



User Guide for

High-Speed CopyStation

Thank you for deciding to buy an altec product. In order to ensure correct functioning and to avoid problems when installing this high-quality German-made product, please read the entire manual and carefully observe the following points:

- Observe the general guidelines when handling components or modules which can be damaged by electrostatic charge or discharge (this applies to the products described in this manual).
- If you should encounter any problems during the installation or use of this product, please contact our service department and ask for technical advice. If you do not do this, your guarantee rights may be impaired.

Support hotline, Monday to Friday, 11 am to 3 pm German time (CET):

Phone **+49 511 98381-70** or eMail **support@altec-cs.com**

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1. Introduction

1.1 Product description

The High-Speed CopyStation makes it easy and fast to copy data images to up to 20 memory cards in parallel. The fully pre-installed hardware and software and the user-friendly Windows software makes it very easy to use, even by untrained personnel.

The **standard version** of the High-Speed CopyStation consists of a Dell Business PC with pre-installed 5.25" IDE CopyStation drive, either English (Item no. B31AL188E) or German (B31AL188) Windows XP Professional operating system and keyboard, pre-installed altec copying software and mouse. You only need to connect up a monitor.

An extra high speed **Ultra Version** is also available. The modified hardware increases the write speed by up to 50%. The Ultra Version is available in a German (B32AL188) and an English (B32AL188E) version.

The CardBoxes you want to use must be ordered separately.

CardBoxes are available for many different memory media types:

- 1.) CompactFlash Card – 20 slots – B31AL157
- 2.) microSD & microSDHC and TransFlash – 20 contact pads – B31AL162
- 3.) miniSD & miniSDHC – 20 slots – B31AL158
- 4.) SD & SDHC Card and MultiMediaCard – 20 slots – B31AL137
- 5.) RS-MMC (Reduced Size MMC) – 20 slots – B31AL156
- 6.) OTP (One Time Programmable) SD/MMC (3.7 Volt; 3.7/12 Volt) and normal SD & SDHC cards, MMC – 20 slots – B31AL159; B31AL160
- 7.) Memory Stick PRO Duo – 20 slots – B31AL164D
- 8.) Memory Stick PRO – 20 slots – B31AL164PRO

CardBoxes are planned for additional media types such as Memory Stick Micro M2.

Handling times can be reduced by using CardBoxes in pairs. While copying is taking place to one of the CardBoxes, the operator can replace programmed cards in the second card box by fresh, unprogrammed cards. When the copying has finished, the operator only needs to swap over the CardBox in the CopyStation drive. Copying can then begin again without delay.

The following **Software Options** are currently available:

- 1.) Optional software interface for data exchange with external applications. This allows you to modify the data which is being copied, e.g. by assigning individual serial numbers or applying data encryption.
Software interface for e.g. external serialization – 31AL2004
- 2.) Software option for creating and copying smaller image files. This allows programming to take place much faster if the master (source) memory media is only partly filled with data.
Software Short Image Files – 31AL2002
- 3.) Software option which accelerates the verification process. After programming the memory cards, the copied data is compared with the image of the master card for all of the memory cards in parallel.
Software Parallel Verification – 31AL2001
- 4.) Software option to set a temporary or permanent write protection flag on SD Card or MMC – 31AL2006
- 5.) Programming of OTP cards requires special software.
Software OTP support – 31AL2005

In addition, the CopyStation software can be modified to meet custom requirements. Please contact us for further information.

1.2 Features

- ◆ Modular High-Speed copying system with exchangeable CardBoxes for 20 memory cards per box.
- ◆ In-house developed copy software with the same «look & feel» as all other altec CopyStations.
- ◆ English or German user interface can be selected.
- ◆ Job Wizard to specify parameters for the copy job such as the image file name, number of copies and whether to verify after writing or not.
- ◆ Separate controller for each card slot or contact pad allows parallel processing of copy commands for very high performance.
- ◆ High-speed image copies – e.g. 20 SD Cards with 512 MB in approx. 4 minutes (Ultra Version) or under 6 minutes (normal Version); speed depends also on make and type of card.
- ◆ SDHC, miniSDHC and microSDHC ready.

1.3 Scope of delivery

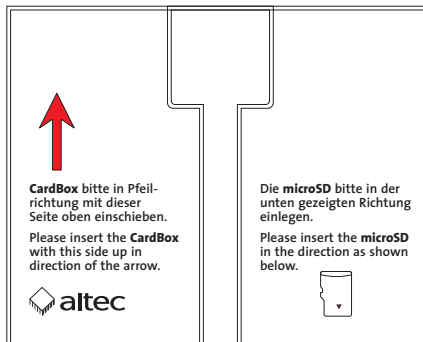
- ◆ CD-ROM with software and this manual as an Acrobat PDF file.
- ◆ Complete system consisting of a Dell Business PC with one pre-installed 5.25" IDE CopyStation drive, pre-installed Windows XP Professional (in English or German) pre-installed altec copying software, mouse and keyboard (with English or German keyboard layout).
- ◆ One or more CardBoxes as per customer order.

2. Using the CardBoxes

2.1 Inserting and removing CardBoxes

Please refer to the warning label on the top of the CardBox before inserting the CardBox in the CopyStation for the first time. Do not use excessive force.

It is recommended to hold the CardBox with both hands when inserting it into the CopyStation. Insert the CardBox in the direction of the arrow with the label on top (the sketch shows the top side). Slight pressure must be applied **when inserting** to ensure that the contacts are fully inserted into the connector.



It is also recommended to hold the CardBox with both hands **when removing** it. Just pull the CardBox out of the CopyStation.

If your High-Speed CopyStation has a 5.25" drive with a stainless steel chassis and you are using a CardBox with a stainless steel rear panel, we recommend you to screw the **stainless steel guide rod** (supplied with the CardBox) into the rear panel of the CardBox. This ensures a very robust mechanical connection and further reduces the risk of electrostatic discharge.

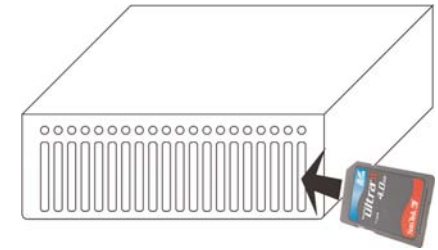
When using a CardBox with a stainless steel rear panel, you cannot use the stainless steel guide rod if your CopyStation has a plastic drive chassis since the matching hole is missing in this case.

