

COM 201 Interface

for Amiga 500 computers

Installation Guide

Cumana Limited

COM 201

ST 506 HARD DRIVE INTERFACE

With 1/2 MB RAM , real-time battery-backed clock and calendar

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11/91

Section 1: Product description

Users of the Amiga 500 will already be familiar with the use of devices like the internal floppy drive df0:. The Cumana interface board and ST506 hard disc is another "device", but differs from a floppy drive in terms of storage capacity and access time. Hard disc operation is the same as a floppy drive (though the drive address is different) and may be accessed through either Amiga Workbench or the CLI environment. The hard disc will act in the same manner as a floppy drive, though noticeably faster.

The ST506 Hard disc interface system provides three distinct functions:

1. ST506 hard disc interface:

Firmware is provided to control a range of ST506 type hard disc drives. The hard disc controller used supports MFM coding and up to 8 read / write heads.

2. 512 Kb RAM expansion module:

An additional 512 kilobytes of RAM is provided. This RAM operates in an identical way to the Amiga A501 RAM extension system. This RAM is automatically configured at system start-up; however it may be disabled if required. The RAM used is in the form of four, 4-bit wide chips. Unlike some other A501 RAM replacements, full memory refresh logic is provided. (See end of Section 3 for enabling / disabling the RAM.)

3. Battery-backed real-time clock:

A battery-backed real-time clock is integrated into the system. This operates identically like the A501 clock, (refer to your User manual for a full explanation).

Section 2: Package contents

WHAT YOU SHOULD HAVE RECEIVED:

- INSTRUCTIONS
- HARD DISC INTERFACE
- 3.5" UTILITIES DISC
- REPLACEMENT COVER PLATE

ADDITIONAL REQUIREMENTS:

- TWO FORMATTED FLOPPY DISCS
- PEN AND PAPER
- SMALL FLAT BLADE SCREWDRIVER

DO NOT unwrap the interface hardware from the original packaging until you are ready to install it.

DO meanwhile, read these instructions thoroughly until you have understood the concepts. Please read *Product installation* (section 3) and *Configuration* (section 4) before commencing installation.

DO before reading or taking any action protect the software which has been provided on floppy disc. You should immediately make a working copy using one of the formatted discs for your working copy. If you are unsure of the procedure for copying discs please consult your Amiga 500 User's Manual. Use the working copy for everyday use and store the original in a safe place.

Section 3: COM 201 Product installation

* * * Please note that fitting the interface is straightforward but may invalidate your warranty. If in doubt, this upgrade should be installed, as with any other non - Commodore product, by your local service agent in order to maintain the warranty of your system. * * *

If you decide to install the interface yourself, first examine the hardware. You will observe that the interface board has three connectors:

- 1 x 20 pin header
- 1 x 34 pin header
- 1 x 56 way connector (along one end of the board)

The 20 and 34 pin headers are to take the 20 and 34 - way flat cables for the hard disc drive data and control (these cables are not supplied with COM 201). The 56 - way connector plugs directly into your Amiga 500. Figure 1 should enable you to identify the connectors.

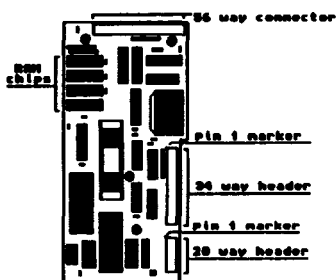


Figure 1.

On the other side of the interface card there is a miniature switch for disabling and enabling the RAM expansion module. Switch No. 1 should be switched to ON to make the memory accessible - do this now. Switch No. 2 is not currently used and is provided for future development.

The installation of the ST506 hard disc interface requires no specialist tools (only a flatblade screwdriver), and no electronics expertise. If you are concerned about installation then it is recommended that you consult your local supplier, or telephone the Cumana help line on **0483 503121**.

