SAFETY PRECAUTIONS

- Use SIMCHECK only on a 110-120VAC line. (EXPORT VERSION for 230VAC/60Hz is available). SIMCHECK PLUS works on 100-240VAC.
- Never insert both a SIMM module and a SIP module at the same time. (No damage will occur but the test results will be incorrect.)
- Never remove or insert a module when the SIM/SIP Power is ON as indicated by the **red** LED. (See note in Sec. 3.1)
- The AC adapter is UL listed for indoor use only. Do not subject the product or adapter to rain or to excessive humidity. Never permit moisture to enter the interior of this instrument.
- The ZIF sockets are expensive components. Never permit moisture to enter the interior of these sockets. Never use excessive force to insert a SIMM module into the SIMM ZIF socket.
- Use this instrument within an ambient temperature of 0^{o}C to 50^{o}C. Do not set it on top of other high temperature equipment.
- Never submit this instrument to a severe shock.
- Make sure that no conductive debris falls into any of the exposed sockets. It can cause a short circuit that will disable the unit.

ONE YEAR LIMITED WARRANTY

SIMCHECK is warranted in entirety against any defects of material or workmanship which may develop for any reason whatsoever, **except abuse and normal tear and wear of external test sockets**, within a period of ONE YEAR following the date of purchase by the original purchaser. If your SIMCHECK should become defective within the warranty period, INNOVENTIONS, Inc. will repair it or elect to replace it free of charge. For warranty service, the purchaser or user must first call to obtain a Return Authorization Number as well as instructions on where to send the defective product, postage prepaid and insured, along with a return shipping charge of $7.50 and a proof of purchase.

Except as stated above, INNOVENTIONS makes no warranty or representation, either expressed or implied, with respect to this product, its quality, performance, merchantability, or fitness for any particular purpose. In no event will INNOVENTIONS be liable for direct, indirect, special, incidental, or consequential damages resulting from any defect in this product. Some states do not allow limitations on how long implied warranty lasts, or exclusion or limitation of incidental or consequential damages, so exclusions or limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other legal rights which vary from state to state.

Product operation and specifications are subject to change without prior notice.

STOP!!! IF YOU HATE TO READ MANUALS

AT LEAST READ THIS PAGE

- Connect the transformer to the AC line and press the power switch.
- Press F3 and watch the Demo on the display. Press F1 to continue the Demo program when it pauses for your response.
- Insert and remove any module only when the SIM/SIP power **red** LED indicator is OFF! You can test only one module at a time.
- To test a module, GENTLY insert it (notice the indication for pin 1) in the SIMM or SIP socket and press F1.
- To stop a test press ESC.
- The EXTENSIVE test starts 5 seconds after the end of the BASIC test (you may bypass the 5 second delay by pressing F1).
- The AUTO-LOOP test begins after the EXTENSIVE test and tests the module with changing data patterns in an endless loop.
- A detected module error in any of the above tests is indicated by a display with the offending bits marked with "F". Press F2 to see the error location. Press F3 to go to SINGLE BIT mode.
- SINGLE BIT mode tests every bit ("chip") individually. Unlike the FULL BYTE test, it does not stop testing after detecting an error.
- See Section 7. for operating with SIMCHECK's optional adapters.

WHEN EVERYTHING ELSE FAILS... READ THE MANUAL!

This manual is applicable to SIMCHECK with EPROM versions 2.40 and up. EPROM version is displayed when SIMCHECK is turned on. Printed 4-02-96

SIMCHECK was invented by David Y. Feinstein and its patent is licensed to INNOVENTIONS, Inc.

CONTENTS

1. INTRODUCTION

The SIMCHECK product line includes state of the art portable memory module testers. The two main products are SIMCHECK and SIMCHECK PLUS. SIMCHECK tests all the standard 30-pin SIMM and SIP memory modules with 8 or 9 bits of 64K, 256K, 1M, 4M, and 16M memory. SIMCHECK PLUS includes SIMCHECK and the 40-BIT PORT, which further tests all popular 72-pin SIMMs with capacities up to 128M. The highly modular SIMCHECK/SIMCHECK PLUS design is further enhanced with numerous optional adapters to test a variety of individual memory chips, memory cards, DIMM modules, and other non-standard memory modules. The add-on SIMCHECK STATIC RAM TESTER tests all the popular SRAM CACHE chips.

Based on a powerful high-speed 16 bit processor and utilizing sophisticated customized chips, SIMCHECK has testing capabilities previously available only in desktop memory testers costing thousands of dollars. Using our proprietary algorithms, SIMCHECK runs a thorough test on the memory module, testing every memory cell. It automatically measures and displays the module size, type, and Access Time (speed). In the SINGLE BIT mode, it provides individual speed ratings and other related information for each bit. Our proprietary Chip-Heat mode automatically warms the chips for temperature related speed measurement. Automatic Voltage Cycling and Voltage Bounce tests verify the module performance under varying voltage conditions.

Our standard FULL BYTE algorithms automatically test all chips (bits) simultaneously. This yields a faster test and enables the instrument to detect errors that are caused by interference among the chips on the module. SIMCHECK is not merely a go/no-go tester. In fact, it explicitly identifies the faulty bits within a defective module, and provides other important repair related information. It also supports and identifies EDO memory devices.

One of our major design goals was to create a STAND ALONE product which could be easily upgraded and expanded. SIMCHECK's test programs can be upgraded by replacing the socketed EPROM. The optional PC Communication Package connects SIMCHECK to your PC for advanced data logging. Section 7. describes SIMCHECK's numerous expansion options in detail.

SIMCHECK, our second generation of portable memory testers, is extremely user-friendly. Its LCD display shows clear instructions and test results on two lines of alphanumeric characters. It has Zero Insertion/Removal Sockets for both the SIMM and SIP modules. If you have ever experienced the frustration of removing a SIMM module from a regular SIMM socket, you will be amazed at the ease of use of our unique SIMM socket. In the DEMO mode, SIMCHECK clearly explains its operation and numerous features.

We are confident that you will find SIMCHECK an indispensable tool. To gain the most from this instrument, please read this manual.

2. SIMCHECK OVERVIEW - THE DEMO MODE

The Demonstration program provides a detailed overview of the SIMCHECK/SIMCHECK PLUS operation. It also familiarizes you with the display messages, graphics, and audible signals used by SIMCHECK while a variety of faults are simulated.

- Insert the power supply's output plug into the power jack at the back of SIMCHECK. Connect the power supply into the AC line.

- Press the ON/OFF switch to turn SIMCHECK on. The **green** LED (power-on) indicator will light up and the LCD will flash through the product title/copyright screens. The message *F3=SIMCHECK DEMO* appears for a few seconds and then the display proceeds to the SIMCHECK's STANDBY mode, in which you are prompted to insert a module for testing. DO NOT INSERT MODULE WHEN USING THE DEMO PROGRAM - all display sequences are internally generated.

- The DEMO mode is initiated by pressing F3 in the STANDBY mode. The program is designed to be self-explanatory. Each screen is displayed for a preset amount of time.

- Press F1 to accelerate the demo pace. You will hear a beep and the next screen will appear.

- At the end of the demonstration, SIMCHECK returns to the STANDBY mode. You may leave the DEMO mode at any time by pressing ESC.

After reviewing the demonstration, you should be familiar with SIMCHECK/SIMCHECK PLUS basic operation and capabilities. Please read the following sections for more detailed information.

3. SIMCHECK/SIMCHECK PLUS OPERATION

This section explains how to operate SIMCHECK or SIMCHECK PLUS. We strongly recommend that you read at least this section before putting the manual away.

3.1. SIMCHECK vs. SIMCHECK PLUS

SIMCHECK is the core unit of the SIMCHECK line of products. It tests all the 30-pin SIMM/SIP modules, and it has the expansion port and connectors to support other members of the product line. SIMCHECK is available in three "flavors": p/n INN-8448 is the domestic USA version; p/n INN-8448E is the export version for international markets with 220-240 VAC main line; p/n INN-8448-120E is the export version for international markets with 100-120 VAC.

The modular SIMCHECK PLUS includes SIMCHECK, and the 40-BIT PORT which further tests all popular 72-pin SIMM modules up to 128MB. Therefore, SIMCHECK PLUS is the most cost effective solution for testing all popular memory modules.

SIMCHECK PLUS, p/n INN-8448PLUS, comes with a universal (100-240 VAC 50/60Hz) power supply and is readily available for both domestic and export markets.

A SIMCHECK unit (domestic or export) can be readily upgraded to SIMCHECK PLUS by purchasing the 40-BIT PORT (p/n INN-8484).

3.2. AC Line Connection and Initial Setup

If you have purchased only SIMCHECK, connect the output plug of the enclosed AC adapter to the power jack at the rear of SIMCHECK.

The SIMCHECK PLUS comes with a universal power supply which can be plugged into either SIMCHECK or into the 40-BIT PORT. For normal use, connect the power supply's output plug directly to the power jack at the rear of SIMCHECK, and leave the optional ground lead disconnected. In special applications where ground connection is required (e.g. when the unit is used with the Automatic Handler) the power supply should be connected to the power jack at the left of the 40-BIT PORT, and the ground connection should be screwed onto the special ground post. When using this special configuration, please note that SIMCHECK PLUS is activated by the AUX POWER ON/OFF switch on the 40-BIT PORT.

SIMCHECK PLUS is equipped with a special Quick Connect socket which allows for fast and easy connection/removal of SIMCHECK and the 40-BIT PORT. When testing 72-pin SIMM modules, the 40-BIT PORT should be connected to SIMCHECK. When testing 30-pin SIMM modules, it is preferable to disconnect the 40-BIT PORT from SIMCHECK. SIMCHECK automatically recognizes the presence or absence of the 40-BIT PORT without any software setup!

To activate SIMCHECK/SIMCHECK PLUS, press the SIMCHECK's ON/OFF switch. When turned on, the **green** LED (power on) indicator is lighted and the display shows the internal Power-On-Self-Test, the product copyright notices and the EPROM version number, as in the following screen:

```
INNOVENTIONS Inc
SIMCHECK Ver2.34
```

The unit then stops at the STANDBY mode where you are prompted with the following message to insert a module and start the test:

```
INSERT MODULE ↑
F1=BASIC TEST |
```

When the SIMCHECK is connected to the 40-BIT PORT, the STANDBY message shows:

```
USE 40-BIT PORT↑
F1=BASIC TEST |
```

Display contrast is set by an internal control, preset at the factory. If it is not to your liking, you may adjust it by following the information provided in Section 6.2.

3.3. Insertion and Removal of Modules

CAUTION:

1. Do not insert or remove a module when the SIM/SIP Power red LED is on! (Press ESC to turn it off prior to insertion/removal.)

2. Do not insert two modules at the same time.

3. Never use excessive force to insert a SIMM module. If a module is not sliding in smoothly - please review the instructions below.

SIP MODULE:

Insertion: Make sure SIM/SIP Power **red** LED is off (if not - press ESC). Open the SIP socket by pulling the lever on the left toward you. You can easily see that the socket holes are open. Hold the module so that the memory chips on the module are facing you. Insert the module so that the left leg (pin 1) of the module is inserted into the first socket hole (near the lever). Close the lever by pushing it away from you. A SIP outline drawing on the panel indicates the correct module orientation. (While the drawing shows a nine-chip module, similar orientation is also applicable to three-chip modules.) Some SIP modules have wide Printed Circuit Boards. When inserting such a module, the left edge of the module should not interfere with the lever. Because the holes in the socket are rectangular, you will find sufficient room to insert the SIP module without interfering with the lever.

Removal: Make sure SIM/SIP Power LED is off (if not - press ESC). Move the SIP socket lever in the direction of the arrow (toward you) and remove the module.

NOTE:
Some SIP or SIMM modules cause the SIM/SIP Power LED to remain ON during Standby mode due to a small leakage from the module address and data lines. This residual current is due to the DRAM chips' internal structure (or optional logic chips on the module) and do not necessarily indicate a failure. You can verify this to be a small leakage current by comparing the intensity of the LED during the Standby mode (when the module power is deactivated) and during the BASIC test (when the module power is applied). **If the intensity of the red LED remains the same, the module has a major current leakage problem!** (See also Section 4.3. Current Measurement)

SIMM MODULE:

Insertion: Make sure SIM/SIP Power LED is off (if not - press ESC). 30-pin SIMM modules are inserted onto SIMCHECK, 72-pin SIMM modules are inserted onto the 40-BIT PORT. Orient the SIMM module so that its chips are facing you. Note that the lower left corner has a curved notch for pin 1 identification. Also notice that there are standard holes on each side of the

module. The socket has two flanges that can be pushed back about 35 degrees. Inspect them closely and notice that each flange has a pin which is designed to enter into the holes on the module's sides when they are correctly inserted. With very gentle pressure, insert the module into the socket and tilt it backwards (thus also tilting the flanges) until the small pins on the socket flanges enter the holes in the module sides. With both hands return the flanges to the normal vertical position until the SIMM module enters the socket. Practice it a few times and you will be amazed how easy it is compared to working with regular SIMM sockets!

Removal: Make sure that the SIM/SIP Power **red** LED is off (if not - press ESC). If the LED remains on even after pressing ESC, read the note at the top of this page. Place one finger on top of the SIMM module to **prevent the module from popping upward** and simultaneously push the two flanges away from you.

NOTE: Both SIMM and SIP sockets are of the best available quality. They are rated for 10,000 to 30,000 cycles of removal and insertion. Using them carefully will provide you with a long period of use. In particular, do not subject them to humidity and always follow the above instructions for smooth handling.

3.4. The Operation Switches - F1, F2, F3, ESC

The operation switches are pressed momentarily to perform a function. The software changes the function of these switches depending on the mode of operation, as indicated by the instructions on the screen.

ESC is always used to EXIT from the current mode.

F1 is typically the ACTION switch. Additionally, F1 can be used to override a pause in operation (for example, override the 5 second delay between the BASIC and the EXTENSIVE tests).

F2 & F3 are typically used for less frequent, non-default operations.

3.5. Screen Displays and Audible Signals

TIME DELAY: To provide an automatic flow of test mode sequences, all test results are displayed for a short period, followed by a short time delay, before the next mode proceeds automatically. To bypass the time delay - press F1. In some screen displays, F2 will increase the delay.

INSTRUCTION MENUS: Instruction menus display the potential choices for your next step (recall that in addition to the displayed choices, you

can always press ESC). If no selection is made, a default alternative is chosen after a preset period of time.

MESSAGE TOGGLING: If more than one screen of information is required, the display will continuously switch between the message elements.

LOCKING ERROR MESSAGE DISPLAYS: When an error is detected in the memory module, the error message will stay on the display until you acknowledge it. This allows you to leave the machine working unattended and read the error message when you return. Byte test displays a list of "**_**"s (pass) and "**F**"s (fail) corresponding to the bit position. Pressing F2 will display the word (byte) tested during the error and the error address (in HEX).

NON-LOCKING WARNING MESSAGE DISPLAYS: A "Warning Condition" (as opposed to "error") indicates a situation that you should be aware of but it does not necessarily means that the memory is bad. When a warning condition is detected, a message will appear on the display for a few seconds and the program will resume thereafter. You may terminate the warning message sooner by pressing F1.

For example, in a 1Mx9 module, pin 19 (which is not used internally by this module) may be accidentally shorted to pin 18. If this happens, the module will still work as a 1M module provided that pin 19 in the computer socket is not wired. If the computer supports 4Mx9 modules, pin 19 is wired in the socket, and such a module will short circuit the motherboard address lines. SIMCHECK will warn you when it detects this type of a module short circuit.

Non-locking warning messages are rare and they are displayed only during the BASIC test. Therefore, there is no need to constantly observe the display after the basic test.

Appendix A lists and describes most of the common screen displays.

Audible signals are produced by SIMCHECK and are used throughout its operation. While various sound frequencies are used, **errors are always indicated by lower frequency tones**. After using SIMCHECK for a short time, you will learn to associate the signals with the corresponding messages displayed at the same time.

3.6. Test Categories

SIMCHECK/SIMCHECK PLUS tests are composed of a variety of routines. They are generally divided into two categories:

1. Within-Specification tests.
2. Out-of-Specification tests.

The first group of tests are done with the module operating within the manufacturer's specifications and conventional safety margins. Detected errors are therefore indicative of a definite chip malfunction and the test is terminated with an error message (and an audible signal).

The second category of tests makes use of comparative tests during which the module is operating outside its normal specifications. This type of test gives some indication of the module behavior under varying conditions, for example, relative cell storage leakage at various temperatures, or at Out-of-Specification voltage spikes. These tests, called Relative Refresh and Relative Voltage Spikes (see Section 3.7.2.), provide you with comparative figures, not with absolute Engineering Units. For example: a refresh figure "5", is indicating a "better" refresh performance than "4". No error messages are given by this type of test, because the module is working outside its specifications. However, the comparative figures, combined with common sense, can help detect some unique problems. For example: let's assume that we suspect a module to be defective, yet it passes all the Within-Specification tests. During the Out-of-Specification test phase we notice that the comparative refresh figure is much lower than normally seen on other modules. This leads to suspicion of a potential intermittent refresh problem.

The Out-of-Specification tests are part of the EXTENSIVE test described later in this section. **Notice that under no condition is the module operated outside its absolute maximum ratings.**

3.7. Test Modes and Phases

SIMCHECK employs a wide variety of test modes, which makes it more than just a go/no-go tester. SIMCHECK provides a detailed insight into the **quality** of the tested module.

SIMCHECK tests work in either FULL BYTE or a SINGLE BIT mode:

- **FULL BYTE** test checks all the bits simultaneously.
- **SINGLE BIT** test checks each bit (chip) individually.

The tests start with a BASIC test (FULL BYTE type) which lasts between 4 and 20 seconds, depending on module size. The EXTENSIVE test (FULL BYTE type) automatically follows the BASIC test and it lasts several minutes. It includes different voltage and temperature related test procedures. The AUTO-LOOP test (FULL BYTE type) proceeds in an endless loop of varying pattern (and algorithm) tests.

The user can terminate a test at any time or switch to SINGLE BIT test for testing a particular chip (bit) on the module.

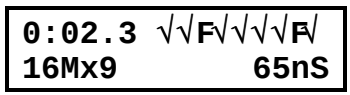
The following sub-sections describe each of the main test phases: BASIC, EXTENSIVE, AUTO-LOOP, and the optional SINGLE BIT.

Section 4. describes the ADVANCED tests. The TEST SETUP mode allows you to preset the size and speed of the tested module. The TEST FLOW setup allows you to customize the test by skipping various test modes and phases.

Appendix A illustrates and describes the actual screen displays during these tests.

3.7.1. BASIC TEST

The initial group of tests determines module size, type, and speed and looks for basic wiring, addressing, and defective bits problems. If such a problem is detected, the test is halted with the corresponding error message. If no initial problem is detected, the test continues with **every cell being written to and read from several times with different basic bit patterns.** In case of byte error, the test halts and the defective bits ("chips") are indicated as in the following message:



The graphic display shows the progress of the test, duration of test in seconds, module type and size, and Access Time. Please consult Appendix A for numerous examples and explanations of error messages.

Next Phase:

- If an error is detected, the defective bit(s) are identified and the display waits for your acknowledgment. Press ESC to terminate the test or F3 to continue to SINGLE BIT test. EXTENSIVE and AUTO-LOOP tests cannot be performed on a module which fails the BASIC test.

- If no errors are detected, an OK test result is shown and you are prompted to continue. Press F1 to go to EXTENSIVE test, F2 to go to AUTO-LOOP, or F3 to go to SINGLE BIT test. If 5 seconds pass with no user selection the EXTENSIVE test is initiated. As always, ESC terminates the test.

Significance of Successful BASIC Test:

The BASIC test provides module type and speed information. It verifies that all wiring on the module is sound and that all cells in the module are operative. It also confirms basic refresh capabilities. It may not detect intermittent and/or pattern sensitivity problems due to its short execution time.

THE BASIC TEST IS SUFFICIENT FOR MOST SCREENING TESTS. Most defective modules will be detected during this test.

THE BASIC TEST determines the fastest Access Time of the tested memory device. See Section 4. for details about Speed Override and Speed Setup. Also, some optional adapters prompt you for possible 3.3V test selection.

3.7.2. EXTENSIVE TEST

The EXTENSIVE test is an extremely comprehensive test! Module behavior is tested under varying voltage conditions, including numerous test functions, thereby achieving a remarkably high reliability level.

What is being tested:

- **Voltage Cycling:** Testing under all allowable voltage conditions.
- **Fast Page Mode:** Testing operation of the Fast Page mode. DRAM technology uses three common modes: Fast Page mode, Nibble mode, and Static Column mode. Fast Page mode is the most popular mode. Mode failure does not halt the test, but the offending bits are shown with 'X' marks. If you test a nibble mode DRAM memory, the display will show 'XXXXXXXX'. Static column should pass the Fast Page mode. Hard failure (which is not part of a specific mode), terminates the test with the familiar 'F' marks. Future enhancements to the SIMCHECK test program will also test the other modes and will provide more explicit information, using the notation 'P' for Fast Page mode, 'N' for nibble mode and 'S' for static column mode. COMPATIBILITY ISSUES: The Fast Page mode may be automatically skipped by SIMCHECK for certain types or sizes of modules, due to potential compatibility problems. Also, some brands of DRAM modules have been reported to cause non-repeating Page mode errors at various temperatures.
- **Voltage Bounce:** Testing data retention during voltage variation between read and write (e.g. write at 4.5V, read at 5.5V, and vice versa).
- **Full up/down March:** Testing of adjacent cell interference. Data is written and read numerous times at all memory cells, using data patterns that are more likely to reveal problems caused by adjacent cell interference.
- **Relative Refresh/cell leakage:** This test provides a relative value for the ability of the memory chip to retain data between refresh cycles. "Relative" means that the result is not an absolute time value but a comparative one. Relative relation between values is exponential. For

example: A chip with a relative value of "5" retained data integrity twice as long as one with a value of "4" without requiring refresh. Typical good values are 5 and higher. Since this test is of the Out-of-Specification type (see Section 3.6.), a module exhibiting a lower relative values can still work in an actual application!

- **Relative Voltage Spikes Performance:** This test provides a relative value that indicates how well a module can sustain voltage spikes before a data loss occurs. Relative relations here are not exponential. Typical good values are 5 and above. Since this test is of the Out-of-Specification type (see Section 3.6.), a module exhibiting a lower relative value can still work in an actual application!

  As you watch the red SIM/SIP Power LED during the Relative Voltage Spikes test, you will see that it flashes vigorously. This LED is directly connected to the module's power supply. SIMCHECK creates artificial voltage spikes (of 5V to 1.5V or to 6.5V) after loading a complete test pattern. Memory devices with higher Relative Voltage Spikes figures can withstand more spikes in an actual application. Take into account that modules with larger built-in capacitors normally exhibit higher Relative Voltage Spikes figures due to the capacitors' smoothing effect on the spikes. Some complex modules which utilize PAL chips and/or logic chips may exhibit significantly lower Relative Voltage Spikes figures.

  The Relative Voltage Spikes test is automatically skipped by the optional AST, PS/2 and BANK adapters.

  Note that ALL relative tests are absolutely safe as SIMCHECK DOES NOT exceed any allowable voltage/current rating!

- **Temperature stress test (Chip-Heat mode):** In this phase, SIMCHECK tests memory chips at the actual higher operation temperature experienced inside a computer. Being able to test at the proper temperature is extremely important because some memory problems are not exhibited until the chip is warmed up.

  The Chip-Heat mode utilizes a unique phenomenon which was revealed in our research. When a DRAM chip is subjected to a unique waveform pattern, it is heated internally without the need of external heating techniques. Furthermore, this Chip-Heat method is absolutely safe as we explicitly DO NOT use higher voltages or currents beyond the memory manufacturer's ratings.

The EXTENSIVE test display shows the current test type, duration of test, applied voltage, Access Time (speed), and module type and size. The final test results look similar to those of the BASIC test. Note that because the speed is tested at a higher temperature during the Chip-Heat portion of the

EXTENSIVE test, the Access Time might be slower than the value obtained at the BASIC test.

Pressing F1 during the EXTENSIVE test terminates the current step and proceeds to the next one (within the EXTENSIVE test).

Next Phase:

- If an error is detected during the EXTENSIVE test, the defective bit(s) ("chips") are identified and the display waits for your acknowledgment. Press ESC to terminate the test or F3 to go to the SINGLE BIT test.

- If no errors are detected - an OK test result is shown and you are prompted to continue. Press F1 to go to AUTO-LOOP. Press F3 to go to the SINGLE BIT test. If the time delay passes with no user selection, the AUTO-LOOP test is initiated.

Significance of Successful Test:

The EXTENSIVE test verifies proper module operation under varying voltage conditions. It will detect intermittent problems which are mainly temperature dependent. It provides comparative scores of module performance. It further tests the module with additional data patterns besides those utilized by the BASIC test.

LONG EXTENSIVE TEST:

In response to the ever growing complexity of memory modules, an optional LONG EXTENSIVE test has been incorporated. This test includes a fairly large number of patterns that are used to read from and write to every cell of the tested memory module. As a result, the LONG EXTENSIVE test takes much longer to complete than the regular EXTENSIVE test. We recommend using the LONG EXTENSIVE test **only for suspected modules** whose problem has not been detected by the regular EXTENSIVE test.

