

CSA 40/4 Magnum™ User's Manual

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Computer System Associates, Inc.
CSA 40/4 Magnum™, Single Board Computer
User's Manual

Table of Contents

1. Introduction.....	3
2. Product Warranty.....	4
3. Theory of Operation.....	5
4. <i>40/4 Magnum</i> Features and Specifications.....	6
5. Preparing the <i>40/4 Magnum</i> for Installation.....	8
6. Installing the <i>40/4 Magnum</i> in the Amiga 2000.....	10
7. Connecting Hardware to the <i>40/4 Magnum</i>	11
8. Software Installation and Usage.....	12

Appendices

A. Jumper Setting Summary.....	13
B. LED Display Summary.....	14

1. Introduction

Thank you for purchasing the CSA *40/4 Magnum*™ single board computer from Computer System Associates, Inc. (CSA). The *40/4 Magnum* with surface mounted components is the most innovative and advanced accelerator design utilizing Motorola 68040 technology available today. Designed for Multi-Media and Presentation Video/Graphics applications, involving Video, Animation, CAD, and other processor intensive routines, the *40/4 Magnum* provides up to 25 times or more performance increase compared with a standard MC68000 equipped Amiga™. At 25MHz, the *40/4 Magnum* crunches over two million floating-point operations per second (FLOPS) and is rated at 20 million instructions per second (MIPS) by Motorola.

When installed in a Commodore-Amiga A2000™ series computer, the *40/4 Magnum* is ideally suited for use with Newtek's Video Toaster™ and programs such as Deluxe Paint™, Imagine™, Pro-Page™ and ASDG's Art Department™.

The *40/4 Magnum* fits into the Amiga 86 pin CPU slot, maintaining the native MC68000 processor for software compatibility, and includes an ultra-high speed SCSI controller, one megabyte of zero wait-state (bursting) 32-bit static RAM, up to sixty-four megabytes of high-speed DRAM, parallel and serial ports for high speed printing, scanning, digitizing, and communications applications.

Please read this manual completely before attempting to install your CSA *40/4 Magnum* single board computer. After reading this manual, if you need assistance or should have a question or a problem, please call the CSA Technical Hot-Line at (619) 566-3923 between the hours of 10:00 AM to 3:00 PM (Pacific Standard Time) Monday through Friday for assistance.

WARNING! - THE INSTRUCTIONS IN THIS MANUAL ABOUT THE AMIGA A2000 SHOULD BE USED AS A GUIDE ONLY. FOR COMPLETE INFORMATION ABOUT THE AMIGA, SEE THE AMIGA USER'S MANUAL APPROPRIATE FOR YOUR MODEL AMIGA.

Failure to follow the directions and warnings in this manual may result in damage to the CSA *40/4 Magnum* single board computer and voiding of its warranty, damage to the Commodore Amiga computer and possible serious personal injury. (See Warnings and Precautions, section 5).

2. Product Warranty

General

This section describes procedures applicable to repair and sets forth the CSA product warranty and limited 1-year provisions.

Product Warranty/Limited 1-Year Warranty

Computer System Associates, Inc. (CSA) warrants to the original purchaser that CSA's computer products shall be free from the defects in material and workmanship for a period of 1 year from the date of original purchase. If a defect in any such product covered by the warranty occurs during the 1-year period, CSA shall, at CSA's option, either repair or replace such product.

THIS WARRANTY IS IN LIEU OF ALL OTHER EXPRESS OR STATIONARY WARRANTIES, AND THE DURATION OF ANY IMPLIED WARRANTY, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IS HEREBY LIMITED TO SAID ONE (1) YEAR WARRANTY. CSA'S LIABILITY IS LIMITED SOLELY TO THE REPAIR OR REPLACEMENT OF THE DEFECTIVE PRODUCT, IN ITS SOLE DISCRETION AND SHALL NOT IN ANY EVENT INCLUDE DAMAGES FOR LOSS OF USE OF OR LOSS OF ANTICIPATED COSTS, EXPENSES OR DAMAGES, INCLUDING WITHOUT LIMITATION ANY DATA OR INFORMATION WHICH MAY BE LOST OR RENDERED INACCURATE, EVEN IF CSA HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. CSA SHALL HAVE NO OBLIGATION TO ENHANCE OR UPDATE ANY PRODUCT AFTER MANUFACTURE.

