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TRANSWARP GS™

User's Manual

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INTRODUCTION

Welcome to the TransWarp GS

❖ *Note:* This manual often refers to the TransWarp GS™ as TWGS for short.

About the TransWarp GS

The heart of the Apple® IIGS™ is the 65C816 microprocessor. It runs all the programs in the computer at either "Normal" or "Fast" speed. The TransWarp GS replaces the 65C816 microprocessor with one that makes your IIGS run more than two times faster than at the "Fast" IIGS speed.

The small light (L.E.D.) mounted on top of the card indicates when the card is running at TransWarp GS speed. However, you won't need to see the light to notice the difference. If you want to know more about *how* TWGS works, refer to Chapter 3.

TransWarp GS's features:

- ❑ 65C816 microprocessor.
- ❑ 32K of built in Graphic, Sound, Diagnostics, and Configuration menus.
- ❑ Permanent built-in control panel for easy user configuration.
- ❑ Totally transparent operation with Apple II, //e, and Apple IIGS software.
- ❑ Compatible with virtually all interface and expansion cards.
- ❑ Supports DMA devices such as AE Z-80® cards and Corvus™ hard disks.
- ❑ Supports AppleTalk™ and AppleShare™.
- ❑ Does not override slot 3's 80 column function.
- ❑ L.E.D. light indicating the speed of the GS -- on for TransWarp speed, off for IIGS speeds.

Hardware Compatibility

Regular cards

Printer and modem cards or any other regular cards will work with no changes.

DMA cards

Most cards that use DMA, such as Applied Engineering's Z-80 Plus™ and Corvus hard disks, work the same as they do in a IIGS without the TWGS; there are no special switches to set or unusual configurations to create.

Coprocessor cards

Cards such as the PC-Transporter™ work with the TWGS although the only speed increase while in MS-DOS mode occurs during I/O transfers.

AppleTalk

AppleTalk and AppleShare work on the TWGS when the control panel option `AppleTalk/IRQ` is turned on (see page 9).

Memory Cards

The TWGS uses a caching technique to speed up the IIGS. This allows all the memory currently installed in your IIGS to be used and accelerated. The TWGS has no problems with memory expansion cards and works with memory slot modifier cards such as Applied Engineering's RamKeeper (see Appendix B, *RamKeeper and TransWarp GS*, for special notes).

Software Compatibility

It works with all software for the IIGS and accelerates it more than two times faster than the IIGS at "Fast" speed.

What Now?

Turn the page and get your IIGS up to speed!

CHAPTER ONE

Getting Started

Required

To use TransWarp GS, you must have one of the following:

- ❑ An Apple IIGS

  or

- ❑ A //e upgraded to a IIGS

Strongly Recommended

Powerful cards in your closed computer generate heat. We recommend the IIGS System Saver from Kensington to keep it running cool.

Install It!

You'll need a small flatblade screwdriver to install the TransWarp GS. Once you have one, follow the steps below:

1. **TURN OFF THE APPLE'S POWER SWITCH.**

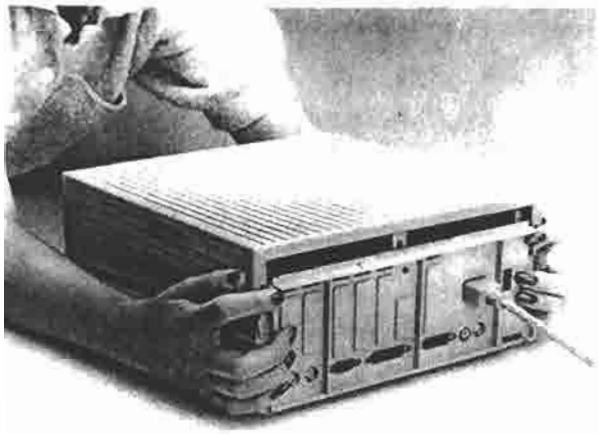
Never install or remove a card while the computer is on. However, you need to leave the computer plugged in throughout the installation to allow the power supply to discharge static electricity from your body.

2. **Remove the cover from the Apple.**

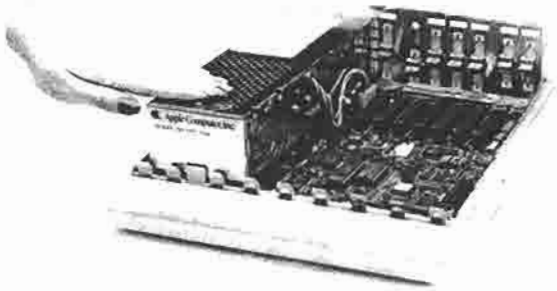
Press in the two latches at the rear of the case with your forefingers while using your thumbs to push the lid up and towards you. (See picture following.)

3. **Touch the power supply** to remove any static electricity from your body. (Don't worry, it's safe!)

Do not skip this step! A static shock can damage the chips on your boards and/or the chips on your computer's motherboard.



