

Apollo

Install-Software
User's Guide
V4.0

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1 About this manual

This manual only explains the software coming with your APOLLO product. It does not contain information about the hardware installation process or configuration of the different APOLLO cards. For questions concerning the hardware please refer to the hardware installation manual that is also enclosed with the package.

2 Apollo-Install

If you buy an APOLLO controller together with a harddisk, it will already be well configured and ready to use. It'll contain one (Amiga-DOS) partition with a *Workbench 1.3* on it. If you don't have any further harddisk controllers installed in your system, the Amiga will boot using the harddisk connected to your APOLLO controller. If there is a bootable floppy disk inserted in disk drive df0:, your Amiga will still boot from floppy disk as it would have done before. In this case the harddisk will automatically be recognized and only mounted, allowing to use it though.

Now, the installation utility APOLLO-INSTALL is needed, when you want to install a new harddisk, modify the current partitioning (i.e. the boot priority of a partition) or change the state of software switches (i.e. enabling or disabling the use of read/write caches).

2.1 How to start Apollo-Install

Insert the APOLLO installation disk in drive df0: and reset your Amiga. After the boot procedure you can see the disk icon of the APOLLO installation disk on the workbench. Now open the disk contents window by double-clicking on the disk icon. Then launch APOLLO-INSTALL with a double-click on the icon named Apollo-Install14.0.

If you want to start the installation program not from the original disk, you have to meet the following requirements: The file Apollo-Install.Texts has to be in the same directory as the main program. Furthermore the FastFileSystem must be in the L: directory, the programs Run and lharc in C: and the devices AT-Apollo.device and SCSI-Apollo.device in the DEVS: directory. To start APOLLO-INSTALL from CLI rather than from the workbench, change the current directory with the CD command to the directory where the program actually is

installed. Then make sure, that the CLI has a stack size of at least 20000 Bytes. You can set the stack size with the command `stack 20000`. If there is no APOLLO controller installed in your system, Apollo-Install terminates immediately, giving an appropriate error message.

2.2 Language selection

After starting the program, you can see the screen shown in figure 1. Now you have to choose the language, in which all texts in the program will appear. The selection is done by simply clicking on the appropriate language gadget.

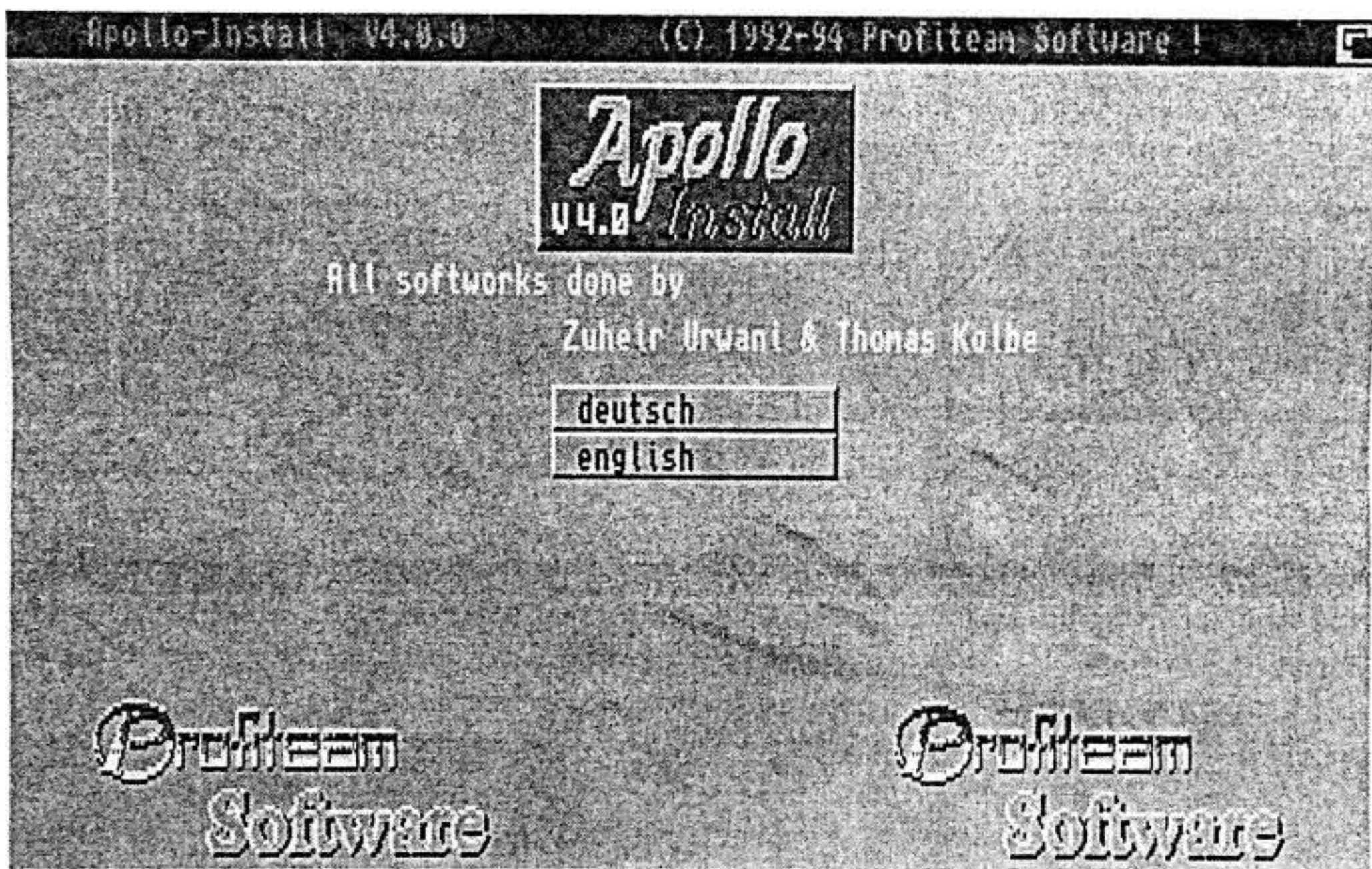


Figure 1: Language selection

2.3 Harddisk selection

After the language selection, all harddisk devices connected to APOLLO controllers are displayed on the screen (see figure 2). If none is found, the installation program terminates immediately, giving an error message.

For each harddisk there is a line containing the following information:

- Manufacturer and product identification: this information is hardcoded by the manufacturer and will be queried and displayed.

- The size in *million* bytes.
- The controller number, to which it is connected. This is only important, if you have more than one APOLLO controller installed. The first controller number is 1.
- Physical unit number (SCSI address).
- The bus type (AT or SCSI).

