot the Supermax with system 100.34. Please note that this problem only occurs if a streaming drive of type 2 is connected to DIOC 1100.

SUPERMAX TECHNICAL NOTE NO. 6.

DATE: 860408.

MODULE/PART: 1100 DIOC module.

DESCRIPTION: bootprom D2BOOT version 300485 is replaced by bootprom D2BOOT version 100286, which supports boot from the winchester.

Boot procedure in D2BOOT version 100286.

1).Selftest of memory mapper, program memory and DMA memory. This selftest takes app. 15 s.

2).If the first floppy drive is ready the DIOC will be booted from floppy.

3).When the first winchester connected to the DIOC becomes ready the system will be booted from this winchester if the operating system is present on a logical disk.

4).If neither the winchester or the floppy are ready, the boot program is waiting for one of 3 conditions, boot from another DIOC, floppy ready or winchester ready.

How to install winchester boot.

1).Generate a logical disk, of size 1 Mbyte.

2).Use the utility program MKWBOOT to configurate the logical disk as a bootdisk.

3).Use the diskcopy utility to make a raw copy from the floppy boot disk to the bootdisk on the winchester.

Notes.

Please note that winchester boot must be installed on the first winchester (channel 8) connected to the DIOC that is used to boot the system from the floppy.

SUPERMAX TECHNICAL NOTE NO. 4.

DATE: 850601.

MODULE/PART: 1100 DIOC MODULE.

DESCRIPTION: 1. Connection between the floppy disk drive and the DIOC module.

2. Floppy disk drive Motor on/off strap.

1. Connection between the floppy disk drive and the DIOC module.

The DIOC module is equiped with a 50 pin flatcable header for connection to the floppy disk drives. The module is strapped for interface to either 8 or 5.25 inch disk drives. The module is strapped for 8 inch disk drives when jumper 6-13 are in position one. In position two the module is strapped for 5.25 inch disk drives. When a 5.25 inch disk drive is used the conncetion between the module and the drive is made with a 34 pin flat cable. The cable is connected to the 50 pin header with pin 34 in the cable connected to pin 50 in the header, see the table.

8 inch interface:

2	tg43
4	nc
6	nc
8	nc
10	nc
12	nc
14	side select
16	nc
18	head load
20	index
22	ready
24	nc
26	sel0
28	sel1
30	sel2
32	sel3
34	direction
36	step
38	write data
40	write gate
42	track 00
44	write protect
46	read data
48	side select
50	nc

5.25 inch interface:

2	tg43	
4	nc	
6	nc	
8	nc	
10	nc	
12	nc	
14	side select	
16	nc	
18	head load	2
20	in use	4
22	nc	6
24	index	8
26	sel0	10
28	sel1	12
30	sel2	14
32	motor on/off	16
34	direction	18
36	step	20
38	write data	22
40	write gate	24
42	track 00	26
44	write protect	28
46	read data	30
48	side select	32
50	ready	34

2. 5.25 inch floppy disk drive Motor on/off strap.

It is recommended that the 5.25 inch floppy disk drive is straped to switch the motor on and off according to the interface signal "motor on/off".

SUPERMAX TECHNICAL NOTE NO. 3.

DATE: 851008.

REVISION: 1

MODULE/PART: 1100 DIOC MODULE.

DESCRIPTION: Adjustment of the floppy disk controller.

5.25 inch disk drive:

1. Place jumpers in strap 4 for 5.25 inch interface. See Supermax technical datasheet no. 8.
2. Adjust the supply voltage to 5.00 Volt, measured at one of the TTL components on the DIOC board.
3. If a disk drive is connected to the DIOC, then remove the floppy disk.
4. Strobe reset to floppy disk controller. (Power up or key)
5. Wait until all LEDs are turned off.
6. Place a jumper between the two pins in strap 5.
7. Observe pulse on testpoint 2.
8. Adjust pulse width to 300 nsec. with multiturn trimmer KM1.
9. Observe pulse on testpoint 3.
10. Adjust pulse width to 500 nsec. with multiturn trimmer KM3.
11. Observe frequency on testpoint 4.
12. Adjust frequency to 250 kHz. with variable capacitor KC3.
13. Remove the jumper on strap 5 and strobe reset to the floppy disk controller. (Power up or key)

8 inch disk drive:

1. Place jumpers in strap 4 for 8 inch interface. See Supermax technical datasheet no. 8.

2. Adjust the supply voltage to 5.00 Volt, measured at one of the TTL components on the DIOC board.

3. If a disk drive is connected to the DIOC, then remove the floppy disk.

4. Strobe reset to floppy disk controller. (Power up or key)

5. Wait until all LEDs are turned off.

6. Place a jumper between the two pins in strap 5.

7. Observe pulse on testpoint 2.

8. Adjust pulse width to 150 nsec. with multiturn trimmer KM2.

9. Observe pulse on testpoint 3.

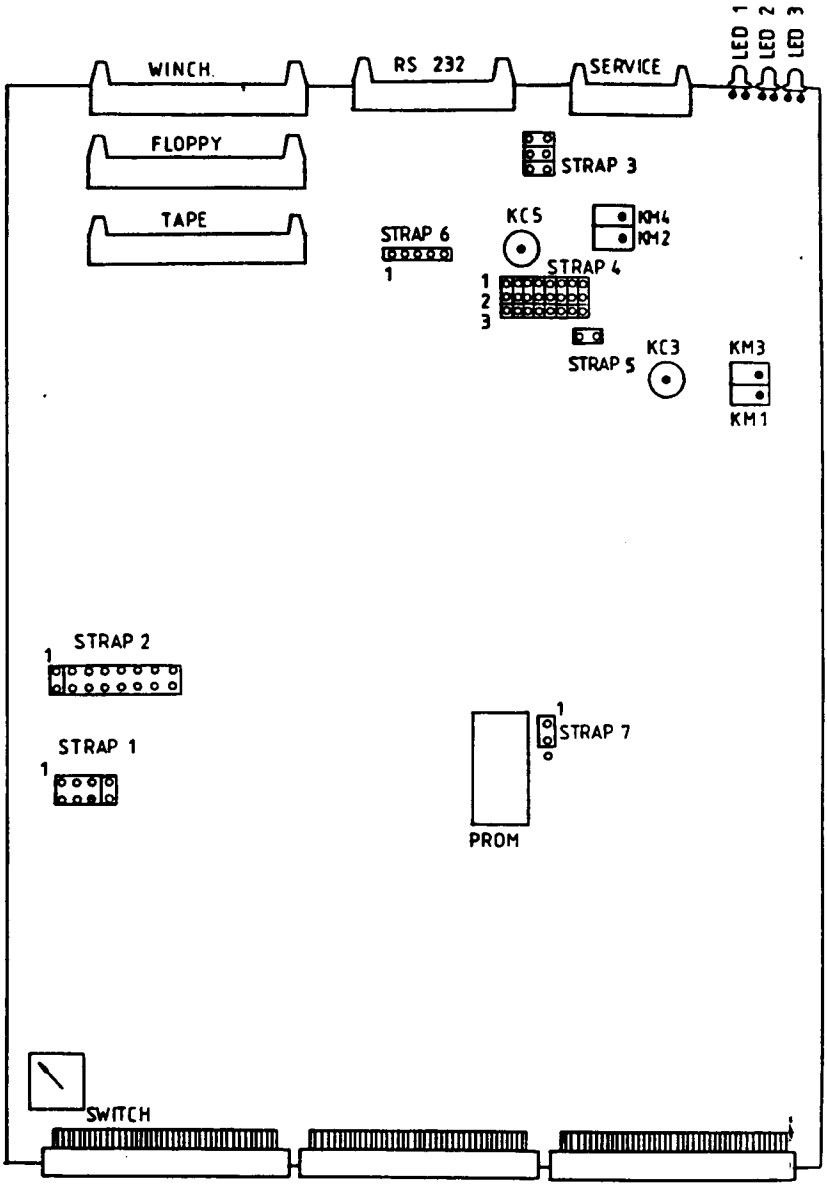
10. Adjust pulse width to 250 nsec. with multiturn trimmer KM4.

11. Observe frequency on testpoint 4.

12. Adjust frequency to 500 kHz. with variable capacitor KC5.

13. Remove the jumper on strap 5 and strobe reset to the floppy disk controller. (Power up or key)

Note: Testpoint 1 and 5 are signal ground.


LED 1
LED 2
LED 3
WINCH.
RS 232
SERVICE
FLOPPY
TAPE
STRAP 3
STRAP 6
1
KC5
KM4
KM2
STRAP 4
1
2
3
STRAP 5
KC3
KM3
KM1
STRAP 2
1
STRAP 1
1
1
STRAP 7
PROM
SWITCH

SUPERMAX TECHNICAL NOTE NO. 1.

DATE: 840924.

MODULE/PART: 040X DIOC MODULE.

DESCRIPTION: Adjustment of the PLL in the floppy disk interface.

DIOC 0400 and 0401.

1. Adjust the supply voltage to 5.00 Volt, measured at one of the TTL components on the DIOC board.

2. Adjust WD-1691 pin 13 (Package U8, position C 4,6) to 1.65 Volt with multiturn trimmer PU1 (Position C 5,6).

3. For an 8 inch floppy drive, adjust WD-1691 pin 12 (Package U8, position C 4,6) to 500 kHz. with multiturn trimmer PU2 (Position C 5,6).

   For an 5.25 inch floppy drive, adjust WD-1691 pin 12 (Package U8, position C 4,6) to 250 kHz. with multiturn trimmer PU2 (Position C 5,6).

DIOC 0402.

1. Adjust the supply voltage to 5.00 Volt, measured at one of the TTL components on the DIOC board.

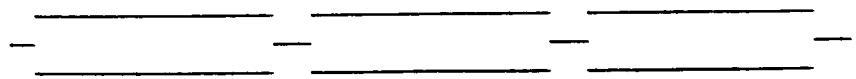
2. Adjust testpoint TP1 (Position C 5,10) to 1.65 Volt with multiturn trimmer PU1 (Position C 5,6).

3. For an 8 inch floppy drive, adjust testpoint TP2 (Position C 5,10) to 500 kHz. with multiturn trimmer PU2 (Position C 5,6).

   For an 5.25 inch floppy drive, adjust testpoint TP2 (Position C 5,10) to 250 kHz. with multiturn trimmer PU2 (Position C 5,6).

BOARD SURVEY, DIOC 04XX.

T G N D		P P U U 1 2	L L L L L E E E E E D D D D D 1 2 3 4 5		
*	TAPE		* * * * *	SERVICE	5
* * *					4
T T T	FLOPPY	U8 WD1691		Socket 1.	3
P P P					2
1 2 3	WINCH	PART C			
				Strap 1.	11
					10
					9
				Strap 2.	8
					7
					6
PART B					5
					4
				Strap 3.	3
					2
					1
					9
					8
					7
PART A					4
					3
					2



I/O BUS CONNECTORS

10 9 8 7 6 5 4 3 2 1

:disk1/bsdadj0

Supermax technical note no. 13

Module: NIOC 1600/3600, SIOC2 3600 **Date: 90-04-01**

Description:

Boot prom NIOC 86.09.17 and
Boot prom SNIOC 87.04.01 is replaced by
SNBOOT Version 2.0 Date 90.04.01.

