



Apple IIc VGA User's Guide



Table of Contents

Description	4
Contents of Package	4
Connections	5
Apple IIc rear panel.....	5
Apple IIc+ rear panel.....	6
A2VGA cabling	6
Close up view of the cabling.....	7
A2VGA Modes.....	7
The RCA connector	8
Brief description of how it works	8
Internal configuration.....	8
Changing the function of the A2VGA RCA connector.....	8
Warning:	8
Setting the default video mode	10
Anti Static Warning:.....	10
Modification Warning:.....	10
Apple IIc Video Expansion Port pinouts.....	12
VGA Port Pinout.....	13
Troubleshooting	14
Frequently Asked Questions.....	14
Where to find further help	15
About a2heaven.com	15
Warranty.....	15
Some other a2heaven products	16

Description

The A2VGA adapter is a small video adapter for the Apple IIc and Apple IIc+ computer. In this day and age, composite CRT monitors for these vintage/retro systems are becoming scarce and harder to obtain, mainly due to the attrition rate of monitors pushing 30 years of age. VGA LCD monitors are part of everyday life and can be had for a cheap price. The Apple IIc VGA adapter (A2VGA), does as its name suggests. It converts the Apple IIc expansion video output into a VGA compatible signal. This means you can use almost any CRT or LCD VGA monitor on your Apple IIc/IIc+ computer. A2VGA works with both NTSC and PAL based Apple IIc and NTSC based Apple IIc+ machines. In the case of PAL based Apple IIc, Apple removed the colour signal from this machine. No matter what type of composite monitor (ie NTSC or PAL) that you connect to your PAL, Apple IIc (as sold in much of Europe, Australia and New Zealand), you cannot get colour. This is not quite true, if you purchase the optional Apple PAL A2M4023 adapter or an adapter such as the French Chat Mauve or Video-7 enhancer you can generate PAL colour. However these PAL adapters are extremely rare and quite expensive. Enter the A2VGA adapter.

Arthur C Clarke's third law

Any sufficiently advanced technology is indistinguishable from magic.

A2VGA supports the following Apple II video modes

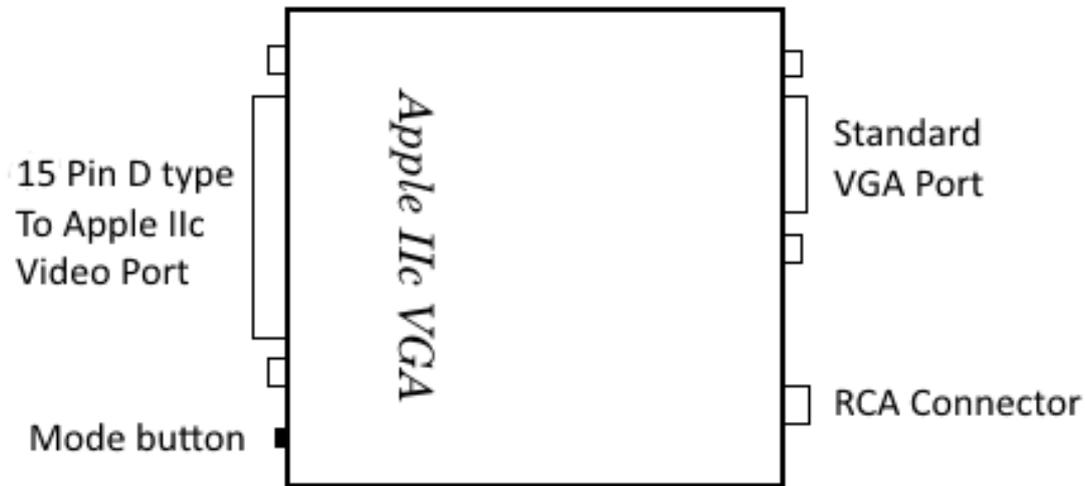
- 40 and 80 columns text, with 24 lines
- Low-Resolution: 40 × 48 (15 colours)
- High-Resolution: 280 × 192 (6 colours)
- Double-Low-Resolution: 80 × 48 (15 colours)
- Double-High-Resolution: 560 × 192 (2 colours)

