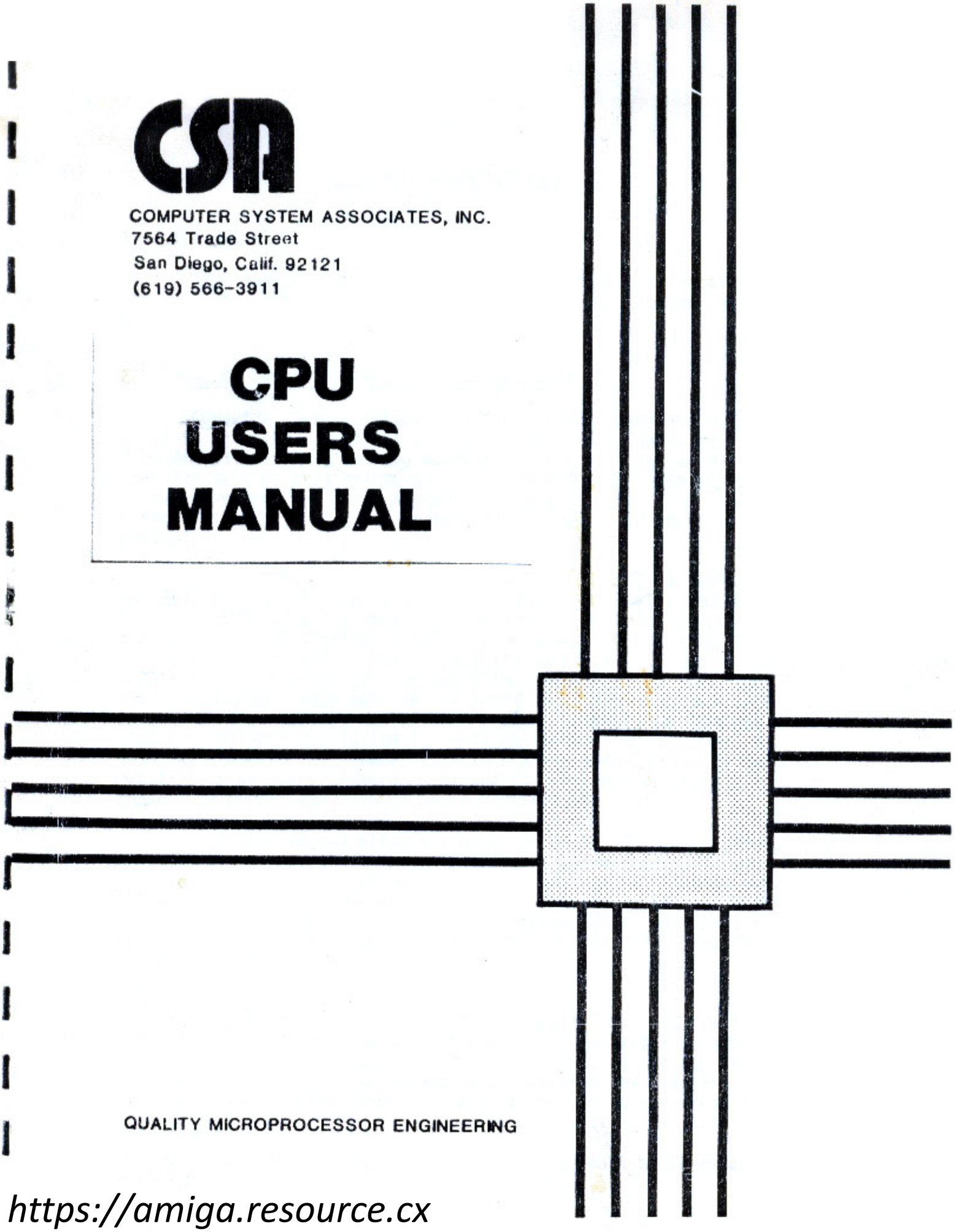

CSA

COMPUTER SYSTEM ASSOCIATES, INC.
7564 Trade Street
San Diego, Calif. 92121
(619) 566-3911

CPU USERS MANUAL

QUALITY MICROPROCESSOR ENGINEERING

LIMITED WARRANTY/REPAIR

1. GENERAL

This section describes procedures applicable to repair and sets forth the CSA product Warranty and limited 90-day provisions.

2. PRODUCT WARRANTY/LIMITED 90-DAY WARRANTY

Computer System Associates, Inc. (CSA) warrants to the original purchaser that CSA's computer products shall be free from defects in material and workmanship for a period of 90 days from the date of original purchase. If a defect in any such product covered by this warranty occurs during this 90-day period, CSA shall, at CSA's option, either repair or replace such product.