The LONG EXTENSIVE test can be selected only during the EXTENSIVE test. To activate it, press F2 either during the Voltage Cycling test or during the March test. The following screen appears:

The LONG EXTENSIVE test is run only during the current test and it is disabled when the test is completed or if you press ESC.

EXTENSIVE TEST FLOW SETUP:

Please refer to Section 4.2. for information on the TEST FLOW SETUP mode which allows you to customize the EXTENSIVE test.

3.7.3. AUTO-LOOP TEST

During the AUTO-LOOP test, the module is endlessly tested with different patterns of data bits, generated by different algorithms.

The time of the test, the iteration (loop) number, applied voltage, module speed, and module size are displayed.

Next Phase: AUTO-LOOP test terminates when an error is detected or in response to the user's command.

- If an error is detected, the defective bit(s) are identified and the display waits for your acknowledgment.
- If no error is detected, the test will continue indefinitely; or until ESC is pressed to terminate the test, or F3 to go to SINGLE BIT test.

Significance of Successful Test:

AUTO-LOOP is designed to detect pattern sensitivity problems, as it tests the modules under many different patterns. 20 minutes or more are sufficient to detect most pattern sensitivity problems.

Notice that the AUTO-LOOP mode makes SIMCHECK an excellent instrument for continuous burn-in procedure.

3.7.4. EDO MODE SUPPORT

Extended Data Out DRAM memory devices comprise the latest improvement to DRAM technology. The SIMCHECK test program version 2.34 and higher supports these EDO mode memory devices, including 30/72 pin SIMMs, 72-pin DIMMs, DRAM cards, and all individual DRAM chips. During the BASIC test and the first phase of EXTENSIVE test, the ‘EDO’ message will appear to indicate that the EDO mode has been detected. Modules employing EDO chips will have additional identification after the BASIC test as in the following example:

```
1Mx32   PRD:1000
EDO MODE
```

The FAST PAGE MODE test will also give an indication when encountering modules using EDO chips as seen below:

```
TEST:   OK EDO
FAST PAGE MODE
```

Since EDO is an enhanced version of Fast Page Mode, EDO devices can work in applications requiring Fast Page Mode. On the other hand, applications which require EDO mode must have EDO devices.

Some modules in the market which include a mixture of EDO and Fast Page Mode chips will test on SIMCHECK PLUS with the following error message:

```
ERROR: SOME EDO
   IN B1>Byte3
```

The EDO test can be disabled through setup (Section 4.1).

3.7.5. SINGLE BIT TEST

You can select the SINGLE BIT test any time after the completion of the BASIC test by pressing F3. During the SINGLE BIT test, each chip is tested sequentially. (We use the term "bit" because in some modules there are fewer chips than bits. For example, a 1Mx9 bits module may be composed of three chips: two 1Mx4 and one 1Mx1.) The SINGLE BIT test reports the speed of each individual bit and other individual information. **Unlike the FULL BYTE test, a detected error in one bit does not terminate the test.** The error message for the bad bit (chip) will stay on the display, but testing of the other bits will continue.

The SINGLE BIT mode is repeated continuously, but it should not be confused with the FULL BYTE AUTO-LOOP mode.

On the display, each bit will be progressively indicated as good, by a check-mark "_", or not good, by an "**F**". The currently tested bit number is shown with its corresponding speed. Note that the displayed Access Times in the SINGLE BIT test are per bit ("chip") and not for the module as a whole. After

a complete SINGLE BIT scan of the entire module, the display will temporarily show a recorded summary of the module size and speed obtained from the previous byte test. After several seconds the SINGLE BIT test is repeated.

When first initiating the SINGLE BIT test, SIMCHECK retains information on failed bits from the previous byte test. You may clear this information by pressing F2 during the SINGLE BIT test. Since the SINGLE BIT test is different than the byte test you may use this feature to determine whether bits which fail one test fail the other. You can restart the SINGLE BIT test at BIT 1 at any time during the SINGLE BIT test by pressing F3. When using the optional adapters to test complex modules, pressing F3 skips to the next memory bank.

Next Stage:

- Press **F3** (or make no selection) to continue SINGLE BIT testing (with changing patterns).
- Press **ESC** to EXIT.

3.7.6. TEST SUMMARY INFORMATION

Test Summary information appears when you press ESC after the end of the EXTENSIVE test or any time during the AUTO-LOOP test.

In addition to module size, speed, and pass/fail indications that are continuous during most test phases, the summary information includes:

a. SPEED DRIFT (or MANUAL SPEED INDICATION).
b. SOFT ERROR count.
c. Relative Refresh performance.
d. Relative Voltage Spikes performance.

The test results of these items do not flag memory as "pass" or "fail". They are, however, extremely important for determination of memory module quality when intermittent errors are experienced in your hardware. Therefore, when all modules are tested OK, yet you know that the computer exhibits memory errors, look at the test results and ask yourself:

- Are the indicated **speed values** of all chips within the expected values. Is one of them much slower than others?

- Is the **speed drift** of one of the modules much greater than the others?
- Is the **soft error count** of one module higher than others?
- Is the **relative refresh** value of one module much lower than others?
- Is the **relative voltage spikes** value of one module much lower than others?

Note that if the errors persist, even after replacing the modules, the problem could be with the motherboard wiring or the memory connectors.

The RELATIVE TESTS subject the modules to conditions which are far beyond the standard specifications so that you can obtain additional insight into their overall quality. However, you should not consider modules with low relative figures as defective modules, because such modules still operate within the industry's specification. If a module cannot meet the industry's refresh specification, it should fail during SIMCHECK's BASIC test.

Note that **F1** accelerates the display of the Test Summary Information. ESC returns SIMCHECK to the STANDBY mode.

3.7.6.1. SPEED DRIFT

As SIMCHECK proceeds with the various test modes, it continually attempts to operate the module at the fastest speed possible. At a given speed, when SIMCHECK encounters a verified error, it increments the speed. We define such changes in speed during the test as "SPEED DRIFT". Please note that it is normal for a DRAM memory module (or chip) to have a reduce speed at higher temperature. However, large speed drift (20nS or more) may indicate other memory problems.

3.7.6.2. SOFT ERRORS

"SOFT" errors in memory products are those transient errors which appear randomly, and cannot be verified. They may stem from alpha particle radiation or other faults in the memory. When SIMCHECK encounters an error, it immediately tries to verify it. If the error is not repeated, the soft error counter is incremented. Soft errors are more common in larger or more complex memory products (e.g. 4M modules, PS2-2M modules).

Typical acceptable values at the end of EXTENSIVE test are:

- 0-1 for memory modules up to 1 Meg.
- 2-5 for larger modules.

Larger values may indicate a potential lower quality module. Because of the accumulating nature of the SOFT ERROR counter, long AUTO-LOOP tests may result with higher SOFT ERROR counts.

ELIMINATING FALSE SOFT ERRORS

In some rare conditions, the soft error may be an artifact of the automatic Access Time measurement algorithm. This occurs when the actual speed of the tested memory device is just a hair below SIMCHECK's Access Time measurement slots so that some memory accesses result with intermittent errors. While the automatic Access Time measurement algorithm will eventually drift to slow the Access Time, soft errors may still register. To eliminate this artifact, simply run the test again at a setup speed which is a notch above the automatically measured Access Time. For example, if a module tests at 55nS with an abnormally high soft error count, retest at @60nS or even @70nS (using either Speed Override or Speed Setup, Section 4.1).

3.7.6.3. RELATIVE REFRESH PERFORMANCE

The relative refresh performance of the module is indicated. See detailed discussion within Sections 3.6. and 3.7.2.

3.7.6.4. RELATIVE VOLTAGE SPIKE PERFORMANCE

The relative voltage spike performance of the module is indicated. See detailed discussion within Sections 3.6. and 3.7.2.

3.8. THE SIMCHECK PLUS 40-BIT PORT

3.8.1. INTRODUCTION

SIMCHECK and the 40-BIT PORT comprises the popular SIMCHECK PLUS package, which is the most cost effective solution for testing both 30-pin and 72-pin SIMM modules.

The SIMCHECK PLUS 40-BIT PORT enhances SIMCHECK's capabilities to test 72-pin SIMM modules having a data bus with up to 40 bits and with a maximum capacity of 128 Megabytes. This includes the 40-bit modules used by the IBM R6000 machines and other RISC and error correcting applications; 36-bit modules used in IBM PS/2 and EISA computers; 32-bit modules used by the new Apple computers; 18-bit modules used by the IBM laptops; and 33-bit modules used by various SUN MICROSYSTEMS computers. The 40-BIT PORT can also test 72-pin SIMM modules which use parity-bit-emulation logic chips instead of true memory parity bits.

SIMCHECK PLUS automatically detects the configuration of the tested module. No need for any special setting - just insert the module and press F1 to test! Test results include explicit size, structure, type, and speed information

The SIMCHECK PLUS 40-BIT PORT performs parallel write/read operation to all 40 bits simultaneously. Every cell of the entire memory array is actually checked several times during the test. The unit comes with a high quality, user replaceable, gold plated ZIF socket, for easy module handling. It is further equipped with a 90-pin expansion socket which accepts adapters for testing DRAM memory cards, DIMM modules, and other application specific memory devices.

3.8.2. CONVERTING SIMCHECK TO SIMCHECK PLUS

This section is intended for SIMCHECK customers who are adding the 40-BIT PORT. **If you have purchased the SIMCHECK PLUS, please proceed to Section 3.8.3.**

Prior to May 95, all SIMCHECK units were manufactured with a power pack soldered in. After May 95, we have incorporated a power jack at the rear of SIMCHECK for easy removal of the power pack. If your SIMCHECK has a power jack in the rear, please simply remove the power pack, and connect the universal power supply to the power jack in accordance with Section 3.2.

If your SIMCHECK has a soldered in power pack, you may check with your supplier about a simple factory upgrade to install the power jack at the rear of

your SIMCHECK. Alternatively, you may still leave SIMCHECK's old power pack soldered into SIMCHECK, **but you must follow these instructions**:

- Turn SIMCHECK OFF and remove its power pack from the AC line outlet.
- Connect the new universal power supply output plug to the AUX POWER jack at left side of the 40-BIT PORT. Screw in the ground lag to the brass ground post.
- Make sure that the 40-BIT PORT's Aux Power ON/OFF switch is OFF. Connect the 40-BIT PORT to your SIMCHECK "RAMCHECK II EXPANSION" slot using the supplied polarized 50-conductor cable and the Quick Connect socket which has ejector latches.
- While SIMCHECK's ON/OFF switch REMAINS in the OFF position, turn the 40-BIT PORT's Aux Power ON/OFF switch ON. The following message should appear (following the normal Title/Version messages):

This message replaces the regular message of INSERT MODULE and indicates that SIMCHECK correctly sensed the 40-BIT PORT connection.

NOTE TO PS/2 ADAPTER USERS:
The 40-BIT PORT covers all the modules which are testable by the old SIMCHECK PS/2 adapter, with an extended coverage to 128M (compared to the 8M coverage of the old PS/2 adapter).

3.8.3. 40-BIT PORT TESTS

3.8.3.1. TEST PROCEDURE

The SIMCHECK PLUS 40-BIT PORT comes with an external switching power supply which can support the high current requirements of large modules. Section 3.2. explains how to connect the power supply directly to SIMCHECK and how to set up the SIMCHECK PLUS.

NOTE TO INTERNATIONAL USERS:
The external switching power supply has an input voltage range of 90-260 VAC, 47-400 Hz and therefore it can be used on your local AC line outlet. The supplied AC line cable is for the North American standard, but you may easily and inexpensively replace it with a local AC cable that will fit your AC line outlet.

The 40-BIT PORT should be connected to SIMCHECK when testing all 72-pin SIMM modules. The 40-BIT PORT should be disconnected from

SIMCHECK when testing all 30-pin SIMM modules. The Quick Connect socket with the ejector latches provides fast and easy connection and removal of the 40-BIT PORT and SIMCHECK.

CAUTION: Never connect or disconnect the 40-BIT PORT to SIMCHECK when POWER IS ON!

Verify that the contact area of the 72-pin SIMM module to be tested is clean and insert it into the SIMM ZIF socket just like the standard 30-pin module. The socket will accept the module only in the correct orientation, where pin 1 points to your left. Please also note that the SIMM Socket has been modified to accept some of the IBM x40-bit modules with a shorter circular tab at the lower corner near Pin 1.

CAUTION: This device uses an expensive, state of the art SIMM Socket, which is designed for easy insertion and removal of the tested modules. Do not use excessive force to insert the modules as you may break the insertion pins on the socket's levers. Please review Section 3.1. of the manual for proper use of this socket.

Once the module is inserted, press F1 to start the test. It proceeds automatically along the BASIC, EXTENSIVE, and AUTO-LOOP tests. The MODULE POWER red LED near pin 1 is turned on during the tests. DO NOT REMOVE OR INSERT MODULES WHEN THE MODULE POWER LED IS ON! (see note in Sec. 3.3 discussing some cases where the LED remains on during Standby mode).

You can verify the module's PRD (Presence Detect) setting by pressing F3 during BASIC test. If the PRD setting corresponds to an IBM PS/2 standard table, the screen also shows you the size in "PS2-xxM". Please refer to the next Section for more details about the module's PRD setting.

Test in progress (TIP) animation uses rotating "timer" elements which are illustrated in Appendix A. The number of the rotating "timers" corresponds to the module size in accordance with the following table:

Number of "timers"	Module's overall size	Examples of Modules with this size
1	1M	256Kx36, 256Kx32
2	2M	512Kx36, 512Kx40, 1Mx18
3	4M	1Mx40, 1Mx36, 2Mx18
4	8M	2Mx40, 2Mx36, 2Mx32, 4Mx18
5	16M	4Mx40, 4Mx36, 4Mx33
6	32M	8Mx40, 8Mx36, 8Mx32
7	64M	16Mx40, 16Mx36, 16Mx32
8	128M	32Mx40, 32Mx36

Of course, you do not need to count the number of "timers" to know the size of the tested module since the 40-BIT PORT provides you with explicit size information.

3.8.3.2. MODULE TYPE AND PRD SETTING

The BASIC test is followed by two important summary screens:

- The module's TYPE screen.
- The PRD setting and optional IBM type number.

The module's TYPE screen provides more information regarding the type of the module and its actual structure. The types identified by the 40-BIT PORT include:

1. JEDEC - standard JEDEC configuration.
2. IBM - variation of the JEDEC standard for x36 modules. IBM CASP is a module with pin 11 used as CASp, an extra -CAS control signal for the parity bits. IBM -OE is a module with pin 19 used as Output Enable.
3. 1-RAS - variation of the JEDEC standard for x36 modules with RAS0 shorted to RAS2, and RAS1 shorted to RAS3.
4. RISC - x40 modules for use in RISC machines, like the IBM R6000 computers.
5. ERC/ECC - Error Correcting x40 modules.
6. PARITY EMULATION - modules that use the parity-bit-emulation logic chip. They are discussed in Sec. 3.8.3.3.

The structure information will advise advanced users about the use of the various control lines (there are 4 -RAS lines and 5 -CAS lines) and identify the number of banks (1 or 2).

EXAMPLES:

```
TYPE:JEDEC x33
2BANK RAS0+1+2+3
```

means that this is a JEDEC standard module, 33-bit configuration, with two banks, and using 4 RAS lines (RAS0, RAS1, RAS2, and RAS3).

```
TYPE:IBM CASP
1BANK RAS0
```

means that this is an IBM proprietary module which uses CASP (the 5th CAS line), with only one bank, and using a single RAS (RAS0) line. RAS2 (and RAS3) are left open (N/C) for this type of module.

```
TYPE:IBM CASP
1BANK RAS0+2
```

means that this is an IBM proprietary module which uses CASP (the 5th CAS line), with only one bank, and using two RAS lines (RAS0 and RAS2).

```
TYPE:IBM -OE
1BANK RAS0+2
```

means that this is an IBM proprietary module which uses pin 19 for Output Enable (-OE), with only one bank, and using two RAS lines (RAS0, RAS2).

```
TYPE:1-RAS x36
2BANK RAS0+1
```

means that this is a x36 module with one RAS control line per bank. There are 2 banks in this example, RAS0 controls BANK 1 and RAS1 controls BANK 2. Unlike the IBM single RAS type where the unused RAS2 and RAS3 are left open, in the "1-RAS" type, RAS2 is shorted to RAS0, and RAS3 is shorted to RAS1.

```
TYPE:RISC CAS0+1
2BANK RAS0+1
```

means that this is a RISC 40-bit module with 2 banks, and using 2 CAS lines (CAS0 and CAS1) and 2 RAS lines (RAS0 and RAS1).

```
TYPE:ERC 4-CAS
2BANK RAS0+1+2+3
```

means that this is an ERror Correcting 40-bit module with 2 banks, and using 4 CAS lines (CAS0, CAS1, CAS2, and CAS3) and 4 RAS lines (RAS0, RAS1, RAS2, and RAS3).

```
TYPE:ECC CAS0
1BANK RAS0
```

means that this is another type of Error Correcting Code 36-bit module with 1 bank, and using one CAS line (CAS0) and one RAS line (RAS0).

The TYPE messages are mainly intended for more advanced users. Most users should understand the explicit size information.

The PRD setting and optional IBM type number appears after the type screen. It shows the PRD setting of the tested module. If the PRD setting corresponds to an IBM PS/2 standard table, the screen also shows the size of the module in "PS2-xxM" format.

The 72-pin SIMM modules have four special lines which are used for automatic presence detection of the module. Those lines are called PRD1, PRD2, PRD3, and PRD4 (pin numbers 67, 68, 69, and 70 respectively). Some of them are shorted to ground (Vss) in accordance with a particular code. The code provides information about the module size and its speed. The IBM PS/2 computer cannot work with a module that does not carry the right code on its presence detection lines. Therefore, checking the PRD lines is important for a complete test of a PS/2 module. SIMCHECK PLUS has special built-in circuitry designed to read these lines. Depending on the setting of the PRD-TABLE (see below) the program determines if a module matches an IBM PS/2 PRD code.

The following is a partial list of the IBM part numbers for PS/2 memory modules and the corresponding PS/2 computer models that use them:

- **6450603 - PS/2-1M:** used by Models 70-121, 70-E61, 70-061, 55XS, and 65SX. Also by Adapter Boards 6450605, 6450609, 34F3011, and 34F3077.
- **6450604 - PS/2-2M:** used by Models 70-121, 70-E61, 70-061, 50Z, 55XS, and 65SX. Also by Adapter Boards 6450605 and 6450609.
- **6450608 - PS/2-2M:** used by Models 70-A21, 70-A61, 70-B21, and 70-B61.
- **34F2933 - PS/2-4M:** used by Models 55SX and 65SX.
- **6450128 - PS/2-4M:** used by most PS/2 Models.

- **6450129 - PS/2-8M:** used by Models 35SX, 40SX, LS.
- **6450130 - PS/2-8M:** used by new PS/2 Models.

EXAMPLES:

```
PS2-4M  PRD:0000
TYPE IBM-34F2933
```

This module is a PS/2 4M, its PRD4-1 lines setting is '0000', and its IBM type number is 34F2933.

```
4Mx36   PRD:1000
NOT FOR IBM PS/2
```

This 4Mx36 module has a PRD4-1 lines setting of '1000' which does not correspond to the IBM PS/2 setting of a 16M module. Therefore, there is a message that the module was not designed for the IBM PS/2 computers. Users familiar with the older SIMCHECK PS/2 Adapter will identify this message to be the equivalent of the PRESENCE DETECT MISMATCH error. While the PS/2 Adapter message also stops the test, the 40-BIT PORT is not defaulted for the IBM PS/2 standard, and therefore, the test proceeds after the message.

Note:
The TYPE and PRD screens are shown on the SIMCHECK's display for a certain preset period of time. You may increase this period of display time delay by pressing F2, or you may accelerate it by pressing F1.

3.8.3.3. PARITY-BIT-EMULATION LOGIC

In an effort to reduce the cost of memory modules, several companies have developed parity-bit-emulation logic chips. These parity-bit-emulation chips, like the GS81C4100J70 or BP41C1000A-6, use logic to emulate the parity bits on such modules, instead of the real (and more expensive) memory devices which are required for **true parity** function. Such modules, which contain x32 real memory devices plus four parity-bit-emulation logic chips, can be used on computers which require the standard x36 bits. Since the parity-bit-emulation logic chips monitor the data read from the x32 memory devices on the module and **always** compute the correct four parity bits for that data **even if the data was corrupted**, they actually **disable** the benefits of the parity feature as defined by the IBM standard PC architecture. As mentioned above, true parity function must include a real memory device to store all individual parity bits for each stored byte.
This section illustrates SIMCHECK's test results when testing parity-bit-emulation modules on the 40-BIT PORT.

Insert the module in the 40-BIT PORT's SIMM socket and press F1 to begin the test. SIMCHECK will respond with the message:

```
32 BITS + PARITY
EMULATION LOGIC
```

The test will then proceed with the normal SIMCHECK tests, and the module's size messages will be followed with a 'p' to indicate the presence of the parity-bit-emulation logic chips. At the end of the BASIC TEST, the module's structure will be identified with a message like:

```
TYPE:JEDEC x32p
1BANK RAS0+2
```

followed by a message like:

```
4Mx32p  PRD:1111
PARITY EMULATION
```

3.8.3.4. ERROR MESSAGES

Error messages include several screens which are automatically switched on an endless loop. Press F2 if you want to halt a screen. Press F1 to expedite the screen switching function. Failure messages provide detailed PIN NUMBERS of the 72-pin connector of the tested modules. **More information regarding the pinout of the 72-pin modules is available in Appendix B.**

For error detection, the module is divided into 5 bytes, which are marked Byte1, Byte2, Byte3, Byte4, and Byte5. When there is no room on the display for the full mark, we use the short form b1, b2, b3, b4, and, b5. These bytes correspond to the actual module's structure and relate to the module's connector pins in accordance with the following 72-pin data line table:

Byte1		Byte2		Byte3		Byte4		Byte5	
pin	name	pin	name	pin	name	pin	name	pin	name
26	DQ7	65	DQ16	27	DQ25	64	DQ34	71	DQ39
24	DQ6	63	DQ15	25	DQ24	62	DQ33	66	DQ38
22	DQ5	61	DQ14	23	DQ23	60	DQ32	46	DQ37
20	DQ4	57	DQ13	21	DQ22	58	DQ31	29	DQ36
8	DQ3	55	DQ12	9	DQ21	56	DQ30	38	DQ35
6	DQ2	53	DQ11	7	DQ20	54	DQ29	35	DQ26
4	DQ1	51	DQ10	5	DQ19	52	DQ28	37	DQ17
2	DQ0	49	DQ9	3	DQ18	50	DQ27	36	DQ8

Byte5 corresponds to the parity bits of all x36, x33, and x18 modules. The names for the data line (DQ) were taken from the JEDEC standard 21C release 3 for the x36 modules. A different ordering of the DQ names is used for the x40 modules.

EXAMPLES:

Fault Detection

```
0:03.0 √√F√√√√
B1>Byte1   50nS
```

The first screen shows us that the fault is the third bit in BANK 1 (B1), Byte1. The speed prior to the error detection was 50nS and test time was 3.0 seconds. This screen is followed by:

```
b1 PINS:2,4,6
8,20,22,24,26
```

which show the pin connections of Byte1. Comparing with the first screen, the defective third bit is the data line connected to pin 6 of the SIMM. You can use the above data line table to figure out that it is DQ2, or you can obtain the same information from the module's actual drawing diagram. This message is followed by the final screen:

```
4Mx36    50nS
"AA55"  @010200h
```

which retains the module's size, the pattern which detected the error, as well as the actual address in the module in which the error occurred. The three screens keep alternating indefinitely. You may hold a screen by pressing F2 or accelerate it by pressing F1. Press ESC to return to the STANDBY mode.

Address Error

```
ERROR:ADDRESS IN
ALL MODULE OR b5
```

The first screen announces that an address error has been detected in all portions of the module or it may effect only Byte5. It follows with a more explicit screen:

```
OPEN/SHORT Addr.
Line: PIN 18=A6
```

which identifies Address Line A6, which is connected to pin 18 of the module. Again, the two screens keep alternating until ESC is pressed.

PIN-48 N/C (Open)

One of the differences between x40 modules and other modules is that pin 48 of the x40 modules is shorted to ground. In all other modules this pin is not connected (N/C). If a x40 module is lacking this connection, an error message is activated at the end of the BASIC test:

```
ERROR:x40 MODULE
WITH N/C PIN-48
```

Missing RAM in Various Bytes

If there is some RAM function on the parity bits (b5) but no RAM function on Byte1, Byte2, Byte3, and Byte4, the following message will be displayed:

```
ERROR: NO RAM IN
DATA BYTES b1-b4
```

Parity Bits Errors

SIMCHECK will report the following message if a parity stuck bit situation is encountered:

```
ERROR:STUCK PAR-
ITY BITS W/O CAS
```

Similar explicit error messages are also flagged for various other wiring violations.

