# SECONDsight™

## VGA Display Interface
### For Apple // & IIGS series computers

# Owner's Manual

# SECOND

## *sight* ™

**High-Resolution 24-bit color video
card for Apple II computers**

Sequential Systems Inc.
1200 Diamond Circle
Lafayette, CO 80026

800-759-4549
303-666-4549
Fax: 303-665-0933
Sequential@Hypermall.com

# Contents

# Credits

| | |
|---|---|
| Andrew Vogan | Lattice Gate-array design, Z180 subsystem & Apple interface, poker stories |
| Joseph A. Yandrofski | VGA subsystem, and all that gooey analog stuff for the video output |
| Jawaid Bazyar | Firmware, GS application software & toolbox, critiques of the hardware |
| Tim Courtney | More Firmware |
| Petar Puskarich | For naming the thing! |

*Petar Puskarich*

Many thanks to:

Tony (Still Two Weeks, Eh?) Diaz; Bill (Where's my Darn Card?!) Heineman; Frank (Guitar-God) Zappa; Michael (QuickDraw Mc) Hackett; Tim (Mr. Living Library of Source Code) Meekins; Michael (Well it works here!) Searl; and Matt Deatherage, for your usual words of encouragement.

# Introduction

Congratulations for purchasing the Second Sight video board - one of the finest Apple II enhancements available anywhere for your computer. Second Sight will give your Apple IIe or IIgs great new video display capabilities with either your existing monitor (Apple IIGS RGB or compatible) or an inexpensive VGA or SVGA monitor.

Step 1: Make sure that the power to your Apple II computer is turned off.

Step 2: Remove the lid to your computer and set it aside. Make sure that your computer's power cord is plugged into both the wall outlet (or power strip) and the Apple II. This is necessary to help prevent static build-up that could discharge into and damage sensitive circuitry in your computer or Second Sight card. You should periodically touch the power supply (the long metallic box on the left side of your computer) to discharge any static build-up.

Step 3: Determine which type of monitor you are going to be using with Second Sight, and set jumper TP3 appropriately. For an AppleColor RGB monitor, the jumper should be removed. For a VGA monitor, the jumper should be in place. (A handy place to keep the jumper so you don't lose it is to place it on only one leg of the jumper.)



Jumper TP3

7
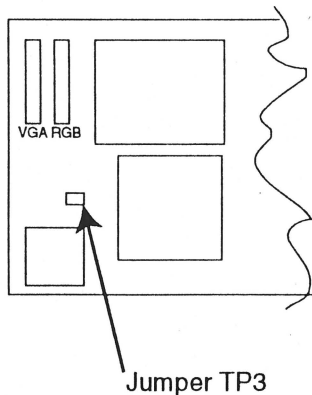
Step 4: Locate an appropriate slot in which to install the Second Sight card. The slots you may use depend on the type of computer you're using:

## Apple IIGS ROM 01

On a ROM 01 IIGS, Second Sight must be installed in Slot 3. This is a limitation of the IIGS' design.

If you have a card in slot 3 currently, you have two choices: either move the card that is currently in Slot 3; or have a qualified computer technician solder a wire from pin 35 (the M2B0 signal) of Slot 3 to the same pin on any free slot (*except* slot 7, on which pin 35 is already in use. Pin 35 is not connected to any signals on slots 1-6).

A Note for Zip GS users: most ZIP boards are installed in Slot 3 because the cable that is supplied with the card is normally only long enough to reach Slot 3. However, if you remove the cable that connects the ZIP to your motherboard and flip it upside-down, it will easily reach the processor socket with the ZIP installed in Slot 1.

## Apple IIGS ROM 03

On a ROM 03 IIGS, Second Sight may be installed in any of slots 1 through 6.

## Apple IIe

On an Apple IIe, Second Sight may be installed in any of the regular slots 1 through 7. Unlike previ-

ous "RGB Video" adaptors for the IIe, Second Sight does *not* go into the IIe's auxiliary slot.