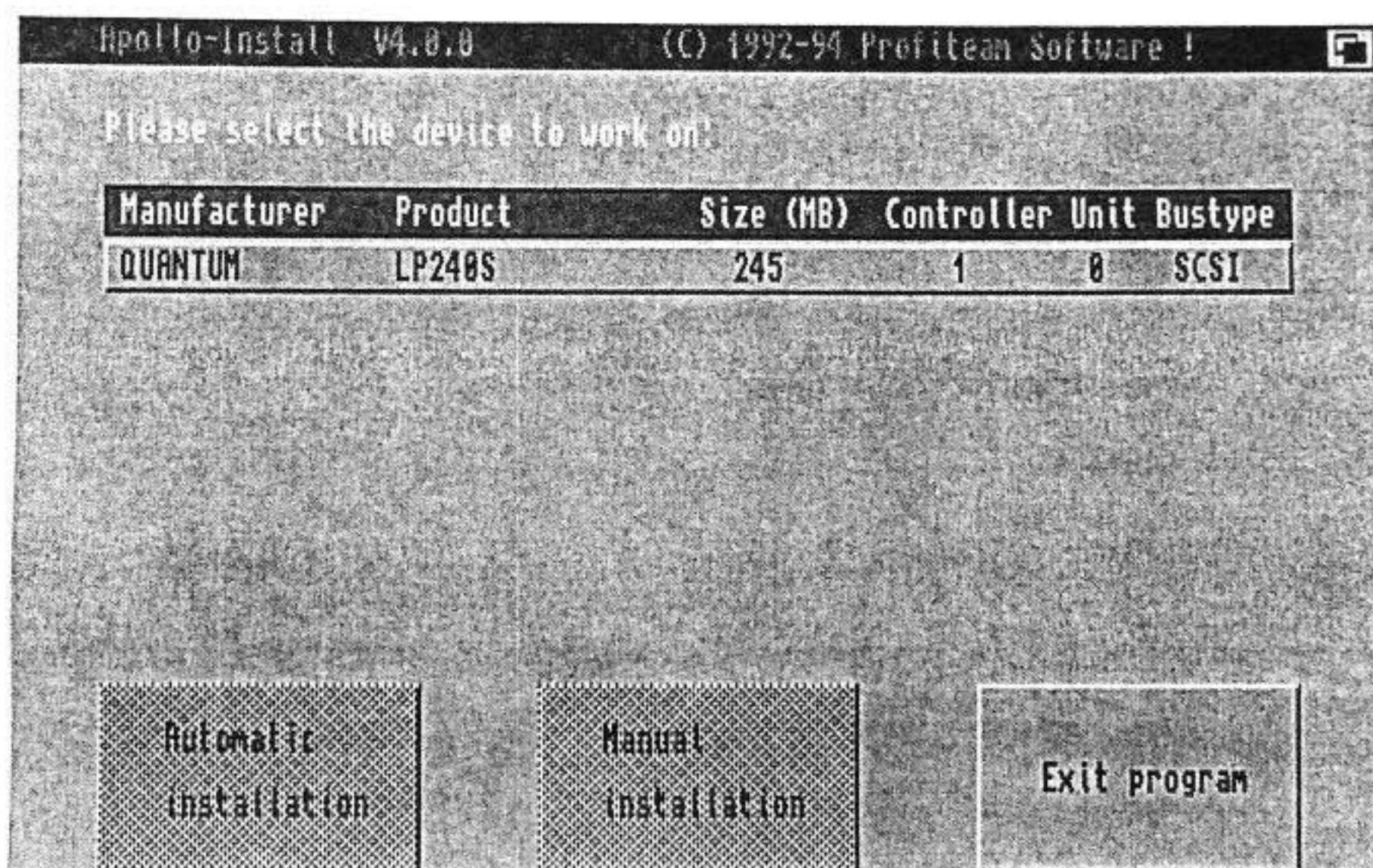


Figure 2: Selecting the harddisk to work on

Choose the disk you want to work on by clicking on its line. After highlighting the line, you can continue with either the automatic or the manual installation procedure. The automatic installation mode is fast and easy to handle, but offers only a limited degree of freedom concerning the parameters. Manual installation means that you can modify all adjustable parameters by yourself. The following chapters discuss both modes in detail.

However, if you don't want to install the selected harddisk, you can quit the program by clicking on the Exit program gadget. In case you want to select another harddisk, just click on its line. A previous selected line will automatically be unselected.

2.4 The Automatic Installation mode

The Automatic Installation mode allows an easy and quick installation of a whole harddisk. After the procedure the disk will contain one Amiga-DOS partition and — depending on the configuration settings — partitions for

- the COMMODORE PC emulator bridgecard,
- the APPLE MACINTOSH emulator AMAX II and
- the ATARI ST emulator CHAMÄLEON II.

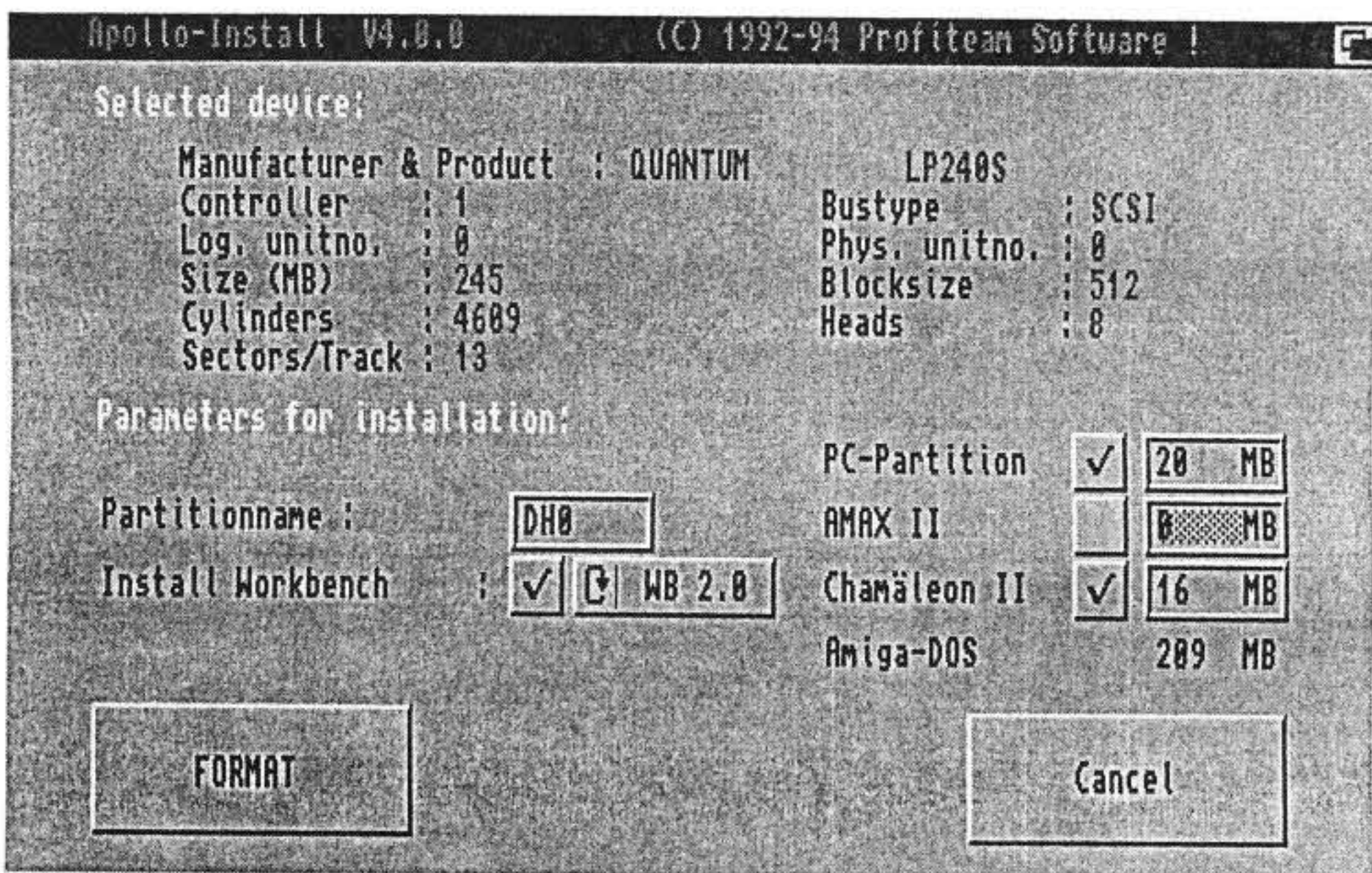


Figure 3: Automatic Installation mode

The upper half of the screen shows the most important physical parameters of the harddisk. These parameters cannot be modified and are only displayed for your information.

These parameters are:

- Manufacturer and product name.
- The controller number, to which the disk is connected.
- The bus type (AT or SCSI).
- Logical unit number: The operating system addresses the disk by this number. For SCSI devices it is calculated as follows:

$$(\text{Controller} - 1) * 100 + \text{LUN} * 10 + \text{SCSI_ID}$$

Disks with an AT bus are sequentially numbered starting with zero.

- Physical unit number: For SCSI devices this is the SCSI address (ranging from 0 to 6), which is set and can be modified on the device itself¹. For AT bus harddisks it is 0 for the master and 1 for the slave disk.
- The size in *million* bytes.
- The blocksize of the device. If it is not equal to 512 bytes, you must have Kickstart 2.0 or higher to be able to use it, because this version is the first that can handle different blocksizes.
- Number of cylinders.
- Number of heads.
- Number of sectors per track. Please note that the SCSI protocol doesn't regard the number of heads or sectors per track. Since the file system needs those parameters, APOLLO-INSTALL calculates optimal values for them. So for SCSI harddisks the displayed values are not the physical but supposed numbers.

You may adjust the following settings:

Partition name: This will be the DOS identifier of the the partition (i. e. dh0:) after the installation. It is comparable to the disk drive identifiers (like df0: or ram:) and should not be mixed up with the volume name. The latter one is fixed to ApolloHarddrive, but can be relabeled after the installation with the CLI command `relabel` or the similar workbench function.

In case you've typed in an already existing identifier, a requester will show up informing you about this. You should then immediately change the name to a system unique one, because Amiga-DOS cannot handle two equal named devices (see also chapter 4: The Boot Process).

Install Workbench: If this option is activated, a workbench will be copied on the Amiga-DOS partition. The cycle gadget to the right of the switch determines the version (Workbench 1.3 or Workbench 2.0). Simply click on it to change the current state. At a later point during the installation process you will then be requested to insert the Workbenches: disk, that was also coming with your APOLLO controller.

If the switch is inactivated, the Amiga-DOS partition will only be formatted and left blank.

¹The SCSI address of the APOLLO controller is always 7

PC-Partition: If this switch is activated, you can enter the desired size of the PC partition in the field to the right. Please refer to the manual of your PC bridgeboard for the further installation steps on the PC side.

AMAX II: This switch can be activated to create a partition used by the *APPLE MACINTOSH* emulator *AMAX II*. The desired partition size must be entered in the number gadget to the right.

Chamäleon II: Same as above, but for a partition used by the *ATARI ST* emulator *CHAMÄLEON II*. The maximum partition size is 16 MB, because the emulator — like the original *ST* — can only handle sizes up to 16 MB.

Please note that the sum of all partition sizes cannot be greater than the disk capacity. The Amiga-DOS partition is at least 1 MB in size and can have the total disk capacity at maximum. For this partition the read prefetch cache and the change detection for removable harddisks are activated by default (for further explanations see chapter 2.5.3).

After adjusting all parameters to your needs, click on the *FORMAT* gadget. Then a requester will open, asking if you are sure about the formatting. If you acknowledge the question positive, the installation begins and a new window opens, protocolling the installation activities.

