

NOLVA

Color Graphics System
for ATARI ST/STE/TT/Falcon



Computerinsel

The Sunny Side of Computing

NOVA-Farbgrafikkarten

ATARI ST/STE/TT/Falcon

NOVA

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ATARI ST/STE/TT/Falcon

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1. Getting Started

Please note that this manual assumes you are already familiar with the basic elements of operating an ATARI ST/STE/TT computer. To avoid misunderstandings, we ask that you read the manual before (!) the installation and first use of the **NOVA**!

1.1 Package Contents

The **NOVA** package includes the following parts:

- The **NOVA** graphics card (hardware)
- This manual
- The **NOVA** driver disk

On the **NOVA** driver disk you will find a file named "READ_ME.TXT". You should definitely read this file because it contains all the information that could not be included in this manual. All files with the extension ".TXT" contain text or explanations that were written for your benefit.

1.2 Warranty and Copyright

Computerinsel offers a one year warranty for all **NOVA** systems.

During this period, faulty systems will be repaired or replaced at our discretion. Further claims are excluded.

Computerinsel is not liable for any damage caused by incorrect installation or improper operation of the software on the computer or monitor.

The copyright for the **NOVA** system hardware and software lies exclusively with Computerinsel.

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2. Installation

Read this chapter completely before starting with your work. Do not hesitate to ask your local dealer to install the card if you do not trust yourself to do the work. NEVER open your computer (!) while it is connected to the mains power. The computer contains dangerous voltages (up to 400V). Touching these voltages can be deadly.

2.1 Installing the 'NOVA VME'

The '**NOVA VME**' is installed in the VME bus slot of the Mega STE or TT.

First the computer must be turned off to avoid damage to the **NOVA** or the ATARI!!!!

Remove the two VME bus covers screws from the back of the computer case. You can identify this cover by the fact that it is made of metal. This cover contains a serial port interface (two with the TT). The serial port cable(s) must be disconnected from the Atari mainboard. To do this, gently pull the cable upwards. This will free up the VME bus slot by releasing the connection.

Pick up the **NOVA VME** and place it in front of you with the (currently) yellow label of the VME connection card facing upwards. With the connector going forward, plug the **NOVA** in using the guide groove of the VME bus. Please make sure that you do not push the **NOVA** in under or over the guide groove. The **NOVA** board will then be about 4mm inside the computer housing. You can clearly feel when the connector of the **NOVA** "locks".

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2.2 Installing the 'NOVA MEGA' in the Mega ST

The **NOVA** is installed in the free slot in the Mega ST. To do this, you must first open the case. Please note that this can void your warranty.

Since both the **NOVA Mega** and the computer contain components that are sensitive to electrostatic discharge, please take adequate measures to ensure that you are grounded.

Disconnect all external cables from the computer and turn the Mega ST upside down.

Remove the housing screws (9 pieces) from the bottom side of the computer. The housing screws are the ones that are in the square recesses. You do not need to remove the floppy drive screws which are in the round holes. However, you should slightly loosen these screws for later removal of the sheilding cover.

Turn the computer over and carefully remove the lid.

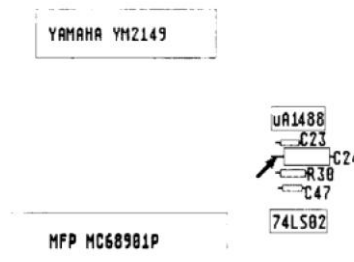
Disconnect the connection between the battery compartment and the computer inside the case.

To remove the shielding cover, first bend all the metal tabs straight and then carefully lift the cover upwards and tilt it forwards.

Remove the small plastic cover at the rear of the computer to clear an opening for the monitor port on your graphics card.

Some of the VGA cards used in ther **NOVA** require and additional power supply of -12V.

Since the mega bus does not have this voltage, a cable with clips is soldered on some **NOVA Mega** graphics cards in order to supply the **NOVA** with this voltage. It can easily taken from the Mega ST at a capacitor on the mainboard. This electrolytic



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is located under the power supply. To remove the power supply, unplug the power supply connector that connects the power supply to the mainboard, loosen the two screws at the base of the power supply and lift it out. Plug the graphics card into the free bus connector. The card's monitor connector must protrude from the exposed opening on the rear side of the computer case.

Connect the power supply plug of the card into the free power supply plug inside the Mega ST. This plug is located next to the power connector for the built-in floppy drive on the Mega ST mainboard. Then the clip, which is sometimes located on the '**NOVA Mega**', should be attached to the left leg of the electrolytic capacitor C24. Please locate the exact location of this capacitor from the illustration above.

Reassemble the computer. To do this, you must cut out the shield under the battery compartment with some metal shears or a small saw (jigsaw). Be careful not to create any short-circuits with metal chips when cutting. It's best not to do the metal cutting near your open computer.

Remove the middle mounting post in the case cover with a side-cutter or small saw. Place the lid back on the computer and fasten the remaining eight screws.

Also, do not forget to reconnect the battery compartment.

2.3 Installing the '**NOVA Mega**' in the ATARI 1040/520

In theory, it is possible to install the **NOVA** in any computer that has a CPU with a DIP design. This would also need an adapter cable that has a mega bus plug on one side and a DIP socket on the other. However, the **NOVA** does not fit in the 1040/520ST housing. So there is no general installation instructions. The notes from Chapter 2.2 have some application in this case.