SNBOOT Version 2.0 includes the feature of loading a new operating system into the NIOC. The new load module is named **niocb** and will be loaded into the NIOC if the hardware description in the EEPROM contains the proper settings. The hardware description can be set using the Diagnostic Program located in the boot prom of the NIOC. It is done in the following way:

1. Turn on the power.
2. Make sure that the computer is not booted.
3. When the self test on the NIOC is completed, type the following sequence on a terminal connected to the service port of the NIOC:
   ESC
   #
   <unit number of the NIOC
   <CR>
4. The following prompt will be displayed: `SNIOCbug 4.1 >`
5. Type **DP<CR>** and the prompt of the Diagnostic Program will be displayed.
6. Type **T<CR>** and the hardware description will be displayed.
7. Change the hardware description by answering the questions.
8. If no LAN controller is specified the unit will be loaded as a SIOC2, using the module **sioc2**.
   If LAN controller and NIOC is specified the unit will be loaded as a standard NIOC, using the module **nioc**.
   If LAN controller and NIOCB is specified the unit will be loaded as a *"streams only"* NIOC, using the module **niocb**.
9. Reset the computer and the changes will be in effect.

Supermax technical note no. 13

Module: NIOC 1600/3600, SIOC2 3600 **Date: 90-04-01**

Description:

Boot prom NIOC 86.09.17 and
Boot prom SNIOC 87.04.01 is replaced by
SNBOOT Version 2.0 Date 90.04.01.

SNBOOT Version 2.0 includes the feature of loading a new operating system into the NIOC. The new load module is named **niocb** and will be loaded into the NIOC if the hardware description in the EEPROM contains the proper settings. The hardware description can be set using the Diagnostic Program located in the boot prom of the NIOC. It is done in the following way:

1. Turn on the power.
2. Make sure that the computer is not booted.
3. When the self test on the NIOC is completed, type the following sequence on a terminal connected to the service port of the NIOC:
   ESC
   #
   <unit number of the NIOC
   <CR>
4. The following prompt will be displayed: `SNIOCbug 4.1 >`
5. Type **DP<CR>** and the prompt of the Diagnostic Program will be displayed.
6. Type **T<CR>** and the hardware description will be displayed.
7. Change the hardware description by answering the questions.
8. If no LAN controller is specified the unit will be loaded as a SIOC2, using the module **sioc2**.
   If LAN controller and NIOC is specified the unit will be loaded as a standard NIOC, using the module **nioc**.
   If LAN controller and NIOCB is specified the unit will be loaded as a *"streams only"* NIOC, using the module **niocb**.
9. Reset the computer and the changes will be in effect.

SUPERMAX TECHNICAL NOTE NO. 2.

DATE: 850214.

MODULE/PART: 030X SIOC MODULE.

DESCRIPTION: Survey of the seriel line drivers and receivers.

RS-232-C INTERFACE.

Channel 0, USART package name R1.

Signal	Package	Pin number	Type	Position
TxD	R2	11	75188	B 9,10
DTR	R2	08	75188	B 9,10
RTS	R2	06	75188	B 9,10
RxD	R3	01	75189	B 8,10
CTS	R3	04	75189	B 8,10
DSR	R3	10	75189	B 8,10

Channel 1, USART package name R4.

Signal	Package	Pin number	Type	Position
TxD	R2	03	75188	B 9,10
DTR	R5	11	75188	B 9,9
RTS	R5	08	75188	B 9,9
RxD	R3	13	75189	B 8,10
CTS	R6	01	75189	B 8,9
DSR	R6	04	75189	B 8,9

Channel 2, USART package name R7.

Signal	Package	Pin number	Type	Position
TxD	R5	06	75188	B 9,9
DTR	R5	03	75188	B 9,9
RTS	R8	11	75188	B 9,8
RxD	R6	13	75189	B 8,9
CTS	R6	10	75189	B 8,9
DSR	R9	01	75189	B 8,8

Channel 3, USART package name R10.

Signal	Package	Pin number	Type	Position
TxD	R8	08	75188	B 9,8
DTR	R8	06	75188	B 9,8
RTS	R8	03	75188	B 9,8
RxD	R9	04	75189	B 8,8
CTS	R9	13	75189	B 8,8
DSR	R9	10	75189	B 8,8

Channel 4, USART package name R11.

Signal	Package	Pin number	Type	Position
TxD	R12	11	75188	B 7,9
DTR	R12	08	75188	B 7,9
RTS	R12	06	75188	B 7,9
RxD	R13	01	75189	B 6,9
CTS	R13	04	75189	B 6,9
DSR	R13	13	75189	B 6,9

Channel 5, USART package name R14.

Signal	Package	Pin number	Type	Position
TxD	R12	03	75188	B 7,9
DTR	R15	11	75188	B 7,10
RTS	R15	08	75188	B 7,10
RxD	R13	10	75189	B 6,9
CTS	R16	01	75189	B 6,10
DSR	R16	04	75189	B 6,10

Channel 6, USART package name R17.

Signal	Package	Pin number	Type	Position
TxD	S3	11	75188	B 9,7
DTR	S3	08	75188	B 9,7
RTS	S3	06	75188	B 9,7
TxC	R15	06	75188	B 7,10
RxC	R15	03	75188	B 7,10
RxD	S4	01	75189	B 8,7
CTS	S4	10	75189	B 8,7
DSR	S4	04	75189	B 8,7
TxC	R16	13	75189	B 6,10
RxC	R16	10	75189	B 6,10

Channel 7, USART package name R18.

Signal	Package	Pin number	Type	Position
TxD	T4	06	75188	B 9,6
DTR	T4	03	75188	B 9,6
RTS	S3	03	75188	B 9,7
TxC	T4	11	75188	B 9,6
RxC	T4	08	75188	B 9,6
RxD	T3	13	75189	B 8,6
CTS	S4	13	75189	B 8,7
DSR	T3	10	75189	B 8,6
TxC	T3	01	75189	B 8,6
RxC	T3	04	75189	B 8,6

RS-422 INTERFACE.

Channel 6, USART package name R17.

Signal	Package	Pin number	Type	Position
T	S5	05,06	26LS31	B 7,7
C	S5	13,14	26LS31	B 7,7
S	S5	02,03	26LS31	B 7,7
R	S6	06,07	26LS32	B 6,7
I	S6	14,15	26LS32	B 6,7
S	S6	01,02	26LS32	B 6,7

Channel 7, USART package name R18.

Signal	Package	Pin number	Type	Position
T	T6	05,06	26LS31	B 7,6
C	T6	13,14	26LS31	B 7,6
S	T6	02,03	26LS31	B 7,6
R	T5	06,07	26LS32	B 6,6
I	T5	14,15	26LS32	B 6,6
S	T5	01,02	26LS32	B 6,6

Supermax technical note no. 19

Module/part:	**HDLC, TERM8, TERM32 MIOC-submodules**
Date:	**92-04-09**
Description:	**Installation as add-on modules.**

Background Information

The MIOC-submodules is delivered with the following components:

- a submodule printboard for installation in an empty MIOC slot.
- a back panel printboard with connectors for installation in the cabinet.
- a flat cabel connecting the two printboards.

Installation of the back panel in new cabinets

The back panel printboard can be installed directly in the SM-4, SM-6, SM-12, and SM-24 cabinets.

Installation of the back panel in previous cabinets

The submodules are delivered with two frames, which are used when the back panel printboards are installed in the previous cabinets (Vertical, Slimline and Rack).

One of the frames can be used if an HDLC-submodule is combined with TERM8-submodule, and the other is used if the HDLC-submodule is combined with the TERM32-submodule.

The first deliveries of the submodule were carried out without these frames. If you have recieved some of these early deliveries, the frames can be ordered on the following part-numbers:

- 99060405
- 99060406

Installation of the back panel in the Compact cabinet

Installation of the back panel in the Compact cabinet also requires the two above mentioned frames. However, one special frame more is required for mounting in the Compact cabinet. This frame can be ordered on the following part number:

- 99060406

Supermax technical note no. 25

Module/part:	**Clear installation no., version 5.0.2**
Date:	**93-06-07**
Description:	**Clearing of installation number on the disks connected to DIOC3**

When using the Clear installation no. version 5.0.2 please note the following:

- Do not use Clear installation no. version 5.0.2 to clear the installation number on disk systems with subsystem (3, 4 and 5 Gbyte disk systems). The clear installation program will destroy some data on the disk system.
- This is changed to work correctly in version 5.1.4 of the Clear installation no., scheduled for release June 1993.

Supermax technical note no. 24

Module/part:	**Video Streamer, FCN116.**
Date:	**93-03-16**
Description:	**Some of the FCN-kit 95101160 has been delivered unassembled.**

When mounting the FCN-kit in the Disk cabinet please be aware of the following:

- The fan is to be mounted in such away that the air flow is directed from the back of the streamer and out through the streamer door. The arrow indication on the fan must face the streamer.
- It is recommended that this mounting of the fan is checked in present installations upgraded with FCN 116.
- The FCN-kit will in future deliveries be assembled at the factories.

Supermax technical note no. 23

Module/part:	**Disk Arrays 2 Gbyte and 4 Gbyte.**
Date:	**93-03-15**
Description:	**The maximum size of the subsystem disk (physical disk size).**

When using the 1 Gbyte and the 0.5 Gbyte disk drives for Disk Arrays please be aware of the following:

- The maximum size of the subsystem disk (physical disk size) is 2047 Mbyte, and not 2048 Mbyte, as the Diagnostic Programs vers. 5.1.2 indicates.
- This indication will be changed in vers. 5.1.3 of the program, scheduled for release May 1993.

Supermax technical note no. 22

Module/part:	**Supermax system/Disk drives**
Date:	**92-11-24**
Description:	**Test of a Supermax system (Disk drives).**

Background Information

Within the last year we have seen Micropolis disk drives fail with periodic read or write errors. These errors give very diffuse error patterns in the UNIX system, because the disk drive itself or the DIOC does not detect the error. The error is detected when the faulty data is interpreted by the system.
The number of disk drives, which we have seen with this kind of error is less than five, which indicates that it is a very little part of the drives in the field.

Disk test on a UNIX system

In a UNIX system the error may be detected by using *dskback* with verify between disk and streamer (remember that verify errors on the root-disk does not imply any faults). It is, however, not always that the error is detected. In mirrored disk systems the faulty disk may not be read during this check, in which case the error is not detected.
If *dskback* detects an error the following formula tells you how to locate the disk drive (scsi id), which had the error.

((Offset + Verify error address) *div* 0x20000) *mod* 4

Offset = The size of all subdisks located on the disk system up to (but not including) the subdisk, which had the error.

Disk test using Diagnostic Programs

To detect these errors with the Diagnostic programs, it is necessary to use the *Write/Read* and *Random Write/Read* test. These test programs write on the disk and checks that the data written can be read again. It is **NOT** enough to use the *CRC test* on the disk, as this program only detects hard errors on the disk (errors that are detected by the disk itself).
In order to use the *Write/Read* and *Random Write/read*, it is necessary to make a total backup of the disks, run the test program (at least 10 passes), and then install the backup on the disks again.
This take a long time, and on large system it might even be impossible become the customer does not want to shutdown the system. A solution to this may be to change the disk drives when there is an indication of such an error (maybe only one of the mirrors), and then check the disk with the *Write/Read* and *Random Write/read* test on another.