If you have not been dissuaded from installing the system then you should follow the instructions in the strict order that they are given:

- Remove any floppy currently in the floppy disc drive.
- Turn your Amiga off and disconnect the power supply.
- Place your Amiga 500 with its keyboard downwards on a flat surface.
- Attach the 34-way and 20-way cables on to the appropriate pins (the red lines on the cables should be aligned to pin 1, identified by a small dot on the board, at one corner of each header, pin 1 is shown on Figure 1) on the ST506 Interface board. **Do not** connect the other ends of the cables to the hard drive yet. (If your hard drive has encased cables attach the cables but ensure the hard drive is not connected to the mains supply.)

- * On the under side of the Amiga 500 you will discover a removable panel. Centrally positioned on one of the shorter sides, is a small recessed hole, housing a locking tab.
- * Carefully using a screwdriver, squeeze the tab against the backing plate. **DO NOT RAISE MORE THAN 5MM** or you will damage the flange housing situated at the other end. The backing plate will now slide out of its housing.
- * Align the 56 pin connector on the interface card with the pins visible through the opening on the Amiga. The RAM chips are on the lower side as you insert the board. Take care to align correctly as failure to do so may result in damage to the board.
- * Press the board gently enabling the interface card's connectors to capture the pins on the Amiga 500.
- * Maintain the gentle pressure until the Amiga's pins are no longer visible.

DO align the soldered joints associated with the interface card pin connector with the Amiga's pins before applying pressure.

DO NOT attempt to insert the interface card at an angle. The interface card must be near horizontal when pressure is applied otherwise the Amiga's pins may become distorted.

DO NOT use a metal device as a lever to apply horizontal pressure - use something plastic like a ruler or a comb.

- * Use the new backing plate supplied with the upgrade board. This has a hole which aligns with the switches on the board and a slot that allows the hard drive ribbon cables to extend out of the computer without being damaged.
- * Before fitting the backing plate ensure that the cabling corresponds with the slot provided. Once in place, fit the backing plate so as to locate the flange in the flange housing. Then press the other end of the backing plate into position, whilst remembering to align the cabling with the slot. If you have any problems then consult your local supplier or the Cumana help line on 0483 503121.
- * Having successfully installed the board, you should now connect the interface cables to your hard drive (as appropriate). Installation is now complete.

Section 4: Configuration

Having completed the installation turn your Amiga over again so that it is the right way up. **Do not** connect your Amiga 500 to the mains supply just yet. First connect your hard disc to the mains supply. Ensure that the power light is on. If unsuccessful check your power connections, including the mains plug wiring and fuse.

Your hard disc will perform a self test for up to 1 minute, this is a normal manufacturer's self test procedure and will occur every time you power up your hard drive. Permit this activity to complete before continuing with the next stage.

Power up your Amiga 500

Now connect your Amiga 500 to the mains supply. Switch on your PSU and observe the power light illuminate on the top right hand side of your Amiga 500. If unsuccessful check your power connections, including the mains plug wiring and fuse.

Installation of your hard disc

Now take the working copy of the ST506 Utility software that you made earlier and insert it in your floppy drive slot (df0:).

The Amiga DOS operating system will detect the presence of a disc and your Amiga 500 will boot up. On completion of the boot sequence you will recognise the standard Amiga Workbench user interface display. One of the icons displayed will be an ST506 Utility labelled - HD_Install. See Figure 2.

Open the HD_Install icon (double click on the left mouse button) and a further window will open to display its contents. Amongst the icons you will discover **hard disc Installer**, see Figure 3. Run the **hard disc Installer** by double clicking the left mouse button on the icon.