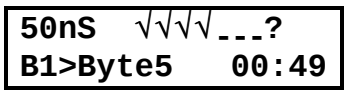
3.8.3.5. SINGLE BIT TEST

The SINGLE BIT test is initiated by pressing F3 at any time after the BASIC test in accordance with SIMCHECK's standard test flow. The test displays a group of 8 bits at a time which constitute one of the five data lines bytes which were shown in the table of Section 7.15.2.3. After each byte is finished, the stored result of the full module is shown, and then the next byte is displayed. If a byte is not used (in the case of x18 modules), the byte is automatically skipped. The tested byte is indicated by the following format:

Bn>ByteK

where B1 indicates BANK 1, and B2 indicates BANK 2, and ByteK shows the actual Byte1, Byte2, Byte3, Byte4, or Byte5. For example, the notation B2>Byte4 indicates Byte4 of BANK 2.

Byte5, the parity byte, is not full for the x18, x33 and x36 modules, and it is completely unused (and therefore skipped) for the x32 modules. Bits which should be missing are indicated by '_' rather than by 'F' as in the following example:



This screen shows the SINGLE BIT test of the parity byte (Byte5) of BANK 1 of a x36 module. Since only the first four bits are used, the last four bits are indicated by '_'. The ? mark at the 8th bit indicates that it is still being tested.

You can skip any byte by pressing F3, in a similar way to the PS/2 Adapter.

When using the 40-BIT PORT with the optional PC COMMUNICATION PACKAGE, the PC screen will explicitly identify the pin number of the currently tested bit.

3.8.4. 40-BIT PORT CUSTOMIZED ADAPTER

As more computer manufacturers are using the 72-pin SIMM modules in their design, some manufacturers have been introducing various "proprietary" modifications in the pinout of their modules. Such modules cannot be tested, obviously, on the 40-BIT PORT and should not be used in standard applications which require JEDEC standard modules.

To assist customers who wish to test such non-standard 72-pin SIMM modules, we have developed the 40-BIT PORT CUSTOMIZED ADAPTER (p/n INN-8484-1). This adapter is plugged in the 90-pin expansion port of the 40-BIT PORT and it has the same quality 72-pin SIMM socket as the 40-BIT PORT. However, the wiring between the

adapter's SIMM socket and the plug has an open wiring matrix which allows you to implement whatever wiring changes you want to incorporate over the JEDEC standard. Thus, to test a non-standard 72-pin SIMM, you will need to identify its pinout and compare it to the JEDEC standard as in Appendix B. Then you can wire the CUSTOMIZED ADAPTER to accommodate the non-standard module.

4. ADVANCED TESTS

Most SIMCHECK users can ignore the Advanced Tests section. Nevertheless, you may want to read this section and get familiar with some additional powerful features of SIMCHECK. Advanced testing lets you do the following:

- Preset a fixed speed (access time) reference so that all memory slower than the reference will be failed. This is different than the default mode which automatically displays the actual speed.
- Preset a fixed module (or chip) size so that all tested memory will fail if it is not of this type (as opposed to the default mode which automatically detects the module size).
- Customize the Test Flow by selectively skipping various test modes and phases.
- Measure the current flow through the module.
- Take an in-depth look at the operation of the automatic Access Time algorithm [performance].
- Repair bad modules faster (see Appendix F).

4.1. TEST SETUP Mode (Size & Speed Preset)

The TEST SETUP mode, in which users can preset the **type**, **size**, **speed**, and other **parameters** of the tested modules or chips, is one of the more powerful features which will appeal to advanced users:

- Presetting the **speed** allows you to test memory operation at a fixed reference. For example, with a preset value of 80nS, SIMCHECK will fail all modules slower than 80nS, even if they operate fine at a slower speed. There are two modes for presetting speed. The default mode is "SPEED AT" where SIMCHECK speed is actually fixed at the preset speed. This mode is useful when the actual speed is unimportant, so long as it meets a particular reference value. The other mode is the "SPEED LIMIT" where SIMCHECK fails a unit which is slower than the preset speed limit. If the unit tests slower than the preset speed, the test terminates with an "ERROR: SPEED IS ABOVE LIMIT" message. If the unit tests faster than the preset limit, the actual speed is displayed.
- The importance of presetting **size** may not be immediately apparent. The following example will illustrate a potential use. Suppose that you are testing a batch of 1Mx9 modules which accidentally includes one 1Mx8 module. Without the ability to preset size, you have to closely watch SIMCHECK's automatic size indication in order to catch this 1Mx8

module. With a preset size of 1Mx9, SIMCHECK aborts the tests and responds with an error message (ERROR: WRONG SIZE) when it detects a module other than 1Mx9.

- TEST SETUP allows you also to enable/disable the EDO mode test and to setup limits for the Relative Refresh, Relative Spikes and Soft Error Count.

You can enter the TEST SETUP mode only from the STANDBY mode (i.e. display showing: "INSERT MODULE, F1=BASIC TEST") by first pressing **F2** and then selecting **F1**. Thereafter, the menu offers three selections:

- F1=AUTO (return to the default AUTO mode).
- F2=S. SIMM/40-BIT PORT (Select S. SIMM to setup speed/size for standard modules and for the following optional adapters: SINGLE CHIP ADAPTER, X4 DRAM ADAPTER, ZIP ADAPTER, PLCC/SOJ ADAPTER, IIfx ADAPTER and BANK ADAPTER).
- F3=MORE.

F1=AUTO: Press F1 if you want to return to the [default] AUTO SPEED/SIZE mode in which SIMCHECK automatically determines the best speed and the actual size of the module.

F2=S. SIMM/40-BIT: Press F2 to preset the **size** or **speed** of the memory modules or chips. The current test parameters are displayed and the screen prompts you to press F2 if you want to make a change:

1. **MEMORY SIZE SETUP**: The current preset memory size (or AUTO-SIZE) is displayed. F3 or F2 can be used to toggle the setting from AUTO-SIZE, 64K, 128K, 256K, 512K, 1M, 2M, 4M, 8M to 16M. Press F1=OK to set the size you selected.

2. **NUMBER OF BITS**: After selection of a memory size and pressing F1 in the previous step, you can change the number of bits (1-9) per module (or per optional adapter) by pressing F3 or F2.

3. **SPEED SETUP**: The current preset speed (or "AUTO-SPEED") is displayed. F3 and F2 can be used to change the setting from AUTO-SPEED, 150ns, 140ns, ... , to 20ns. After presetting the speed, SIMCHECK prompts you to press F1 if you want to use the preset speed as a SPEED LIMIT. Otherwise, the preset speed will be used for the default "SPEED AT" mode (press ESC to avoid message delay). Note that if you select the SPEED LIMIT mode, the preset speed is shown with a "^" prefix during all subsequent SIMCHECK test modes.

F3=MORE: This selection introduces a second menu with three selections:

- F1=AST (test setup for the optional AST ADAPTER).

- F2=STATIC RAM (test setup for the optional STATIC CHIP ADAPTER).
- F3=MORE.

The setup of these optional adapters is similar to the standard modules but may include more options for each individual adapter (see Section 7.).

Selecting F3=MORE introduces the third menu with three selections:

- F1=EDO (allows you to disable/enable the EDO mode test).
- F2=LIMITS (setting up limits for Relative Refresh, Relative Spikes, and Soft Errors.).
- F3=PS2 (test setup for the optional IBM PS/2 ADAPTER).

Note that a preset speed or size is shown with an "@" prefix ("^" prefix for speed limit mode) during all subsequent SIMCHECK test modes.

Once you start testing your modules or chips, these preset size/speed entries remain in effect until they are changed via the TEST SETUP mode. You can easily return to the fully automatic [default] mode by simply turning SIMCHECK OFF and then ON again (or by selecting AUTO from the TEST SETUP MENU).

"ONE TIME" SPEED OVERRIDE:

In addition to the normal TEST SETUP mode described above, a quick preset speed can also be set **during the BASIC test**. The key difference is that this setup is in effect only while the current module is tested. To set a "one time" speed override, press **F2 during** the BASIC test to reach the SPEED OVERRIDE screen. Press **F3** to preset a slower (higher nano- seconds) value, or **F2** to set a faster value. Thereafter, subsequent tests will be conducted at the selected speed, as displayed on the screen with an "**@**" marker. Note that the Manual Speed Override is not effective during the SINGLE BIT test.

4.2. TEST FLOW Setup Mode

The TEST FLOW SETUP mode allows you to selectively enable or disable (skip) the various test modes and phases of the SIMCHECK test program. It was developed in response to advanced users asking for some means of customizing the flow of SIMCHECK's test. Such an advanced feature allows you, for example, to setup the EXTENSIVE test so that it may run **without** the Relative Refresh, the Relative Voltage Spikes, and the Chip- Heat modes. It can also be used to skip the BASIC test (and start your test from EXTENSIVE test), or to substitute the BASIC test with a quick PARTIAL/SHORT BASIC test.

You can enter the TEST FLOW SETUP mode only from the STANDBY mode by first pressing **F2** and then selecting **F3**. Thereafter, the menu offers three selections:

- F1=SET BASIC: to select the standard BASIC test or the quick PARTIAL/SHORT BASIC test.
- F2=SET EXTENSIVE: to setup the flow of the EXTENSIVE test.
- F3=CUSTOMIZATION (Reserved for enabling/disable customized programs).

F1=SET BASIC: Press F1 if you want to setup the BASIC test. You can then select the NORMAL BASIC test by pressing F1, or the quick SHORT/PARTIAL BASIC test by pressing F2. (See SET EXTENSIVE below if you want to skip the BASIC test and start the test with the EXTENSIVE test.

THE SHORT/PARTIAL BASIC TEST is a reduced version of the STANDARD BASIC test, which includes all the wiring tests, but actually tests only part of the memory cell array. This test is practical only if the chips of the tested module have been thoroughly tested prior to their assembly on the module. A letter 'S' appears on the screen during SHORT BASIC test, to warn the user that only part of the memory cell array is being tested!

F2=SET EXTENSIVE: Press F2 to setup the EXTENSIVE test FLOW. The following screen allows you to skip the BASIC test and start the test with the EXTENSIVE test:

```
SKIP BASIC   [N]
F1=OK  F2=CHANGE
```

F1 accepts the current setting, while F2 toggles the current setting between [Y] Yes and [N] No. To skip the BASIC test, press F2 to select "SKIP BASIC [Y]". F1 scrolls to the next screen:

```
SKIP V.C.    [N]
F1=OK  F2=CHANGE
```

As with the previous example, press F2 to select "SKIP V.C. [Y]" if you want to skip the Voltage Cycling test. To reactivate this test, press F2 again to select "SKIP V.C. [N]". Similarly, all the remaining tests of the EXTENSIVE test are scrolled for setup by pressing F1. In the default SIMCHECK program, all the tests are enabled, which means that all skip options are disabled (set to [N]).

Once you have scrolled through all the subtests of the EXTENSIVE test, the final screen provides you with the following three choices:

F1=REVIEW: scroll again through the EXTENSIVE TEST FLOW setup.

F2=SAVE: accepts the new TEST FLOW setup. If your SIMCHECK is equipped with the optional HANDLER INTERFACE (Section 7.9.) or with the optional PC COMMUNICATION PACKAGE (Section 7.14.), the new TEST FLOW setup is automatically saved in a NON-VOLATILE memory so that it is retained even when you turn SIMCHECK off.

F3=RESET: resets all the skip options of the EXTENSIVE test to [N]. This returns to the default SIMCHECK's test flow, in which all subtests of the EXTENSIVE test are performed.

The various test setup modes described in Sections 4.1. and 4.2. are alternatively supported by the full screen menu system of the optional PC COMMUNICATION PACKAGE (see Section 7.14.).

4.3. Current Measurement

The current of the module under test can be directly measured by connecting a multi-meter to the current posts (red post is positive, "+"). Set your multi-meter to the Direct Current Voltage (DCV or DC-VOLT) function. One Volt on your multi-meter indicates one Ampere consumed by the module under test. You can also use an oscilloscope to see the current consumption waveform (use two channels in differential mode, each channel should be connected to one of the posts).

CAUTION:

The black post is not grounded! Both posts are actually kept at +Vdd relative to Ground. We use red and black posts only to indicate the correct polarity connection to a multi-meter.

4.4. Explicit Error Information

If you want to know more about an error beyond the regular bit map of "_"s and "F"s, press F2. The second line of the display will show you the word test (pattern) that caused the error and the location of the error. This information is shown in HEX notation.

4.5. Supervisor Mode

SIMCHECK's SUPERVISOR mode provides continuous information on speed-related memory errors and their direct effect on the automatic speed algorithm [setting]. This mode is used extensively in our ongoing R&D efforts to improve SIMCHECK. Also, we have incorporated some experimental routines within this mode which are not yet complete for incorporation in our regular program. Since most users do not use this advanced feature, it is purposefully made cumbersome to activate in order to avoid accidental initiation:

1. From STANDBY mode ("INSERT MODULE...") press F2 twice to get into the pre DIAGNOSTIC mode.
2. Enter the code sequence F2, F1, F3 to reach DIAGNOSTIC mode.
3. Press F3 to reach SUPERVISOR mode screen.
4. Press F1 to activate SUPERVISOR mode or F2 to deactivate it.
5. Return to STANDBY mode by pressing ESC several times.

4.5.1. PATTERN ERROR INFORMATION

In the SUPERVISOR mode, the pattern which encounters memory (speed related) errors is displayed in HEX notation (e.g. F0F0 indicates a 16 bit pattern of 1111000011110000).

4.5.2. SPEED TABLE IDENTIFICATION

SIMCHECK uses several internal SPEED TABLES which are useful for running tested DRAM memory at its highest speed. We regret that due to our trade secret policy we cannot disclose more detailed information regarding our speed tables. The difference between the tables is fairly small (+/- 2-3nS) and limited only to the secondary speed parameters. In all speed tables, the parameters we use still fall within the published parameters of DRAM manufacturers. During the SUPERVISOR mode, the character immediately following the speed display identifies the current speed table used by SIMCHECK to generate all MUX and CAS timing. Currently, a space character (as in "85nS ") indicates Table 0, a "." character (as in "85nS.") indicates Table 1, and a ":" character (as in "55nS:") indicates Table 2. Other speed tables may be used in future versions with a different marking character.

4.5.3. FAST PAGE / NIBBLE MODE IDENTIFICATION

When you test 1Meg Modules with the SUPERVISOR mode, SIMCHECK will terminate the BASIC test with a message explicitly showing the operation mode of each data bit (DRAM CHIP). A data bit which operates in Fast Page mode will be marked as 'P', and a data bit which operates in Nibble mode will be marked as 'N'. Currently, this experimental test is confined to 1M modules

only. We are planning to extend this test also for other modules and for the Static Column mode. When Static Column is incorporated into this program, it will be identified by 'S'.

4.5.4. TEST CONTINUATION AFTER FAILURE

The SUPERVISOR mode allows advanced users to continue the test after a fault is detected. To activate this feature, simply press F2 after an error message. You will see the following screen:

```
CONTINUE (ERROR)
```

and the test continues with a byte test, with an 'F' flag at the bottom display line to remind you that an error has already been detected!

This feature is very useful when you are trying to identify defective chips after a general error message. For example, if the test halt with an address error message, you do not know if the problem is with an individual chip or if it is a common address wiring problem. Continuing from error, individual chip address problems (if present) will be identified.

5. SIMCHECK PROGRAM UPGRADES

(EPROM REPLACEMENT)

After using SIMCHECK for a short period, you will appreciate its power and flexibility. And yet, the current SIMCHECK program is continuously being upgraded. To achieve a long and useful product life we have included numerous hardware capabilities designed to support future exciting EPROM software upgrades. Additionally, as new add-on tools are introduced, the EPROM software will be modified to support them. Therefore, during the life of this product you will be able to upgrade its program periodically.

In order to be notified of program upgrades you must complete and mail the product registration form which is enclosed with this instrument!

Upgrading the program is a simple task which does not require technical expertise. You will need a PHILLIPS screwdriver and a FLAT screwdriver, both with a small head size.

CAUTION - DO NOT OPEN THE FRONT PANEL SCREWS.

- Disconnect SIMCHECK's transformer from the AC power line.

- Pull out the 4 anti-skid black feet at the bottom corners of the instrument, remove the 6 Phillips screws on the back and carefully lift the back cover.

- The lower board is the main processor board which contains the Program EPROM in socket U8. Remove the old EPROM from socket U8 by gently prying with the flat blade screwdriver at both ends of the EPROM.

- Insert the new EPROM in socket U8, making sure that the chip marker points to the top of the board and that all 28 EPROM pins are properly inserted. When upgrading the new 64K EPROM, PLEASE FOLLOW ANY SPECIAL INSTRUCTIONS which may come in the EPROM package.

  CAUTION - INSERTING THE EPROM IN THE REVERSE DIRECTION WILL DAMAGE THE EPROM!

- Carefully close the back cover. Replace the 6 Phillips screws and insert the anti-skid feet into the 4 corner holes.

- Activate SIMCHECK and make certain that the unit is working. If not, recheck your EPROM installation. Make sure the cable connector is properly connecting the two boards. With the current 64K EPROM, there must be a chip marked "SIMPAL12" or "SPAL12" in socket U9, and the lower printed circuit board should be marked with version 'C' or higher. Contact your dealer to upgrade earlier PCB versions.

6. IN CASE OF DIFFICULTY

SIMCHECK does not require regular service. Depending on your level of use, the test sockets may become defective due to normal tear and wear. Following the instructions in this manual, including the safety precautions, will ensure long life for this product. In the event that this product needs service, please call our service department at the number listed on the front page of this manual. Do not send this instrument for factory service without first obtaining a RETURN AUTHORIZATION NUMBER.

WARNING:

Any attempt to service SIMCHECK products by unauthorized personnel will void the warranty. User service is restricted to the EPROM upgrade procedure detailed previously and the adjustment of the LCD intensity as detailed below.

Some simple problems do not require service, as itemized below.

6.1. Display Locking or "Garbage" Characters

When transient power surges occur on the AC line, the SIMCHECK display may include some unusual characters or the display may lock. This problem disappears by turning the unit off and on again (thus performing SIMCHECK's automatic reset). A malfunction is indicated only when such a problem recurs frequently, and under the same mode of operation.

6.2. Adjusting The LCD Intensity

The unit's LCD intensity is preset by the factory and most users will not need to adjust it. Nevertheless, if adjustment is required, follow these steps:

- Disconnect the AC transformer.
- Open the unit in accordance with the instructions on performing EPROM upgrade (Section 5.).
- Look for the potentiometer trimmer on the lower right corner of the top PC board.
- Connect the transformer to the AC line and, while the unit is open, turn it on and set the trimmer, using a flat small screw driver, until the display is satisfactory.
- Turn SIMCHECK off and close it (as described in Section 5.).

To report operation problems, or to clarify questions, please call our Technical Support department (see phone number and address on the front page of the manual) or complete and mail the Trouble Report form at the end of the manual. We strive to achieve product excellence and will respond promptly to your comments.

7. SIMCHECK OPTIONS

This section describes options that can be added to your SIMCHECK and which are available from your dealer. Pictures of the various units appear at the beginning of this manual.

7.0. QUICK INDEX

To Test:	You need:
30 PIN SIMMs and SIPs 16Mx9, 4Mx9, 1Mx9... 16Mx8, 4Mx8, 2Mx8, 1Mx8...	Only SIMCHECK, no adapters are necessary. (See Sec. 3).
72 PIN SIMM modules IBM PS/2 128M, ...,1M EISA Machines up to 32Mx40. 18,32,33,36, or 40 bit modules... 32 bit + logic parity emulation.	**SIMCHECK PLUS 40-BIT PORT** p/n INN-8484. (See Sec. 3.8).
Test 72 PIN SIMM modules at true 3.3V.	40-BIT PORT 3.3V ADAPTER p/n INN-8484-5 (See Sec. 7.20) and SIMCHECK PLUS.
88 PIN JEIDA/JEDEC DRAM CARDs.	DRAM CARD TESTER p/n INN-8484-3 (See Sec. 7.18) and SIMCHECK PLUS.
72 PIN SO DIMM modules.	DIMMCHECK 72P p/n INN-8484-4 (See Sec. 7.19) and SIMCHECK PLUS.
168 PIN DIMM modules.	DIMMCHECK 168P p/n INN-8484-9 (See Sec. 7.23) and SIMCHECK PLUS.
72 PIN HP Workstation modules.	HP WORKSTATION ADAPTER p/n INN-8484-7. (See Sec. 7.21.1).
72 PIN x39 IBM ECC modules.	X39 IBM ECC ADAPTER p/n INN-8484-8. (See Sec. 7.21.2).
64 PIN AST modules AST 1M, 4M with or without write-per-bit.	AST ADAPTER p/n INN-8448-10. (See Sec. 7.9).
64 PIN Apple MAC IIfx SIMMs of 16M, 4M, and 1Mx8.	IIfx ADAPTER p/n INN-8448-4. (See Sec. 7.4).

QUICK INDEX (continued from previous page)

To Test:	You need:
40 PIN High Density SIMMs 256Kx16, 512Kx16, 1Mx16 and 2Mx16.	40-PIN MODULE ADAPTER p/n INN-8448-12. (See Sec. 7.11).
30 PIN SIMMs which use only one -CAS control line. 30 PIN SIMMs with logic parity-bit-emulation.	SINGLE -CAS ADAPTER p/n INN-8448-13. (See Sec. 7.13).
IBM MODEL 30 SIMMs 1Mx8.	PS/2 30-PIN ADAPTER p/n INN-8448-5. (See Sec. 7.2).
High volume of SIMMs in a production line.	**SIMCHECK AUTOMATIC HANDLER** (see Sec. 7.8). Two versions: 30-PIN and 72-PIN SIMMs.
Individual x1 DIP DRAMs 4Mx1, 1Mx1, 256Kx1, 64Kx1.	SINGLE CHIP ADAPTER p/n INN-8448-1 (See Sec. 7.1) or BANK ADAPTER (for 1-9 chips) p/n INN-8448-8. (See Sec. 7.7).
Individual x4 DIP DRAMs 1Mx4, 256Kx4, 64Kx4.	X4 DRAM ADAPTER p/n INN-8448-2. (See Sec. 7.1).
Individual x1 or x4 PLCCs or SOJs (300m or 350m) 1Mx4, ..., 1Mx1, 256Kx1.	PLCC/SOJ ADAPTER p/n INN-8448-6. (See Sec. 7.5).
Individual 16M 400 mil SOJs 16Mx1, 4Mx4.	16M SOJ ADAPTER p/n INN-8448-14-4. (See Sec. 7.12).
Individual 16M 300 mil SOJs 16Mx1, 4Mx4.	16M SOJ ADAPTER p/n INN-8448-14-3. (See Sec. 7.12).
Individual x8/x9 SOJ DRAM chips (512K, 2M) and ZIP DRAM chips (512Kx8/x9).	x8/x9 SOJ/ZIP ADAPTER p/n INN-8448-17. (See Sec. 7.17).
Individual 256Kx16/x18 or 1Mx16/x18 SOJ DRAM chips.	x16/x18 SOJ ADAPTER p/n INN-8484-2 (See Sec. 7.16) and SIMCHECK PLUS.
Individual ZIP DRAM chips (x1 or x4) 256Kx1, 1Mx1, 4Mx1, 64Kx4, 256Kx4, 1Mx4.	ZIP DRAM ADAPTER p/n INN-8448-7. (See Sec. 7.6).

QUICK INDEX (continued from previous page)

To Test:	You need:
Individual 4M TSOP DRAM 4Mx1 or 1Mx4.	4M TSOP ADAPTER p/n INN-8448-16. (See Sec. 7.15).
Individual 16M TSOP DRAM 16Mx1 or 4Mx4.	16M TSOP ADAPTER p/n INN-8448-15. (See Sec. 7.15).
Static RAM chips 1Mx1, 256Kx1, 64Kx1, 16Kx1 256Kx4, 64Kx4, 16Kx4, 4Kx4 512Kx8, 128Kx8, 64Kx8, 32Kx8, 8Kx8, and 2Kx8.	STATIC RAM TESTER p/n INN-8448-9. (See Sec. 7.10).
To interface SIMCHECK to your PC for printing, data logging, and more...	PC COMMUNICATION PACKAGE p/n INN-8448-11. (See Sec. 7.14).

7.1. SINGLE CHIP DIP ADAPTERS

7.1.1. INTRODUCTION

The optional X1 SINGLE CHIP ADAPTER (p/n INN-8448-1) enables SIMCHECK to test the popular 64Kx1, 256Kx1, 1Mx1, and the 4Mx1 DRAM chips. The optional X4 SINGLE CHIP ADAPTER (p/n INN-8448-2) enables SIMCHECK to test the 64Kx4, 256Kx4, and 1Mx4 DRAM chips. All the advanced features that are used in *module* testing are employed in *individual* chip testing too (Chip-Heat, Voltage Bounce, Voltage Spike, AUTO-LOOP, etc.). The graphic display screens are very similar to those used during memory module testing.

Either model of the SINGLE CHIP ADAPTER snaps into the SIP socket of SIMCHECK and has two Zero-Insertion-Force sockets for fast and easy handling. An automatic current limiter fully protects your chips, even if they are accidentally reversed.

The SINGLE CHIP ADAPTERS make SIMCHECK a universal DRAM tester, for both memory modules and individual chips.

Required EPROM Version: If you are adding the adapter to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- SIMCHECK's EPROM is earlier than **Version 1.25**.
- An EPROM is included with the adapter.