Step 5: holding the Second Sight card as shown in Photo 1, insert the Second Sight card into the slot you have chosen.
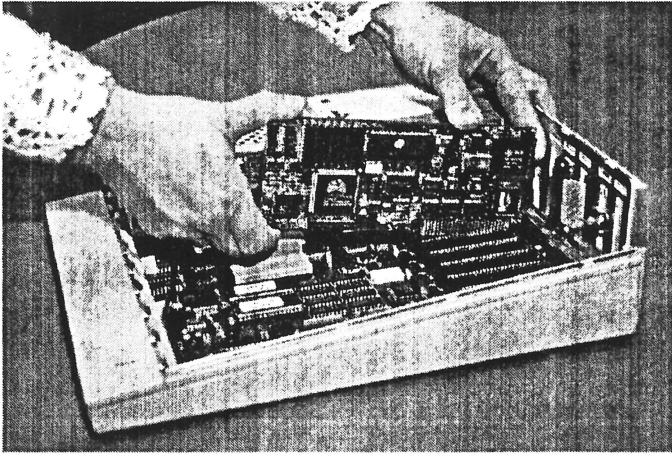


Photo 1

Step 6: attach the appropriate cable for the type of monitor you wish you use. If the interior of your Apple II is crowded you may wish to attach the cable to the card before inserting it in the machine.

There are two monitor cable connectors on Second Sight. One is labelled "VGA" and is for connection to a regular VGA monitor. The other is labelled "RGB" and is for connection to a monitor such as the Apple IIGS "AppleColor RGB" monitor, or compatible (See

9

Photo 2). Even though the AppleColor RGB cable is a DB-15 like Macintosh monitor cables, it is **not** compatible with Macintosh monitors.

Second Sight will automatically detect which cable you have attached and use the appropriate video modes for each type of monitor.

Each of the cables has one wire that is colored red; when the cable is properly installed, this red wire should be on top.

NOTE: do **NOT** attach both types of cables simultaneously. While it is unlikely that damage would result, the setup definitely will not work.
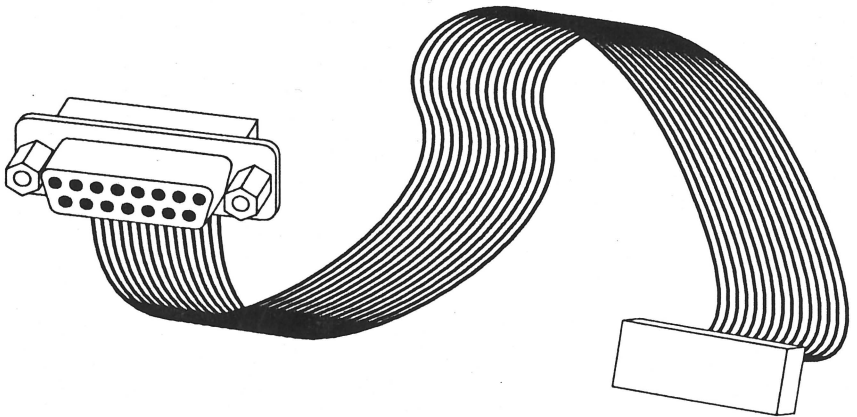


RGB Cable
(for use with AppleColor RGB or compatible)
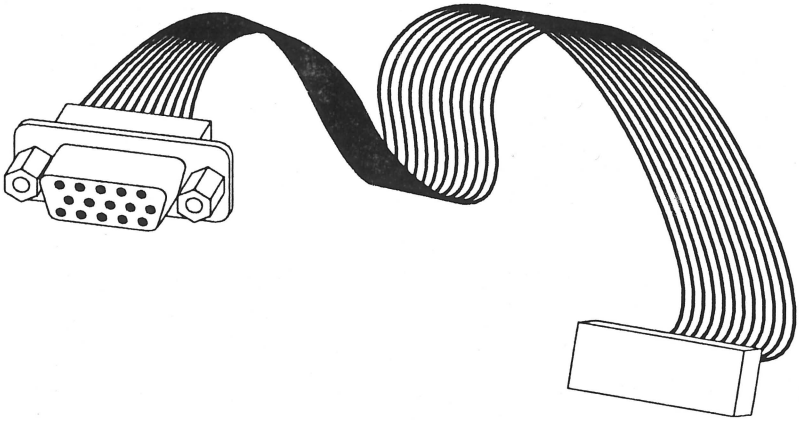
VGA Cable
(for use with any VGA/SVGA monitor)



Photo 2

This section gives a brief introduction to the components of the Second Sight, for those who wish to know some of the technical low-down. It is not necessary to read this section to use your Second Sight board.