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The difference from the installation in the Mega ST is that the single 64-pin socket must be soldered to the CPU. Then plug the corresponding end of the **NOVA Mega** adapter cable into the soldered socket. The processor has a small mark (recess) on its housing to indicate the orientation. The notch on the socket must point in the same direction as the mark (recess) of the processor. Attach the clip on the **NOVA** graphics card to the free red wire of the adapter cable. The clip of the adapter cable must be connected to -12V in the computer. Depending on the model, the following are the possible locations:

1040 STF: C65, U14 (pin 1), C25 (negative pole), CR3 (anode)

520 ST: C15, U14 (pin 1), C100, C101

3. Installation of the VDI Drivers and Initial Startup

The **NOVA** can in principle be installed and operated on the ATARI ST without a second monitor (i.e. without an SM124 or SM144/46). Only on the TT is a second monitor necessary for installation. However, the installation is simplified with the use of a second monitor.

The installation of the VDI driver can be done on a floppy disk or on any boot partition of your hard drive.

If you want to plug or unplug your monitor on the **NOVA** or on the computer then switch off both devices beforehand (!)

3.1 Installation with attached SM124 or SM144/46 or on a TT

After reassembling your computer, turn it on and have it boot up as normal. If you have a TT then you need to connect your VGA compatible monitor to the ATARI monitor connector for installation. Insert the **NOVA** driver disk in floppy disk drive "A". (it must be drive "A"!). Now start the

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program INSTALL.PRГ with a double-click. A dialog box will appear. Select the destination drive from which you normally boot your computer.

If you specify floppy drive "A" or "B" as the destination drive then please have a formatted blank disk ready. If, going forward, you only want to use your VGA compatible monitor with the

NOVA then click on the field "with Emulator".

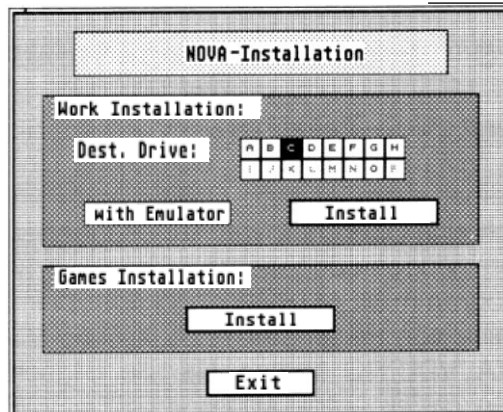
If you still want to use an original ATARI monitor in the future, do not select this box.

Click "Install" in the "Work Installation" section. The installation program will install the driver in the AUTO folder of the drive you have selected.

Follow the on-screen instructions.

The installation is completed when the "Install" button becomes white again.

After a subsequent reboot, the **NOVA** VDI driver is automatically loaded and the desktop is displayed on the monitor connected to the **NOVA**.



3.2 Installation without additional Monitor

Your **NOVA** driver disk is already bootable. (does not apply to ATARI TT).

If you want to install the **NOVA** VDI driver without an additional monitor, then after reassembling your computer boot it from the original driver disk with your monitor connected. (does not work on the TT). Start INSTALL.PRГ and proceed as described in Chapter 3.1

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3.3 Installation "By Hand"

The **NOVA** driver (STA_VDI.PRG is an abbreviation of "Stand Alone VDI", i.e. VDI without GDOS) is an AUTO folder program. The driver will search the AUTO folder for a STA_VDI.BIB file containing a library of resolutions. This file can be changed using the video mode generator (see Chapter 5). The program MENU.PRG allows you to set a number of parameters of the **NOVA** VDI driver at boot time. It must be set to run before STA_VDI.PRG. Since screen output from AUTO folder programs before STA_VDI.PRG are not visible on the VGA monitor, the program EMULATOR.PRG is provided which redirects all screen output to the **NOVA**. To install the **NOVA** software manually, you must ensure the following (physical) order of the programs in the AUTO folder.

- EMULATOR.PRG: Screen redirection
- MENU.PRG: Sets the VDI parameters
- STA_VDI.PRG: Stand Alone VDI

If you want to also install a GDOS application, then it must be placed somewhere in the AUTO folder after the STA_VDI.PRG program. There must also be an ASSIGN.SYS on the boot drive which contains 9 screen drivers. The fonts for the screen drivers must also be present on the boot drive. The information files STA_VDI.BIB, EMULATOR.BIB and MENU.INF can be placed anywhere.

3.4 First Startup and Adjustment of the VDI Drivers

After the computer has been reset, the operating system first loads the hard disk driver from the disk and then starts processing the files in the AUTO folder. So any output from the hard disk driver won't be visible on the VGA monitor.

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As described in the previous chapter, the first program in the AUTO folder should be EMULATOR.PRG. This will make all screen output visible on the VGA monitor. This takes you to the main menu of MENU.PRG. where you will see the following menu on the screen:

- a. set NOVA resolution
- b. select output
- c. set boot configuration
- d. set GDOS name
- e. save configuration
- f. exit

If a menu item is active, it is displayed with inverted color. You can switch between the menu items with the cursor keys to move to the corresponding entry and then pressing "Return" or by pressing the key of the letter in front of the menu item.

With 'ESC' you can return to the main menu or leave the main menu completely.

With the menu item "a. set NOVA resolution" you can choose between different VGA resolutions. Such an entry could be "d. 800x600x256, 71 Hz,800x800 ". That would represent a visible screen resolution of 800x600 pixels with 256 colors on-screen at once. However, the virtual resolution is 800x800 pixels (for more information on "virtual resolutions" see Chapters 4.3 and 6).

