

ZOR

Zetaco On-Line Reliability Program for Sun O/S User Reference

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1.0 ZOR Overview

What is ZOR?

The Zetaco On-Line Reliability (ZOR) utility is a test program used to help isolate a problem with a specific device connected to your system. With ZOR you can perform reliability tests on magnetic or optical disks, 8mm, or QIC tape devices. Each one of the reliability tests allow you to test for:

- Read-only testing
- Write-only testing
- Data type written testing
- Random and sequential access

ZOR can be used to isolate a problem without having to bring your system down. It can be run in the background while your operating system and programs are up and running.

Before starting ZOR there are certain conventions you must follow. Knowing these conventions will make it easier to use the program and interpret its results.

- The program is not case sensitive. At any point you may use upper or lower case and it will not matter. ZOR makes every input lower-case before interpretation.
- The number of blocks written and read and the number of errors, are displayed in decimal. All block addresses are displayed in hexadecimal.

The Zetaco On-line Reliability program can only be run under the SunOS operating system. Before you begin the program you must get **superuser** privilege by issuing the **su** command at the system prompt.

You will find the ZOR program in the directory */usr/fst/bin*. The name of the program file is **zor**. At the system prompt type:

```
# /usr/fst/bin/zor ↵
```

1.1 Getting Started

The ZOR Main Menu

The ZOR utility is located in the directory */usr/fst/bin* and is started by entering the path name followed by the program file name *zor*. At the system prompt type:

```
# /usr/fst/bin/zor ↵
```

After entering the *zor* command the following main menu will appear on your screen (Figure 1.0). From the main menu you can perform nine different functions.

To select one of the menu choices, type only the letter that appears in brackets.

```
Zetaco On-line Reliability Utility
Rev. x.xx

Day Month Date Time Year
MENU SELECTIONS
-----

[I]nit a test
[R]ules for execution
[S]tart the tests
[H]alt the tests
[P]ause the tests
[C]ontinue running
[M]enu display
[L]ist the status
[Q]uit the utility

Enter your menu selection:
```

Figure 1.0: ZOR Main Menu

The Menu Options

Listed below is a brief explanation of each of the ZOR menu functions:

Init a test — With this menu choice you are able to select test parameters for each type of peripheral you will be running. The choices include: read-only or write-enabled testing; data type to write; and random accessing of the device or sequential (block by incrementing block). This function only sets up the tests; it does not start them.

Rules for Execution — With this menu choice you can set the test rules for the ZOR utility. The choices include: length of time to run tests (in minutes); whether to quit when time is up; file name of error listing; and maximum number of errors to log.

Start the tests — This choice will actually begin the execution of the peripheral tests you have defined according to the rules you have chosen.

Halt the tests — This choice stops the testing and clears all counts to zero.

Pause the tests — This choice will stop the testing, but retains the counts and allows the testing to continue where it stopped.

Continue running — After you have paused the tests, you can re-start them where they stopped by using this option.

Menu display — Use this option to display the main menu when you are at a status display.

List the status — When you choose this from the ZOR menu, you can choose an overview of all peripherals being tested or specify a certain device for more specific status data.

Quit the utility — Use this option when you wish to return to the command line. All testing automatically halts when you choose this option.

Information more specific to each option is given in the following sections.

1.2 Setting Up ZOR Testing

The Init a Test Menu

Two important menu choices that you need to learn about first are the `Init a test menu option` and the `Rules for execution option`. Each of the peripherals have different testing needs. ZOR also allows you to specify runtime and error log files. Choose this option at the menu prompt by typing:

Enter your menu choice: `I` ↵

Next you will be offered a choice of four devices to set-up with this menu - magnetic or optical disk and 8mm or QIC tape devices:

```
POSSIBLE TEST SELECTIONS
-----
[M]agnetic disk reliability[8]mm tape reliability
[O]ptical disk reliability [Q]IC tape reliability
  <cr> to main menu

Test selection( or CR for main menu):
```

Figure 1.2a: Init a Test Menu

As shown in Figure 1.2 you can assign test parameters to your choice of devices. If you wish to go back to a main menu selection, press RETURN to get to the main menu prompt.