You can quit the Automatic Installation mode at any time by clicking on the *Cancel* gadget. No changes are written to the selected harddisk. Note that all settings you've made so far for this disk will be discarded. If you enter the Automatic Installation mode again, the default settings will be supposed again.

2.5 The Manual Installation mode

The Manual Installation mode is very powerful. It lets you adjust all configuration parameters. For example you can create several Amiga-DOS partitions, change partition bounds or delete existing partitions. Most of the current partition settings may be modified without having to reformat it and so without any data loss.

As in the Automatic Installation mode the upper half of the screen shows the most important physical harddisk parameters (see figure 4). These parameters cannot be modified and are only displayed for your information.

These parameters are:

- Manufacturer and product name.
- The controller number, to which the disk is connected.
- The bus type (AT or SCSI).

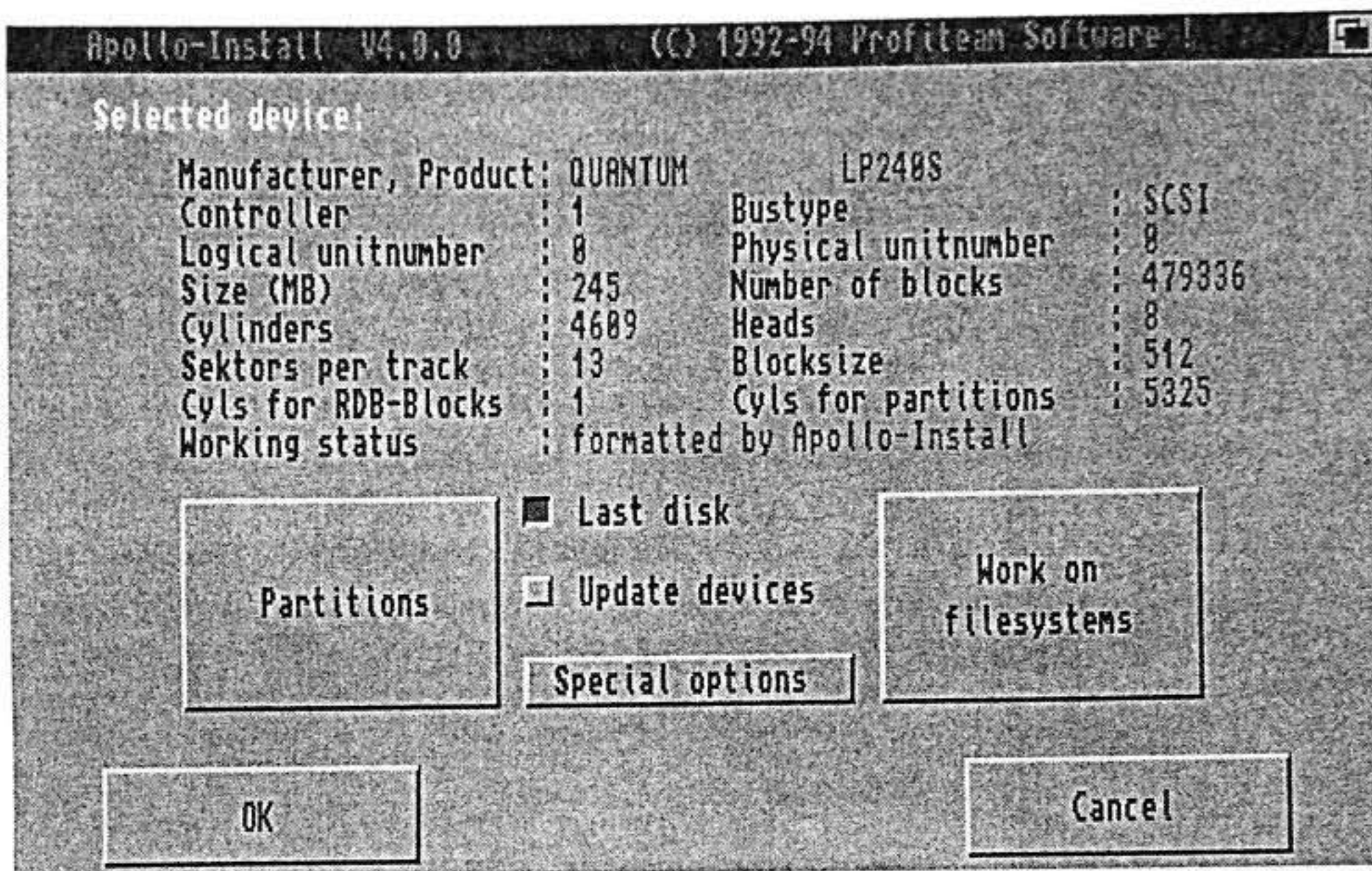


Figure 4: Main screen of the Manual Installation mode

- Logical unit number: The operating system addresses the disk by this number. For SCSI devices it is calculated as follows:

$$(Controller - 1) * 100 + LUN * 10 + SCSI_ID$$
 Disks with an AT bus are sequentially numbered starting with zero.
- Physical unit number: For SCSI devices this is the SCSI address (ranging from 0 to 6), which is set and can be modified on the device itself². For AT bus harddisks it is 0 for the master and 1 for the slave disk.
- The size in *million* bytes.
- Total number of blocks.
- Number of cylinders.
- Number of heads.
- Number of sectors per track. Please note that the SCSI protocol doesn't regard the number of heads or sectors per track. Since the file system needs those parameters, APOLLO-INSTALL calculates optimal values for them. So for SCSI harddisks the displayed values are not the physical but supposed numbers.
- The blocksize of the device. If it is not equal to 512 bytes, you must have Kickstart 2.0 or higher to be able to use it, because this version is the

²The SCSI address of the APOLLO controller is always 7

first that can handle different blocksizes. AT bus harddisks always have a blocksize of 512 bytes.

- The number of cylinders that are needed for the *Rigid Disk Blocks*, the reserved area on the disk in which the partitioning parameters and other software settings are stored. This value is normally 1, but can be higher if many partitions and filesystems are installed.
- The maximum number of cylinders available for partitions. This is simply the difference between the maximum and the reserved number of cylinders.
- The actual working status:

unformatted: This means, that the disk contains no *Rigid Disk Blocks* and is therefore considered unformatted.

formatted by Apollo-Install: The disk was previously installed by APOLLO-INSTALL.

formatted by alien software: The disk was previously installed by any other installation software.

changed: This is word is added in front of the working status, if you have changed any settings of the former state. These changes are only comitted if you click on the OK gadget.

In the middle of the screen there are two switches which have the following meanings (for more details see also chapter 4: The Boot Process):

- **Last disk:** This switch indicates if the harddisk is the last one connected to this controller. For each controller only the disk with the highest physical unit number should have this switch activated. In case you have both AT and SCSI bus harddisks connected to one controller, the switch should only be activated on the SCSI disk with the highest physical unit number.

When you add a new harddisk to your system, this switch will be set for this disk to the correct state by default. When there was already at least one disk installed before, please check and modify if necessary the state of the switch of the disk which had activated the switch until now.

- **Update devices:** If activated, the device driver software will be freshly installed on the reserved area of the disk, when you click on the OK gadget. The drivers has to be installed, if you have only this one APOLLO formatted harddisk in your Amiga and you want to boot from the disk or automatically mount the partitions on it. The drivers can also be installed on a harddisk that was formatted by another installation program (to make it bootable).

To leave the Manual Installation mode without committing the changes you have made, click on the Cancel gadget. When you want to commit the changes

instead, click on the OK gadget. You will then be asked if you are sure about the changes. If your answer is positive, the current configuration is written to the harddisk.

The following three subsections explain the working areas *Partitions*, *Filesystems* and *Special options* in detail.

2.5.1 Partitions

To create, modify or delete partitions, click on the Partitions gadget on the main screen of the Manual Installation mode.