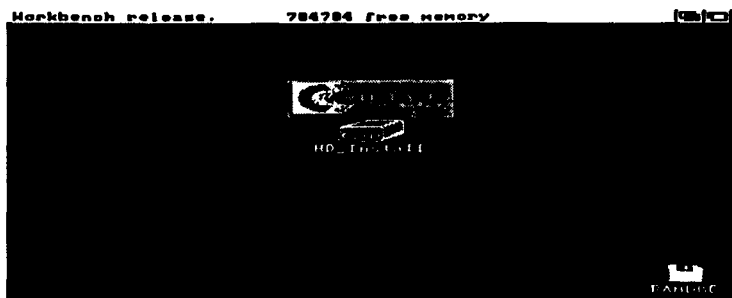


Figure 2: HD_Install Icon

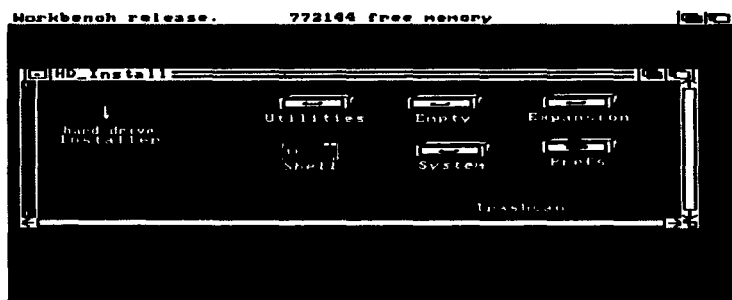


Figure 3: Hard disc Installer Icon

Hard Drive Installer - see Figure 4

Installer will firstly indicate the release version of Kickstart ROM fitted in your Amiga 500. It must be 1.2 , 1.3 or later. There are slightly different installation procedures, because of different booting methods, depending on the version of Kickstart ROM. See, *Make ready for use*, later on in this section (page11).

Installer will also indicate if it has found any existing set-up information on the hard disc drive. The options open to you depend on this. If no set-up parameters are recorded one of two situations may exist.

- The hard disc drive has not been previously configured. If that is the case you can proceed to Initialize it.
- If the drive HAS been previously configured, but the set-up information is corrupt, you can attempt a Recovery and re-initialization.

If Installer discovers previously set-up parameters, you may choose to Maintain, or change parts of these parameters. Alternatively you may proceed with a full initialization, over-writing existing data. Figure 4 shows the options as displayed by Installer. The end of this section refers to this.

- Initialize - Sub-section 1
- Maintain - Sub-section 2
- Recover - Sub-section 3

DO NOT click on the close gadget, top left-hand corner of the Installer window, as this will close the window and prematurely terminate the Installer program.

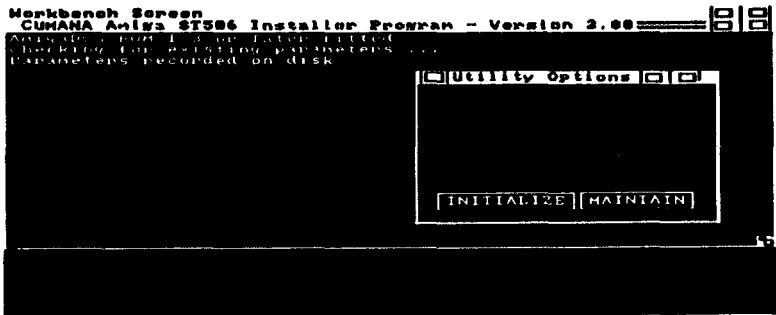


Figure 4:Illustration of the Installer options

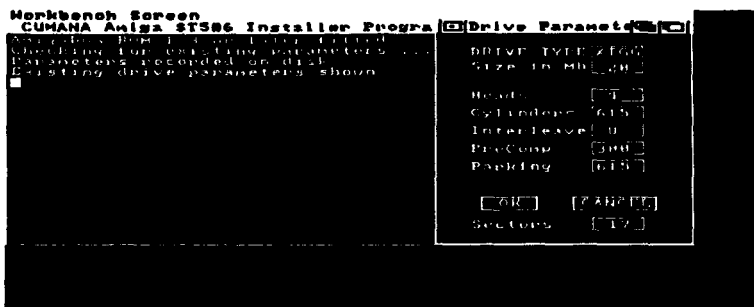


Figure 5: Initialization options

Sub-section 1: INITIALIZE

Select INITIALIZE from the Installer prompt. A window opens showing a range of drive parameters. These parameters may be changed - but beware as it would be unlikely in the normal course of events that you should need to change any other than DRIVE TYPE. See Figure 5, refer to the parameters that are supplied with your hard disc drive and enter these in the appropriate boxes, or match your drive's parameters to the pre sets (see page 18) and then just enter the drive type.