2.2 Inserting memory cards into the CardBox

Please note the following when inserting the memory cards with the exception of microSD (see chapter 2.3 ff) into the Card-Box:

Cards must be inserted with the card front oriented on the left side (see sketch).

When copying, make sure that the **write protect switch** on the card (if fitted) is **not** set to the »Lock« position).



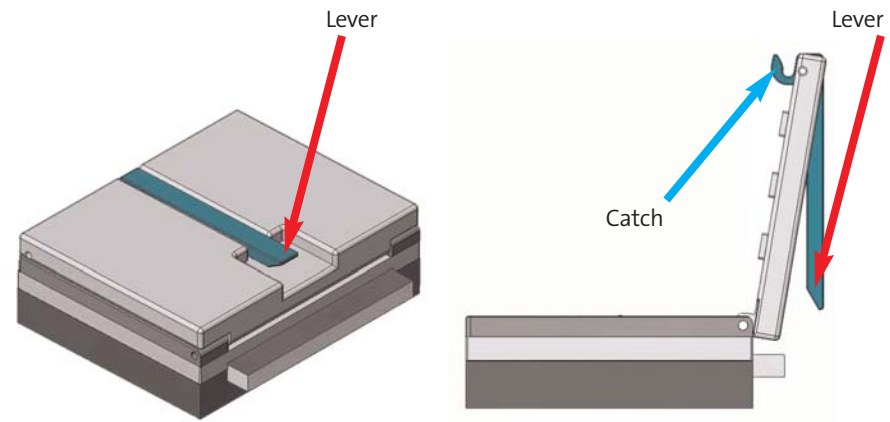
2.3 Handling of the microSD CardBox

The cards are contacted using high-quality spring contacts that are quite sensitive and require careful handling. When handled properly, however, they feature a high stability.

Protect the contacts from getting in touch with any hard objects. Always keep the contact area clean and free from any dirt.

2.3.1 Opening the microSD CardBox

To **open** the CardBox, please raise the lever (shown green in the sketch below). Open the lid of the CardBox with the lever raised.



2.3.2 Placing microSD cards in the CardBox

When **placing** microSD or TransFlash memory cards in the CardBox, please put them in the dedicated contact pads with the arrow pointing to the front (see the sketch on the CardBox cover, page 6).

The golden contacts on the card's bottom side must be placed right above the golden contact pins in the contact pad. When lying in the contact pads, the cards are slightly higher at the front.



The following procedures are possible:

1. Hold each card with your forefinger and thumb in the contact area, place it in the contact pad with the backside first and then drop it.



2. Place the cards with the contacts at the bottom side on the black plastics body, move them with one finger over the partition walls between the contact pads until reaching the desired pad and drop it there.



3. Use a separate vacuum pipette for sucking each card's top side, placing it above the corresponding contact pad and then dropping it into the contact pad.



These two vacuum pipettes can be ordered separately from us.



CAUTION: Please **don't** place the cards in the following manner:

Holding each card with the forefinger and thumb in the back area, placing it in the contact pad with the contact area first and then dropping it.



This implies the risk that the card is inserted too steeply and the spring contacts are touched and may be damaged. Over the time, this may result in premature contact failure.

IMPORTANT:

- Always avoid getting in contact with the spring contacts.
- Prior to closing the cover, make sure that not two cards are placed in the same contact pad by accident.
- Prior to closing the cover, make sure that all cards are placed correctly (especially: the right side up) in the contact pad.
- Do not attempt to force the cover closed. Otherwise, the cards, their spring contacts or – worst case scenario – the entire contacting mechanism might be damaged.

2.3.3 Closing the microSD CardBox

In order to **close** the CardBox cover, completely lift the lever (see p. 7), lower the cover and then carefully lock the cover by pushing down the lever.

IMPORTANT: When closing the CardBox, take care that the inserted memory cards lie properly in their contact pads and do not protrude. Otherwise, the cover may be damaged mechanically when being closed. Please do not apply force to lock the CardBox.

2.3.4 Removing the microSD cards from the CardBox

The following procedures are possible:

1. Open and simply tip out the CardBox. This is the easiest way.

2. Use a separate vacuum pipette for sucking each card's top side and removing the card from the CardBox. In this case, make sure not to press the card down against the spring contacts with the pipette.

2.3.5 Instructions for servicing and maintaining the microSD CardBox

- Always keep the contact pads free from dirt. Immediately remove any larger foreign bodies (e.g. pieces of broken microSD cards), e.g. by putting the CardBox upside down.
- Remove dust and fine abraded card particles on a regular basis (e.g. at each shift end). You can either use a small vacuum cleaner or a fine horsehair paint brush. (Do not use a brush!). Hold the CardBox upside down and carefully clean it with the paint brush from the bottom side.

CAUTION: The spring contacts must not get in contact with any hard objects!

NOTE: We recommend not to use compressed air for cleaning as this may transport impurities into the CardBox.

- If you cannot avoid direct finger contact with the cards, we recommend to wear thin cotton gloves (or similar) to avoid the accumulation of grease on the spring contacts over the time.
- Do not use a liquid of any kind for cleaning the CardBox. The liquid might permeate the spring contacts and cause malfunctions. Moreover, impurities solved by the cleaning agent could reach into the CardBox and cause contacting errors.
- If any problems should occur (e.g. frequent failure of a contact pad), do not attempt to solve the problem with contact spray or similar (see last item). Usually, this will deteriorate the situation and cause the failure of even more contact pads.
- We recommend to use a dry microfiber cloth for cleaning the CardBox outside, e.g. for removing finger prints.

3. Starting the software, logging in and CardBox activation

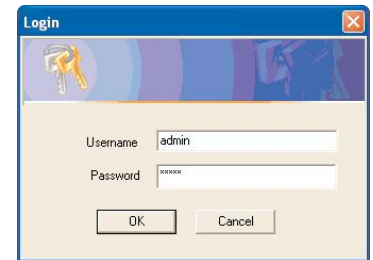
3.1 Starting the software

To start the software, double click the button "**High-Speed CopyStation**" which is on the Windows Desktop. This button is a shortcut to "HighSpeedCopyStation.exe", which is normally installed in C:\Program Files\altec\HighSpeedCopyStation.

You then need to accept the licensing agreement by clicking "OK".

3.2 User log in

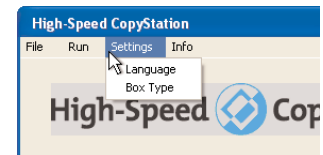
After accepting the licensing agreement you will be shown the login dialog box (see figure). The default user name and password to log in as the administrator is **admin** and **admin**.