THIS WARRANTY IS IN LIEU OF ALL OTHER EXPRESS OR STATUTORY WARRANTIES, AND THE DURATION OF ANY IMPLIED WARRANTY, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IS HEREBY LIMITED TO SAID NINETY (90) DAY PERIOD. 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 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 has found that certain external devices may not function properly in conjunction with other internal or external add-on products in the Amigatm 500, 1000, 2000, including CSA'S "Piggyback" and cpu boards. CSA cannot guarantee the operation of its products with other Non-Commodore or Non-CSA add-on products.

"AMIGA, KICKSTART, and WORKBENCH are a trademark of Commodore-Amiga, Inc."

PRODUCT WARRANTY REGISTRATION

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

REPAIR

Any material returned to CSA for repair must be accompanied by a Return Material Authorization (RMA) number issued in advance by CSA. Returned material will not be accepted without an RMA. For an RMA, phone 1-619-566-3911 (USA)

SPECIFICATION

68020/68881 CPU Board

Clock frequency	14.32 mhz
Data bus size	8/16/32 bits
Address bus size	24/32 bits
Supply Voltage	5.0 Volts
Supply Current	2 amps max

BOARD OPTIONS

Motorola 68881 or 68882 math co-processors at 12, 16, 20 or 25 MHZ

CPU BOARD JUMPERS
(FACTORY SETTINGS SHOWN BELOW)

JUMPER	BOARD # 00992 C (REV C)	BOARD # 00992 D (REV C)
FC	IN	IN
FC2	OUT	OUT
68000	OUT	OUT
14MHZ	NA	~~IN~~ OUT
Y1	NA	~~OUT~~ IN
B2000	NA	IN

DESCRIPTION OF JUMPERS

FC (IN) and FC2 (OUT) the board will generate a Function code of 7 for a coprocessor access.

FC (OUT) and FC2 (IN) the board will generate a Function code of 3 for a coprocessor access.

68000 (IN) will disable the 68020/68881 and the CSA 32-bit memory and enable the mother board 68000.

14MHZ (IN) and Y1 (OUT) will operate the 68881 at 14mhz.

14MHZ (OUT) and Y1 (IN) will operate the 68881 at the frequency of the Y1 OSC.

B2000 (IN) controls the Boss signal for proper dma operation of the B2000 Computer. Remove for A2000 and HighRise operation.

Note: For dma operation with a 00992C board in a B2000 with pal 408 (U11) installed pins 5 and 10 must be jumpered on circuit side.

LED DISPLAY

Located on the top edge of the cpu board are located three leds labled V, Z, and F. These show which bus is in use.

V-Led = The CSA 32 bit bus is in use.
Z-Led = The AMIGAtm 16 bit bus is in use.
F-Led = The 68020 is working with the 68881.

THEORY OF OPERATION

68020/68881 CPU BOARD, CSA PART # 1700-9010920

The Turbo AMIGAtm CPU board contains both a Motorola 68020 microprocessor chip and a Motorola 68881 floating point math coprocessor chip. The CPU board takes over the AMIGAtm 68000 processor on startup and places it in a tri-state condition so that it is effectively taken out of the circuit. From this point on, the 68020 emulates the 68000, and the CSA special state machine which allows the 68020 to run at 14 MHz and transfers all data to the AMIGAtm at 7 MHz completely controlling the AMIGAtm computer. The 68020 is directly connected to the 68881 floating point coprocessor via a 32 bit data bus. The 68881 provides an extended instruction set to the 68020 which includes floating point and trigonometric operations. These extra instructions allow the 68020/68881 pair to execute directly in native machine code many operations which previously were carried out by software subroutines. In some cases a fifty-to-one or more speed improvement can be attained through the use of this feature. The 68020 microprocessor also generates 32 bit data and address buses. Separate physical 32 bit data and address buses are generated by the CSA 68020 CPU board and may be used to interface to other 32 bit cards (designed to CSA standard 32 bit bus specs) via four ribbon cables. Every other conductor of the ribbon cable is grounded to reduce the possibility of noise and crosstalk. The clock signals for the 68020 are generated from the AMIGAtm clock by doubling the AMIGAtm clock frequency of 7.16 mhz. The 14 mhz clock frequency of the 68020 along with its 32 bit data bus, provides for a factor of up to four times speed improvement over programs running in a stock AMIGAtm. The 68881 offers the possibility of up to an additional fifty-to-one or more speed improvement in math intensive operations. The 68881 can operate at any frequency up to 25 mhz (with a 25 mhz option installed) for even further performance improvement.

SOFTWARE CONSIDERATIONS

The WORKBENCHtm diskette which you received with this manual contains the following CSA programs:

NOTE: KICKSTARTtm 1.2 and later revisions automatically determines the type of processor and co-processor that is in use, and enables the Cache.