- **DRIVE TYPE** refers to the drive configurations known by drive type numbers, and covers a wide range of likely drives. Entering a different type and pressing return will give you a display of the parameters pertinent to that type of drive. An editing facility is provided which you may use if at some later date you purchase another, possibly larger, hard disc drive. (See Section 8: Appendix.)
- **SIZE IN MB** refers to the unformatted capacity of your hard disc drive.
- **HEADS** refers to the number of heads in your hard disc drive. If the drive that you are using is known to have a different number of heads or cylinders from any of the standard offerings just type in the values you need. Check the technical specification of your hard disc drive for information.
- **CYLINDERS** refers to the number of tracks on one side of a hard disc surface.
- **INTERLEAVE** refers to the ST506 controller's ability to transfer data to / from its buffer RAM by DMA allowing the drive to operate at an interleave of 1:1. This means that the sectors are allocated sequentially around the tracks. The interleave value is used to give extra space when switching from one cylinder to another. The default value which is displayed has been found to be the optimum on drives tested, but seek times, etc, may affect this.

- **PRECOMP** is an electrical function incorporated on some drives, please refer to your hard drive manual to see if precompensation is needed with your hard drive, and if so, on which cylinder to switch it on.
- **PARKING** refers to the cylinder reserved for putting the heads on (to minimise risk of damage) when the hard drive is in transit.

DO NOT alter the **INTERLEAVE** parameter unless you have deep knowledge of hard disc technology.

Notes: If existing values were found, the **TYPE** field shows **EXTG**. If you edit any fields and press **RETURN**, the **TYPE** changes to **CSTM** - just a reminder that you have set up a non-standard type.

Formatting

Having checked the settings, click the mouse on **OK** to continue. You will then be presented with another window asking for **Start** and **End** cylinders. These will default to 0 and the last physical cylinder of the drive type selected. Leave these untouched as you can re-format a partition at a lower level if required. Refer to Figure 6 in the section *Partitioning* below.

- Select **OK** to continue. You will be prompted to confirm this action as continuing further will destroy data on the drive. A **Cancel** input will terminate the program.
- The program will inform you of the range of cylinders being formatted and verified. As each cylinder is dealt with, a message in an information window advises progress. The program verifies each cylinder after formatting and compiles a map of bad blocks found. The bad block numbers are shown as they are found. The list is later used to reassign bad blocks to good ones - a process that is transparent to the user. On completion of formatting, a window shows the total formatted capacity of your hard disc in blocks and Mbytes.

Partitioning

When completed select **CONTINUE** again. You will see a window with three editable fields:

Partition Name	-	set this as dh0
Buffers	-	set this to 5
Partition size	-	set this to whatever size the hard drive has been formatted to.

It is recommended that you accept these default values at this stage, as these parameters can be varied at a later date using the instructions contained in **MAINTAIN**. If you do wish to have a different partition size, enter the size and press return. Inputs will be reflected in the field below which will show the size in terms of the percentage of the whole drive's capacity. In addition, a field shows the amount of space available. See Figure 6.

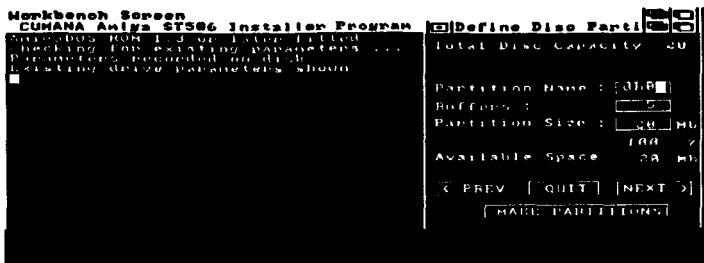


Figure 6: Partition options

Make a copy, using a pen and paper, of the selections you make in order that you have the information available in the event of a Recovery being required.

