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Chapter 1 Specification and Features

1.1 General Specifications

39XXA-Series S3 Savage4 VGA Card taking the 1999 graphics mainstream of Savage4 is designed into two groups of solution: **3970A, the LCD solution** and **3952A, the TV-out solution.**

General specifications:

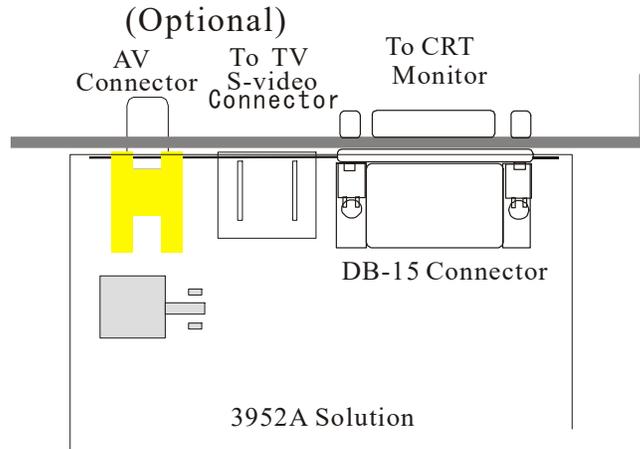
1. Main Chipset: S3 Savage4
2. Driver Support: Windows95/98; WindowsNT4.0/5.0; DirectX 6.x; OpenGL 1.11CD
3. Bus: AGP 2x/4x
4. Memory: Up to 32MB SD/SGRAM
5. BIOS: Flash ROM BIOS
6. RAMDAC: 300MHz RAMDAC with Gamma Correction.
7. Resolution: 640x480x32 at 160Hz to 1920x1440x16 at 75Hz
8. DVD Playback: Optimized DVD Playback (Motion Compensation)
9. DB-15 Analog Monitor Connector (VESA DDC2B)

1.2 Solution Differentiation

To cope with users' diversified requirements, 39XXA series VGA Card is flexibly designed into two groups of solution: 3952A and 3970A:

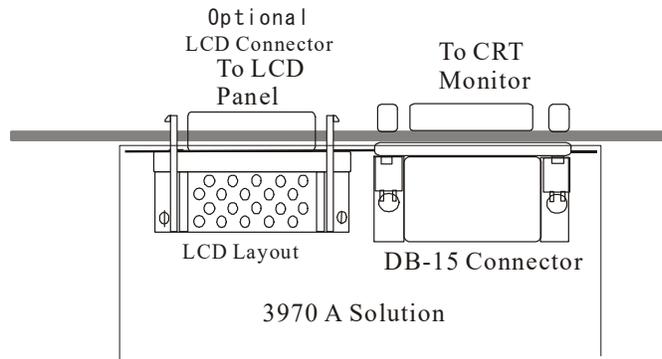
1.2.1 3952A-Solution

Main feature of this series is optional S-video Connector and AV Connector.



1.2.2 3970A Series

The main feature of this solution is optional LCD Connector:



Chapter 2 Features Highlight

2.1 S3 Savage4 Accelerator Features Highlight

39XXA Series VGA Card is based on the marvelous S3 Savage4 Accelerator. Setting the 1999 mainstream standard, S3 Savage4 accelerator delivers today's hottest graphics and video technologies at mass market price points

Let us appreciate its features one by one:.

2.1.1 High-Performance 2D/3D/Video Accelerator

- Floating point triangle setup engine
- Single cycle 3D architecture
- 8M triangles/second setup engine
- 128-bit rendering pipeline
- 140M pixels/second trilinear fill rate
- Full AGP 4X/2X, including sideband addressing and execute mode
- S3 DX6 texture compression (S3TC)
- Flat panel desktop monitor support
- High quality DVD video playback

2.1.2 3D Rendering Features

- Single-pass multiple textures
- Hardware bump mapping
- Full scene anti-aliasing
- Anisotropic filtering
- 8-bit stencil buffer
- Single cycle trilinear filtering
- 32-bit true color rendering
- Specular lighting and diffuse shading
- Alpha blending modes
- MPEG-2 video textures
- Vertex and table fog
- 16- or 24-bit Z-buffering
- Sprite anti-aliasing, reflection mapping, texture morphing, shadows, procedural textures and atmospheric effects