Testing
Magnetic Disks

When you choose the **Magnetic disk reliability** option, you will have to specify parameters based on what you know about the disk to be tested. To init a test for a device you need to know:

1. **The name of the character device**, as it appears in the /dev directory.
2. **Whether the device should be run READ-ONLY.** You will always enable the **system** disk in Read-Only mode, however, any data disk in use must also be run Read-Only. In Read-only mode, ZOR tests that a given block can be accessed without error. When writes are enabled, ZOR writes a block of known data, reads it back, and then verifies that the read data matches.
3. **If device can be written to, what pattern to use.** There are ten patterns available to choose from, including an option for all patterns. If you choose all patterns, the testing for each block of data will take longer because ZOR will try each of nine patterns before moving on.
4. **Whether the test should be sequential or random.** If you choose sequential mode, ZOR will start at the first blocks and move through each contiguously. Only one process per device is started. ZOR will start over when all blocks have been accessed, unless the time specified by the **Rules of execution** has been reached. In random mode, two processes are started per device. ZOR runs the test until stopped.

On the next page is a representation of the dialog you will see when initiating a ZOR test to a data disk:

Enter the following at the prompt:

Test selection(or CR for main menu): M ↵

```

DISK RELIABILITY QUERY
-----

Enter the device name [none]: rzmd0c ↵

Do you wish to test this device in a READ ONLY
manner ([yes],no): no ↵

Do you wish to allow writes outside of the diagnostic
area (yes,[no]): ↵

Data type selections
-----
allz - All zeroes (0x00)
allo - All ones (0xFF)
altz - Alternate zeroes (0x55)
alto - Alternate ones (0xAA)
fltz - floating zero
flto - Floating one
rot  - Roatting (0xAA)
rand - Random
addr - Address
allp - All patterns
Enter your selection (allp): ↵

Which reliabilty mode ([random],sequential): ↵

```

Figure 1.2b: Disk Reliability Query

Tape Drive Testing

There are two different types of tape drives that ZOR supports: *8mm* and QIC. Each has its own unique operating features. That is why they have separate entries in the **Init a test** menu.

When you choose the **8mm tape reliability** or **QIC tape reliability**, you will need to choose test parameters based on what you know about each tape device:

1. **The name of the tape device** as it appears in the `/dev` directory.

2. **The data pattern to write.** You may choose one of nine patterns or choose to write all patterns to tape.
3. **Whether to run Sequential or Random.** The *8mm* drive **MUST** be run sequentially. You will be offered no choice. The QIC tape can run in random mode.

Be sure the tapes that you will be using do not contain important data since the data *will* be overwritten during the test. We recommend that you label the tapes as scratch because ZOR's read-after-write functions for data comparison stress tapes beyond normal operating stresses. Tape life will be shortened when testing is completed.

To insure reliability, we also recommend that you clean the heads after testing is completed.

A representation of the dialog you would see for either the QIC or *8mm* tape drive is shown next:

To set-up a tape drive for testing select either Q or 8 from the test selection menu by entering the following at the prompt:

```
Test selection ( or CR for main menu): Q ↵
```

```
OR
```

```
Test selection ( or CR for main menu) : 8 ↵
```

The program now prompts you for more information:

```
TAPE RELIABILITY QUERY
-----

Enter the device name [ ]: rzmt0a ↵
Data type selections
-----
allz - All zeroes (0x00)
allo - All ones (0xFF)
altz - Alternate zeroes (0x55)
alto - Alternate ones (0xAA)
fltz - floating zero
flto - Floating one
rot  - Roatting (0xAA)
rand - Random
addr - Address
allp - All patterns
Enter your selection (allp): ↵

Which reliabilty mode ([random],sequential): ↵
```

Figure 1.2c: Tape Reliability Query

1.3 ZOR Rules for Execution

Rules for Execution

The second option from the main menu you should get to know is option R - Rules for execution. The ZOR test program abides by the rules you specify. You set these parameters before you issue a start to the program. When you choose the `Rules of Execution` function from the ZOR main menu, you will need to know what parameters to select:

1. Maximum run time of the test.

This is a decimal value expressed in minutes. If you enter 0, the test will run until stopped by you.

2. Whether the program should quit when indicated time is elapsed.

If you answer yes to this option, the ZOR program will cease test execution at the appointed time and then go back to the command line prompt. With a no answer the program will wait at the main menu.

3. Whether to list test errors to a print file.

As the test runs, if you enable this option, errors will be directed into a file that you can view and print if you wish.