General test of Supermax system

It can be recommended to use the Non-Operator Diagnostic Programs on large installations regularly, not just when problems have occurred. The Diagnostic programs will test the Supermax modules and a *CRC test* will be performed on the winchester disks.
This can be done by using the Non-Operator Diagnostic program weekly, as long time as possible (preferable 24 hours). It is done by using the *cron* program, which when running *init 5* will shutdown the machine and the Diagnostic programs will be booted. When the test is completed, the result is saved on the disk and the system will be rebooted. The result can be read, by using the *hwstatus*.
The test be for internal test time should 1/4 of the test time for bus test should be 3/4 of the time. The test time can be configured in the Non-Operator error buffer on the disk. Refer to the Diagnostic manual, to see the detailed description of Non-Operator mode.

Supermax technical note no. 21

Module/part:	**UPS**
Date:	**92-10-16**
Description:	**Dimensioning of UPS system for the Supermax models 4, 6, 12, 24 and Disk.**

Background Information

A UPS (Uninterruptable Power Supply) system is a power supply which is connected between the mains supply and the computer. The main purpose of a UPS system is to provide AC power to the computer in case of a mains drop-out. The power is provided for as long time as necessary for the computer to perform a shut-down procedure. In addition to this main feature, the UPS system also protects the computer against the following:

- Mains distortion.
- Mains transients.
- Mains voltage fluctuations.

Configuration

The following table shows which UPS model to use with the different Supermax models. Using these specifications, will ensure that the UPS system is capable of providing enough power, even when the Supermax is fully expanded.

Supermax configuration	UPS power	UPS model
Supermax 4	1000W	DP10
Supermax 6	1000W	DP10
Supermax 12	2000W	DP20
Supermax 24	3kW	DP103
Supermax 4 + 1 Supermax Disk	2000W	DP20
Supermax 6 + 1 Supermax Disk	2000W	DP20
Supermax 12 + 1 Supermax Disk	3kW	DP103
Supermax 24 + 1 Supermax Disk	5kW	DP105
Supermax 12 + 2 Supermax Disk	5kW	DP105
Supermax 24 + 2 Supermax Disk	5kW	DP105

Supermax technical note no. 18

Module/part: UPS **Date: 91-02-25**

Description: Dimensioning of UPS system for the Supermax.

Background Information

A UPS (Uninterruptable Power Supply) system is a power supply which is connected between the mains supply and the computer. The main purpose of a UPS system is to provide AC power to the computer in case of a mains drop-out. The power is provided for as long time as necessary for the computer to perform a shut-down procedure. In addition to this main feature, the UPS system also protects the computer against the following:

- Mains distortion.
- Mains transients.
- Mains voltage fluctuations.

Configuration

The following table shows which UPS model to use with the different Supermax models. Using these specifications, will ensure that the UPS system is capable of providing enough power, even when the Supermax is fully expanded.

Supermax configuration	UPS power	UPS model
1 Compact	1000W	DP10
1 Slimline	1000W	DP10
1 Vertical	2000W	DP20
1 Slimline + 1 disk cabinet	1000W	DP10
1 Vertical + 1 disk cabinet	2000W	DP20
2 Vertical's	3kW	DP103
2 Vertical's + 1 disk cabinet	3kW	DP103
2 Vertical's + 2 disk cabinets	5kW	DP105
3 Rack (1 card cage)	2000W	DP20
3 Rack (2 card cages)	3kW	DP103
5 Rack (1 card cage)	3kW	DP103
5 Rack (2 card cages)	5kW	DP105

DDE SOFTWARE NOTE

Basisprogrammel

Subject: New hardware handshake.

This information is valid from the stated dates:

SMOS 500.8K	68000	Version date	09MAY89
SMOS 520.4K	68020	Version date	09MAY89
SMOS 530.1K	68030	Version date	09MAY89

The RS-232-C ports on SIOC, SIOC2 and DIOC2 will from now on transmit hardware handshake from pin-4 (RTS) instead of pin-20 (DTR).

N.B.: The NTC's has always transmitted hardware handshake on pin-4.

BACKGROUND

To make the SIOC cabling equal to the NTC cabling.

To offer the possibility of using a new generation of 'modems' running both hardware handshake (pin-4) as well as hang-up (pin-20). These two functions has up to now been connected (OR'ed) together on pin-20 as seen from the point of view that local units are using hardware handshake and do not use any hang-up signal, contrary to remote units (modems) who uses xon/xoff handshake and certainly need a hang-up signal. The old cabling were only provided with 4 cable cores giving only one control signal, which in fact was pin-20.

CONSEQUENCES

There are very few asynchronous units able to transmit such enormous amount of data that makes it necessary for the Supermax to stop.

These few units will in most cases represent modems using xon/xoff handshake from the Supermax.

Some remaining units will automatically stop the flow of data if just one of the mentioned signals goes OFF. These units may observe no consequences if both pin-4 and pin-20 are connected through the cable.

The cables 8801, 8802, 8803, 8804, 8805 a.o., do all have pin-4 and pin-20 connected right through and should not cause any trouble.

WHERE CAN TROUBLE OCCUR?

Cables like for instance 8819 used for linking Supermax ports, requires hardware handshake between pin-5 and pin-20. This cable should be replaced with cable, Stock no.8888, supported with a cross-connection between pin-4 and pin-5.

It is also possible that the customers multiplex boxes are using hardware handshake which requires re-wiring. (Cable nos. 8833 and 8834 to CODEX MUX).

At additional sale of terminals to customers without the new SMOS, these new cables should cause no problems as long as the HUPCL symbol is removed from the line used by the terminal in /etc/gettydefs

HOW TO HANDLE THE UPDATING

The following is required to make the new SMOS work:

1. New terminology tables. Supplied on a Utilities Update.
2. Changes in /etc/gettydefs. HUPCL **must** be removed from those lines containing terminals. Modem lines **must** contain the HUPCL.
3. The cable no. 8819 (Supermax to Supermax) **must** be replaced with the cable no. 8888.

COMPATIBILITY

Or, what if anything goes wrong and you will have to boot by using the previous SMOS?

- Cable no. 8888 (Supermax to Supermax) must be replaced by cable no. 8819

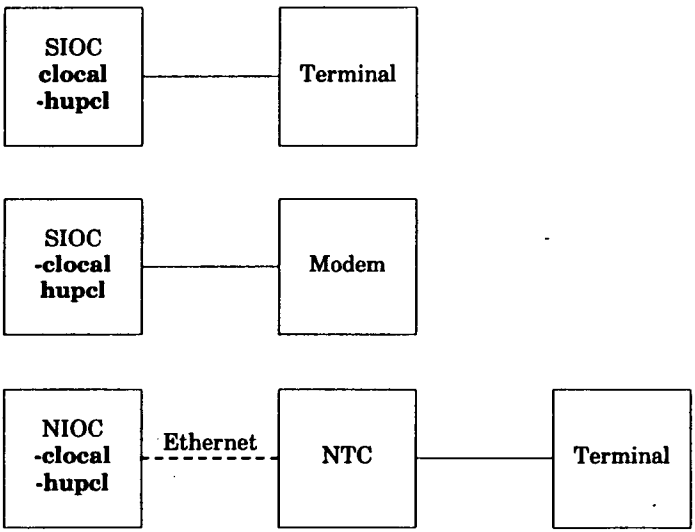
The new terminology tables and the changes in /etc/gettydefs should not cause any problems.

SECURITY

If the HUPCL is removed from lines in /etc/gettydefs used by modems, an empty line may be left behind. Check the correctness of all modem lines.

THE FOLLOWING DEFAULT IS RECOMMENDED

The use of **stty2** flags **hupcl** and **clocal**.



NOTE

The stty-flag **ixoff**

The hardware handshake is seen and set with the stty-flag **ixoff**.

ixoff	hardware handshake	(– xon/xoff).
–ixoff	xon/xoff	(– hardware handshake).

The stty-flag **hupcl** / symbol **HUPCL**

The flag **hupcl** is short for: 'hang up connection on last close', which means: disconnect when user is logged off. When a user is logged off from the Supermax, then pin-20 on the Supermax will be switched, the modem will receive an hang-up and disconnect the line.

The symbol **HUPCL** is contained in the file /etc/gettydefs, which is handling the terminal setup at logon. The symbol **HUPCL must** be used during setup of modems. For further information kindly refer to **gettydefs(4)**. If the symbol **HUPCL** is contained in the terminal setup line the terminal will be set to **hupcl**. If the symbol is missing in the terminal setup line then the terminal wil be set to **–hupcl**

The stty-flag **clocal** / symbol **CLOCAL**

The flag **clocal** is short for: 'connection local', and should be self-explanatory. The importance of this flag is when the flag is turned off as **–clocal** (a non-local connection).

With the **–clocal** set, the terminal and the modem is turned off, or disconnected from the NIOC, the pin-6 on the Supermax will switch off. This indicates that the remote part is turned off or the connection has been disturbed. All programmes running on the terminal will be killed and a login picture will be ready for the next user. This login picture **must** be used for modems, but may also be used for NIOC channels without permanent connection.

The symbol **CLOCAL** is contained in the file /etc/gettydefs, which is handling the terminal setup at logon. The symbol **CLOCAL must not** be used for setup of modems. For further information kindly refer to **gettydefs(4)**. If the symbol **CLOCAL** is contained in the terminal setup line the terminal will be set to **clocal**. If the symbol is missing in the terminal setup line the terminal will be set to **-clocal**

bkn/bp

DDE SOFTWARE NOTE

Systems Software

Subject: Dskback, how to backup the root disk (/).

To assure correct backup of the root disk using the 2.1 or 2.2 version of `dskback` a step by step list is provided. In future `dskback` versions detection and proper handling of the root disk is planned to be implemented. In the following it is assumed, that `/dev/dsk/u14c8s0` points to the rootdisk.

How to make a backup of the root disk.

1. `shutdown`
2. `dskback -v -c /dev/dsk/u14c8s0 /dev/stream`

It is important not to run other programs at the same time as `dskback`.

How to restore the root.

Do only restore `dskback` copies which have been verified successfully.

1. `shutdown`
2. `setdioc -cache /dev/dsk/u14c8s0`
3. `dskback -v /dev/stream /dev/dsk/u14c8s0`

   Do not run other programs at the same time as `dskback`.
4. Immediately after dskback has completed reboot the machine by turning the key without starting commands of any kind. If the machine does not automatically run the `fsck` as expected then run the command

   `fsck /dev/dsk/u14c8s0`
5. The machine is ready for normal use.

DDE SOFTWARE NOTE

Systems Software

Subject: Accounting, how to enable/disable

To assure correctly enabling/disabling of the accounting system a step by step list is provided.

To disable accounting:

1. Log in as superuser.
2. Bring the system to single user mode using the *shutdown* program.
3. Remount the *usr* disk if it is located on its own logical disk.
4. Remove the `/etc/wtmp` file, to avoid that it will grow to unpredictable size.

   ```
   rm /etc/wtmp
   ```

5. Save the accounting startup shellscript in `/etc/rc.d` by typing:

   ```
   cd /etc/rc.d
   mv acct .acct
   ```

6. Save the accounting shutdown shellscript in `/etc/shutdown.d` by typing:

   ```
   cd /etc/shutdown.d
   mv acct .acct
   ```

7. Remove any crontab lines from `/usr/spool/cron/crontabs/adm` that belongs to the accounting system. In the standard distribution the following lines deal with accounting.