2.1.3 Motion Video Architecture

High quality up/down scalar
Planar to packed format conversion
Motion compensation for full speed DVD playback
Hardware subpicture blending and highlights
Multiple video windows for video conferencing
Contrast, hue, saturation, brightness and gamma controls
Digital port for NTSC/PAL TV encoders

2.1.4 High Speed Memory Bus

125/143 MHz memory interface
2 to 32 MB frame buffer
1Mx16 or 2Mx32 or 4Mx16 SDRAMs
256Kx32 or 512Kx32 or 1Mx32 SGRAMs
Block write support

2.1.5 2D Acceleration Features

Highly optimized 128-bit graphics engine
Full featured 2D engine for acceleration of BitBLT, rectangle fill, line draw, polygon fill, panning/scrolling and hardware cursor
8, 16, and 32 bpp mode acceleration

2.1.6 Flat Panel Desktop Monitor Support

24-bit digital interface for flat panel encoders
Auto-expansion and centering for VGA text and graphics modes
Support for all resolutions up to 1280x1024

2.1.7 Full Software Support

Drivers for major operating systems and APIs: [Windows 9x, Windows NT 4.0/5.0, Windows 3.x and OS/2 2.1/3.0 (Warp), Direct3D, DirectDraw and DirectShow, OpenGL ICD for Windows 9x and NT]

2.1.8 Additional Features

300MHz RAMDAC with gamma correction

I²C serial bus and flash ROM support

ACPI and PCI power management

Hardware and BIOS support for VESA timings and DDC monitor communications

PCI 2.2 bus support including bus mastering

27x27mm PBGA with 336 balls

2.5V core with 3.3V/5V tolerant I/O

2.2 Further Discussion on S3 Savage4 Features**2.2.1 High-Performance 3D Accelerator**

Featuring a new super-pipelined 128-bit engine, Savage4 utilizes a single cycle architecture that provides high performance along with superior image quality. Several new features enhance the 3D architecture, including single-pass multitexturing, full scene anti-aliasing, anisotropic filtering, an 8-bit stencil buffer and hardware bump mapping. Savage4 also offers the industry's only simultaneous usage of single-pass multitexturing and single-cycle trilinear filtering - enabling stunning image quality without performance loss. Savage4 further enhances image quality with true 32-bit color rendering throughout the 3D pipeline to produce more vivid and realistic images. Savage4's advanced triangle setup engine provides industry leading 3D performance for a realistic user experience in games and other interactive 3D applications. The 3D engine is designed for AGP texturing from system memory or the local frame buffer.

2.2.2 128-bit 2D Graphics Engine

Savage4's advanced 128-bit 2D graphics engine delivers high-speed 2D acceleration for productivity applications. Several enhancements have been made to the 2D architecture to maintain best of class performance and to provide acceleration in all color depths.

2.2.3 DVD Playback and Video Conferencing

Savage4 provides the ideal architecture for high quality MPEG-2 based DVD applications and video conferencing. For DVD playback, Savage4's video accelerator offloads the CPU by performing the planar to packed format conversion and motion compensation tasks, while its enhanced scaling algorithm delivers incredible full-screen video playback. Furthermore, for video conferencing, Savage4's multiple video windows and image mirroring provide an ideal solution.

2.2.4 Flat Panel Desktop Monitor Support

Savage4 has the capability of displaying graphics on flat panel desktop monitors using a 24-bit digital interface to an external encoder. Savage4 also supports autoexpansion and centering of all VGA text and graphics modes to ensure that the entire flat panel display will be utilized. All resolutions are supported up to 1024x768.

2.2.5 High Screen Resolution CRT Support

Frame Buffer Size			
Resolutions Supported	4MB	8MB	16/32 MB
640x480x8/16/32	x	x	x
800x600x8/16/32	x	x	x
1024x768x8/16/32	x	x	x
1280x1024x8	x	x	x
1280x1024x16	x	x	x
1280x1024x32		x	x
1600x1200x8	x	x	x
1600x1200x16	x	x	x
1600x1200x32		x	x
1920x1440x8	x	x	x
1920x1440x16		x	x
1920x1440x32			x

2.3 S3 Texture Compression and AGP

S3 Texture Compression is supported by the S3TC platform. Licensed by Microsoft as a standard in DirectX 6.0 APIs, S3 Texture Compression allows software developers to compress their texture data by one-fourth to one-sixth its normal size while maintaining the image quality of the original artwork. When used in conjunction with AGP, S3TC provides for texture amounts that were previously unheard of. Now, instead of a texture budget of 2,4 or 8 megabytes of memory, software developers can put over 200 MB of 24-bit textures in one 3D scene on a PC with 64 MB of system memory (see expanded texture storage).

