IN1000

INSTRUCTION MANUAL
REVISION 2

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INTRODUCTION

Thank you for choosing the IN1000 as a method for expanding your Amiga. We have spent many hours in refining our product to deliver the best performance possible with your Amiga computer system.

The IN1000 is an internal memory expansion device that will expand your A1000 computer system up to 2 megabytes (including the A1000s 512K). There are a total of 3 possible memory configurations starting with 512K, 1 megabyte and ending with a 1.5 megabyte total on the IN1000. Total memory including the Amiga's 512K will put you at 2 megabytes.

As you may know, there are many software packages now available for your Amiga that may require 1 megabyte or more to run. Some software will even give you greater work-space capacity and expanded features with the presence of extra memory. No need to worry about a limited choice of software. With as little as just 512K on your IN1000 you can run almost anything you may have wanted but couldn't, because of the limitations of memory in your Amiga system.

We feel that our product is of very high quality and provides a NEAT way of expanding your Amiga 1000 computer system.

The Spirit IN1000 expansion board installs inside of the Amiga 1000 computer. This involves 8 steps.

1. Opening the Amiga 1000.
2. Carefully removing the 68000 Microprocessor.
3. Installation of the 68000 onto the IN1000.
4. Installation of RAM chips onto the IN1000 (if necessary).
5. Attaching the ez-clips and installing the IN1000 into the Amiga.
6. Testing the IN1000.
7. Selecting a configuration.
8. Reassembly of your Amiga 1000.

TOOLS NEEDED

Listed below are the tools needed for installation of the IN1000.

* Phillips head screw driver (medium tip).
* I.C. chip puller or flat head screw driver (medium tip).
* Needle nose pliers

Before you begin any of the installation steps, 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) and before you touch any static sensitive devices make sure you touch something connected to ground.

STEP 1, OPENING YOUR AMIGA 1000

Remove the five screws from the bottom of the Amiga. Place these in a dish so they will not be lost or mixed with other screws. *SEE DIAGRAM 1 ON THE DIAGRAMS SHEET*.

Remove the top cover by grasping its corner seams and pulling upwards. A wide flat blade screw driver may then be inserted into the seam at each top cover corner and twisted to also help pop the cover loose. Place the cover to one side. This now exposes the internal FCC radiation shield and inner components.

Carefully remove the back cover plate. A little prying may be required to accomplish this. It is not absolutely necessary to remove this cover, but installation will be made a lot easier if you do.

Remove 8 phillips head self tapping screws holding the radiation shield to the rear of the Amiga. Group separately. *SEE DIAGRAM 2 ON THE DIAGRAMS SHEET*.

Remove two phillips head self tapping screws at the front edge of the Amiga FCC shielding, one on each side of the Amiga 256K Memory Module. Group separately. *SEE DIAGRAM 2 ON THE DIAGRAMS SHEET*.

Remove three small phillips machine screws holding the FCC shielding to the internal power supply. Group separately. *SEE DIAGRAM 2 ON THE DIAGRAMS SHEET*.

Remove one flathead phillips machine screw holding the FCC shielding to the internal disk drive. Group Separately. *SEE DIAGRAM 2 ON THE DIAGRAMS SHEET*.

Using needle nose pliers, bend the two metal retaining tabs located at the right and left rear FCC shielding corners until they will clear their slot. *SEE DIAGRAM 2 ON THE DIAGRAMS SHEET*.

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

This completes installation step 1.

STEP 2, REMOVING THE 68000 FROM YOUR AMIGA

The 68000 microprocessor is the large I.C. on the right hand side of the computer, next to the expansion connector. Using an I.C. puller or a flat blade screw driver, VERY CAREFULLY pry the 68000 from its SOCKET (DO NOT PRY BELOW THE SOCKET!). *SEE DIAGRAM 3 ON THE DIAGRAMS SHEET*.

CAUTION

*The 68000 is static sensitive. Do not touch the pins unless you are grounded or static free.
*Do not lever the screw driver down into the Amiga mother-board under the 68000.
*Do not bend the pins on the 68000 or you may have trouble reinstalling on to the IN1000 memory board.
*Notice the orientation of the 68000, thr notch on one end is pointing towards the back of the Amiga.

This completes installation step 2.