- * The buttons <PREV and NEXT> switch between the different partitions you may set up. You may go back and forth editing them at will, until you are satisfied with the arrangement of partitions entered. Any remaining space is added to the last non-empty partition you specify.
- * When you have completed the choices you require, select MAKE PARTITIONS. When you acknowledge the CONTINUE, this will inform you as the drive is being partitioned. On completion you will be prompted to format the partitions at DOS level. Select CONTINUE. Ignore the requests to "Insert Disk to be" and wait for the program to complete - no intervention is necessary.

Make ready for use

Like a newly formatted floppy, your hard disc cannot be used to boot the system as it is effectively empty. You are prompted to confirm copying of the Workbench files. Select CONTINUE. This causes the whole of the HD_INSTALL disc to be copied to the first of the newly set up partitions. You will also be prompted to copy your "Extras" disc - this is optional after making the boot floppy.

Installer now goes on to make a boot floppy disc. The procedure depends on the release version of boot ROM fitted to your Amiga 500.

* Kickstart 1.2

Kickstart 1.2 contains no support for booting from anything other than floppy disc. It is therefore necessary to have a boot floppy containing a number of standard Workbench files and some specially generated files, including a start-up sequence. For this you will need to have a blank unformatted floppy.

- **Kickstart 1.3 or later**

Later Kickstart releases support booting from ROMs configured as expansion devices. There isn't a ROM, but by placing a minimal program in the boot sectors of a floppy disc, a driver program can be loaded from the system area of the hard disc and made to look like a ROM. In this way, having read just the boot sectors from the floppy, all subsequent operation is from the hard disc. This boot information can be written to any Amiga DOS formatted usable floppy.

- **A window prompts you to place the floppy into drive df0:**
- **Select CONTINUE.** For 1.2 systems the program now will format the disc and copy on to it only those files necessary to boot the system, while for later ROM releases just the boot sectors will be written. When this is successfully completed the installation is done.

Do make back-up copies of these discs and keep the originals in a safe place.

Note: During the Installer activity two files have been constructed on the installation floppy - Mountlist and Partlist. The first shows the entry(ies) that would be used in the system mountlist if the drive did not auto-mount. The second is a record of the partition names, buffers and sizes chosen. This can be used later (See Sub-section 4 - *Recover*) in the unlikely event of damage to the system area of the drive.

Sub-section 2: Maintain

- **You must first boot with your Utilities floppy HD_Install in df0.**

If you have completed a satisfactory installation, you can change the configuration at any time as your hardware or other requirements change.

Do, before commencing a Maintain procedure, ensure that valuable software is first backed up to floppy disc.

Verification

- **When back-up is completed select MAINTAIN option, see Figure 4, and you will be asked to confirm that you wish to update the driver, file system, etc. Select CONTINUE and you will be asked if you wish to VERIFY the drive. QUIT will exit from MAINTAIN. Selecting YES, after the CONTINUE, verifies the drive - you will see the progress in terms of the cylinder being verified and cylinders to go - it takes a couple of minutes. The list of bad sectors will be updated. This may have an effect on files as they may include reassigned sectors. Fortunately you can recover your software from floppy.**

Modifications of Partitions

- * **MAINTAIN** will now ask if you wish to modify the partition set-up. Select **YES** and you will be presented with the partition window with values for the first partition on your drive. You may use the <PREV and NEXT> buttons to inspect the partition set-up and change any of the fields. Remember, if you change sizes it will be necessary to re-format at the DOS level, destroying all data. This option is applicable if you wish to alter the number of buffer blocks in use, relevant to your system memory. Select **MAKE PARTITIONS** when satisfied with your choices, or **QUIT** if you decide against making changes.

Note: It is only at this stage that the data on the drive is changed - **QUITting** or using the window **CLOSE** gadget at any earlier point will leave the drive unaffected.