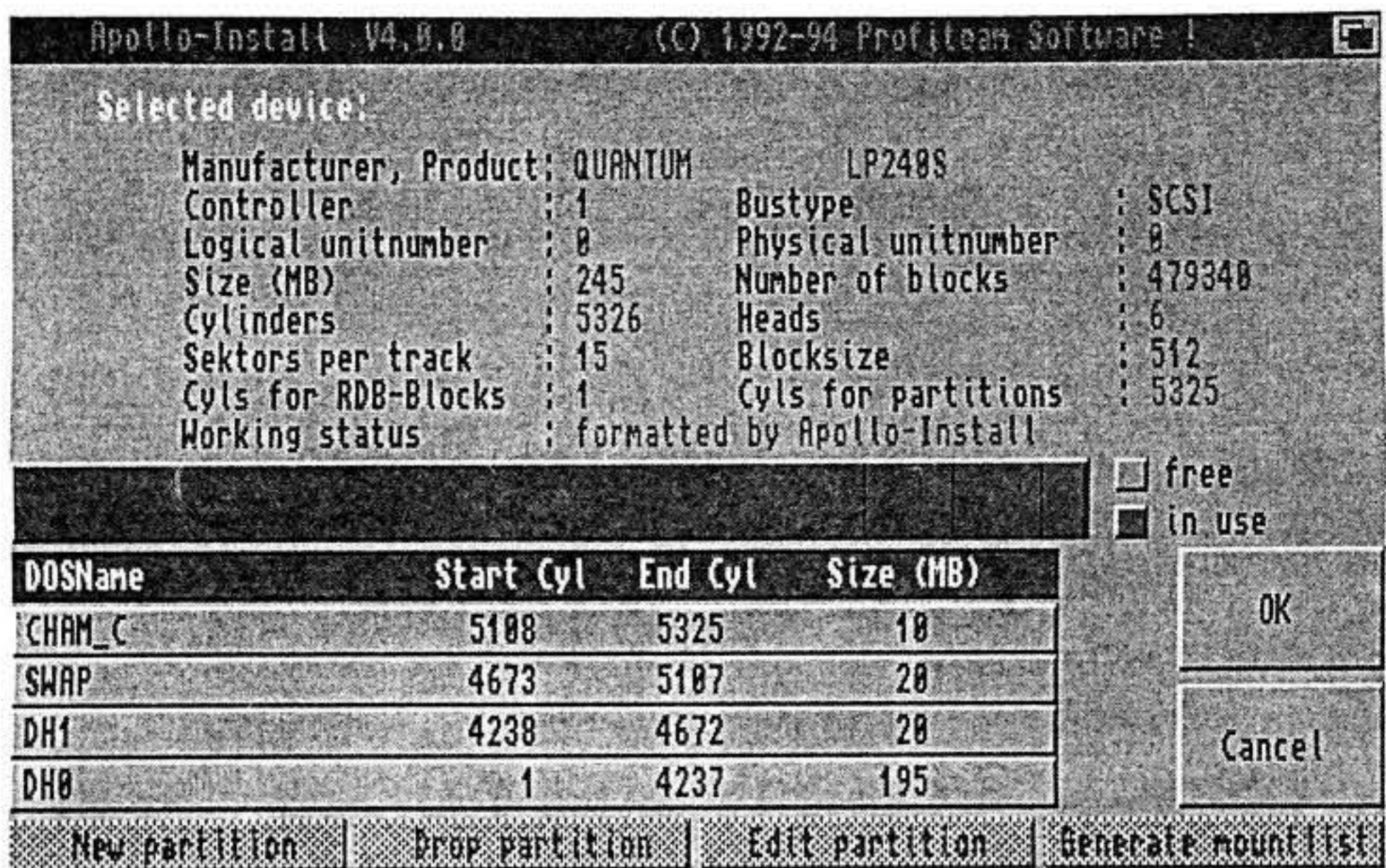


Figure 5: Partitions area of the Manual Installation mode

Now you can see the list of partitions that are already installed on the selected harddisk (see figure 5). When there are more than four partitions on it, you can scroll the list with the two arrow buttons (then appearing to the right of the list). Each line stands for one partition and it shows:

- **DOSName:** The disk drive identifier by which the partition can be accessed from Amiga-DOS (i. e. DH0:).
- **Start Cylinder:** The first cylinder of the partition.
- **End Cylinder:** The last cylinder of the partition.
- **Size:** The partition size in *million* bytes (rounded).

Furthermore you can see above the partition list a graphical representation of used and free harddisk space. Cylinder 0 is on the left side of the bar and the highest cylinder number is on the right side. The blue areas mark used space. The bar immediately reflects every change of partitioning.

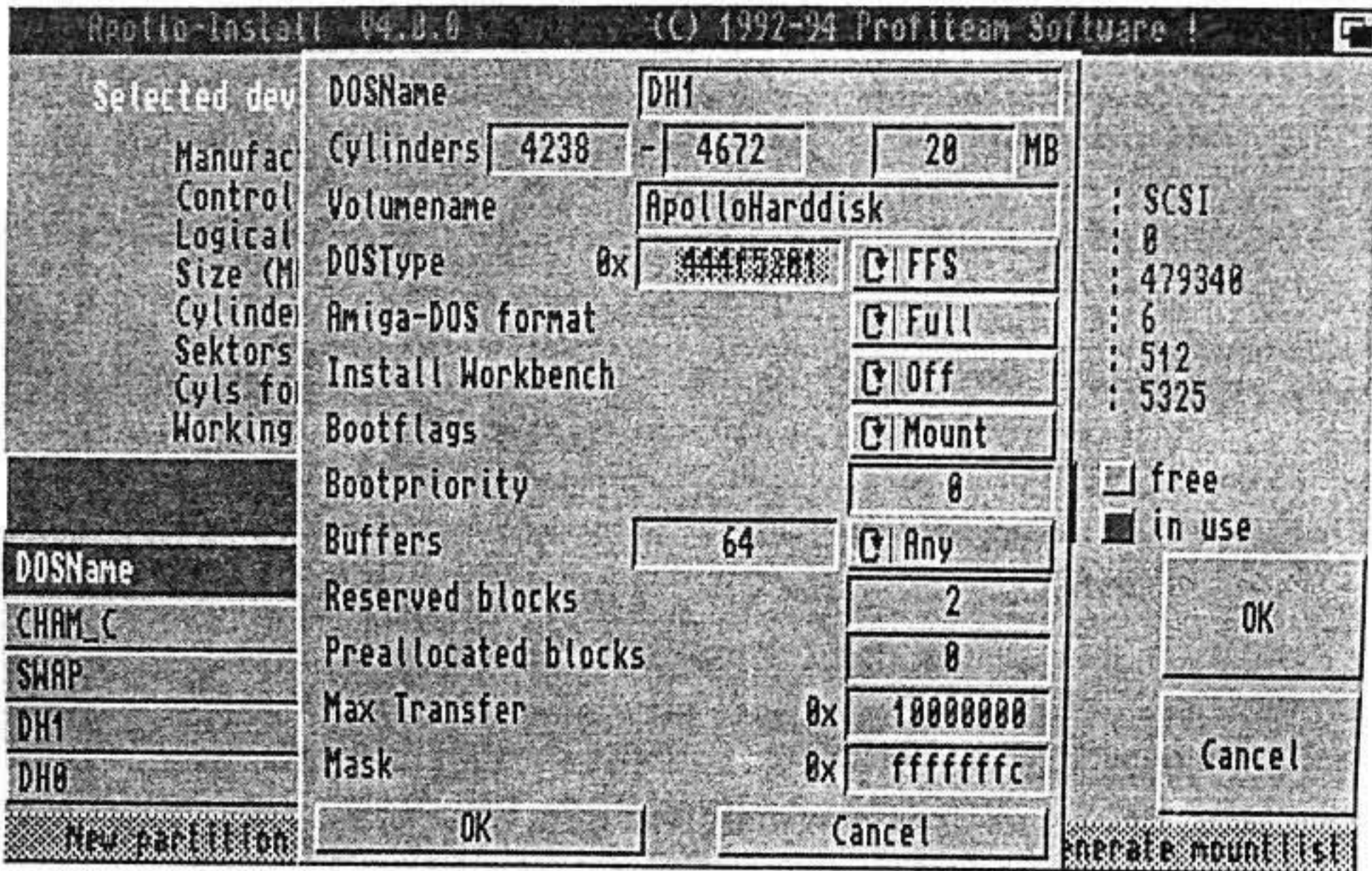


Figure 6: New partition / Edit partition

Now you have the following possibilities to modify the partitioning:

- Click on the New partition gadget to create a new one. If the disk still holds any free space, a big window opens (see figure 6), in which you can configure all parameters of the partition to create. Every change of the entry fields and switches is checked and immediately rejected in case of containing an illegal value or state. The adjustable parameters are:
 - DOSName: This is the disk drive identifier of the partition by which it will be adressed from Amiga-DOS.
 - Cylinders: separated into first and last cylinder and the partition size in *million* bytes. Each number of these three fields can be changed, the other two fields are then updated accordingly.
 - Volumename: This is the disk's name given to it, after formatting it with an Amiga-DOS filesystem (if it should be formatted at all). The volume name can be changed after the installation from the workbench or with the CLI command `relabel`.
 - DOSType: This identifier tells Amiga-DOS the filesystem to use with this partition. Please note, that if the filesystem is not built into

your Kickstart ROM, it must be installed on the harddisk (see chapter 2.5.2). Kickstart 1.3 only contains the *OldFileSystem* (OFS), Kickstart 2.0 or higher contains the *FastFileSystem* (FFS) in addition. If the filesystem is one of these two you can simply select it with the cycle gadget to the right. For every other filesystem you must select Custom on the cycle gadget and then enter its identification number in the entry field.

- Amiga-DOS format: Here you have the following options:
 - * Off: The partition won't be formatted. In this mode the volume name field is disabled.
 - * Quick: The partition will be quick formatted. This means that only a new boot and a new root block will be written to it. This is normally sufficient for all AT bus and SCSI harddisks.
 - * Full: Same as above, but all sectors of the partition will be cleared before. This takes some time, but can be useful to erase old data completely.
- Install Workbench: Here you have the following options:
 - * Off: No workbench installation.
 - * WB 1.3: Workbench 1.3 will be copied to the partition.
 - * WB 2.0: Workbench 2.0 will be copied to the partition.