STEP 3, INSTALLATION OF THE 68000 CHIP ONTO THE IN1000

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 IN1000. The orientation of the 68000 must be the same in the IN1000 as it was on the Amiga mother-board with the notch end of the 68000 towards the back of the Amiga. You must be careful to prevent bending a pin under the 68000 or outside the mating Spirit socket. The easiest way is to start all of 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 in the IN1000.

CAUTION: The pins on the solder side of the IN1000 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, RAM CHIP INSTALLATION

If you purchased your Spirit memory board unpopulated or wish to add memory to the IN1000, then you will need to read the following instructions on the installation of ram chips.

The chip specifications for the IN1000 are as follows.

*256K x 1 DRAMs
*120 or 150 ns Chips
*16 Chips per bank = 512K
*48 Chips per board = 1.5MEG

Banks must be filled in the following order adding 16 chips per bank each time.

1ST Population - Bank 0....... 512K
2ND Population - Bank 1....... 1MEG
3RD Population - Bank 2....... 1.5 MEG

*Or you may initially populate all three banks for 1.5 megabytes.

Bank 0 is located along the back edge of the IN1000, bank 1 is the center row of sockets and bank 2 is the row of sockets closest to the 68000 microprocessor. Chip orientation is labeled and is the same as the socket indicates (notches pointing towards bank 0).

Inspect each chip BEFORE attempting to insert in socket. Make sure all pins are straight and aligned with all the other pins. If not straight, gently adjust with needle nose pliers. Adjust width between rows of pins by gently pressing entire row against a straight surface, like the edge of a table.

Insert the chips into the sockets with a firm uniform pressure. Chips should click into place and be evenly seated. Make sure the IN1000 is evenly supported on a flat surface to distribute pressure equally. The extended pins under the 68000 socket should 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 IN1000. Also be sure the ez-clips (J1 and J2 on the IN1000) are out from under the solder side of the IN1000. Take similar care to clear the small capacitor next to the extended pins of the 68000 socket on the underside of the IN1000.

Double check your work before proceeding with the installation of your IN1000.

This completes installation step 4.

STEP 5, ATTACHING THE EZ-CLIPS AND INSTALLING THE IN1000

The two ez-clips attached to the IN1000 are labeled J1 and J2. They must be hooked to the daughter-board as indicated by DIAGRAM 4 on the diagrams sheet. The diagram indicates that ez-clip J1 should be hooked to the fourth pin down on the right side of location "P", and ez-clip J2 should be hooked to the third pin down on the right side of location "P" (the pin directly above where J1 connects). There are two different methods for attaching the ez-clips.

METHOD 1 .. Solder the clips to the solderside pins of the daughter-board. There are no heat sensitive devices to be concerned about when soldering. This is the easiest method for connecting the ez-clips if you don't mind soldering. *SEE DIAGRAM 4 ON THE DIAGRAMS SHEET*.

METHOD 2 .. Hook the clips to the extension pins located opposite the solder side. The extension pins (the gold shafts leading into the A1000 mother-board) are a direct pass through from the above solder side, you can hook the ez-clips to the appropriate pins. *SEE DIAGRAM 4 ON THE DIAGRAMS SHEET*.

SPECIAL NOTE FOR THE SINGLE BOARD INTERNATIONAL A1000

For single board versions of the A1000 (without daughter-board) you must hook J1 to pin 7 and hook J2 to pin 8 of the PAL chip labeled "PALEN" (U4T) located under the internal disk drive assembly. The disk drive must be removed to access this PAL chip. Sorry we have no diagram for this procedure. If you have any difficulties please contact Spirit Technology or your local dealer.

Before you proceed, make sure you have ez-clip J1 and J2 hooked to the appropriate pins.

The IN1000 68000 extension 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 shipment will sometimes cause some bending. The IN1000 can now be installed into the empty Amiga 68000 socket.

Carefully place the IN1000 so the pins line up in the Amiga 68000 socket. You should examine each pin for proper alignment.

Now exert a firm, even, downward pressure until the IN1000 pins are fully seated into the Amiga 68000 socket.

This completes installation step 5.

STEP 6, TESTING THE IN1000

When installation of the IN1000 is done, and you have checked everything, then you are ready to test your Amiga/IN1000 system.

With the Amiga chassis still open and the shielding off, connect the keyboard, mouse, monitor and power cable to the Amiga.