Some states do not allow a limitation on how long an implied warranty lasts, so the above limitation may not apply to you. Some states do not allow for the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

NOTE: CSA'S products are specifically designed for operation with the Commodore Amiga 2000 manufactured by Commodore Business Machines. In certain cases, some third party devices may not function properly in conjunction with other internal or external add-on products and the Amiga 2000, including CSA's *40/4 Magnum*. Therefore, CSA warrants the operation of its products only with Commodore or CSA products. If you have a question regarding compatibility of a specific third-party device, please contact CSA at (619) 566-3923 for more information.

Product Warranty Registration

All CSA products are registered and warranted at the time of shipment and require no further action on the part of the purchaser.

Repair

Any product returned to CSA for repair must be accompanied by a Return Material Authorization (RMA) number issued in advance by CSA. Product returns will not be accepted without a valid RMA number clearly showing on the outside of the package. Contact CSA on the technical hot line, (619) 566-3923, to obtain an RMA number.

3. Theory of Operation

** THIS SECTION IS NOT AVAILABLE AT THIS TIME. **

4. 40/4 Magnum Features and Specifications

This section describes the major features and specifications of the CSA *40/4 Magnum*. Although it is not strictly required that you read this section in its entirety, it is good to be familiar with the major components and capabilities of the system.

68040 Microprocessor:

The *40/4 Magnum* utilizes a Motorola 68040 microprocessor operating at 25 or 33 MegaHertz (MHz). The 68040 is Motorola's third generation of high performance, 68000-compatible, 32-bit microprocessors. The 68040 integrates onto a single chip:

- a highly optimized 68030-compatible integer execution unit
- a 68882-compatible floating-point unit (FPU) and instruction subset
- dual independent instruction and data Memory Management Units (MMU)
- dual independent 4KByte physical instruction and data caches
- a high bandwidth, synchronous bus interface controller

With its advanced caching architecture, optimized execution units, and high bandwidth bus controller, and complemented by the Magnum's extensive resources, the 68040 can process most application and system tasks with unmatched throughput.

Asynchronous Design:

Although the Magnum's 68040-based local bus operates synchronously, the *40/4 Magnum* interfaces with the Amiga motherboard through an entirely asynchronous design. This allows the 68040 and its resources to operate at the most optimum frequency, independent of the Amiga's custom chip clocks.

Coprocessor Slot Board Offers 68000 Compatibility:

The *40/4 Magnum* installs in the 86-pin coprocessor slot in the Amiga A2000. To assure 100% software compatibility, the original 68000 CPU is both software and hardware selectable.

One MegaByte of Zero Wait-State SRAM:

CSA's unique design provides the 68040 with one megabyte of zero wait-state (bursting), 32-bit Static Random Access Memory (SRAM). This memory is used to obtain the highest throughput possible by the 68040. Provided software allows the user to control the priority of the SRAM for most efficient use.

Up to 64 Megabytes of On-Board DRAM:

Today's memory intensive applications are easily accommodated by installing up to four standard 32-bit SIMM modules in the Magnum's on-board DRAM area. Configurations are available which add 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 48, 52 or 64 megabytes of 32-bit DRAM to the system. Also, a 512kB portion of the DRAM can be used to remap the Amiga ROM kernel via hardware, which leaves the MMU free for other system or application software. Provided software allows the user to enable and disable the ROM remapping and to set the mode of the DRAM to either normal, page or burst mode.

SCSI I/O Processor:

Professional video graphics production, as well as multimedia presentation, require high system throughput. The *40/4 Magnum* incorporates a state of the art SCSI I/O Processor, which uses its own on-board RISC processor to execute SCSI Script programs in parallel with the 68040, leaving it available to do other system or application processing. The SCSI I/O Processor is SCSI-1 and SCSI-2 compliant and can transfer data at up to 10MB/s on the SCSI bus. On the Magnum's bus, the SCSI I/O Processor can DMA data at up to 106MB/S using the same efficient bus interface as the 68040. Up to seven SCSI devices may be added to the SCSI bus through an internal 50-pin connector and a external DB25 connector. To provide the ultimate flexibility in configuring a properly terminated SCSI bus, the on-board termination resistor networks are socketed and can be removed, and termination power can be supplied to either or both of the connectors via two jumpers. Along with the built-in ability to Autoboot off the SCSI bus, a device driver, *csascsi.device*, is provided for standard access to the SCSI bus devices.