- * If you selected **MAKE PARTITIONS**, a final window informs you that you have changed partition sizes and you must therefore reformat the partitions at DOS level. Select **CONTINUE** if this is the case, otherwise select **QUIT**.
- * If you select **NO** at the Modify Partition prompt the final warning prompt can be ignored as you have not changed anything significant.

Sub-section 3: RECOVER

Note: **RECOVER** will only allow the configuration of the hard disc to be restored. It will not recover any data that originally resided on the disc.

If you have completed a satisfactory installation, but subsequently there is a hardware or software malfunction, you can use **RECOVER** to assist you in recovering your software and data. Firstly select **HD_Install** by booting from your Utilities disc in **df0**, and then hard disc Installer, see earlier part of this section. Then select **INITIALIZE**, see Figures 2, 3 and 4.

- * If the disc appears unformatted to the system you will be prompted to reformat the disc. Select **CONTINUE** and **INSTALLER** will reformat the system area of the drive and verify the user area. It will indicate its progress as previously described, before offering you the Partition Window. On this occasion the **PartList** on your **HD_Install** disc is used. It will show the Partition Names, Buffers and Size for each partition that you had set up.

Partition name	-
Buffers	-
Partition size	-

- Confirm or re-enter the data from the records, you have made previously, to re-establish the drive layout.
- Re-establish the partitioning by selecting MAKE PARTITIONS.
- The system information will be re-recorded on the drive to enable it to be used again with the data intact. INSTALLER will recover a drive which has faulty system tracks. Data tracks cannot be recovered.
- A final window informs you that the reconstruction is complete. Select CONTINUE to exit from HD_Install and the hard disc should operate normally.

DO make regular back-ups from your hard disc to floppy (or tape streamer) to minimise the impact of a hard disc failure.

Section 5: Hard Disc operating instructions

If you have completed a satisfactory installation, a hard drive icon appears on the screen. You will want to copy software onto your hard-disc and this is as straightforward as copying floppies. Refer to the Amiga 500 User manual if in doubt. The hard drive icon can be treated in exactly the same way as a floppy drive icon.

It is worth noting that the 3.5" Utilities disc that came with the package does not contain all the files off Workbench - therefore it is advisable for those with Workbench 1.3 or later to copy this across to the first hard disc partition.

Bootling up your system

Switch on your hard drive and place your boot floppy in df0 - nothing more is needed. The system will handle the hard disc boot for you. Once Workbench appears on the screen you no longer need the floppy in df0.

Copy files

Now copy the files from df0 which you require - Utilities, Prefs, System, Shell, Expansion and Trashcan, etc. Once the files are transferred to the hard disc window you can remove the floppy from df0 - it is now redundant.

Your hard disc will behave in much the same way as other disc devices. There is one difference worth noting in the way the drive light operates. You will be familiar with the need to wait until the floppy drive light goes out before switching off or re-booting your Amiga. This is to ensure that any data being written is complete. You may have noticed the sounds from a floppy when writing - in particular there is a lull after the main activity followed by another head movement about a second later.

The hard disc gets identical commands from AmigaDos but because the drive light responds directly to disc read/write activity the light goes off during the lull. It is important not to switch off during the lull or reboot the system at this point. A final burst of hard disc activity may be heard as AmigaDos records the map of used sectors. A file-write halted here usually can be recovered as DOS will detect the invalid map and reconstruct it. But it is not guaranteed.

DO ensure that you wait for drive activity to cease before switching off your Amiga 500 and its associated hard disc.

DO NOT move the hard drive when it is turned on, you may crash the heads to the hard disc surface, causing irretrievable data loss.

Note: If the drive is to be moved, use the park utility before switching off.

Section 6: Utility Software

The Utilities disc supplied with your ST506 hard disc system contains a number of Utility programs relevant to hard disc operation. These utilities should now be available on your hard disc drive.

PARK

The Park program is used to park the hard disc read/write heads clear of the read/write surface for transportation.

Do Park the heads before switching off your machine. In case you (or someone else) should move it before it is next used. Failure to park the disc heads is likely to cause serious, and potentially expensive damage to your disc surface and/or heads. If you ever need to send your disc by carrier for servicing or repair ensure the heads are parked and it is wrapped in its original container.