There are basically three systems on the Second Sight card: the Z180 system, the VGA system, and the Apple interface. The Z180 subsystem is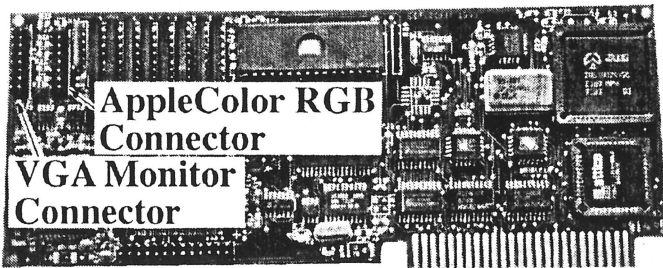 composed of the Z180 processor running at about 20MHz, 128K of fast static RAM memory for program & "shadow storage" (see below), and the card's firmware in a 128K ROM. The Z180 processor runs the program code that converts Apple II video data into VGA video data and also helps move data back and forth from the Apple via its DMA controller.

The VGA system is composed of the Oak OTI-087 VGA graphics controller chip, the video memory DRAMs, and the DAC (digital to analog converter) chip that actually makes the video signals that go to your monitor. The VGA chip controls video timing signals and generates the appropriate data for the DAC, which converts that data into separate red, green, and blue signals that go straight into your monitor.

The Apple interface's major component is a Lattice FPGA (field-programmable gate array). This part contains a great deal of custom logic that tells the Z180 processor when the Apple has accessed a soft-switch related to video (so the Second Sight can "follow" video mode changes, text colors, etc). The FPGA also makes sure that any writes to the Apple's built-in

video memory is copied to the static RAM automatically (a process called "shadowing").

Much more detailed information on Second Sight's internal workings will be available soon in a developer package.

Any "VGA" or "SVGA" monitor will work fine with Second Sight. Any monitor sold for use with an IBM PC clone (386/486) computer will work. Some monitors made by Apple for Macintosh computers (those advertised as "Multi Sync" or "Multi Scan") will work also.

*Dot-pitch* is a term that means the distance between the phosphor dots on a monitor. Monitors with smaller dot-pitch ratings are better: 0.39 dot pitch is not very good; 0.28 dot pitch is better, and 0.23 dot pitch is best (but most expensive, of course).

For reference, the AppleColor RGB is best described as a 12" monitor (this is the visible area measured from corner to corner).

Sequential Systems sells a high quality 14" Multi-Sync monitor with 0.28 dot pitch. Apple IIe owners might be interested in an inexpensive "paper-white" VGA monitor (less than $100), that would be perfect for use with AppleWorks. Call Sequential's toll-free sales line for details.

The dot-pitch of the AppleColor RGB monitor is 0.37 - not great, but not bad.

The Second Sight card is capable of the following SVGA video modes "out of the box".

Graphics
    320x200
    640x200
    640x400
    640x480*
    800x600*
    1024x768*

Text
    40x25
    80x25
    80x43*
    80x50*
    80x60*
    132x25
    132x60*

An * indicates that the mode is not available when used with an AppleColor RGB monitor, which can support 640x400 (interlaced) maximum. (Actually, it can support more horizontal pixels than 640, up to around 1024, for a strange display of 1024x400).

There are three basic graphics modes: indexed (palette), Hi-Color, and True-Color.

In *indexed* mode, each pixel can be one of 256 colors that are specified in a palette. Each of these 256 palette entries can be one of 16.7M colors (All modes).

In Hi-color mode, each pixel can be any of 32768 direct colors (no index or palette lookup). This is like the "thousands" mode on the Macintosh. Resolutions up to 800x600 are supported.

True-color mode is similar, but each pixel can be any of 16.7M (million) colors. This is like the "millions" mode on the Macintosh. Resolutions up to 640x480 are supported.

Since the VGA chip is completely programmable, there are actually a potential millions of different text and graphics video modes (with a MultiScan monitor) - the above list is just the most commonly used, and most useful, ones.