When you've chosen the installation of a workbench, and you execute all of your selected installation steps by clicking on the OK gadget on the main screen of the Manual Installation mode, you will be requested to insert the *Workbenches: disk*. This disk was also coming with your APOLLO controller.

- Bootflags: These flags determine the behaviour of the partition during the boot process:
 - * Skip: The partition will be ignored.
 - * Mount: The partition will be mounted.
 - * Boot: The partition is bootable. If it finally will be the boot drive depends on its boot priority and the existence of further bootable partitions or inserted floppy disks. In all cases it will be at least mounted and therefore is accessible.
 - * Boot 1.3: The partition is only regarded as bootable with Kickstart 1.3. With any other operating system version it will simply be mounted.
 - * Boot 2.0: The partition is only regarded as bootable with Kickstart 2.0 or higher. With Kickstart 1.3 it will simply be mounted.
- Bootpriority: When the partition is selected as bootable, you can enter its boot priority in this field. You normally should enter values

- smaller than 5, because that's the floppy disk drives boot priority. Otherwise you cannot boot from floppy disk any longer, until you lower the partition's priority.
- Buffers: Number of Amiga-DOS buffers to use. Each buffer has a size equal to the block size of the harddisk in bytes.
 - Type of buffer memory: This cycle gadget to the right of the buffers field determines which type of memory to allocate for the buffers. Possible types are Any, Fast and Chip. You normally should select Any.
 - Reserved blocks: Depends on the filesystem. With the normal Amiga-DOS filesystems OFS or FFS this field must contain the value 2.
 - Preallocated blocks: Number of blocks reserved at the end of the partition. This field should normally contain the value 0.
 - Max Transfer: This field tells how many bytes can at maximum be transferred in one block from or to the harddisk. You should set this field to a very high value (i.e. 0x1000000), because the APOLLO controllers don't need transfer size restrictions.
 - Mask: You must set this field to 0xFFFFF0C (because all buffers have to be longword aligned in memory).

When you finally click on the OK gadget, the partition will be added to the list of existing partitions.

If the number of reserved blocks for the rigid disk blocks (RDB) isn't sufficient any longer, the number of cylinders needed for RDB's is incremented by one. This can only be done, if the needed extra cylinder isn't already occupied by a partition. If the smallest lower bound of all partitions doesn't allow the increase, a pop-up requester will inform you about that fact. If that partition is not a newly created one and contains data already, you have to quit the installation, create a backup of the partition, then reenter APOLLO-INSTALL and increase its lower bound, reformat it and finally restore the old data. After that you have to repeat the creation of the new partition.

If you cancel the creation by clicking on the Cancel gadget, the creation settings will be discarded.

- To delete a partition click on the appropriate line in the list and then on the Drop partition gadget. When you've deleted a partition by mistake, you only have to quit the Manual Installation mode by clicking on the Cancel gadget on the main screen. Note that in this case all changes that you've made since you've entered this mode are cancelled (and discarded).
- When you want to edit the parameters of an existing partition, first select its line in the list and then click on the Edit partition gadget. Then

the same big window opens as already described above in the explanation of the creation of a new partition (see figure 6). See there for details.

- You can create a mountlist entry for a partition by activating its line in the list and then simply clicking on the `Generate mountlist` gadget. The entry will be written as a file named

`Mountlist-drive identifier`

to the RAM disk. For example if you generate a mountlist entry for a partition named `DH0:`, the entry would be saved as `ram:Mountlist-DH0`. With a text editor you can append such a mountlist entry to the `Devs:Mountlist` file. This is necessary, when you want to — for what reason ever — manually mount the partition with the CLI command `Mount`.

If you click on the `OK` gadget all created partitions and all changes will be accepted for the moment. Click on the `Cancel` gadget, when you want to cancel this instead.

2.5.2 Filesystems

When a partition uses a non-standard filesystem, it has to be installed on the harddisk. The only standard filesystem contributed in the Kickstart 1.3 ROM is the *OldFileSystem* (OFS). Kickstart 2.0 already contains the *FastFileSystem* (FFS) in addition. So if you need to install a filesystem, click on the `Work on filesystems` gadget.

Now you can see the list of filesystems that are installed on the selected harddisk (see figure 7). Each line stands for one filesystem and contains the following information:

- `DOSType`: This identification number is the link between partitions and their filesystems. When you want to mount a partition using a certain filesystem, you have to enter its identifier in the `DOSType` field of that partition.
- `Name`: This field contains either `FastFileSystem`, `OldFileSystem` or `???` for any other filesystem.
- `Version`: The version number of the filesystem.
- `Size`: The size of the filesystem in bytes.
- `GlobVec`: This value is normally `-1` and means *no global vector*. For further explanation of this parameter please refer to the Amiga-DOS documentation.
- `Stack`: The stack size, that will be allocated for the filesystem process.
- `Pri`: The process priority of the filesystem.

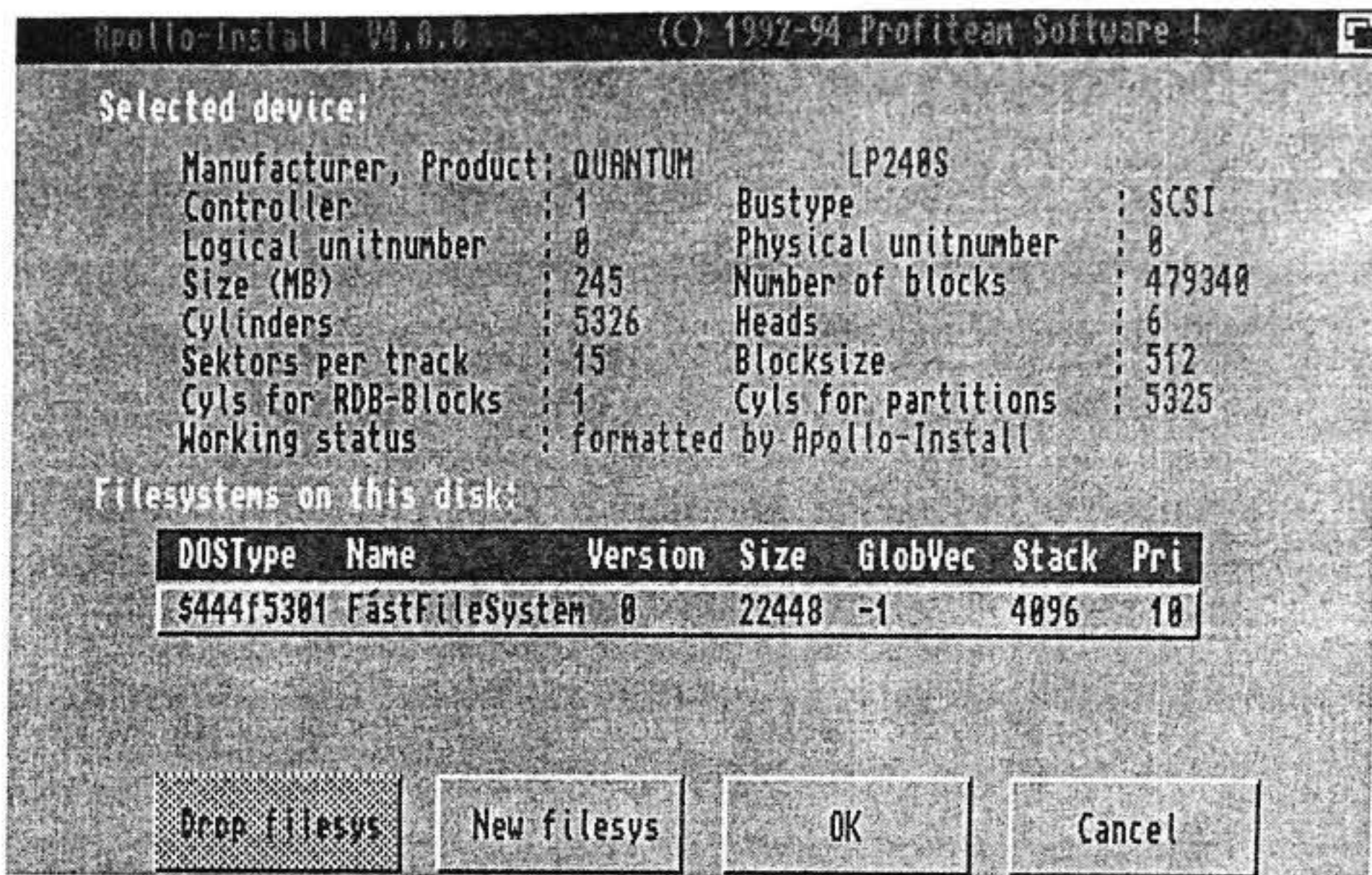


Figure 7: Working on filesystems

Now you have the following options:

- When you want to delete a filesystem, you must first click on the appropriate line and then on the Drop filesys gadget. If you have dropped a filesystem by mistake, you can leave the filesystem working area by clicking on the Cancel gadget. Please note that in this case all changes that you've made since you have entered the filesystem working area will be discarded.
- To install a new filesystem click on the New filesys gadget. Then a window opens, in which you can specify which filesystem to load and set all its parameters (see figure 8). The default values of the entry fields are valid for the *FastFileSystem*. So if you want to install the latter, you only have to click on the Install it! gadget.

