OSTA
Optical Storage
Technology Association

Test Plan for MultiRead Devices

Revision 1.11

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ABSTRACT

This test plan defines the MultiRead Test Plan for a MultiRead device. The Annexes are part of this document but are not required for compliance.

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Purpose

The purpose of this test plan is to test the requirements of the MultiRead Specification.

Scope

This document defines the OSTA MultiRead Test Plan for use with the OSTA MultiRead Specification.

The MultiRead Test Plan for a MultiRead Device applies only to the actions or feature in the MultiRead Specification which are indicated by the word "**shall**". This document expresses what shall be tested. All sections are mandatory. Most of these tests should be performed with special software designed to this test plan.

Related Documents

OSTA MultiRead Specifications for CD-ROM, CD-R, CD-R/RW and DVD-ROM Devices, Version 1.11 or higher.

Terms

Terms and definitions are defined in the OSTA MultiRead Specification.

Symbols

Numbers that are not immediately followed by lowercase "b" or "h" are decimal values. Numbers followed by lowercase "b" (xxb) are binary values. Numbers followed by lowercase "h" (xxh) are hexadecimal values.

Revision History

Revision 0.90 - Initial Version. 23 June 1997
Revision 0.99 - Changes from OSTA MR meeting in Yokohama July 2nd. July 11, 1997
Revision 1.00 - Added disc layout details, switched to the MultiRead logo. August 15, 1997.
Revision 1.01 - Modified 3.2 item 4) to apply differently to CD-R and CD-RW discs. Modified 1.7 to reading blocks 46,175 to 46,974 instead of blocks 300,012 to 300,101. September 09, 1997.
Revision 1.02 - Added Sony's comments of 10-03-97. To Section 1.2.2 added clarification to skip LBA's 46,911 to 46,974 and the Link Blocks. To Section 1.7 corrected in session 1 to in session 2. To Annex D added clarification of algorithm. October 06, 1997.
Revision 1.10 - Modified CD-ROM disc to be only a Single Session disc. Added changes to support version 1.11 of the MR Specification. October 20, 1997.
Revision 1.11 - In Section 1.2 changed Annex from D to C. In Section 1.4.2 added skipping sectors to match those in Section 1.2.2. Clarified Section 1.7 last sentence. October 23, 1997.

1.0 Data Test Plan for a MultiRead Device

1.1 Test Reading Media with Different Reflectivity's

Test with discs written or stamped in the Epsilon II test disc layout (see Section 3.2) to verify that the test drive can mount and read media with different reflectivity's.

Requirements:
Issue a READ TOC command to the drive for each test disc.
The data returned need not be verified in this section (see Section 1.2.4).
Test with CD-ROM (stamped), CD-R (written) and CD-RW (written) media.

Results:
The drive shall not return any errors.
This test shall be passed successfully.

1.2 Test Reading User Data Blocks on Data Tracks

Test with discs written in the Epsilon II test disc layout to verify that all User Data Blocks on Data Tracks can be read. Also verify that the blocks read are unmodified from the data patterns specified (see Algorithms, Annex C.1) by the test drive performing the read operations.

1.2.1 Reading Incrementally Written Tracks

Read blocks in session 1, a Track at once (TAO) session, starting at LBA 29 and ending at LBA 15,388.

Requirements:
Issue READ commands sequentially to the drive over the range of LBA's listed for each test disc.
Verify that the data pattern received from the drive matches the Epsilon II test disc layout for the LBA's read.
Issue REQUEST SENSE commands for any LBA's in error.
Test with CD-ROM (stamped), CD-R and CD-RW media.

Results:
The drive shall not return any errors.
This test shall be passed successfully.

1.2.2 Reading Fixed Packet Written Tracks

Read the Fixed Packets in session 2 starting at LBA 27,007 and ending with LBA 66,974, skipping LBA's 46,911 to 46,974 and the Link Blocks (see Section 3.2 for the data pattern layout).

Requirements:
Issue READ commands sequentially to the drive over the range of LBA's listed for each test disc.
Verify that the data pattern received from the drive matches the Epsilon II test disc layout for the LBA's read.
Issue REQUEST SENSE commands for any LBA's in error.
Test with CD-R and CD-RW media.

Results:
The drive shall not return any errors.
This test shall be passed successfully.

1.2.3 Reading Variable Packet Written Tracks

Read the various sizes of Variable Packets in session 3, (see Section 3.2 and Algorithms, Annex C.3 for sizes and data patterns) starting at LBA 82,693 and ending with LBA 300,004 skipping the Link Blocks.