Remove the IIGS cover



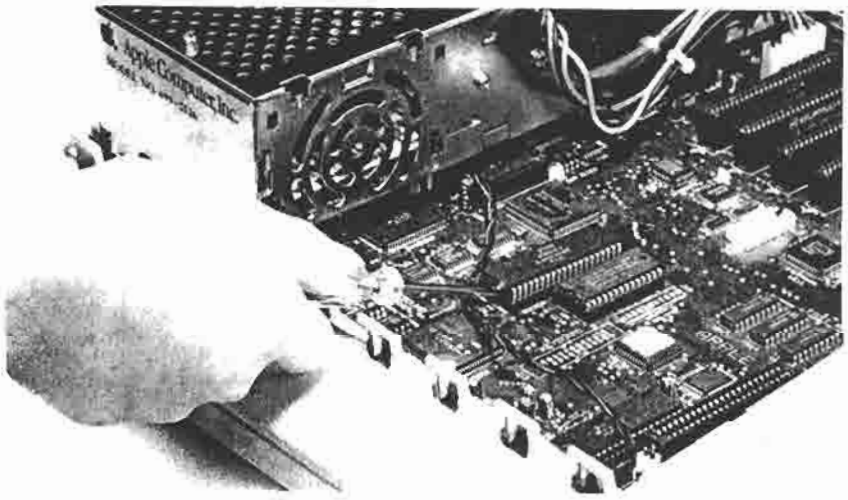
Touch the power supply case

4. **Remove any card from slot 2.**

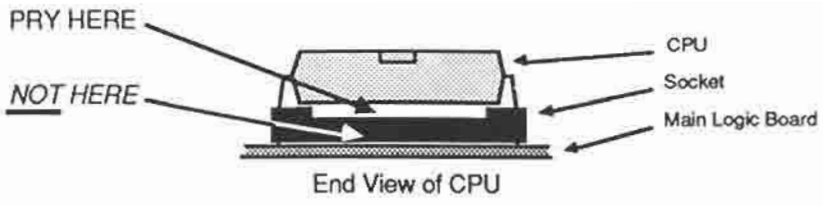
Follow that card's removal instructions. The slot 2 card must be removed to allow you access to the CPU chip.

5. **Remove the CPU chip from the IIGS motherboard.**

The TWGS connector will plug into the CPU socket. Refer to the picture below to locate the CPU chip near the center of the IIGS motherboard. The chip is labeled "CPU UI8" in white lettering just below the chip.



Remove the CPU



Do not pry the socket

Using the flatblade screwdriver, gently pry the CPU out of its socket. Be careful not to bend the pins! Lift alternate ends of the chip just a tiny bit at a time until it's free of the socket. Make sure you pry only the chip and not the socket. Bent pins can usually be straightened with needle-nosed pliers or tweezers.

Set the CPU chip aside for now.

6. **Remove the TWGS from its anti-static bag.**

Hold the card by its edges, like a photograph.

7. **Remove the piece of foam from the cable attached to the TWGS.**

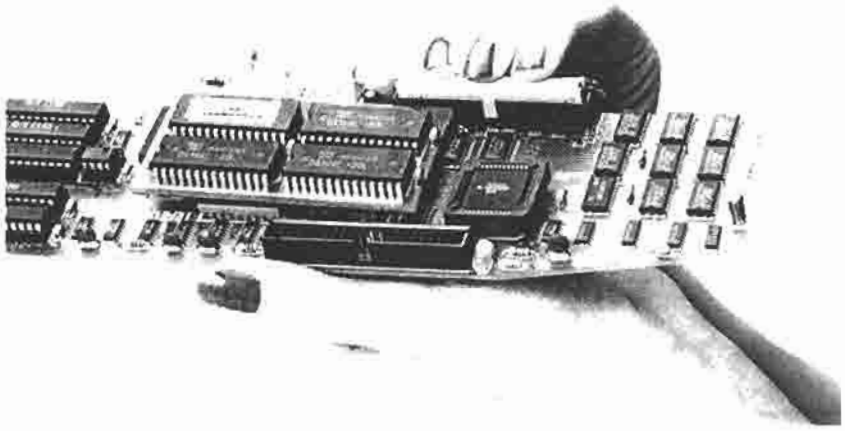
This foam is used to protect the pins of the CPU connector during shipping.

8. **Insert the CPU chip into the piece of foam.**

Put the CPU you have removed from the IIGS into the foam you have removed from the CPU connector and store it in a safe place.

