

SPIRIT TECHNOLOGY

SIN500-2

INSTALLATION MANUAL

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INTRODUCTION

Congratulations AMIGA User, we are excited that you have chosen our Spirit INTERNAL A500 memory expansion board, SIN500-2. We have spent many hours in refining our product, to deliver the best performance possible with your A500 computer system.

The SIN500-2 is an internal memory expansion device that will expand your A500 computer system up to 3MB (including the A501 card), just by plugging DRAMs (Dynamic Random Access Memory Chips) into their appropriate banks. There are a total of 3 possible memory configurations, starting with 0.5MB, 1.0MB and ending with a 2.0MB total on the SIN500-2. Total memory including the A500 will put you at 2.5MB. If you have already obtained the A501 (AMIGA 0.5MB trap door expansion), then your total available memory will change to a comfortable 3.0MB with full AutoConfig.

As you may know there are many software packages now available for your AMIGA computer that may require 1.0MB or more to run! Some software will even give you greater work-space capacity and expanded features with the presence of extra memory. No more need to worry about a limited choice of software. With as little as just 0.5MB on your SIN500-2 you can run anything you may have wanted but couldn't, because of the limitations of memory in your AMIGA system.

If the power budget on your A500 is an issue that is bothering you, let me point out that the SIN500-2 has an option for an external power source so that no power will be drawn from your A500 (see the power budget chart located in the "POWERING THE SIN500-2" section).

We feel that our product is of very high quality and provides a NEAT way of expanding your A500 computer system.

GET READY, GET SET, GO!

Now we're ready to get down to business, but first here is a check list for the items that you should have received with the unit.

1. (2) Phillips head screws.
2. (2) Nylon spacers.
3. (3) Blue shorting plugs (located on the SIN500-2).
4. (1) Software support disk.
5. (1) Jumper wire clip for XRDY (only required for special expansion).

If you are missing any of the items mentioned above, please call SPIRIT TECHNOLOGY at (801) 485-4275 and ask for Technical Support.

Listed below are the tools needed for installation of the SIN500-2.

1. Torx head driver or allen wrench of appropriate size.
2. Phillips head screw driver (medium tip).
3. I.C. chip puller or flat head screw driver (medium tip).
4. Needle nose pliers

Before we begin the installation make sure that you are in a static free environment. To make sure there will be no static discharge it is best to work on NON carpeted floors (cement or linoleum).

When you have found an appropriate place to do the installation then you are ready to start.

INSTALLING RAM CHIPS ON YOUR SIN500-2

If your SIN500-2 came populated from the factory then you may skip this section and move on to STEP 1, DISASSEMBLY.

The chip specifications for the SIN500-2 are as follows.

256K x 4 DRAMS
Any speed will work fine.
4 Chips Per Bank = 512K
16 Chips Per Board = 2MB

Banks should be filled in the following order.

512K, populate bank "A" with 4 ram chips. 1.0M, populate bank "A" and "B" each bank with 4 ram chips.
2.0M, populate bank "A", "B", "C", and "D" each bank.

Inspect each chip BEFORE attempting insertion into socket. Make sure all pins are straight and aligned, If not straight, gently adjust with needle nose pliers. You may need to adjust the width between the rows of pins on the ram chips for proper seating into their socket, adjust the width between the rows of pins by gently pressing one row at a time against a flat surface (like the edge of a table).

Insert the chips into their sockets with a firm, uniform pressure. Chips should click into place and be evenly seated. Make sure that the notch in the ram chip matches the notch in the socket (notches point towards the 68000). Make sure the SIN500-2 is evenly supported on a flat surface to distribute pressure equally. The extended pins under the 68000 socket should, of course, hang over the edge of this flat surface (usually the edge of your work area). Be sure you protect the work area surface from the solder side of the SIN500-2.

Double check your work before proceeding with the installation of your SIN500-2.

