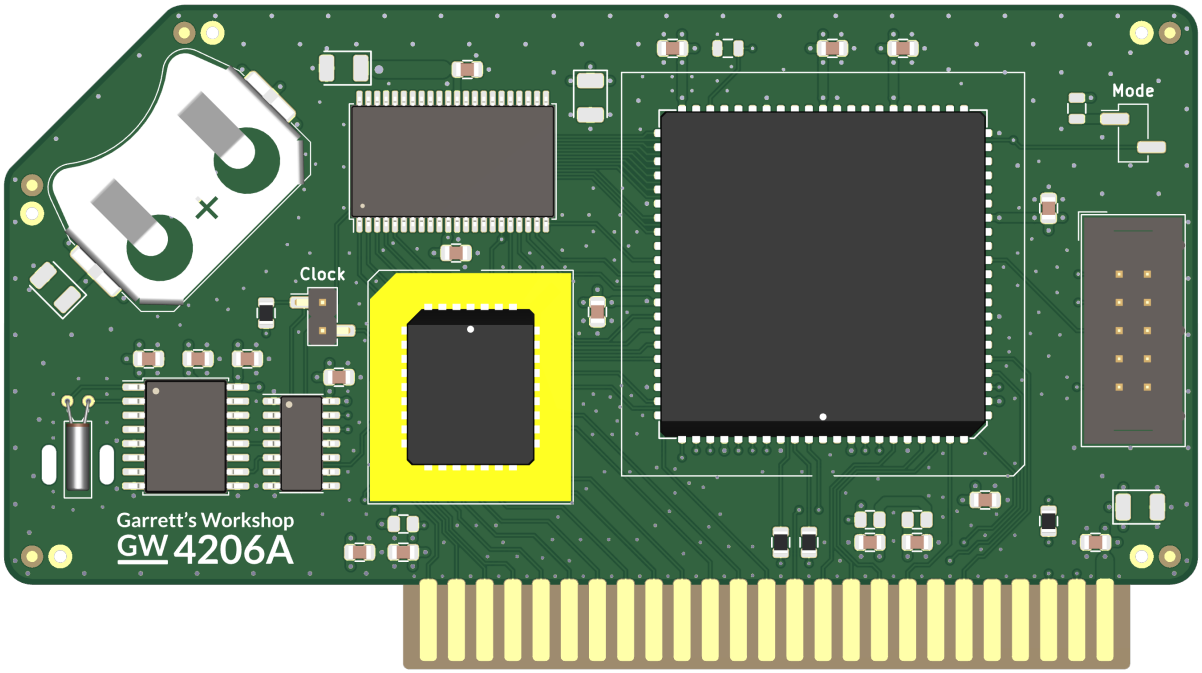
Garrett’s Workshop

GW4206A “Time Disk”

RAMFactor-compatible RAM Expansion and
NoSlotClock-compatible Clock for Apple II-series

User’s Guide



Time Disk was designed by Zane Kaminski and Garrett Fellers

Overview

Time Disk (GW4206A) provides an Apple II-series machine with 1 MB of RAMFactor-type memory usable as a fast RAM disk or as RAM by supported applications. Time Disk also provides a NoSlotClock-compatible real-time clock.

Low-Power, SRAM-Based Design

Thanks to the use of low-power SRAM, Time Disk uses a maximum of 0.6 watts in active use (120 mA @ 5V) and 0.4W in active use (80 mA @ 5V).

Open-Source Design

Time Disk's design is fully open-source. The schematics, board layouts, CPLD firmware, and utility software are all freely available for commercial and noncommercial use. To download the design files, visit the Garrett's Workshop GitHub page: https://github.com/garrettsworkshop

Installation

Hardware

Time Disk must be installed into one of the Apple II's peripheral card slots numbered 1 through 7. On machines with eight slots such as the Apple II and II+, using Time Disk in slot 0 is not supported. Also ensure that Time Disk is inserted in the correct orientation. Markings on the card indicate the side which is to face towards the rear of the Apple II.

Software

The RAMFactor-type RAM provided by Time Disk is automatically recognized by ProDOS as a disk device. Select application such as AppleWorks can use RAMFactor RAM directly; refer to these programs' documentation to determine

RAM/Hardware Test

Time Disk can be tested by the host Apple II system. To test a Time Disk card, enter the machine language monitor from BASIC using the "CALL -151" command. Depending on the slot into which your GR8RAM is installed, a different command must be entered in the monitor to begin the test. In the monitor, type "C", followed by the slot number into which the Time Disk is installed, followed by "AG", then press the enter key. For example, if your Time Disk card is installed in slot 7, type "C70AG" and then press the enter key to begin the test. The RAM test will run indefinitely until it the computer is restarted or an error is detected.

Technical Specifications

Physical Dimensions

Parameter	Value
Height	$59.817\ \text{mm} \pm 0.2\ \text{mm}$
Width	$107.569\ \text{mm} \pm 0.2\ \text{mm}$
Thickness	$< 12.7\ \text{mm}$
Weight	$< 28\ \text{g}$

Electrical Specifications

Specifications are valid over temperature range of $0\ °C - 85\ °C$ and $V_{CC} = 4.5\ V - 5.5\ V$.

Parameter	Value	Conditions
$V_{IH_{min}}$	$2.0\ V$	
$V_{IL_{max}}$	$0.8\ V$	
$V_{OH_{min}}$	$2.4\ V$	$I_{OH} = -4\ mA$
$V_{OL_{max}}$	$0.5\ V$	$I_{OL} = 4\ mA$
Output Slew Rate	$< 1.5\ V/ns$	
$I_{I_{max}}$	$\pm 20\ \mu A$	$V_{in} = 0\ V - 5.5\ V$
$C_{IO_{max}}$	$50\ pF$	address bus A[15:0], R/W
	$20\ pF$	all other Apple II bus signals
$I_{CC_{max}}$	$200\ mA$	