Parallel and Serial Ports:

The standard Amiga ports are often in great demand, requiring the user to frequently switch cables or devices. To help break this I/O bottle-neck, the Magnum offers both high speed parallel and serial ports, which can be used for such applications as printing, scanning, digitizing, communications, and control. These ports do not replace but are in addition to the standard Amiga ports. Two device drivers, *csaser.device* and *csapar.device*, are provided for standard access to the ports.

Full 32-bit Expansion Bus:

For future expansion, two high-quality connectors provide an extension to the *40/4 Magnum's* high bandwidth, 32-bit bus. Additional memory, high speed peripherals, and even multiple processors could be added to the system.

Surface Mount Technology and Other Specifications:

Where applicable, non user installable components on the *40/4 Magnum* are surface mounted to enhance reliability and conserve space. Power is supplied through the 86-pin coprocessor slot and should be 5.0+/-0.25VDC. Physical support is provided by the 86-pin slot connector, the front guide rail, and the rear bracket.

Autoconfig and Autoboot software:

The *40/4 Magnum* contains EPROM-based software that executes during the Amiga's Autoconfig process. At that time, all memory is configured, tested, and added to the system, and the Amiga ROM kernel is remapped into DRAM. The Magnum will then Autoboot off of the first drive on its SCSI bus that is capable of Autobooting. Autoboot may be temporarily bypassed by depressing the left mouse button during bootup, or may be disabled continuously via a rear mounted micro switch. And for diagnostics and special developmental testing, all Autoconfig processing for the Magnum may be disabled via a jumper.

5. Preparing the *40/4 Magnum* for Installation in the Amiga 2000 Series Computer

WARNING: THE CSA *40/4 Magnum* IS SUBJECT TO DAMAGE FROM ELECTROSTATIC DISCHARGE AND CANNOT BE HANDLED UNDER ANY CIRCUMSTANCES, UNLESS YOU AND THE WORKSTATION ARE PROPERLY PROTECTED FROM STATIC. Computer Systems Associates, Inc. WILL NOT BE RESPONSIBLE FOR DAMAGE TO THE *40/4 Magnum* DUE TO THE IMPROPER STATIC-PROTECTIVE CONDITIONS.

WHEN PERFORMING ANY OPERATIONS ON THE INSIDE OF THE AMIGA, A GROUNDING WRIST STRAP MUST BE WORN AT ALL TIMES. IF A WRIST STRAP IS NOT WORN, DAMAGE MAY OCCUR TO THE AMIGA AND OR THE *40/4 Magnum*. IN ADDITION TO THE WRIST STRAP, AN ANTISTATIC MAT THAT IS FULLY GROUNDED MUST BE PLACED UNDER THE AMIGA AND THE *40/4 Magnum*.

NOTE: Prior to performing any preparation or installation procedures involving the *40/4 Magnum*, remove all packing materials (including any foam materials) from the accelerator board.

The CSA *40/4 Magnum* has been designed for maximum flexibility and versatility and is fully tested at the factory with all the jumpers and switches set for normal operation. Most jumpers and switches will not need to be changed. The following information is provided so the user may take full advantage of the built-in capabilities of the *40/4 Magnum*.

Jumper Settings

Most jumpers should not need to be changed, except for special diagnostic or developmental testing. If you think it might be appropriate to change any of the jumpers on the *40/4 Magnum*, please first read **Appendix A, Jumper Setting Summary** to develop a clear understanding of what each jumper does and how it affects the system's operation.

Switch Settings

Located at the top-rear corner of the board, is a bank of four micro switches (also known as DIP switches) which is labeled **SW1**. These switches allow the user to enable or disable the Magnum's Autoboot feature, and to set the Magnum's SCSI ID number.