In general you have to adjust the following settings:

- Filename: Here you have to enter the complete file name (including the full path) of the filesystem. The file must exist, otherwise an error message will be displayed, when you click on the Install it! gadget.
- DOSType: Please note that you have to enter the identification number and the version number manually, because there is no way to extract this information automatically from a given filesystem.
- Version: The version number of the filesystem.

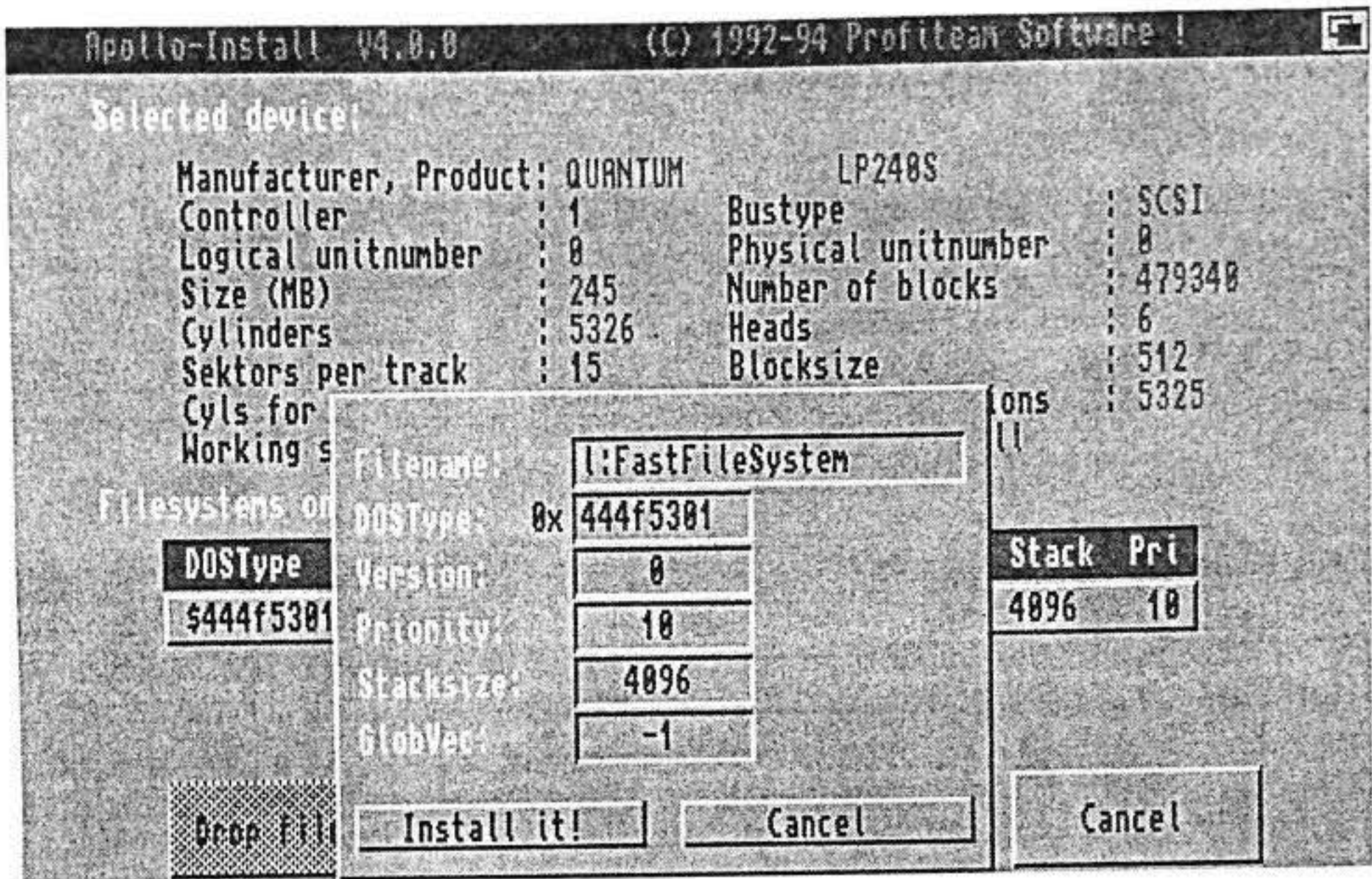


Figure 8: Installing a new filesystem

- Priority: The process priority of the filesystem. The normal value is 10, but the valid range is from -128 to 127.
- Stacksize: The stack size, that will be allocated for the filesystem process.
- GlobVec: The filesystem's global vector. It is normally -1 and means *no global vector*.

When you finally click on the **Install it!** gadget and the filesystem is found under the given name and directory path, it will be added to the list of existing ones. If the file was not found, an error message will be displayed.

The filesystems are installed in the reserved area of the disk. So if the number of reserved blocks for the rigid disk blocks (RDB) isn't sufficient any longer, the number of cylinders needed for RDB's is incremented by one. This can only be done, if the needed extra cylinder isn't already occupied by a partition. If the smallest lower bound of all partitions doesn't allow the increase, a pop-up requester will inform you about that fact. If that partition is not a newly created one and contains data already, you have to quit the installation, create a backup of the partition, then reenter APOLLO-INSTALL and increase its lower bound, reformat it and finally restore the old data. After that you have to repeat the installation of the new filesystem.

To cancel the installation of a new filesystem, simply click on the Cancel gadget.

If you click on the OK gadget the newly installed filesystems and all deletions will be accepted for the moment. The changes will only be written to the harddisk, if you afterwards leave the Manual Installation mode by clicking on the OK gadget in the main screen. Click on the Cancel gadget instead, when you want to discard all changes.

2.5.3 Special options

After clicking on the Special options gadget, a window opens, in which you can adjust the following — APOLLO specific — parameters (see figure: 9):

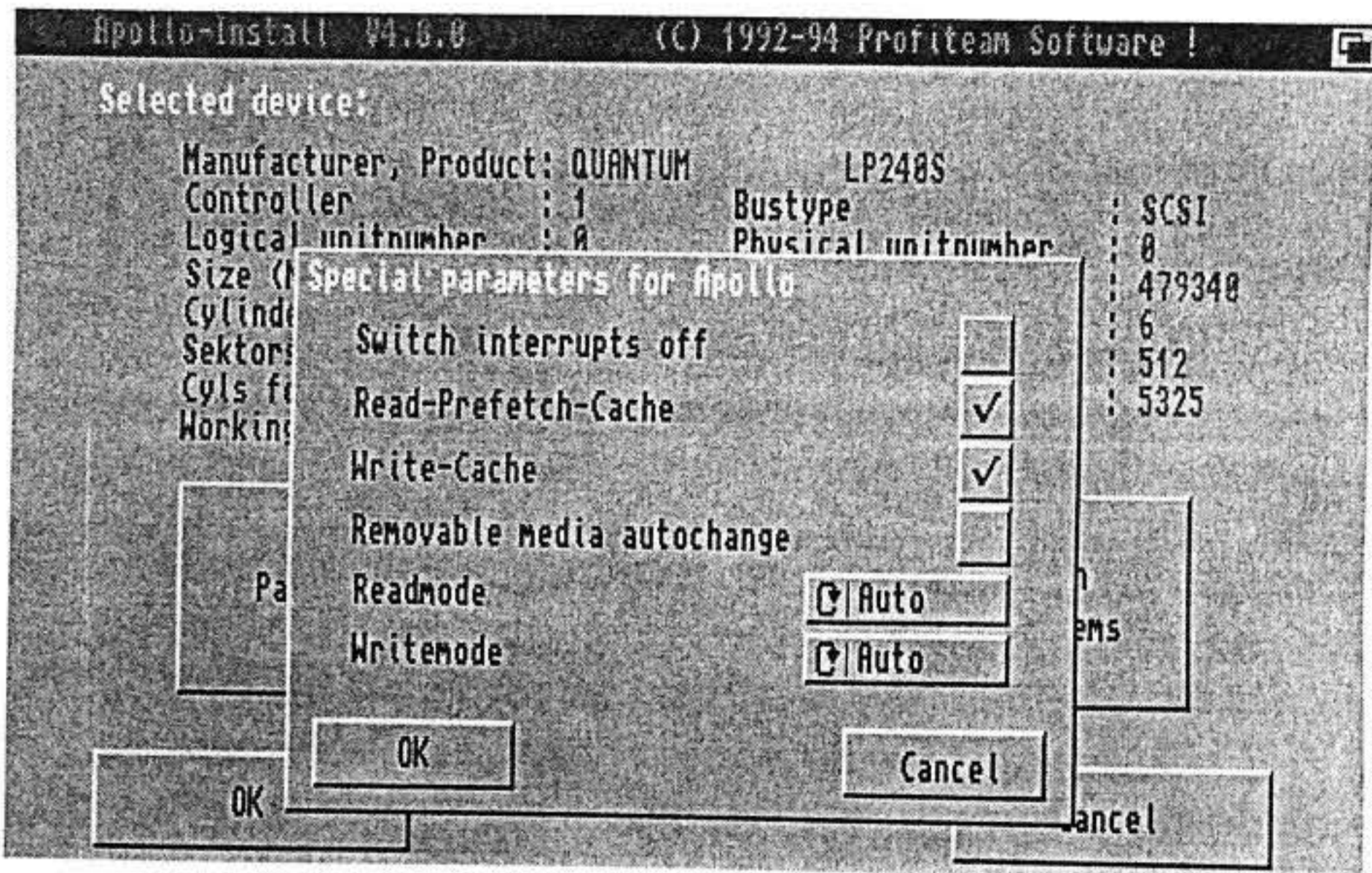


Figure 9: APOLLO specific options

- **Switch interrupts off:** The meaning of this switch depends on the APOLLO model that you have.