SIMCHECK's EPROM version is indicated when you first power up SIMCHECK. Section 5. explains how to replace the EPROM.

7.1.2. OPERATION

Each ADAPTER has a 32-pin connector which mates with SIMCHECK's SIP (Green) socket. There is no need to turn SIMCHECK off when inserting either adapter. Just like when testing a SIP module, open the SIP socket, set the adapter in the socket and move the lever to the closed position. Note that once installed, the adapter covers both the SIP and the SIMM sockets.

SIMCHECK automatically detects the presence of the X1 SINGLE CHIP ADAPTER or the X4 SINGLE CHIP ADAPTER. It changes its STANDBY message from ***"INSERT MODULE"*** to ***"INSERT 1 CHIP"***.

The X1 SINGLE CHIP ADAPTER has two ZIF sockets:

1. The **20-pin socket** (marked U1) tests the 1M and the 4M chips.
2. The **16-pin socket** (marked U2) tests the 64K and 256K chips.

To test a **64K or a 256K chip**, lift the lever of the 16-pin socket and place the chip to be tested in the socket. To avoid excessive wear and tear on SIMCHECK's SIP socket, press lightly on the lower side of the adapter (the part that covers the SIMM socket) when lifting the lever. The notch marker on the chip should point to your left, with pin 1 at the lower left hole.

Similarly, a **1M or a 4M chip** should be inserted in the 20-pin socket with the notch marker pointing to the left and pin 1 at the lower left hole. A 1M or 4M chip has only 18 pins. Therefore, a properly inserted chip leaves the far right holes empty in the 20-pin socket.

The X4 SINGLE CHIP ADAPTER has two ZIF sockets:

- The right one is for testing the 18-pin 64Kx4 DRAM chips. As the right socket is also a 20-pin socket, make sure that you insert the 64Kx4 chip in accordance with the inboard marking for pin 1 (which leaves both far right holes empty).
- The left one is for testing 20-pin 256Kx4 and 1Mx4 DRAM chips.

You can test only one chip at a time with the SINGLE CHIP ADAPTERS!

Once the chip is in the correct socket, close the socket by pressing the lever all the way down.

The test is initiated by pressing F1. It proceeds exactly as the test for memory modules (Section 3.) with the following main exceptions:

1. The graphic display shows either one bit or four bits. Thus for the X1 SINGLE CHIP ADAPTER, a good chip results in one check mark and a bad chip results in "F".

2. The SINGLE BIT test is not used for the X1 SINGLE CHIP Adapter.

The SIMCHECK timing circuitry is designed for 20nS to 150nS. This means that very old 64K memory chips which are typically marked 300nS or slower, cannot be tested. (Our RAMCHECK device will test these older chips.) Chips which are marked 250nS or faster normally have an actual speed of 150nS or better and they can usually be tested.

7.2. PS/2 30-PIN ADAPTER

7.2.1. INTRODUCTION

IBM made a modification in the JEDEC standard pinout of the 30-pin modules used in the PS/2 Model 30. While the change is minor, a special adapter is needed because SIMCHECK is wired according to the standard.

The PS/2 30-pin ADAPTER utilizes a user replaceable, state of the art SIMM ZIF socket of the same type used by the main SIMCHECK unit. While the main function of this board is for testing the above mentioned PS/2 modules, a switch on the ADAPTER board can set the adapter to test regular SIMM modules.

7.2.2. OPERATION

- Connect the adapter to your SIMCHECK SIP ZIF (green) socket when SIMCHECK is either ON or OFF.
- Please note that the switch at the upper right corner of the adapter has two positions. The upper position is marked "PS/2". The lower position is marked "REG." for testing regular SIMM modules. Set the switch at the "PS/2" position for testing the PS/2 modules.
- Insert the PS/2 30-PIN module into the adapter's SIMM ZIF socket. Please follow the insertion and removal instructions which appear in Section 3.1.
- Once the module is inserted, press F1 to start the test. The test procedure is exactly the same as our regular 30-pin module test.
- Set the switch at the "REG." position for testing regular SIMM modules.

NOTE:

On some PS/2 30-pin modules, pin 2 (-CAS) and pin 28 (-CAS9) are shorted together on purpose. With such modules, SIMCHECK displays the size as being x8 instead of x9. This is OK as both bit 1 and 9 are mapped to SIMCHECK's bit 1. If either bit 1 or bit 9 fails, your error message will show bit 1 as defective.

7.3. PS/2 ADAPTER

The SIMCHECK PS/2 ADAPTER was designed to test the 72-pin IBM PS/2 memory modules with capacities of 1M, 2M, and 4M. As 72-pin SIMM modules have increased in size, INNOVENTIONS has developed the 40-BIT PORT which, together with SIMCHECK comprise the SIMCHECK PLUS.

Compared to the PS/2 Adapter, the 40-BIT PORT can test modules with capacities up to 128M, and without any manual setup.

If you intend to test only 1M to 4M PS/2 modules and have purchased the PS/2 Adapter (p/n INN-8448-3), please insert the instructions accompanying the adapter in this section.

7.4. APPLE MAC IIfx ADAPTER

7.4.1. INTRODUCTION

The optional APPLE MAC IIfx ADAPTER enables SIMCHECK to test the 1Mx8, 4Mx8, and the new 16Mx8 modules used by the Macintosh IIfx computer (and other APPLE products). The connector portion of these modules has 64 contacts spaced at 0.050" (1.27 mm) with an arched gap in the middle, and they are typically made of eight DRAM chips. Some of the new 16Mx8 modules may use 32 4Mx1 DRAM chips plus some logic ICs.

TERMINOLOGY: Note that the adapter board itself is marked "SIMCHECK IIfx ADAPTER".

Required EPROM Version: If you are adding the adapter to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- SIMCHECK's EPROM is earlier than **Version 1.23**.
- An EPROM is included with the adapter.

SIMCHECK's EPROM version is indicated when you first power up SIMCHECK. Section 5. explains how to replace the EPROM.

7.4.2. OPERATION

To use the adapter:

- Connect the adapter to your SIMCHECK SIP ZIF (green) socket when SIMCHECK is either ON or OFF.

- Insert the 64-pin module into the SIMM ZIF socket of the adapter just like the standard 30-pin module. The socket will accept the module only in the correct orientation.

> **CAUTION:**
>
> **This device uses an expensive, state of the art SIMM Socket, which is designed for easy insertion and removal of the tested modules. Do not use excessive force to insert the modules as you may break the insertion pins on the socket's levers. Please review Section 3.1. of the manual for proper use of this socket.**

- Once the IIfx module is inserted, press F1 to start the test. The test is exactly the same as our regular 30-pin module test.

7.5. PLCC/SOJ ADAPTER

7.5.1. INTRODUCTION

The optional PLCC/SOJ ADAPTER enables SIMCHECK to test surface mounted DRAM chips which are packaged in either the PLCC or SOJ standard. This adapter tests 64Kx1, 256Kx1, 1Mx1, 4Mx1, 64Kx4, 256Kx4 and 1Mx4. The adapter uses three high quality sockets which support the PLCC, SOJ 300 mils width and the SOJ 350 mils width standards.

Required EPROM Version: If you are adding the adapter to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- SIMCHECK's EPROM is earlier than **Version 1.25**.
- An EPROM is included with the adapter.

SIMCHECK's EPROM version is indicated when you first power up SIMCHECK. Section 5. explains how to replace the EPROM.

7.5.2. OPERATION

- Connect the adapter to your SIMCHECK SIP ZIF (green) socket when SIMCHECK is either ON or OFF.

- The adapter has two switches for selecting the X1 or X4 configuration. If you test a SOJ X1 or a PLCC X1 DRAM chip, set both switches at the left position. If you test a SOJ X4 or a PLCC X4 DRAM chip, set the two switches at the right position. Setting the switches incorrectly will not harm the tested chip BUT WILL CAUSE AN ERROR MESSAGE.

- **HANDLING THE PLCC CHIPS:** Use the PLCC SOCKET (marked PLCC) for testing the PLCC chips. Pin 1 of the PLCC chip is marked with a dot. Place the chip in the socket so that pin 1 points away from you. Press the chip down as far as it will go and release. This will lock the PLCC chip in the socket. To remove the chip, press the chip down and release. This time it will unlock the socket.

- **HANDLING THE SOJ CHIPS:** Most SOJ DRAM chips are made in accordance with the standard 300 mils package and they should be tested in the middle socket which is marked "SOJ 300". Pin 1 of the SOJ chip is marked with a dot. Place the chip in the socket so that pin 1 points away from you. Also, make sure that the markings on the top of the chip face up (this is called "LIVE BUG" insertion). Insert the chip carefully as far as it will go and press the sides of the socket to lock the chip in the test position. To remove the chip, press the sides of the socket to unlock the chip. You may find a common chip/IC extractor tool helpful in handling the tiny chips. Some 4Meg SOJ chips are made in accordance with the 350 mils package. These chips are tested in the left socket which is marked "SOJ 350". Insert

the chip all the way down into the socket so that pin 1 points away from you and the markings on the top of the chip face up.

- Once the PLCC or SOJ chip is inserted, press F1 to start the test. The test procedure is exactly the same as our SINGLE CHIP ADAPTER test or the X4 DRAM ADAPTER test (Section 7.1.).

NOTES:

1. YOU CAN TEST ONLY ONE CHIP AT A TIME!

2. If you are not sure about the size of the chip, you may experiment safely with the adapter's switches until SIMCHECK is able to identify the chip's size.

3. The adapter has two LEDs which light during the test (namely after you have pressed F1 to initiate the test). Their location on the board corresponds to the setting of the switches. The left LED lights when you test X1 chips, the right LED lights when you test X4 chips.

7.6. ZIP ADAPTER

7.6.1. INTRODUCTION

The optional ZIP ADAPTER enables SIMCHECK to test individual DRAM chips which are packaged in the ZIP (Zigzag Inline Package) standard. This adapter tests 256Kx1, 1Mx1, 4Mx1, 64Kx4, 256Kx4 and 1Mx4. The adapter uses four high quality, burn-in type sockets. SIMCHECK automatically recognizes the presence of the ZIP ADAPTER, and the test is similar both in appearance and function to the SINGLE CHIP ADAPTER test.

Required EPROM Version: If you are adding the adapter to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- _ SIMCHECK's EPROM is earlier than **Version 1.35**.
- _ An EPROM is included with the adapter.

SIMCHECK's EPROM version is indicated when you first power up SIMCHECK. Section 5. explains how to replace the EPROM.

7.6.2. OPERATION

- Connect the adapter to your SIMCHECK SIP ZIF (green) socket when SIMCHECK is either ON or OFF.

- If the ZIP chip is 256Kx1 it will have 16 pins, while ZIP chips of other sizes have 20 pins. The four sockets are arranged as follows:

U4	**64Kx4**	**1Mx1, 4Mx1**	**U1**
U3	**256Kx1**	**256Kx4, 1Mx4**	**U2**

The size markings are also printed on the board for easy identification.

- Insert the ZIP chip into the corresponding socket, making sure that pin 1 faces to the left. The top corner of the ZIP chip where pin 1 is located is marked by a small slanted cut. If the ZIP chip has 16 pins, insert it in socket U3. If the ZIP chip has 20 pins and you are not sure what size it is, you can safely test it in all three 20-pin sockets to determine its size. The ZIP chip is tested by SIMCHECK only when it is inserted in the correct socket.

- Once the ZIP chip is inserted, press F1 to start the test. The test procedure is exactly the same as our SINGLE CHIP ADAPTER test (Section 7.1.). **YOU CAN TEST ONLY ONE ZIP CHIP AT A TIME.**

- When removing a ZIP chip, you must hold the adapter board down with one hand while pulling the chip up with the other hand. The best point to hold the board is on the word ZIP at the bottom of the board.

7.7. BANK ADAPTER

7.7.1. INTRODUCTION

The optional BANK ADAPTER enables SIMCHECK to simultaneously test up to a full bank of nine DRAM chips, with size ranging from 4Mx1, 1Mx1, 256Kx1 to 64Kx1. This ability to test a complete bank of DRAM chips, in virtually the same configuration as the chips are used inside the computer, is extremely useful for service operation. This adapter is up to 9 times faster than our SINGLE CHIP ADAPTER when testing a large batch of DRAM chips, since up to 9 chips can be tested at the same time.

Key Features:

- This adapter is fully automatic and requires no switch setting. SIMCHECK automatically recognizes the presence of the BANK ADAPTER and identifies the size of the tested DRAM chips.
- The adapter uses nine individual ZIF sockets for easy insertion and removal of memory chips.
- The testing procedure is similar to our regular chip test program; therefore, as with our other adapters, no additional training is required.
- The adapter simultaneously tests from one to nine DIP DRAM chips, including 4Mx1, 1Mx1, 256Kx1 and 64Kx1.

Required EPROM Version: If you are adding the adapter to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- SIMCHECK's EPROM is earlier than **Version 1.38**.
- An EPROM is included with the adapter.

SIMCHECK's EPROM version is indicated when you first power up SIMCHECK. Section 5. explains how to replace the EPROM.

7.7.2. OPERATION

- Connect the adapter to the SIMCHECK SIP ZIF (green) socket when SIMCHECK is either ON or OFF. Once installed, SIMCHECK automatically detects the presence of the BANK ADAPTER. The display will read "PUT 1-9 CHIPS" along with an arrow prompting the user to begin the test.
- The adapter uses nine 20 pin Zero-Insertion-Force (ZIF) sockets for easy handling of the memory chips. Each of these sockets can accept a memory chip when the lever is in the up position. The lever is then lowered to secure the chip in place.

- Up to nine memory chips can be tested simultaneously. **ONLY MEMORY CHIPS OF THE SAME CAPACITY CAN BE TESTED TOGETHER.** When testing less than nine chips, you must use the sockets from left (BIT 1) to right, without skipping any socket.

- The 64K/256K DRAM chips are packaged in a 16 pin DIP package, while the 1M/4M are packaged in an 18 pin package. The 64K/256K chips should be inserted with pin 1 at the top left corner of the ZIF socket. The 1M/4M chips should be inserted with pin 1 in the SECOND hole from the top left corner of the socket. In a proper insertion, the 64K/256K chips should be aligned with the top of the socket, while the 1M/4M chips should be aligned with the bottom of the socket. Please review the outline drawing on the adapter which summarizes the difference between the 1M/4M chips and the 256K/64K chips.

- Once the memory chips are inserted in the sockets with levers locked down, press F1 to start the test. The test procedure is exactly the same as our regular module test procedure; the BASIC test is followed by the EXTENSIVE test, the AUTO-LOOP test, and optionally the SINGLE BIT test.

- During the test, the display will indicate the number of chips as well as their size. For example, the display will read 1Mx5 when testing five 1Mx1 memory chips. Similarly, it will read 256Kx7 when testing seven 256Kx1 memory chips. Detected errors will halt the test with the familiar display of check marks and 'F's. The number of bit characters (both check marks and 'F's) will correspond to the number of tested memory chips. The left character corresponds to the furthest left socket (marked "BIT 1"), the second character corresponds to the next socket (marked "BIT 2"), and so on.

Special Setup for old 64K/256K DRAM chips:

Some of the older generation 64Kx1 and 256Kx1 DRAM chips are subject to excessive interference by noise. Such interference results in seemingly random errors which do not correspond to chip position replacement. Special extra filter capacitors have been added at the bottom of the Bank Adapter with five jumper attachments. For modern 256K\1M\4M chips, all the jumpers must be attached to the **LOWER** two pins on each connection point. This will **disconnect** the filter capacitors.

For testing some of the older generation of 64Kx1 or 256Kx1 chips, connect one or more of the jumper attachments to the **TOP** two pins. This will connect the extra filter capacitors. You will find that the more capacitance connections you need, the more sensitive your memory chips are to noise. Should your memory chips continue to fail, noise sensitivity is definitely not the problem.

Regardless of the capacitor setting, there is no change in the SIMCHECK test procedure.

NOTES:

1. SIMCHECK is designed with over-current protection circuitry to protect memory chips which are accidentally inserted backwards or in the wrong holes of the socket. Therefore, if you insert the 256K chips in the position used for the 1M chips (as explained above), SIMCHECK will provide an error message but will not damage your chips. If you are not sure about the size of the chips, you may experiment safely until SIMCHECK is able to identify the bank of chips.

2. When testing more than one memory chip at a time, SIMCHECK will display the slowest access time in which it can access all the memory chips in the BANK ADAPTER. For example, if you were to test six 1Mx1 chips, five having an access time of 70nS, while one has an access time of 100nS, then the access time for the complete bank of six chips would be 100nS.

3. Please note that the 1M/4M memory chips are inserted flush with the bottom of the BANK ADAPTER'S ZIF sockets, while the 64K/256K chips are inserted flush with the top of the sockets. The reason for different alignment is due to the fact that the 64K/256K chips are not pin compatible to the 1M/4M chips. The alignment method we have developed allows us to minimize line switching in the BANK ADAPTER.

4. On rare occasions, a memory chip may cause a short in the address lines which can simulate an error in an adjacent chip. When this happens, removing the "bad" chip will reveal another fault elsewhere caused by the same chip which flagged the previous error. If this rare problem ever occurs, we suggest you try isolate the defective chip by gradually removing good chips from the bank.

7.8. SIMCHECK MODULE HANDLER

The SIMCHECK MODULE HANDLER solves the needs of the high volume module manufacturer. A picture of the HANDLER appears in Figs. 12 and 13 at the beginning of this manual. Like SIMCHECK itself, the HANDLER is priced at a fraction of the cost of other device handlers in the market. It is capable of automatically testing up to 100 modules which are placed inside a vertical input tray. After undergoing a SIMCHECK test procedure, the modules are then sorted into two piles: one having the good modules, the other having the bad modules. Using SIMCHECK's TEST SETUP capabilities, you can sort the modules based on varieties of parameters and not just according to good/bad modules (e.g. only modules that meet specific size and speed requirements will be sorted as good).

SIMCHECK is placed on a tray on the back of the HANDLER. Connected to the SIMCHECK expansion slot is an interface module used specifically for this testing procedure. This interface unit is further connected to the HANDLER and provides the SORT GOOD/SORT BAD operation for the modules. The modules to be tested are placed in a vertical tray. Up to 100 modules can be loaded into this tray at a time. The tray has dimensions corresponding to the modules. Our standard package includes a tray for the 1Megx9 and a tray for the 4Megx9 modules. Other tray sizes are available, as well as customized trays for your specific module type.

Absolutely no supervision is required once the HANDLER is initiated. It automatically starts the test when a module is placed in the test position. At the end of the SIMCHECK test, the HANDLER receives the test results - either SORT GOOD or SORT BAD. If SORT GOOD is activated, the test module travels to the good module pile. If the SORT BAD was determined by SIMCHECK, it causes the module to travel to the bad module pile.

The HANDLER uses both the AC lines and the air pressure system at the production floor. The AC lines power the motor for the movement of the modules and also supplies current to the control circuitry. The air pressure system activates both the module contact system and the power relay for diverting the test modules to the right sorting piles.

There are currently two versions of the SIMCHECK MODULE HANDLER:

- p/n INN-818-HANDLER for testing the 30-pin, 0.100" pitch SIMMs.
- p/n INN-818-72P-HAN for testing the 72-pin, 0.050" pitch SIMMs.

Also available is the new SIMCHECK Advanced Module Handler (p/n INN-828-HANDLER).

The HANDLER comes with a **COMPLETE INSTRUCTION MANUAL** and a precision tool kit with which the customer can set up for operation.

7.9. AST ADAPTER

7.9.1. INTRODUCTION

The AST ADAPTER is designed to test the 64-pin AST memory modules with capacities of 1M and 4M. These modules are configured as x36 bits and they typically include 9 1MegX4 chips for the 4M module or 9 256Kx4 chips for the 1M module. The AST modules are made either with or without the WRITE-PER-BIT feature. SIMCHECK automatically identifies if the AST module is a WRITE-PER-BIT module. Such WRITE- PER-BIT modules are equipped with a special WRITE-PER-BIT DRAM chip for the four parity bits.

Key Features:

- Every cell of the entire memory array is actually checked numerous times during the test.
- High quality gold plated ZIF Socket for easy module handling.
- SIMCHECK automatically detects the presence of the AST module. No need for any special setting - just plug the adapter in and insert an AST module.
- Testing program structure is compatible with our regular module test programs. Therefore, one can use the AST ADAPTER without additional training.
- The adapter tests 1M and 4M modules and provides detailed indications of detected faults. It also provides an automatic identification of the WRITE-PER-BIT feature. The adapter is rated for a test range of 45nS to 150nS access time.
- An LED indicator identifies the AST modules which use pin 61 as a PResence Detection line (PRD).

Required EPROM Version: If you are adding the adapter to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- SIMCHECK's EPROM is earlier than **Version 1.50**.
- An EPROM is included with the adapter.

SIMCHECK's EPROM version is indicated when you first power up SIMCHECK. Section 5. explains how to replace the EPROM.

7.9.2. OPERATION

- Connect the adapter to your SIMCHECK SIP ZIF (green) socket when SIMCHECK is either ON or OFF.

- Insert the 64-pin AST module into the SIMM ZIF socket just like the standard 30-pin module. The socket will accept the module only in the correct orientation.

> **CAUTION:**
> **This device uses an expensive, state of the art SIMM Socket, which is designed for easy insertion and removal of the tested modules. Do not use excessive force to insert the modules as you may break the insertion pins on the socket's levers. Please review Section 3.1. of the manual for proper use of this socket.**

- Once the AST module is inserted, press F1 to start the test. It proceeds along our BASIC, EXTENSIVE, and AUTO-LOOP tests in accordance with our regular module tests. An LED in the lower left corner of the AST adapter is turned on during the tests.

Test in progress (TIP) animation is different than the regular module test. During BASIC test (and similar test sections in the EXTENSIVE test), instead of the "hour glass" display, there are 1 or 4 rotating "timer" elements corresponding to the module size in Megabytes.

The WRITE-PER-BIT feature is identified with a "w/b" marker on the upper right corner of the display during BASIC test (and similar test sections in the EXTENSIVE test). At the end of BASIC test you will hear a beep and the following message appears if the module is a WRITE-PER- BIT module:

```
WRITE/BIT MODULE
AST-4M    60nS
```

If the module is not a WRITE-PER-BIT module, you will hear a different beep and the message will be:

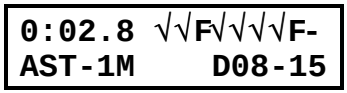
```
NOT WRITE/BIT
AST-4M    60nS
```

In case of fault detection, defective bits are shown in a condensed form:

- The upper display line shows 8 consecutive bits.
- The bottom display line displays the corresponding bank (bit groups) in which the fault occurs.

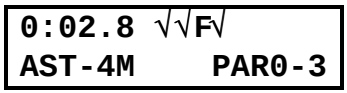
The AST module is composed of 36 bits: 4 bytes of 8 bits each and 4 parity bits. The four bytes are marked D00 to D31 and the 4 parity bits are marked PAR0-3.

Example 1:



This display indicates a problem within bit group D08 to D15, in bit number 10 (the 3rd from the left counting 8, 9, 10) and in bit number 15.

Example 2:



This display indicates a problem in parity bit PAR2.

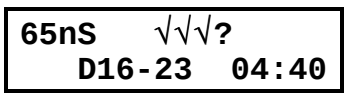
Due to variations in nomenclature among the manufacturers, SIMCHECK displays the generic bit number instead of Uxx or Mxx number. To identify the defective chip(s), please use manufacturer's schematics which clearly identify the actual chip responsible for each data bit.

Presence Detection status is displayed on the right LED, which is marked "PRD PIN-61", provided that there is a jumper connecting the two right posts of jumper block SW2 (this is factory default). Some AST modules internally short pin 61 to ground for automatic presence detection. For such modules, the LED will turn on during the test. The LED is kept off for all other AST modules which do not use this pin. Future 16M AST modules may require the use of PIN 61 for Address Line A10.

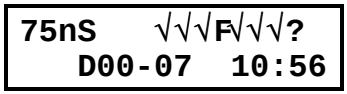
Jumper Block SW1 is reserved for future use, and should have a jumper connecting the two right posts (factory default).

AST SINGLE BIT TEST

The SINGLE BIT test for the AST modules is initiated in accordance with our regular module tests. During the SINGLE BIT test, SIMCHECK's display shows 8 bits at a time and the section of the module being tested. For example,



indicates that bit D19 (4th bit, counting 16,17,18, and 19) is currently tested at 65nS.



This example indicates that bit D03 has failed the SINGLE BIT test. It also indicates that bit D07 is currently tested at 75nS.
You can skip from one bank (bits group) to the next by pressing F3.

When using the AST ADAPTER with the optional PC COMMUNICATION PACKAGE, the PC screen will explicitly identify the pin number of the currently tested bit.

7.9.3. LIST OF SUPPORTED AST MODULES

Original AST modules were developed and produced by AST Research Inc. We would like to express our thanks to AST for their technical assistance in developing this adapter which included electrical drawings and module samples.