The four switches are labeled 1 through 4 on the component. Switch 1, when moved to the ON position, enables the Autoboot feature. When in the OFF position, the Magnum's PROM-based software will not attempt to identify, mount or boot any SCSI devices attached to the Magnum.

Switches 2, 3, and 4 select the SCSI ID number for the Magnum's SCSI I/O Processor. The ON/OFF values of these switches form a binary number between 0 and 7, with switch 2 equal to 1 when ON, switch 3 equal to 2 when ON, switch 4 equal to 4 when ON, and each switch equal to zero when OFF. Adding up the value of all switch settings gives the SCSI ID. At the present time, all switches should be set to ON to select ID #7.

Installing Additional Memory on the CSA 40/4 Magnum

The CSA 40/4 Magnum uses two types of memory: Static Random Access Memory (SRAM) and Dynamic Random Access Memory (DRAM). There is a one megabyte (1MB) bank of fast SRAM soldered directly on the 40/4 Magnum. It is not user-installable or expandable. This SRAM is the fastest memory on the 40/4 Magnum and supports zero wait-state accesses, as well as the 68040's burst protocol.

On the other hand, the 40/4 Magnum supports up to sixty-four megabytes (64MB) of user-installable DRAM. On the back side of the 40/4 Magnum there are four, 72-pin, Single Inline Memory Module (SIMM) sockets that support 1Mx32 and 4Mx32 DRAM SIMMs. Each 1Mx32 module contains four megabytes (4MB) of memory while each 4Mx32 module contains sixteen megabytes (16MB). The four SIMM sockets may be populated one module at a time, and also, the two sizes of modules may be mixed together. Because of this flexibility, the possible configurations of on-board DRAM include: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 48, 52, and 64 megabytes.

The 40/4 Magnum comes standard with four megabytes of DRAM, but can be ordered, and therefore factory installed and tested, with any of the valid DRAM configurations listed above. If at a later time more memory is required, the user may add additional modules, or replace one or more 1Mx32 SIMM modules with 4Mx32 SIMM modules.

DRAM Jumpers

There are three jumpers, labeled **S1**, **S2**, and **S4**, which control the 40/4 Magnum's ability to access the larger DRAM SIMM modules. These jumpers are located towards the front of the machine and near the top edge of the board. If only 1Mx32 DRAM SIMM modules are installed, then the three black shorting blocks should be placed across pins one and two (towards the front of the machine). If any 4Mx32 SIMM modules are installed, even if mixed with 1Mx32 modules, then the three black shorting blocks should be placed across pins two and three (towards the rear of the machine).

Installing SIMM Modules

The four SIMM sockets on the back side of the Magnum are labeled **MM1** through **MM4**, with **MM1** being the closest to the edge of the board. Each socket is keyed and each module is notched so that backwards insertion is nearly impossible. The SIMM modules should be installed in **MM1** first, then **MM2**, and so on.

6. Installation in the Amiga 2000

Please refer to your Amiga A2000 Users Manual for complete information on the Amiga 2000.

To install the *40/4 Magnum* in the A2000, the following procedures must be followed.

A.) Disconnect the power, keyboard and mouse from the front of the computer. Also disconnect any peripherals attached to the rear of you computer such as a printer, modem, external disk drives, etc. This will make moving the computer easier.

B.) Remove the A2000 cover by removing the two screws on the lower left side, the lower right side and the center screw in the top rear of the Amiga. Set these screws aside for later use.

C.) Turn the computer so that the front is facing you. Grasp the cover on the sides, carefully sliding it towards you, lifting the front as you pull.

WARNING: IF THE COVER GETS CAUGHT DO NOT FORCE IT! Check under the cover to see if any internal cables are holding it. If so, correct the problem before continuing with the cover removal.

D.) Locate the co-processor slot. It is the first slot to the left of the power supply cage. Locate the rear cover plate of the co-processor slot. Remove the two screws that hold the metal plate in place and lift the plate out. Also remove the two screws that hold the metal plate next to the co-processor slot, and remove the plate itself. Save the screws, you'll need them to hold the *40/4 Magnum* board in place.