Requirements:
Issue READ commands sequentially to the drive over the range of LBA's listed for each test disc.
Verify that the data pattern received from the drive matches the Epsilon II test disc layout for the LBA's read.
Issue REQUEST SENSE commands for any LBA's in error.
Test with CD-R and CD-RW media.

Results:
The drive shall not return any errors.
This test shall be passed successfully.

1.2.4 Test of Multisession

Test with discs written in the Epsilon II test disc layout to verify multisession operation.

Requirements:
Issue a READ TOC command to verify that the last complete session number is three (3) for each test disc.
Test with CD-R and CD-RW media.

Results:
Verify that the test disc has three (3) sessions.
This test shall be passed successfully.

1.3 Write Methods

Using discs written in the Epsilon II test disc layout verify that the test drive can read Track at once, Fixed Packets and Variable Packets tracks by the Packet type.

Requirements:
Issue READ CD MSF commands to locate, identify and read (see Algorithms, Annex C.2) the Track Descriptor Block for each track on each test disc.
Test with CD-R and CD-RW media.

Results:
Verify for each track that the Packet type is correct (track 1 is Track at once, track 2 is Fixed Packet and track 3 is Variable Packet) and for Fixed Packets the Packet size is 32 blocks in length.
This test shall be passed successfully.

1.4 Test of Addressing Methods

1.4.1 Addressing Method 1

Test with discs written in the Epsilon II test disc layout to verify that the test drive can read Variable Packets using Addressing Method 1. Read the various sizes of Variable Packets in session 3 (see Algorithms, Annex C.3) starting at LBA 82,693 and ending with LBA 300,004.

Requirements:
Issue READ commands to random LBA's within the range of LBA's listed for each test disc for 1000 passes.
Verify that the data pattern received from the drive matches the Epsilon II test disc layout for the LBA's read.
Test with CD-R and CD-RW media.

Results:
The drive shall not return any errors.
This test shall be passed successfully.

1.4.2 Addressing Method 2

Test with discs written in the Epsilon II test disc layout to verify that the test drive can read Fixed Packets using Addressing Method 2. Read Fixed Packets in session 2 starting at LBA 27,007 and ending with LBA 66,910, skipping LBA's 46,911 to 46,974.

Requirements:
Issue READ commands to random LBA's within the range of LBA's listed for each test disc for 1000 passes.
Verify that the data pattern received matches the Epsilon II test disc layout for the LBA's read.
Test with CD-R and CD-RW media.

Results:
The drive shall not return any errors.
This test shall be passed successfully.

1.4.2.1 Drive only Implementation

For drive manufacturer's that implement Address Method 2 for Fixed Packets using the drive only, they shall perform the proper address conversion within the test drive.

1.4.2.2 Drive and Driver Implementation

For drive manufacturer's that implement Address Method 2 for Fixed Packets using a software driver provided with the test drive, they shall perform the proper address conversion within their driver.

1.5 Test Support of Multimedia Commands

Test that the Multimedia command set (MMC) is supported and that Mode Sense Page 2A is a valid page.
Note: No media is required for these tests.

Requirements:
Issue a MODE SENSE command for Page 2A to validate the following fields:

CD-RW Read is	1	(Byte 2, bit 1)
CD-R Read is	1	(Byte 2, bit 0)
Multisession is	1	(Byte 4, bit 6)
Audio Play is	1	(Byte 4, bit 0)
CD-DA Cmds. is	1	(Byte 5, bit 0)

Results:
Verify that the drive recognizes Page 2A as a valid page.
Verify that the Page 2A bits listed above are set to one (1).
This test shall be passed successfully.

1.6 Test of Reading Link Blocks

Test with discs written in the Epsilon II test disc layout to verify that the Link Block, Run-in and Run-out Blocks can be accessed. Note: since Link Blocks are not given user data, the data patterns are unspecified for these blocks.

Requirements:
Issue READ commands sequentially in session 3, one block at a time, starting at LBA 82,693, for nine (9) blocks. Block 82,694 to 82,700 are Link Blocks, Blocks 82,693 and 82,701 are Data Blocks.
Issue REQUEST SENSE commands for any LBA's in error.
Test with CD-R and CD-RW media.

Results:
Blocks shall either return without error or with error providing the correct LBA.
Verify that the data pattern received matches the Epsilon II test disc layout for the Data Blocks read.
This test shall be passed successfully.

1.7 Testing of Reading Errors on Non-Requested Blocks

This test verifies that the reading of a block in error is only reported for that block and not for blocks accessed before or after sequentially or randomly.