Choosing "b. select output" shows the following submenu:

- a. NOVA with GDOS
- b. NOVA without GDOS
- c. ATARI display with GDOS
- d. ATARI display without GDOS

For the '**NOVA Mega**' and the '**NOVA VME**' for Mega STE there are two additional menu items:

- e. monochrome emulation
- f. color emulation

For menu items a. and b., the screen output goes over the **NOVA** with or without using a GDOS program.

The menu options c. and d work in a similar fashion. But with those

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the screen output is performed on the original monitor via the ATARI VDI included in TOS.

The menu item e. selects a mode of operation for the NOVA where the original screen memory of the ATARI is transferred to the **NOVA** several times per second. This will reduce system performance to about 80% of what it is capable of. With dynamic screen actions (for example, fast mouse movements) the presentation can get a bit choppy. For programs whose screen outputs are programmed improperly, this type of output can help.

Menu item f. also works in a similar fashion, but the screen content is interpreted as a color image instead. It is best to just try these modes out to form your own impression of them.

The program MENU.PRГ renames the drivers that will be inactive by setting their extensions to ".PR". Menu items e. and f. are only available for the '**NOVA Mega**' and '**NOVA VME**' for the Mega STE. In order to use them, the program CONVERT.PRГ must be copied to the AUTO folder.

The main menu item "c. set boot configuration" allows you to set the keys to pause MENU.PRГ while booting and display the main menu. If MENU.PRГ does not find a MENU.INF file when booting, the main menu will be displayed automatically.

You also have the option to set the key setting to "a. no key". With this setting MENU.PRГ will always pause to display the menu each time the computer is reset. In some cases, due to a peculiarity of TOS (the operating system of your Atari) the special keys (Alternate, Control, Left Shift and Right Shift) are only recognized correctly if you have pressed a "normal" key immediately after the reset. For example, the <space> key. Make sure though that the key combination you select is not also used by another AUTO folder program.

Since many AUTO folder programs check the state of the special keys, it can cause problems. In this submenu you also have the options "q. time (5s)" and "r. time (3s)". When you choose either of these options, MENU.PRГ will pause for 3 or 5 seconds each time the computer starts and will wait for a keypress (normal keys and

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not special keys like 'Alternate'). If a key is pressed during this period then the menu will be displayed.

The menu item "d. set GDOS name" allows you to specify the name of your GDOS program. If you only press <Return> then the old name will be retained. If you are using a GDOS program then you should enter the name here along with the extension (.PRG).

The menu item "e. save configuration" (as you have already guessed) is used to save the menu settings. This will create the file MENU.INF in the AUTO folder. Saving the settings is absolutely necessary if you have assigned a new key combination with "c. set boot configuration".

Select "f. exit" to quit MENU.PRG and continue booting the operating system.

4. The NOVA Utilities

The **NOVA** driver disk contains several helpful utilities and support programs. Some of these you can find in the folder "UTILITY". These programs are not described in this manual. Please read through the respective text files.

The accessory for adjusting the colors and other minor things, the automatic resolution switcher ReSwitch (ReSwitch stands for Resolution Switch) and the video mode generator are described in the following sections.

4.1 The NOVA Accessory

To install the **NOVA** accessory you must copy it (the file NOVA_COL.ACC) to the root directory of your boot drive. It will only become active after a reboot.

Color Setup: In the main dialog box of the **NOVA** control panel

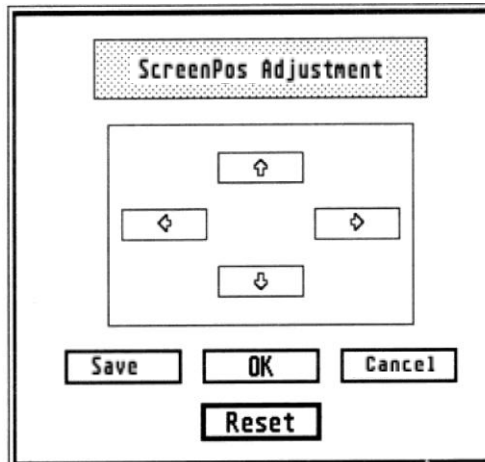
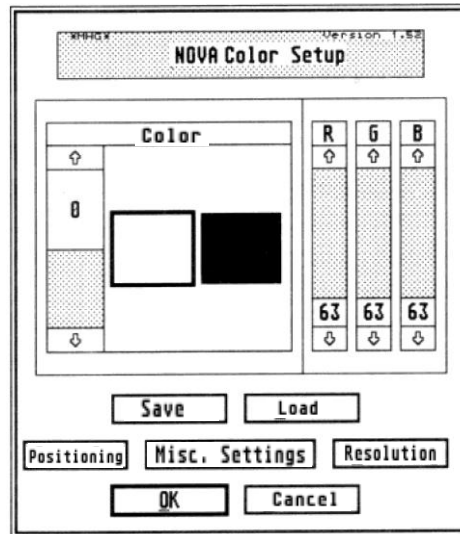
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you can set all the colors of your **NOVA** graphics card. For this purpose, there are scroll bars for the red, green and blue parts of each color so that the color intensity can be set. The color that is currently selected for changing is marked with a thick black border.

Positioning: Here you can easily adjust the position of the screen image on your monitor in case it is not displayed correctly.