STEP 1, DISASSEMBLY

Now you are ready to open your A500. To do this you must remove 6 torx head screws located on the underside of the A500 (3 screws along the front edge and 3 screws along the back edge). You can use the torx driver or small allen wrench for removal of the screws. When you have removed the 6 screws, group them separately so they will be easy to locate. Return the A-500 to its upright position.

Remove the top cover by grasping it at the corner seams and pulling upwards. A wide flat blade screw driver may be inserted into the seam at each rear corner and gently twisted to also help remove the top cover. Place the cover to one side. This now exposes the internal FCC radiation shield and keyboard.

Remove the keyboard assembly by first disconnecting the keyboard cable. Then simply grasp the top edge of the keyboard and set it to the right side of the AMIGA. All this should be done with the grounding wire still attached to the keyboard. REFER TO DIAGRAM 2 ON THE DIAGRAMS SHEET.

Remove the FCC radiation shield by removing four torx head self tapping screws at the front left of the shielding cover. Keep these screws separated from the others. REFER TO DIAGRAM 3 ON THE DIAGRAMS SHEET.

Using needle nose pliers bend the four metal retaining tabs (located around the shielding edges) until they will clear the slots in the FCC cover. REFER TO DIAGRAM 3 ON THE DIAGRAMS SHEET.

Using a little rocking action from rear to front, the FCC cover can now be removed and placed to one side.

This completes installation step 1.

STEP 2, 68000 REMOVAL

The 68000 Microprocessor is the large I.C. on the left hand side of the computer, next to the expansion connector. Using a flat blade screw driver, or an I.C. remover VERY CAREFULLY pry the 68000 from its socket. SEE DIAGRAM 4 ON THE DIAGRAMS SHEET.

CAUTION - This is a static sensitive component, DO NOT TOUCH THE PINS unless you are static free!

CAUTION - DO NOT pry between the socket fitting and the mother-board. Pry between the socket and the 68000 chip.

CAUTION - DO NOT LEVER the screw driver down into the A500 mother-board under the 68000 or you may DAMAGE the CIRCUIT TRACES.

CAUTION - DO NOT BEND THE PINS on the 68000 or you may have trouble reinstalling it into the SPIRIT memory board.

CAUTION - NOTE THE DIRECTION of the I.C. orientation, NOTCH ON ONE END is pointing towards the FRONT of the A500.

REFER TO DIAGRAM 4 ON THE DIAGRAMS SHEET for a complete map on where to locate the 68000 as stated above.

This completes installation step 2.

STEP 3, INSTALLATION OF 68000

This step is easy if the 68000 Microprocessor has been carefully removed in the prior step. Visually examine the pins on the 68000 to make VERY sure that they are perpendicular, if they are not, gently straighten them using the needle nose pliers on each pin.

CAUTION - The pins on any I.C. are delicate and not designed to be bent very much or they will break off and a new I.C. will need to be obtained.

The 68000 Microprocessor must now be installed into the SIN500-2. The orientation of the 68000 must be the same in the SIN500-2 as it was on the AMIGA mother-board with the notch end of the 68000 towards the FRONT of the AMIGA.

You MUST be careful to prevent bending a pin under the 68000 or outside the mating SIN500-2 socket. The easiest way is to "start" all the pins on one side of the connector and then lower the other row of pins into the other side - making sure they are all centered in the connector holes. Now apply a FIRM EVEN PRESSURE to the top of the 68000 until it is completely seated into the SIN500-2, make sure the SIN500-2 is stabilized or you may bend the pins on the solder side of the SIN500-2.

CAUTION - The PINS on the solder side of the SIN500-2 are sharp and can mar a soft surface such as wood. They will also break very easily if bent too much!

This completes installation step 3.

STEP 4, INSTALLATION OF THE SIN500-2

The SIN500-2's pins should now be examined to make sure the tips are perfectly straight and the rows are even. They have been aligned at the factory but bending may occur in shipping. The SIN500-2 is ready to be installed into the empty A500 68000 socket.