In addition, by compressing textures, S3TC:

- ## Improves sustained fill rates when texturing from system memory by removing the read bandwidth bottleneck that often limits achievable fill rates.

- ## Maximizes effective bandwidth so that more data can be shipped across the AGP bus, increasing performance.

- ## Frees sufficient memory to allow for triple buffering, boosting overall achievable fill rate by about 30% when texture data is stored in the local frame buffer.

- ## Improves image quality by allowing for higher resolution images to be stored in the same memory footprint.

- ## Supported by strong Savage 3D Tools and Utilities:

The following tools and Utilities can be found in:

www.S3.com/support/tech/savage.htm

S3TC Viewer Utility (download s3tc.zip 24k)

The S3TC Viewer Utility is a tool for converting image files to a S3TC file format. The S3TC Viewer Utility allows programmer using this tool to convert supported image file formats such as 24-bit BMP, 24-bit TGA, TIFF, and JPEG to a S3TC file format.

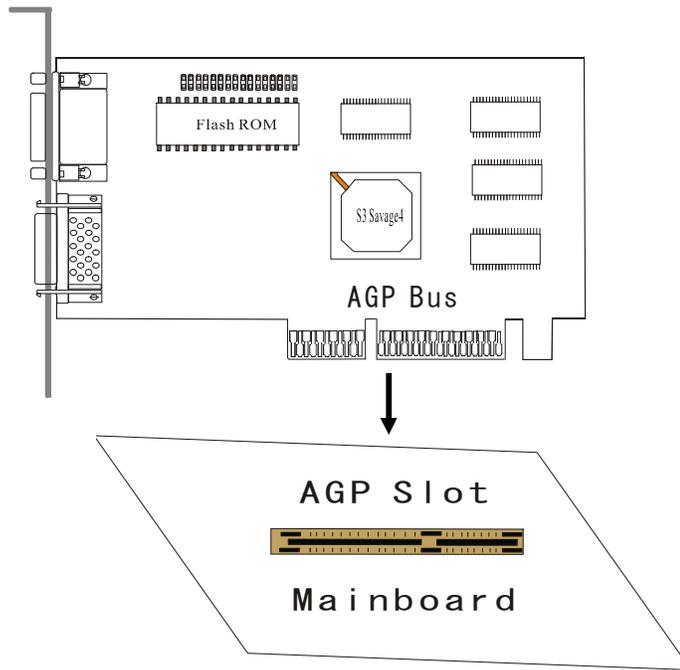
S3TC Libraries and Headers (download s3tcsetup.exe 916k)

Allows you to compress your proprietary texture format with S3 Texture Compression.

CHAPTER 3 INSTALLATION

3-1 Hardware Installation – To install the VGA Card

Each VGA card of 39XXA Series is built with AGP Bus support. The AGP Slot is a 124-pin slot as shown below.



Both the AGP Edge and the AGP Slot are of foolproof design to assure a correct connection.

3-2 Highlights of AGP Features:

S3 Inc. announced its new Savage4 graphics accelerator, which is the first accelerator to be designed to work with Intel's new 4X AGP support in its forthcoming chipsets. Henceforth, in trying S3 Savage4, we cannot but examine the role of AGP.

3-2-1 AGP or Accelerated Graphics Port is a new bus interface for graphics accelerators.

AGP gives graphics accelerators fast, high throughput direct access to system memory. This allows a graphics accelerator access to more memory than available locally on the graphics card. For example, to display a scene that contains 16MB of textures, a 4MB AGP graphics card could access the PC system memory for the additional 12MB required.

3-2-2 AGP delivers a peak bandwidth that is 4 times higher than the PCI bus using pipelining, sideband addressing, and more data transfers per clock.

It will also enables graphics cards to execute texture maps directly from system memory instead of forcing it to pre-load the texture data to the graphics card's local memory. AGP is based on the PCI 2.1 standard which calls for a 66MHz PCI bus speed.

The result of AGP is a much smoother frame rate and the ability to display 3D graphics and video that is many times more realistic and much a higher quality than ever before found a PC.

3-2-3 The current PCI bus supports a data transfer rate up to 132 MB/s, while AGP (at 66MHz) supports up to 533 MB/s!