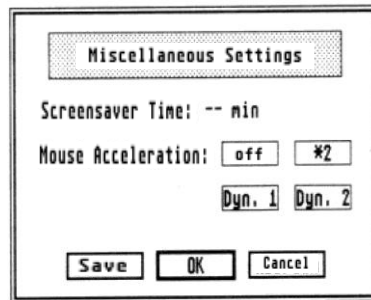
With the 4 arrow buttons the picture can be shifted in the respective direction. If you should move the image too much in one direction, the monitor may start to flicker or even turn black. In this case you can either use the "Reset" button or press the <Return> key to restore the old picture position. With the "Save" button the new image position is saved in the file STA_VDI.BIB. The "OK" button exits back to the main control panel screen and keeps the adjusted image position.

Misc. Settings: The **NOVA** VDI contains its own screen blanking function (also called a screensaver) and



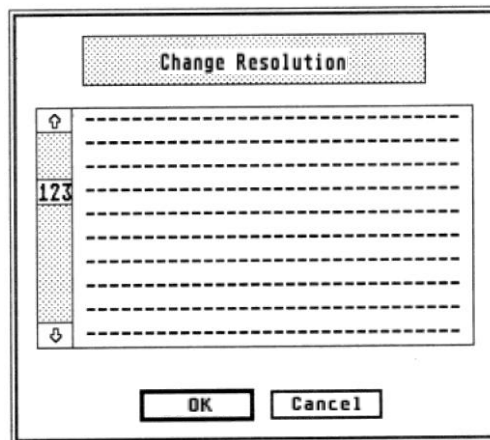
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also a mouse accelerator. The screen blanking time can be set in minutes. A value of 0 turns off the screen blanking. For the mouse acceleration, you have the choice between turning it off, acceleration with a constant *2 factor and two dynamic acceleration modes; slow and fast. The "Save" button saves the parameters of the



mouse accelerator and the screen blanking function in the file NOVA_COL.INF. The "OK" button exits the dialog and activates the selected values. With the "Cancel" button the old values are retained.

Resolution: This allows you to change the real resolution of the **NOVA** while retaining the virtual resolution. The VDI continues to manage the old screen resolution, but



only part of it may be displayed on the screen. If the mouse pointer is moved to the edge of the display, the screen will be scrolled in that direction. Practical application of this function is as a hardware zoom for programs that don't offer an acceptable implementation of such a feature. For example, if you boot at a resolution of 800x600 and then downscale to 320x200, the image will be magnified by a factor of about 2.5 in both the x and y directions. You click on the desired resolution with the mouse and activate it with the "OK" button. The "Cancel" button exits the dialog box with settings unchanged.

Save: This button saves the modified color palette to the NOVA_COL.INF file.

Load: The opposite of "Save". A color palette that has been saved can be loaded and restored.

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If there is no corresponding .INF file, then nothing happens.

OK: leaves the accessory and keeps the color setting in effect.

Cancel: leaves the accessory, but doesn't keep any changes to the color settings.

4.2 The Automatic Resolution Switcher "ReSwitch"

There are some annoying problems with programs on the ATARI: although graphics cards are already quite common on the ST, there are still many programs (even new ones) that only work in monochrome resolution and possibly only then with a screen width of 640 pixels. Before these programs can be used, you must switch the resolution which usually means the computer has to be reset.

ReSwitch provides a fix for this problem: in the file RESWITCH.INF a default resolution can be assigned to each program for this purpose. This resolution will be set automatically when the program is started. So now there are no more problems with starting Arabesque or Signum!2 with 256 colors (there are other programs from other well known software companies whose products are not coded for use with a color display).

Pressing the <ALTERNATE> key while starting a program prevents this resolution switching.

To allow accessories to also enjoy this resolution switching ability, you can find a program in the UTILITY folder called ACCESSORY.PRG: assign this program a default monochrome resolution. Now all you have to do is start the ACCESSORY.PRG from either the hard drive or floppy disk. The program simply provides a menu bar from which you now have the accessory available in monochrome mode.

For the ReSwitch program to work correctly, there are several points to consider. Both the boot resolution and the default resolution must have a vertical resolution greater than or equal to 400 pixels and

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the default resolution must not exceed as many colors as the boot resolution (This is just a rough rule. For insiders, the screen memory of the new resolution may only be at most as large as the screen memory of the original one). If you ignore this, then you will be surprised with a variety of unexpected and colorful side effects!

The file RESWITCH.INF is a normal ASCII file that you can create with a standard text editor. The structure of this file is quite simple: First is the name of a resolution and then the following lines are the programs that use the resolution. A resolution name is identified by a leading colon. Be careful not to accidentally add a space to the resolution name.

Example: :640x480x2, 70Hz, 640x680

The program names should not contain any path names. Each program name should be unique. Comment lines are also allowed (mind you, only whole (!) lines). These are generated by a leading semicolon.

Example: ;This is a comment

Each line in RESWITCH.INF must be terminated with a <Return>.

As a basic example, you can use the sample RESWITCH.INF file in the RESWITCH folder of the **NOVA** driver disk.

To install the automatic resolution switcher, the two files RESWITCH.PRG and RESWITCH.INF must be copied to the AUTO folder of your boot drive.

Changes to the RESWITCH.INF file only take effect after a system reset.

Since ReSwitch digs deep into the AES box of tricks, it is not possible to run on all TOS versions. Nor can it also be guaranteed to work properly in all possible or impossible situations. At present time it runs on the following (official) German TOS versions: TOS 1.04, KAOS 1.4, TOS 2.05, TOS 3.01, TOS 2.06 and TOS 3.06. There are problems with TOS 1.02 and KAOS 1.2.3.