Turn on the Amiga while watching the system power light. If it does not flicker dim and bright as it normally does, and you do not see the Kickstart prompt screen, then turn off the Amiga and check your installation. You may want to additionally check the trouble-shooting guide for possible solutions.

If everything appears to be functioning properly and you are able to load Kickstart (1.2 or 1.3), then boot the IN1000 software support disk at the Workbench prompt. You are now ready to test the IN1000 memory.

The STEST program is used to test memory on the IN1000 and is located in the main directory of the software support disk.

Before you can run STEST, you must make certain the IN1000 is set to configuration 4 (Config. 4 is the factory default setting). See "STEP 7, SELECTING A CONFIGURATION" for more information.

To run STEST, simply double click the icon from Workbench. STEST will draw an outline of your memory board with all memory chips shown. You can exit anytime by pressing the close gadget.

NOTE: When you are ready to exit STEST you may need to hold down the close gadget for at least 30 seconds before intuition will respond.

Any chips that are bad will be shown in the same color as the text "BAD CHIPS". Any banks that are not populated will also show bad, this is normal.

The following is a description of tests run by STEST.

0's fill and 1's fill -
These two tests will indicate any chips that are not installed or 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 interrupts for about 2 seconds and then does a very tight loop which will prevent the CPU from doing the memory refresh. STEST 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.

The last 2 tests will repeat until you click the close gadget. STEST can be left running for as long as you like. The current pass is printed along with a running total of all errors. Any chip showing in the indicated bad color has had an error and should be checked for proper installation or defects. Chip colors are not redrawn between tests unless there was an error.

STEST is very CPU intensive and disables interrupts during the data retention test, therefore it does not multitask very well.

If you are unable to get your system working and you have read the trouble shooting guide, then please contact Spirit Technology by mail or by phone for further assistance. See "STEP 8, FINALE" for the proper address and phone number of Spirit Technology.

This completes installation step 6.

STEP 7, SELECTING A CONFIGURATION

The IN1000 uses shorting plugs to determine its configuration.

The blue plastic shorting plugs are labeled (on the circuit board) JP1, JP2 and JP3 and are located towards the center of the IN1000.

Shorting the two metal prongs together with the shorting plug results in an "ON" configuration. Offsetting the shorting plug to just one of the prongs results in an "OFF" configuration.

Use the following chart to select your configuration.

IN1000 CONFIGURATION TABLE

	JP1	JP2	JP3	MEMORY	ADDRESS	BANKS	ACCESS
Config 1 -	OFF	OFF	OFF	1.5 MEG	$C00000	0,1,2	AUTOCONFIG
Config 2 -	OFF	OFF	ON	1.0 MEG	$C00000	0,1	AUTOCONFIG
Config 3 -	OFF	ON	ON	512 KBS	$C00000	0	AUTOCONFIG
Config 4 -	ON	ON	ON	OPTION	$800000	SEQ	TEST/ADDMEM

Configurations 1-3 are fully auto-config under V1.2 and V1.3 of Kickstart. This means that the IN1000 memory will automatically be added and available to the Amiga system. No user interaction is required.

Configuration 4 is primarily used in conjunction with STEST for testing memory on the IN1000. The IN1000 is shipped from the factory with configuration 4 as its default.

If configuration 4 is selected for system operation, then you must run a special ADDMEM program (located on the IN1000 support disk) to make the memory available to your Amiga system.

There are three different ADDMEM programs on the support disk.

ADDMEM-15 ... If your IN1000 has 1.5 megabytes installed.
ADDMEM-10 ... If your IN1000 has 1.0 megabyte installed.
ADDMEM-05 ... If your IN1000 has 512K bytes installed.

To run the special ADDMEM program, simply select the version that matches your memory configuration and double click on its icon.

You may copy the appropriate ADDMEM program to any of your standard boot disks via Workbench by dragging its icon into the destination disk's window.

To copy the ADDMEM command via the CLI/Shell, you may use the AmigaDOS copy command to copy the file to your disk.

The ADDMEM command can be included in your Startup-Sequence to automate the process at boot time. If you choose to include the ADDMEM program in your Start-Sequence, then you must make sure the ADDMEM program is on your disk and is the first program to run. This will insure that any programs run after ADDMEM will utilize the expansion memory.