AGP attains this high transfer rate due to it's ability to transfer data on both the rising and falling edges of the 66MHz clock, and through new design advances that have made data transfer modes more efficient.

3-2-4 Direct Memory Execute (also knows as DIME) is the most important feature of AGP.

AGP graphic chips have the capability to access main memory directly for the complex operation of texture mapping. AGP provides the graphics card with two methods of directly accessing texture maps in system memory: pipelining and sideband addressing. In pipelining, AGP makes multiple requests for data during a bus or memory access. PCI makes one request, and does not make another until the data it requested has been transferred.

3-3 Driver installation:

S3 Savage4 VGA Card is shipped in a package which includes a Driver & Utility CD containing Drivers for Windows 95/98, and NT 4.0.

3-3-1 Driver Installation For Widows 95/98 system:

Step 1: Install your hardware card properly (refer to hardware installation guide).

Step 2: Power on your PC.

Step 3: For the first time you install this card, by the Plug and Play feature of Windows 95/98, Windows will find a new hardware and ask for the driver. Because the Savage4 driver is provided in the manufacturer’s CD (and not in your Windows system yet), you Should leave Windows Device Driver Wizard first.

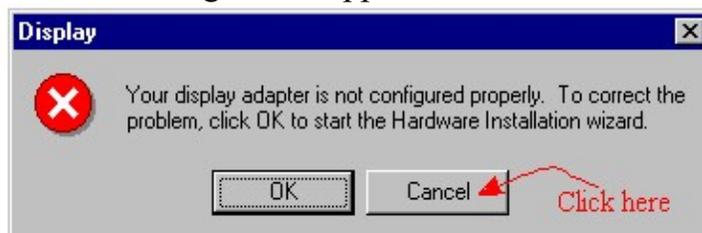
(A) For Windows 95 (Original Version):

After starting Windows, You will see a dialog similar to the window below appear on your screen:

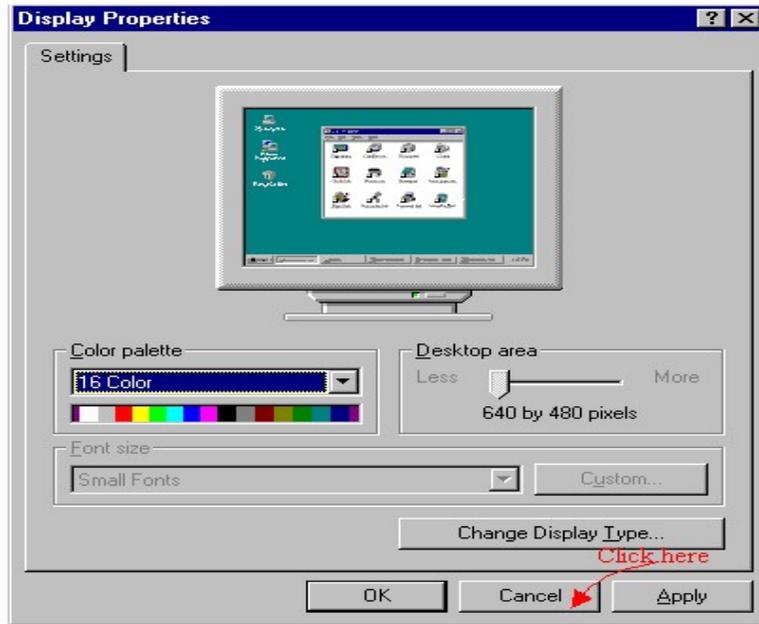


Click **“Do not install a driver (Windows will not prompt you again)”** then press **“OK”**.

When the following screen appears, click **“cancel”**



Click “Cancel” then you will see:



Click “Cancel”, and the system’s “Desktop” screen .

(B) For Windows 98:

After starting Windows 98, you will see a dialog similar to the window below appears on your screen:



Click “**Next**”. After that, you will see a dialog similar to the window below appears on your screen:



The default is “**Search for the best driver...**”, select it and then click “**Next**”.

After that, you will see a dialog similar to the window below appear on your screen:



Tick “Specify a location” , enter “C:Windows 98” and click “Next”.