To use Park:

Access a CLI window and type Park.

OR

Open the Amiga Workbench system drawer and double click on the Park icon. A window will open confirming that parking is complete and reminding you to switch off power before moving.

Do not access the hard disc when the heads are parked. If you wish to resume use of the hard disc you must first reboot the system.

InstallResidentDriver

InstallResidentDriver writes the boot sectors to a formatted floppy to enable a system with Amiga Kickstart 1.3 or later to boot from the hard disc. To make a hard drive boot floppy, place any formatted floppy in a drive (e.g. df0:) and run the **InstallResidentDriver** program.

Access a CLI window and type :

sys: system/InstallResidentDriver df0:

OR

Open the Amiga Workbench system drawer and double click on the **InstallResidentDriver** icon. The drive will default to df0:.

NewDriver

NewDriver installs a new driver program into the system area of the hard disc. To use it the driver must be in either RAM: or in the HD_Files directory of a floppy in df0:.

Access a CLI window and type :

sys:system/newdriver

OR

Open the Amiga Workbench system drawer and double-click on the **NewDriver** icon.

NewFileSys

The Amiga 500 has a fast file system which exists as a separate executable file. The system is periodically updated by Commodore Computers UK Ltd. **NewFileSys** copies a new version from either the RAM drive or the L drawer of a floppy in df0:. To load a new file system:

Access a CLI window and type :

sys:system/newfilesys

OR

Open the Amiga Workbench system drawer and double-click on the **NewFileSys** icon.

Checkblocks

The System area of the drive referred to in this document is organised according to the HardBlocks structures defined by Commodore Computers UK Ltd in the header files, Hardblocks.i (for assembler) and Hardblocks.h (for C). These files are available to software developers as part of most C compiler and Assembler software packages. The Checkblocks examines the blocks in the system area of the hard disc drive and displays relevant structures and their contents.

Should you encounter a problem with your hard disc system severe enough to merit contacting the Cumana help line, first run Checkblocks and have listed, preferably in hard copy, the CheckBlocks output together with MountList and PartList files. To run CheckBlocks:

Access the CLI window and type : CheckBlocks [p] - the p option will direct output to the standard output PRT. Alternatively redirect the output to a file, e.g. CheckBlocks > hd.blocks.

OR

From the Amiga Workbench open the system drawer and double-click on the CheckBlocks icon. Paged output will default to the screen.

Section 8: Appendix

Drive pre sets :

Type No	Size	Heads	Cylinder	Precomp	Park	Known drive
1	10	4	306	128	305	COM 20HE
2	21	4	615	300	615	
3	30	6	615	300	615	
4	65	8	940	512	940	
5	49	6	940	512	940	
6	20	4	615	615	615	
7	32	8	462	256	511	
8	30	5	733	733	733	
9	115	15	900	900	901	
10	20	3	820	820	820	
11	35	5	855	855	855	
12	50	7	855	855	855	
13	20	8	306	128	319	
14	44	7	733	733	733	
15	0	0	0	0	0	
16	20	4	612	000	663	
17	40	5	977	300	977	
18	58	7	977	977	977	
19	62	7	1024	512	1023	
20	30	5	733	300	732	
21	44	7	733	300	732	
22	30	5	733	300	732	
23	10	4	306	000	336	
24	42	5	977	977	977	
25	80	9	1024	1024	1023	
26	74	7	1224	1224	1223	
27	117	11	1224	1224	1223	
28	159	15	1224	1224	1223	
29	71	8	1024	1024	1023	
30	97	11	1024	1024	1023	
31	87	11	918	918	919	
32	72	9	925	925	926	
33	9	10	1024	1024	1023	
34	106	12	1024	1024	1023	
35	115	13	1024	1024	1023	
36	124	14	1024	1024	1023	
37	17	2	1024	1024	1023	
38	142	16	1024	1024	1023	
39	119	15	918	918	919	
40	42	6	820	820	820	

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