E.) Remove the *40/4 Magnum* board from it's protective anti-static bag and orient the board so that the bracket and connectors are toward the rear of the machine with the IC chips facing toward the power supply. Align the *40/4 Magnum* above the slot connector with the metal bracket against the inside rear panel of the computer and the connectors poking through the rear panel opening. Make sure the edge connector is seated properly. Apply gentle, but even pressure while inserting the board into the slot until you feel the board seat firmly.

WARNING: IMPROPER INSTALLATION COULD CAUSE DAMAGE TO BOTH THE A2000 AND THE *40/4 Magnum*. IF YOU HAVE ANY QUESTIONS ABOUT THE INSTALLATION, PLEASE CONTACT CSA'S TECHNICAL HOTLINE AT (619) 566-3923 FOR ASSISTANCE.

Reassemble instructions:

F.) When the *40/4 Magnum* is in place, secure it in place with the two screws that hold the metal cover plate in place. The bracket that house's the additional ports also needs to be screwed into the place where you removed the second metal plate next to the *40/4 Magnum*.

G.) Now that the *40/4 Magnum* is firmly in place, replace the A2000's cover and replace the five screws that you removed. Carefully re-install any removed equipment, the mouse and keyboard, any peripherals and finally the power cord.

7. Connecting Hardware to the 40/4 Magnum

The *40/4 Magnum* allows various devices to be connected directly to the card, Media storage devices, printers, modems and external peripherals can be attached through the use of connectors provided on the *Magnum*.

SCSI Devices (internal)

The *40/4 Magnum* includes a 50 PIN SCSI connector for attaching internal SCSI devices. This connector is located on the component side of the card nearest the card slot bracket and is labeled CN3 on the *Magnum*'s computer board.

To use this connector, simply attach the cable from your internal SCSI device directly into the connector. (WARNING) Make sure you match pin one on the connector with pin one on your SCSI cable. Pin one is located on the top of the 50 PIN connector and is denoted by a 1 on the *Magnum*'s computer board. Pin 1 on your SCSI cable should be denoted by a red strip or should be keyed to insert only one way into the *Magnum*'s 50 PIN connector.

SCSI Devices (external)

Attached directly to the end of the *Magnum*'s computer board is a card slot bracket. This bracket supplies a female DB 25 SCSI connector for the use of external SCSI devices. To use this connector, simply attach the male DB 25 SCSI cable from your external SCSI device to the *Magnum*'s female connector. Screw this connector down firmly into the socket making sure that good contact is made. Since the male and female connectors are keyed and can only be installed one way, there is no need to worry about the location of PIN one for external SCSI devices.

PORTS

Your *40/4 Magnum* may be purchased with the Serial and Parallel ports included. Any *Magnum* may be factory upgraded to include these ports. Locate the card slot bracket with (DB 25) Parallel and (DB 9) Serial connectors attached. Ribbon cables extend from the bracket providing two female connectors. Plug each connector into the *Magnum* using the two sockets provided, located near the top of the card between the *Magnum*'s LEDS. The card slot bracket then screws into the next available slot adjacent the accelerator card. The *40/4 Magnum*'s ports are designed to provide additional "High-Speed" ports to the computer and will operate in conjunction and simultaneously with the Amiga's own serial and parallel ports.

Parallel Devices

Locate the DB 25 "Parallel" connector attached to the additional card slot bracket provided. The *Magnum*'s parallel port is accessed by connecting the parallel device to the *Magnum*'s external DB 25 connector. If the parallel device used does not have a male DB 25 connector, it may be necessary to purchase an adapter converting it to this standard. Remember to install the CSAPAR.DEVICE driver software provided with the *Magnum*'s installation disk.

Serial Devices

Locate the DB 9 "Serial" connector attached to the additional card slot bracket provided. The serial port is located just under the parallel port on this bracket. To access the serial port simply plug the serial device into the *Magnum's* external DB 9 connector. If the serial device does not have a male DB 9 connector it may be necessary to purchase an adapter converting it to this standard. Remember to install the CSASER.DEVICE driver included with the *Magnum's* installation disk.