Contents of Package

A2VGA – Apple IIc to VGA Adapter

15 Pin – 15 Pin D Type interface cable to connect A2VGA to the Apple IIc

Connections



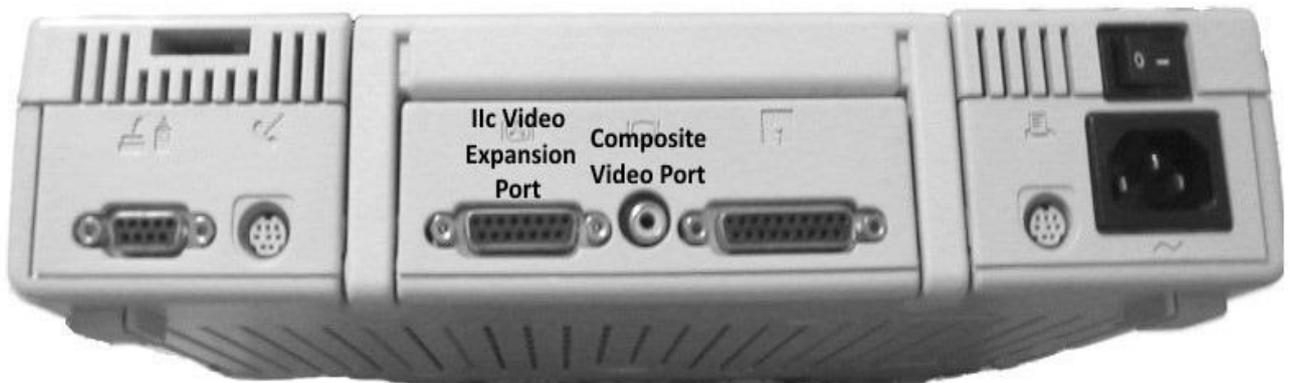
For most situations, you will simply connect the 15 Pin D type connector to the Apple IIc/IIc+ via the supplied ribbon cable and connect your VGA monitor to the VGA port.

*** Please be aware, the A2VGA output is VGA 720x480 resolution. This may not work on some older VGA monitors. ***

Apple IIc rear panel

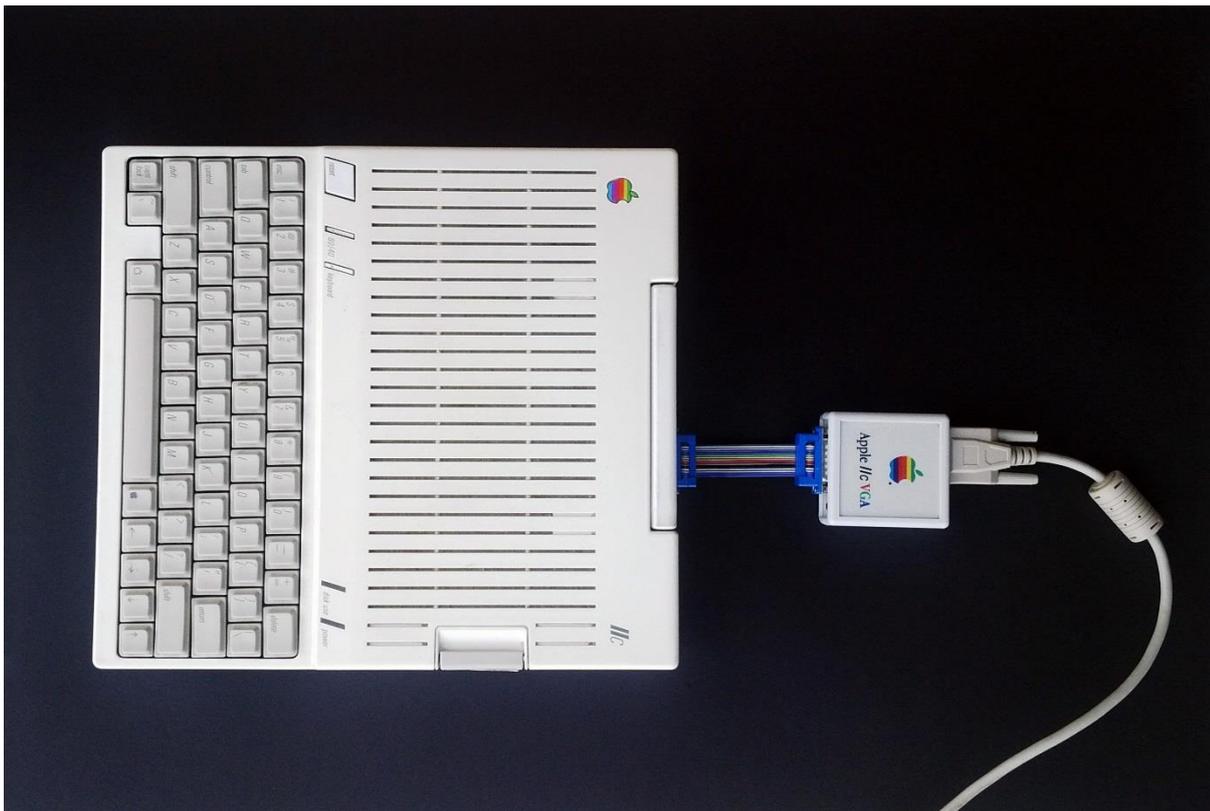


Apple IIc+ rear panel



A2VGA cabling

The completed setup should look like this:



Close up view of the cabling



A2VGA Modes

The A2VGA has 16 modes of operation, to allow you to tailor your retro experience. The 16 modes are as follows:

1. Colour – VGA Rendering *Default mode
2. Colour – NTSC Emulation – VGA Rendering
3. Monochrome – Shaded Green Screen
4. Monochrome - White Screen
5. Monochrome - White Screen Bold, mostly visible in 80 column mode
6. Monochrome - White Screen x2
7. Monochrome - Green Screen
8. Monochrome – Amber Screen
9. Colour – With Scan Lines
10. Colour – NTSC Emulation – With Scan Lines
11. Monochrome – Shaded Green Screen – With Scan Lines
12. Monochrome – White Screen – With Scan Lines
13. Monochrome – White Screen Bold – With Scan Lines
14. Monochrome – White Screen x2– With Scan Lines
15. Monochrome – Green Screen – With Scan Lines
16. Monochrome – Amber Screen – With Scan Lines

The modes are accessed sequentially by pressing the mode button, each press will change the mode, once you get to mode 16, pressing the button once more will return you to mode 1 and the sequence repeats.

The RCA connector

The RCA connector is next to the VGA socket. By default it outputs composite NTSC video in the case of a USA based Apple IIc/IIc+. In the case of a PAL based Apple IIc, the output is monochrome only. The signal by default, is exactly the same as the RCA connector on the back of the Apple IIc/IIc+.

Brief description of how it works

The A2VGA adapter is a paradox of technology. Its form and function is simple, and yet internally it is complex. Thankfully, due to the excellent work done by Plamen, A2VGA is simple to use. A2VGA uses 2 LSI devices, a CPLD and a 256K x 16 static ram. The CPLD (Complex Programmable Logic Device) is configured as a scan line doubler, in that it stores the video information from the Apple IIc (15Khz) frame by frame and then outputs the video as VGA 720 x 480 (shows as 640 x 480 on some VGA monitors) at 31Khz. The 256K x 16 static RAM is used as a video frame buffer.

In addition it allows the video out to be adjusted to simulate various colour and monochrome modes as well as adding scan lines for that really retro look.

Internal configuration

Most of you will never need to open the A2VGA to make changes, but for completeness, the alterations cover 2 areas.

1. Modify the function of the RCA jack
2. Set the default video mode on power up (*Warning this will void warranty*)

Changing the function of the A2VGA RCA connector

Warning: *opening the case on the A2VGA could potentially void warranty. The device uses static sensitive components. As long as you are careful and take anti-static precautions, you should have no problems.*

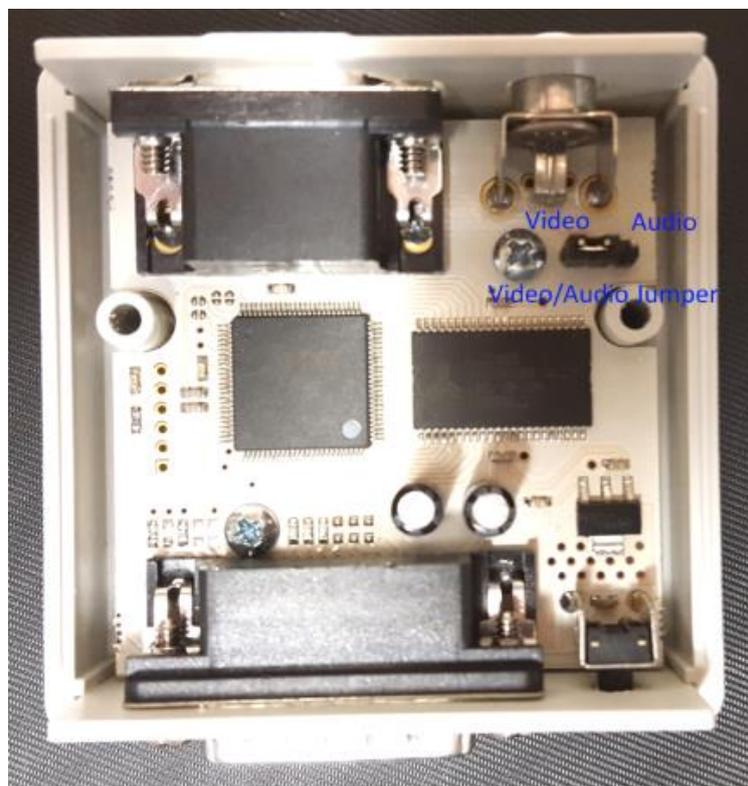
As mentioned previously the RCA connector on the A2VGA adapter outputs either NTSC composite video in the case of a USA based Apple IIc/IIc+ or monochrome composite video for a PAL Apple IIc. However, internally there is a jumper to allow you to change the function of the RCA connector from video out to audio