9. **Make sure that the cable's connector is securely seated in the TransWarp GS connector.**

Push firmly on the top of the connector as shown in the picture following:

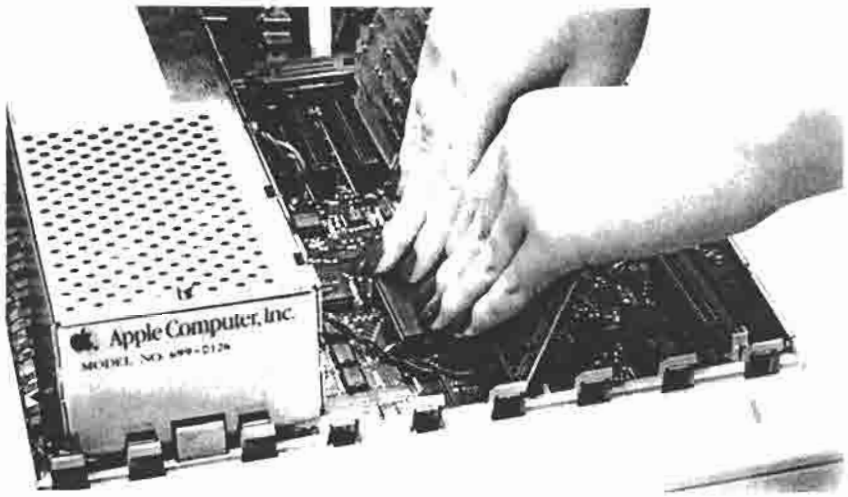


Make sure cable is securely connected to TWGS

10. **Insert the cable connector into the motherboard socket.**

Insert the connector into the CPU socket as shown in the following picture. The cable should be under the TWGS and connect to the socket behind the board.

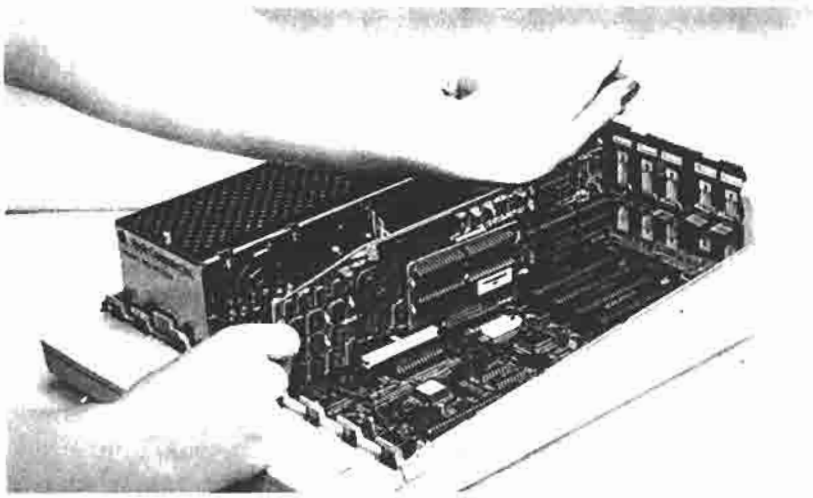
❖ *Note:* Be very careful to align all pins with their correct holes.



Insert connector into socket (make sure all pins are aligned w/ holes)

11 **Insert the TWGS into slot 3.**

Align the gold "fingers" of the TWGS' edge connector with the slot; then use the heel of one hand to push the card down into the slot and seat it firmly.



Insert TWGS into slot 3

12. **Replace the Apple's cover.**

Hardware installation is complete. *Congratulations!*

What Now?

Read the next chapter to find out about controlling and testing the TransWarp GS through the Desk Accessory.

TransWarp GS

CHAPTER TWO

The TransWarp GS Desk Accessory

About the Desk Accessory

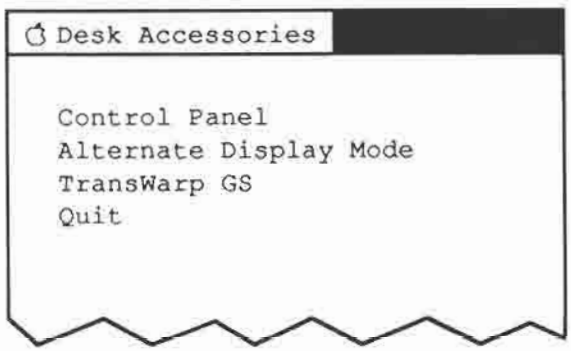
The TransWarp GS Desk Accessory needs little or no explanation for basic operation; it's simple to use. However, to fully understand and take advantage of TWGS' features, read through this chapter and display the menus on your screen as they're being described.

The TWGS Desk Accessory automatically loads itself into the Classic Desk Accessories menu. The Desk Accessory allows you to control the speed of the TWGS and test its operation.

Accessing the Desk Accessory

1.) Access the Classic Desk Accessories menu by holding down the Open-Apple and Control keys while pressing Esc (- then).

Pressing these three keys will display a Desk Accessories menu much like the one shown below (appearance may vary according to which Desk Accessories you have loaded).

