

# ***Chapter G***

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***Using***

***SCO UNIX V/386***

## **G. Using SCO UNIX V/386**

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After having explained in chapters B and C the installation of the ICP Controller as well as that of the Host Drives, we would now like to give you a few hints regarding the installation of the operating systems

### **SCO UNIX V/386 3.2v4.x, 3.2v5.x (Open Server)**

For successful installation, it is essential to read the SCO system manuals thoroughly.

### **G.1 Transparency of Host Drives**

The structure of the Host Drives, which have been installed with GDTSETUP (in chapter C), is not known to UNIX. I.e., the operating system does not recognize that a given Host Drive consists of a number of hard disks forming a disk array. To UNIX this Host Drive simply appears as one single SCSI hard disk with the capacity of the disk array. This complete transparency represents the easiest way to operate disk arrays under UNIX; neither UNIX nor the PCI computer need to be involved in the administration of these complex disk array configurations.

### **G.2 General Tips for Installation**

In the following description, we shall explain the installation of SCO UNIX V/386 3.2v4.x and 3.2v5.x step by step in connection with the ICP Controller. Apart from the SCO UNIX floppy disks and the SCO UNIX documentation, you also need the GDT floppy disks

#### **GDT SCO UNIX BTLD-Disks** for 3.2v4.x, 3.2v5.x

for the installation. In the following discussion, when we speak of a *boot drive* we refer to the drive which is first integrated upon system power up. For the ICP Controller this drive is the first Host Drive in the list of GDT Host Drives, i. e., the Host Drive number 0 (see GDTSETUP menu *Configure Host-Drives*). During the installation you will have to decide whether you want the ICP Controller to make the boot drive available, or whether you want to operate the ICP Controller as an additional controller in the computer system.

If the ICP Controller is the only hard disk controller in the computer system, it will automatically make the boot drive available. If there are more hard disk controllers, the controller which makes the first drive available (the drive containing the MS-DOS partition C:) will be the boot controller.

In principle, SCO UNIX is always installed on the hard disk with Target ID 0 and LUN 0 on host adapter 0, that is on Host Drive 0 of this controller. If SCO UNIX is installed from tape (streamer) the streamer must have SCSI ID 2 and be connected to SCSI channel A of host adapter 0. For an installation from CD-ROM, the CD-ROM device must have SCSI-ID 5 and has to be connected with channel A of the ICP Controller.



When using 3.2v4.x or 3.2v5.x, you have the option to link the driver to the kernel before starting the kernel (*btld* (ADM)). This will allow you to use the ICP Controller as the only controller in the system. Use the *GDT BTL D*isk. During the installation, whenever the N1 floppy disk is inserted and the message

```
Boot
:
```

is displayed, do not press <ENTER> immediately, but type in *link* <ENTER>. The system will then prompt you for the name of the BTL D driver. Now type in *gdth*. It may be necessary to type in the complete boot string. In this case, you have to add the following command:

```
link=gdth btld=fd(xx)
```

where *xx* is the "Minor Device Number" of the corresponding device file. *xx* = 60 for fd0135ds18, 3.5" floppy as A.; or *xx* = 61 for fd1135ds18, 3.5" floppy as B: (see SCO UNIX system Administrator's Reference, Hardware Dependence, floppy devices). When requested, enter the IRQ which has been assigned to the PCI INT of the ICP Controller (see chapter B, Hardware Installation). In addition, the GDT BIOS must not be disabled and the boot drive must be connected with the ICP Controller having the lowest PCI slot number. When the UNIX installation has been completed, the driver is installed, too, and you may install further devices with *mkdev hd* (ADM).

If the ICP Controller is an additional controller, the installation of the driver is carried out with *installpkg*.

### **G.3 Instructions on *mkdev* (ADM) for 3.2v4.x**

Whenever the program *mkdev hd* (ADM) is started, you will be asked for the coordinates of the device you wish to install. The driver does not automatically display all devices connected, so after the installation you will find a tool named **GDTSCAN** in the directory */etc*'. The scanning can take up to several seconds, especially when there is more than one controller in the system. The devices are displayed together with their host adapter number, target-ID and LUN. These values are to be used in *mkdev* (ADM). Let's have a brief look at how the HA-no., target-ID and LUN are determined. Please note that the UNIX driver always maps the first detected Host Drive with target-ID 0, LUN 0. Exactly this drive would be used as a boot drive when the ICP Controller is to make the boot drive available.