It is not guaranteed to work for any other TOS versions.

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ReSwitch should also run in other language versions, but so far these have not been tested. In these cases it helps to just try it out.

4.3 The NOVA Video Mode Generator

When booting the computer, the **NOVA** VDI driver loads the file STA_VDI.BIB. This is the so-called resolution library. It contains all the resolutions (up to 26) that can be selected in the menu program and can be created or changed with the video mode generator. The disk contains pre-made resolution libraries in the MONITOR folder. These are called, for example, BIS65MHZ.BIB. This means that this resolution library is suitable for monitors with a pixel frequency up to 65MHz. To install one of these, copy the library corresponding to your monitor to the AUTO folder and rename it to STA_VDI.BIB.

NOVA Video Mode Generator 1.20

Resolution Name: 640x480x2, 68 Hz, 640x480

Signals: horizontal vertical
 Total: 792_ 518_
 Length: 640_ 480_
 Border Width: 8_ 7_
 Screen Position:

Polarity:

Virtual Resolution:
 horizontal: 640_
 vertical: 480_

Colors:
 2

Frequencies:
 maximum current
 Screen Frequency: 70_ Hz --- Hz
 Line Frequency: 38_ kHz --- kHz
 Pixel Frequency: 45_ MHz 28 MHz

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4.3.1 Purpose of the Video Mode Generator

With the **NOVA** video mode generator (abbr: VMG) you can create new resolutions, modify or delete existing resolutions from a resolution library or define virtual resolutions.

For this it is advantageous if, in addition to your VGA compatible monitor for your NOVA card, you also have another monitor connected to the ATARI monitor port. Also you must have booted the computer without loading the **NOVA** VDI driver. If you do not have a second monitor, you can also start the video mode generator on the **NOVA** monitor (of course then you would also need the **NOVA** VDI loaded).

The video mode generator can be found in the folder VORSICHT. Also in this folder is the resolution library file RES_BIB.BIB which contains all the predefined resolutions. The folder can be copied to any location on the hard drive. The folder name VORSICHT (English: "CAUTION") has been chosen carefully as the video mode generator can cause irreparable damage to any connected VGA or multisync monitor if it is used improperly.

4.3.2 Controls of the Video Mode Generator

The dialog box which appears after starting the **NOVA** video mode generator is divided into several sections:

Resolution Name:

A resolution that you have created with the video mode generator can be assigned a name of up to 32 characters in length. This name then appears in the menu program when booting the computer when you want to select a VGA resolution. The ReSwitch program also needs these names. In order for the names of your new resolutions to clearly represent what the resolution looks like, you should construct them according to some rules that were also used for the predefined resolutions.

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A typical name for the predefined resolutions is: 800x600x256, 70 Hz, 800x1024

This means in detail: "800x600", there are 800 horizontal pixels and 600 vertical pixels on the screen. These values are referred to as the real resolution. The value "x256" indicates that a maximum of 256 colors can be simultaneously displayed in this resolution. "70 Hz" describes the refresh rate. It is 70 Hz. "800x1024" means that an image area of 800 horizontal pixels and 1024 vertical pixels is internally managed by the display driver. These values are referred to as the virtual resolution. This virtual area is not completely visible on the screen. For this reason, when using such a resolution, the VDI driver will "shift" the screen when the mouse pointer touches the corresponding edge of the monitor. This shift is done with real-time hardware scrolling.

Signals:

In this field you can set all the signals your monitor receives from the **NOVA** card. This gives you the capability to create any real resolutions yourself.

Warning: Improper settings can cause irreparable damage to your monitor. So before you change any of these values you should read the following Chapter 4.3.3.

All important values for creating new resolutions can be found in the 'Signals' field. These are divided into two columns: one column for horizontal signals and another for the vertical signals. The horizontal values must always be a multiple of 8. If this is not the case, the video mode generator adjusts the value accordingly.

The following values are adjustable:

The value in the 'Total' field indicates how many screen pixels the monitor raster beam scans over in the respective direction. This value must be the largest one in the corresponding column.

The 'Length' value indicates how many pixels are actually displayed in each direction. In general, this value is about 75% of the 'Total' value for the horizontal column about 90-95% of the 'Total' value for the vertical column. The 'Border Width' value can be used to specify an edge around the actual screen image. This border is not usually visible.

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Under the item "Screen Position" you will find five buttons: "Init" and one arrow button for each direction up, down, left and right. You should always press the "Init" button if you have changed any values in the range of 'Total', 'Length' or 'Colors'. By pressing "Init" the video mode generator calculates necessary values for your graphics card and remembers them. After displaying the screen with "Set Values" you can change the screen position with the four directional arrows (this does not work if the VMG has been started on the NOVA monitor). Use the 'Polarity' buttons to indicate which polarity the synchronization signals have in each direction. The polarity changes the image size (depending on the monitor). A "selected" button (black background) indicates negative polarity, otherwise it is positive when the button is "deselected".

The "Interlaced" button switches to interlaced mode. In the interlacing process, only every second line is displayed each time a full screen image is rendered, which doubles the frame rate. It should be noted that in interlace mode the vertical 'Total' value contains an odd number.