1. CACHE - click on the icon to turn on the 68020 instruction cache.

2. NO_CACHE - click on the icon to turn off the 68020 instruction cache.

3. FASTMAN - This a mandelbrot type program that only works with the 68881. This program and has a fixed pattern which continuously repeats and may only be stopped by re-booting the system.

4. Mandelbrot - This is a standard type of program which has a menu to set up the type of pattern and the type of math (software or 68881).

   Standard setup, at the prompt type in:
   P3(cr) - Mandelbrot recursion
   Fn(cr) - n=0 software math routines
            n=2 68881 math routines
   G(cr) - Go process

NOTE: THE FOLLOWING IS OF CONCERN ONLY IF YOU ARE WRITING YOUR OWN ASSEMBLY LANGUAGE PROGRAMS.

The stack frame for the 68020 is different than for 68000/68010. Consult the Motorola 68020 User's Manual if you plan to manipulate the 68020 stack frame directly with your software.

The Move from Status Register instruction is privileged in the 68010 and 68020. This is different than the 68000 where this instruction is of the non-privileged type.

Remember that with the 68020 board installed that software timing loops will execute faster, which may cause a problem if you are relying on a fixed time delay.

PERFORMANCE TEST OF THE CSA 68020/68881 BOARD

A. Benchmark Execution Time Comparison of the 20 MHz Turbo AMIGAtm MC68881.
1000 Whetstones/sec is approximately 1 million floating-point operations per second.

TEST	Time (sec) 68881 (14.32 MHz)	Time (sec) 68881 (20.0 MHz)	Percent Improvement
Savage	0.39	0.29	26%
Float	1.2	0.84	30%
Whetstone	450 K/sec	505 K/sec	11%
Geometric Mean =			20%

Savage Benchmark (25,000 Iterations):
Double Precision

LANGUAGE	CPU/FPU	CPU/FPU (MHz/MHz)	TIME (sec)
Absoft F77 V2.2C	68020/68881	14.32/20.0	2.9
" " "	" "	14.32/14.32	3.9
Manx Aztec C V3.03E	68020/68881	14.32/20.0	4.5
" " " "	" "	14.32/14.32	5.7
" " " "	" none	14.32/----	340.0
" " " "	68000 ----	7.16 ----	1197.0

Sieve Benchmark Results (100 Iterations)

Manx Aztec C V3.30E	68020/none	14.32	6.3
" " " "	68000/none	7.16	25.8

Note: Benchmark Test results are available through CSA.

INSTALLATION OF CPU BOARD IN CSA TH1000 HIGHRISE EXPANSION CHASSIS

1. Before installation Turn off power and remove power cords to both the Highrise and A1000 Computers.

2. Remove Highrise front cover.

3. Insert the cpu board in socket J2 with the components facing the power supply. Be sure this board is inserted into the 86 pin socket only and not the 100 pin zorro bus.

4. Replace cover and test for proper operation.

INSTALLATION OF CPU BOARD IN THE AMIGAtm B2000

INSTALLATION OF CSA 68020 CPU BOARD

WITH REV 4.0 and later MOTHERBOARD PROVIDED THE FOLLOWING MODIFICATION MUST BE PERFORMED ON THE B2000.

NOTE: CSA HAS DETERMINED THAT THE B2000 MOTHERBOARD MAY REQUIRE A MODIFICATION TO CORRECT A CLOCK SIGNAL POSSIBLE DESIGN ERROR TO THE COPROCESSOR SOCKET CN600 ON THE MOTHEROARD. THE FOLLOWING PROCEDURE IS PROVIDED FOR YOUR INFORMATION. B2000 MOTHERBOARD MODIFICATION MAY INVALIDATE ANY WARRANTY EXPRESSED OR IMPLIED BY THE MANUFACTURER AND SHOULD BE PERFORMED AT THE SOLE DISCRETION AND RISK OF THE END USER.

The following modification should only be performed by a skilled person with great care.

1. Turn off the rear power switch to the B2000, and remove the power cord. Then remove the cover.

2. Remove any and all pcb's from the mother-board.

3. Remove the screws (6) from the Power Supply and Disk drive tray.

4. Unplug the Power Supply cable going to the Motherboard.

5. Unplug the Disk drive control cable going to the Motherboard.

6. Remove the tray from the Amigatm B2000 and carefully place it on a near by table.

7. Locate C904 cap about one inch to the right of U800.

8. Locate and cut the trace as shown on the Amigatm Modification Instructions drawing CSA Part #01126 be very careful not to cut other lines.

9. Locate the pad as shown on the Amigatm Modification Instructions next to U100 (68000 CPU) socket and add a jumper (#30 awg. insulated wire) to the pad by C904.