#### **Host adapter Number (HA)**

The host adapter number assigned to the ICP Controller is derived from the PCI slot number of the ICP Controller. Therefore, if there is only one ICP Controller installed in the PCI bus computer system, the host adapter number=0. If there are two ICP Controllers installed, the ICP Controller with the lower PCI Slot number is assigned host adapter number 0 and the ICP Controller with the higher PCI slot number is assigned host adapter 1. (Note: After a cold boot, the GDT BIOS displays a couple of messages, each beginning with the controller's PCI slot number, e.g. "[PCI 0/3] 4 MB RAM detected". The number after the '/' is the slot number of the controller. This helps you to determine which is the order of the ICP Controllers and which host adapter number is assigned to them by UNIX. See also chapter B, Hardware Installation).

**UNIX Target-ID and LUN**

Target-IDs 0 and 1 with LUN 0 to 7 are reserved for "**Direct Access Devices**" (devices behaving like a hard disk or a removable hard and therefore configurable with GDTSETUP). There is a correlation between the Host Drive number GDTSETUP assigns (menu *Configure Host Drives*), and the assigned target-ID and LUN:

$$\text{Host-Drive Number} = 8 * \text{Target-ID} + \text{LUN}$$

The Host Drive number is the number the drive is given in the list of available Host Drives in the GDTSETUP program. The following exemplary screen shows a list of Host Drives. In this example, there is only one Host Drive installed.



Therefore, this Host Drive has target-ID 0 and LUN 0. The formula for determining target ID and LUN from the existing Host Drive numbers yields the following possible combinations for "Direct Access Devices":

Host Drive number	Target ID	LUN	Host Drive No.	Target ID	LUN
0	0	0	8	1	0
1	0	1	9	1	1
2	0	2	10	1	2
3	0	3	11	1	3
4	0	4	12	1	4
5	0	5	13	1	5
6	0	6	14	1	6
7	0	7	15	1	7

This conversion is necessary because the single SCSI devices are not declared to the host operating system in the order of their SCSI-IDs anymore, but according to the Host Drive numbers they have in GDTSETUP. Host Drives are a prerequisite for the ICP Controller to be able to link several SCSI devices to form a higher structure (i.e., RAID 5).

The sequence of the single Host Drives can be changed very easily by having GDTSETUP sort them in its *Configure Host Drives* menu. In this way, it is also possible to change the boot drive (it had previously been selected as boot drive because it has the lowest drive number, that is, 0, and is therefore the first drive to be communicated to the system).

Target ID and LUN of "**Not Direct Access Devices**" (devices such as streamers, tapes, CD-ROMS, etc., not configurable with GDTSETUP) are determined on the basis of the SCSI-ID and the SCSI channel used by the ICP Controller. These devices can only be configured with SCSI-IDs 2 to 6. SCSI-ID 0 and 1 are reserved for hard disks, SCSI-ID 7 for the ICP Controller. If "Not Direct Access Devices" are configured on SCSI-ID 0 or 1, they are not recognized during the scanning process and can therefore not be used. The Target IDs of *Not Direct Access Devices* are identical to their SCSI-ID, the LUN depends on the SCSI channel used (LUN 0 for SCSI channel A and LUN 4 for SCSI channel B). Note: After a cold boot the GDT BIOS displays all connected devices with their physical coordinates, i. e. their SCSI-ID and SCSI-LUN, (see "Chapter B, ICP Controller Function Check").

<b>SCSI-ID of Not Direct Access Devices</b>	<b>Used GDT SCSI channel</b>	<b>UNIX Target ID</b>	<b>UNIX LUN</b>
2	A	2	0
3	A	3	0
4	A	4	0
5	A	5	0
6	A	6	0
2	B	2	4
3	B	3	4
4	B	4	4
5	B	5	4
6	B	6	4

Having to determine the Target ID and LUN in such a complicated manner might seem rather awkward. However, it is necessary to do so because the ICP Controllers have more than one SCSI channel, whereas UNIX can only manage host adapters with one SCSI channel. Therefore, the GDT UNIX driver has to make the appropriate transformations.

**Configuration Example:**

In the PCI computer are two ICP Controllers (HA 0 = 1st GDT, HA 1 = 2nd GDT), each with two SCSI channels.