   ```
   0 * * * * /usr/lib/acct/dodisk
   0,15,30,45 * * * * /usr/lib/acct/ckpacct
   0 4 * * * /usr/lib/acct/runacct
   0 5 1 * * /usr/lib/acct/monacct
   ```

8. Bring the system to multiuser mode again by running

```
init 2
```

To enable accounting:

1. Log in as superuser.
2. Bring the system to single user mode using the *shutdown* program.
3. Remount the *usr* disk, if it is located on its own logical disk.
4. Create the `/etc/wtmp` to make it known by *init* and *getty*.

```
> /etc/wtmp
```

5. Restore the accounting startup shellscript in `/etc/rc.d` by typing:

```
cd /etc/rc.d
mv .acct acct
```

If the `/etc/rc.d/.acct` file is not found the following lines will do:

```
# Starting accounting
/usr/lib/acct/startup
```

6. Restore the accounting shutdown shellscript in `/etc/shutdown.d` by typing:

```
cd /etc/shutdown.d
mv .acct acct
```

If the `/etc/shutdown.d/.acct` file is not found the following lines will do:

```
# Shutdown accounting
/usr/lib/acct/shutacct
```

7. Add the missing crontab lines to `/usr/spool/cron/crontabs/adm` that belongs to the accounting system. In the standard distribution the following lines deal with accounting.

```
0 * * * * /usr/lib/acct/dodisk
0,15,30,45 * * * * /usr/lib/acct/ckpacct
0 4 * * * /usr/lib/acct/runacct
0 5 1 * * /usr/lib/acct/monacct
```

8. Bring the system to multiuser mode again by running

```
init 2
```

SECTION 3.0

System Diagnostics

Boot strapping display values

During boot strapping the Supermax computer does an internal hardware test of the microprocessor, memory, memory management unit and the math – coprocessor. For each test a corresponding value is shown in the display on the front of the Supermax Computer. A value of P*n* indicates that the test has just passed phase *n*. A value of F*n* indicates that the test has failed during phase *n*. The hardware test has the phases shown below (depending of processor type):

MC68020 boot strapping display values

Phase		Description
Passed	**Failed**	
P0	**F0**	Test stuck at high or low bits.
P1	**F1**	Test data registers.
P2	**F2**	Test control registers.
P3	**F3**	Test adress registers.
P4	**F4**	Test status bits.
P5	**F5**	68020 instruction set.
P7	**F7**	Testing adress space register.
P8	**F8**	Testing **MMU** memory.
P9	**F9**	Testing memory adress 0 – 100000.
PA		Just before copying prom.
PC		Just after copying prom.

MC68020 boot strapping display values continued:

Phase		Description
Passed	**Failed**	
Pd		Testing caches.
PE		Determing memory size.
PF		Testing memory top and MC 68881 FPC.
bo		The system is ready to boot.
	FA	Data error in memory.
	FC	Single error in memory.
	Fd	Error in cache test.
	FE	Double fault in memory.

MC68030 boot strapping display values

Display Codes		
Passes	**Failed**	**Test**
P0	**F0**	Test stuck in high or low bits.
P1	**F1**	Test data registers
P2	**F2**	Test control registers
P3	**F3**	Test address registers
P4	**F4**	Test status bits
P5	**F5**	68030 instruction test
P7		USART initialized
P8	**F8**	PMMU/AMMU memory
P9	**F9**	Testing memory 0 – 100000
PC		Just after copying eprom
Pd		Test caches
PE		Determine memory size
PF		Test memory to top
bo	**FF**	Test MC 68881/68882 FPC
	FA	Data error in memory
	FC	Single error in memory
	Fd	Error in cache test
	FE	Double fault in memory

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Display codes		
Passed	Failed	Test R3000
P0		Writing hello message
P1	F1	Test memory 0 - 2 Mb
P2	F2	Test cache
P3	F3	Test write buffer
P4	F4	Test block refill
P5	F5	Test TLB
P6	F6	Test IMR
P7	F7	Test AMR
P8	F8	Test AMMU memory
P9	F9	Test PMMU memory
PA		Ready to boot
	FA	Single fault in memory
PC	FC	Test FPC
Pd	Fd	Test main memory > 2 Mb
	FE	UTLB exception error
	FF	Normal exception error
bo		Self test completed
r3		Running debugger

ERRLOG messages description

Whenever the operating system detects a system table overrun or another nonfatal error, an error record is written to the device called /dev/error. These error messages are picked up by a daemon named *errlog*. Usually *errlog* formats the record; writes it to the console, and appends the record to the logfile /usr/lib/errlog/log. The format of an error message is:

*** CPU 0: Thu Jan 1 01:00:00 : *Error message*

Thus it is possible to see on which cpu the error occured, and the time of the event. The following table gives an overview of the different error messages, and a description for each message, telling what possibly could be done avoiding the error from reoccuring.

Error message	Description
OS item area is full.	The dynamic storage area called the *items* area for the CPU mentioned is full. Use the **chhw** program to increase the size of the items area, until the message no longer appears.
No memory.	The Operating System could not get sufficient memory to start a new process. Increase the swap area for the CPU mentioned. This situation would also occur when no partition descriptors are available during a swapout of a process. The cure is to increase the size of the partition descriptor table using the **chhw** program.
Partition descriptor table is full.	Overun in an internal system table. Use the **chhw** program to increase the nummer of partitions.

Error message	Description
No ASN available for process start.	The maximum number of *Adress Space Numbers* has been reached. This is a hardware dependent limit, and cannot be increased. The only way to increase the number of ASN's, is to add one more MCU (Main Cpu board).
Local process descriptor table is full.	The maximum number of local processes for the mentioned CPU has been reached. Use the **chhw** program to increase the number of local processes.
Text descriptor table is full.	The maximum number of text descriptors for the mentioned CPU has been reached. Use the **chhw** program to increase the number of text descriptors.
Global process descriptor table is full.	The maximum number of global processes has been reached. Use the **chhw** program to increase the number of global processes.
Lock table is full.	The maximum number of lock entries has been reached. Use the **chhw** program to increase the number of lock entries.
File opening table is full.	The maximum number of file openings has been reached. Use the **chhw** program to increase the number of file openings. The is done by using the *opens* command within the *chhw* program.

Error message	Description
Disk /dev/dsk/u14c8s0 is full.	No available space on the mentioned disk. Consult your System Administrator. It might be possible to delete unused files from the disk in question.
File table is full.	The maximum number of files has been reached. Use the **chhw** program to increase the number of files. This is done by using the *files* command within the *chhw* program.
No inode available on disk /dev/dsk/14c8s0.	All available inodes for the mentioned disk have been used. If there are available blocks left on the disk (use the **df** command to check that), one way of obtaining the available space, is to make a backup of the disk, using *cpio* or *tar*, then reinitialize the disk with the *mkfs* program using a larger number of inodes. Finally restore the backup again.
Message queue table is full.	The maximum number of message queue entries has been reached. Use the **chhw** program to increase the number of message queue entries.
Semaphore ID table is full.	The maximum number of semaphore id table entries has been reached. Use the **chhw** program to increase the number of semaphore id table entries.
Shared memory ID table is full.	The maximum number of shared memory id table entries has been reached. Use the **chhw** program to increase the number of shared memory id table entries.

Error message	Description
There is nothing to swap out.	The operating system wants to copy a program back from the swap area to main memory, but there is not a sufficient large available block in main memory, to hold the new program. The only cure is to add more main memory.
Swap space cannot be allocated, SMOS error = *nnn*.	Some kind of error occured when the operating system was in process of copying a program from the main memory to the swap area. The SMOS error *nnn* might indicate what the problem was (refer to appendix C for a description of SMOS error codes.)
Less than 25% swap space left.	More than 75 % of the swap area for the mentioned CPU has been used. This is only a warning. If this message occurs frequently, the size of the swap area should be increased.
Less than 20% swap space left.	More than 80 % of the swap area for the mentioned CPU has been used. Memory allocation will now be rejected for the cpu in question. If this message occurs frequently, the size of the swap area should be increased.
Less than 10% swap space left.	More than 90 % of the swap area for the mentioned CPU has been used. If this message occurs frequently, the size of the swap area should be increased.
Disk error *nn nn nn nn* ...	Some kind of error occured during a disk operation. Call your service representive.

Error message	Description
No ASN available for process number 0.	The maximum number of *Adress Space Numbers* has been used. This is a hardware dependent limit, and cannot be increased. The only way to increase the number of ASN's, is to add one more MCU (Main Cpu board).
Single fault in memory.	A memory fault has been detected by the operating system. Normally single faults can be corrected by the error correction code within the hardware, but some level of overhead is introduced, when error correction takes place. Call your service representive to get the error corrected.
Device hash table is full.	The configuration specifies more devices than the internal device table can include.
No multiplexer links available.	The maximum number of multiplexer links has been reached. Use the *chhw* program to increase the number of multiplexer links.
No streams buffer of size <*size*> available.	All stream buffers of size · *size* · has been used.
No streams events available.	The maximum number streams events has been reached. Use the *chhw* program to increase the number of streams events.

Error message	Description
No queues available.	The maximum number of streams queues has been reached. Use the *chhw* program to increase the number of streams queues.
Could not perform unlink *ioctl* on stream.	Unexpected termination of streams command.
No send descriptors available.	The maximum number of send descriptors has been reached. Use the *chhw* program to increase the number of send descriptors.
User message block all. failed, resource disconnected.	Unexpected termination of RFS command.
RFS user daemon queue overflow.	Unexpected termination of RFS command.
Out of *rd_user* space.	The maximum number of receive descriptor users has been reached. Use the *chhw* program to increase the number of receive descriptor users.
Error when writing superblock.	An error occured when writing the superblock on a disk.
maxserve changed to < number >.	Caused by unexpected termination of RFS command.
minserve changed to < number >.	Caused by unexpected termination of RFS command.
Not enough stream buffers for RFS, RFS failed.	Unexpected termination of RFS command.

Error message	Description
Unknown RFS system call *<error number>* returned.	Unexpected termination of RFS command.
Remote system call copy-out failed *(error = <number>)*, remote call may hang.	Unexpected termination of RFS command.
No streams message block available.	The maximum number of streams message blocks has been reached. Use the *chhw* program to increase the number of streams message blocks.
Outgoing remote mount table is full.	The maximum number of outgoing mounts has been reached. Use the *chhw* program to increase the number of outgoing mounts.
Incoming remote mount table is full.	The maximum number of incoming mounts has been reached. Use the *chhw* program to increase the number of incoming mounts.
gdp array is full.	The maximum number of remote connections has been reached. Use the *chhw* program to increase the number of remote connections.
No receive descriptors available.	The maximum number of receive descriptors has been reached. Use the *chhw* program to increase the number of receive descriptors.
Advertise table is full.	The maximum number of advertisable resources has been reached. Use the *chhw* program to increase the number of advertisable resources.
OUTPUT request received to free srmount entry.	Unexpected termination of RFS command.

UNIX System CRASH Codes

When the system detects an error in the hardware or the software where it would be inadvisorable to continue the system does a so called crashdump and displays a crash code in the MCU-display at the front of the Supermax Computer. The cause is usually a hardware problem or a minor problem in the kernel software. Some file systems may be corrupted, but the UNIX system checks for this when it is restarted. As with most sophisticated computer systems, CRASHs will occasionally occur; they should not cause much concern. If a particular crashcode occurs repeatedly (or predictably), you should contact your service representative. These crashcode explanation are defined numerical order in the following table.

NOTE

Take a crash dump if desired (see Procedure 3.7 for information about how to do that). Reboot the UNIX system (see Procedure 3.6). If crashs occur frequently, contact your service representative.