Since your system cannot find the “Savage4 Driver” in itself, a dialog similar to the window below appears on your screen:



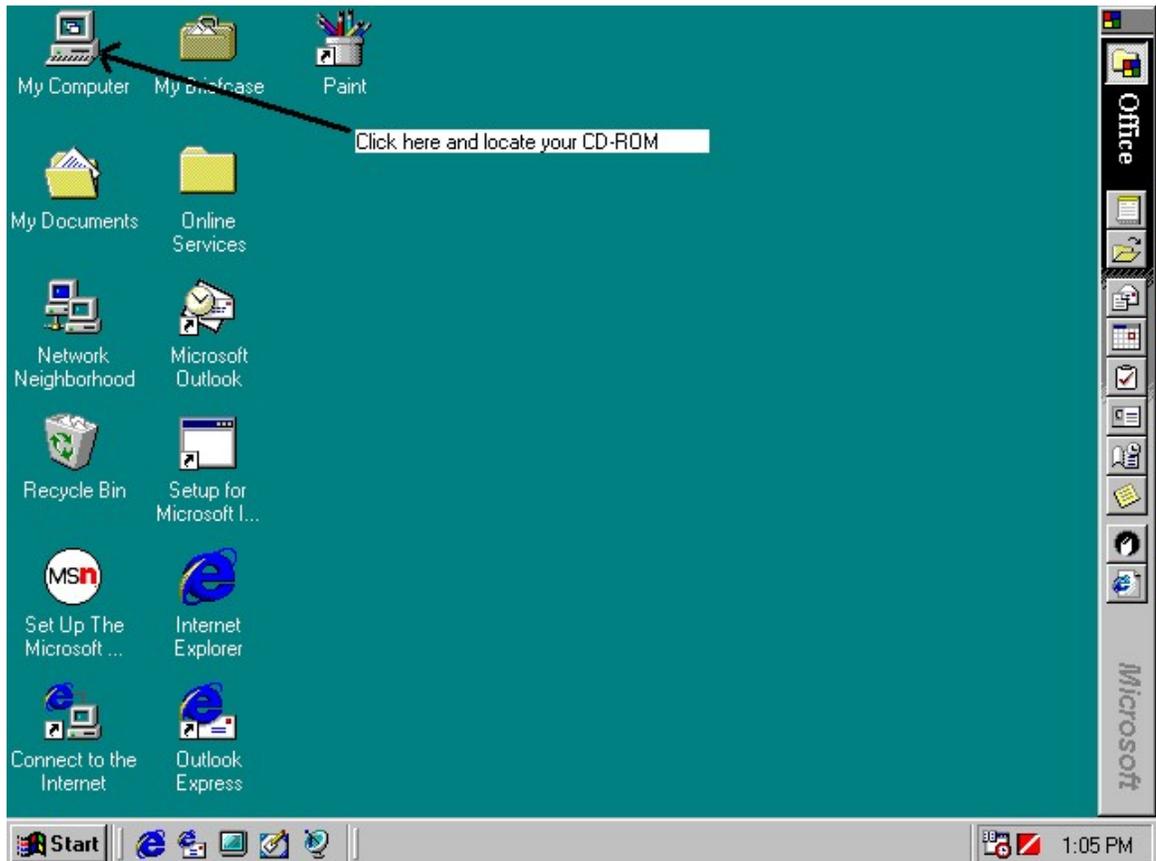
The default is “Next”, click “Next”. After that, you will see a dialog similar to the window below appear on your screen:



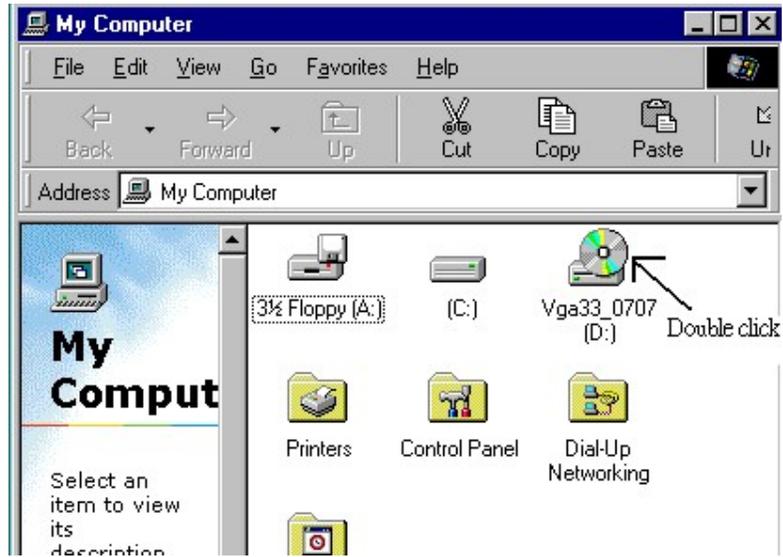
If Windows prompt you to restart Windows, click “OK” to restart Windows.