If the chip labeled "FAT AGNES" (The square chip) has a metal retaining clip across the top, you MUST remove it so that it will not short the solder side of the SIN500-2. SEE DIAGRAM 4 ON THE DIAGRAMS SHEET.

Carefully place the SIN500-2 so the pins line up in the A500 68000 socket. You should examine each pin for alignment. You may need to use a flashlight.

NOTE - There is a clearance hole in the SIN500-2 for capacitor C307 to fit thru. You may need to adjust capacitors C815 and C814 on the AMIGA 500 mother-board slightly so that they clear the SIN500-2. They may be carefully, but firmly adjusted. SEE DIAGRAM 4 ON THE DIAGRAMS SHEET.

Now exert a firm even downward pressure until the SIN500-2 pins are fully seated in the A500 68000 socket.

Check both rows of pins on the underside of the SIN500-2 to make sure that they are fully seated into the 68000 socket.

Now you must install the two nylon spacers and two phillips head long screws which were included in your SIN500-2 package. Notice the holes in the SIN500-2, one located on each side of the 86 pin A500 expansion port. Place the nylon spacers between the A500 mother-board, with the FCC shielding expansion port strip in place, and the SIN500-2. Then insert the screws thru the SIN500-2, down thru the nylon spacers and into the A500's threaded holes, gently tighten using a phillips head screwdriver. Now the SIN500-2 will be securely installed into the A500's 68000 socket.

This completes installation step 4.

STEP 5, TESTING YOUR SYSTEM

When the above installation steps are done (AND YOU HAVE DOUBLE-CHECKED EVERYTHING), then you are ready for testing.

The SIN500-2 must be configured correctly for the TEST mode which is indicated by the silk-screen diagram directly to the left of the shorting pins. The location of the shorting pins can easily be found by locating the two blue plastic shorting plugs (top, right center of the SIN500-2). You should see the config diagram directly to the left of these shorting pins. The two blue plastic shorting plugs should already be plugged onto their appropriate shorting pins (JP2 AND JP3), If they are not, please correct them now for the TEST mode.

With the AMIGA 500 still open and the shielding off connect the keyboard connector and mouse.

CAUTION - Standing in front of the AMIGA and looking down on the mother-board (with the 68000 slot on the left and the internal disk drive on the right) MAKE SURE that when you plug the keyboard connector back in that the BLACK wire is on the LEFT, and the VIOLET wire on the RIGHT. Failure to do so will damage the computer.

Now connect the monitor and power cables to the AMIGA 500.

Turn on your AMIGA 500 while watching the power light. If it does not flash on as normal and you do not see the Workbench prompt screen then turn off the AMIGA and check your installation step by step.

If everything appears to be functioning properly and you get the WorkBench prompt screen, you are ready to run the SIN500-2 "STEST" program located on the SPIRIT disk.

"STEST" is a program to test the RAM chips on your SPIRIT TECHNOLOGY SIN500-2. To use, click the "STEST" icon located on the SPIRIT disk. It will draw an outline of your memory board with all memory chips shown. You may exit the program anytime by pressing the close gadget in the upper left corner.

Any chips that are either not installed or are bad will be shown in the same color as the text "BAD CHIPS".

The following tests are performed:

* 0's fill and 1's fill *

These two tests will detect any chips not installed or that don't work at all. This will find most bad chips immediately.

* Walking 1's *

This is a good test for finding shorted data bits between chips.

* Random Data Test *

This test fills all the memory with random data and then tests each location to see if it has been changed. This works well for detecting shorted address lines, marginal chips and chips that are data sensitive.

* Data Retention Test *

This test disables CPU interrupts for about 2 seconds and then does a very tight loop which will prevent the CPU from doing the memory refresh. It then tests the random data in the memory to be sure it has not changed. This is a good test to be sure that the memory refresh circuit is working properly.

The last 2 tests will repeat until you click the close gadget. This can be left running for as long as you want. The current pass is printed along with a running total of all errors. Any chip in red has had an error. Chip colors are not redrawn between tests unless there was an error.