4. The print file pathname for error messages.

If you enable the print file option, you will need to specify a file pathname. The default is `ZOR.errors`.

5. The maximum number of errors the print file should accept.

This option limits the size that the error file can grow to. Up to 65,535 errors can be stored without writing over the first ones, but we don't recommend you enable that large a file. Choose a smaller number because you will not need that many entries to determine you have a problem.

Example Rules Dialog

Below is a representation of what you will see when you choose the **Rules of Execution** option from the main menu:

```
Maximum run time in minutes,  
0 = infinite (0): 240 ↓  
Do you wish to quit when time is up ([yes],no): ↓  
  
Enable listing to print file (yes,[no]): yes ↓  
Enter print file pathname (ZOR.errors): ↓  
  
Enter the maximum errors before disabling  
print output (65535): 1000
```

Figure 1.3: Rules of Execution display messages

1.4 The List Status Command

Status Information

The information you receive from the ZOR List the Status command is useful to determine:

1. If the tests have been set-up correctly with **Init a test** before issuing a **Start the tests** command.
2. The current state of all tests being performed on all devices.
3. The current function and status of any specific device under test.

When you select the `List the status` command from the ZOR main menu, you will be given the opportunity to list all devices or just a certain device to report on. The list output for all devices looks different than listing a single device status.

Example List All Status

Below is a representation of what you would see if you enabled the all status listing:

```

Enter the device to list (all): ↵

                Year
Day Date Time Written
  Read
  Errors
  State
-----

rzmd0c
  xxxxxxxxxxxx
xxxxxxxxxxxx
  xxxxxxxxxxxxrunning
rzmt0a
  xxxxxxxxxxxx
  xxxxxxxxxxxx
xxxxxxxxxxxx
  running

Enter your menu selection:

```

The ZOR program will stay at this message until an error occurs or you give it a menu command.

Example List Single Device Status

Below is a representation of what you will see when you list the status of a specific device :

```
Enter the device to list (all): rzmd0c ↵
Day Date Time Year
rzmd0c0                      Current state: initied
Mode: RD/WT, Diag, Random
Current function: None# of blocks: 0Block # 0

  TOTALS
  WRITTEN
  READ
  ERRORS
-----
    0
     0
    0

Expanded error log
-----
End of error log
-----

Enter a menu selection:
```

Figure 1.4b: Example List Status (single device)

Notice that the current state reports that the test is initialized only. The testing will not start until the Start all tests command is given from the main menu.

1.5 Program Control Commands

Start Command

There are six commands that are used to control the ZOR program. Each command is involved with running a series of tests and will not alter your set-up. Option S from the main menu is used to instruct ZOR to begin performing the tests that you have set up. At the menu prompt enter the following:

```
Enter a menu selection:  S
```

The following text is printed to screen (and to the print file pathname you specified), assuming you enabled tests for SCSI devices 2,0; 3,0; and 1,0:

```
STARTING RELIABILITY TESTING
DayDateTimeYear
-----

Disk reli on rzmd0c started
Tape reli on rzmt0a started

Enter a menu selection:
```

Pause Command

The Pause function is used to halt test execution without losing pass and error counts of the current test. This command is used in conjunction with the Continue command. At the prompt, enter the following:

```
Enter a menu selection:  P
```

The following text is printed to screen (and to the print file pathname you specified), assuming you paused tests for SCSI devices 2,0; 3,0; and 1,0:

```
PAUSING RELIABILITY TESTING
-----

Disk reli on rzmd0c paused
Tape reli on rzmt0a paused

Enter a menu selection:
```

Display
Menu Command

The Menu display command is used at any time to view the ZOR utility Main Menu. At the menu prompt enter the following:

```
Enter a menu selection:  M
```

Quit Command

The Quit option halts all tests that are running and terminates the ZOR program itself. At the prompt enter the following:

```
Enter a menu selection:  Q
```

The following text will be displayed:

```
TERMINATING EXECUTION OF RELIABILITIES
DayDateTimeYear
-----
Disk reli on rzmd0c halted with x errors.
Tape reli on rzmt0a halted with x errors.

ZETACO RELIABILITY TERMINATED
-----
```

Halt Command

When the Halt the tests option is selected, all tests are stopped in an orderly fashion and the main menu prompt is displayed to the screen. Error and pass totals will not be saved. At the main menu prompt enter the following:

```
Enter a menu selection:  H
```