The SCSI-2 controller of the APOLLO accelerator board and that of the APOLLO 4000 are able to generate interrupts to notify the CPU about readiness for data transmission, thus making the busy polling of the hard-disk status obsolete. The main advantage is, that — although the controller does fast data transmissions — much CPU time remains free i. e. for

the handling of complex I/O operations. In the normal state (switch inactivated = interrupts on) the mechanism will be used as described above. If the switch is activated, the device driver uses furthermore busy polling.

For all other APOLLO controller models an activated switch forces the device driver to switch off all system interrupts during data transmission to or from the harddisk. This gives a slight speed-up of transmission on the one hand, but can cause problems with simultaneously scheduled data transmissions over the serial port on the other hand. In the normal state (switch inactivated = interrupts on) the system interrupts will be handled in their former way.

- **Read-Prefetch-Cache:** If this switch is activated, the read prefetch caching mechanism is used with this harddisk. The purpose of this cache is to minimize the number of physical disk accesses. The device decides if in certain cases it is more efficient to fetch one bigger block from the harddisk rather than several small ones. So following read commands may eventually be served by the cache.

An activated read prefetch cache needs 16 Kbytes of memory.

- **Write-Cache:** If this switch is activated, the write caching mechanism is used with this harddisk.

The Amiga-DOS filesystems writes all changes directly to the disk, and often the same blocks are written several times again in a very short time. The caching mechanism delays the physical writing and therefore prevents the multiple writing to the same block numbers. After a short idle period of the device the contents of the cache will be physically written to the harddisk.

An activated write cache needs 32 Kbytes of memory.

- **Removable media autochange:** This switch determines whether the device should automatically check for the removal or insertion of a disk from resp. in a removable media drive (see also chapter 6) or not.
- **Readmode:** In the mode Auto the highest possible data transmission speed will be used when the controller reads from the harddisk. The controller determines and sets the maximum speed automatically during the boot process. For some few older harddisks this mechanism fails, because these disks not always sustain the detected speed. So if you get read errors, you should set the mode to Safe for such a disk drive.
- **Writemode:** Similar to read mode, but if you get read/write errors, try at first to set only the write speed to Safe, because often those harddisks only cause trouble when they use the highest writing speed.

When you leave the Manual Installation mode by clicking on the OK gadget, all created partitions and filesystems and all other changes will be committed. All

performed actions then will be displayed in a protocol window. By clicking on the Cancel gadget you can quit the Manual Installation mode without the execution of any changes.

3 Mountlist creation

There are two ways to create mountlist entries for partitions that should be manually mounted. The first way is to use the function `Generate mountlist` of the Manual Installation mode of `APOLLO-INSTALL`. The second way is to use a text editor, edit your `Devs:Mountlist` file and create an entry from scratch. For the latter way this chapter helps setting the right values.

Please note, that you must have installed the needed device drivers in your `Devs:` directory. These are the files `AT-Apollo.device` for AT bus harddisks and `SCSI-Apollo.device` for any SCSI devices. If your system runs Kickstart 1.3 you should furthermore have the file `FastFileSystem` installed in your `L:` directory.

The following table lists the important fields for devices connected to an `APOLLO` controller. The general structure of mountlist entries is explained in more detail in your Amiga manual.

Device	<code>AT-Apollo.device</code> or <code>SCSI-Apollo.device</code>
Unit	The <i>logical</i> unit number, as displayed in <code>APOLLO-INSTALL</code>
Flags	(not used)
Surfaces	Number of heads.
BlocksPerTrack	Number of sectors per track. Please pay special attention that this value and that of <code>Surfaces</code> match exactly to those displayed in <code>APOLLO-INSTALL</code> .
Reserved	For Amiga-DOS partitions the value is normally 2.
PreAlloc	0
Interleave	(not used)
LowCyl	Partition bounds as configured and displayed in <code>APOLLO-INSTALL</code> .
HighCyl	
Buffers	Should be at least 32 for a 50 MB partition.
BufMemType	1 for <i>public</i> RAM, 4 for <i>fast</i> RAM
MaxTransfer	0x1000000 (no restriction with <code>APOLLO</code> controllers)
Mask	0xFFFFFFFF
BootPri	Should normally lay between 0 and 4.
DosType	0x41504F4C for the <i>Fast File System</i> (FFS).
Stacksize	4000
Priority	10
GlobVec	-1
FileSystem	<code>L:FastFileSystem</code> (only needed with Kickstart 1.3)
BlockSize (WB 2.0)	512 or more, as displayed in <code>APOLLO-INSTALL</code> .

4 The Boot Process

This chapter explains in detail how your APOLLO controller behaves during the boot process. The boot process is initiated by either switching the Amiga on or resetting the system by pressing the three keys CTRL-AMIGA-AMIGA simultaneously. The information given in this chapter can be very valuable to solve any problems resulting from wrong software settings.

During the boot process all hardware extensions are initialized one after another. When the first APOLLO controller is at its turn, it will initialize all harddisks connected to itself and also to any further APOLLO controllers that are installed in your Amiga.

At first all APOLLO controllers are searched for any AT bus harddisks. When there is none found, the search will be terminated after approximately two seconds. If any AT bus harddisks are found, all partitions from correctly configured disks are — according to their bootflags — ignored, mounted or inserted in the list of bootable drives.

If you have just switched your system on, the harddisks will need some time to spin up. In this case the driver software waits up to 15 seconds for all drives (AT and SCSI disks) to get ready. This time is long enough even for older harddisk models.

After processing the AT bus harddisks the controller searches for SCSI disks. For each controller it starts with SCSI address 0 and increments to SCSI address 6. If it finds a correctly installed harddisk at an address, its partitions will — according to their bootflags — immediately be ignored, mounted or inserted in the list of bootable drives. In most cases not all SCSI addresses are occupied by devices. The controller tries approximately up to 10 seconds to find a device at the first free address. This is necessary, because several older harddisk models do not respond during their spin up and initialization phase and would otherwise not be recognized. At the next addresses the controller tries only once to get a response. At free addresses it then only waits for a short timeout period.

To prevent long waiting times during the boot process (especially when you don't have any SCSI devices but only e.g. an AT bus harddisk attached), you should make use of the *Last Disk Bit* option. For that you should ensure that the addresses of your SCSI devices are configured to consecutive numbers starting with 0. This means that the first device should have address 0, the second one address 1 and so on. The address of SCSI devices is normally coded by three jumpers on the device's controller board (for further details refer to the manual of your SCSI device). When you install your harddisks using APOLLO-INSTALL, the program will set the *Last Disk Bit* of the drive actually being configured to the proper value. It will only be switched on, when the harddisk is the last one connected to that APOLLO controller. The following order is given: First comes

the AT bus *Master* harddisk, then the AT bus *Slave* drive and thereafter the SCSI devices from address 0 to 6. You can check and modify (if necessary) the state of the *Last Disk Bit* in the Manual Installation mode of APOLLO-INSTALL. Now, the effect of the *Last Disk Bit* is as follows: As soon as the boot process finds a harddisk with the *Last Disk Bit* set, it stops looking for further harddisks attached to the actual controller. With the proper configuration, the booting takes essentially only the time, that the attached harddisks need to spin up and to get ready. After a warm start, when the disks are already spun up, the system will then reboot very fast.

Please ensure that the *Last Disk Bit* is set only on the last harddisk attached to a controller, because otherwise all other disks coming behind wouldn't be recognized. Nevertheless the partitions of such ignored harddisks may be manually mounted after the booting with the CLI command `Mount` (see also chapter 3). Normally, all mounted partitions will be assigned their configured drive names (e. g. `DH0:`). Since Amiga-DOS identifies all drives by their drive name, it must be unique. When a partition shall be mounted, whose name already exists, the boot process concatenates dots to the name until it becomes unique. For example the first partition found with the drive name `DH0:` will be accessible under that name, the second one under the name `DH0.:`, the third under `DH0..:` and so on. If you detect such a clash of names, you are advised to change them in the Manual Installation mode of APOLLO-INSTALL.

When a controller has finished up with the initialization of all attached harddisks, the Amiga continues with next expansion card. When it finally has finished up with all expansion cards, it will boot from the partition (or other device, e. g. floppy disk drive) with the highest boot priority of all bootable partitions (and other devices) found. This hasn't to be a harddisk connected to an APOLLO controller by all means.

The following summary enumerates all conditions that have to be met to make a partition the boot drive:

- The partition must be contained on a properly installed harddisk.
- The partition has to be bootable.
- The partition's boot priority must be the highest of all bootable partitions and disk drives with inserted bootable floppy disks.
- If several partitions have the same, highest boot priority, the Amiga will boot from the partition that was found first.