The following is a list of AST modules which are supported by the new SIMCHECK AST ADAPTER:

MODULE SIZE	COMPUTER(S) USED IN	AST PART #
1MB	Premium II 386SX/20 & Premium 386SX/16	500780-003
4MB	Premium II 386SX/20 & Premium 386SX/16	500780-004
1MB	Premium 386/25 and Premium 386/33	500780-003
1MB	Premium 386/33T/25 & Premium 386/33TE	500780-003
4MB	Premium 386/33T/25 & Premium 386/33TE	500780-004
4MB	Premium II 486SX	500780-004
4MB	Premium 486/25, 486/25e and 486/33	500780-004
1MB	Cupid-32 Memory Expansion Card (AST part 500810-001)	500780-003
4MB	Cupid-32 Memory Expansion Card (AST part 500810-001)	500780-004
1MB	Cupid-32 Memory Expansion Card earlier version (AST part 500722-004)	500780-003
4MB	Bravo 486/25	500780-004

AST, PREMIUM, PREMIUM II, CUPID-32 and BRAVO are trademarks of AST RESEARCH Inc.

7.10. STATIC RAM TESTER

7.10.1. INTRODUCTION

The optional STATIC RAM TESTER brings SIMCHECK's unique testing capabilities to the vast domain of the FAST STATIC RAM chips. The unit utilizes state of the art CMOS technology which enables the testing of both ultra FAST CACHE RAM and modern LOW POWER STATIC chips.

Key Features:

- Tests all the current state of the art STATIC RAM CHIPS including: 2Kx8; 8Kx8; 32Kx8; 64Kx8; 128Kx8; 512Kx8; 16Kx1; 64Kx1; 256Kx1; 1Mx1; 4Kx4; 16Kx4; 64Kx4 and 256Kx4.
- Fully automatic identification of the tested chip. Automatically configured for both x4 chips with and without Output Enable (OE) control.
- Speed measurements from 5nS to 151nS, at 2-4 nS increments.
- Fast cache ram are tested for access time from Chip Select (Tace) and access time from address (Taa).
- Examination of the chip optional 2.0V low voltage data retention.
- Determination of optional LOW VOLTAGE working capability at the 3.1V-3.7V range. If a tested SRAM chip has this capability, the tester automatically records the degraded access time (Taa) at this lowest operational Vcc source voltage.
- SIMCHECK automatically detects the presence of the STATIC RAM TESTER. Simplified ONE BUTTON test flow eliminates the need for time consuming training.
- Two tests are available. The BASIC test (F1) is extremely fast and provides size, speed and complete pattern test. Every cell of the entire memory array is actually checked numerous times during the BASIC test. The EXTENSIVE test (F3) adds the above mention tests for 2.0V DATA RETENTION, LOWEST OPERATIONAL Vcc and the Tace access time for fast cache RAM.

Required EPROM Version: If you are adding the adapter to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- SIMCHECK's EPROM is earlier than **Version 2.34**.
- An EPROM is included with the adapter.

SIMCHECK's EPROM version is indicated when you first power up SIMCHECK. Section 5. explains how to upgrade the EPROM.

7.10.2. STATIC RAM FUNDAMENTALS

While the STATIC RAM chips (called SRAM chips for short) provide the same essential Random Access Memory function as the DRAM memory chips, they differ significantly in their structure and technology.

The DRAM memory chip utilizes only one transistor and one capacitor per each memory cell which contributes to their immense density (number of data bits/square inch of silicon) and low cost. However, the DRAM memory chip requires constant refreshing of the charge (data) stored in the cell's capacitor. The SRAM chip utilizes an arrangement which consists of a 4-transistor flip-flop for each cell. This arrangement is called static because the flip-flop retains the data indefinitely (as long as the power supply is connected to the chip). This STATIC arrangement is faster than DRAM technology and does not require any refresh scheme. However, STATIC RAM technology yields a much lower density than DRAM technology, and therefore SRAM chips are much more expensive.

Because of their high speed and easy interface (due to the lack of refresh circuitry), SRAM chips are used for fast cache memory in most modern computers.

7.10.2.1. THE 3.3V FEATURE

All SRAM chips are specified to work with a single power supply (Vcc) in the range of at least 4.5V-5.5V power source. Many are further specified to work with a lower voltage source of 3.3V. SIMCHECK's EXTENSIVE test automatically identifies the lowest Vcc range of the tested SRAM chip.

7.10.2.2. THE 2.0V LOW VOLTAGE DATA RETENTION FEATURE

To work with battery backup arrangement, many CMOS SRAM chips have a data retention capability even when the power source falls to 2.0V. SIMCHECK's EXTENSIVE test automatically identifies and verifies this feature.

7.10.2.3. SRAM ACCESS TIMES

The SRAM access time which is marked on the chip relates to two different time intervals:

Taa - Address Access Time - the time interval from the instant that the address input to the chip is stabilized to the instant in time when the stored data is stable in the chip's output.

Tace - Chip Enable Access Time - the time interval from the instant that the SRAM's Chip Enable input is asserted to the instant in time when the stored data is stable in the chip's output. This access time is also called Tacs.

When measuring Taa, the chip enable input must be asserted at or before the instant of time in which the address stabilized. Similarly, when measuring Tace, the address should be stable prior to the assertion of the chip enable input.

While these two access times are marked with the same value, there is a minor variation between them. However, the marking on the chip is the worst case value for both. For slow SRAM chips, the 4-8nS difference is insignificant, and SIMCHECK shows only one value (Taa). For fast CACHE SRAM chips, SIMCHECK provides measurements for both Taa and Tace during EXTENSIVE test.

Access times degrade (becomes slower) when the following conditions occur:

- The ambient temperature is increased.
- The power source voltage is decreased.

7.10.3. OPERATION

CAUTION:

Never connect or disconnect the STATIC RAM TESTER to SIMCHECK when SIMCHECK IS ON! Insert or remove STATIC RAM CHIPS only when the SRAM POWER RED LED is off.

- Turn SIMCHECK OFF! Connect the STATIC RAM TESTER to your SIMCHECK "RAMCHECK II EXPANSION" slot using the supplied polarized 50-conductor cable. Turn SIMCHECK ON. The following message should appear:

```
STATIC RAM
TESTER IS ON...
```

- This message is then followed by the Title/Version message and reaches the STANDBY screen, which prompts you to insert a static chip into the tester.

- All STATIC RAM chips to be tested (regardless of their size) must be inserted into the ZIF socket in such a way, that the lower two pins are flush with the bottom of the socket. Please note the orientation drawing to the left of the ZIF socket. The ZIF socket is opened by lifting the lever up, closed by pushing the lever down.

- To initiate the BASIC test, simply press F1. The display will show the chip's size and access time and will perform a complete test of the entire memory array using several test patterns. At the end of the test, the number of pins of the tested chip is also displayed.

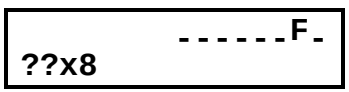
- The EXTENSIVE test for the STATIC RAM TESTER is initiated by F3. Note that unlike SIMCHECK DRAM testing, the EXTENSIVE test is activated by itself, without a need to first run the BASIC test (F1). The EXTENSIVE test starts in a way similar to the BASIC test. After the first test, which provides the same results of the BASIC test, the tester enters the 2.0 Volt DATA RETENTION test. You can see that the RED LED marked SRAM POWER becomes dim as the chip Vcc falls to 2.0V. Since 2.0 Volt DATA RETENTION capability is optional (that is, some SRAM chips are not designed to have this feature), the test does not terminate if this mode fails! After the DATA RETENTION test, the tester determines the lowest Vcc with which full memory function still exists. While all SRAM chips should work with Vcc of 4.5V to 5.5V, many modern chips work at 3.3V. If the chip is of the CACHE type (that is, speed is less than 50nS), the EXTENSIVE test ends with a full test of the access time from Chip Enable (Tace). Measurement of Tace is always followed by '.' on the display.

- After the active portion of EXTENSIVE test (during which the SRAM POWER RED LED is ON) terminates, the display shows the familiar check-mark graph with the OK beeps. At this time, you may remove the tested SRAM chip. A summary of the test results now sequence through the display. You can use ESC to quit the summary display and return to STANDBY mode, or Press F1 to accelerate the display. A new feature at this point is F2 which delays the sequence (each time you MOMENTARILY press F2 you add 4 seconds to the current display).

7.10.4. ERROR RESULTS

Error results follow the same easy to understand notation of SIMCHECK's DRAM testing. Errors which relate to an address line provide the pin number of the ZIF socket. Pin 1 corresponds to the upper left hole of the socket, pin 32 corresponds to the upper right hole.

Examples:



A major error in bit 7 of a x8 chip has been detected. This error stops the test before the size of the chip was determined.

```
OPEN/SHORT Addr.
Line: PIN 8
```

The tested chip exhibits an address problem in pin 8 of the 32 pin ZIF test socket.

7.10.5. SUMMARY SCREENS

During the tests, and particularly at the end of the EXTENSIVE test, SIMCHECK provides a wealth of information about the tested SRAM chip. The following screens illustrate some of the information which is unique to the STATIC RAM TESTER.

```
SRAM HAS 28 PINS
256Kx4 OE 18nS
```

The tested chip is a 256Kx4 with optional Output Enable (OE) control. The chip has 28 pins.

```
ACCESS TIMES AT
 Vcc = 4.5V:
```

Followed by:

```
Taa=13nS   (add)
Tace=15nS.  (ce)
```

This fast CACHE SRAM chip has a 13nS Taa access time and a 15nS Tace access time, as measured at 4.5V.

```
LOWEST VCC WAS
3.1V AT 21nS
```

Full memory function was achieved at a low Vcc of 3.1V. As speed always degrades at lower voltage, this screen also indicates that the speed at 3.1V was 21nS. Note that a speed measurement which is not followed by a '.', indicates Taa access time.

```
DATA RETENTION
AT 2.0V WAS OK
```

The tested chip featured an optional 2.0V data retention capability.

7.10.6. SRAM/DRAM TEST SETUP MODE

F2, F1 select the SIMCHECK TEST SETUP mode. You can select the "STANDARD SIMM" setup to activate the regular DRAM module tests. To reactivate the STATIC RAM TESTER, select it through the SETUP mode or simply turn SIMCHECK OFF and ON again.

7.11. 40-PIN MODULE ADAPTER

7.11.1. INTRODUCTION

The 40-PIN MODULE ADAPTER is designed to test the high density 40- pin modules with capacities of 256Kx16, 512Kx16, 1Mx16, and 2Mx16. These modules are configured as x16 bits and they typically include 4 or 8 x4 DRAM chips. Due to their small size, these new JEDEC standard modules are becoming popular in laptop computers made by various brand name manufacturers like IBM and AST. They are also used by application specific computers like the Alacrity Desktop Document Manager System.

Key Features:

- Every cell of the entire memory array is actually checked numerous times during the test.
- SIMCHECK automatically detects the presence of the 40-pin (x16) module. No need for any special setting - just plug the adapter in and insert the module.
- Testing program structure is compatible with our regular module test programs. Therefore, one can use the 40-PIN MODULE ADAPTER without additional training.
- The adapter tests 256Kx16, 512Kx16, 1Mx16, and 2Mx16 modules and provides detailed indications of detected faults. It also provides an automatic identification of the WRITE-PER-BIT feature. The adapter is rated for a test range of 45nS to 150nS access time.
- The adapter can read the setting of the PRD (presence detect) at pins 7,19 and 34 of the modules. This setting may identify the size of the module.

Required EPROM Version: If you are adding the adapter to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- SIMCHECK's EPROM is earlier than **Version 1.59**.
- An EPROM is included with the adapter.

SIMCHECK's EPROM version is indicated when you first power up SIMCHECK. Section 5. explains how to replace the EPROM.

7.11.2. OPERATION

- Connect the adapter to your SIMCHECK SIP ZIF (green) socket when SIMCHECK is either ON or OFF.

- Insert the 40-pin module into the high density SIMM socket, so that pin 1 of the module is to your left. The socket will accept the module only in the correct orientation. To avoid premature wearing of the test socket, NEVER use excessive force when inserting the modules, and make sure that the module's contact area is CLEAN.

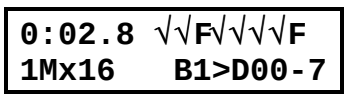
- Once the 40-pin module is inserted, press F1 to start the test. It proceeds along our BASIC, EXTENSIVE, and AUTO-LOOP tests in accordance with our regular module tests.

Test in progress (TIP) animation is different than the regular module test. During BASIC test (and similar test sections in the EXTENSIVE test), instead of the "hour glass" display, there are 1 to 4 rotating "timer" elements corresponding to the module size. A 256Kx16 module will display one "timer" element. A 512Kx16 module will display two elements, a 1Mx16 will display three elements, and a 2Mx16 will display four elements.

In case of fault detection, defective bits are shown in a condensed form:
- The upper display line shows 8 consecutive bits.
- The bottom display line displays the corresponding bank (bit groups) in which the fault occurs.

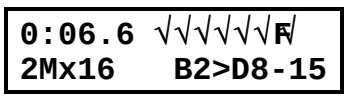
The 40-pin module is composed of 16 bits arranged in two bytes of 8 bits each. Depending on its size, the module may have either one or two banks.

Example 1:



This display indicates a problem within BANK 1 (typically the four chips on the front side, starting from left), group D0 to D7, in bit number D2 (the 3rd from the left counting 0, 1, 2) and in bit number D7.

Example 2:



This display indicates a problem in BANK 2, bit D14.

Due to variations in nomenclature among the manufacturers, SIMCHECK displays the generic bit number instead of Uxx or Mxx number. To identify the defective chip(s), please use manufacturer's schematics which clearly identify the actual chip responsible for each data bit.

Presence Detection status

The program can provide you with an explicit list of the PRD lines setting. Press F3 during the BASIC test to get the following display:

```
PRD4-1 ARE: 0110
```

In this example, PRD1 (pin 7 of the module) is 0 (shorted to ground), PRD2 (pin 19) is 1 (shorted to Vcc or left open), and PRD3 (pin 34) is also 1. PRD4 is always 0 and is used internally by the adapter circuitry.

7.12. 16M SOJ ADAPTER

7.12.1. INTRODUCTION

The optional 16M SOJ ADAPTER enables SIMCHECK to test the surface mounted SOJ DRAM chips with 16 Megabits. It can be ordered for 400 mil (p/n INN-8448-14-4) or 300 mil (p/n INN-8448-14-3) SOJ DRAM chips. These include the 4Mx4 and the 16Mx1 configurations. 4 Megabits and smaller SOJ and PLCC DRAM chips are testable by the optional PLCC/SOJ adapter (See Section 7.5.). The 16M SOJ ADAPTER tests and distinguishes between the 4K and 2K refresh modes which are now available for the 4Mx4 chips.

Required EPROM Version: If you are adding the adapter to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- SIMCHECK's EPROM is earlier than **Version 2.04**.
- An EPROM is included with the adapter.

SIMCHECK's EPROM version is indicated when you first power up SIMCHECK. Section 5. explains how to replace the EPROM.

7.12.2. OPERATION

- Connect the adapter to your SIMCHECK SIP ZIF (green) socket when SIMCHECK is either ON or OFF.

- **HANDLING THE SOJ CHIPS:** The 16M SOJ DRAM chips are made in accordance with the standard 400 mils package. Pin 1 of the SOJ chip is typically marked with a dot. Alternatively, the short edge of the package which is near pin 1 may be slightly slanted. The left socket is for the 16Mx1 configuration, and the right socket is for the 4Mx4 configuration. Place the chip in the corresponding socket so that pin 1 points away from you. Also, make sure that the markings on the top of the chip face up (this is called "LIVE BUG" insertion). Insert the chip carefully as far as it will go. Use an IC chip extractor or a thin flat head screwdriver to remove the chip from the socket.

> If you are not sure whether to use the 16Mx1 or the 4Mx4 socket, you can safely try either socket. If you have inserted a 16Mx1 into the 4Mx4 socket (or vice versa), SIMCHECK will protect your chip by immediately stopping the test with a "NO MEMORY" error.

- Once the 16M SOJ chip is inserted, press F1 to start the test. The test procedure is exactly the same as our SINGLE CHIP ADAPTER test (Section 7.1.).

THE 4K REFRESH DETECTION

The 4Mx4 DRAM chips are currently available in two refresh modes, 2K and 4K. The 2K refresh mode uses 11 address lines for the row strobe and for refresh. This is the more common refresh mode as it uses only 11 multiplexed address lines for both row address and column address. Therefore 4Mx4 DRAM with 2K refresh are compatible with regular 4Meg modules. The 4K refresh uses 12 address lines for the row strobe and for the refresh and therefore the chip must use 12 multiplexed address lines (MA11 and MA12 used for row address only). This mode is less common and therefore SIMCHECK provides the following message when this mode is encountered:

```
4M/4K REFRESH:12
ROWS, 10 COLUMNS
```

OUTPUT ENABLE ERROR MESSAGE

The 4Mx4 DRAM chips are equipped with an Output Enable (-OE) pin. If this pin is stuck at '0', SIMCHECK will provide the following error message:

```
ERROR: -OE STUCK
AT ZERO
```

7.13. SINGLE -CAS AND LOGIC PARITY ADAPTER

7.13.1. INTRODUCTION

The optional SINGLE -CAS ADAPTER (p/n INN-8448-13)provides a testing solution for two types of special 30-pin SIMM modules: the SINGLE -CAS MODULES and the modules with PARITY BIT EMULATION LOGIC CHIPS.

7.13.1.1. SINGLE -CAS MODULES

The JEDEC standard for 30-pin SIMM modules requires the use of two -CAS (Column Address Strobe) control lines. The first one, at pin 2, is marked -CAS and is used to control the eight data bits of the module. The second one, at pin 28, is marked -CAS9 and it controls the ninth bit (parity bit). Since most applications connect the -CAS and -CAS9 to a single source on the motherboard, some module manufacturers use a single -CAS control line for all the nine bits. These include some of the 16Mx9 modules which are made of 36 4Mx1 chips, and most of the x9 modules which use a set of three special x3 chips. When you test these modules directly on SIMCHECK, they will be detected as x8 modules, since SIMCHECK was designed for the JEDEC standard. This optional adapter is designed to accommodate such 30-pin modules with a single -CAS control line, so that they can be tested as x9 modules.

7.13.1.2. MODULES WITH PARITY-BIT-EMULATION LOGIC CHIPS

In an effort to reduce the cost of memory modules, several companies have developed parity-bit-emulation logic chips for 30-pin SIMMs. These parity-bit-emulation chips, like the GS81C4100J70 or BP41C1000A-6, use logic to emulate the parity bits on such modules, instead of the real (and more expensive) memory devices which are required for **true parity** function. Such modules, which contain x8 real memory devices plus the parity-bit-emulation logic chips, can be used on computers which require the standard x9 bits. Since the parity-bit-emulation logic chips monitor the data read from the x8 memory devices on the module and **always** compute the correct parity bit for that data **even if the data was corrupted**, they actually **disable** the benefits of the parity feature as defined by the IBM standard PC architecture. As mentioned above, true parity function must include a real memory device to store all individual parity bits for each stored byte. Since SIMCHECK was designed to be a memory tester, it can test logic devices only with an external adapter such as the SINGLE -CAS ADAPTER.

Required EPROM Version: If you are adding the adapter to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- SIMCHECK's EPROM is earlier than **Version 2.32**.
- An EPROM is included with the adapter.

SIMCHECK's EPROM version is displayed when you first power up SIMCHECK. Section 5. of the manual explains how to replace the EPROM.

7.13.2. OPERATION

- Connect the adapter to your SIMCHECK SIP ZIF (green) socket when SIMCHECK is either ON or OFF.

- Insert the module into the SIMM ZIF socket of the adapter. The socket will accept the module only in the correct orientation.

> **CAUTION:**
>
> **Do not use excessive force to insert the module as you may break the insertion pins on the socket's levers. Please review Section 3.1. of the manual for proper use of this socket.**

- Once the module is inserted, press F1 to start the test. The test is exactly the same as our regular 30-pin module test, with the exception that the Page mode test section of the EXTENSIVE test is currently not included.

7.13.3. DETECTION OF PARITY-BIT-EMULATION LOGIC

When SIMCHECK detects a module which employs the parity-bit-emulation logic, the following message will appear at the beginning of the test:

```
BIT9: PARITY BIT
EMULATION LOGIC
```

The test will then proceed with the normal SIMCHECK test in progress (TIP) animation with the letter 'p' placed at the position of bit 9. The final test result will show a message like:

```
0:08.4 √√√√√√√P
1Mx8p   60nS
```

A "dummy" or a non-functioning parity-bit-emulation logic chip will be noted on the display with '-'. Throughout the remainder of the test, the size messages will be followed with a 'p' to indicate the presence of the parity-bit-emulation logic chip.

7.14. PC COMMUNICATION PACKAGE

7.14.1. INTRODUCTION

We have received many requests from SIMCHECK users to add printing and data logging capabilities. The new PC COMMUNICATION PACKAGE answers this request with a versatile link between the stand alone SIMCHECK and your Personal Computer. With this link, SIMCHECK can be remotely activated through your PC, or you can still use it with its regular operation switches. In either case, SIMCHECK sends detailed test results to your PC where they are displayed by a state-of- the-art real-time graphics program. The colorful graphic screen of the PC provides much more simultaneous information on the SIMCHECK test process than can be shown on SIMCHECK's own display. Test results may be printed, and, using the automatic logging feature, stored in a running log file for a later review. A full menu system with detailed on-line help screens simplifies the setup process of SIMCHECK's test parameters and test flow. Customized setups can be stored in your computer disk for future use.

The package includes a small Serial Interface Module, which is attached to SIMCHECK's expansion slot, and a special communication program for your PC. The Serial Interface Module fits snugly to the side of SIMCHECK, and when the serial cable to your PC is removed, the SIMCHECK-Serial Interface Module combination is still portable. The Serial Interface Module further includes a NON-VOLATILE memory which retains SIMCHECK's test setup even when SIMCHECK is turned off.

We have put much efforts into the design of SIMCHECK to make it a user friendly, stand alone instrument. The new PC Communication Package builds upon this foundation. The real-time graphics include a SIMCHECK LCD DISPLAY and OPERATION SWITCH (ESC,F1,F2,F3) emulator which retains the familiar look of SIMCHECK's display, operation, and messages. Other windows on the PC screen log the test data and provide speed, voltage, test summary, speed profile and other important information. All of this results in a PC program which you can operate **immediately and intuitively,** without spending time to learn a complex user interface.

MINIMUM REQUIREMENTS:

IBM PC-AT or compatible computer with an EGA/VGA display, 640K RAM, one floppy diskette drive (hard disk recommended), and a serial port (COM1 or COM2).

7.14.2. INSTALLATION

The PC COMMUNICATION PACKAGE includes:

- The Serial Interface Module.
- The PC Communication Program Diskette (**Version 1.05 or higher**).
- A 6' shielded 9-pin D-SUB M-F Serial Cable.
- An optional SIMCHECK EPROM.

NOTE: Special low- profile serial cable is available for customers using the SIMCHECK MODULE HANDLER.

Required EPROM Version: If you are adding the PC COMMUNICATION PACKAGE to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- SIMCHECK's EPROM is earlier than **Version 2.34**.
- An EPROM is included with the package.

SIMCHECK's EPROM version is indicated when you first power up SIMCHECK. Section 5. explains how to replace the EPROM.

- Upgrade the EPROM (if needed) and turn SIMCHECK OFF. Your SIMCHECK's expansion slot is protected by a "dummy" black connector, which you remove in order to expose the expansion slot. The Serial Interface Module has a 50-wire cable with an IDC socket connector and a cascading expansion slot. Insert the socket connector to SIMCHECK's expansion slot and protect the Serial Interface Module's expansion slot with the "dummy" black connector. NOTE: If your SIMCHECK was manufactured prior to December 1991, it may not be equipped with the "dummy" black connector. Please contact your SIMCHECK dealer to get one.

- Turn SIMCHECK ON. The green LED on the Serial Interface Module should be ON and the red LED should blink every few seconds to indicate SIMCHECK transmitting mode. Turn SIMCHECK OFF.

- Use the Serial Cable to connect the SIMCHECK Serial Interface Module to an available serial port (COM1 or COM2) your PC. In most modern PCs, the serial ports use 9-pin Male D-SUB connector. Older computers may use 25-pin D-SUB connectors, for which you will need to get a 25-pin to 9-pin serial port adapter. NOTE: Conforming to RS-232C standard, the Serial Interface Module uses Pin 2 for transmitting (TxD), Pin 3 for receiving (RxD), and Pin 5 for ground, with straight connections across the cable.

- Make a backup of the Program Diskette and store the original in a safe place. While a hard disk installation is recommended, you can still use this program without a hard disk.

- HARD DISK INSTALLATION: Create a new directory "SIMCHECK" and copy all the contents of the Program Diskette to this directory. Assuming that drive C: is your hard disk, and A: is your floppy diskette drive, the above process is accomplished by:

```
C:>cd\
C:>md simcheck
C:>cd simcheck
C:\SIMCHECK>copy a:*.* /v
```

- You can now proceed to verify your installation. While in the "SIMCHECK" directory (or at the floppy diskette drive), type "simcheck " to activate the program. The program starts with the SIMCHECK TEST mode, a real-time graphics screen which resembles the SIMCHECK panel. The status bars at the lower left corner indicate the default program setting of "COM2" as the SIMCHECK serial port and "LPT1" as the active printer port. Consult Section 7.14.3.3. if you need to select different ports. If you have a mouse, check that the mouse cursor responds to the mouse movements. If the mouse is stuck, it is typically because of a serial port conflict (see Section 7.14.3.3.). Turn SIMCHECK ON. If your installation is correct, you should see SIMCHECK's familiar STANDBY message of "INSERT MODULE F1=BASIC TEST" on the graphics display section which emulates SIMCHECK's display. Make sure that the printer is ready with paper, and press F9 (or click the mouse on the PRINT bar) to verify the active printer port. A short report should be printed on your printer. If the printer does not respond, the corresponding status bar will change its background to red, indicating that the printer port needs to be changed.