# Compatibility with other Hardware Products

## TransWarp GS
So far as we know, Second Sight is compatible with the TWGS.

## Zip GS
Second Sight is completely compatible with the Zip GS (GSX) accelerator board.

## RamFAST/SCSI
Some early RamFAST/SCSI Revision D boards (incorrectly) assert the /RDY signal constantly on the Apple II slot bus. This will prevent the Second Sight board from working properly. If, when you install the Second Sight, your computer will not boot, or the display functions erratically, remove your RamFAST board and look for the chips U15 and U17. If the part number is "18CV825" then you need to have your RamFAST board updated. Sequential Systems will upgrade your RamFAST board for $35.00 if it has this problem. Please call Sequential Tech Support for an RMA. This problem does not appear on CVTech RamFASTs approx. S/N #4800 or greater or a Sequential Systems-manufactured RamFAST.

## Apple Video Overlay Card
There should be no problems between the two cards in the same machine. However, since both cards require the M2B0 signal, if you have a ROM 01 you will have to have the signal wired to another slot by a technician.

The only way to use the two cards in conjunction with each other is to purchase a VGA->TV adaptor and feed that into the NTSC port on the Video Overlay Card. There are also video overlay adaptors that work in conjunction with the Feature Connector. This would replace the VOC, but which give you a higher quality video overlay system.

## Visionary Digitizer/Vision Plus Enhanced
There should be no obvious compatibility problems between Second Sight and the Visionary card, but there is no software support for it at this time. (*Vision Plus Enhanced* is the name of the card as sold by Alltech Electronics).

SecondView™ is an application program that works with your Second Sight card to view high-quality GIF and TIFF images on your Apple IIGS computer.

SecondView is a very straightforward and easy to use IIGS desktop application.

Simply double-click on the SecondView icon to run it.

The File menu in SecondView contains the "Open" item. Use this menu item to select a picture to view.

Since uncompressing a GIF on an unaccelerated Apple IIGS can be somewhat slow, the progress of the load is shown in the middle of the screen with a thermometer bar.

With a VGA monitor, the 640x480 mode is used, with 256 colors. On an AppleColor RGB monitor, a 640x400 (interlaced) mode is used - also with 256 colors.

If the picture you are viewing is too tall for the screen, you can "scroll" it up and down by moving the mouse up and down. To stop viewing a picture, simply click the mouse button. Pictures that are taller than 700 pixels or so will be clipped at the bottom.

Who can I contact regarding third-party software support for my Second Sight board?

Seven Hills Software, 2310 Oxford Road, Tallahassee, FL 32304
America Online, AppleLink, eWorld, GEnie: SevenHills
Internet: sevenhills@aol.com
CompuServe: 75300,1743
Voice: 1-904-575-0566, M-F, 9am-5pm ET
Fax: 1-904-575-2015 anytime

| | |
|---|---|
| Spectrum 2.0 | Communications program |
| SuperConvert | Image processing and conversion program |

## Sequential Systems

| | |
|---|---|
| discQuest™ | View images from discQuest titles in blazing color! |
| discQuest Encyclopedia™ | Enhance your Compton's™ encyclopedia experience |

Call Sequential for the latest list of Second Sight savvy application software!

# Known Problems

Second Sight is a very complex system; in some respects more so than the computers it works with. Hence, it may take some time of use out in the field to uncover and resolve problems.

Also, these first few boards do not yet emulate all existing Apple II video modes, particularly the following:

- Hires on an AppleColor RGB monitor (hires does work on a VGA monitor)
- Double-Hires
- Double-Lores

Promised features that are not on your board will be provided soon via a free ROM upgrade.

"3200-mode" is incompatible with Second Sight. Thereis no way to synchronize the extremely rapid updates in this pseudo-mode with Second Sight's video output. In the future SecondView *will* support viewing 3200-color image files, however.

Some boards may exhibit a problem on power-up or when the Apple II reset key is used, which will cause varying patterns to appear on the screen, and the computer will be locked up. Hitting reset again will usually restore the system to proper operation. This occurs only with VGA monitors.

On an AppleColor RGB monitor, the MouseText solid apple character appears as an underline.

The Second View application may not be entirely stable. As enhancements and fixes are made to Second View, we will make the updates available from Internet and other online services.