Each non-ROM-resident filesystem will be loaded from the harddisk containing the first partition that uses it. The device drivers instead will be loaded from the *Rigid Disk Blocks* of the first properly installed disk found in the system. Therefore at least one harddisk connected to any APOLLO controller must contain the device drivers. Otherwise no harddisk will be recognized and initialized.

When you install new harddisks in the Automatic Installation mode of APOLLO-INSTALL, you don't have to bother about the installation of the device drivers or the *Fast File System*; this will be done automatically.

The logical unit numbers of the AT bus harddisks will be assigned to them during the boot process. Each disk will be given a consecutive number in the order they were found, beginning with 0. If you have more than one APOLLO controller installed in your system, and you switch one or more of them off, the logical unit numbers of the AT bus harddisks attached to enabled controllers remain the same though.

5 Hints for programmers

This section is dedicated to those, who want to use their harddisks or other SCSI devices by directly accessing the APOLLO device drivers.

The software devices must be opened with the `OpenDevice` command of the `exec.library`. Please note the following comments about the parameters:

- The device name must be `AT-Apollo.device` or `SCSI-Apollo.device`, depending upon the bus type of the device. Please pay attention to the correct writing; the name is case-sensitive.
- The unit number for SCSI devices is calculated as follows:

$$(Controller - 1) * 100 + LUN * 10 + SCSI_ID$$

For AT bus harddisks you have to use a logical unit number. When you have n AT bus drives attached to your APOLLO controller(s), the unit numbers range from 0 to $n - 1$.
- Flags are not used.

You have to consider the following points when using the devices:

- `TD_Format` is identical to `TD_Write`.
- For the commands `TD_Read` and `TD_Write` the values in `IO_Offset` and `IO_Length` must be a multiple of the block size.
- `IO_Data` must point to an even address.
- When writing, let your last `CMD_WRITE` follow a `CMD_UPDATE` command. This is necessary, because if the write cache is enabled, its contents will be physically written to the harddisk only by the latter command.

The APOLLO controller fully supports the *SCSI Direct* standard as defined by COMMODORE. Please note the following comments about the parameters:

- `scsi_Command`, `scsi_CmdLength`, `scsi_Data`, `scsi_Length`, `scsi_SenseData` and `scsi_SenseLength` don't have to be even.
- `scsi_Length` and `scsi_SenseLength` will be rounded up to even values.
- The flags `SCSIF_READ_WRITE`, `SCSIF_OLDAUTOSENSE` and `SCSIF_AUTOSENSE` are supported.
- The return values `scsi_Actual`, `scsi_CmdActual` and `scsi_SenseActual` will contain the real number of bytes transferred. These values can be lesser or greater than the values given in the `Length` parameters. If the number of transferred bytes was lesser than requested,

the missing data will be padded with bytes of value 0. If instead the number of transferred bytes was greater than expected, the extra bytes will be ignored.

- The AT bus device driver can emulate the following *SCSI Direct* commands:
 - TESTUNITREADY: to test for drive readiness
 - INQUIRY: to retrieve the disk and manufacturer name
 - MODESENSE: pages 3 and 4 to retrieve the drive geometry
 - REQUESTSENSE: to get the drive's current status
 - READCAPACITY: to retrieve the disk and block size

6 Removable media drives

The APOLLO software supports the automatic disk change detection for removable media drives. This means you don't have to manually unmount and mount the partitions of the removed resp. inserted cartridges. This prevents writing on partitions of removed media, that could corrupt the structure of the actually inserted medium.

If a removable media drive holds a medium during the boot process, it will be regarded as a regular harddisk at first.

After the booting a daemon process checks every three seconds if a medium was removed or inserted from resp. into a removable media drive. If such a change was detected, all partitions of the removed disk will be unmounted (and thus making them unaccessible) and the partitions of the inserted disk will be mounted (again). The removable media drive therefore behaves similar to the floppy disk drives.

If the drive name (not the volume name) of newly mounted partitions already exist in the system, it will be modified by concatenating dots to it until it becomes unique. This is necessary, because Amiga-DOS identifies the disk drives by this name. For example if there was a medium inserted with a partition named DH0: on it, and you replace that medium by a different one, that also contains a partition with that drive name, the new partition will then be mounted as DH0.:. The daemon process generally keeps track of all media that were inserted in the drive(s) since booting. The cartridges are distinguished by their serial number, that is hard coded on it by the manufacturer. Since some magneto-optical removable media drives don't support different serial numbers, the daemon process is unable to distinguish different media inserted into such drives. The safest way to handle this is to change disks and reboot the system.

The automatic disk change detection is activated for all removable media drives by default. If you want to disable this for a certain drive, a medium must be in that drive during the boot process, which has the switch `Removable media autochange` turned off. If later, during normal operation, a medium with the switch activated is inserted, it will have no effect on the status of the automatic disk change detection of the drive.

Some final remarks about the use of removable media drives:

- The activation of the read prefetch and write cache will be determined only once during the boot process. If there is a cartridge in the drive at that time, the cache activation will be set as configured on the disk. If the drive is empty instead, both caches will be disabled by default. These settings remain valid afterwards for all newly inserted disks until the next reboot.

- The *Last Disk Bit* option in general affects only the boot process. After booting the daemon process checks for disk changes from all removable media drives, whether they have a higher unit number than the (hard)disk with the *Last Disk Bit* set or not.
- When you have more than one removable media drive connected to your APOLLO controller(s), avoid inserting a medium in a drive that was inserted in another one before, because otherwise the partitions would — according to their bootflags — be mounted again for each drive. It is not possible for a drive to recognize that a medium was previously inserted in another drive.

7 Attaching alien formatted harddisks

When connecting a harddisk to your APOLLO controller that wasn't formerly formatted by APOLLO-INSTALL but by some other installation utility (that followed COMMODORE's RDB standard), please consider the following remarks:

- If there is at least a second harddisk attached to the same or another APOLLO controller that was formatted by APOLLO-INSTALL, you only have to pay attention to the *Last Disk Bit* (see below). The newly connected harddisk will be automatically recognized during the boot process.
- If there isn't any other harddisk connected to an APOLLO controller and you don't want to update the harddisks RDB (which means writing to it), you have to manually mount its partitions. To do so, you have to boot from a (e.g. floppy) disk that contains at least the following files:
 - DEVS:AT-Apollo.device
 - DEVS:SCSI-Apollo.device
 - L:FastFileSystem
 - DEVS:mountlist
 - C:Mount

The mountlist must contain entries for each partition to be mounted (see also chapter 3 and 2.5.1). To retrieve the number of cylinders, sectors and heads of the harddisk perform the following actions:

- Reset your Amiga, boot from the APOLLO installation disk and then start APOLLO-INSTALL.
 - After selecting the appropriate language, activate the line that represents the connected harddisk and enter the Manual Installation mode. In the upper half of the screen the drive parameters will be displayed, including the number of heads and sectors per track.
 - Click on the Partitions gadget. Now the partitions will be displayed in a list on the lower half of the screen, from which you can read the first and the last cylinder of each partition.
 - You can also let APOLLO-INSTALL generate mountlist entries; see chapter 2.5.1 for details.
- Another possibility is to install the files, that the APOLLO controller needs for booting, directly in the *Rigid Disk Blocks* (RDB) of the alien formatted disk. This doesn't affect any user data on the partitions, but makes the disk directly bootable. Please note, that this can only be done, if there is

enough free space left in the reserved area of the harddisk. In chapter 2.5.1 it is explained how to overcome such problem if it occurs. Now, to update the RDB perform the following steps:

- Reset your Amiga, boot from the APOLLO installation disk and then start APOLLO-INSTALL.
 - After selecting the appropriate language, activate the line that represents the alien formatted harddisk and enter the Manual Installation mode.
 - A requester will show up, informing you about the fact that the harddisk was not formatted by APOLLO-INSTALL. Now activate the switch Update devices and leave the Manual Installation mode by clicking on the OK gadget. When you now confirm the question in the requester which then comes up, the changes will be written to the harddisk.
- **Important remark:** All harddisks will be regarded by the boot process in a certain order (see chapter 4 for details). If a disk has the *Last Disk Bit* activated, the boot process stops looking for further harddisks on the actual controller; it immediately continues with the first disk connected to the next controller. Now, if you connect a new harddisk, it eventually may not be recognized. This will be the case when the unit number of the new disk is higher than those of the previous connected disks of that controller, and when one of these disks has already the *Last Disk Bit* activated. In this case you have to correct the setting of the *Last Disk Bit* by performing the following steps:
 - Reset your Amiga, boot from the APOLLO installation disk and then start APOLLO-INSTALL and select the appropriate language.
 - Activate the line that represents the new harddisk and enter the Manual Installation mode.
 - Activate the Last Disk Bit switch and quit the Manual Installation mode by clicking on the OK gadget. Confirm the question in the requester which then comes up.
 - Back in the main menu click on the line with the harddisk that was the last one before and enter the Manual Installation mode again.
 - Inactivate the Last Disk Bit switch and quit the Manual Installation mode by clicking on the OK gadget. Again, you have to confirm the question in the requester which then comes up.
 - Quit APOLLO-INSTALL and reboot your Amiga.