Step 4: When your system settles on the “Desktop” screen, insert the Manufacturer’s “Savage4 Setup CD” into your CD-ROM drive.

If the “S3 Savage4 Setup” screen does not automatically appear in a second or two, you should then double-click “My Computer” icon to locate your CD-ROM icon:



Step 5: When the CD-ROM icon appears on screen, double-click it to enter “S3 Savage4 Setup”

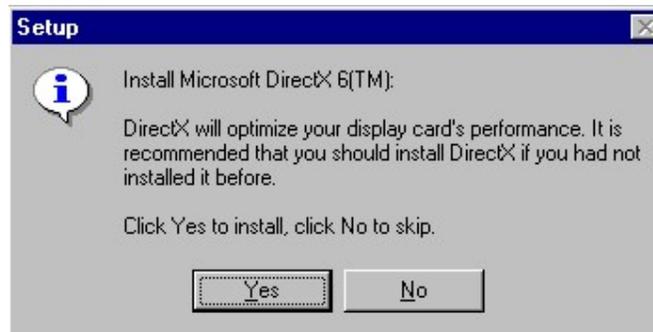


Step 6: The “S3 Savage4 Setup” main menu will appear instantly.

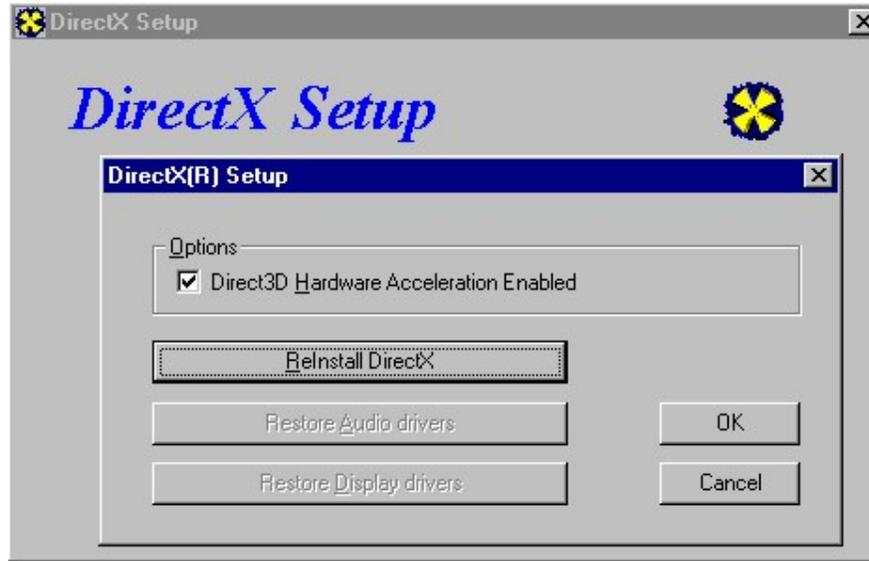
Click “Drivers Setup”. A series of screens with user-friendly instructions will appear to guide you through Savage4 setup, until you see a screen to ask you to install “DirectX 6”.



Step 7: When you see the following screen, click “Yes” to finish “Install DirectX 6”, or click “No” to skip.



Step 8: If you click “Yes” to install “DirectX 6” now, the following screen appears. Click “OK” to finish it.



Step 9: As soon as installation of “DirectX 6” finishes, the following screen appears to remind you to restart your system.



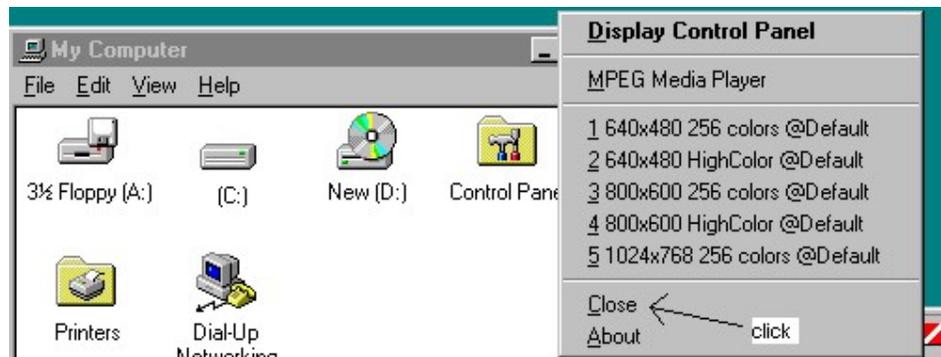
Congratulation! You have successfully installed S3 Savage4 Driver and DirectX 6.

