TANDY®

Technician Series
Diagnostics Software

CMOS

CMOS Memory Diagnostic

01-0220 Computer Technical Services

IMPORTANT

READ THIS BEFORE USING THIS PRODUCT

<u>Important Notice:</u>

This diagnostic software and manual are written for Tandy™ computer owners who have a thorough understanding of electronics and computer circuitry. It is not written at a comprehension level for the beginner.

Radio Shack® will not be liable for any damage caused, or alleged to be caused, by the customer or any other person using this diagnostic software or manual to repair, modify, or alter any Tandy™ computer in any manner.

Many parts of the computer electronics are very sensitive and can be easily damaged by improper servicing. We strongly suggest that for proper servicing, the computer be returned to Radio Shack®.

While this diagnostic software and manual have been carefully prepared, Radio Shack® will not be responsible for any errors or omissions and will not be liable for damages resulting therefrom.

Opening the Tandy™ computer housing, breaking the housing seal, or altering or modifying the computer may void the warranties given at time of purchase.

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CMOS

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GENERAL DESCRIPTION

The CMOS test is a diagnostic designed for the Tandy 3000, 4000, and 5000MC
and their GRiD and Panasonic counterparts. In addition to a complete test of
the CMOS RAM and status of the flags set on boot-up contained in the
diagnostic status byte, the test also permits reconfiguration of the CMOS RAM.

FEATURES

The CMOS test is a menu driven program which permits complete testing of the
CMOS RAM regardless of its size. Testing of the CMOS RAM can be done through
a selection of four tests in either single or continuous mode. On the Model
5000MC type machines, in addition to the standard CMOS RAM, the extended CMOS
RAM can also be tested. An error log is kept containing any errors which
occur during the testing process. This error log may be cleared at any time.
The CMOS test also allows for the reconfiguration of the CMOS RAM. This
configuration may be saved or restored to and from the CMOS RAM.

EQUIPMENT REQUIRED

The CMOS test may be executed on the Tandy 3000, 4000, or 5000MC and their GRiD
and Panasonic counterparts. The only other requirement is the appropriate
diagnostic disk containing the CMOS program.

LOADING CMOS

There are two ways to access the CMOS diagnostic. The first is through the
main menu of the diagnostic disk. The key corresponding to the CMOS test is
pressed to load the CMOS program. The second method to access the CMOS
diagnostic is directly from MS-DOS. The name of the CMOS diagnostic is typed
in at the MS-DOS prompt:

A>CMOS<ENTER>

The machine selection screen will then appear on the screen, unless the test is
being executed on one of the 5000MC type machines, in which case the first
screen displayed is the CMOS configuration screen.

OPERATING CMOS

After the selection of the machine type, except on the 5000MC family where the
configuration screen is shown initially, the configuration screen will be
displayed. The configuration screen allows new configurations to be selected,
saved, and restored from CMOS. The CMOS test screen can also be accessed from
the configuration screen. The test screen displays the status of various
items which are contained in the status byte in CMOS. It also contains
commands for running the tests and an option to display the error log. Exiting
the test screen returns the user to the configuration screen, from which point
he can exit the program.