In session 2, LBA's 46,911 to 46,942 should be written unreadable. Read LBA 46,175 to LBA 46,974 (see Algorithms, Annex C.4) and verify that all blocks in the range can be read unmodified, with the proper data patterns. Reading LBA's 46,911 to 46,942 should be reported as errors.

Requirements:
Issue READ commands to the drive over the range of LBA's listed.
Issue REQUEST SENSE commands for any LBA's in error.
Test with CD-RW media only.

Results:
Verify that the any unreadable LBA's return the proper LBA.
Verify that the data pattern received matches the Epsilon II test disc layout for the LBA's read.
This test shall be passed successfully.

2.0 Audio Test Plan for a MultiRead Device

2.1 Single Session Test

Test the disc written in the Audio I test disc layout (see Section 3.1) to verify Single Session operation.

Requirements:
Issue a READ TOC command to verify that the last complete session number is one (1) on the test disc.
Test with CD-DA media only.

Results:
Verify that the test disc has only one (1) session.
This test shall be passed successfully.

3.0 Test Discs Layouts

The test disc layouts used shall meet the requirements as specified.

Two disc layout types are defined, for a total of four separate test discs.

	Epsilon II Disc Layout	**Audio I Disc Layout**
CD-DA Disc	NR	YES
CD-ROM Disc	YES	NR
CD-R Disc	YES	NR
CD-RW Disc	YES	NR

YES - This test disc shall be used.
NR - Currently this disc is not required.

3.1 Audio I Test Discs

When an Audio I test disc is used, it shall contain:
At least five Audio Tracks recorded in Disc at once (DAO) or Track at once (TAO) mode.

3.2 Epsilon II Test Discs

When an Epsilon II test disc (written in Mode 2 Form 1) is used, it shall contain:

3.2.1 CD-ROM Disc

The disc contains a Disc at once session. A CD-ROM disc contains only the first session layout below.

3.2.2 CD-R and CD-RW Discs

1) The first session contains a Track at once track.
2) The second session contains Fixed Packets of 64 KB bytes each.
3) The third session contains Variable Packets of various sizes. The packet sizes on the test disc in session 3 shall range from 1 to 128 blocks increasing, then from 128 to 1 blocks decreasing, then one large packet which is 199,008 blocks in length, (see Algorithms, Annex C.3) then one packet which is 90 blocks in length.

Note: The last session on the CD-RW disc should be written such that the last session is finalized, but the disc is not finalized, so that further sessions may be written to the test disc. The last session on the CD-R disc shall be written such that the last session is finalized, but the disc is not finalized, so that further sessions may be written to the test disc.

EPSILON II DISC LAYOUT
ISO 9660 FILE SYSTEM (MULTISESSION)
Path Table \cdwtest

<table>
<tr><td>SESSION 1

Track at Once</td><td>Track 1
Track Start: 0 00h) lba
Track Length: 26943 blocks</td><td colspan="2">30 Files
File names: MEG01.FIL to MEG30.FIL
File Size: 1,048,576 bytes each
Data Start: 29 (1Dh) lba - Data End: 15388 (3C1Ch) lba
Data Pattern: * LBA then 7Ch and 59h repeating</td></tr>
<tr><td>SESSION 2

Fixed Packets</td><td>Track 2
Track Start: 26943 (693Fh) lba
Track Length: 55684 (D984h) blocks</td><td>1 File
File name: MEG31.FIL
File Size: 40,894,464 bytes
No. of Packets: 624
Packet Size: 32 blocks
Data Start: 27,007 (697Fh) lba
Data End: 46,974 (B77Eh) lba
Data Pattern: * LBA then 7Ch and 59h repeating</td><td>1 File
File name: MEG32.FIL
File Size: 40,960,000 bytes
No. of Packets: 625
Packet Size: 32 blocks
Data Start: 46,975 (B77Fh) lba
Data End: 66,974 (1059Eh) lba
Pattern: * LBA then 28h, 47h, A8h, F2h repeating</td></tr>
<tr><td rowspan="2">SESSION 3