Q. How do existing programs that directly access the IIGS video hardware work with Second Sight?

A. Second Sight watches the IIGS I/O bus for writes to the IIGS video memory; and when they occur, it copies the data onto the card. Software on the card then updates the VGA memory periodically to correspond to the IIGS screen information. This process is called "shadowing".

Q. What happens if I run a program that needs a high-res video mode on an Apple RGB monitor?

A. The program will most likely return an error. The Second Sight card will prevent any possibly damaging video modes from being used with an Apple RGB monitor.

Q. How is existing software improved by the Second Sight?

A. Existing software is not generally improved automatically, except for one thing: because the IIGS's super hires mode is simulated using a 640x400 mode in the VGA controller, there are no black lines running through graphics or text.. pictures and text are solid on a VGA monitor.

Q. Do existing applications, like Finder or AppleWorks GS, take advantage of the higher resolutions, like 640x480 or 800x600?

A. No. There is currently no support for patching the IIGS' QuickDraw tool, which is what would be required for current programs to automatically use the Second Sight board's special features. Such

a patch isn't impossible, and we will work with programmers who would like to attempt it.

Q. Do I have to use two monitors with Second Sight, one for VGA graphics, and one for regular IIGS graphics?

A. No. The Second Sight "shadows" existing IIGS video modes onto the card, and emulates them through the VGA monitor. If you want to however, you *can* run two monitors off your GS, one from the built-in video, and one from the Second Sight. There might be some interesting applications possible with this setup. In short, all your existing IIGS applications and games will work with Second Sight and on a VGA monitor.

Q. Does the Second Sight have a graphics "overlay" mode, like the Video Overlay Card?

A. No, although such a product could be added via the Second Sight card's "feature connector".

Q. I heard that Second Sight can only emulate GS graphics at 15 fps (frames per second). If this is true, it seems very slow.

A. This is only partially true. Yes, Second Sight can only do 15 full-screen updates per second. However, Second Sight is smart enough to know what region of the screen has been modified, so that it doesn't have to update the *entire* screen each time. This greatly speeds up the emulation process making it smooth and seamless for the great majority of applications.

*Problem: The picture "rolls"*
• If you are using an AppleColor RGB monitor, you might need to slightly adjust the horizontal position control on your monitor (facing your monitor's screen, that is the knob furthest to the left). You may also wish to adjust the vertical size control.
• VGA monitors should require no adjustments; if you are having picture problems on a VGA monitor, check to make sure you have properly attached the cable.

*Problem: The picture appears twisted, or the screen is blank*
• You might have attached the monitor cable to the wrong connector on the board. Double-check the position of the cable -- the 'VGA' connector is for VGA/SVGA monitors; the 'RGB' connector is for the AppleColor RGB (standard IIGS) monitor and compatibles.

*Problem:When I turn on my computer, or sometimes when I press RESET, the screen gets a flickering pattern and the computer locks up.*
• Hit Control-RESET again to release the computer. This is a known problem, with some boards, that we are putting every effort into correcting. We will notify our customers when we have fixed it.

*Problem: The computer starts booting, and I see the GS/OS "Welcome to the Apple IIGS" screen; but about halfway through the boot I get all sorts of garbage in the middle of the screen.*

• You probably installed the Second Sight in an incorrect slot. In a ROM 01 IIGS, Second Sight must be in Slot 3 (or you must modify your IIGS motherboard to allow use in other slots). In a ROM 03 GS, Second Sight must be in slots 1 through 6 (*not* 7).

*Problem: animation in a game I like to play seems jerky.*
• Some programs update the IIGS's super-hires screen faster than the Second Sight can emulate it. While the Second Sight has some advanced technology to help speed this up, some programs (games and demos mostly) are just too aggressive for the card to keep up. This will not cause any problems other than the sometimes jerky display. For most applications such as word processing, communications, etc. you will not notice any slow-down.

*Problem: I am having problems not covered by your otherwise fine Troubleshooting section!*
• Call 800-999-1717, Sequential Systems' toll-free technical support hotline. Or, email `Sequential@hypermall.com`.

# SEQUENTIALSYSTEMS

*1200 Diamond Cir.*
*Lafayette, CO 80026*
*Ph: 303•666•4549    Fax: 303•665•0933*