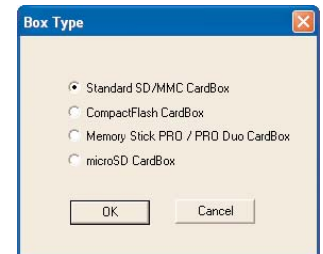
The default user name and password to log in as a normal user is **user** and **user**. In this case you are only given limited rights to the program functions. You can only open and run existing copy jobs.

3.3 Activating CardBox types

All CardBoxes except for standard SD/MMC CardBoxes (including SD/MMC, miniSD, RS-MMC and OTP SD/MMC CardBoxes) must be activated before you can use them. To do this, choose "**Box Type**" in the "**Settings**" menu (see figure on the right). Please make sure that no CardBox is inserted in the CopyStation.

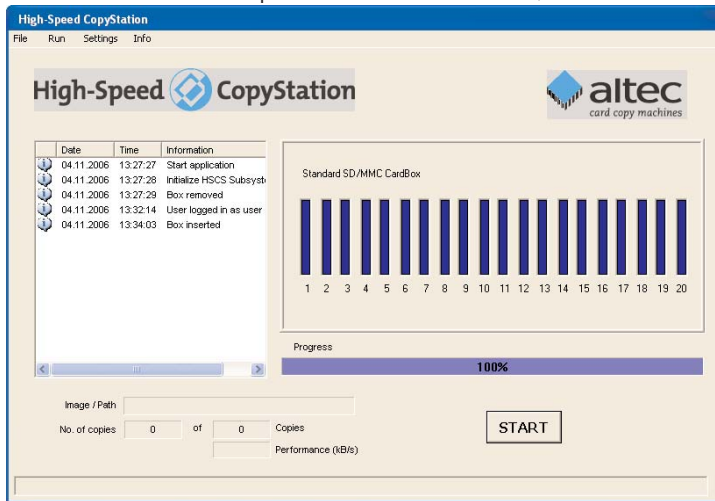


Choose the CardBox type you want to use in the "**Box Type**" dialog box and click OK. Please insert the selected CardBox to initialize it correctly.



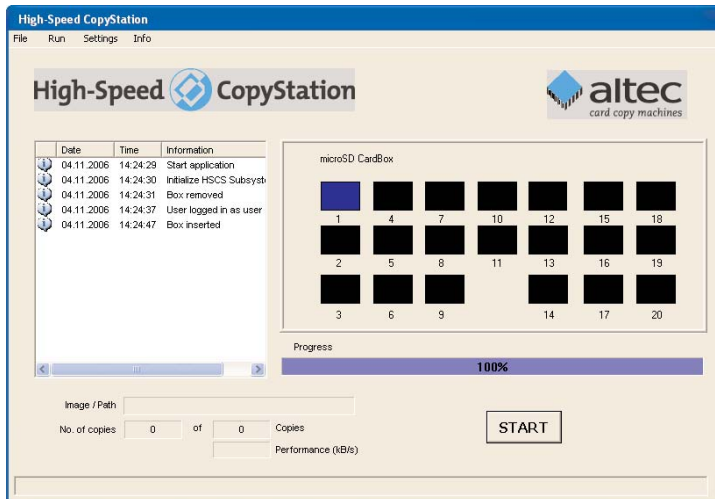
When you restart the software (starting from version 3.4.0.4), the activated CardBox remains the default CardBox.

After inserting a CardBox in the CopyStation, the main screen shows a representation of the 20 slots. Except for the microSD CardBox, the main screen is similar for all



CardBox types. The chosen CardBox type is shown above the 20 slots:

If you are using the microSD CardBox instead, the main screen shows the arrangement



of the 20 contact pads:

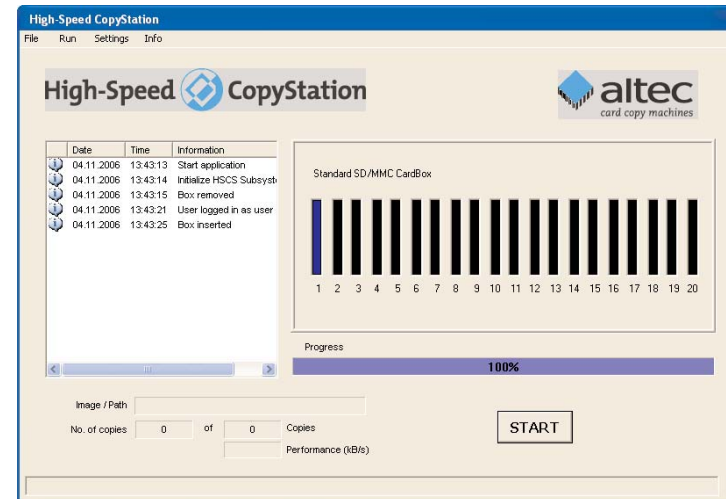
4. Copying from card images

4.1 Creating an image

The storage capacity of the master (source) memory card must be identical to the storage capacity of the destination cards (the cards onto which you want to copy). We strongly recommend that the master card and the destination cards are from the same manufacturer and preferably from the same manufacturing batch.

After logging in as **admin**, insert the master card in the CardBox and insert the CardBox in the CopyStation. The main screen of the software then shows a representation of the 20 card slots.

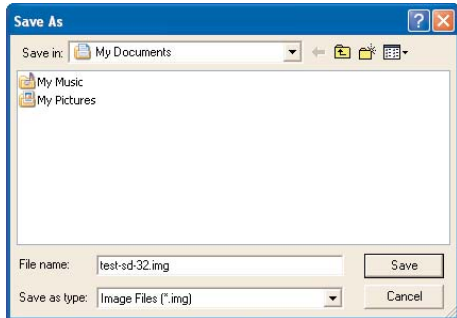
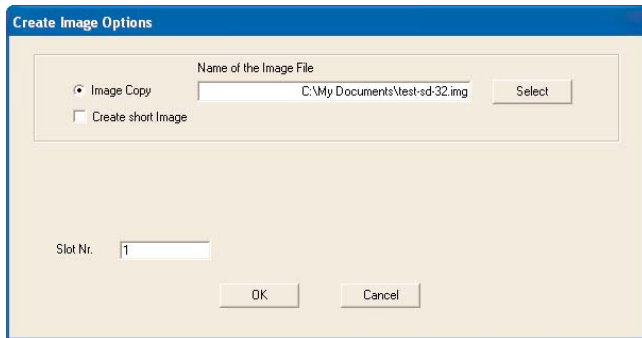
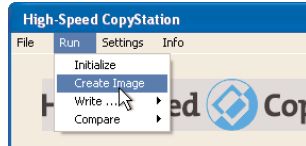
After a short delay, the color of the slot changes to blue to indicate that a card is inserted:



Empty slots are shown in black. Slots are also shown in black if the memory card they contain cannot be recognized or does not respond.