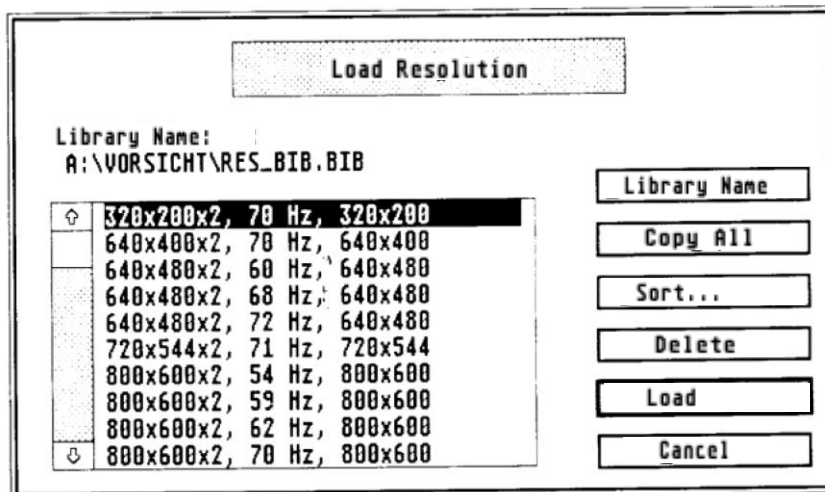
The "Low Res." button is needed to display lower screen resolutions. If this button is selected, two vertical lines are combined into one (so-called double scan mode). This requires you to specify the values of all the vertical signals twice as high as the resolution you want. For example, if you load one of the included 300x200 pixel resolutions, you will notice that the vertical length is 400 pixels. With the "Double Scan" button, only the double scan mode is switched on: see also "Low Res." button. Under "Virtual Resolution" you can set the desired virtual resolution, in which the horizontal value must be a multiple of 16. If it is not a multiple of 16, then the value is adjusted accordingly by the video mode generator. If the specified virtual resolution is too high, a corresponding error message will be displayed.

Colors: In this field you can specify how many colors can be simultaneously displayed in the configured resolution.

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The values 2, 16, 256 and 32768 (and 16.7 million in the true color version) are available.

Frequencies: This field is of crucial importance if you want to create your own resolutions. For one thing, you can enter maximum frequencies at which your monitor will not be damaged. If the video mode generator calculates a frequency from the values entered in the 'Signals' field that is greater than one of the maximum frequencies then an error message will be displayed. Of course, the resulting signals will not be sent to your monitor. All calculated frequencies are also placed in the 'Current' column.'



The button field has six buttons.

With the "Load Resolution" button a predefined resolution can be loaded. After selecting this button, you will be taken to another submenu. A dialog box will appear in which all the resolutions available in the current resolution library are displayed on the left-hand side in a box with a slider. (scroll bar). By double-clicking one of these resolutions, it will be loaded and will then return to the main menu. Next to the list is a button field. With the "Library Name" button you can select the name of the desired resolution library by means of a file selector box.

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If this library does not exist, it will be created when saving the first resolution. The name of the library should end with ".BIB". The "Copy All" button saves the current resolution library under a different name. After clicking the button a file selector box will appear, in which you can specify the new name for the copy. With the help of the "Sort..." button you can sort the current resolution library. After selecting the button a small box will appear, in which you can decide between sorting by resolution height or by number of colors (or not at all). Selecting the "Delete" button clears the currently highlighted resolution. The resolution doesn't necessarily have to be visible in the resolution window. Before deleting, a confirmation prompt will appear. After clicking the "Load" button, the currently highlighted resolution is loaded and then returns to the main menu. The "Cancel" button exits the submenu and returns to the main menu. No resolution is loaded. Any newly set library name is retained though.

The "Save Resolution" button on the main menu stores the values currently entered on the screen in the current resolution library. If a resolution library with the specified name already exists in the resolution library, a warning message is displayed and you can either cancel or overwrite the already saved resolution.

The "Save Parameters" button saves all current settings in the file VMG.INF. Next time the program is started they will be available again.

With the "Set Values" button, the resulting frequencies are calculated from the values currently set in the 'Signals' and 'Colors' fields. If the settings are valid depending on what you set for the maximum frequencies, they will be sent to your **NOVA** monitor.

ATTENTION: Incorrect 'signal' values and maximum frequencies that are too high can cause irreparable damage to the monitor connected to the **NOVA** card!!!

Before you press this button, you should (really) read Chapter 4.3.3 of this manual!

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Pressing the "Screen Off" button will stop sending signals to the monitor connected to the **NOVA** card. After pressing the button the monitor will display a black screen. The VMG is terminated by pressing the "Exit" button. You will be asked if you really want to quit the program.

4.3.3 Usage of the Video Mode Generator

A generic "recipe" for creating new resolutions cannot be cooked-up. For this reason, we will only briefly explain which values are needed to create resolutions. A complete and comprehensive explanation is reserved for some specialized documentation.

We therefore remind you (again and again) that the creation of new resolutions through incorrect usage of the video mode generator will (or can) lead to the destruction of your monitor!!

However, there are some measures that can minimize this risk.

First, after starting the video mode generator for the first time, you should enter the maximum permissible frequencies for your monitor in the 'Frequencies' field. These frequencies can be found in the manual for your monitor. Instead of "Pixel Frequency", the term "Bandwidth" may appear in your manual. After entering the maximum frequencies you should save your settings with "Save Parameters" button. This will make them available again each time the program is started.

After setting up the video mode generator in this way you can try a new resolution. To do this, it is best to select and load an already existing resolution whose values are closest to the desired new resolution. A number of resolutions of all kinds can be found on the **NOVA** driver disk in the RES_BIB.BIB file in the folder VORSICHT .