NOTE: The ADDMEM program will crash your system if not set in configuration 4, or if run twice.

This completes installation step 7.

STEP 8, FINALE

With all tests being completed and a proper configuration chosen, return to step 1 and reassemble your Amiga by going in reverse order.

NOTE: When re-installing the FCC shielding, it should fit snugly on top of the IN1000. It may even make contact with some of the surface chips on the IN1000, this is normal and will cause no problems.

When your Amiga is ready to run, and all accessories attached, boot your Amiga with Kickstart (1.2 or 1.3), then boot Workbench (1.2 or 1.3). When all disk activity has stopped and you can see that Workbench is loaded and ready for use, look at the free memory display located in the title bar of the Workbench screen. You should see the pleasing addition of extra memory.

NOTE: If configuration 4 was selected, then you must use the ADDMEM program to add the IN1000 memory to your system. See "STEP 7, SELECTING A CONFIGURATION" for more information about ADDMEM.

If you are unable to get your system working and you have read the trouble shooting guide, then please contact Spirit Technology by mail or by phone for further assistance.

Spirit Technology
Technical Support Dept.
220 West 2950 South
SLC, UT 84115

Technical Support (801) 485-4275

This step completes the installation of the IN1000, enjoy your memory!

FAST MEMORY TECHNICAL NOTES

The memory in the IN1000 is classified as fast memory. The memory that comes with your Amiga is called chip memory. The difference is that the 68000 can tell the Amiga custom chips to do things with chip Memory such as hardware line draw, logic operations, block moves or fills that the 68000 would otherwise need to do itself. These operations take some of the memory that the processor could otherwise use, but are much faster than if the processor actually had to do the operation itself. Fast memory allows the processor to continue at full speed, all the time.

Fast memory is electrically separate from chip memory. Programs running in fast memory run at full speed, even when the custom chips are busy doing what they do best. With fast memory a program could have the Amiga blitter draw a line and at the same time, calculate the endpoints for the next line. Programmers can also instruct the custom chips to use processor clock cycles to add more colors to certain display modes.

SOFTWARE INCOMPATIBILITIES WITH FAST MEMORY

There are some programs that have been incorrectly programmed to handle fast memory and will not work when fast memory is added. For a possible fix you may try using the FixHunk program located in the PD-SHAREWARE directory of the IN1000 support disk. Be sure and carefully read the FixHunk.Doc file for usage instructions.

The program called NoFastMem (located in the system directory of the IN1000 support disk) allows you to toggle the allocation of fast memory OFF and ON, allowing the use of incompatible programs.

Some programs require that fast memory be OFF at boot time. If so then you may use a program called TheFix located in the PD-SHAREWARE directory of the IN1000 software support disk. This program will install a custom bootblock to your selected disk that will automatically disable all fast memory at boot time. Be sure to carefully read TheFix.doc file for usage instructions.

SETTING AND USING THE IN1000 CLOCK/CALENDAR

The IN1000 comes standard with a built in battery backed time calendar. There are two utility programs included on the IN1000 software support disk for using the clock. The ClockSet program is used to store the correct time
and date into the clock chip. The ReadClock program is used to read the clock registers from the IN1000 clock to the Amiga system clock.

To set the IN1000 clock follow the steps below.

1. Double click on the Shell icon located in the main directory of the IN1000 software support disk.

2. Type (excluding the quotes) "ClockSet MM/DD/YY HH:MM:SS" (i.e. ClockSet 01/05/88 13:49:00) and press return.

3. Type (excluding the quotes) "ReadClock" and press return. This will display the time and date of the Spirit clock. Make sure the time and date are correct.

4. Type (excluding the quotes) "EndCLI" and press return. This will get you out of the Shell.

Your Spirit clock should now be correctly set.

NOTE: When setting the clock in a leap year you must subtract one day (before FEBRUARY) or add one day (after FEBRUARY) from the actual date. If you don't your system clock will be incorrect.

NOTE: Some Amiga software manipulates the machine in an unusual way. This may cause the Spirit clock to reset and display the message CLOCK NOT FOUND. If this should happen then use the ClockSet program to reset the clock chip.

There is a program on the IN1000 software support disk named Install-RC. This program installs the ReadClock command onto your program disks so that they will utilize the Spirit clock at boot time. To run the Install-RC program, simply double click on its icon and follow the prompts.