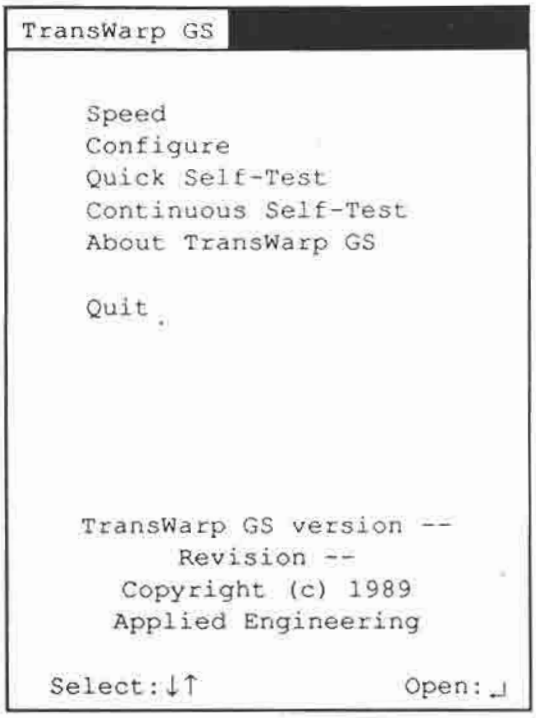


Classic Desk Accessories Menu

2.) Use the up and down arrow keys ( ), as instructed at the bottom of the menu screen, to highlight the `TransWarp GS` option.

3.) Press .

The TWGS main menu will appear as shown following:



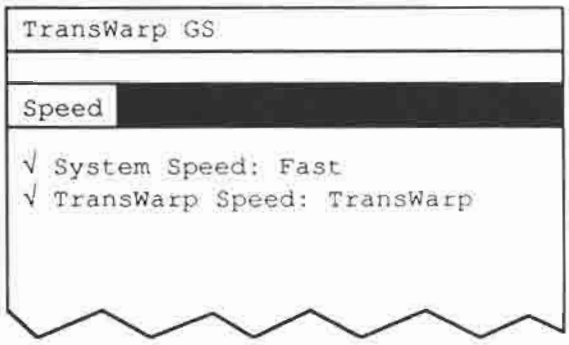
TransWarp GS Main Menu

Again, use the up and down arrow keys to select different options. The options and their functions are described next.

Speed

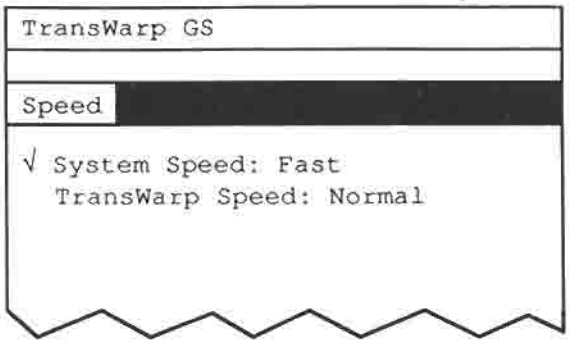
This menu allows you to toggle the IIGS speed between `Normal` and `Fast` like in the `System Speed` option of the Control Panel. The `Speed` menu also has the `TransWarp Speed` setting.

- For TransWarp speed, the `System Speed` option must be set to `Fast` and the `TransWarp Speed` must be set to `TransWarp`.



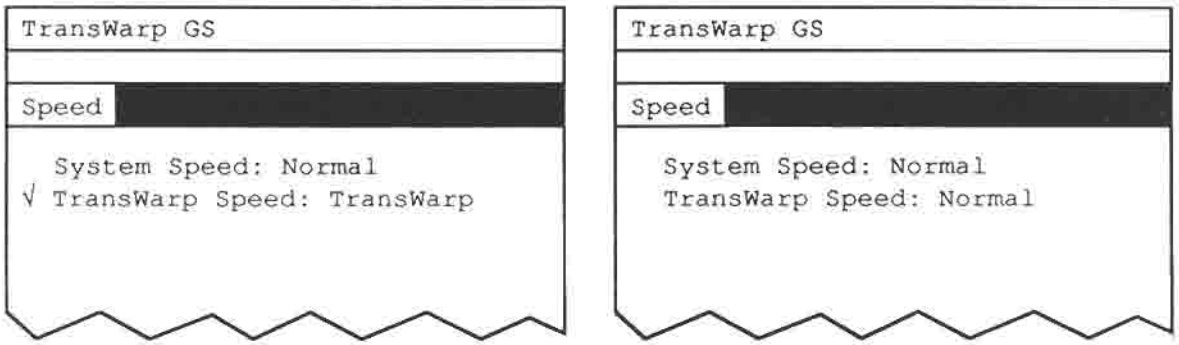
TransWarp Speed

- For regular IIGS "Fast" speed, set the `System Speed` option to `Fast` and the `TransWarp Speed` to `Normal`.



Fast Speed

- If the `System Speed` is set to `Normal`, you'll notice that even if the `TransWarp Speed` setting is set to `TransWarp`, the speed will still be "Normal."