3-3-2 S3 Savage4 Driver Installation on WIN NT 4.0/5.0

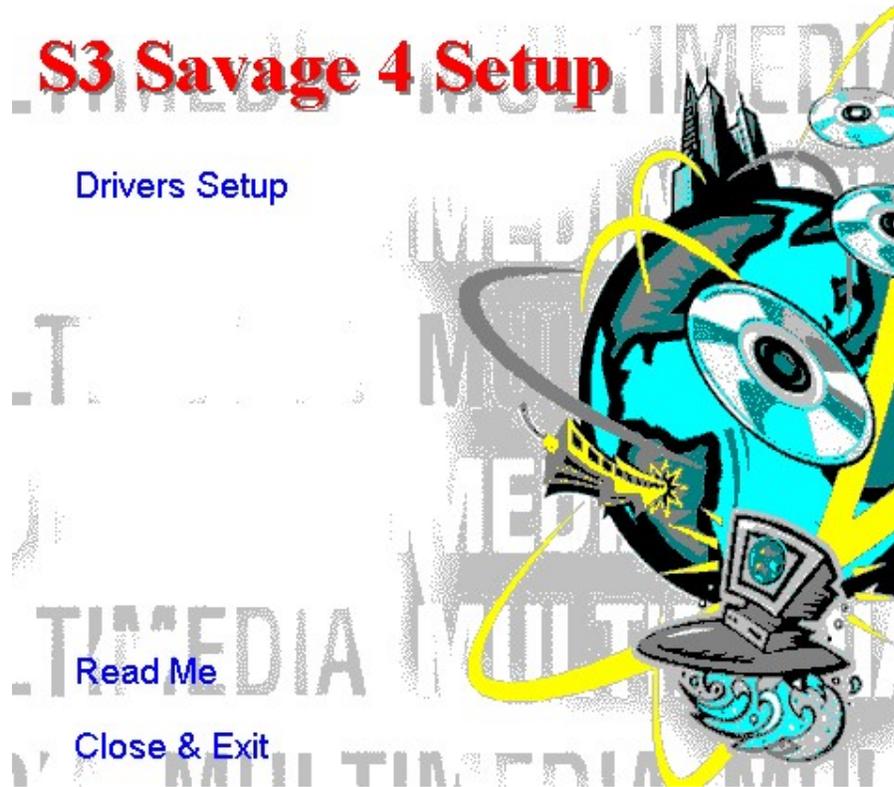
After Savage4 VGA Card has been properly installed to your mainboard, you could then go to Savage4 Driver installation on Win NT 4.0/5.0.

Step 1 With your VGA Card installed and NT system started, insert the Savage4 Utilities and Driver Installation CD into the CD-ROM Drive to go to manual setup.

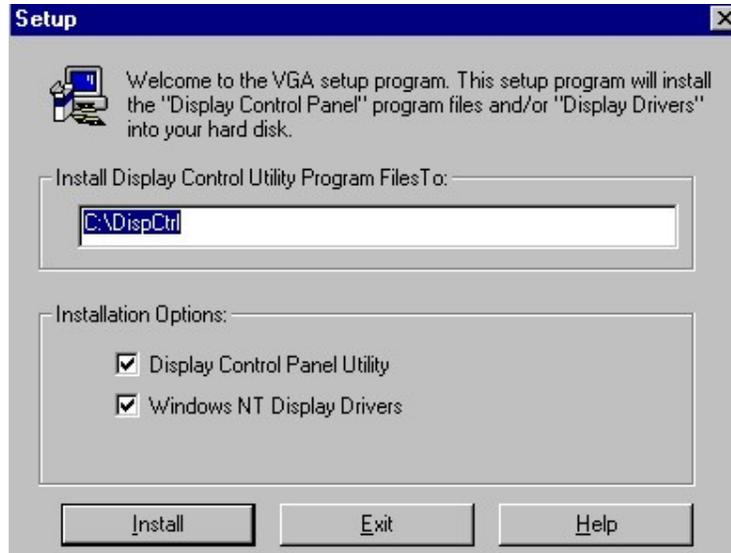
Step 2 Since the driver setup program starts with re-installation of your “Display Control Panel”, you must first close the already installed one so as to enter the program. So, Close the “Display Control Panel” before you click to the CD-ROM icon to enter the Driver CD.