This program does not multi-task well because it is very CPU intensive and also has the interrupts disabled during the data retention test.

Please note that if you do not have a fully populated SIN500-2, then the banks that are empty will indicate errors, this is normal and is not a concern. If you are unable to get things working, double check all of your work (carefully go back over steps 3-5). If you are still having problems contact SPIRIT TECHNOLOGY at:

SPIRIT TECHNOLOGY	Tech Support (801) 485-4275
220 West 2950 South	For Ordering (800) 433-7572
SLC, UT 84115	

This completes installation step 5.

STEP 6, CONFIGURING YOUR SIN500-2

Now that you have tested your SIN500-2 you are ready to set your final configuration.

You must now locate the configuration shorting pins. An easy way to find the shorting pins is by looking for two blue plastic shorting plugs (almost top center), these are the same blue plugs used for determining the test mode.

The blue shorting plugs are located on a vertical row of 4 sets of two shorting pins. The shorting plugs work much like switches, when they are connected to the shorting pins they equal an "ON" setting, when they are removed from the shorting pins they equal an "OFF" setting.

If you look directly to the left of the shorting plugs, you will notice a configuration chart silk-screened on the surface of the SIN500-2. This chart reads vertically and is labeled at the bottom from left to right, "2MB", "1MB", ".5MB" and "TEST". Vertically over each label there are four lines which represent each shorting pin set. A thicker line with circles at each end indicate where a blue shorting plug must be attached.

The following is a break down of each configuration.

For 2MB, banks A, B, C, and D should be populated with memory and the shorting plugs should be one on the TOP and one on the BOTTOM.

For 1MB, banks A, and B should be populated with memory and the shorting plugs should be one on the TOP CENTER and one on the BOTTOM CENTER.

For 512K, bank A should be populated with memory and the shorting plugs should be one on the TOP CENTER and one on the BOTTOM.

STEP 7, POWERING THE SIN500-2

The SPIRIT TECHNOLOGY SIN500-2 memory boards are designed to peacefully co-exist with expansion devices that connect to the side of the AMIGA. The SPIRIT SIN500-2 *DOES*, however, use electrical power, and adds some line "load" to the expansion bus (730ma). For this reason the SIN500-2 internal board "counts" as one external expansion device.

With the AMIGA 500 power supply you should take CAUTION when adding additional expansion devices. The A500 power supply gives you 4.3 Amps in total, and the system uses approximately 2.59 Amps, that is with the A501 memory expansion and the 1010 external disk drive. With the SIN500-2 (2.0MB), A500, A501 memory, and the 1010 external disk drive you are using in total approximately 3.32 Amps.

* A500 Power Budget Chart *

Mother-Board (only)	= 1.69 Amps Max
A-501 Expansion	= 0.40 Amps Max
1010 Ext. Disk Drive	= 0.50 Amps Max
SIN500-2 2.0MB	= 0.73 Amps Max

3.32 Amps, Maximum Total

3.32 Amps is about 75% of the 4.3 Amp A500 power supply rating. With this setup, almost 1.0 Amp "reserve" is still available from the power supply for other expansion accessories, although with the limitations of A500 power supply you must carefully monitor what you add to your system and what power is consumed. Most other expansion accessories have their own power and do not put any load on the A500 power supply. If you plan to heavily expand your A500, you may wish to obtain a more powerful supply for your system, or use the external power supply option from SPIRIT TECHNOLOGY for the SIN500-2.

The SIN500-2 can be powered in two different ways, if the system is not already loaded down with expansion products requiring power from the A500, then you may use the A500 as a power source. If you have expansion products attached to your system and they are drawing their power from the A500 then you must power the SIN500-2 externally. There is a three pin shorting plug set which determines how the SIN500-2 is to be powered, it works in basically the same way as the configuration shorting plugs that were talked about in step 6 of the manual. The shorting plug for power selection is located on the top left edge just below the power connector in the top left corner of the SIN500-2. There is a silk-screen diagram located to the right of the actual shorting plug which will show you the appropriate plug position for the power configuration you choose.