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Crash Code	Description
00	Bus error.
01	Address error.
02	Illegal instruction.
03	Division by zero.
04	CHK instruction.
05	TRAPV instruction.
06	Privileged instruction.
07	Trace.
08	1010 instruction.
09	1111 instruction.
10	Illegal TRAP instruction.
11	Floating point exception.
12	Coprocessor protocol violation.
13	Format error.
15	Garbage on stream head read queue.
16	Bad stream multiplexer unlink.

Crash Code	Description
17	Stream open routine returned junk.
20	Reservation inconsistency.
21	Reference to an RFS routine not included.
28	Illegal file position.
30	Disk space inconsistentcy.
31	Bad remote inode.
32	Buffer for fastrcopyout too large.
33	Bad call of rnamei0.
34	Bad remote inode.
35	RFS server array full.
36	Unlink inode with nlink = 0.
39	Illegal scheduling.
40	Interrupts not disabled.
41	Memory fault found in timer routine.
42	ASSERT debug error.
43	Supervisor stack overflow.

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Crash Code	Description
44	Inconsistency during swap compress.
45	Illegal address in delitem/delcoitem call.
46	Process not in active queue.
47	Memory fault found as bus error.
48	Error when swapping in.
49	Inconsistency in swapping information.
50	Illegal interrupt.
52	Unexpected SIOC interrupt.
53	Unexpected disk interrupt.
54	Unexpected CIOC interrupt.
55	Timeout structure overflow.
60	Partition not allocated for decrease sbrk.
61	Partition not allocated for increase sbrk.
62	Freeing bad Address Space Number.
71	Process number 1 dies.

Crash Code	Description
72	Too many global events.
73	Asynchronous i/o inconsistency.
75	sys_crash call.
80	Bad hardware configuration table.
81	Cannot start system process.
82	Cannot read hardware configuration.
83	Local OS memory exceeds 1 MB.
84	Cannot open console.
85	Cannot initialize Superfile system.
89	The system is not licensed for this number of terminals.
90	MCU is being initialized.
91	MCU is waiting for the other MCUs.
92	Cannot read physical disk size.
93	Master MCU not installed.
94	Too many terminals on one SIOC.
95	Cannot establish error reporting terminal.

Crash Code	Description
96	Missing streams module.
97	Bad streams module initialization.
98	Boot disc inconsistency (IOC too old).
99	MCU is waiting DIOC 3.

UNIX System Call Error Messages

A system call that is unsuccessful returns an impossible value to the calling process. This impossible value is almost always a −1. When a system call is successful, a value of 0 is returned to the calling process. Any time a system call is unsuccessful, an external variable called *errno* is set to one of the numbers in the following table.

When a −1 value is returned, the *errno* variable contains the number corresponding to the reason of the failure. The *errno* variable is only valid immediately after a system call failure. It is not cleared on successful system calls. These error numbers are defined in the **/usr/include/sys/errno.h** header file.

Error		Description
Number	**Name**	
1	EPERM	**Not Owner**.Typically this error indicates an attempt to modify a file in some way forbidden except to its owner or super-user. It is also returned for attempts by ordinary users to do things allowed only to the super-user.
2	ENOENT	**No such file or directory**. This error occurs when a file name is specified and the file should exist but does not, or when one of the directories in a path name does not exist.
3	ESRCH	**No such process**. No process can be found corresponding to that specified by **pid** in **kill** or **ptrace**.
4	EINTR	**Interrupted system call**. An asynchronous signal (such as interrupt or quit), which the user has elected to catch, occurred during a system call. If execution is resumed after processing the signal, it will appear as if the interrupted system call returned this error condition.
5	EIO	**I/O error**. Some physical I/O error. This error may in some cases occur on a call following the one to which it actually applies.

Error Number	Error Name	Description
6	ENXIO	**No such device or address**. I/O on a special file refers to a subdevice which does not exist, or beyond the limits of the device. It may also occur when, for example, a tape drive is not on-line or no disk pack is loaded on a drive.
7	E2BIG	**Arg list too long**. An argument list longer than 5,120 bytes is presented to a member of the *exec* family.
8	ENOEXEC	**Exec format error**. A request is made to execute a file which, although it has the appropriate permissions, does not start with a valid magic number (see, **a.out**(4)).
9	EBADF	**Bad file number**. Either a file descriptor refers to no open file, or a read (respectively write) request is made to a file which is open only for writing (respectively reading).
10	ECHILD	**No child processes**. A **wait**, was executed by a process that had no existing or unwaited-for child processes.
11	EAGAIN	**No more processes**. A **fork**, failed because the system's process table is full or the user is not allowed to create any more processes.
12	ENOMEM	**Not enough space**. During an **exec, brk**, or **sbrk**, a program asks for more space than the system is able to supply. This is not a temporary condition; the maximum space size is a system parameter. The error may also occur if the arrangement of text, data, and stack segments requires too many segmentation registers, or if there is not enough swap space during a **fork**.
13	EACCES	**Permission denied**. An attempt was made to access a file in a way forbidden by the protection system.

Error		Description
Number	Name	
14	EFAULT	**Bad address**. The system encountered a hardware fault in attempting to use an argument of a system call.
15	ENOTBLK	**Block device required**. A non-block file was mentioned where a block device was required, e.g., in **mount**.
16	EBUSY	**Mount device busy**. An attempt to mount a device that was already mounted or an attempt was made to dismount a device on which there is an active file (open file, current directory, mounted-on file, active text segment). It will also occur if an attempt is made to enable accounting when it is already enabled.
17	EEXIST	**File exists**. An existing file was mentioned in an inappropriate context, e.g., **link**.
18	EXDEV	**Cross-device link**. A link to a file on another device was attempted.
19	ENODEV	**No such device**. An attempt was made to apply an inappropriate system call to a device; e.g., read a write-only device.
20	ENOTDIR	**Not a directory**. A non-directory was specified where a directory is required, for example in a path prefix or as an argument to **chdir**(2).
21	EISDIR	**Is a directory**. An attempt to write on a directory.

Error Number	Error Name	Description
22	EINVAL	**Invalid argument**. Some invalid argument (e.g., dismounting a non-mounted device; mentioning an undefined signal in **signal**, or **kill**, reading or writing a file for which **lseek** has generated a negative pointer). Also set by the math functions described in the (3M) entries of this manual.
23	ENFILE	**File table overflow**. The system's table of open files is full, and temporarily no more **opens** can be accepted.
24	EMFILE	**Too many open files**. No process may have more than 20 file descriptors open at a time.
25	ENOTTY	**Not a typewriter**
26	ETXTBSY	**Text file busy** An attempt to execute a pure-procedure program which is currently open for writing (or reading). Also an attempt to open for writing a pure-procedure program that is being executed.
27	EFBIG	**File too large** The size of a file exceeded the maximum file size (1,082,201,088 bytes) or ULIMIT; see **ulimit**(2).
28	ENOSPC	**No space left on device** During a write to an ordinary file, there is no free space left on the device.
29	ESPIPE	**Illegal seek** An **lseek** was issued to a pipe.
30	EROFS	**Read-only file system** An attempt to modify a file or directory was made on a device mounted read-only.
31	EMLINK	**Too many links** An attempt to make more than the maximum number of links (1000) to a file.

Error		Description
Number	Name	
32	EPIPE	**Broken pipe** A write on a pipe for which there is no process to read the data. This condition normally generates a signal; the error is returned if the signal is ignored.
33	EDOM	**Math argument** The argument of a function in the math library (3M) is out of the domain of the function.
34	ERANGE	**Result too large** The value of a function in the math package (3M) is not representable within machine precision.
35	ENOMSG	**No message of desired type** An attempt was made to receive a message of a type that does not exist on the specified message queue; See **msgop**(2).
36	EIDRM	**Identifier removed** This error is returned to processes that resume execution due to the removal of an identifier from the file system's name space (see **msget**(2), **semct**(2), and **shmct**(2).
45	EDEDLK	**Deadlock** A deadlock situation was detected and avoided.
46	ENOLCK	**No locks available**. There are no more locks available. The system lock table is full.

SMOS System Call Error Messages

The Supermax Operating System has a set of errorcodes that are equavivalent to the UNIX system call error codes. Any time a system call is unsuccessful, an external variable called *smoserr* is set to one of the numbers in the following table.

When a −1 value is returned, the *smoserr* variable contains the number corresponding to the reason of the failure. The *smoserr* variable is only valid immediately after a system call failure. It is not cleared on successful system calls. These error numbers are defined in the **/usr/include/smoserr.h** header file.

Error Number	Error Name	Description
0	EOK	No error detected.
1	EDATFUL	OS data area is full.
2	EPRIVIO	Privilege violation.
3	EBADADDR	Address in segment 0 or 1.
4	EBADDIR	Bad directive number.
5	ENOTIMP	Facility not yet implemented.
7	EBADPARM	Bad value of parameter to system call.
30	EXOSAX	XOS module already installed.
31	EXOSNX	XOS module not installed.
32	EXOSVERS	Bad XOS module version.

Error Number	Error Name	Description
34	EXOSIF	Illegal format of XOS module.
35	EBADINIT	Bad streams module initialization.
36	ENOMOD	Missing streams module.
37	EXOS2BIG	XOS code (code bss data) exceeds 1 MB.
38	EXOSC2BIG	XOS common (streams bufs etc.) exceeds 1 MB.
39	EINITINC	Streams modules init inconsistent.
50	EPARNX	Partition does not exist.
51	EPARAX	Partition already exists.
52	ESEGUSE	Segment in use.
53	EILSEGNO	Illegal segment number.
54	EPARNATT	Partition not attached.
55	EPARLONG	Partition too long.
56	ENOMEM	No memory.
57	EASEGUSE	All segments in use.
58	EMAXPAR	All partition descriptors allocated.

Error		Description
Number	Name	
70	EMODAX	Streams module already exists.
71	EMAXDRIV	Streams driver table is full.
72	EMAXMOD	Streams module table is full.
73	EMAXDEVENT	Device hash table is full.
102	ENOASN	No asn available.
103	EBADLM	Bad load module structure.
104	EBADSER	Bad serial number.
106	EPROCNX	Process does not exist.
110	EPROCABO	Process is being aborted.
111	ERESUME	Process was resumed by another process.
112	ENOTSUSP	Process is not suspended.
113	EMAXPNO	The max. number of local process descriptors exist.
114	EDEADPNX	There is no dead process.
116	EBADEXNO	Bad exception number.
118	ESIGNAL	An exception caused the system call to abort.
119	ESTSHORT	The stack is too short to hold parameters.

Error Number	Error Name	Description
120	ESYSPR	The process is a system process.
121	EMAXTD	The maximum number of text descriptors exist.
126	EBPIPE	Write on broken pibe.
127	EMAXPG	The max. number of global process descriptors exist.
128	EMAXATTENT	No more attentions to a specific terminal allowed.
129	ENOTMCU	The hardware unit is not an MCU.
150	EPROTO	Protocol error.
151	EMAXSERVEI	Maximum number of RFS servers exist.
152	EADV	Advertise error.
153	EAADV	Already advertised.
154	EMAXADV	Advertise table is full.
155	EMAXRCVD	Maximum number of receive descr. exist.
156	EMAXSNDD6	Maximum number of send descr. exist.
157	ENONET	Machine is not on the network.
160	ECOMM	Communication error on send.