Choose **"Create Image"** in the **"Run"** menu to create an image of the master memory card. This opens the **"Create Image Options"** dialog box (see figure below).

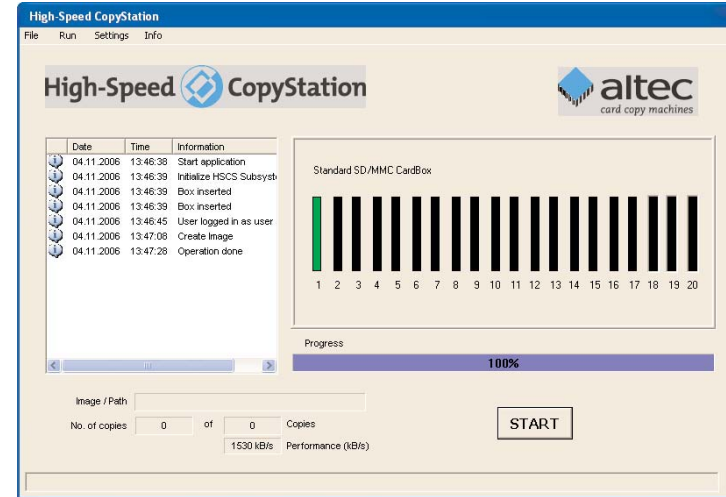
Click the **"Select"** button and enter the required name and location for the image file in the **"Save As"** dialog box which is shown (see figure at the bottom). Use the file extension **".img"**. Click **"Save"** to save your settings. Then specify the slot which contains the master card by entering the slot number. Slot number 1 is on the left hand side.



Click **"OK"** to read the card contents and create the image file. Progress is shown in the main window using a progress bar. The color of the chosen slot changes to yellow (slot is busy).

The image has been fully created when the progress bar reaches 100%, the message **"Operation done"** appears in the message panel on the

left of the main window and the slot color changes to green again (see figure on next page).



4.2 Optional: Creating a short image

This feature is only available if you have purchased the software option Short Image Files (Item no. 31AL2002).

Memory cards often only need to be partly filled with data. The rest of the media is left empty and can be used by the customer to store his or her personal files. The Short Image Files software option significantly speeds up copying smaller amounts of data.

The short image files software option supports FAT12, FAT16 or FAT32 (the latter starting with software version 3.4.0.4) file systems.

The FAT (File Allocation Table) of the file system stores information on memory blocks which contain user data. By analyzing the FAT, the CopyStation software can determine the last block of memory which contains user data. If you create a short image file, it will only contain data for memory blocks which are being used.

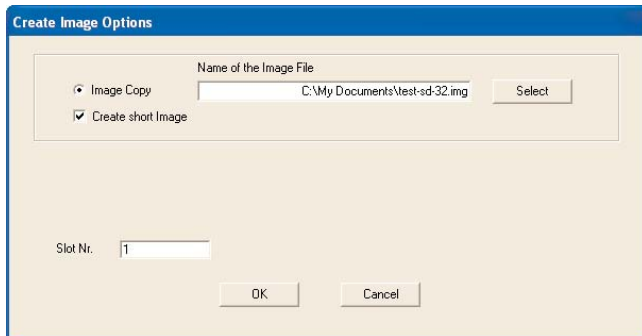
To maximize the speed benefit (minimize the size of the short image file), the master (source) memory card should not have fragmented data blocks. Data blocks get fragmented if the card has often been written to since it was last formatted.

If necessary, format the source memory card and copy the data back on again before using it to create the short image file.

When making copies using a short image, it is only necessary for the CopyStation to write data to some of the memory blocks in the destination memory card. This leads to a speed advantage. However, if the destination card has already been used to store files, some of the unused and unwritten blocks may still contain old data. Although the old data will not appear as files in the file system (directory), in some cases the data can be analyzed using special software tools. This could present a security risk if the memory card was previously used to store sensitive information.

For short images too, the storage capacity of the master (source) memory card must be identical to the storage capacity of the destination cards (the cards onto which you want to copy).

Choose **"Create Image"** in the **"Execute"** menu. This opens the **"Create Image Options"** dialog box:

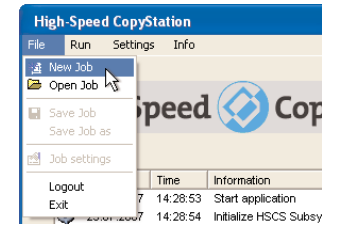


If you check the **"Create short image"** checkbox, the CopyStation software will create a normal image and a second image with the file extension **".img.short"**. Use the second image to create a short image job. When you specify the copy job in the **Job Wizard**, you must check the **"Allow short image file"** checkbox in the **"Extended Settings"** tab (see next chapter).

4.3 Creating a job

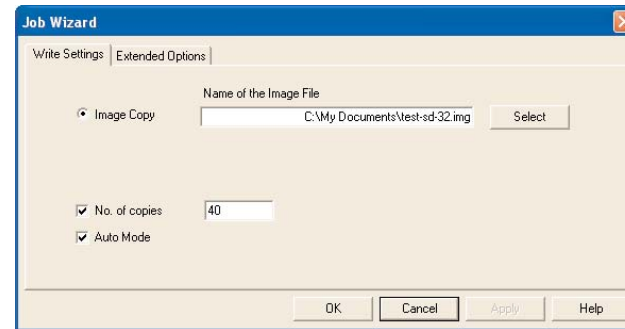
Choose **"New Job"** in the **"File"** menu to create a new copy job with the Job Wizard.

In the Job Wizard, clicking the **"Select"** button to select an image. Then choose the required image using the **"Open"** dialog box which is shown.



If you want to use a **Short Image** please be aware that **".img.short" files will not be shown in the Open dialog** due to the standard settings that only shows *.img files. Please select **"Files of type: All Files (*.*)"** to open the Short Image.

Check the **"No. of copies"** check box and enter the total number of copies you want to produce (see figure below). If you don't mark the **"No. of copies"** check box, an unlimited amount of copies is produced until you cancel the copying process manually by loading a new job.