- 1 hard disk as Host Drive no. 0 on HA0
- 1 hard disk as Host Drive no. 0 on HA1
- 1 hard disk as Host Drive no. 1 on HA1
- 1 Streamer SCSI-ID 2, LUN 0 on SCSI channel A of HA0
- 1 CD-ROM SCSI-ID 3, LUN 0 on SCSI channel A of HA0
- 1 DAT SCSI-ID 2, LUN 0 on SCSI channel B of HA1

**Result:**

HA	Target-ID	LUN	Device
0	0	0	1 <sup>st</sup> hard disk, Host Drive no. 0 (boot- and installation drive)
0	2	0	Streamer
0	3	0	CD-ROM
1	0	0	hard disk, Host Drive no. 0
1	0	1	hard disk, Host Drive no. 1
1	2	4	DAT

## G.4 Instructions on *mkdev* (ADM) for 3.2v5.x (Open Server)

Whenever the program *mkdev hd* (ADM) is started, you will be asked for the coordinates of the device you wish to install. The driver does not automatically display all devices connected, so after the installation you will find a tool named **GDTSCAN** in the directory `/etc`. The scanning can take up to several seconds, especially when there is more than one controller in the system. The devices are displayed together with their host adapter number, target-ID and LUN. These values are to be used in *mkdev* (ADM). Let's have a brief look at how the HA-no., target-ID and LUN are determined. Please note that the UNIX driver always maps the first detected Host Drive with target-ID 0, LUN 0. Exactly this drive would be used as a boot drive when the ICP Controller is to make the boot drive available. As an alternative for the following "new" mapping method of SCO UNIX V/386 3.2v5.x, you may also use the mapping as described in section G.3 (for 3.2v2.0 & 3.2v4.x). To enable this ("old") mapping, change in the

```
/etc/conf/pack.d/gdth/space.c
gdth_mapping=1          into
gdth_mapping=0
```

### Host adapter Number (HA)

The host adapter number assigned to the ICP Controller is derived from the PCI slot number of the ICP Controller. Therefore, if there is only one ICP Controller installed in the PCI bus computer system, the host adapter number=0. If there are two ICP Controllers installed, the ICP Controller with the lower PCI Slot number is assigned host adapter number 0 and the ICP Controller with the higher PCI slot number is assigned host adapter 1. (Note: After a cold boot, the GDT BIOS displays a couple of messages, each beginning with the controller's PCI slot number, e.g. "[PCI 0/3] 4 MB RAM detected". The number after the '/' is the slot number of the controller. This helps you to determine which is the order of the ICP Controllers and which host adapter number is assigned to them by UNIX. See also chapter B, Hardware Installation).

### UNIX Target-ID and LUN

Target-IDs and LUNs for "Not Direct Access Devices" (devices like streamers, tapes and CD-ROMs and therefore not configurable via GDTSETUP), are directly assigned to the SCSI-ID and the channel of the ICP Controller. Host Drives are assigned in increasing order to the free coordinates (bus number and target ID; LUN is always 0).

### Configuration Example:

In the PCI computer are two ICP Controllers (HA 0 = 1st GDT, HA 1 = 2nd GDT), each with two SCSI channels.

1 hard disk	as Host Drive no. 0 on HA0
1 hard disk	as Host Drive no. 0 on HA1
1 hard disk	as Host Drive no. 1 on HA1
1 Streamer	SCSI-ID 2, LUN 0 on SCSI channel A of HA0
1 CD-ROM	SCSI-ID 3, LUN 0 on SCSI channel B of HA0
1 DAT	SCSI-ID 2, LUN 0 on SCSI channel A of HA1

**Result:**

HA	Bus	Target-ID	LUN	Device
0	0	0	0	1 <sup>st</sup> hard disk, Host Drive no. 0 (boot drive)
0	0	2	0	Streamer
0	1	3	0	CD-ROM
1	0	0	0	hard disk, Host Drive no. 0
1	0	1	0	hard disk, Host Drive no. 1
1	0	2	0	DAT
1	0	3	0	hard disk, Host Drive no.2

**Important Note:** 'Not Direct Access Devices' must not be connected to Bus 0, Target-ID 0, LUN 0. This is reserved for the boot device under SCO Unix 3.2V5.0

## G.5 Further Information

- From version 4.x of SCO UNIX V/386 3.2, a media change can be made with the UNIX commands **MOUNT** and **UNMOUNT**. Please make sure that the removable hard disk keeps its GDTSETUP drive number when changing the media, otherwise a separate ID/LUN entry is necessary for each single media (since the drive number depends on the media and not the device containing it).
- SCO UNIX V/386 3.2v4.x and later versions support a maximum of 4 ICP Controllers in one computer system.
- The tool **GDTSYNC** in the directory '/etc' carries out a UNIX SYNC command (update super block) and causes all buffers still present in GDT's cache to be written to the Logical Drives. It is advisable to use this tool before shutting down the system.
- When using *Direct Access Devices* with **exchangeable media** (e.g., removable hard disks), a media has to be inserted when the system is booted, otherwise the device is not available under UNIX.
- "Not Direct Access Devices" (streamer, tapes, CD-ROMs, etc) can be switched on even after system power up, they will still be recognised by **GDTSCAN** afterwards.



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