7.14.3. OPERATION

7.14.3.1. PROGRAM OVERVIEW

Our main goal is to provide you with a PC COMMUNICATION program that you can use immediately and intuitively without studying a long manual. To achieve this goal, we have followed conventional user interface schemes, and included full mouse support. The program has two main modes:

- The **SIMCHECK TEST** mode is the one used to activate SIMCHECK and to display, log, and print the test results. SIMCHECK's LCD display and operation switches are emulated in order to give you SIMCHECK's familiar look. Additional meters and bar graphs are used to clearly display various test data. A summary screen logs all the important information obtained at various test stages.

- The **SETUP** mode allows you to setup SIMCHECK's test parameters (Section 4.1.) and test flow (Section 4.2.), as well as the setup of the program itself.

In the following sections you can find more information on how to use the program. However, we encourage you to first run the demo program by pressing (or clicking with the mouse) F3, and then insert a module in your SIMCHECK and experiment on your own. The SIMCHECK EPROM test program is completely isolated from the PC program so that you cannot damage or alter it with your experimentation.

7.14.3.2. THE SIMCHECK TEST MODE

After calling the SIMCHECK program, you enter the SIMCHECK TEST mode. The real-time graphics allow you to activate SIMCHECK, view, log, and print the test results. The graphics screen is divided into various windows, each providing specific information or control options:

- **SWITCHES ESC, F1, F2, and F3** emulate SIMCHECK's operation switches with the same names. They can be activated by keyboard switch or by clicking the mouse (you can also use SIMCHECK's operation switches while communicating with the PC). A variable function description appears inside each switch.

- **F10=QUIT** is your exit from the program.

- **Current Test Phase window** is the top bar where the current test mode or phase (e.g. BASIC TEST, VOLTAGE BOUNCE) is displayed. The title "SIMCHECK PC COMMUNICATION PACKAGE" appears during STANDBY mode.

- **SIMCHECK LCD window** emulates and expands SIMCHECK's own LCD display. Error messages are displayed in red.

- **ANALOG METER AND COUNTER windows** provide a familiar analog display of speed, voltage, Relative Refresh, Relative Voltage Spikes, and Soft Error count information. During the Single Bit Test, the counter window is replaced by the Single Bit Profile window.

- **TEST SUMMARY window** logs various messages provided by SIMCHECK during the test, including important test results or errors. Use F9 (or click the corresponding bar with your mouse) to print the test report. You can print the current test report even after ending the test with ESC (but before you press F1 to initiate the next test).

- **TEST FLOW window** at the left side shows the various test phases. Test phases which are set to be skipped are not displayed. Completed test phases are drawn in red with a log of the prevailing speed. When you use optional

SIMCHECK adapters that do not perform Relative Voltage Spikes, the "Relative Spikes" phase is automatically erased.

- **STATUS window** at the lower left corner of the screen has four bars to indicate the Serial Port, Printer Port, SIMCHECK status, and the DUT (memory Device type Under Test). Serial or Printer Port errors are highlighted with a red background. SIMCHECK status switches to "SIMCHECK OFF" message when an internal timer overflows without receiving of a SIMCHECK message. Some test phases like Page mode may intermittently withhold SIMCHECK transmission thereby generating a false "SIMCHECK OFF" message (which you simply ignore). The SIMCHECK status bar is also used to indicate SIMCHECK error status.

- **AUTOMATIC LOGGING window** appears below the Voltage Meter if the AUTOMATIC LOGGING feature is enabled (through the SETUP mode, see next Section). With AUTOMATIC LOGGING, the test results of each module are automatically recorded in the log file SIMCHECK.LOG at the conclusion of each test. The window shows the serial number of the device under test (DUT), which will also appear in the log file. This serial number is originally set in the SETUP mode and it is incremented at the beginning of each new test. You can put a sticker on the tested module with the serial number for later comparison with the log file data. The SIMCHECK.LOG file can be reviewed using your favorite word processor. Advanced users may write their own filter program to extract data from the log file to their data-base/spread- sheet programs. The program always appends new data at the end of the log file, so that this file keeps increasing in size. We recommend that you erase the SIMCHECK.LOG file (or rename it for permanent storage) when it becomes too big or when the log data is no longer needed. The PC COMMUNICATION program will automatically create a new SIMCHECK.LOG file after this file is erased or renamed. Log file errors, if any, are indicated with a red background message in the AUTOMATIC LOGGING window.

7.14.3.3. THE SETUP MODE

You use the SETUP mode to set SIMCHECK test parameters and test flow, and to set up the program itself. You reach the SETUP mode by pressing F2 at the STANDBY mode. You can also reach the SETUP mode directly from the DOS prompt by typing "simcheck setup ". If SIMCHECK is ON, the program reads its current setup and displays it on the CURRENT SETUP window on the right side of the screen.

The program follows the standard pull-down menu interface:

- Items are pulled down by clicking the mouse on the top bar or by using the <ALT> key followed by the item highlighted letter.

- Cascading menu items are selected by up/down arrow keys, by pressing the highlighted letter (if any) or by optionally clicking with the mouse.

The Enter key (or the left mouse button) selects the currently highlighted item, ESC key aborts the current menu.

- The lower line provides a short help message for the current menu item. F1 provides a more detailed help window.

The main menu provides three main selections:

- **Device Setup** selects the type of memory, its size and speed (and, in the case of a PS/2 module, its test table). Of course, you can select Auto Detect which is SIMCHECK's default setup. Device Setup achieves the same result as SIMCHECK's built-in Test Setup Mode except that it is faster and more convenient. Please refer to Section 4.1. for more detail. PS/2 Test Tables are further discussed in Section 7.3.3. Your device setup is interactively shown in the CURRENT SETUP window. NOTE: A new device setup must be explicitly written to SIMCHECK. You are conveniently prompted to do so when you exit the SETUP mode.

- **Test Flow Setup** allows you to skip various test modes or phases, as explained in Section 4.2. You can use the mouse or the space bar to toggle the skip flag of each test phase. Once accepted, the CURRENT SETUP window shows the new Test Flow. DEFAULT TEST FLOW sets all the skip flags to [N] NO, which means that all the test phases will be performed.

- **Functions** provide you with three groups of useful functions: **The File Handling** functions include Open, Save, and Save As for handling XXXXXXX.SET setup files. When you read a setup file, the CURRENT SETUP window is updated and the name of the file is displayed at the bottom of the screen. **The SIMCHECK Access functions** allow you to read SIMCHECK's setup or to write the new setup into SIMCHECK's non-volatile (permanent) memory, which is located inside the Serial Interface Module. The program automatically tries to read SIMCHECK's setup when the SETUP mode is initiated, and if you have changed any setup item, the program automatically prompts you to write the new setup to SIMCHECK when you exit the SETUP mode. **The PC COMMUNICATION Setup functions** enable you to setup the communication port, the printer port, and the reports. The communication port can be set to COM1 or COM2. The printer port can be set to LPT1 or LPT2. Most printers, including HP Laserjet and EPSON printers, should be set to the IBM Proprinter emulation. Some EPSON printers may print '{' for the check mark symbol and thus will require the EPSON emulation. Selecting the REPORT SETUP function allows you to activate/deactivate the AUTOMATIC LOGGING feature, set the Device Under Test serial number which will appear in the SIMCHECK.LOG file, and to enter your company name, which will appear on the printed reports. **The F1 on-line-help provides more information on all the Setup Functions.**

7.14.4. TROUBLESHOOTING

Following the installation outlined above should result in a smooth operation. If a problem arises, please recheck your installation. For problems at the SIMCHECK's end, verify that you have installed the right EPROM version and make sure that the cable connecting the Serial Interface Module is secured in SIMCHECK's expansion slot. Problems at the PC's end are typically created by incorrect port selection (resulting in conflicting devices). Use SETUP mode to change the port selection. If the Serial Interface Module's red LED blinks, and the PC program seems to work fine by itself, yet you still cannot establish communication, recheck the proper connection of the Serial Cable. The cable uses straight connections from one connector to the other (pin 1 to pin 1, pin 2 to pin 2, and etc.). Only pins 2, 3, and 5 are actually being used by the Serial Interface Module.

As we continue to develop the SIMCHECK product line, various features are being added to the PC COMMUNICATION program. If a certain SIMCHECK add-on device does not seem to operate with the PC COMMUNICATION package, there may have been a program update. To verify the current version of the PC COMMUNICATION program and the required version of SIMCHECK's EPROM, type "simcheck help " from the DOS prompt. Please also review the readme.doc file for recent manual updates.

7.14.5. SERIAL COMMUNICATION PROTOCOL

The PC COMMUNICATION PACKAGE uses a proprietary serial communication protocol which enables the PC to emulate the physical appearance of SIMCHECK on the PC screen.

Advanced users may want to write their own serial interface which will enable them to control SIMCHECK from within their own specific application program. If you are interested, please contact your dealer for more information.

7.15. 4M/16M TSOP ADAPTERS

7.15.1. INTRODUCTION

This Section describe two similar adapters, the 4M TSOP ADAPTER (p/n INN-8448-16) and the 16M TSOP ADAPTER (p/n INN-8448-15) which enable SIMCHECK to test Thin Small Outline Package DRAM chips. The 4M TSOP ADAPTER tests the 26-pin 300 mils wide 4Mx1 and 1Mx4 chips. The 16M TSOP ADAPTER tests the 28-pin 400 mils 16Mx1 and 4Mx4 chips, and it distinguishes between the 4K and 2K refresh modes which are now available for the 4Mx4 chips. Both adapters can be special ordered for the reverse wiring option which is popular with TSOPs.

Required EPROM Version: If you are adding the adapter to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- SIMCHECK's EPROM is earlier than **Version 2.34**.
- An EPROM is included with the adapter.

SIMCHECK's EPROM version is indicated when you first power up SIMCHECK. Section 5. explains how to replace the EPROM.

7.15.2. OPERATION

- Connect the adapter to your SIMCHECK SIP ZIF (green) socket when SIMCHECK is either ON or OFF.

- **HANDLING THE TSOP CHIPS:** Both adapters are equipped with two ZIF sockets. The left socket is for the x1 configuration, the right socket is for the x4 configuration. Since the 4M TSOP are 300 mils wide and the 16M are 400 mils, you can see why it was necessary to make two different adapters. Pin 1 of the TSOP chip is typically marked with a dot. Alternatively, the short edge of the package which is near pin 1 may be marked with a semi-circle tab. Place the chip in the corresponding socket so that pin 1 points away from you. Also, make sure that the markings on the top of the chip face up (this is called "LIVE BUG" insertion). Insert the chip carefully at the bottom of the ZIF socket and press and release both sides of the black socket top to lock in the tested chip. After the test, press the black socket top to remove the chip from the socket.

> If you are not sure whether to use the x1 or the x4 socket, you can safely try either socket. If you have inserted a x1 into the x4 socket (or vice versa), SIMCHECK will protect your chip by immediately stopping the test with a "NO MEMORY" error.

- Once the TSOP chip is inserted, press F1 to start the test. The test procedure is exactly the same as our SINGLE CHIP ADAPTER test or the X4 DRAM ADAPTER test (Section 7.1.).

THE 4K REFRESH DETECTION

The 4Mx4 TSOP DRAM chips are currently available in two refresh modes, 2K and 4K. See Section 7.12 for a discussion of SIMCHECK automatic detection of the refresh mode.

OUTPUT ENABLE ERROR MESSAGE

Both the 1Mx4 and the 4Mx4 TSOP DRAM chips are equipped with an Output Enable (-OE) pin. If this pin is stuck at '0', SIMCHECK will provide the following error message:

```
ERROR: -OE STUCK
AT ZERO
```

7.16. x16/x18 SOJ ADAPTER

7.16.1. INTRODUCTION

The optional X16/X18 SOJ ADAPTER enables SIMCHECK to test the surface mounted SOJ 400 mils DRAM chips with a wide data bus of 16 or 18 bits. These include the 256Kx16, 256Kx18, 1Mx16, and 1Mx18. The X16/X18 SOJ ADAPTER tests and distinguishes between chips having a 1 -CAS/ 2 -WE or a 2 -CAS/ 1 -WE configuration.

IMPORTANT NOTE: This adapter requires the SIMCHECK PLUS.

Required EPROM Version: If you are adding the adapter to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- SIMCHECK's EPROM is earlier than **Version 2.34**.
- An EPROM is included with the adapter.

SIMCHECK's EPROM version is indicated when you first power up SIMCHECK. Section 5. explains how to replace the EPROM.

7.16.2. OPERATION

- This adapter connects to SIMCHECK via the 40-BIT PORT (see Section 3.8). Plug the adapter into the 40-BIT EXPANSION PORT of the 40-BIT PORT when SIMCHECK is either ON or OFF.

- **HANDLING THE SOJ CHIPS:** All these chips are made in accordance with the standard 400 mils 40/42-pin package. The 256Kx16/18 SOJ DRAM chips have 40 pins and are tested on the right socket. The 1Mx16/x18 have 42 pins and are tested on the left socket. ONLY ONE CHIP can be tested at one time. Pin 1 of the SOJ chip is typically marked with a dot. Alternatively, the short edge of the package which is near pin 1 may be slightly slanted or have a tab. Place the chip in the corresponding socket so that pin 1 points away from you. Also, make sure that the markings on the top of the chip face up (this is called "LIVE BUG" insertion). Insert the chip carefully as far as it will go. Use an IC chip extractor or a thin flat head screwdriver to remove the chip from the socket.

- Once the SOJ chip is inserted, press F1 to start the test. The test procedure is similar to the 40-BIT PORT module test (Section 3.8.3.). Pressing F3 during Basic Test will display a message like:

```
256Kx16
SINGLE DRAM CHIP
```

At the end of the Basic Test, the tested chip will automatically be identified as either a 1 -CAS/ 2 -WE type or as a 2 -CAS/ 1 -WE type. The following example shows a x16 SOJ device which uses two -CAS lines and one -WE line (please note that all x16/x18 chips use only one -RAS line, shown here as RAS0). This type is the more common in general use.

```
TYPE:2CAS/1W X16
1BANK RAS0
```

The next example shows a x18 SOJ device which uses one -CAS line and two -WE lines.

```
TYPE:1CAS/2W X18
1BANK RAS0
```

7.17. x8/x9 SOJ/ZIP ADAPTER

7.17.1. INTRODUCTION

The optional x8/x9 SOJ/ZIP ADAPTER enables SIMCHECK to test various x8/x9 SOJ and ZIP individual DRAM chips. These include the 400 mil wide SOJ DRAM chips with capacities of 512Kx8/x9 and 2Mx8/x9, as well as the 512Kx8/x9 ZIP DRAM chips.

Required EPROM Version: If you are adding the adapter to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- SIMCHECK's EPROM is earlier than **Version 2.34**.
- An EPROM is included with the adapter.

SIMCHECK's EPROM version is indicated when you first power up SIMCHECK. Section 5. explains how to replace the EPROM.

7.17.2. OPERATION

- Connect the adapter to your SIMCHECK SIP ZIF (green) socket when SIMCHECK is either ON or OFF.

- **HANDLING THE SOJ CHIPS:** Pin 1 of the SOJ chip is typically marked with a dot. Alternatively, the short edge of the package which is near pin 1 may be slightly slanted or marked with a tab. There are three SOJ sockets on the adapter. The left socket is for testing the 32-pin 2Mx8/x9 chips. The middle socket is for testing the 28-pin 2Mx8 chip. The right socket is for testing the 28-pin 512Kx8/x9 chips. All the sockets are marked accordingly. Place the chip in the corresponding socket so that pin 1 points away from you. Also, make sure that the markings on the top of the chip face up (this is called "LIVE BUG" insertion). Insert the chip carefully as far as it will go. Use an IC chip extractor or a thin flat head screwdriver to remove the chip from the socket.

If you test a 28-pin SOJ chip and you are not sure whether to use the 2Mx8 or the 512Kx8/x9 socket, you can safely try either socket. In case you have selected the wrong socket, SIMCHECK will protect your chip by immediately stopping the test with a "NO MEMORY" error.

- **HANDLING THE ZIP CHIPS:** Pin 1 of the ZIP chip is typically marked with a dot. The adapter has one 28-pin ZIP socket for testing the 512Kx8/x9 ZIP DRAM chip. Place the chip in the ZIP socket so that pin 1 points to your left.

- Once the SOJ or ZIP chip is inserted, press F1 to start the test. SIMCHECK automatically recognizes the adapter. The test procedure is exactly the same as our regular 30-pin SIMM module test.

7.18. DRAM CARD TESTER

7.18.1. INTRODUCTION

The optional DRAM CARD TESTER (p/n INN-8484-3) enables SIMCHECK to test the JEIDA/JEDEC 88-pin DRAM memory cards with basic configurations of 18, 32, and 36 bits. The DRAM memory card has an internal architecture which is similar to the JEDEC 72-pin SIMM standard. It uses TSOP DRAM chips and TSOP address buffer logic chips which results in a remarkable thin package. They are becoming increasingly popular for laptop, notebook computers, and various other applications where minimum size and ease of removal/insertion are at a premium. The DRAM CARD TESTER is conveniently installed in the 40-BIT PORT expansion slot, and is automatically recognized by SIMCHECK. All memory cells are fully tested, with parallel write/read of 36 bits. The test procedure is similar to the 40-BIT PORT test. The unit can test memory cards at 3.3V or 5V, with maximum capacities of 32Mx36.

IMPORTANT NOTE:
This adapter requires the SIMCHECK PLUS.

Required EPROM Version: If you are adding the adapter to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- SIMCHECK's EPROM is earlier than **Version 2.34**.
- An EPROM is included with the adapter.

SIMCHECK's EPROM version is indicated when you first power up SIMCHECK. Section 5. explains how to replace the EPROM.

40-BIT PORT 3.3V COMPATIBILITY:
Your 40-BIT PORT should have serial number #20158 or higher for compatibility with the new 3.3V tests performed with this adapter. This serial number cutoff corresponds to May 9, 1995 or later.
If your 40-BIT PORT has an earlier serial number, the 3.3V tests will be actually done at 3.7V-4.1V instead of 3.0V-3.5V. Please consult application note INN-8448-APN09 "40-BIT PORT 3.3V COMPATIBILITY MODIFICATION" which comes with this adapter, or contact your dealer.

7.18.2. OPERATION

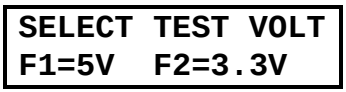
- This tester connects to SIMCHECK via the 40-BIT PORT (see Section 7.15). Plug the adapter into the 40-BIT EXPANSION PORT of the 40-BIT PORT only when **SIMCHECK is turned OFF**.

CAUTION:
Failure to turn SIMCHECK OFF when connecting or disconnecting the DRAM CARD TESTER to the 40-BIT PORT may result in damage to the PAL chip of the DRAM CARD TESTER!

- **HANDLING THE DRAM CARDS:** The memory card has a miniature 88-pin socket connector with tiny holes arranged along two staggered lines. The upper surface of the card is marked with the manufacturer's logo, p/n, model number, and other markings. There are small tabs at the two corners of the connector which allow the insertion of the memory card **only** when the card is facing up. The DRAM CARD TESTER uses a high quality Low Insertion Force (LIF) socket rated at 10,000 insertions.

- Turn SIMCHECK ON once the DRAM CARD TESTER is installed in the 40-BIT PORT, and insert the first DRAM CARD. THERE IS NO NEED TO SETUP SIMCHECK, as it automatically recognizes this tester. After the first DRAM CARD has been tested and SIMCHECK returns to the STANDBY mode, the presence of the DRAM CARD TESTER is recognized with the message:

- **5V/3.3V VOLTAGE SELECTION:** The DRAM CARD TESTER can test the memory cards at either 5V or 3.3V. Once the memory card is inserted, press F1 to start the test. Upon initial startup, the test voltage selection menu will appear:



Press F2 to set the test at 3.3V, or press F1 to select the default 5V test (if no selection is made within a few moments, SIMCHECK will default to 5V). The BASIC test follows the voltage selection as described below. If the 3.3V test was selected, you will see the message '3V' at the top right corner of the display during BASIC test and the final test of the EXTENSIVE test. The voltage selection menu WILL NOT APPEAR on subsequent tests - the voltage selection you have made upon startup remains in effect throughout all subsequent tests. You can change the voltage selection setting using the setup mode: from STANDBY mode, press F2, then F1, and the above voltage selection menu will reappear. After the voltage selection, the standard setup menus will appear; if no additional setups are needed, simply press ESC after your selection. You can also change the voltage selection by simply turning SIMCHECK off and on. The voltage selection menu will appear as soon as you start a new test.

3.3V vs. 5V TEST:
Most DRAM cards that are rated for 5V will still be testable at 3.3V. You will notice, however, a large decrease in access time at the 3.3V tests.
A 3.3V DRAM card can still be tested at the 5V test without damage, as most 3.3V chips are "5V Tolerable". You will still notice a better speed at 5V than at 3.3V, but the difference will be much smaller than with the 5V DRAM cards.
Future DRAM cards may come with 3.3V devices which are not 5V tolerable. **Such devices should be tested only at the 3.3V setup.**
Although the JEIDA/JEDEC standard allows several separate pins for the 3.3V power source, currently available DRAM memory cards use the 5V power source lines for both 5V and 3.3V versions. Once modules utilizing the special 3.3V pins become available, we will modify the SIMCHECK test program to automatically detect such 3.3V cards.

- The test procedure is similar to the 40-BIT PORT module test (Section 3.8.3.) and is initiated by pressing F1 from Standby. Pressing F3 during Basic Test will display the PRD setting of the card in a message like:

```
PRD8-1:11001010
1Mx36 CARD
```

As shown, the PRD information for DRAM memory cards includes 8 bits. Please note that the JEDEC standard allows the use of a 36 bit memory card as an 18 bit card. In this example, the 1Mx36 card can be used as a 2Mx18 card.

At the end of the Basic Test, the tested memory card will be automatically identified as a JEIDA/JEDEC type, with explicit structure information as in the following example:

```
TYPE:JEIDA/JEDEC
1BANK RAS0+2
```

where the card uses two RAS lines (RAS0 and RAS2) and is composed of one bank. This will be followed by the PRD setting display shown earlier.

- The EXTENSIVE test and the AUTO-LOOP test follow the BASIC test. Pressing F3 will activate the SINGLE BIT test.

7.19. DIMMCHECK 72P

7.19.1. INTRODUCTION

The optional DIMMCHECK 72P (p/n INN-8484-4) enables SIMCHECK to test 72-pin SO DIMM (36x2 pin Small-Outline Dual-Inline-Memory-Module) modules with basic configurations of 18, 32, and 36 bits. The test can be selected by the user at 5V or 3.3V.
The DIMM module (JEDEC MO-160) has an internal architecture similar to the JEDEC 72-pin SIMM standard with the main differences being the arrangement of the 72 pins along a double sided 36x2 edge connector and the use of TSOP DRAM chips which results in a remarkably thin package. The DIMMCHECK 72P is conveniently installed in the 40-BIT PORT expansion slot, and is automatically recognized by SIMCHECK. All memory cells are fully tested, with parallel write/read of 36 bits. The test procedure is similar to the 40-BIT PORT test.

IMPORTANT NOTE:
This adapter requires the SIMCHECK PLUS.

Required EPROM Version: If you are adding the adapter to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- SIMCHECK's EPROM is earlier than **Version 2.34**.
- An EPROM is included with the adapter.

SIMCHECK's EPROM version is indicated when you first power up SIMCHECK. Section 5. explains how to replace the EPROM.

40-BIT PORT 3.3V COMPATIBILITY:
Your 40-BIT PORT should have serial number #20158 or higher for compatibility with the new 3.3V tests performed with this adapter. This serial number cutoff corresponds to May 9, 1995 or later.
If your 40-BIT PORT has an earlier serial number, the 3.3V tests will be actually done at 3.7V-4.1V instead of 3.0V-3.5V. Please consult application note INN-8448-APN09 "40-BIT PORT 3.3V COMPATIBILITY MODIFICATION" which comes with this adapter, or contact your dealer.

7.19.2. OPERATION

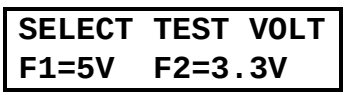
- This tester connects to SIMCHECK via the 40-BIT PORT (see Section 7.8). Plug the adapter into the 40-BIT EXPANSION PORT of the 40-BIT PORT only when **SIMCHECK is turned OFF.**

CAUTION:
Failure to turn SIMCHECK OFF when connecting or disconnecting the DIMMCHECK 72P to the 40-BIT PORT may result in damage to the PAL chip of the DIMMCHECK 72P!