The **"Auto Mode"** option simplifies copying to a large number of memory cards. Check the **"Auto Mode"** checkbox if you want copying to resume automatically each time the CardBox is replaced. This avoids having to click the **"START"** button each time. Auto Mode will continue until the specified total number of copies has been produced.

Extended Options

Click the **"Extended Options"** tab to specify additional settings (see figure next page). Check **"Verify after write"** if you want the data to be verified automatically after writing.



Parallel Verification

This feature is only available if you have purchased the software option Parallel Verification (Item no. 31AL2001).

While in standard verify mode, the comparison is done card after card, which takes about 20x the time what it takes to write all cards.

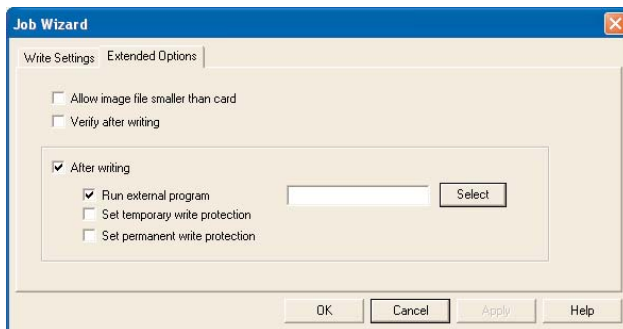
In the optional parallel verify mode, all cards are verified simultaneously, which will take about as much time as writing all the cards. So, parallel verify takes about 1/20 of the time of a standard verify process.

Short Image Copy

The "Extended Options" tab also contains settings for the "Short Image Files" option (Item no. 31AL2002; see chapter 4.2).

Optional software interface for data exchange with external applications

The "Extended Options" tab also contains settings for the **Optional software interface for data exchange** (Item no. 31AL2004). This option allows you to integrate an external



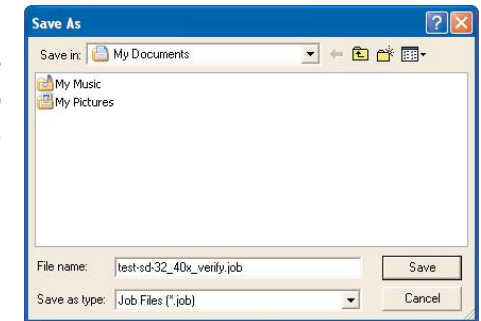
program into the copying process which modifies the data on the card after copying, e.g. to assign a serial number or to apply data encryption (see chapter 6.4 on page 27).

Write Protect for SD Card or MMC

The "Extended Options" tab also contains settings for the **Write Protect software option** (Item no. 31AL2006) (see chapter 6.3 on page 26).

Saving a copy job

Click the "OK" button and enter the required name and location for the job file in the "Save As" dialog box which is shown. Use the file extension ".job". Click "Save" to save the file.

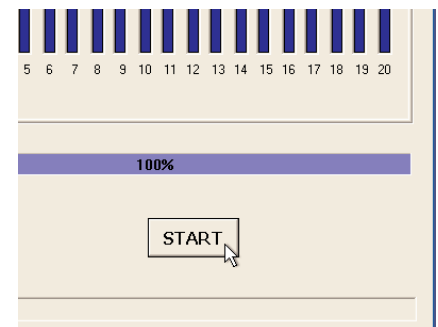


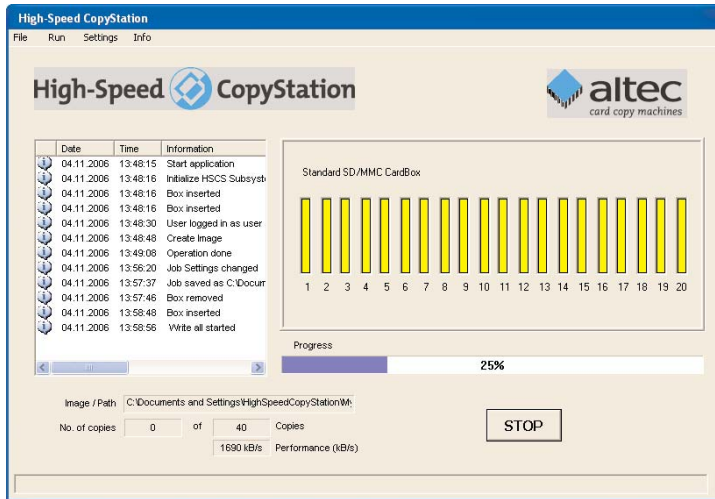
4.4 Starting a copy job

Remove the CardBox with the master card from the CopyStation and insert a fresh CardBox with the memory cards you want to copy to.

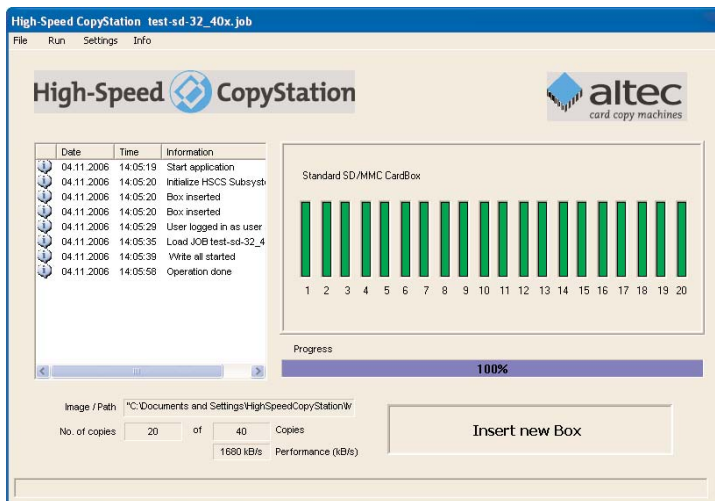
Click "START" to start programming (see figure on right).

The color of the slots which contain memory cards changes to yellow (slot is busy). See figure at top of next page.





The data has been copied successfully to all of the cards in the CardBox when the progress bar reaches 100%, the message "Operation done" appears in the message panel on the left and the slot color changes to green again (see figure below).



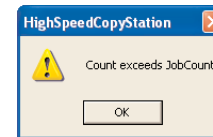
The message "Insert new Box" is shown if you have not copied enough cards yet (see figure above).

Replace the CardBox with the programmed memory cards with a CardBox containing fresh cards. If you have configured Auto Mode, programming resumes automatically as soon as the new CardBox has been inserted.