CLOCK CHIP TECHNICAL INFORMATION

The IN1000 clock is a Thompson/Mostek zeropower TimeKeeper MK48T02. It has 2040 bytes of battery backed ram which is available for use, and 8 bytes of clock registers. The battery will last from 5 to about 17 years depending on variables such as temperature (high heat lowers battery life).

The ram starts at location $DC0001 and every other byte after that for a total of 2040 bytes.

FURTHER EXPANSION OF YOUR AMIGA

The IN1000 memory is designed to peacefully co-exist with expansion devices that connect to the side of the Amiga. The IN1000 does however use electrical power, and adds some line load to the expansion bus (650ma MAX). For this reason a Spirit internal memory board counts as one external expansion device.

If you have an expansion product that fails to work with the IN1000 (continuous crashing or green screen), then you may want to follow the special expansion instructions.

SPECIAL EXPANSION INSTRUCTIONS

If you are experiencing problems with your Amiga system after the installation of the IN1000, then you may need to do one or both of the following fixes. The first fix you should do is the PAL grounding, in most cases this will solve your problem (see instructions below). If the PAL grounding does not solve your problem, then you must check and if necessary replace the PAL chips in locations J and K (see instructions below).

GROUNDING THE DAUGHTER BOARD PALS

The daughter-board PALs in locations J, K, L, and N need a ground wire soldered, linking pin 10 of each PAL location together. Use 24 AWG insulated wire to make the four solder connections. Leave enough extra wire length to additionally connect to the mother-board ground, located near the left edge of the mother-board and next to the power supply. Use the hold down screw at that location to hold the ground wire in place.

1. Remove the daughter-board from your A1000 computer.

2. Solder pin #10 on each PAL chip J, K, L, and N together with a jumper wire. This wire should also extend down to mother-board ground and be connected.

3. Re-install the daughter-board. Be careful not to bend any interconnect pins.

REPLACING THE DAUGHTER BOARD PALS J AND K

The daughter-board pals in locations J and K are usually too slow. These PALs should be replaced with 15 nsec PALs, available from Spirit Technology for $28.00 postage paid. If you remove the daughter-board and the PALs in locations J and K are PAL16L8A-2CN, then they should be replaced with PAL16L8-15CN, a much faster PAL. This change MUST be incorporated only if you experience problems with additional devices attached to the A1000 expansion port, and you have first tried the PAL grounding fix.

1. Remove the daughter-board from your A1000 computer.

2. Observe the PAL chips in locations J and K. They should both be PAL16L8A-15CN. If they are both PAL16L8A-2CN, then they should both be replaced with PAL16L8A-15CN. The chips are marked 02 and 04. An update kit is available from Spirit Technology for $28.00 U.S. postage paid.

3. Re-install the daughter-board. Be careful not to bend any interconnect pins.

4. Finally connect a jumper wire from the 68000 chip pin #53 located on the IN1000 to the A1000 mother-board ground.

This completes the special expansion instructions.

TROUBLE SHOOTING GUIDE

SYMPTOM A - A1000 does not prompt or load Kickstart.

1. 68000 chip installed backwards.

2. The pins on the IN1000 are not making a proper connection with the mother-board socket.

3. Disk drive cable disconnected or incorrectly connected during IN1000 installation.

SYMPTOM B - Amiga will not load Workbench or green screen.

1. May need to do PAL grounding and or replace the PAL chips in location J and K. See the "SPECIAL EXPANSION INSTRUCTIONS".

2. J1 and J2 ez-clips improperly connected.

3. Mother-board socket damaged to the point of needing a replacement.

SYMPTOM B - Random crashing while using your A1000 (GURU MEDITATION).

1. The 68000 microprocessor should probably be replaced with a Motorola brand, if another brand is presently installed, especially Hitachi.

2. See the information regarding PAL grounding and PAL replacement, located in the "SPECIAL EXPANSION INSTRUCTIONS".

SYMPTOM C.- All chips show bad during the STEST program.

1. Check to make sure the IN1000 is set to configuration 4. See "STEP 7, SELECTING A CONFIGURATION" for more information on configurations.

2. Chips have been incorrectly installed (backwards in socket).

SYMPTOM D - No response from keyboard.

1. Traces under the 68000 mother-board socket have been damaged while removing the 68000 and will need to be repaired.