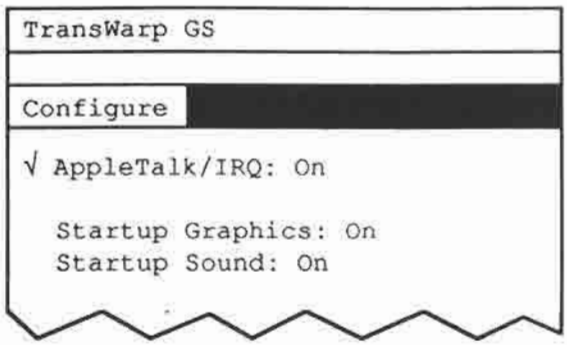
Normal Speed

Configure

AppleTalk/IRQ

The Basics

The `AppleTalk/IRQ` setting is, for the most part, a safety feature. The only disadvantage to leaving this option on at all times is that the TransWarp will slow down a very small amount (about a 5% decrease in speed) for any programs that disable interrupts.



Configure Menu

If you're not using AppleTalk and think that a 5% speed increase will make a difference, try operating with the `AppleTalk/IRQ` option `Off`. If you notice any unusual problems with your GS after turning this option off, turn it back on to determine if the problem is caused by a time-sensitive device.

A More Detailed Explanation

Some programs are timing sensitive. This means that they have to run at a particular speed in order to work correctly. TWGS can detect when a program is running most time-sensitive routines, such as accessing the 3.5" and 5.25" disk drives, and shut off the fast mode so that the program can run at the correct speed. However, some timing-sensitive hardware, like some peripheral cards, or software, such as AppleTalk, cannot easily be detected by the hardware.

In order to adjust for these timing-sensitive programs, TWGS watches a special flag in the processor called the IRQ Disable flag. Timing-sensitive programs need to set this flag. When a program sets this flag, the TransWarp slows down when the `AppleTalk/IRQ` Option is `On`,. The TWGS slows down even if a program that sets the IRQ Disable flag *could* run at TransWarp speed. This accounts for the approximate 5% decrease in overall speed.

Once again--you probably won't notice the small speed difference and can leave the `AppleTalk/IRQ` setting `On` as a safety measure.

//e Games and AppleTalk/IRQ

Some games, mainly those created for the //e, turn off interrupts. If you want faster game speed, turn the `AppleTalk/IRQ` setting to `Off`.

Startup Graphics and Sound

These options control whether or not the TransWarp GS logo and sound will appear and play when you boot the GS.

❖ *Note:* The sound cannot be played unless the Graphics are on; the sound toggles off when you turn off the graphics.

Quick Self-Test

The Quick Self-Test will run the TransWarp GS through its paces. The test lasts about five seconds. As each test is run, you'll be informed that the card `Passed`, `Failed` or `Skipped` the test.

Passed Tests

When the tests pass successfully, press to exit the test menu.

Failed Test(s)

If the TransWarp fails one or more of the tests:

1.) Run the tests again.
2.) If it fails a second time:
    a) Power down the computer.
    b) Wait 20 seconds.
    c) Power back up.
3.) If the test still fails, call Technical Support at (214) 241-6069.

Skipped Tests

If a test is skipped, it does not mean the TWGS failed that test. The test is most likely making adjustments for your computer's particular setup. The system should still perform properly if a test is skipped.

Continuous Self-Test

These are the same set of tests as the Quick Self-Test but continue to run until the user presses .

If the TransWarp GS should fail any of these tests, follow the directions under "Failed Test(s)" above.

About TransWarp GS...

This screen gives credit to the masterminds behind the TWGS. It also lists Applied Engineering's address and phone numbers for Sales and Technical Support.

If you don't have enough available memory, you'll get a text-only version of the `About` screen.

If you have enough memory free (about 40K), you'll get the startup screen with dissolving credits. The startup sound is disabled to avoid interference with any other sound programs that may be active at the time.

CHAPTER THREE

The TransWarp GS Hardware

General Theory of Operation

The TWGS accelerates the IIGS by replacing the on-board microprocessor with a much faster one. Because the memory on the IIGS can only run at "Fast" speed maximum, faster memory must be provided to increase performance. To do this, the TWGS contains a small amount of accelerated memory on it called caching memory.

Almost all programs are made up of small program pieces that loop around many times, rerunning themselves until they have finished what they are trying to do and then going on to the next piece of code. Caching takes the small pieces of programs that loop around and puts them into fast memory so that the loops don't take as long to loop.

When the program is in the cache memory, the TWGS can run it at TWGS speed. When it is not in the cache, the TWGS must slow down and get it at the IIGS' Fast speed. When one part of the program is finished, the TWGS copies in the next piece of program to run it fast and, at the same time, gets rid of the old program piece. In this way, the small cache memory makes the entire IIGS memory appear to run much faster.

Technical Description

Following is a more detailed description of what the TWGS is doing. For complete technical details, refer to *Programmers' Note* in the appendices.

Memory Addresses Accelerated

All of the memory is accelerated in the TWGS cache except the I/O space $C000-$CFFF.

Determining Speed

The speed at which the TWGS runs is determined by both the IIGS and the TWGS.