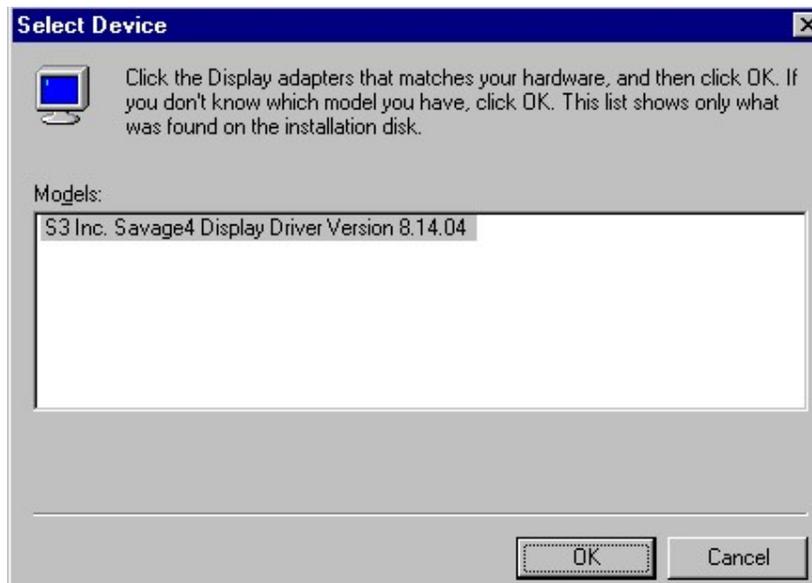
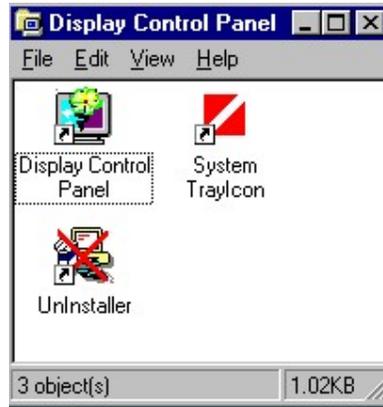
Step 3 After closing your “Display Control Panel”, click the CD-ROM icon and the screen will show the “S3 Savage4 Setup” menu at once as below:



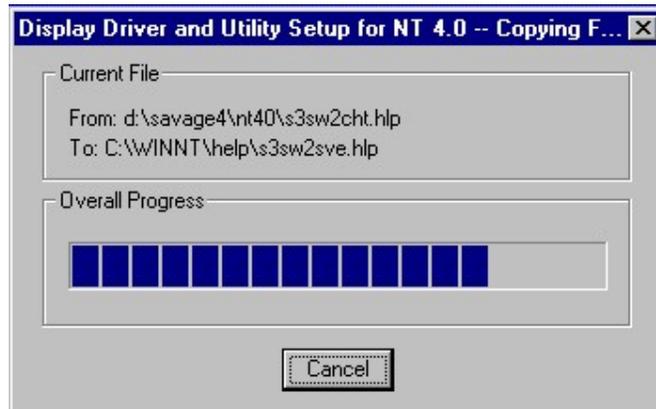
Step 4: Click “**Drivers Setup**” and a screen appears to guide you to install “**Display Control Panel**” first.



Step 5: When “**Display Control Panel**” installation is complete, the corresponding icons will appear for a second and the screen will then switch to the “**Select Device**” display. Click “**OK**” on the “**Select device**” screen to finish “**Display Control Panel**”.



Step 6: After “**Display Control Panel**” installation is complete, the Setup Program will automatically start “**Copying files**” for Savage4 driver setup.



Step 7: In a second, the “**copying files**” finishes, and the “**System Settings Change**” screen will appear to remind you to restart your computer now. Click “**Yes**” to let the new settings take effect.



Congratulations! You have successfully installed the i752 Driver on your Windows NT 4.0/5.0.