Compatibility

The *40/4 Magnum* is designed to offer the highest degree of compatibility with SCSI, Serial and Parallel devices. Although highly compatible, CSA RECOMMENDS VERIFYING COMPATIBILITY BEFORE PURCHASING HARDWARE INTENDED TO OPERATE DIRECTLY FROM THE 40/4 MAGNUM SINGLE BOARD COMPUTER. CSA CANNOT GUARANTEE OPERATION OF ALL DEVICES CAPABLE OF CONNECTING TO THE 40/4 MAGNUM.

8. Software Installation and Usage

**** THIS SECTION IS NOT AVAILABLE AT THIS TIME. ****

Appendix A. Jumper Setting Summary

There are several two-pin jumpers on the Magnum, labeled **JP1** through **JP7**. They control various system options and are described below.

- JP1** 68040 MMU Disable. When a black shorting block is in place, the 68040's MMU (Memory Management Unit) is disabled through hardware. This function is primarily intended for diagnostic and development use. By default, a shorting block is not installed in JP1.
- JP2** 68040 Cache Disable. When a black shorting block is in place, the 68040's caches are disabled through hardware. This function is primarily intended for diagnostic and development use. By default, a shorting block is not installed in JP2.
- JP3** Internal SCSI Terminator Power. When a black shorting block is in place, power is supplied to the internal 50-pin SCSI connector (CN3, pin-26) for termination. This jumper should only be installed if an appropriate SCSI terminator is connected at the end of the cable that requires terminator power. By default, a shorting block is not installed in JP3.
- JP4** External SCSI Terminator Power. When a black shorting block is in place, power is supplied to the external 25-pin SCSI connector (CN4, pin-25) for termination. This jumper should only be installed if an appropriate SCSI terminator is connected at the end of the cable that requires terminator power. By default, a shorting block is not installed in JP4.
- JP5** 68000 Mode Select. When a black shorting block is in place, 68000 mode is selected. The next time the system is either cold or warm booted, the 68000 will take over. In this mode, all of the *40/4 Magnum's* resources are disabled. A switch may be connected to JP5 to allow external access to this function. By default, a shorting block is not installed in JP5.
- JP6** Autoconfig Disable. When a black shorting block is in place, the *40/4 Magnum* will not participate in the Amiga's Autoconfig Sequence, and therefore, will not configure any of its memory or devices. This function is primarily intended for diagnostic and development use. By default, a shorting block is not installed in JP6.
- JP7** Reset Code Disable. When a black shorting block is in place, the *40/4 Magnum* will not execute any of its PROM-based diagnostics or initialization routines after a cold or warm boot. This function is primarily intended for diagnostic and development use. By default, a shorting block is installed in JP7.

Appendix B. LED Display Summary

There are two displays of ten LEDs (Light Emitting Diodes) each. Both displays are located along the top edge of the *40/4 Magnum* board. The first display, **DP1**, is the one towards the center of the board. It indicates various system functions. The second display, **DP2**, is the one nearest the rear of the board. It indicates SCSI related functions. The following information briefly describes the function of each LED in each display. For each display, LED1 is the leftmost position, LED2 is the second from the left, and so on.

NOTE: Several of the LEDs will not flash often enough or long enough to be seen under normal operating conditions. They are, however, useful for diagnostics and development work.

System Display (**DP1**):

- LED1** Master Reset. This LED is lit when the Amiga is being reset by either a cold or warm boot. It should be off (not lit) at all other times.
- LED2** General Reset. This LED is lit when the Amiga's RESET signal is asserted. This happens during a cold or warm boot, but can also happen under software control. It should be off most of the time.
- LED3** Magnum Bus Strobe. This LED is lit when the Magnum bus is being accessed. This LED will flicker on and off, indicating activity on the Magnum bus.
- LED4** Zorro Bus Strobe. This LED is lit when the Magnum accesses the Amiga's Zorro bus. This LED will flicker on and off, indicating that the Magnum is accessing motherboard resources (like the Amiga custom chips and chip RAM).
- LED5** Magnum Interrupt. This LED is lit when one or more of the Magnum's devices is requesting an interrupt.
- LED6** Zorro Boss. This LED is lit when the Magnum has control of the Amiga and its Zorro bus. This LED should be constantly lit while in 68040 mode, and should not be lit when in 68000 mode.
- LED7 - LED10** These four LEDs are programmable and are used for diagnostic purposes. They should not be lit under normal operating conditions.

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