Variable Packets</td><td rowspan="2">Track 3
Track Start: 82627 (0142C3h) lba
Track Length: 217,477 (035185h) blocks</td><td>1 File
File name: MEG33.FIL
File Size: 16,908,288 bytes
No. of Packets: 128
Packet Size: various (see 3 above)
Data Start: 82,693 (014305h) lba
Data End: 91,837 (0166BDh) lba
Pattern: * LBA then 28h, 47h, A8h, F2h repeating</td><td>1 File
File name: MEG34.FIL
File Size: 16,908,288 bytes
No. of Packets: 128
Packet Size: various sizes (see 3 above)
Data Start: 91,845 (0166C5h) lba
Data End: 100,989 (018A7Dh) lba
Data Pattern: * LBA then 7Ch and 59h repeating</td></tr>
<tr><td>1 File
File name: MEG35.FIL
File Size: 407,568,384 bytes
No. of Packets: 1
Packet Size: 199,008
Data Start: 100,997 (018A85h) lba
Data End: 300,004 (0493E4h) lba
Pattern: * LBA then 28h, 47h, A8h, F2h repeating</td><td>1 File
File name: MEG36.FIL
File Size: 184,320 bytes
No. of Packets: 1
Packet Size: 90
Data Start: 300,012 (0493ECh) lba
Data End: 300,101 (049445h) lba
Pattern: * LBA then 7Ch and 59h repeating</td></tr>
</table>

* - First 9 bytes of each sector contains the sector number, a left justified character string, the reminder of t block is filled
with the data pattern, in bytes, as indicated above . For example the LBA 49368 is recorded as:
"49368", starting at offset 00 (34h, 39h, 33h, 36h, 38h, 00h, 00h, 00h, 00h) then the repeating four (4) character data pattern
(28h, 47h, A8h, F2h, 28h, 47h, A8h, F2h, 28h, 47h, A8h, F2h, ...

ANNEX A - Epsilon II Check List

The following check list is provided to facilitate the MultiRead Test Plan testing.

Drive Manufacturer_____

Date of Test Plan_____

Device Type (CD-ROM, CD-R, CD-R/RW, DVD-ROM, other)
_____

Device Model (from inquiry string)_____

Revision Number (from inquiry string) _____

A check mark (√) or "Checked" in each table entry below indicates that this test has passed.

MultiRead Test Plan Version 1.1 Section Numbers		CD-ROM Disc	CD-R Disc	CD-RW Disc
1.1 - Reflectivity's				
1.2.1 - TAO data verification				
1.2.2 - Fixed Packet data verification		NR		
1.2.3 - Variable Packet data verification		NR		
1.2.4 - Multisession		NR		
1.3 - Write Method		NR		
1.4.1 - Addressing Method 1 with Variable Packets		NR		
1.4.2 - Addressing Method 2 with Fixed Packets		NR	*	*
1.5 - Page 2A valid	**	NR	NR	NR
1.5 - Multimedia Command Set support	**	NR	NR	NR
1.6 - Reading Link Blocks		NR		
1.7 - Reading Errors on Non-Requested Blocks		NR	NR	

***** - With or without a software driver.
****** - No media required for this test.
NR - Currently this test configuration is Not Required.

ANNEX B - Audio I Check List

The following check list is provided to facilitate the MultiRead Test Plan testing.

Drive Manufacturer

_____

Date of Test Plan

_____

Device Type (CD-ROM, CD-R, CD-R/RW, DVD-ROM, other)

_____

Device Model (from inquiry string)

_____

Revision Number (from inquiry string)

_____

A check mark (√) or “Checked” in each table entry below indicates that this test has passed.

MultiRead Test Plan Version 1.1 Section Numbers	CD-DA Disc
2.1 - Single Session	

ANNEX C - Algorithms

C.1 Read Data Pattern Algorithm

For each block read, first verify that the embedded LBA matches the request block, then verify that the data pattern matches the data pattern specified for the LBA based on the Epsilon II test disc layout (see Section 3.2).

C.2 Read Write Method Algorithm

Scan to and from the track start location (see Section 3.2) by MSF frames looking for the Track Descriptor Block (TDB) identifier ("TDI") starting at block offset 00. If found, verify the Write Method (at offset 09) for each disc. For the Fixed Packet track (starting at offset 10 for three bytes) verify that the packet size is 32 (BCD).

C.3 Read Variable Packet Address Method 1 Algorithm

Read sequentially the Epsilon II test disc in session 3 within the range of LBA's, starting at LBA 82,693. Use the following algorithm:

where: n is 1, m is 7 and LBA is 82,693.

while n is ≤ 128 (4 character data pattern)
    read n blocks starting at LBA
    increment LBA by m
    increment n by 1

where: n is 128, m is 7 and LBA is 91,845.

while n is ≥ 1 (2 character data pattern)
    read n blocks starting at LBA
    increment LBA by m
    decrement n by 1

where: LBA is 100,997.
read 199,008 blocks starting at LBA (4 character data pattern)

C.4 Read Error of Non-Requested Block Algorithm

Read over range of LBA's sequentially for 1 pass and then randomly for 100 passes, posting any errors (including the known LBA's that should fail).