You may safely power the SIN500-2 from the A500 power supply if the only peripherals attached are an external 1010 AMIGA disk drive and or the A501 (512KB trap door expansion) memory card. Other peripherals may be attached only if they have their own power source.

If you have multiple peripherals that require power from the A500 then you must obtain an external power supply from SPIRIT TECHNOLOGY or a stronger third party power supply.

For internal power, the shorting plug must be plugged onto the lower pin and middle pin vertically, as indicated by the silk-screen diagram to the right of the shorting plug.

For external power, the shorting plug must be plugged onto the upper pin and the middle pin vertically, as indicated by the silk-screen diagram to the right of the shorting plug. Now you must connect the power supply to the power receptacle located in the upper left corner of the SIN500-2. You may route the power cord out thru the A500 side expansion slot.

NOTE - The SIN500-2 has built in varistor which will protect the memory board from normal power spikes.

NOTE - The SIN500-2 will actually require less power then 730ma when the DRAMs are being used then when idle.

The SIN500-2 power supply technical specifications are as follows.

120 VCA / 5 VDC, 900ma.

Wall transformer power supply.

Right angle female power connector with 2.1mm receptacle.

If you have any further questions on powering you SIN500-2 please call SPIRIT TECHNOLOGY technical support at (801) 485-4275.

STEP 8, REASSEMBLY

When all tests are completed and a memory and power configuration has been chosen then you are ready for reassembly. If still attached, unplug the power, monitor, keyboard and mouse. For the shielding to fit back on your A500 you must first remove or bend back the two shielding legs normally located (when installed) to the left and right of the A500 86 pin side expansion port. Now you can return to installation step 1 and reassemble by following in reverse order.

This completes the SIN500-2 installation.

DISABLING THE SPIRIT INTERNAL MEMORY

If for any reason you need to disable the SIN500-2 internal memoryboard, you can use a program (located on your A500 Workbench disk in the System directory) called NoFastMem.

If the program you are trying to run does not load from Workbench but loads from the CLI at startup, then you may put the NoFastMem program on your program disk and edit its Startup-Sequence so that the NoFastMem program is executed first, memory will then be disabled when the desired program is loaded.

SPECIAL EXPANSION INSTRUCTIONS

The following instructions are only relevant if you have problems running any DMA device with a SIN500-2 installed.

You should have received a small shorting plug with a length of wire and micro-clip attached, this plug should be attached to the SIN500-2 if you are having problems running a device with DMA such as some hard disks.

To install the plug, look down on the SIN500-2 while standing in front of the A500, follow the right edge of the board down from the top looking for an area labeled "XRDY" (vertically) and "HD2" (horizontally), this is the location where you must plug the "XRDY" jumper.

You must now clip the jumper wire to pin 31 of the "GARY" chip. The "GARY" chip is located near the internal disk drive and almost right center on the A500 mother-board. Pin 31 of the "GARY" chip is located (while standing in front of your A500) on the front side of the "GARY" chip that is facing you and is the seventh pin over from the left.

Now that the SIN500-2 to "GARY" jumper is in place you may test for proper operation of your system.

If you continue to have problems please contact SPIRIT TECHNOLOGY.

TROUBLE SHOOTING GUIDE

No screen or green screen when A500 is turned on

- * Check 68000 for proper insertion and orientation.
- * Check SIN500-2 for proper complete insertion of connector pins.
- * Check for proper insertion and orientation of DRAMs.
- * Check for proper shorting plug configuration.
- * Make sure you are within the A500 power budget.

All chips show bad in test program

- * Check for proper insertion and orientation of DRAMs.
- * Check shorting plug configuration to make sure test mode was selected.

Many unexplained system failures and GURU crashes

- * Make sure the special expansion instructions were followed correctly.
- * 68000 may have been damaged during installation.
- * Make sure the internal disk drive cables are securely connected.
- * Make sure the software you are using is compatible with extra memory.

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