- When the IIGS is set to Normal, the TWGS is forced to run at that speed. When a program sets the GS to Normal, it is for compatibility with time-sensitive code or hardware cards. The TWGS will not override the setting because doing so could cause problems with the program or hardware.
- When the IIGS is set to "Fast" speed, the TWGS uses its internal speed switch (set in the TWGS control panel) to determine how fast it should run.
  - When the speed in the TWGS control panel is set to Normal, it matches the IIGS "Fast" speed.
  - When the speed in the TWGS control panel is set to `TransWarp GS Speed`, the TWGS runs at more than twice the IIGS "Fast" speed.

Some timing-sensitive programs, such as AppleTalk, don't access the IIGS hardware in a way that the TWGS can monitor efficiently. In a IIGS these timing-sensitive programs will have to turn interrupts off to guarantee that they will run at the proper speed. To ensure that the program is running at a speed that it expects, IIGS speeds of Normal or Fast, the TWGS will slow down to the appropriate speed whenever the interrupts are disabled (the IRQ Disable flag is set) and the TWGS `AppleTalk/IRQ` switch is on. (Refer to the Configure menu, page 9.)

DMA Cycles

The IIGS supports DMA cycles at Normal speed only. The fast mode DMA cycles are not allowed. When a DMA cycle occurs, the TWGS will update that entry in the cache that corresponds to that address. In this fashion, the cache is continually updated and other parts of the cache are unaffected. This will work with most devices that use this feature.

RDY Cycles

RDY cycles with the TWGS are only supported when the IIGS is at Normal speed. Any RDY cycles at Fast speed have unpredictable results. (For information about RDY cycles, refer to 65816 section of the *IIGS Hardware Reference* book, Addison-Wesley.)

The cache memory sizes and hardware cache flush may change in the future. Check the TWGS software interface to determine what your board offers.

APPENDICES

The following appendices are included for further reference and reading enjoyment:

A -- Trouble Shooting

B -- RamKeeper and TransWarp GS

C -- Programmers' Note

D -- Getting Help

TransWarp GS

APPENDIX A

Trouble Shooting

If the power-up diagnostic test encounters an error, follow the directions displayed on the screen.

```
TransWarp GS failure
(error code = 0201)

Follow these steps:

  1) Turn off the GS
  2) Wait 20 seconds
  3) Turn on the GS

If this screen re-appears,
 note the error code and
contact technical support at:

(214) 241-6069
9am to 12:30pm & 1:35pm to 5pm (CST)
Monday Through Friday
```

Checkerboard Pattern at Startup

This may occur when the TWGS connector is not seated securely in the CPU socket or when it has been damaged by static electricity.

- Turn off power to the computer.
- Remove the computer's cover.
- Touch the power supply to discharge static electricity.
- Check the connector's seating and alignment in the CPU socket.
- Check the cable's connection to the TWGS.
- Make sure the card's edge connector is firmly seated in the slot.
- Turn the computer on again.
- If the computer still will not boot, refer to the "Getting Help" section in the Appendices.

- If the computer boots properly, turn the power back off then replace the computer's cover.

Self-Test Notes

Failed Test(s)

If the TransWarp fails one or more of the tests:

1.) Run the tests again.

2.) If it fails a second time:

   a) Power down the computer.

   b) Wait 20 seconds.

   c) Power back up.

3.) If the test still fails, call Technical Support at (214) 241-6069.

RamKeeper Users

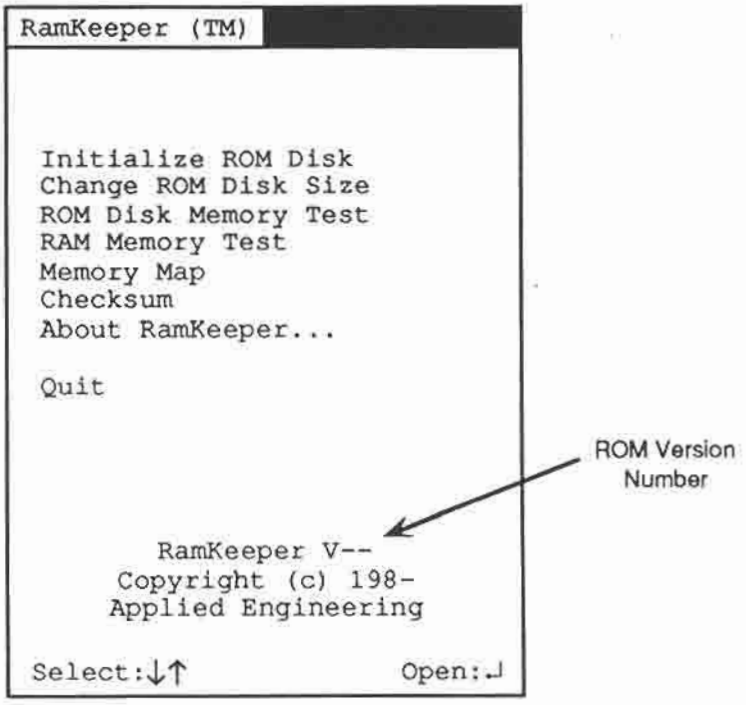
If you have a RamKeeper installed and your system is crashing when you run the RamKeeper tests, refer to Appendix B.