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Now change the desired parameter (i.e. screen width or screen height) and give the resolution a new name. To validate the new values in the "Signals" table, press the "Init" button.

You can test the new values with the "Set Values" button. It clears the screen, sets the frame color to red and draws 2 blue lines at each edge of the screen to let you see if the image is actually fully rendered. In addition, a blue grid overlays the screen. With 2 colors, the blue lines may be broken, but that doesn't matter.

If your monitor does not display a steady image or makes strange whistling noises about 3 to 5 seconds after pressing the "Set Values" button, you must immediately press the "Screen Off" button. Otherwise, you risk irreparable damage to the monitor.

After pressing the "Screen Off" button, your monitor should display a quiet, black image and you should hear no strange sounds. If that is not the case, you should physically turn it off. If the screen is quiet after pressing the "Set Values" button, but slowly changes (for example, shows distortions) then you should also press the "Screen Off" button.

If the new resolution has worked to your satisfaction, then save it with the "Save Resolution" button and exit the video mode generator.

5. Miscellaneous Topics

Throughout this manual most of the questions about the **NOVA** should have been clarified. If, despite careful study of the manual, you still have unanswered questions, please contact your dealer.

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5.1 Tips and Tricks

When using the **NOVA** in the Mega ST 1 there are no thermal issues unless the computer is equipped with too many other extensions.

But as soon as 4MB of RAM, a 16MHz accelerator and the **NOVA** are installed, there may be occasional heat-related malfunctions. If this is the case, we recommend installing a fan in the computer!

If the '**NOVA VME**' is operated in 16 color mode in the Mega STE, the CPU cache must be switched off (with the control panel) Otherwise, astonishing things will happen on the screen!

Some programs (such as GFA BASIC) have problems if the screen height is not a multiple of 16. In that case, modify a resolution in the resolution library to accommodate this.

If you have updated your **NOVA** VDI driver, you should replace all old files with the corresponding new files!

5.2 Compatibility

All programs that use the VDI to perform their screen output should run on the **NOVA**!

Many programs only support monochrome resolutions. In most cases, it is enough to have the VDI driver switch over to a monochrome resolution with the ReSwitch program (see Chapter 4.2).

However, a number of programs completely bypass the VDI with their programming. These are primarily line debuggers which normally work without an operating system. As a remedy, only the use of an additional monitor on the original ATARI monitor port or the use of a monitor switch box can be recommended.

Also various games don't use clean programming. For this purpose, two programs are included in the DATA folder of your **NOVA** driver disk; BOOT.PRG and FCONVERT.PRG (an Atari screen emulator).

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These programs should be copied to a separate AUTO folder which you can use to boot only when you want to emulate the SM124/144/146 or the SC1435.

Also, booting with only EMULATOR.PRG in the AUTO folder is successful with some programs.

Unfortunately, many PD programs are not programmed cleanly. At this point we again appeal to the PD software authors to at least ensure their programs are resolution-independent! If a program or part of a program does not work with the **NOVA** driver, and there are no other known problems, please let us know. In this case, please describe the error as accurately as possible. Do not forget to mention your computer configuration, the name of any loaded accessories and AUTO folder programs and the resolution used. We will then try to make the VDI driver even more compatible.

5.3 Programming on the NOVA

This section is for the advanced user and programmers only.

In principle, you should only perform screen access via the VDI. Programming with LINE-A routines is only supported up to 16 colors. However, it is best to completely avoid LINE-A programming, because it causes enormous problems with the TT! You can write directly to the screen memory. But to achieve a speed advantage, you must use assembly programming. The **NOVA** VDI driver itself is written in assembler in all time-critical sections! Also of note, the STA_VDI routines have more speed optimizations for 256 colors mode than for 16 colors.

The **NOVA** software creates its own cookie in the cookie jar ("IMNE"), which points to the variables region of the **NOVA**. This can be used to check whether the **NOVA** is correctly installed in the system. The cookie value then points to the a structure of type "ICB". The details of this structure are described in the file ICB.H (Attention: the tab width should be set to 3).

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In the resolution files, the resolutions are stored in the form of structures of the type RESOLUTION. This structure is described in the file RES.H (tab width 3). Those values which are not sufficiently explained by the structure description are irrelevant to application programming and should not be used since they may differ from card-type to card-type.

The NOVA_COL.ACC accessory can be remotely controlled. appl_write can be used to toggle the physical resolution while the virtual resolution remains the same (magnification effect).

The way to use this functionality is shown in the demo program ACC_DEMO.ACC (source included). This demo program can be used to switch back and forth between the boot resolution and the lowest possible physical resolution via the keyboard. (with Control+Left Shift). The virtual resolution is retained which results in a magnification effect. The switching function only works after about 10 seconds from the time the desktop appears. In the current version, this demo program is not quite secure. With ReSwitch the resolution is switched at the start of a program so it should not be switched to the lowest resolution, otherwise you will experience an unpleasant surprise after leaving the program: the physical resolution of the lowest resolution is then used as the virtual resolution.

A few words about the 32768 color version:

The associated resolutions have the component "x32k" in the name.

Screen memory configuration:

For each pixel a word is needed, of which only 15 bits are used. For each color component (red, green, blue), 5 bits are used which allows for 32 shades ($32 \times 32 \times 32 = 32768$). Bit 0-4 affect blue, Bit 5-9 green, Bit 10-14 red. But this calculated pixel value must be rotated by 8 bits to the left (or right) before writing to screen memory because the screen memory is constructed according to the very common Intel format Low Byte/High Byte.