Error		Description
Number	Name	
161	ENOLINK	The link has been severed.
162	EREMOTE	Remote error.
163	EMULTIHOP	Multihop attempted.
164	ESRMNT	srmount error.
165	EDOTDOT	Cross mount point.
200	EBADACC	File not open for this access mode.
201	EBUFLONG	Buffer is too long.
203	EILDEVIC	Illegal device.
204	EUNITAX	File already exists.
205	EUNITNX	File does not exist.
206	EILMODE	Illegal access mode.
207	EACCVIO	Access right violation.
208	ETIMEOUT	I/O operation time out.
209	EOPEN	File is already open.
210	ENOTOPEN	File is not open.
211	EILOP	Illegal operation on specified file.

Error Number	Error Name	Description
212	EILPOSM	Illegal position mode.
213	EILBUFL	Illegal buffer length.
214	EEXCDDSK	Transfer exceeds disk.
215	ENMOUNT	Disk not mounted.
216	EAMOUNT	Disk already mounted.
217	EOPENFIL	Files are open on the disk.
219	EMAXMOUNT	mount table is full.
220	EISDI	The file is already in direct input mode.
221	EISNTDI	The file has not been put in direct input mode by the calling process.
222	ENREADY	Disk not ready.
223	EHARD	Hard error on disk.
224	EWRPROT	Disk write protected.
225	EILSECT	Illegal sector number.
226	ENODATA	No data (for no delay io).
228	EFULLLOC	The lock table is full.

Error		Description
Number	Name	
229	EBADPOS	Bad position on file.
230	ELUSED	The byterange is already locked.
232	EILSIZE	Illegal file size or file buffer size.
233	EMAXIO	The maximum number of files are open.
234	ENOTSIOC	The hardware unit is not a SIOC.
235	EDISK	Internal DIOC error.
236	ENOSDISK	No sub-disks defined on physical disk.
237	EMAXL1	The maximum number of level 1 devices in use.
238	ENOREAD	No read open for fifo opend with NODELAY.
239	EILSEEK	Illegal seek on unit (seek on pipe/fifo).
243	EFULLDSK	The disk is full.
244	EILVARI	Illegal variable record.
250	EILTYPE	Illegal file type.
251	ELOOP	Too many symbolic links.
252	ENAMETOOLONG	File name too long.

Error Number	Error Name	Description
254	EMAXL2	Full level 2 device table.
258	EDEADLK	Byte locking deadlock detected.
259	EILFNAM	Illegal Filename.
262	ENOINO	No inode available.
264	EOLFIL	Outside legal file.
266	EMXNLINK	Max number of links to a file reached.
267	EMNTMISM	Disagree internal/external superblock init time.
268	EILMNT	The disk does not contain a superfile system.
270	ESTREAM	Generic streams error.
271	EMAXMUX	No multiplexer links available.
272	EMAXBUF	No streams buffer available.
273	EMAXSTREV	No streams events available.
274	EMAXQ	No queues available.
275	EBADMSG	Trying to read unreadable message.
280	EMAXMSG	The maximum number of message queues exist.

Error		Description
Number	Name	
281	EMAXSEM	The maximum nuber of semaphore IDs exist.
282	EMAXSHM	The maximum number of shared memory IDs exist.
283	EMSGAX	Message queue already exists.
284	EMSGNX	Message queue does not exists.
285	EMSQREM	Message queue has been removed.
286	ESEMAX	Semaphore ID already exists.
287	ESEMNX	Semaphore ID does not exist.
288	ESEMREM	Semaphore ID has been removed.
289	ESEMVBIG	Semaphore value is too big.
290	EUNDOFULL	The undo table for the process is full.
291	ESEMVAL	The semaphore value would cause the process to wait.
292	ENOMSG	No message on queue.
293	EMSQFULL	Message queue is full.

LP Spooler Error Messages

This section provides a description of the error messages that are associated with LP commands. The following variables are used in the error messages:

file(s)	Indicates the file or files that are to be printed.
dest	Indicates the name of the destination printer.
printer – id	Indicates the request identification number of the printout. For example, *dqp10_2-46* is the printer name followed by the request identification number.
printer – name	Indicates the name of the printer.
program – name	Indicates the program name that was executed.
user	Indicates the user who requested the printout.

Following each message is an explanation of the probable cause of the error and the corrective action to take. If you are not able to correct all the error conditions you encounter, call your service representative for assistance.

Some lengthy error messages that appear all on one line on the display are too long to be shown as one line in the documentation. When more than one line is required in the documentation to show a one line error message, a "\" is used to split the message.

Error Message	Description/Action
dest is an illegal destination name	The *dest* you used is not a valid destination name. Use the **lpstat -p** command to list valid destination names.
file is a directory	The file name you typed is a directory and cannot be printed.

Error Message	Description/Action
xx is not a request id or a printer	The argument you used with the **cancel** command is not a valid request identification number or a printer name. Use the **lpstat -t** command to give you all the printers and requests waiting to get printed.
xx is not a request id	The request identification number you used with the **lpmove** command is not a valid request identification number. To find out what requests are valid, use the **lpstat -u** command.
xx not a request id or a destination	You used an invalid request identification number or destination with the **lpstat** command. To find out what is valid, use the **lpstat -t** command.
dest not accepting requests since *date*	Requests to the printer which you are trying to use have been stopped by the **reject** command.
Can't access FIFO	The named pipe file **/usr/spool/lp/FIFO** is incorrect. The mode should be 600.
LP Administrator not in password file	You must have an entry in the **/etc/passwd** file for "lp," and you must belong to the group "bin."
acceptance status of destination "printer-name" unknown	Use the **accept** command to enable the printer so that it will accept requests.
can't access file "xx"	The mode could be wrong on your directory or the file that you are trying to access.

Error Message	Description/Action
can't create class "xx"-it is an existing printer name	The class name you are trying to use has already been given to a printer. You will have to use another name or remove the printer to use the class name.
can't create new acceptance status file	The mode may be wrong on the **/usr/spool/lp** directory. It should be 755 with the owner "lp" and the group "bin."
can't create new class file	The mode may be wrong on the **/usr/spool/lp** directory. It should be 755 with the owner "lp" and the group "bin."
can't create new interface program	The mode may be wrong on the **/usr/spool/lp/interface** directory. It should be 755 with the owner "lp" and the group "bin."
can't create new member file	The mode may be wrong on the **/usr/spool/lp/member** directory. It should be 755 with the owner "lp" and the group "bin."
can't create new printer status file	The mode may be wrong on the **/usr/spool/lp/pstatus**. It should be 644 with the owner "lp" and the group "bin."
can't create new request directory	The mode may be wrong on the **/usr/spool/lp/request** directory. It should be 755 with the owner "lp" and the group "bin."
can't create printer "printer-name" -- it is an existing class name	The printer-name you are trying to use has already been used as a class name. You will have to assign another name for the printer.

Error Message	Description/Action
can't create new output queue	The mode on the file **/usr/spool/lp/seqfile** is incorrect. It should be 644, and the mode on the directory should be 755. The owner should be "lp," and the group should be "bin." This may be corrected by typing the command at a later time.
can't create new sequence number file	The mode on the file **/usr/spool/lp/seqfile** is incorrect. The mode of the file should be 644, and the mode of the directory should be 755. The owner should be "lp," and the group should be "bin." This may be corrected by typing the command at a later time.
can't create request file "xx"	The mode on the file **/usr/spool/lp/request/***printer-name*/r-id is incorrect. *Printer-name* is the name of the printer such as dqp10, and r-id is the request identification number. The mode of the file should be 444, and the mode of the directory should be 755. The owner should be "lp," and the group should be "bin." This may be corrected by typing the command at a later time.
can't fork	You either have several processes running and are not allowed to run anymore, or the system has all the processes running that it can handle. You will have to rerun this command later.
can't lock acceptance status	This is a temporary file in **/usr/spool/lp** that prevents more than one "lp" request from being taken at any given instant. You will have to rerun this command later.

Error Message	Description/Action
can't lock output queue	The file **/usr/spool/lp/QSTATLOCK** prevents more than one "lp" request from being printed on a printer at a time. You will have to rerun this command later.
can't lock printer status	The temporary file **/usr/spool/lp/PSTATLOCK** prevents more than one "lp" request from being printed on a printer at a time. You will have to rerun this command later.
can't lock sequence number file	The file **/usr/spool/lp/SEQLOCK** prevents more than one "lp" request from getting the next printer-id (request identification) number at a time. You will have to rerun this command later.
can't move request printer-id	*Printer-id* is the request identification number that cannot be moved. You will probably have to change the modes on the files and directories in **/usr/spool/lp/request**. Also, you will have to manually move the request from the disabled printer directory to the new destination after you shut down the LP scheduler.
can't open class file	The **lp** program is trying to access the list of classes for printers. One reason it may not be able to open the class file is that the system could have the maximum number of files open that are allowed at any time. This can be corrected by typing the command at a later time.
can't open member file	The **lp** program is trying to access the list of members in the directory **/usr/spool/lp/member**. The system

Error Message	Description/Action
	could have the maximum number of files open that are allowed at any time. This can be corrected by typing the command at a later time.
can't open xx file in MEMBER directory	There are a couple of reasons why file *xx* in the **/usr/spool/lp/member** directory cannot be opened. The mode on the file could be incorrect. It should be 644. Another possibility is that the system could have the maximum number of files open that are allowed at any time. This can be corrected by typing the command at a later time.
can't open xx file in class directory	One possibility why file *xx* cannot be opened is that the mode on the file or directory is incorrect. The file mode should be 644, and the directory mode should be 755. Another possibility is that the system has the maximum number of files open that are allowed at any time. The latter problem can be corrected by typing the command at a later time.
can't open xx	You cannot print on printer *xx* because the mode is incorrect on **/dev/tty**. The mode should be 622.
can't open FIFO	The mode on the named pipe file **/usr/spool/lp/FIFO** may be incorrect. It should be 600. Or, the system could have the maximum number of files open that are allowed at any time. The latter problem can be corrected by typing the command at a later time.
can't open MEMBER directory	The mode on the directory **/usr/spool/lp/member** could be incorrect. It should be 755. Another pos-

Error Message	Description/Action
	sibility is that the system could have the maximum number of files open that are allowed at any time. If the maximum number of files are open, try typing the command at a later time.
can't open acceptance status file	The mode on the file **/usr/spool/lp/qstatus** may not be correct. It should be 644. Another possibility is that the system could have the maximum number of files open that are allowed at any time. The latter problem can be corrected by typing the command at a later time.
can't open default destination file	Check the mode on the file **/usr/spool/lp/default**. The mode should be 644. If the mode is okay, it could be that the system has the maximum number of files open that are allowed at any one time. This can be corrected by trying the command at a later time.
can't open file filename	The *filename* was incorrectly typed or you don't have the correct modes set. The mode should be at least 400 if you are the owner.
can't open output queue file	Check the mode on the file **/usr/spool/lp/outputq**. It should be 644. This error message could also be generated if the system has the maximum number of files open that are allowed at any one time. Try entering the command at a later time.
can't open printer status file	The mode on the file **/usr/spool/lp/pstatus** is incorrect. The mode should be 644. It could also be that