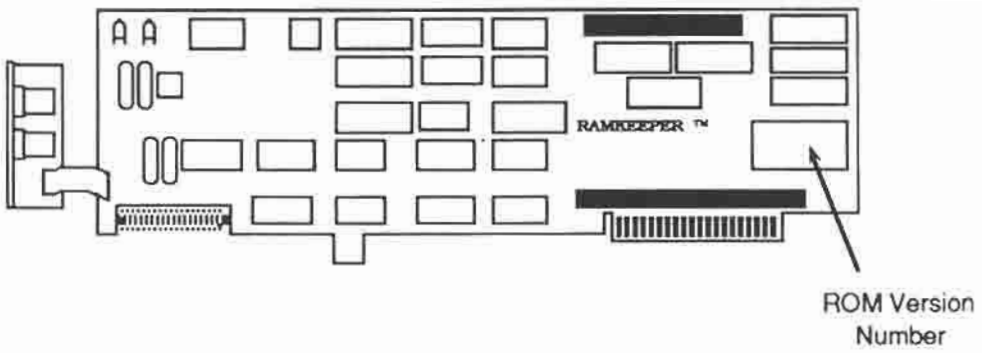
APPENDIX B

RamKeeper and TransWarp

If you have a RamKeeper, note the version of the ROM. The version is listed both on the RK's main menu screen (accessed through the RK desk accessory) and on the ROM sticker on the RK board. (See drawings below.)

If you have a version prior to 1.5, you'll need to turn off the TransWarp GS by setting the speed to IIGS Fast or Normal before running the RamKeeper tests.





APPENDIX C

Programmers' Note

If you are an assembly language programmer and are interested in writing programs that directly access the TransWarp GS, call Applied Engineering Technical Support, (214) 241-6069, for the *TWGS Programmer's Reference.*

APPENDIX D

Getting Help

If you have a technical question relating to your TransWarp GS card or any other Applied Engineering product that is not covered in the manual, please contact the dealer from whom you purchased the product. If you are experiencing difficulties with one particular program, contact the program's author or publisher.

In the event that the dealer or the publisher's support personnel cannot answer your question, call Applied Engineering Technical Support. The support representatives are experienced in the applications and uses of Applied Engineering products, but in order to provide a quick and effective answer to your question, they will need to know as much as possible about the hardware and software specifically related to your question. Please provide the technical support representative with the following information:

- ◊ The Applied Engineering product related to your question and its revision number.
- ◊ The original and current memory configuration of the card (if applicable).
- ◊ The model and revision of your computer.
- ◊ What peripherals are being used and what cards are in each slot.
- ◊ The name, version, and revision level of the software with which you are experiencing problems.
- ◊ The results of any test programs, diagnostics, or troubleshooting done by you, your dealer, or your software publisher's support department.

Applied Engineering
Technical Support
(214) 241-6069
9 AM to 12:30 PM & 1:35 PM to 5 PM(CST)
Monday Through Friday

(Please call only the number above for technical support. Our sales office cannot transfer calls to the support lines.)