If you have not configured Auto Mode, you now need to click the "START" button again.



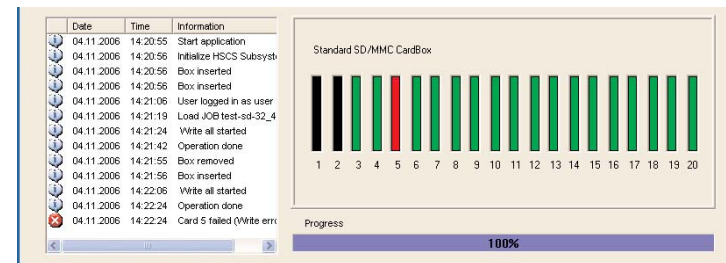
Keep on replacing the CardBoxes until you see the "Job finished" message, which indicates that the specified number of copies have been made.



The message "Count exceeds job count" is shown instead if the final CardBox contains more memory cards than are necessary to complete the specified number of copies (see figure).

Remove some of the memory cards from the CardBox until it contains the exact number of cards needed to complete the job. The software will only accept the last CardBox and complete the copying if the number of cards is correct.

A red slot and an error message in the message panel on the left indicate that a copying error has occurred (see figure below).



You can re-use saved copy jobs at any time.

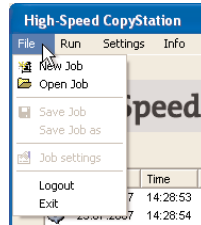
If you want to change settings for a job, we recommend saving it with a new name. Then choose "Job Settings" in the "File" menu to modify the job and confirm by clicking "OK".

5. User software menus and functions

5.1 "File" menu

This menu lets you create, save, open or modify jobs or exit the program.

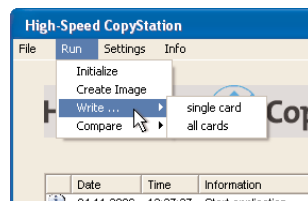
- **"New Job"** creates a new job. Choose an image file in the Job Wizard (see p. 17). Choose the number of copies you want to produce (see p. 17). Click the "Extended Options" tab if you want to carry out verification after writing (see p. 17).
- **"Open Job"** opens an existing copy job.
- **"Save Job"** saves an open copy job.
- **"Save Job as"** saves a job under a new name.
- **"Job settings"** opens the Job Wizard where you can modify and save an open job. If no job has been opened, the command has the same effect as the "New Job" command (see above).
- **"Logout"** logs the current user out.
- **"Exit"** terminates the program.



5.2 "Run" menu

This menu initializes the CardBox, lets you create image files and select direct copy or verify commands for single or all memory cards.

- **"Initialize"** has the same effect as removing and inserting the CardBox. The CardBox will be initialized and the status of the card slots is renewed.
- **"Create Image"** reads the data image of a memory card and saves it at any user selected directory (see p. 13 ff).



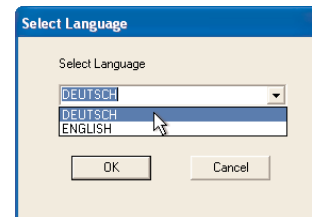
- **"Write . . . single card"** opens the "Write Options" dialog where you have to select an image file and a card slot. After confirming the selection with "OK", copying to the selected card is started.
- **"Write . . . all cards"** opens the "Write Options" dialog where you have to select an image file. After confirming the selection with "OK", copying to all cards is started.
- **"Compare . . . single card"** opens the "Verify Options" dialog where you have to select an image file and a card slot. After confirming the selection with "OK", data comparison between the image file and the selected card is started.
- **"Compare . . . all cards"** opens the "Verify Options" dialog where you have to select an image file. After confirming the selection with "OK", data comparison between the image file and all cards is started.

5.3 "Settings" menu

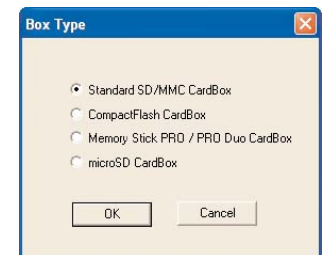
This menu lets you select the user interface language.

- **"Language"** opens the "Select Language" window where you can select German (DEUTSCH) or

English as the user interface language. Note that standard Windows dialogs shown by the CopyStation software are always in the language of the Microsoft operating system you are using.



- **"Box Type"** is used to configure the CardBox type which you are using with the High-Speed CopyStation (see p. 11). The setting "SD/MMC CardBox" includes the following four CardBox types: SD/MMC, miniSD, RS-MMC and OTP SD/MMC CardBoxes.



5.4 "Info" menu

This menu lets you open this manual as a PDF file and call up information about the program.

→ **"Help"** opens this manual as a PDF file in the selected user interface language. Please note that you can only read PDF files if Acrobat Reader has been installed on your computer.

You can find setup files for the Acrobat Reader on the CD delivered with your CopyStation.

The manual files are stored on the CD and in the program folder and can also be opened directly.

→ **"About"** opens the program's information window where you can find the software version number and the license agreement.



5.5 Card information and mapping of cards

With a right-click on the slot of an inserted card, the slot number as well as card information is provided. The card can also be mapped as a logical drive under Windows.

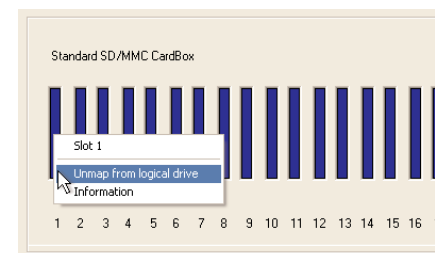
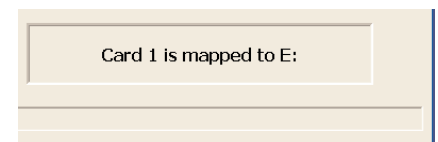
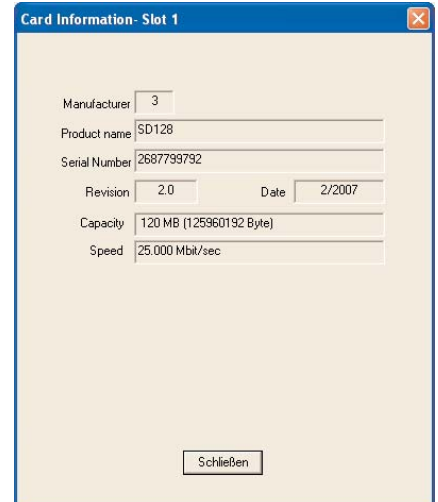
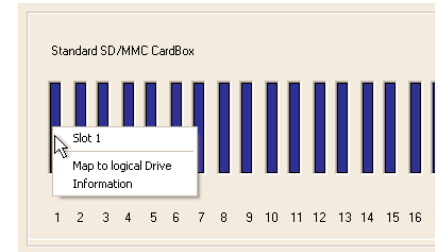
Card information

In order to get detailed information on a memory card, right-click the respective card slot and choose "Information" from the context menu. This opens a new window with information such as product name, serial number, capacity etc. (the figure shows an example for a SD Card).