DISPLAY DESCRIPTION

The initial screen displayed upon execution of the CMOS test contains a list of machine types. The number which corresponds to the target machine should be pressed for proper functionality of the CMOS test. After this selection the following screen will appear. This configuration screen is the initial screen when the CMOS test is being run on the 5000MC family.

```
┌───────────────────────────────────────────────────────────────┐
│                   Tandy CMOS Setup and Test                    │
│              XXXXXX XX, XXXX        Version X.XX               │
│        Copyright (c) XXXX, XXXX Tandy Corp.  All rights  reserved. │
└───────────────────────────────────────────────────────────────┘

        L/R Arrow to Select                        Size of CMOS Ram

┌───────────────────────────────────────────────────────────────┐
│           Bytes of CMOS   .....  128                           │
│           CPU/BUS Speed   .....  N/A                            │
│         Diskette Drive A:  .....  1.44M 3½" Floppy             │
│         Diskette Drive B:  .....  360K  5¼" Floppy            │
│         Diskette Swap Flag  .....  No                          │
│         Fixed Disk Drive C:  .....  06-  615  4   -1  615 17   │
│         Fixed Disk Drive D:  .....  40- 1024  8 1024 1024 17   │
│         Prime Video Adapter  .....  EGA/VGA                    │
│          Math Co-Processor   .....  None                       │
│         System Base Memory   .....  640K                       │
│          Expansion Memory    .....  None                       │
│                      Date    .....  August     23,1989         │
│          Day of the Week     .....  Wednesday                  │
│                      Time    .....  10:05:47 am                │
├───────────────────────────────────────────────────────────────┤
│  F1: Save Setup to CMOS            F2 : CMOS Tests     ↑ : Up  │
│  F3: Restore Last Setup Saved      ESC: Exit Setup     ↓ : Down│
└───────────────────────────────────────────────────────────────┘
```

The help line is located between the copyright section and the configuration section. This line will change when the highlight bar is moved up and down highlighting different fields. The information on the left indicates which key should be pressed to change the highlighted item. The information on the right describes the current field and its options.

Under the help line is the current configuration of the CMOS RAM. The commands available on this screen are listed at the bottom of the screen. If the command for CMOS tests is selected the following screen will appear.

TANDY COMPUTER PRODUCTS

```
┌─────────────────────────────────────────────────────────────┐
│                  Tandy CMOS Setup and Test                   │
│           XXXXXX XX, XXXX        Version X.XX                 │
│      Copyright (c) XXXX, XXXX Tandy Corp.  All rights reserved.│
└─────────────────────────────────────────────────────────────┘
```

```
┌──────────────────────────────Standard─────────Extended───┐
│         Checker Board Pattern ... Not Tested      N/A      │
│        Rotating Bit Pattern ... Not Tested        N/A      │
│     Modified Address Pattern ... Not Tested       N/A      │
│          On/Off Bit Pattern ... Not Tested        N/A      │
│                                                            │
│             Clock Power Ok ... Yes   ┐                     │
│       Checksum Status Byte Ok ... Yes │                    │
│            Equipment Status ... Good  │   Flags            │
│           Memory Size Valid ... Yes   ├── Set on           │
│           Hard Drive Status ... Good  │   Boot-up          │
│       Time Valid 10:29:06 am ... Yes  │                    │
│        Installed Adapters OK ... N/A  │                    │
│            Read Adapter ID ... N/A   ┘                     │
├────────────────────────────────────────────────────────────┤
│ F1 : Single Test        F3 : Display Error Log    ESC : Exit│
│ F2 : Continuous Test                                       │
└────────────────────────────────────────────────────────────┘
```

This screen displays the possible tests to be run and their status. The
extended column is used in the testing of the extended CMOS RAM which is
present in the 5000MC family only. After the tests have been run, a passed or
failed message will appear.

Under the testing information the status of the flags set in the diagnostic
status byte in CMOS RAM are displayed. These flags are set on boot-up;
therefore changes in the CMOS configuration will not be reflected in this
section until the computer is rebooted. The last two items in the status list
pertain to the 5000MC family only.

The commands for the test screen are displayed at the bottom of the screen.
In addition to these commands, a command to test extended CMOS (executed by
pressing the <F4> key) will be listed when the test is executed on a 5000MC
family machine.

COMMANDS

Configuration Screen Commands

<F1> - Save Setup to CMOS
        This option saves the current displayed configuration to the CMOS
        RAM. Any changes made without the execution of this command will not
        be changed in the CMOS RAM when the program is exited.

<F2> - CMOS Tests
        This command displays the CMOS test screen.

<F3> - Restore Last Setup Saved

        This command retrieves the current configuration located in CMOS RAM.
        If changes are made to the displayed configuration after a save has
        been executed the latest setup that was saved can be restored.

<ESC> - Exit Setup
        Pressing the <ESC> key allows the user to exit the program. If
        the configuration has not been saved a message confirming the exit is
        displayed. By pressing the <Y> or <y> key the test is exited. If
        the <N> or <n> key is pressed the exit is aborted.