out. Why would you want audio out? In the case of a VGA monitor that has audio input, you can connect your Apple IIc to the monitor and utilize both video and audio. This way you can control the audio volume and video from the monitor.

This process assumes the A2VGA is not connected to either an Apple IIc or VGA monitor. Turn the A2VGA so the top with the name and logo is face down. You will see 4 clear feet and between them 2 Philips head screws.



Gently remove the two screws. Flip the A2VGA over and remove the top.



Inside will look similar to the photograph above. On the RHS just below the RCA connector is a 3 pin jumper block. With the jumper in its default position (as shown above) composite video will be present on the RCA connector. If you move the jumper to the RHS position (as shown below), the Apple IIC audio will be present on the RCA connector.



Once you have made the change, re-install the top and replace the two Philips head screws. You will now be able to route audio from the Apple IIC/IIC+ to the audio input jack on your monitor and control the volume via the monitor volume control.

Setting the default video mode

Anti Static Warning: *opening the case on the A2VGA could potentially void warranty. The device uses static sensitive components. As long as you are careful and take anti-static precautions, you should have no problems. These instructions are presented for completeness. As these modification require the use of a soldering iron, making changes to the default video mode, will void warranty. Make changes to the default video mode at your own risk.*

When you receive the A2VGA adapter, it is factory set to default to mode 1, Colour – VGA Rendering (no added/visible scan lines). For most people this is exactly what they want, but there is a means to change the default video mode.

Modification Warning: *This modification requires VERY fine soldering skills and should not be attempted by anyone NOT possessing those skills. The process of changing the default video mode requires bridging solder pads around 1mm in length. Most people do not possess a soldering iron with a tip fine enough to be*

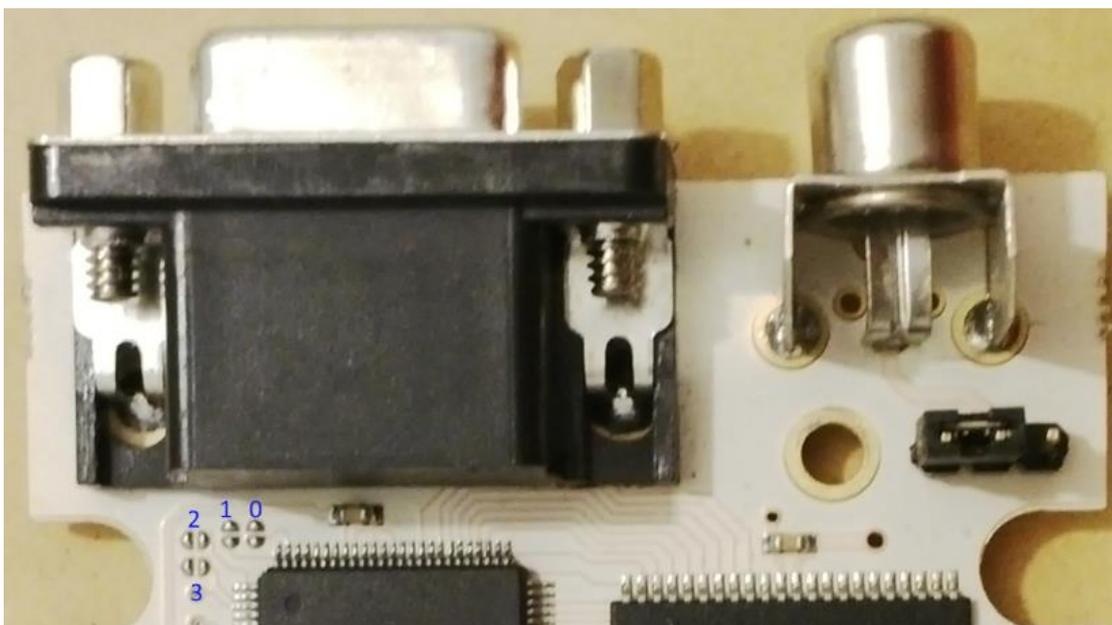
able to do this. If you make the changes you will need to observe strict anti-static procedures whilst making the changes. If you choose to implement changes to the default video mode, you will void the warranty. Make changes to the default video mode at your own risk. You have been warned.