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Compared to the older driver versions using 32768 colors, there has been a change since version 1.48 for reasons of compatibility: 256 colors are simulated in 32768 color modes. The VDI driver thus returns 256 in 'Open Virtual Workstation' as the number of colors.

There are two reasons for this:

1. The standard GEM colors 0 to 15 are now correctly assigned.
 2. Color problems with the FSMGDOS from ATARI are avoided.
- In 32k modes, the color palette (CLUT) can not be changed. Correspondingly, the VDI driver returns the value 0 for the 'Extended Inquire' call in `work_out[5]` (= `intout[5]`) (no CLUT). The number of planes returned is 16.

However, calls to "Set Color Representation" (`vs_color`) are possible because the VDI driver simulates a CLUT in software. The following method gives you access to all 32768 colors: You set a color index (please do not use indexes 0 to 15 as these should continue to be GEM compliant) with `vs_color` to the desired color. Now you can perform your output. If you want to use a different color, set the same color index to a different color with `vs_color`. Unlike the true 256 color modes, your recent outputs retain their original color. You can now output with the new color.

In the TT (MEGA STE) control panel, the sound setting should not be used as this will result in a system crash.

Changes from version 1.57:

As of driver version 1.57 the **NOVA** VDI driver supports several different screen pages. With 1.57, you have the option of displaying an image, building one in the background and then switching the display to the new image. Since it is not possible, like with the original ATARI resolutions, to put the screen memory in any position in main memory (at least in ST-RAM), another way had to be found.

The procedure is as follows:

The **NOVA** supports several screen pages. These are all located in

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the address space provided by the graphics card. To switch to another screen, use the XBIOS function 5 "Set Screen" as usual. The number of screen pages can be determined from the **NOVA** Control Block (ICB) variable `scrn_cnt` (read: "screen count"). There is also the ICB variable `scrn_size`, which specifies the size of a screen in bytes. The variable `base` gives the address of page 0 of the screen. If you want to physically switch to page 1, this is done simply by calling (under the assumption that `icb` represents a pointer to the **NOVA** Control Block):

```
Setscreen((void *)-1, icb->base, -1);
```

One more thing:

As you may know, you can use the function `(*icb->p_chres)()` to toggle the resolution of the graphics card. However, this does not change the physical screen address. Therefore, one should always do before this

```
Setscreen(icb->base, icb->base, -1);
```

to toggle the physical and logical screen address for page 0.

With the function `(*set_vec)()` (Attention: call this in supervisor mode) the VDI output routines are changed to the currently set resolution. In doing this, it is implicit that the physical and logical screens are switched to page 0.

As of driver version 1.46, in the management of the virtual screen, the visible section is shifted as soon as the distance between the mouse pointer and the edge of the screen falls below a certain value. However, this may not be desirable, especially if the scrolling is triggered programmatically with `(*icb->chng_vrt)()`. Therefore, the ICB variables `v_top`, `v_bottom`, `v_left` and `v_right` were introduced, which define the distance for the four screen edges. If all four values are set to 0, scrolling is only really done if the coordinate passed with `(*icb->chng_vrt)()` is outside of the currently visible range

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When changing these values, you should note that it is
 $(v_top + v_bottom) < \text{screen height}$
and
 $(v_left + v_right) < \text{screen width}$

6. Definitions

For clarification, some terms used in this manual are explained here again for reference:

Resolution Library: A resolution library is a file in which resolution definitions are stored. Such a file can be created and modified with the video mode generator VMG.PRG and is used by the menu program during the boot process to determine the possible resolutions. Resolution libraries should always end in ".BIB".

Real Resolution: The real resolution refers to the actual number of pixels shown on the monitor in the horizontal and vertical dimensions. Typical real resolutions are 640x480 pixels, 800x600 pixels or 1024x768 pixels.

Virtual Resolution: With the virtual resolution the operating system of your computer is tricked to see a higher resolution than really exists. When using the virtual resolution only part of entire screen is visible on the monitor. To view the entire screen content the visible screen area is shifted when the mouse pointer reaches the edge of the screen. This happens in real-time. The horizontal virtual resolution must be a multiple of 16.

7. Technical Data

In concept, the VGA cards used with the **NOVA** can have a maximum video bandwidth of 90 MHz. This can be changed several steps down. The horizontal and vertical frequency can be freely programmed.

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The linear addressable screen memory is 1MB in the VME versions (Mega-Bus 768KB).

The VDI driver is approx. 100KB and is started from the AUTO folder. This means that the **NOVA** complies with the VESA standard. The VESA standard specifies a resolution of 1024x768 pixels in 256 colors with more than 70Hz screen refresh rate. Of course, higher resolutions are possible. These will then run with a lower refresh rate. Likewise, the **NOVA** can also display lower resolutions with lower pixel clocks.

The setting of virtual resolutions is not subject to any restrictions that depend of the frequencies of the **NOVA**. Of course, the maximum addressable screen memory defines the limit.

The Mega-Bus version can be equipped with a 68881 math coprocessor. A socket is provided for the PGA version of this chip. With the coprocessor equipped, it runs with a clock frequency of 8MHz. If you want to increase the clock speed of the coprocessor you have to solder an oscillator over the socket in holes provided for this. In addition, the spot marked with "X" on the underside of the pcb board must be interrupted.

The jumpers on the VGA card are always placed by us. You should not change these settings.