Error Message	Description/Action
	the system has the maximum number of files open that are allowed at any one time. This can be corrected by trying the command at a later time.
can't open request directory directory name	The mode on the directory **/usr/spool/lp/request** is incorrect. The mode should be 655. It could also be that the system has the maximum number of files open that are allowed at any one time. This can be corrected by trying the command at a later time.
can't open request file xx	The mode on the file **/usr/spool/lp/member/request/***xx* is incorrect. The mode should be 644. It could also be that the system has the maximum number of files open that are allowed at any one time. This can be corrected by trying the **lpmove** command at a later time.
can't open system default destination file	The mode on the file **/usr/spool/lp/default** is incorrect. The mode should be 644. It could also be that the system has the maximum number of files open that are allowed at any one time. This can be corrected by trying the command again at a later time.
can't open temporary output queue	The mode on the file **/usr/spool/lp/outputq** is incorrect. The mode should be 644. It could also be that the system has the maximum number of files open that are allowed at any one time. This can be corrected by trying the command at a later time.
can't proceed -- scheduler running	Many of the **lpadmin** command options cannot be executed while the scheduler is

Error Message	Description/Action
	running. Stop the scheduler using the **lpshut** command and then try invoking the command again.
can't read current directory	The **lp** and **lpadmin** commands cannot read the directory containing the file to be printed. The directory name may be incorrect or you do not have read permission on that directory.
can't remove class file	The mode may be wrong on the **/usr/spool/lp/class**. It should be 755. The owner should be "lp," and the group should be "bin." Another possibility is the file in that directory may have the wrong mode. It should be 644.
can't remove printer	The mode may be wrong on the **/usr/spool/lp/member** directory. It should be 755, and the files in that directory should be 644. Both the directory and the files should be owned by "lp," and the group should be "bin."
can't remove request directory	The mode may be wrong on the **/usr/spool/lp/request** directory. It should be 755 and should be owned by "lp," and the group should be "bin." The directory may still have pending requests to be printed which will have to be removed before the directory can be removed.
can't set user id to LP Administrator's user id	The **lpsched** and **lpadmin** commands can only be used when you are logged in as "lp" or "root."
can't unlink old output queue	The **lpsched** program cannot remove the old output queue. You will have to

Error Message	Description/Action
	remove it manually by using the command **rm/usr/spool/lp/outputq**.
can't write to xx	The **lpadmin** command cannot write to device *xx*. The mode is probably wrong on the /dev/ttyxx file. It should be 622 and owned by "lp."
cannot create temp file filename	The system may be out of free space on the **/usr** file system. Use the command **df /usr** to determine the number of free blocks. Several hundred blocks are required to insure that the system will perform correctly.
class "xx" has disappeared!	Class *xx* was probably removed since the scheduler was started. The system may be out of free space on the /usr file system. Use the command **df /usr** to find out. Use the **lpshut** command to stop the scheduler and restore the class from a backup.
class "xx" non-existent	The class *xx* may have been removed because the system is out of free space on the **/usr** file system. Use the command **df /usr** to find out how much free space is available. The class will probably have to be restored from a backup.
class directory has disappeared!	The **/usr/spool/lp/class** directory has been removed. The system may be out of free space on **/usr**; use the **df /usr** command to find out. The class directory contains all the data for each printer class. To restore this directory, get these files and directory from a backup.
corrupted member file	The **/usr/spool/lp/member** directory

Error Message	Description/Action
	has a corrupted file in it. You should restore the directory from backup.
default destination "dest" non-existent	Either the default destination is not assigned or the printer *dest* has been removed. Use the **lpadmin** to set up a default destination or set **LPDEST** to the value of the destination.
destination "dest" has disappeared!	A destination printer, *dest* has been removed since **lpsched** was started. Use the **lpadmin** command to remove the printer.
destination "printer-name" is no longer accepting requests	The printer has been disabled using the **reject** command. The printer can be reenabled using the **accept** command.
destination dest non-existent	The destination printer you specified as an argument to the **accept** or **lpadmin** command is not a valid destination name, or it has been removed since the scheduler was started.
destination "printer-name" was already accepting requests	The destination printer was previously "enabled." Once a printer is accepting requests, issuing any more **accept** commands to it are ignored.
destination "printer-name" was already not accepting requests	A **reject** command was already sent to the printer. Use the **accept** command to allow the printer to start accepting requests again.
destination printer-name is not accepting requests move in progress ...	The printer has been disabled by the **reject** command, and requests are being moved from the disabled printer to another printer. The printer can be enabled again by the **accept** command.

Error Message	Description/Action
destinations are identical	When using the **lpmove** command, you need to specify a printer to move the print requests from and a different printer to move the requests to.
disabled by scheduler: login terminal	The login terminal has been disabled by the LP scheduler. The printer can be reenabled by using the **enable** command.
error in printer request printer-id	*Printer-id* is the actual request identification number. The error was most likely due to an error in the printer. Check the printer, and reset it if needed.
illegal keyletter "xx"	An invalid option, *xx*, was used. See the manual page for the correct options.
keyletters "-xx" and "-yy" are contradictory	This combination of options to the **lpadmin** program cannot be used together.
keyletter "xx" requires a value	The option *xx* requires an argument. For example, in the command line **lpadmin -m** *model* the argument to the **-m** option is the name of a model interface program.
keyletters -e, -i, and -m are mutually exclusive	These options to the **lpadmin** command cannot be used together. Refer to the manual page for more information on usage.

Error Message	Description/Action
lp: xx	In this message the variable *xx* could be one of several arguments. Typically, it is a message telling you the default destination is not assigned.
member directory has disappeared!	The **/usr/spool/lp/member** directory has been removed. The system is probably out of free disk space in the **/usr** file system. You need to clean up the **/usr** file system, and then install the LP commands or retrieve them from a backup.
model "xx" non-existent	The name that you are using for a model interface program is not a valid one. A list of valid models is in the **/usr/spool/lp/model** directory.
new printers require -v and either -e, -i, or -m	A printer must have an interface program, and this is specified by **-e**, **-i**, or **-m** options. The **-v** option specifies the device file for the printer. For more information on these options, refer to the **lpadmin** manual page.
no destinations specified	There are no destination printers specified. Use the **lpadmin** command to set one up.
no printers specified	There are no printers specified. Use the **lpadmin** command to set one up.
non-existent printer xx in PSTATUS	A printer with the name *xx* is in the **/usr/spool/lp/pstatus** file but no longer exists. The printer should be removed using the **lpadmin** command.

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Error Message	Description/Action
non-existent printer printer-name in class xx	The printer that you are trying to address in class *xx* has been removed from that class.
out of memory	Implies the system is in trouble. The message implies that there is not enough memory to contain the text to be printed.
printer "printer-name" already in class "xxl"	The printer you are trying to move to class *xx* is already in that class. You cannot move a printer to a class that it is already in.
printer "printer-name" has disappeared! or printer "printer-name" has disappeared	The printer has been removed, and the **enable** command cannot find it. The printer was most likely removed since the machine was rebooted or since the scheduler was started.
printer "printer-name" non-existent	*Printer-name* is the name of a printer that has been removed since the scheduler has been started. You must use the **lpadmin -x***printer-name*.
printer status entry for "printer-name" has disappeared	The **/usr/spool/lp/pstatus** file must have been corrupted. You will have to resubmit the printer request.
printer "printer-name" was not busy	The printer is not printing a request at this time. Either the request you wanted to cancel is finished printing or you have specified the wrong printer.
request "printer-id" non-existent	You are attempting to cancel a request that does not exist. You may have given the wrong printer name or wrong request id number or the request may have finished printing.

Error Message	Description/Action
request not accepted	The request was not accepted by **lp**. The scheduler may not be running. Use the **lpstat -t** command to find out more information.
requests still queued for "printer-name" -- use lpmove	*Printer-name* is the printer that still has requests waiting to get printed. You need to use the **lpmove** command to get those requests moved to another printer.
scheduler is still running -- can't proceed	You cannot perform this command while the scheduler is running. You will have to use the **lpshut** command first.
spool directory non-existent	The directory **/usr/spool** has been removed. You will have to use the **mkdir** command to restore the directory. This has probably removed some of the necessary LP files. You may have to reinstall the LP commands.
standard input is empty	You specified an invalid file name either by incorrectly typing a name or by specifying a nonexistent file. Nothing will be printed on the printers from this request.
this command for use only by LP Administrators	This command is restricted to someone logged in as root or lp.
too many options for interface program	The **lp** command called the appropriate interface program with too many arguments. For more information on the options and arguments that can be used with the **lp** command, refer to the **lp** manual page.

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Error Message	Description/Action
unknown keyletter "xx" or unknown keyletter "-xx"	An invalid option was supplied to the **lp** or **lpadmin** commands. Refer to the manual pages in Appendix B for all the correct usages.
unknown option "xx"	This message is displayed in response to an invalid option supplied to the **disable**, **lpstat**, or **reject** commands. Refer to the manual pages in Appendix B for all the correct usages.
usage: disable [-c] [-r[reason]] printer	The syntax for the **disable** command is not correct. The valid options are: **-c** to cancel the currently printing request, and **-r** followed by the reason that you are disabling the printer.
usage: reject [-r[reason]] dest ...	The syntax for the **reject** command is not correct. The proper format is to specify the reason why the printer is not taking any more print requests and to identify the destination printer.
usage: accept dest	The syntax for the **accept** command is to specify a destination printer. You are setting up a printer to accept requests, and you did not specify what printer should accept requests.
usage: enable printer	The syntax for the **enable** program is to specify a destination printer.
usage: cancel id ... printer ...	The syntax for the **cancel** command is not correct. The proper format is to specify the request identification number or the printer name.

Error Message	Description/Action
usages: lpadmin -pprinter [-vdevice] [-cclass] [-rclass] [-eprinter ¦ -iinterface ¦ -mmodel] [-h ¦ -l] -or- lpadmin -d[destination] -or- lpadmin -xdestination	The correct syntax for the **lpadmin** command is to specify at least one of the options mentioned above.
your printer request printer-id was canceled by user	The printer request did not finish printing because another *user* cancelled it. Typically, you will get this message in your mail. One reason a person may cancel a request other than their own is because the request is not printing correctly.

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Basic Networking Utilities Error Messages

This section lists the error messages associated with Basic Networking Utilities. There are two types of error messages. ASSERT errors are recorded in the **/usr/spool/uucp/.Admin/errors** file. STATUS errors are recorded in individual machine files found in the **/usr/spool/uucp/.Status** directory.

BNU ASSERT Error Messages

When a process is aborted, ASSERT error messages are recorded in **/usr/spool/uucp/.Admin/errors**. These messages include the file name, sccsid, line number, and the text listed below. In most cases, these errors are the result of file system problems. The "errno" (when present) should be used to investigate the problem. If "errno" is present in a message, it is shown as () in the following list.

Error Message	Description/Action
CAN'T OPEN	An open() or fopen() failed.
CAN'T WRITE	A write(), fwrite(), fprint(), etc. failed.
CAN'T READ	A read(), fgets(), etc. failed.
CAN'T CREATE	A create() call failed.
CAN'T ALLOCATE	A dynamic allocation failed.
CAN'T LOCK	An attempt to make a LCK (lock) file failed. In some cases, this is a fatal error.
CAN'T STAT	A stat() call failed.
CAN'T CHMOD	A chmod() call failed.
CAN'T LINK	A link() call failed.
CAN'T CHDIR	A chdir() call failed.
CAN'T UNLINK	A unlink() call failed.
WRONG ROLE	This is an internal logic problem.