<↑>   - Up
        By pressing the <↑> key the highlight bar is moved to the
        preceding field.

<↓>   - Down
        By pressing the <↓> key the highlight bar is moved down to the
        next field.

Test Screen Commands

<F1> - Single Test

       This command executes one test. The tests are executed in a
sequential order. Each time the <F1> key is pressed the current
test in the sequence will be executed. The test being executed is
pointed to by an arrow.

<F2> - Continuous Test

       This command sequentially executes the tests without input from the
user. While in the continuous mode the testing may be paused or
stopped. By pressing the <F2> key the testing is paused. To resume
continuous testing after the pause has been initiated, any key may be
pressed. To abort continuous testing the <F1> key is pressed.

<F3> - Display Error Log

       This option displays the errors found by the CMOS tests. The errors
will be displayed one at a time from smallest to largest offset at
the bottom of the screen. After the last error is shown a message
will be displayed inquiring whether or not the error log should be
cleared. If the <Y> or <y> key is pressed the log will be
cleared. If the <N> or <n> key is pressed the log will not be
cleared.

<ESC> - Exit

       By pressing the <ESC> key the configuration screen is again
displayed.

Model 5000

<F4> - Test Extended CMOS

       This command tests the extended CMOS. This option will appear only
when the test is being executed on a 5000MC family machine. The
errors will be listed in the error log with the standard CMOS
errors. When the <F4> key is pressed another set of commands will
appear at the bottom of the screen. These commands include single
testing which is activated by pressing the <F1> key, continuous
testing activated by the <F2> key and exiting the extended CMOS
test by pressing the <ESC> key.

TEST DESCRIPTION

Checker Board Test

The checker board test uses the patterns 55h and AAh. First, a 55h is written
to each CMOS offset, read back and verified. If any pattern read back does not
match the pattern written, a message that the test failed is displayed, and the
offset, pattern written, and pattern read is added to the error log. Next the
pattern AAh is written to each CMOS offset, read back and verified. It too
displays a failed message and is added to the error log if any offset read back
does not match the pattern written.

Rotating Bit Test

The rotating bit test begins by writing an 80h to the first offset in CMOS.
The offset is then read, and verified. The high bit is then shifted one bit
to the right making the new pattern 40h which is written to the same offset,
read back, and verified. This process is continued with the bit being shifted
right by one and the new pattern being written, read and verified from the
same offset until the pattern 00h is reached. If any errors are found a
failed message is displayed and the offset, pattern read, and pattern written
are added to the error log. The same patterns are written to each offset
throughout the CMOS RAM with all errors being recorded.

Modified Address Test

The modified address test writes the result of the offset address exclusive
OR'ed with the data located at that offset. This result is then read back and
verified. This process is done for each CMOS offset. For example, if the CMOS
offset is 30h, and the data located at that offset is 45h, the result written
to the address would be 75h (30h XOR 45h). Again, as with the other tests, if
the pattern read back from the offset does not match the pattern written to
that offset a failed message is displayed and the error is recorded in the
error log.

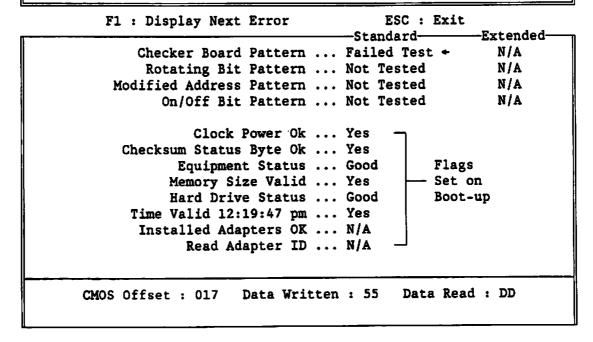### On/Off Bit Test

The on/off bit test writes the pattern 00h to each offset in CMOS, reads the
pattern back and verifies it. Next, the test writes the pattern FFh to each
offset, reads the pattern back, and verifies it. If the pattern read back does
not match the pattern written then a failed message is displayed and the
offset, pattern written and pattern read are recorded in the error log.