The following text is printed to screen (and to the print file pathname you specified), assuming you halted tests for all devices:

```
HALTING RELIABILITY TESTING
DayDateTimeYear
-----
Disk reli on rzmd0c halted with x errors.
Tape reli on rzmt0a halted with x errors.

Enter a menu selection:
```

Continue Command

The Continue command is used to restart tests when they have been stopped with the Pause command. Error and pass totals saved by the Pause command will be added to. At the menu prompt enter the following:

```
Enter a menu selection:  C
```

The following text is printed to screen (and to the print file pathname you specified), assuming you continued tests for all devices:

```
CONTINUING RELIABILITY TESTING
-----
Disk reli on rzmd0c continued
Tape reli on rzmt0a continued

Enter a menu selection:
```

Message Reporting

There are two types of messages displayed from the ZOR program: status messages and error messages. This section describes what they mean.

Status Messages

Status messages from disk tests are slightly different than status messages from tape device tests. Examples of each type is shown below:

Disk status message:

```
***** Message from device test *****
  Day Date Time Year
  rzmd0c
  Information: message
  *****
```

Examples of disk status messages include:

```
Unable to open the device. Terminating test!
Unable to allocate memory. Terminating test!
All patterns pass of sequential disk reli
Single pattern pass of sequential disk reli
```

Tape status message:

```
***** Message from device test *****
  DayDateTimeYear
  rzmt0a
  Information: message
  *****
```

Examples of tapes status messages include:

```
Unable to open the device. Terminating test!
Unable to allocate memory. Terminating test!
All patterns pass of sequential tape reli
Single pattern pass of sequential tape reli
```

Error Messages

There are error reports generated by both disk and tape test errors. They are printed to the screen and to the print file pathname you specified with the Rules command. Following are examples of how the error messages might look:

Disk error messages--- SCSI status error:

```

***** Error during disk testing *****
DayDateTimeYear
rzmd0c
Current function:  Read  # of blocks: xxxxxxxxxx
Block #: xxxxxxxxxxxxxxxx
System errno  : 0005 I/O error
Extended errno: 8000047
SCSI sense key: 0000 No sense
Sense code:xx
Information:  message
*****
Enter a menu selection:
    
```

Disk Status--- Data Compare error:

```

***** Disk data error *****
      DayDateTimeYear
      rzmd0c
      # of blocks: xxxxxxxx  Block #: xxxxxxxxxxxxxx
      Expected dataReceived dataOffset-start of buffer
      -----
      xxxxxxxx  xxxxxxxx  xxxxxxxx
      xxxxxxxx  xxxxxxxx  xxxxxxxx
      xxxxxxxx  xxxxxxxx  xxxxxxxx
      xxxxxxxx  xxxxxxxx  xxxxxxxx

      Count: xxx
      *****
      Enter a menu selection:
    
```

Tape error messages--- SCSI status:


```
***** Error during tape testing *****
  DayDateTimeYear
rzmt0a
Current file: xxxxCurrent record: xxxx
Current function: Read# of bytes: xxxxxxxx
# Records: xxxxxxxxxx
System errno: 0005 I/O error
Extended errno: 8000047
SCSI sense key: 0000 No sense
Sense code: xx
Information: message
*****
Enter a menu selection:
```

Tape error messages--- Data compare error:

```
***** Tape data error *****
  DayDateTimeYear
rzmt0a
Current file xxxxCurrent record: xxxx
# of blocks: xxxxxxBlock #: xxxxxxxx
Expected dataReceived dataOffset-start of buffer
-----
xxxxxxx xxxxxxxx xxxxxxxx
xxxxxxx xxxxxxxx xxxxxxxx
xxxxxxx xxxxxxxx xxxxxxxx
xxxxxxx xxxxxxxx xxxxxxxx

Count: xxx
*****
Enter a menu selection:
```

SCSI status error interpretation:

System errno

This is the SunOS errno value. Refer to your SunOS documentation for detailed descriptions.

SCSI Sense Key

This is the Sense Key value returned from the peripheral. Refer to your peripheral documentation for detailed descriptions.

Sense Code

This is extended error information returned from the peripheral. Refer to your peripheral documentation for detailed descriptions.

Information

This will be a specific message from ZOR.