This process assumes the A2VGA is not connected to either an Apple IIc or VGA monitor. Turn the A2VGA so the top with the name and logo is face down. You will see 4 clear feet and between them 2 Philips head screws.



Gently remove the two screws. Flip the A2VGA over and remove the top.

The area of the A2VGA adapter printed circuit board that you want to make the changes to, is located on the LHS just below the VGA connector as shown below.



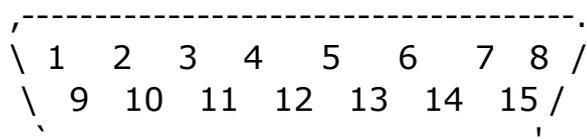
There are 4 solder pads labelled 0-3 that can be bridged in various combinations to change the default video mode of the A2VGA adapter.

Solder Pad Configuration

0	1	2	3	Mode
Off	Off	Off	Off	1. Colour – VGA Rendering *Default mode
On	Off	Off	Off	2. Colour – NTSC Emulation – VGA Rendering
Off	On	Off	Off	3. Monochrome – Shaded Green Screen
On	On	Off	Off	4. Monochrome - White Screen
Off	Off	On	Off	5. Monochrome - White Screen Bold
On	Off	On	Off	6. Monochrome - White Screen x2
Off	On	On	Off	7. Monochrome - Green Screen
On	On	On	Off	8. Monochrome – Amber Screen
Off	Off	Off	On	9. Colour – With Scan Lines
On	Off	Off	On	10. Colour – NTSC Emulation – With Scan Lines
Off	On	Off	On	11. Monochrome – Shaded Green Screen – With Scan Lines
On	On	Off	On	12. Monochrome – White Screen – With Scan Lines
Off	Off	On	On	13. Monochrome – White Screen Bold – With Scan Lines
On	Off	On	On	14. Monochrome – White Screen x2– With Scan Lines
Off	On	On	On	15. Monochrome – Green Screen – With Scan Lines
On	On	On	On	16. Monochrome – Amber Screen – With Scan Lines

It will pay to test the changes you have made to the default video mode before re-assembling the A2VGA adapter. Once you are happy with the changes you have made, re-install the top and replace the two Philips head screws.

Apple IIc Video Expansion Port pinouts



- 1- **TEXT** Video text signal from TMG; set to inverse of GR, except in double high-resolution mode.
- 2- **14M** 14M master timing signal from the system oscillator.
- 3- **SYNC*** Displays horizontal and vertical synchronization signal from IOU pin 39.
- 4- **SEGB** Displays vertical counter bit from IOU pin 4; in text mode, indicates second low-order vertical counter; in graphics mode, indicates low-resolution.
- 5- **1VSOUND** One-volt sound signal from pin 5 of the audio hybrid circuit (AUD).
- 6- **LDPS*** Video shift-register load enable from pin 12 of TMG.

- 7- **WNDW*** Active area display blanking; includes both horizontal and vertical blanking.
- 8- **+12V** Regulated +12 volts DC; can drive 300mA.
- 9- **PRAS*** RAM row-address strobe from TMG pin 19.
- 10- **GR** Graphics mode enable from IOU pin 2.
- 11- **SEROUT*** Serialized character generator output from pin 1 of the 74LS166 shift register.
- 12- **NTSC** Composite NTSC video signal from VID hybrid chip.
- 13- **GND** Ground reference and supply.
- 14- **VIDD7** From 74LS374 video latch; causes half-dot shift if high.
- 15- **CREF** Colour reference signal from TMG pin 3; 3.58 MHz.