- **HANDLING THE 72-P DIMM:** The delicate DIMM socket has two latches which are pushed in the directions of the arrows on the board to release the DIMM module. The DIMM module should be inserted carefully, at about a 30 degree angle into the socket insuring that the notch, indicating pin 1, is on the left side. Push the two latches in the directions of the arrows and carefully push the DIMM to a horizontal position. The latches should go over the module's top notches for retention once the module is in the horizontal position. The DIMM is removed by releasing the latches and pulling the DIMM upward to the same insertion angle. Once lifted, the DIMM can easily slide out of the socket.

- Turn SIMCHECK ON once the DIMMCHECK 72P is installed in the 40-BIT PORT and insert the first DIMM module. THERE IS NO NEED TO SETUP SIMCHECK, as it automatically recognizes this tester. After the first DIMM has been tested and SIMCHECK returns to the STANDBY mode, the presence of the DIMMCHECK 72P is recognized with the message:

- **5V/3.3V VOLTAGE SELECTION:** The DIMMCHECK 72P can test the DIMM modules at either 5V or 3.3V. Once the first DIMM module is inserted, press F1 to start the test. Upon initial startup, the test voltage selection menu will appear:



Press F2 to set the test at 3.3V, or press F1 to select the default 5V test (if no selection is made within a few moments, SIMCHECK will default to 5V). The BASIC test follows the voltage selection. If the 3.3V test was selected, you will see the message '3V' at the top right corner of the display during BASIC test and the final test of the EXTENSIVE test. The voltage selection menu WILL NOT APPEAR on subsequent tests - the voltage selection you have made upon startup remains in effect throughout all subsequent tests. You can change the voltage selection setting using the setup mode: from STANDBY mode, press F2, then F1, and the above voltage selection menu will reappear. After the voltage selection, the standard setup menus will appear; if no additional setups are needed, simply press ESC after your selection. You can also change the voltage selection by simply turning

SIMCHECK off and on. The voltage selection menu will appear as soon as you start a new test.

3.3V vs. 5V TEST:
You can distinguish between a 3.3V DIMM and a 5V DIMM by the length of the lower tab near pin 1. The 3.3V DIMM's tab is 3-3.3 mm long while the 5V DIMM's tab is 6.2-6.5 mm long.
Most 5V DIMM modules will still be testable at 3.3V, but you will notice a large decrease in access time at the 3.3V tests.
A 3.3V DIMM module can still be tested at the 5V test without damage, as most 3.3V DRAM chips are "5V Tolerable". You will still notice a better speed at 5V than at 3.3V, but the difference will be much smaller than with the 5V DIMMs.
Future DIMM modules may come with 3.3V devices which are not 5V tolerable. **Such devices should be tested only at the 3.3V setup.**

- The DIMMCHECK 72P test procedure is similar to the 40-BIT PORT module test as discussed in Section 3.8.3. Pressing F3 during Basic Test will display the PRD setting of the module in a message like:

```
PRD8-1: _1101001
DIMM: 1Mx32
```

As shown, the PRD information for DIMM modules includes 7 bits, as compared to 8 bits of the DRAM card, hence the leading underscore. At the end of the Basic Test, the tested memory module will be automatically identified as a 72-P DIMM type, with explicit structure information as in the following example:

```
TYPE:72-PIN DIMM
1BANK RAS0+2
```

where the module uses two RAS lines (RAS0 and RAS2) and is composed of one bank. This will be followed by the PRD setting display shown earlier.

- The EXTENSIVE test and the AUTO-LOOP test follow the BASIC test. Pressing F3 will activate the SINGLE BIT test.

7.20. 40-BIT PORT 3.3V ADAPTER

7.20.1. INTRODUCTION

The optional 40-BIT PORT 3.3V ADAPTER (p/n INN-8484-5) enables SIMCHECK to test 3.3V 72-pin SIMM modules. It uses latest electronic circuitry for true 3.3V testing and the same high quality SIMM ZIF socket for safe and easy module handling.
The 40-BIT PORT 3.3V ADAPTER is conveniently installed in the 40-BIT PORT expansion slot, and is automatically recognized by SIMCHECK. The test procedure is identical to the 40-BIT PORT test.

IMPORTANT NOTE:
This tester connects to SIMCHECK via the 40-BIT PORT (p/n INN-8484) which is sold separately.

Required EPROM Version: If you are adding the adapter to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- SIMCHECK's EPROM is earlier than **Version 2.30.**
- An EPROM is included with the adapter.

SIMCHECK's EPROM version is indicated when you first power up SIMCHECK. Section 5. explains how to replace the EPROM.

40-BIT PORT 3.3V COMPATIBILITY:
Your 40-BIT PORT should have serial number #20158 or higher for compatibility with the new 3.3V tests performed with this adapter. This serial number cutoff corresponds to May 9, 1995 or later.
If your 40-BIT PORT has an earlier serial number, the 3.3V tests will be actually done at 3.7V-4.1V instead of 3.0V-3.5V. Please consult application note INN-8448-APN09 "40-BIT PORT 3.3V COMPATIBILITY MODIFICATION" which comes with this adapter, or contact your dealer.

7.20.2. OPERATION

- This adapter connects to SIMCHECK via the 40-BIT PORT (see Section 7.15). Plug the adapter into the 40-BIT EXPANSION PORT of the 40-BIT PORT only when **SIMCHECK is turned OFF.**

CAUTION:
Failure to turn SIMCHECK OFF when connecting or disconnecting the 40-BIT PORT 3.3V ADAPTER to the 40-BIT PORT may result in damage to the PAL chip of the ADAPTER!

- Turn SIMCHECK ON once the 40-BIT PORT 3.3V ADAPTER is installed in the 40-BIT PORT and insert a 3.3V SIMM module.

- Press F1 to start the BASIC test. Since the test is done at 3.3V, you will see the message '3V' at the top right corner of the display during BASIC test (and during the final test of the EXTENSIVE test).

- The 3.3V ADAPTER test procedure is identical to the 40-BIT PORT module test as discussed in Section 3.8.3. Since the voltage levels are different, you will see that the Voltage Cycling test of the EXTENSIVE test goes through 3.0V, 3.3V, and 3.5V instead of 4.5V, 5.0V, and 5.5V. Also, the Voltage Bounce test of the EXTENSIVE test is performed between 3.0V to 3.5V, instead of 4.5V to 5.5V.

Testing 5V modules on this 3.3V Adapter:
Regular 5V SIMM should be tested directly on the 40-BIT PORT. You may safely try to test the regular 5V modules on this 3.3V adapter, but the test results will be much different than those obtained at 5V: there will be a large speed degradation, and even functional test failures.

7.21. NON-STANDARD 72-PIN SIMM ADAPTERS

Various computer manufacturers have come out with non-standard 72-pin SIMM modules. These are similar to the JEDEC standard but have some variation which make it difficult to support directly on the 40-BIT PORT. As a generic solution, we offer the 40-BIT PORT CUSTOMIZED Adapter (p/n INN-8484-1) which was describe in Section 3.8.4. Customers purchasing this adapter should have the equipment and knowledge to wire the Adapter for their needs.

INNOVENTIONS constantly monitors the market and identify such non-standard modules which achieve some significant presence in the market. We support such modules with new off-the-shelf, plug-n-play adapters.

The following are off-the-shelf adapters which are available for non-standard 72-pin SIMM modules:

7.21.1. HP WORKSTATION ADAPTER

This adapter tests the 36-bit, 72-pin SIMM modules used in the HP Workstation. (p/n INN-8484-7).

7.21.2. IBM 39-BIT ECC SIMM ADAPTER

This adapter tests the 39-bit, 72-pin ECC SIMM modules used in the IBM PS/2 Server 95, PS/2 Model 76, 77 and other IBM computers. (p/n INN-8484-8).

IMPORTANT NOTE:
All the adapters mentioned in this section require the SIMCHECK PLUS.

7.22. SRAM/P-SRAM MODULE TESTER

7.22.1. INTRODUCTION

The optional SRAM/P-SRAM MODULE TESTER (p/n INN-8844) is designed to be the main hub for testing a variety of SRAM and P-SRAM modules. The item is equipped with two test heads which are capable of supporting the JEDEC 64-pin SIMM/ZIP SRAM modules with sizes of 64K, 128K, and 256Kx32 and Apple Computer's POWER BOOK modules with sizes of 4M, 6M, 8M, and 12M. Future test heads are planned to support other SRAM and P-SRAM devices with wide bit configuration.

Required EPROM Version: If you are adding the adapter to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- SIMCHECK's EPROM is earlier than **Version 2.36**.
- An EPROM is included with the adapter.

SIMCHECK's EPROM version is indicated when you first power up SIMCHECK. Section 5. explains how to replace the EPROM.

NOTE:

Also included with this tester is a **74ACQ241** IC chip which should be used in place of U4 on the SIMCHECK display board. Follow the procedure in Section 5 on how to open your SIMCHECK unit. Locate the socketed chip marked U4 on the SIMCHECK display board (top), and with an IC extractor tool, remove the 74AC241 chip that is currently installed and replace it with the enclosed 74ACQ241.

7.22.2. OPERATION

CAUTION:

Never connect or disconnect the SRAM/P-SRAM MODULE TESTER to SIMCHECK when SIMCHECK IS ON! Insert or remove modules only when the MODULE POWER RED LED is off.

- Turn SIMCHECK OFF! Connect the SRAM/P-SRAM MODULE TESTER to your SIMCHECK "RAMCHECK II EXPANSION" slot using the supplied polarized 50-conductor cable. Install one of the supplied test heads on the SRAM/P-SRAM MODULE TESTER when SIMCHECK is OFF. Turn SIMCHECK ON. The standard Title/Version message appears and reaches the STANDBY screen, which prompts you to begin the POWER BOOK test or to insert an SRAM module. SIMCHECK automatically recognizes which test head is being used. Below is the STANDBY screen as shown when the POWER BOOK connector is used:

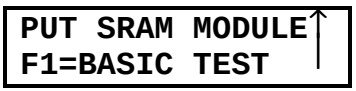
- Once SIMCHECK is turned on with a test head installed, a module may be installed or removed freely. Insert the POWER BOOK module into the connector. Note that pin 1 is to be connected on the RIGHT side of the test head. You will also note the presence of a small tab that is located on the connector of the module for proper orientation when it is being inserted.

CAUTION:

Tilting an inserted POWER BOOK module may break its fragile connector! Once installed firmly into the test head DO NOT move the module!

- To initiate the BASIC test, simply press F1. The display will show the module's size and access time and will perform a complete test of the entire memory array using several test patterns. At the end of the test, SIMCHECK will prompt for either exiting the test, or continuing with the AUTO-LOOP. The test will terminate if no selection is made.

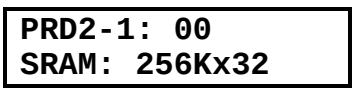
- If using the SRAM MODULE connector with your SRAM/P-SRAM MODULE tester, you will be prompted with the following STANDBY screen:



- Press F1 to start the BASIC test. Like the POWER BOOK test, the display will show the module's size and access time.

7.22.3. SUMMARY SCREENS

Following the BASIC test, a group of summary screens will appear to give further information on the module tested.



The first summary screen identifies the SRAM module as being a JEDEC type with 32 bits. The second screen gives information on the PRD setting of the module. A third summary screen is then displayed.

```
SPEED= Taoe:13
Tace:13 Taa:15nS
```

The final screen gives the access times as acquired from output enable (Taoe), from chip enable (Tace), and from the address lines (Taa). The SRAM access time which is marked on the module relates to these three values.

7.23. DIMMCHECK 168P

7.23.1. INTRODUCTION

The optional DIMMCHECK 168P (p/n INN-8484-9) enables SIMCHECK to test 168-pin DIMM (84x2 pin Dual-Inline-Memory-Module) modules with basic configurations of 64, 72, and 80 bits. Based on JEDEC standard 21-C, the x72 DIMM can be wired as PARITY or ECC (Error Correction Code) types. The x80 DIMM comes ECC type only.

The DIMM module has an internal architecture similar to the 72-pin SIMM module, but to achieve a wider bus, the number of -CASx control lines has been doubled from four (-CAS0,1,2,3) to eight (-CAS0,1,2,3,4,5,6,7). Also, two Write Enable control lines (-WE0 and -WE2) and two Output Enable (-OE0 and -OE2) have been added. This arrangement allows for one-bank (e.g. 1Mx72, 4Mx64, 16Mx80) or two-bank (e.g. 2Mx64, 8Mx72) embodiments. Special A0 and B0 address lines (for the first multiplexed address line) have been implemented within the DIMM 168 pin standard for optimized bank interleaving operation.

The DIMMCHECK 168P is conveniently installed in the 40-BIT PORT expansion slot, and is automatically recognized by SIMCHECK. All memory cells are fully tested. The test procedure is similar to the 40-BIT PORT test.

IMPORTANT NOTE: DIMMCHECK 168P requires the SIMCHECK PLUS.

Required EPROM Version: If you are adding the adapter to a previously purchased SIMCHECK, you will need to upgrade SIMCHECK's EPROM if any of the following apply:

- SIMCHECK's EPROM is earlier than **Version 2.38**.
- An EPROM is included with the adapter.

SIMCHECK's EPROM version is indicated when you first power up SIMCHECK. Section 5. explains how to replace the EPROM.

7.23.2. OPERATION

- This tester connects to SIMCHECK via the 40-BIT PORT (see Section 7.8). Plug the adapter into the 40-BIT EXPANSION PORT of the 40-BIT PORT only when **SIMCHECK is turned OFF.**

CAUTION:
Failure to turn SIMCHECK OFF when connecting or disconnecting the DIMMCHECK 168P to the 40-BIT PORT may result in damage to the two PAL chips of the DIMMCHECK 168P!

- **HANDLING THE 168-PIN DIMM:** The 168-pin is a delicate device which warrants great care in handling. The edge connector portion (which is inserted into DIMMCHECK's socket) has two key notches which are keying the device for the right socket. The first key is placed between contacts 10 and 11 (or between contacts 94 and 95 when viewed from the back of the module) and it determines if the unit is a standard DRAM or Synchronous DRAM. DIMMCHECK 168P supports only standard DRAM. The second key is placed between contact 40 and 41 (contact 124 to 125 in the back) and is keyed for the voltage. DIMMCHECK 168P will test the 5.0V DIMM only (a 3.3V version will be available soon).

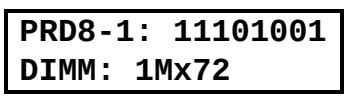
  INSERTION: Please examine the DIMMCHECK 168P's socket and note the two keys which prohibit the insertion of wrong type DIMMs. The socket has two ejectors that need to be opened prior to insertion. Carefully insert the DIMM into the socket, pushing it evenly along its top. When the DIMM is properly inserted, the ejectors will snap onto the semi-circular notches on each sides of the modules.

  REMOVAL: The DIMM is easily released from the socket by pulling both ejectors sideways.

  NOTE: DIMM insertion and removal should be done only when SIMCHECK in STANDBY mode.

- Turn SIMCHECK ON once the DIMMCHECK 168P is installed in the 40-BIT PORT and insert the first DIMM module. THERE IS NO NEED TO SETUP SIMCHECK, as it automatically recognizes this tester. After the first DIMM has been tested and SIMCHECK returns to the STANDBY mode, the presence of the DIMMCHECK 168P is recognized with the message:

- The DIMMCHECK 168P test procedure is similar to the 40-BIT PORT module test as discussed in Section 3.8.3. Pressing F3 during Basic Test will display the PRD setting of the module in a message like:



As shown, the PRD information for DIMM modules includes 8 bits. At the end of the Basic Test, the tested memory module will be automatically identified as a 168P DIMM type, with explicit structure information as in the following examples:

One BANK, ECC type:

```
TYPE:168PIN DIMM
1BANK ECC x72
```

where the DIMM is of the ECC type, and is composed of one bank. Such DIMM modules are using two -RAS lines (RAS0 and RAS2) and two -CAS lines (CAS0 and CAS4).

Two BANK, ECC type:

```
TYPE:168PIN DIMM
2BANK ECC x80
```

where the DIMM is of the ECC type, and is composed of two banks. Such DIMM modules are using four -RAS lines (RAS0, RAS1, RAS2, and RAS3) and four -CAS lines (CAS0, CAS1, CAS4 and CAS5).

One BANK, JEDEC x64 type:

```
TYPE:168PIN DIMM
1BANK JEDEC x64
```

where the DIMM is of the standard JEDEC type, and is composed of one bank. Such DIMM modules are using two -RAS lines (RAS0 and RAS2) and eight -CAS lines (CAS0, CAS1, CAS2, CAS3, CAS4, CAS5, CAS6, and CAS7).

Two BANK, JEDEC x64 type:

```
TYPE:168PIN DIMM
2BANK JEDEC x64
```

where the DIMM is of the standard JEDEC type, and is composed of two banks. Such DIMM modules are using four -RAS lines (RAS0, RAS1, RAS2, and RAS3) and eight -CAS lines (CAS0, CAS1, CAS2, CAS3, CAS4, CAS5, CAS6, and CAS7).

One BANK, PARITY x72 type:

```
TYPE:168PIN DIMM
1BANK PARITY x72
```

where the DIMM is of the standard JEDEC type, and is composed of one bank. Such DIMM modules are using two -RAS lines (RAS0 and RAS2) and eight -CAS lines (CAS0, CAS1, CAS2, CAS3, CAS4, CAS5, CAS6, and CAS7).

Two BANK, PARITY x72 type:

```
TYPE:168PIN DIMM
2BANK JEDEC x72
```

where the DIMM is of the standard JEDEC type, and is composed of two banks. Such DIMM modules are using four -RAS lines (RAS0, RAS1, RAS2, and RAS3) and eight -CAS lines (CAS0, CAS1, CAS2, CAS3, CAS4, CAS5, CAS6, and CAS7).

NON-STANDARD 1-RAS per BANK x64 type:

```
TYPE:168PIN DIMM
1BANK 1-RAS/BANK
```

This is an example of the result with a non-standard DIMM we have investigated. The DIMM does not conform to the JEDEC standard as it used only one -RAS (-RAS0) for the entire bank. It also uses eight -CAS lines (CAS0, CAS1, CAS2, CAS3, CAS4, CAS5, CAS6, and CAS7).

We expect to find other non-standard DIMM modules in the market. If you use a non-standard DIMM module which is not currently supported by the DIMMCHECK 168P, please contact us so that we may add it to our test program.

The structure screen as will be followed by the PRD setting display shown earlier.

- The EXTENSIVE test and the AUTO-LOOP test follow the BASIC test. The SINGLE BIT test is not fully supported with this initial program version of the DIMMCHECK 168P.

7.X. OTHER OPTIONS

New adapters and other options are continuously being developed for SIMCHECK. Special instructions are being printed for these items. These instructions should be inserted within the appropriate sections of the manual. Most belong within this section. Please call us if you need additional information on any of the items listed here. If you have a memory testing application which is not covered by our standard test options, we can customize an adapter to your specifications (see APPENDIX I).

APPENDIX A:

DISPLAY MESSAGES

To make SIMCHECK operation easy, clear display messages of test results and menu selections have been built-in. This appendix further explains some of the more important messages.

SPEED (Access Time) DISPLAY:

Speed format is: **XXXnS**. For example, **150nS**, or **35nS**.

"**@**": When manual speed override or speed setup is preset (see Section 4.1.), the speed message is prefixed by an "**@**" ("testing at preset value of XXXnS").

When SUPERVISOR mode (see Section 4.4.) is selected, the speed message may be followed by a "**.**" or other character to indicate a different internal speed table.

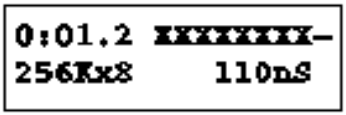
SIZE DISPLAY:

Standard module size format is **LxD**. Examples: 4Mx8, 256Kx9, 16Mx32.

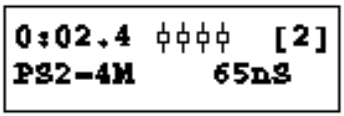
PS/2 module size format is **PS2-1M, PS2-2M, PS2-4M, PS2-8M, or PS2-16 (M)**.

If size setup has been preset (see Section 4.1.), the size message is preceded by an "**@**".

TEST IN PROGRESS ANIMATION:



During the BASIC test and portions of the EXTENSIVE test, the display shows characters resembling a hour glass. Their size shows the test progress and their number correspond to the number of bits in the tested module or chip. For example, a 1Mx4 chip will show 4 hour glasses, a 64Kx1 chip will show only 1 hour glass, and a 4Mx9 module will display 9 hour glasses.



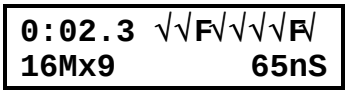
The optional PS/2 ADAPTER uses different "timer" animation characters, as shown above. They rotate to indicate test progress and their number corresponds to the module size in Megabytes. A PS2- 16M is indicated by 6 timers, a PS2-8M by 5, a PS2-4M by 4, a PS2- 2M by 2, and a PS2-1M by one. The [2] marking at the upper right corner indicates that table [2] is currently running (see Section 7.3.3.2.). The default table [0] is not shown when active.

ERROR MESSAGES:

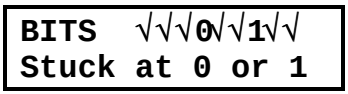
Error appears if you try to test without any memory installed, or if the memory you installed is defective and without any memory functions.

Typically appears when some of the main control lines (e.g. -CAS line) of the memory are faulty.

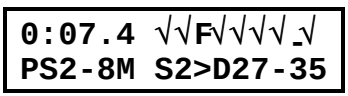
DEFECTIVE BIT ERROR SAMPLES:



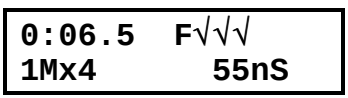
Error shows a bit map of the defective bits. The far left character of the bit map corresponds to bit 1 and the far right character corresponds to bit 9. An "**F**" indicates bit failure; "_" indicates that the corresponding bit was tested OK so far (prior to the detection of the marked errors). The screen also shows test duration (2.3 seconds), module size (16Mx9) and speed (65nS). Bits 3 and 8 are defective.



Error indicates that the bits marked by 0 or 1 in the bit map are stuck at logical 0 or 1. In the example, bit 4 is stuck at zero while bit 7 is stuck at one.



An 8M PS/2 module error that indicates a problem on the rear side of the module in bit 29 (within group D27 to D35). The dash "-" means that the status of bit 34 is not shown in this 8 bit group.



A 1Mx4 single DRAM chip error. Bit 1 is defective.

ADDRESS LINES ERRORS:

Followed by the actual address line:

In this example pin 11 of the standard 30-pin SIMM/SIP connector is either open or shorted.

DATA BITS SHORT TO ADDRESS LINES:

```
ERROR:
DATA BIT/S SHORT
```

Error indicates that a short condition was detected between one of the data bits line and one of the address lines. This message is followed by a bit-map...

A DATA BIT SHORTED TO ANOTHER DATA BIT:

```
ERROR:
BAD/SHORTED BITS
```

Error indicates that a short condition was detected between one data bit to another data bit. This message is followed by a bit-map...

```
ERROR: FF_____
BAD/SHORTED BITS
```

which indicates that bits 1 and 2 are shorted.

DYNAMIC TEST DISPLAYS:

The following are examples of selected test sections. These displays are dynamic in the sense that the shown information is actually changing as the test proceeds. Other dynamic test displays which are not listed here can be similarly interpreted.

```
4.5V VOLT-BOUNCE
55nS      0:14.3
```

In the Voltage Bounce phase of the EXTENSIVE test, voltage is varied between read and write. Display shows the bouncing voltage (4.5), the speed (55nS) and the elapsed time (14.3 seconds).

```
MARCH UP/DOWN
60nS      0:23.3
```

In the MARCH UP/ MARCH DOWN phase of the EXTENSIVE test, adjacent cell interference is tested.

```
CHIP-HEAT MODE
45nS      0:38.6
```

In the Chip-Heat phase of the EXTENSIVE test, testing is done under actual operational temperature.

```
VOLTAGE CYCLING
           1Mx4
```

In the VOLTAGE CYCLING phase of the EXTENSIVE test, the memory is tested under all allowable voltage conditions.

```
55nS   01:27:32
LOOP#3245  4Mx9
```

An AUTO-LOOP test display shows the speed, the loop number, the size and the elapsed time in seconds. In a variation of this display, voltage is shown instead of speed.

```
Bit5  √√F√?
70nS      00:49.6
```

In this SINGLE BIT test display, 4 bits are already tested (bit 3 is bad). Bit 5 is currently being tested, as indicated by the "?".

ADDITIONAL TEST RESULTS:

Along with the standard test results (module size, speed, pass or fail), SIMCHECK provides additional data such as:

```
REL. REFRESH 7
REL. SPIKES  8
```

Relative values of refresh and voltage spike performance. The higher the numbers, the better the quality of the module. Typical good values are 5 and higher for either test.

```
SOFT ERROR COUNT
WAS 0
```

Test summary message, indicating the number of soft errors, as explained in Section 3.6.5.2.

```
SPEED DRIFT:
100nS → 110nS
```

Test summary message, indicating the speed degradation during the test, as explained in Section 3.6.5.1.