Mapping of cards as a drive

When you choose "Map to logical Drive" by right-clicking on the card slot, the respective memory card of this slot becomes available as a logical drive in the Windows Explorer and can be used as such. You can see it including the used drive letter at the bottom-right corner of the program's main window (see right figure).

After another right-click on the card slot, the command "Unmap from logical drive" is to be seen. Please use this command to log the drive off (see figure at the bottom right).

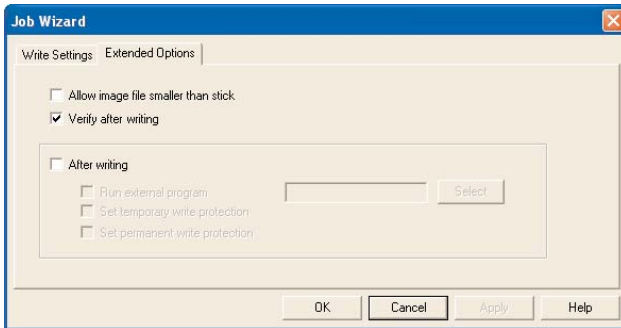


6. The Software Options

6.1 Software option "Parallel Verification"

If you have purchased this software option, "Verify after write" takes place simultaneously for all inserted cards (see chapter 4.3).

"Verify after write" must be activated in the Job Wizard in the "Extended Options" tab (see figure below).



6.2 Software option "Short Image Files"

This software option allows you to create and copy short image files. If the master (source) memory media is only partly filled with user data, the resulting smaller image files allow faster programming of the target memory media.

Detailed information on using this software feature can be found in chapters 4.2 and 4.3.

6.3 Software option "Write Protect for SD/MMC"

SD/MMC cards (and only these card types) have two write protect flags. Both flags are stored in the CSD of the memory card:

1. If the **temporary write protect** bit is set, it is not possible to write data to the card. The bit status can be changed with the WRITE_CSD command as follows:
Bit value = "1" – write protect, bit value = "0" – no write protect.
The write protect settings for this flag can be cleared again to allow more data to be written to the card.

2. If the **permanent write protect** bit is set, it is not possible to write data to the card. The bit status can be changed with the WRITE_CSD as follows: Bit value = "1" – write protect, bit value = "0" – no write protect. The write protect status for this flag can not be cleared again. As the name indicates, the card is permanently protected against changes to the data as soon as this flag has been set to "1".

Temporary and/or permanent write protection can be activated in the HSCS software Job Wizard. The write protect flag or flags are only set to "1" after copying the data, verification and serialization, and only if the copying, verification and serialization of the card completed successfully with the OK status.

6.4 Software interface for e.g. external serialization

6.4.1 General Description

The High-Speed CopyStation has the optional feature to allow the customer to serialize the programmed SD Cards and MultiMediaCards.

Serialization of cards can be used to protect card contents such as data files or programs against unauthorized duplication or usage.

SD Cards and MultiMediaCards contain a serial number that is unique to each card and which cannot be altered because it is predefined by the manufacturer. If the target application allows to read out this serial number, the application can check, whether this is an authorized copy or not.

The serialization feature is not included in the standard High-Speed CopyStation application.

6.4.2 How it works

If serialization is enabled, the High-Speed CopyStation application will first write the selected master image to all inserted cards in parallel as normal and verify the contents if the verify after write feature is enabled. After that, for each inserted card, the High-Speed CopyStation will map the current active card to a logical drive in the operating system and then call an external application.

This application, which has to be designed by the customer, gets the CID Data, which includes the CID of the card and the cards virtual drive path as parameters.

When the SD Card or MultiMediaCard has been mapped to the logical drive, the external patch application has two ways to communicate with the SD Card or MultiMediaCard.

6.4.3 Accessing the memory card through filesystem calls

The application can use the standard operating system file system calls like fopen() fread() fwrite() With these calls, the application has full access to all files and subdirectories which reside on the card. In addition, using special fopen() calls, the application has also full access to any data on the card, starting from the first and ending on the last storage block of the card.

Example 1

The example shows, how to access the SD Card or MultiMediaCard through the standard operating system file system calls.

In this example, the contents of the CID, which is given as a parameter to the application, is written to a text file named CID.BIN to the SD Card or MultiMediaCard. The name of the logical drive is taken from the second parameter.

```
#include "stdio.h"
#include "stdlib.h"
#include "string.h"

int main(int argc, char* argv[])
{
    char v_drive_letter, filename[256];
    FILE *f1;
    int retcode=0;

    if (argc == 2) {
        // Please note: argv[1] = drive letter and argv[0] = CID

        v_drive_letter = argv[1][0]; // get the drive letter from 2nd parameter
        sprintf(filename,"%c:\\CID.BIN",v_drive_letter);
        f1 = fopen(filename,"w+"); // open a file on the Virtual Drive and
        fwrite(argv[0],1,strlen(argv[0]),f1); // write the CID Data.
        fclose(f1);
    }
    else
        retcode = 1; // invalid number of parameters

    return retcode;
}
```

6.4.4 Accessing the memory card through the Device I/O Control interface

The second way of communication can be used to perform SD Card or MultiMediaCard specific functions. For this communication, a pass through DEVICE I/O Control interface is implemented into the driver. Using this I/O Control Interface, the application can issue almost every SD Card or MultiMediaCard command to the card, either defined by the SD Card or MultiMediaCard standard, or using the VENDOR SPECIFIC commands supported by the cards.

The Device I/O Control function call in the WIN32 operation system is defined as parameter block is defined as

```
BOOL DeviceIoControl (HANDLE hDevice, // handle to device
                     DWORD dwIoControlCode, // operation
                     LPVOID lpInBuffer, // input data buffer
                     DWORD nInBufferSize, // size input data
                     LPVOID lpOutBuffer, // output data buffer
                     DWORD nOutBufferSize, // size output data
                     LPDWORD lpBytesReturned, // byte count
                     LPOVERLAPPED lpOverlapped // overlapped information
                     );
```

For more details about the parameters and return codes of the DeviceIoControl function call see WIN32 Programmers Reference Guide.