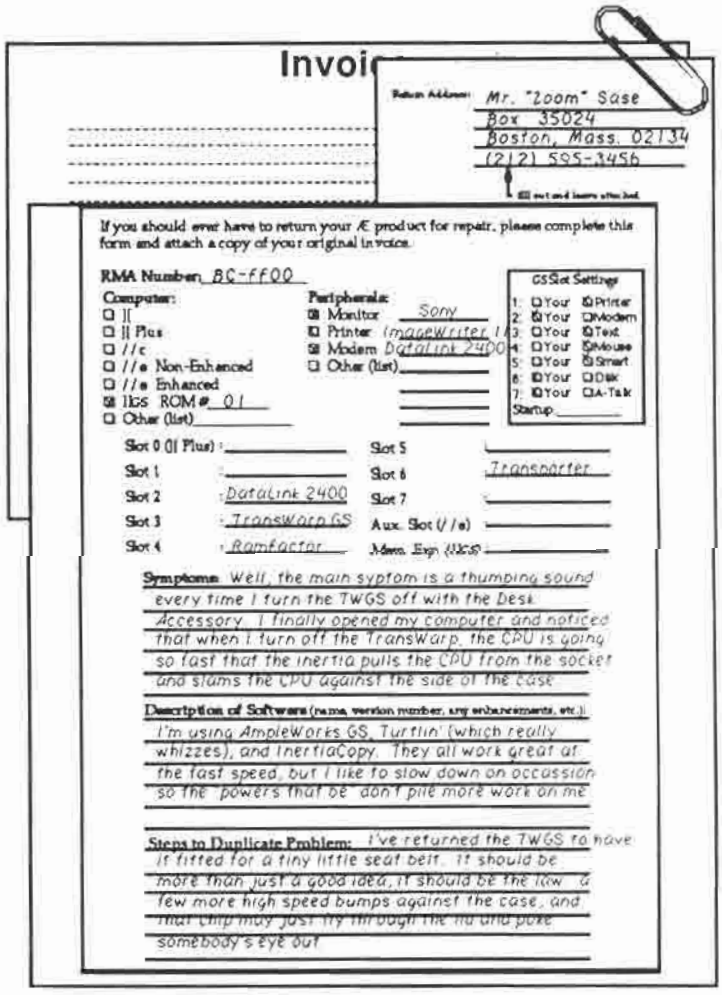
Returning a Product

RMA Number, "Attention" Sheet, and Invoice

If your product needs to be returned, the technical support representative will give you a Return Material Authorization (RMA) number.

- ❑ Record the RMA number for your own records.
- ❑ Write the RMA number on your package label.
- ❑ Fill out the Return Form on back of the yellow sheet marked "Attention!" A complete form will greatly reduce the time it takes to return your package.
- ❑ Attach a copy of your original invoice to the form.
- ❖ *Warning:* If you don't include an invoice, products will be treated as out of warranty products and will be returned to you C.O.D. for the amount of the service charge.

A completed form should look something like the one below:



Invoi

Return Address: Mr. "Zoom" Sase
Box 35024
Boston, Mass. 02134
(212) 555-3456

If you should ever have to return your Æ product for repair, please complete this form and attach a copy of your original invoice.

RMA Number: BC-FF00

Computer:
- ❑][
- ❑][Plus
- ❑ //c
- ❑ //e Non-Enhanced
- ❑ //e Enhanced
- ☒ IIgs ROM # 01
- ❑ Other (list)

Peripherals:
- ☒ Monitor Sony
- ☒ Printer ImageWriter II
- ☒ Modem DataLink 2400
- ❑ Other (list)

GSSlot Settings
1: ❑Your ☒Printer
2: ☒Your ❑Modem
3: ❑Your ☒Text
4: ❑Your ☒Mouse
5: ❑Your ☒Smart
6: ❑Your ❑Disk
7: ❑Your ❑A-Talk
Startup

Slot 0 (][Plus)
Slot 1
Slot 2: DataLink 2400
Slot 3: TransWarp GS
Slot 4: Ramfactor
Slot 5
Slot 6: Transporter
Slot 7
Aux. Slot (//e)
Mem. Exp (IIGS)

Symptoms: Well, the main syptom is a thumping sound every time I turn the TWGS off with the Desk Accessory. I finally opened my computer and noticed that when I turn off the TransWarp, the CPU is going so fast that the inertia pulls the CPU from the socket and slams the CPU against the side of the case.

Description of Software (name, version number, any enhancements, etc.):
I'm using AppleWorks GS, Turftin' (which really whizzes), and InertiaCopy. They all work great at the fast speed, but I like to slow down on occassion so the "powers that be" don't pile more work on me.

Steps to Duplicate Problem: I've returned the TWGS to have it fitted for a tiny little seat belt. It should be more than just a good idea, it should be the law. A few more high speed bumps against the case, and that chip may just fly through the lid and poke somebody's eye out.

When You Ship

If you don't have the original packing material, wrap the board in anti-static material (preferably the anti-static bag in which the card was originally shipped; however, aluminum foil will work fine). Pack it in a sturdy box cushioned with wadded papers (i.e. used computer paper or newspaper).

- ❖ *Warning:* If your product is damaged due to inadequate packing, your warranty will be void.

Include the return form and invoice.

Send the package, shipping prepaid, to:

RMA#__?__
Applied Engineering
Technical Support
3210 Belt Line Road, Suite 154
Dallas TX 75234

You should insure your package. Æ will not assume any responsibility for inadequate packing or loss or damage during shipping.

When We Receive

Our service department will use your completed form in an attempt to duplicate the problem.

If it is determined that your product is defective due to a manufacturing defect, your card will be repaired or replaced at Æ's option.

Any misuse, abuse, or non-Æ authorized alteration, modification, and/or repair to the Applied Engineering product will void the warranty. This warranty will also be void if you use the Æ product for any purpose other than its intended use.

Your product will be fully tested before it is shipped back to you, transportation prepaid, via UPS regular delivery.

Once your product is received by Technical Support, it will be processed and delivered to our shipping department within 7 to 10 working days.

Applied Engineering

Telephone Numbers

Technical Support

(214) 241-6069

9 AM to 12:30 PM & 1:35 to 5 PM (CST)

Monday through Friday

Do not return any
product for service without a
Return Material Authorization (RMA) number.
An RMA number can be obtained by calling Technical Support.

Sales

(214) 241-6060

9 AM to 11 PM (CST) 7 days