MENU DISPLAYS:

Numerous SIMCHECK menus make it extremely easy to use!

```
INSERT MODULE ↑
F1=BASIC TEST |
```

The "STANDBY" mode startup menu.

```
ESC=EXIT
F1=EXTENSIVE
```

and:

```
F2=AUTO-LOOP
F3=SINGLE BIT
```

After the BASIC test, you may exit, proceed with the EXTENSIVE test, AUTO-LOOP "infinite" test, or the SINGLE BIT test. While waiting for your choice, the display toggles between the two screens. If no key is pressed within a few seconds, the EXTENSIVE test is automatically started.

MISCELLANEOUS DISPLAYS:

```
INNOVENTIONS Inc
SIMCHECK Ver2.34
```

EPROM Version number is displayed when you first activate SIMCHECK.

SIMCHECK
DEMO PROGRAM ...

The built in demo can be used for quick learning of SIMCHECK's operation.

APPENDIX B:

MEMORY MODULE TECHNICAL REVIEW

Memory modules offer the advantages of reduced space and easier handling. For example, a 1Megx9 SIMM or SIP module takes much less space on a motherboard than a bank of 9 individual 1Meg DRAM chips. It also requires less time to install memory modules in a computer than individual DRAM chips installation.

Memory modules first appeared in the early 1980s but became increasingly popular in the late 1980s. In recent years, the SIMM modules completely dominated the memory market.

All solid state memory configurations are coordinated and standardized by the Electronic Industries Association through its JEDEC Standard 21-C. In the early and mid-80s, memory modules were made in a variety of pinouts and without any dominant standards. For example, an early Texas Instrument module TMS4164EC had four 64Kx1 DRAM chip mounted on a 22-pin module to achieve a 64Kx4 module. Another early module, the TM4164EQ5 had five such chips on a 24- pin module to achieve 64Kx5 module. Toward the end of the 80s, a JEDEC standard 30-pin module evolved with a full byte configuration (either x8 or x9 bits) which can support up to 16 Megabytes.

These JEDEC standard 30-pin modules are now the most popular in the DRAM market, and they are fully supported by SIMCHECK. Some non-standard variations of the JEDEC 30-pin modules are supported by the SINGLE -CAS ADAPTER and the PS/2 30-PIN ADAPTER. The other most popular configuration is the 72-pin SIMM module which was originally used in the IBM PS/2 machines. The 72-pin SIMM modules with its numerous variants are supported by the optional PS/2 ADAPTER and the more advanced 40-BIT PORT. Other popular non-standard configurations include the 64-pin AST module, which is supported by the AST ADAPTER, and the 64-pin APPLE MAC IIfx module, which is supported by the optional MAC IIfx ADAPTER. Future SIMCHECK add-on tools will support other configurations.

The following is the JEDEC standard pin-out of the 30-pin modules:

PIN	ITEM	DESCRIPTION
1	+Vcc	+5V
2	-CAS	Column Address Strobe
3	DQ1	Data I/O bit 1
4	A0	Multiplexed Address bit 0
5	A1	Multiplexed Address bit 1
6	DQ2	DATA I/O bit 2
7	A2	Multiplexed Address bit 2
8	A3	Multiplexed Address bit 3

9	GND	Ground
10	DQ3	DATA I/O bit 3
11	A4	Multiplexed Address bit 4
12	A5	Multiplexed Address bit 5
13	DQ4	DATA I/O bit 4
14	A6	Multiplexed Address bit 6
15	A7	Multiplexed Address bit 7
16	DQ5	DATA I/O bit 5
17	A8	Multiplexed Address bit 8
18	A9	Multiplexed Address bit 9
19	A10	Multiplexed Address bit 10
20	DQ6	DATA I/O bit 6
21	-W	Write Command
22	GND	Ground
23	DQ7	DATA I/O bit 7
24	A11	Multiplexed Address bit 11
25	DQ8	DATA I/O bit 8
26	Q9	DATA OUT bit 9
27	-RAS	Row Address Strobe
28	-CAS9	BIT 9 Column Address Strobe
29	D9	DATA IN bit 9
30	+Vcc	+5V

Notes:

- In x8 configurations, pins 26, 28, and 29 are NC (not connected).
- A8 to A11 are NC in 64K modules.
- A9 to A11 are NC in 256K modules.
- A10 to A11 are NC in 1M modules.
- A11 is NC in 4M modules.
- "-" in front of a signal name like "-RAS" indicates a control line which is "Active Low". (A bar over the signal name is another industry convention.)

Memory chips are internally arranged in a ROW/COLUMN matrix selection (actual architectures are somewhat more complex but conceptually the same). -RAS is used to strobe the ROW address lines and -CAS is used to strobe the COLUMN address. As a result, only 11 address lines are needed to create the real address of 22 bits required for 4Meg modules. DRAM memory chips operate in accordance with a variety of protocols (namely, the order of -RAS, -W, and -CAS and other control signals). Interested readers should refer to memory data sheets for more details. SIMCHECK has full software control of

all the module pins and it can test the behavior of the module under most possible protocols.

The JEDEC standard pin-out of the 72-pin module is detailed in the following table:

PIN	x36	x40	DESCRIPTION
1	GND	GND	Ground
2	DQ0	DQ0	Data I/O
3	DQ18	DQ1	Data I/O
4	DQ1	DQ2	Data I/O
5	DQ19	DQ3	Data I/O
6	DQ2	DQ4	Data I/O
7	DQ20	DQ5	Data I/O
8	DQ3	DQ6	Data I/O
9	DQ21	DQ7	Data I/O
10	+Vcc	+Vcc	+5V
11	NC	NC	No Connection
12	A0	A0	Multiplexed Address bit 0
13	A1	A1	Multiplexed Address bit 1
14	A2	A2	Multiplexed Address bit 2
15	A3	A3	Multiplexed Address bit 3
16	A4	A4	Multiplexed Address bit 4
17	A5	A5	Multiplexed Address bit 5
18	A6	A6	Multiplexed Address bit 6
19	A10	-OE	x36: Multiplexed Address bit 10 x40: Output Enable
20	DQ4	DQ8	Data I/O
21	DQ22	DQ9	Data I/O
22	DQ5	DQ10	Data I/O
23	DQ23	DQ11	Data I/O
24	DQ6	DQ12	Data I/O
25	DQ24	DQ13	Data I/O
26	DQ7	DQ14	Data I/O
27	DQ25	DQ15	Data I/O
28	A7	A7	Multiplexed Address bit 7
29	NC	DQ16	x36: No Connection x40: Data I/O
30	+Vcc	+Vcc	+5V
31	A8	A8	Multiplexed Address bit 8
32	A9	A9	Multiplexed Address bit 9
33	-RAS3	NC	x36: Row Address Strobe 3 x40: No Connection
34	-RAS2	NC	x36: Row Address Strobe 2 x40: No Connection
35	DQ26	DQ17	Data I/O

36	DQ8	DQ18	Data I/O
37	DQ17	DQ19	Data I/O
38	DQ35	DQ20	Data I/O
39	GND	GND	Ground
40	-CAS0	-CAS0	Column Address Strobe 0
41	-CAS2	A10	x36: Column Address Strobe 2 x40: Multiplexed Address bit 10
42	-CAS3	A11	x36: Column Address Strobe 3 x40: Multiplexed Address bit 11
43	-CAS1	-CAS1	Column Address Strobe 1
44	-RAS0	-RAS0	Row Address Strobe 0
45	-RAS1	-RAS1	Row Address Strobe 1
46	NC	DQ21	x36: No Connection x40: Data I/O
47	-W	-W	Write Command
48	NC	GND	x36: No Connection x40: Ground
49	DQ9	DQ22	Data I/O
50	DQ27	DQ23	Data I/O
51	DQ10	DQ24	Data I/O
52	DQ28	DQ25	Data I/O
53	DQ11	DQ26	Data I/O
54	DQ29	DQ27	Data I/O
55	DQ12	DQ28	Data I/O
56	DQ30	DQ29	Data I/O
57	DQ13	DQ30	Data I/O
58	DQ31	DQ31	Data I/O
59	+Vcc	+Vcc	+5V
60	DQ32	DQ32	Data I/O
61	DQ14	DQ33	Data I/O
62	DQ33	DQ34	Data I/O
63	DQ15	DQ35	Data I/O
64	DQ34	DQ36	Data I/O
65	DQ16	DQ37	Data I/O
66	NC	DQ38	x36: No Connection x40: Data I/O
67	PRD1	PRD1	Presence Detect 1
68	PRD2	PRD2	Presence Detect 2
69	PRD3	PRD3	Presence Detect 3
70	PRD4	PRD4	Presence Detect 4
71	NC	DQ39	x36: No Connection x40: Data I/O
72	GND	GND	Ground

APPENDIX C:

MEMORY MODULE IDENTIFICATION

SIMCHECK automatically identifies and displays the correct size of the memory module.

Standard 30-pin memory modules are available with 64Kx8/x9, 256Kx8/x9, 1Mx8/x9, 4Mx8/x9, and 16Mx8/x9 configurations. The module uses DIP (Dual In-line Package) or Surface Mounted individual chips of x1 or x4 arrangement. For example, a 1Mx9 can be made of 9 chips (nine 1Mx1 DRAM chips) or of 3 chips (two 1Mx4 and one 1Mx1). A SIP module has "legs", while a SIMM fits into a female **edge** connector.

Modules are marked with their manufacturer's model number, usually printed on the back. Individual chips are marked on their top. The following is a short list of some of the early generation memory module types.

64Kx8	MT8068MN
64Kx9	MT9068MN
256Kx8	MT8259MN, TM4256GU8
256Kx9	MT9259MN, TM4256EL9
1Mx8	MT8C8025MN, MT8C8026D, MT8C8024M, TM024GAD8, MB85230
1Mx9	MT8C9025M, MT8C9024M, MT8C9026MN, TM024EAD9, MB85235, THM91000AS/ASL, THM91020AL
4Mx9	MSC2340-80 YS9/KS9

In many cases the modules are manufactured by OEM firms which purchase brand name chips and assemble them on their own boards. You can identify the module's size by the marking on the memory chips. While the numbering system on the memory chips differ from one manufacturer to another, the following partial strings of the chip markings are fairly popular:

"1256" indicates 256Kx1; "14256" indicates 256x4; "11000" indicates 1Mx1; "14400" indicates 1Mx4; "14100" indicates 4Mx1; "116400" indicates 4Mx4; and "116100" indicates 16Mx1.

These strings are preceded by the manufacturer ID letters followed by 4 or 5. For example, a "TC5116100J" is a Toshiba 16Mx1, a "M514100-8AJ" is an OKI 4Mx1 chip, a "MT4C1024DJ" is a Micron Technology 1Mx1 chip, and a "HM514256HJP" is a Hitachi 256Kx4 chip.

More current information is directly available from the memory module manufacturers and from the data books of memory chip manufacturers.

APPENDIX D:

SIMCHECK TEST ALGORITHMS

SIMCHECK's proprietary test algorithms were developed for optimum efficiency and fast testing. SIMCHECK utilizes different patterns and different algorithm types whenever the same module is re-tested. Tests are of type O(n), using MARCH, CHECKER, WALKING 0s, WALKING 1s and Surround Disturb Patterns.

The complexity of testing a memory chip can be understood from the following example: let us assume that we want to test a simple hypothetical memory chip of only 8 cells. A simple approach is to first write "0" in all the cells and verify that the cells hold the data, and then write "1" in all the cells and verify. Thus in only 16 write/read cycles we have "completely checked" this chip. **However, there is a major flaw** in this conclusion since it is possible that cell number 2 is shorting (or otherwise disturbing) cell 7, and the above test will not detect this!

An alternate approach is to exhaustively test the memory with all possible combination of "0"s and "1"s in all the cells. First we write and verify with all "0"s. Second, we write and verify with "1" in cell 1 and "0"s in all other cells. The third test checks cell 2 with "1", "0"s in all others, etc. Overall, we need to test this hypothetical chip with 2^8=256 patterns, since each pattern has at least 8 write/read accesses to the chip. Based on the example above, it will take at least [256,000 x $2^{256,000}$] accesses to fully test a 256K memory chip. This number is astronomical - and therefore it is theoretically impossible to create a test for a modern memory chip with 100% accuracy.

Fortunately, most inter-cell disturbances in a memory chip occur between adjacent cells, so that a fully exhaustive test as mentioned above is not required.

During the years since our RAMCHECK line of products was first developed, the test algorithms have been continuously improved to achieve unparalleled accuracy in testing memory chips. The proprietary programs which have been thoroughly tested and refined in RAMCHECK have been transported to SIMCHECK and have been further improved. For example, using programmable voltage sources, our test algorithms use advanced tests incorporating Voltage Bounce and Voltage Cycling. The first provides higher accuracy in detecting pattern sensitivity and other intermittent memory problems. The latter provides additional assurance of proper product operation under the entire manufacturer's voltage specifications. Another addition is our Chip-Heat mode, which warms the tested module to true working temperatures, thereby improving the reliability of temperature related measurements. So despite the complexities enumerated above, your SIMCHECK can trap most defective memory modules.

APPENDIX E:

ACCESS TIME MEASUREMENT

The most important parameter of a memory chip is its speed capability, which is characterized by its Access Time. The Access Time is the dominant factor in the cost of memory chips and modules. It is also the only parameter which is marked on the chips.

The primary function of a memory chip is to retrieve and to store data. Ideally, it would be very desirable if a memory chip could deliver its stored data at the exact instant of time when it receives the read command. In practice, this process does take some length of time which is generally called Access Time. Intuitively, the Access Time of a memory chip is the length of time from the moment the chip is instructed to read specific data until the point in time when the required data is available at the chip's output.

DRAM chips utilize a clever accessing scheme which allows them to address 256,000 cells (which require 18 address bits) by scanning the address bits in two portions (ROW and COLUMN). As a result, a chip can use only 16 pins, of which only 9 are used for the address bits. To load the address, two control signals, RAS (Row Address Scan) and CAS (Column Address Scan), are applied sequentially to the chip. The period of time between the initiation of the RAS signal until the instant when the data is available at the chip's output is called the DRAM Access Time. The Access Time determines the speed of a memory chip: A chip with a shorter Access Time is faster.

The chip manufacturer marks (and rates) chips with the WORST CASE condition. In other words, the manufacturer fully guarantees that the chip Access Time will either meet or exceed its marked rating under full recommended operating conditions. The industry standard "recommended operating conditions" means operating voltages from 4.5V to 5.5V, temperature from 0^{o}C to 70^{o}C, maximum capacitance load on the data-line of 100pF, and maximum data-line load of 2 TTL input loads.

SIMCHECK measures the ACTUAL Access Time of the chip as it is subjected to the maximum recommended loading condition and under the lowest voltage within the chip specifications.

You will be surprised to see that in most cases the ACTUAL Access Time is much better than the manufacturer's rating because most manufacturers tend to have a substantial margin of safety. However, as the DRAM technology matures (namely, chips with faster ratings), the difference between the manufacturer's rating and the ACTUAL Access Time becomes smaller: a typical 150nS rated chip may have 100nS ACTUAL Access Time at room temperature, while an 80nS rated chip may have 70nS ACTUAL Access Time at room temperature.

While SIMCHECK helps you to sort out faster memory modules in comparison to their marked WORST-CASE Access Time, care should be taken along the following general guidelines:

1. **Memory chips become slower at higher temperatures** - the same chip which can run at 100nS at 25^{O}C may slow down to 120nS at 70^{O}C. Therefore, the BASIC SIMCHECK test which is conducted at room temperature may show a better Access Time than the later EXTENSIVE test that includes the Chip-Heat mode, where the module will actually be warmed to true working temperatures.

2. **Memory chips become slower at lower voltages** - the same chip which can run at 90nS at 5.5V may slow down to 100nS at 4.5V. Therefore, SIMCHECK's Access Time tests are conducted at 4.5V.

3. Other speed related factors (e.g. loading conditions) may be different in your particular application as compared to the testing conditions.

After obtaining the speed of the memory module from your SIMCHECK, determine your own margin of speed-variation and base it on the above arguments and your particular application. Experiment with modules of different actual Access Time to determine your margin of safety. We would like to emphasize that **SIMCHECK provides you with the ACTUAL Access Time reading, with no added artificial margin**.

With SIMCHECK, the actual Access Time is automatically calculated and displayed. There is no need to set an Access Time switch. The module's Access Time is determined by the slowest chip on the module and our SINGLE BIT test will also show you the speed of each chip on the module! Additionally, the Chip-Heat mode warms the module to actual working temperatures, an important parameter in Access Time measurement.

APPENDIX F:

MODULE REPAIR WITH SIMCHECK

Only a technician with component-level repair expertise can repair a memory module. The required soldering/desoldering equipment is relatively complex, especially with modules made with Surface Mount technology.

Nevertheless, a few minor problems which are identified by SIMCHECK can be repaired with simple tools. A short between an adjacent pin may be caused by a small piece of metallic debris which is stuck between two chips. You "repair" the module in this case with an Exacto knife or a watchmaker's fine screwdriver by simply removing the debris.

SIMCHECK provides explicit information for the replacement of defective chips. If the module is made of 8 or 9 chips, bit 1 is in the chip which is closest to pin 1 of the module. Bit 2 is the second chip and so forth. If the module is made with three chips, then bits 1 to 4 are in the left chip (the one closest to pin 1), and bits 5 to 8 are in the middle chip. Bit 9 is in the furthest right chip.

Common address problems are marked by SIMCHECK with reference to the standard 30-pin interface (e.g., short between pins 4 and 5). Open address lines in individual chips are indicated by SIMCHECK. That information, together with a wiring diagram of the specific module (or the individual chip's data sheet) can lead you to the faulty line. Module wiring diagrams and chip's data sheets are available from their manufacturers.

Refer to Section 4. for additional useful repair information.

APPENDIX G:

SIMCHECK DIAGNOSTICS

SIMCHECK DIAGNOSTICS include a large group of programs that are used in the manufacturing and repair process of SIMCHECK. **The SIMCHECK Diagnostics are not a part of any test mode and can be completely ignored by the end user**. Nevertheless, if you are curious to review the DIAGNOSTIC mode, follow this procedure:

- For correct performance, all diagnostic programs should run WITHOUT any memory module in the sockets. Remove any SIMM or SIP from SIMCHECK prior to entering the DIAGNOSTIC mode.

- To enter the DIAGNOSTICS mode, press F2 at the STANDBY mode. (As usual, ESC will return SIMCHECK to the STANDBY mode.)

- Next, enter the DIAGNOSTIC entry code: F2, F1, F3. (This code sequence is set to avoid accidental entry by casual users.)

- Review the diagnostic screens by pressing the various buttons as indicated. To exit the diagnostic, press ESC one or more times.

APPENDIX H:

SIMCHECK CONNECTION TO INTERNATIONAL AC LINES (220 - 240 VAC)

The export version of SIMCHECK (p/n INN-8448E) is equipped with our standard 230VAC 50Hz/9VDC 1AMP unregulated AC line adapter, which is built to VDE/TUV Continental European specifications. Our Domestic USA /CANADA/JAPAN version has the 110VAC 60Hz/9VDC 1AMP unregulated AC line adapter which is UL/CSA listed. We are able to use unregulated adapter because SIMCHECK is internally equipped with three precision regulators.

Some foreign countries may use 240VAC or 220VAC mains instead of 230VAC and the AC socket may be different in shape than the Continental Europe plug of SIMCHECK. You may still use our 230VAC line adapter but you must use your locally certified socket/plug converter.

SIMCHECK PLUS comes with a universal power supply that should work with your local AC mains. You may need to change the AC plug to match the AC mains' socket.

For additional information, please contact your local dealer or the manufacturer.

APPENDIX I:

CUSTOMIZED ADAPTERS AND SIMCHECK

EXPANSION SLOT

SIMCHECK's design allows ample room for expansion and enhancement using the 32-pin SIP socket or the 50-pin expansion socket. In addition to standard adapters, we design customized adapters for customer's proprietary modules. Alternatively, we can also support customers in their in-house development of their own special adapters.

This appendix presents some introductory information on SIMCHECK's expansion. Please contact us for more detailed examination of your specific requirements.

The most effective way to design a customized adapter for testing non-standard memory modules is to connect the adapter directly to the 32-pin SIP ZIF SOCKET. In this SIP socket, pin 1-30 are wired in accordance with the standard JEDEC SIP pinout. Pin 31 is AUX1, a logical output line controlled by the SIMCHECK program and used for control and for byte/word switching in complex module adapters like our new PS/2 ADAPTER. Pin 32 is a mirror Vdd with a lower current limiting - it is used in our SIMCHECK SINGLE CHIP ADAPTERS, as well as in our future ZIP and SOJ adapters.

SIMCHECK's expansion slot is a 50-pin shrouded header for a standard 50-pin Insulation Displacement Socket. This expansion slot will be used for future add-on instruments that will be connected to SIMCHECK (for example, a STATIC RAM TESTER). The following is the pin list of this proprietary bus expansion slot.

PIN numbering: The top-left pin is pin 1. To its right is pin 2. Directly under pin 1 is pin 3. The lower-right pin is pin 50.

PIN 1 - Vtransformer (non-regulated 9VDC/1AMP)
PIN 2 - Vtransformer (same as pin 1)
PIN 3 - 5V regulated.
PIN 4 - 5V regulated (same as pin 3)
PIN 5 - GND
PIN 6 - MA0 (multiplexed address line 0)
PIN 7 - MA1
PIN 8 - MA2
PIN 9 - MA3
PIN 10 - MA4
PIN 11 - MA5
PIN 12 - MA6
PIN 13 - GND
PIN 14 - MA7

PIN 15 - MA8
PIN 16 - MA9
PIN 17 - MA10
PIN 18 - MA11
PIN 19 - IO/-M
PIN 20 - PA0 (non-multiplexed processor address 0)
PIN 21 - PA1
PIN 22 - -RD
PIN 23 - -RCIIR (select read for RAMCHECK II)
PIN 24 - CS_TIM (chip select for the timer)
PIN 25 - PIO1 (chip select for the PIO)
PIN 26 - REG4 (chip select for the programmable voltage)
PIN 27 - GND
PIN 28 - -SIMR (select read for SIMCHECK)
PIN 29 - PD0
PIN 30 - PD1
PIN 31 - PD2
PIN 32 - PD3
PIN 33 - PD4
PIN 34 - PD5
PIN 35 - PD6
PIN 36 - PD7
PIN 37 - GND
PIN 38 - -CAS9
PIN 39 - -WR
PIN 40 - -W
PIN 41 - +W
PIN 42 - -CAS
PIN 43 - GND
PIN 44 - -RAS
PIN 45 - DATA_LD
PIN 46 - RESET
PIN 47 - GND
PIN 48 - PCK (processor clock)
PIN 49 - INTR (wired or interrupt)
PIN 50 - GND

APPENDIX J:

SIMCHECK TECHNICAL SPECIFICATIONS

- Processors:
  - Main processor: V20-10 CMOS 16 bit processor.
  - Secondary processor: HD44780A00.
  - Main Processor Clock: 10Mhz 0/1 wait state controlled by program. Chips with actual Access Time of 120nS or more are tested with 1 wait test.

- Internal RAM: 8K (Expandable) + module under test.

- Internal Program EPROM: 64KB (Expandable up to 192KB).

- Enhanced 82C54 CMOS programmable interval timer with three 16 bit counters and 6 programmable mode.

- Display: Standard 16 characters x 2 lines type TN-FEM LCD (Reflective) 6 o'clock view direction (internal contrast control located on top PCB).

- DRAM/MODULE interface:
  - 12 multiplex DRAM/MODULE address line for up to 16Mbyte of direct processor access.
  - Complex wave generation and digital delay synthesis on -W, -RAS, -CAS, -CAS9. +/-5nS (linear) accuracy.
  - 2.5nS/step (non-linear) Address Multiplexing digital delay.
  - Two Programmable Regulated Voltage Sources 1.5V-6.5V with automatic current limiters.
  - DRAM Access Time: Direct measurement from 150nS down to 20nS at 5nS resolution/accuracy. NOTE: As 20nS DRAM are not yet available, some industry standard timing characteristics have not been set yet. Therefore, a timing modification will be required in the future to support the actual 20nS DRAM units.

- General:
  - Chip technology: Advanced CMOS.
  - Internal Construction: Two Printed Circuit Boards connected with a 50-pin cable.
  - AC LINE ADAPTER: DOMESTIC USA/CANADA has a UL/CSA listed 120VAC/60Hz to 9VDC @ 1 AMP adapter. EXPORT MODEL has a 230VAC/50Hz to 9VDC @ 1 AMP adapter.

- Dimensions : 7" x 5" x 2.75" (W x L x H).

- NET Weight: 2 Lb. (including the AC line adapter). SHIPPING Weight: 4-5 Lb.

- TEST ALGORITHM: Refer to Appendix D.

PROBLEM REPORT FORM

Please complete and return this form to the address on the front page of the manual if you experience any problems with this instrument. Duplicate this form if you need additional copies. We will review your comments promptly and contact you if necessary.

Name:_____ Title/Dept:_____

Company:_____

Address:_____

City:_____State:____ Zip:_____

Phone:(_____) _____

EPROM Version (as seen on the entry screen):_____

Type of module tested (SIMM or SIP, Size, Manufacturer, etc.):

_____

Problem Description:

_____

_____

_____

_____

_____

_____

_____

_____

To be Completed by INNOVENTIONS:

PRF#_____Received:_____ Engineer:_____

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