Device I/O Control Codes supported by the driver

The following Device I/O Control Codes are supported by the driver:

W32_SD_CMD_MMC_SEND_CMD

Sends a command given by the **lpInBuffer** to the SD Card or MultiMediaCard. The **lpInBuffer** must contain the **sd_cmd_block** (see below) as well as any data which should be sent to the card.

The **lpOutBuffer** contains the cards response. The CRC field which is included in the **sd_cmd_block** is automatically calculated by the driver.

W32_SD_CMD_MMC_GET_RESPONSE

Receives the last response sent from the SD Card or MultiMediaCard. The **lpInBuffer** can be NULL. The **lpOutBuffer** contains the cards response in the

W32_SD_CMD_MMC_GET_CID

Receives the CID from the card.

The `lpInBuffer` can be NULL

The `lpOutBuffer` contains the cards response.

sd_cmd_block structure

```
struct sd_cmd_block
{
    char sd_cmd;
    char sd_arg[4];
    char sd_cmd_flags;
    char sd_data_dir;
    char sd_data_len;
    char sd_response;
    char sd_response_len;
};

sd_cmd          char SD/MMC command byte
sd_arg[4]       char SD/MMC Arguments for command as defined by the
                SD/MMC Standard

sd_command_flags char Flags : 0x01 command with data transfer
                             0x02 command with response
                             0x04 driver sends APP_CMD first (used for SD security
                             feature)

sd_data_dir     char data direction
                0x00 data transfer from card to host (read)
                0x01 data from host to card (write)

sd_data_len     char data length
sd_response     char response type :
                0x00 : no response
                0x01 : R1
                0x02 : R2
                0x03 : R3

sd_response_len char response length
```

Any data, that shall be sent to the card (if `sd_data_dir = 0x01`) must follow the command block.

Any data, that shall be received from the card will be transmitted in the `lpOutBuffer` given in the parameters of the Device I/O Control command.

sd_response structure

This is the standard response format as defined in the SD Card or MultiMediaCard standard. For more details see these standards.

```
struct sd_response
{
    unsigned char cmd;
    unsigned char arg1;
    unsigned char arg2;
    unsigned char arg3;
    unsigned char arg4;
    unsigned char crc;
};
```

Example 2

This example shows, how to send a SD command 13 to the SD Card or MultiMediaCard and receive the response. The logical drive name is fixed to Z:

```
#include "stdio.h"
#include "stdlib.h"
#include "string.h"

int main(int argc, char* argv[])
{
    FILE *f1;
    int retcode =0;
    void *vdrive;
    BOOL ioresult;
    char buffer[512];
    struct sd_response *response = (struct sd_response *)buffer;
    unsigned long bytesreturned=0;
    struct sd_cmd_block sd_cmd;

    // display parameters..
    for ( int i=0;i<argc;i++)
        printf("Parameter %d = %s\n",i,argv[i]);

    // Open a channel to the virtual drive
    vdrive = CreateFile("\\\\.\\Z:", GENERIC_READ | GENERIC_WRITE,
        FILE_SHARE_WRITE | FILE_SHARE_READ,
        NULL,
        OPEN_EXISTING,
        0,
        NULL );
    if (vdrive == INVALID_HANDLE_VALUE) {
        return (1);
    }
}
```

```
// send a command to the card, rca will be filled in by driver...
sd_cmd.sd_cmd = 13;
sd_cmd.sd_arg[0] = sd_cmd.sd_arg[1] = sd_cmd.sd_arg[2] = sd_cmd.sd_arg[3] = 0x00;
sd_cmd.sd_cmd_flags = 0x02;
sd_cmd.sd_data_dir = sd_cmd.sd_data_len = 0;
sd_cmd.sd_response = 1;
sd_cmd.sd_response_len = 6;

ioreresult = DeviceIoControl(vdrive, W32_SD_CMD_MMC_SEND_CMD,
    buffer, 512,
    NULL, 0,
    &bytesreturned,
    NULL);

if (ioreresult == 0) {
    // Handle error here ....
}
else {
    // and now get the response from the card ...
    ioreresult = DeviceIoControl(vdrive, W32_SD_CMD_MMC_GET_RESPONSE,
        NULL, 0,
        buffer, 4096,
        &bytesreturned,
        NULL);
}
}
```

6.4.5 Requirements

The requirements to use serialization are:

- High-Speed CopyStation Hardware
- High-Speed CopyStation application with serialization enabled
- Microsoft Windows 2000 or XP
- SD Cards or MultiMediaCards which conform to the actual standards

7. Technical specifications of the High-Speed CopyStation

Hardware (CopyStation drive)

- Interface: IDE
- Slots per CardBox: 20 slots or contact pads
- Cardboxes available for (supported card types): CompactFlash, microSD & microSDHC, Trans-Flash, miniSD & miniSDHC, SD & SDHC Card, MMC, RS-MMC, OTP SD, OTP MMC, Memory Stick PRO Duo, Memory Stick PRO
- Dimensions: Standard 5.25" internal drive for exchangeable CardBoxes

Performance

- Data transfer rate (example): 20 SD Cards à 512 MB in approx. 4 minutes (Ultra version) or under 6 minutes (normal version); speed depends also on type and make of card)

Software

- Compatible with: Windows 2000 and XP
- Supplied operating system: Windows XP Professional

Environmental specifications

- Temperature: +10° to +35°C (operating)
-40° to +65°C (non-operating)
- Humidity: 10% to 90%, non-condensing

Power requirements

- DC input voltage: 5 Volt ±5%

Accessories

- 31AL2001: Software Parallel Verification
- 31AL2002: Software Short Image Files
- 31AL2004: Software interface for e.g. external serialization
- 31AL2005: Software OTP support
- 31AL2006: Software Write Protect for SD/MMC



8. Support and further information

On-site support for Dell-manufactured hardware and software components of the PC is available from your national Dell distributor.

Support for altec-manufactured hardware and software components of the CopyStation is provided by altec.

Support hotline from Monday to Friday, 11 am to 3 pm German time (CET):
Phone **+49 511 98381-70** or eMail **support@altec-cs.com**

Please ask for our product overview or visit our website for information on further CopyStations, storage products, Flash Card Drives and Solid State Disks from altec:

www.altec-cs.com