VGA Port Pinout

Pin	Name	Dir	Description
1	RED	OUT	Red Video (75 ohm, 0.7 V p-p)
2	GREEN	OUT	Green Video (75 ohm, 0.7 V p-p)
3	BLUE	OUT	Blue Video (75 ohm, 0.7 V p-p)
4	ID2	IN	Monitor ID Bit 2
5	GND	-----	Ground
6	RGND	-----	Red Ground
7	GGND	-----	Green Ground
8	BGND	-----	Blue Ground
9	KEY	-	Key (No pin)
10	SGND	-----	Sync Ground
11	ID0	IN	Monitor ID Bit 0 GND=Color, NC=Mono
12	ID1 or SDA	IN	Monitor ID Bit 1 NC=Color, GND=Mono Some systems only uses ID0 for monitor ID
13	HSYNC or CSYNC	OUT	Horizontal Sync (or Composite Sync)
14	VSNC	OUT	Vertical Sync
15	ID3 or SCL	IN	Monitor ID Bit 3

Female at video card

Male at the cable

Troubleshooting

A2VGA is so simple to use, you should not run into any issues. It draws its power from the Apple IIC video expansion connector. As long as you have the cable connecting the A2VGA to the Apple IIC/IIC+ and your VGA monitor plugged into the VGA port, A2VGA should just work. If the video is not as you expected, keep pressing the mode button until you see the image style you desire.

If you do not get any video signal to your VGA monitor, you can do some basic checks.

Make sure the Apple IIC/IIC+ is plugged in and switched on.

Do you get composite video out via the composite video port on the Apple IIC/IIC+?

Do you get composite video out on the RCA connector on the A2VGA adapter?

Is your VGA monitor plugged in and switched on?

Is your VGA monitor capable of 720x480 resolution?

Test the VGA monitor with another video source, i.e. a Mac or a PC.

Frequently Asked Questions

Q. Who makes the A2VGA adapter?

A. The adapter was designed and built by Plamen from a2heaven.com. This includes the software/firmware, circuit design and the PCB.

Q. Can I use A2VGA on other computers?

A. Almost certainly no, the Apple IIC/IIC+ uses a custom video expansion interface, not found on other machines. A2VGA was designed exclusively for the Apple IIC series of computers.

Q. My Apple IIgs has a 15 pin video socket, will A2VGA work with that machine?

A. Definitely not, in fact you risk damaging either the Apple IIgs or A2VGA.

Q. My Macintosh has a 15 pin video socket, will A2VGA work with that machine?

A. Definitely not, in fact you risk damaging either the Macintosh or A2VGA.

Q. How much does the A2VGA adapter cost?

A. At the time of writing this document (Late January 2016), the price was US\$85.00 which includes shipping to anywhere on the planet.

Q. I have an NTSC only version, will this work on a PAL Apple IIC?

A. No, Plamen has improved the design over the last year to end up with a design now that automatically handles both NTSC and PAL Apple IIC. The earlier A2VGA is NTSC only.

Where to find further help

Phone: +359 888 810 993

Email: info@a2heaven.com

Facebook: <https://www.facebook.com/Apple-IIc-VGA-177260632607299>

About a2heaven.com

A2Heaven is a small company that implements new technology for use on vintage computer hardware.

About this User Guide

This User Guide was written by Martin Crockett and Plamen Vaysilov, Version 1.02, 25th January 2016, 1st public release.

Warranty

A2Heaven.com warrants the A2VGA adapter for 6 months or 180 days, from the date of purchase. This warranty assumes the A2VGA adapter has not been tampered with in any way. If you want to change the functionality of the RCA connector by moving the internal jumper from the left hand position to the right, this will not void the warranty. However due to the complexity of changing the default video mode, and the necessity to yield a soldering iron, this simply cannot be covered under warranty. Make changes to the default video mode at your own risk. You have been warned.

Some other a2heaven products

Apple SAM (Semi Automatic Mouth): A high quality speech synthesizer.

Mockingboard-T: A sound card for all Apple II computers, no speech chip.

ALF MC1 Clone: A music synthesizer that allows you to program music into your apple using standard musical notation.

Ramworks III Clone: Comes with 64k, expandable to 1M or 3M with 2M expander board. For apple IIe only.

Ramworks III VGA adapter: Option board for the Ramworks III Clone. Generates VGA compatible video, only for NTSC, 60Hz Apple IIe.

dClock: Clock option for Ram Express or Apple IIc Memory Expansion card.

Senior PROM IIe: Add debugging commands to your Apple IIe, such as entry to System monitor at any time, copy memory to and from auxiliary memory, plus much more.

Trak Star II: Gives constant digital read of any 5.25" Apple II drive, great for seeing what that pesky protection scheme is up to. Supports full, half and quarter track movement.

SDFloppy II: Store up to 16 .DSK images on an SD card, replaces 5.15" floppy drive.