APPENDIX

Error Messages

When an error occurs during testing a failed test message will appear to the right of the test that failed. In addition to this message an error log is also kept of each offset where an error occurred. Only one error is kept per offset, therefore the most recent error at one particular offset will be the error stored in the error log. To view this error log the <F3> key is pressed. The error at the smallest offset will appear first at the bottom of the screen. The offset where the error occurred is displayed along with the data written and the data read to and from that offset. To view the next error the <F1> key is pressed and the next error is displayed at the bottom of the screen. The user may exit the display of the error log at any time by pressing the <ESC> key. When all the errors have been displayed a message stating that there are no more errors and inquiring whether or not the user wishes to clear the user log is displayed. If the error log is to be cleared either <Y> or <y> is pressed. Otherwise either <N> or <n> is pressed. The following screen shows the messages present when the error log is being displayed.

```
┌─────────────────────────────────────────────────────────────┐
│                 Tandy CMOS Setup and Test                    │
│           XXXXXX XX, XXXX         Version X.XX               │
│   Copyright (c) XXXX, XXXX Tandy Corp.  All rights reserved.  │
└─────────────────────────────────────────────────────────────┘

       F1 : Display Next Error              ESC : Exit
┌──────────────────────────────────Standard───────────Extended─┐
│           Checker Board Pattern ... Failed Test ←      N/A    │
│           Rotating Bit Pattern ... Not Tested         N/A    │
│       Modified Address Pattern ... Not Tested         N/A    │
│            On/Off Bit Pattern ... Not Tested         N/A    │
│                                                              │
│             Clock Power Ok ... Yes       ┐                   │
│      Checksum Status Byte Ok ... Yes     │                   │
│          Equipment Status ... Good       │  Flags            │
│          Memory Size Valid ... Yes       ├─ Set on           │
│          Hard Drive Status ... Good      │  Boot-up          │
│      Time Valid 12:19:47 pm ... Yes      │                   │
│        Installed Adapters OK ... N/A     │                   │
│            Read Adapter ID ... N/A       ┘                   │
│                                                              │
├──────────────────────────────────────────────────────────────┤
│     CMOS Offset : 017   Data Written : 55   Data Read : DD    │
│                                                              │
└──────────────────────────────────────────────────────────────┘
```

Diagnostic Status Byte

The status of the diagnostic status bits are displayed on the test screen.
These flags are set on boot-up, therefore any corrections to these areas after
boot-up will not be reflected in this display until the computer has been
rebooted.

Clock Power Ok :
  YES - indicates that the Real Time Clock has not lost power.
  NO   - indicates that the Real Time Clock has lost power.

Checksum Status Byte Ok :
  YES - indicates that the configuration checksum is good.
  NO   - indicates that the configuration checksum is bad.

Equipment Status:
  GOOD - indicates that the configuration information is correct.
  BAD - indicates that the configuration information is incorrect.

Memory Size Valid:
  YES - indicates that the power on check has determined the memory size to be
       the same as that stored in the configuration.
  NO   - indicates that the memory size is different than that stored in the
       configuration.

Hard Drive Status:
  GOOD - indicates that the fixed disk and adapter are operating properly, and
       the system can attempt to boot up.
  BAD - indicates that either the fixed disk or the adapter has failed
       initialization.

Time Valid:
  YES - indicates that the time is valid.
  NO   - indicates that the time is invalid.

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Installed Adapters Ok:
  YES - indicates that the installed adapters match the configuration.
  NO   - indicates that the installed adapters do not match the configuration.

Read Adapter ID:
  YES - indicates that no time out occurred while reading the adapter ID.
  NO   - indicates that a time out occurred while reading the adapter ID.

SERVICE POLICY

Radio Shack's nationwide network of service facilities provides quick, convenient, and reliable repair services for all of its computer products, in most instances. Warranty service will be performed in accordance with Radio Shack's Limited Warranty. Non-warranty service will be provided at reasonable parts and labor costs.