Error Message	Description/Action
CAN'T MOVE TO CORRUPTDIR	An attempt to move some incorrect or bad C. or X. files to the directory **/usr/spool/uucp/.Corrupt** has failed. The directory is probably missing or has wrong modes or owner.
CAN'T CLOSE	A close() or fclose() call failed.
FILE EXISTS	The creation of a C. or D. file is attempted, but the file exists. This occurs when there is a problem with the sequence file access. Usually indicates a software error.
NO UUCP SERVER	A tcp/ip call is attempted, but there is no server for UUCP.
BAD UID	The uid cannot be found in the **/etc/passwd** file. The file system is in trouble, or the **/etc/passwd** file is inconsistent.
BAD LOGIN_UID	Same as previous.
ULIMIT TOO SMALL	The ulimit for the current user process is too small. File transfers may fail, so transfer is not attempted.
BAD LINE	There is a bad line in the **Devices** file; there are not enough arguments on one or more lines.

Error Message	Description/Action
FSTAT FAILED IN EWRDATA	There is something wrong with the ethernet media.
SYSLST OVERFLOW	An internal table in gename.c overflowed. A big/strange request was attempted. Contact your DDE Account Representative or Authorized Dealer.
TOO MANY SAVED C FILES	Same as previous.
RETURN FROM fixline ioctl	An ioctl, which should never fail, failed. There is a system driver problem.
BAD SPEED	A bad line speed appears in the **Devices/Systems** files (Class field).
PERMISSIONS file: BAD OPTION	There is a bad line or option in the **Permissions** file. Fix it immediately!
PKCGET READ	The remote machine probably hung up. No action need be taken.
PKXSTART	The remote machine aborted in a non-recoverable way. This can generally be ignored.
SYSTAT OPEN FAIL	There is a problem with the modes of **/usr/lib/uucp/.Status**, or there is a file with bad modes in the directory.

Error Message	Description/Action
TOO MANY LOCKS	There is an internal problem! Contact your DDE Account Representative or Authorized Dealer.
XMV ERROR	There is a problem with some file or directory. It is likely the spool directory, since the modes of the destinations were suppose to be checked before this process was attempted.
CAN'T FORK	An attempt to fork and exec failed. The current job should not be lost, but will be attempted later (**uuxqt**). No action need be taken.

BNU STATUS Error Messages

Status error messages are messages that are stored in the **/usr/spool/uucp/.Status** directory. This directory contains a separate file for each remote machine that your Supermax Computer attempts to communicate with. These individual machine files contain status information on the attempted communication, whether it was successful or not. What follows is a list of the most common error messages that may appear in these files.

Error Message	Description/Action
OK	Things are OK.
NO DEVICES AVAILABLE	There is currently no device available for the call. Check to see that there is a valid device in the **Devices** file for the particular system. Check the **Systems** file for the device to be used to call the system.
WRONG TIME TO CALL	A call was placed to the system at a time other than what is specified in the **Systems** file.
TALKING	Self explanatory.
LOGIN FAILED	The login for the given machine failed. It could be a wrong login/password, wrong number, a very slow machine, or failure in getting through the Dialer-Token-Pairs script.
CONVERSATION FAILED	The conversation failed after successful startup, which means that one side went down, the program aborted, or the line (link) was dropped.

Error Message	Description/Action
DIAL FAILED	The remote machine never answered. It could be a bad dialer or the wrong phone number.
BAD LOGIN/MACHINE COMBINATION	The machine called us with a login/machine name that does not agree with the **Permissions** file. This could be an attempt to masquerade!
DEVICE LOCKED	The calling device to be used is currently locked and in use by another process.
ASSERT ERROR	An ASSERT error occurred. Check the **/usr/spool/uucp/.Admin/errors** file for the error message and refer to the section *ASSERT Error Messages*.
SYSTEM NOT IN Systems	The system is not in the **Systems** file.
CAN'T ACCESS DEVICE	The device tried does not exist or the modes are wrong. Check the appropriate entries in the **Systems** and **Devices** files.
DEVICE FAILED	The open of the device failed.
WRONG MACHINE NAME	The called machine is reporting a different name than expected.
CALLBACK REQUIRED	The called machine requires that it calls your Supermax Computer.

Error Message	Description/Action
REMOTE HAS A LCK FILE FOR ME	The remote site has a LCK file for your Supermax Computer. They could be trying to call your machine. If they have an older version of Basic Networking, the process that was talking to your machine may have failed leaving the LCK file. If they have the new version of Basic Networking, and they are not communicating with your Supermax Computer, then the process that has a LCK file is hung.
REMOTE DOES NOT KNOW ME	The remote machine does not have the node name of your Supermax Computer in its **Systems** file.
REMOTE REJECT AFTER LOGIN	The login used by your Supermax Computer to login does not agree with what the remote machine was expecting.
REMOTE REJECT, UNKNOWN MESSAGE	The remote machine rejected the communication with your Supermax Computer for an unknown reason. The remote machine may not be running a standard version of Basic Networking.
STARTUP FAILED	Login succeeded, but initial handshake failed.
CALLER SCRIPT FAILED	This is usually the same as "DIAL FAILED." However, if it occurs often, suspect the caller script in the **Dialers** file. Use **Uutry** to check.

Gettydefs values

The following table explains the values defined in the file **/etc/gettydefs**. This file is used by the **getty(1M)** program to set up the line, when a user logs in to the system.

Symbol	Description
B0	Hang Up.
B110	110 Baud.
B1200	1200 Baud.
B134	134 Baud.
B150	150 Baud.
B1800	1800 Baud.
B200	200 Baud.
B2400	2400 Baud.
B300	300 Baud.
B4800	4800 Baud.
B50	50 Baud.
B600	600 Baud.
B75	75 Baud.
B9600	9600 Baud.

Symbol	Description
B19200	19200 Baud.
BRKINT	Signal Interrupt on Break.
BS0	No Delay After Backspace.
BS1	Short Delay After Backspace.
BSDLY	Select Backspace Delays.
CEOF	cntl d.
CINTR	DEL.
CLOCAL	Local line.
CQUIT	FS, cntl |
CR0	No Delay After Carriage-return.
CR1	Short Delay After Carriage-return.
CR2	Medium Delay After Carriage-return.
CR3	Long Delay After Carriage-return.
CRDLY	Select Carriage-return Delay.
CREAD	Enable Reciever.
CS5	5 Bit Character.
CS6	6 Bit Character.

Symbol	Description
CS7	7 Bit Character.
CS8	8 Bit Character.
CSIZE	Character Size.
CSTART	cntl q.
CSTOP	cntl s.
CSTOPB	Send two stop bits.
CSWTCH	cntl z.
DDE_CTL	Special DDE control flags. That is Intr = cntl q, Quit = cntl |, Erase = cntl h and Kill is undefined.
ECHO	Enable Echo.
ECHOE	Echo Erase Character as Backspace/Space/Backspace.
ECHOK	Echo New-line after Line Kill.
ECHONL	Echo New-line.
EVENP	Parity Enabled, 7 Bit Character.
EXTA	External A.
EXTB	External B.
FF0	No Delay After Form-feed.

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Symbol	Description
FF1	Short Delay After Form-feed.
FFDLY	Select Form-feed Delays.
HUPCL	Hang Up on Last Close.
ICANON	Canonical Input (character erase and line kill processing).
ICRNL	Map Carriage-return to New-line.
IGNBRK	Ignore Break.
IGNCR	Ignore Carriage-return.
IGNPAR	Ignore Characters with Parity Errors.
INLCR	Map New-line to Carriage-return.
INPCK	Enable Input Parity Check.
ISIG	Enable Signals.
ISTRIP	Strip Character.
IUCLC	Map Upper-case to Lower-case on Input.
IXANY	Enable Any Character to Restart Output.
IXOFF	Enable Start/Stop Input Control.

Symbol	Description
IXON	Enable Start/Stop Output Control.
LOBLK	Block Layer Output.
NL0	No Delay After New-line.
NL1	Short Delay After New-line.
NLDLY	Select New-line Delays.
NOFLSH	Disable Flush after interrupt or quit.
OCRNL	Map Carriage-return To New-line On Output.
ODDP	Parity Enabled, 7 Bit Character, Odd Parity.
OFDEL	Fill is DEL Character.
OFILL	Use Fill Characters For Delay.
OLCUC	Map Lower Case To Upper Case On Output.
ONLCR	Map New-line To Carriage-return/New-line On Output.
ONLRET	New-line Performs Carriage-return Function.
ONOCR	No Carriage-return at Column 0.
OPOST	Postprocess Output.
PARENB	Parity Enabled.
PARITY	Parity Enabled, 7 Bit Character.

Symbol	Description
PARMRK	Mark Parity Errors.
PARODD	Odd Parity.
SANE	Set All Modes To "Traditionally Reasonable" Values.
SANE8	Same as SANE but setting the line to 8 data-bits, no parity and one stop bit.
SSPEED	Default speed.
TAB0	No Delay After Horizontal-tab.
TAB1	Short Delay After Horizontal-tab.
TAB2	Long Delay After Horizontal-tab.
TAB3	Expand Horizontal-tab To Spaces.
TABDLY	Select Horizontal-tab Delays.
VT0	No Delay After Vertical-tab.
VT1	Short Delay After Vertical-tab.
VTDLY	Select Vertical-tab Delays.
XCASE	Canonical Upper/Lower Case Presentation.

Error codes for embedded controllers

Number	Text
00	No sense.
01	No index/sector signal.
02	No seek complete.
03	Write fault.
04	Drive not ready.
05	Selection failure.
06	No track zero found.
07	Multiple drives selected.
08	Logical unit communication failure.
09	Track following error.
0A-0F	Not used.
10	ID CRC/ECC error.
11	Uncorrectable data error.
12	No address mark found in ID field.
13	No address mark found in data field.
14	No record found.
15	Seek error.
16	Data synchronization mark error.
17	Recovered read data with retries (without ECC).
18	Recovered read data with ECC.(without retries).
19	Defect list error.
1A	Parameter overrun.
1B	Synchronous transfer error.
1C	Primary defect list not found.
1D	Compare error.
1E	Recovered ID with ECC correction.
1F	Not used
20	Invalid command.
21	Illegal block address.
22	Illeal function for device type.
23	Not used.
24	Illegal field in CDB.
25	Invalid logical unit number.
26	Invalid field in parameter list.
27	Write protect.
28	Cartridge changed.
29	Power on, reset, or bus device reset.
2A	Mode select parameters changed.
2B-2F	Not used.

to be continued

continued

30	Incompatible cartridge.
31	Medium format corrupted.
32	No defect spare location available.
33-3F	Not used.
40	Ram failure.
41	Data path diagnostic failure.
42	Power on diagnostic failure.
43	Message reject error.
44	Internal controller error.
45	Select/reselect failed.
46	Unsuccessful soft reset.
47	SCSI interface parity error.
48	Initiator detected error.
49	Illegal message.
4A-8F	Not used.

Error codes for Cipher ½" Magtape

Number	Text
00	No sense
01	Recovered error
02	Not ready
03	Medium error
04	Hardware error
05	Illegal request
06	Unit attention
07	Data protect
08	Blank check
09	Vendor unique (not used)
0A	Copy aborted
0B	Aborted command
0C	Reserved
0D	Volume overflow
0E	Not used
0F	Reserved

Error codes for EXABYTE 8mm Video Streamer

Number	Text
00	No sense
01	Not used
02	Not ready
03	Medium error
04	Hardware error
05	Illegal request
06	Unit attention
07	Data protect
08	Blank check
09	Vendor unique (not used)
0A	Copy aborted
0B	Aborted command
0C	Reserved
0D	Volume overflow
0E	Not used
0F	Reserved