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Test specification of self-test for AV Devices 1.0 (Point-to-Point Test and Network Test)

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Abstract:

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Change history

The following table shows the change history for this specification.

Version 1.0

Original version.

1. Overview

1.1 Purpose

The purpose of this document is to define the way to self-test “Point-to-Point Test” and “Network Test” of AV devices among four tests defined in 1394 TA Compliance Logo Program.

1.2 Scope

This test is intended for the following devices:

- AV devices in the category that have the Functional Conformance Test defined in AV Working Group.

2. References

The following standards contain provisions, which through reference in this document, constitute provisions of this standard. All the standards listed are normative references. Informative references are given in Annex A. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

- [R1] IEEE Std 1394-1995, Standard for a High Performance Serial Bus.
- [R2] IEC 61883-1, Consumer audio/video equipment – Digital interface – Part 1: General.
- [R3] AV/C Digital Interface Command Set General Specification, Version 3.0. TA document number 1998003.

3. Definitions

3.1 Conformance levels

3.1.1 expected: A key word used to describe the behavior of the hardware or software in the design models *assumed* by this Specification. Other hardware and software design models may also be implemented.

3.1.2 may: A key word that indicates flexibility of choice with *no implied preference*.

3.1.3 shall: A key word indicating a mandatory requirement. Designers are *required* to implement all such mandatory requirements.

3.1.4 should: A key word indicating flexibility of choice with a strongly preferred alternative. Equivalent to the phrase *is recommended*.

3.1.5 reserved fields: A set of bits within a data structure that are defined in this specification as reserved, and are not otherwise used. Implementations of this specification shall zero these fields. Future revisions of this specification, however, may define their usage.

3.1.6 reserved values: A set of values for a field that are defined in this specification as reserved, and are not otherwise used. Implementations of this specification shall not generate these values for the field. Future revisions of this specification, however, may define their usage.

NOTE —The IEEE is investigating whether the “may, shall, should” and possibly “expected” terms will be formally defined by IEEE. If and when this occurs, draft editors should obtain their conformance definitions from the latest IEEE style document.

3.2 Glossary of terms

3.2.1 byte: Eight bits of data, used as a synonym for octet.

3.2.2 CSR Architecture: A convenient abbreviation of the following reference (see clause 2): ISO/IEC 13213 : 1994 [ANSI/IEEE Std 1212, 1994 Edition], Information Technology—Microprocessor systems—Control and Status Register (CSR) Architecture for Microcomputer Buses.

3.2.3 quadlet: Four bytes of data.

3.2.4 DV device: Consumer-use DV camcorder and DV deck.

3.2.5 STB: Consumer-use STB for the Japanese BS/CS broadcast.

3.2.6 TV: Consumer-use DTV for the Japanese BS/CS broadcast.

3.2.7 AV-HDD: Consumer-use AV-HDD for the Japanese BS/CS recording.

3.2.8 D-VHS: Consumer-use D-VHS.

3.3 Acronyms and abbreviations

AV/C Audio Video Control

IEEE The Institute of Electrical and Electronics Engineers, Inc.

4. Point-to-Point Test

4.1 Purpose

The purpose of this test is to check whether the performance between the DUT and the reference device is according to the expectations when a DUT and a reference device are connected.

- In the case that the devices are expected to be recognized in a certain combination, can the device be recognized?
- Will isochronous transmission operate correctly?
- Will there be any problem if a plug is pulled out or inserted?

4.2 Rule regarding the way to determine the category of reference devices

This section is about how to determine a reference device for each DUT.

Policy regarding the way to determine AV reference devices:

1. List the categories of devices that can input and output video signal by connecting with the DUT.
2. Select 5 reference devices:
 - (A) The case where devices that are expected to behave when connected to DUT are not specifically determined by the device guideline or its normative reference documents:

Select 5 devices from the device categories for the test. Breakdown of each category is not specified; however, it is recommended to select devices from as many categories as possible.
 - (B) The case where devices that are expected to behave when connected to DUT are determined by the device guideline or its normative reference documents:

The minimum number of test devices to be selected from each test category may be specified.

Select the device from each category according to the following order of priority.

- a) Select the devices with 1394 TA compliance logo from other companies.
- b) Select the devices from other companies that are (were) available on the market.
- c) Select the devices with 1394 TA compliance logo from a tester's company.
- d) Select the devices from a tester's company that are (were) available on the market.

However, if the DUT cannot control its own isochronous transmission and there are less than five reference devices that can control the isochronous transmission of the DUT, the tester can conduct the test with three devices by adding one controller device to control the DUT.

Refer to the document of each DUT for the procedures of the tests.

5. Network Test

5.1 Purpose

The purpose of this test is to check that other devices on the bus are not affected when the DUT is connected to the bus and the DUT connected to the bus operates properly.

5.2 Basic configuration and topology

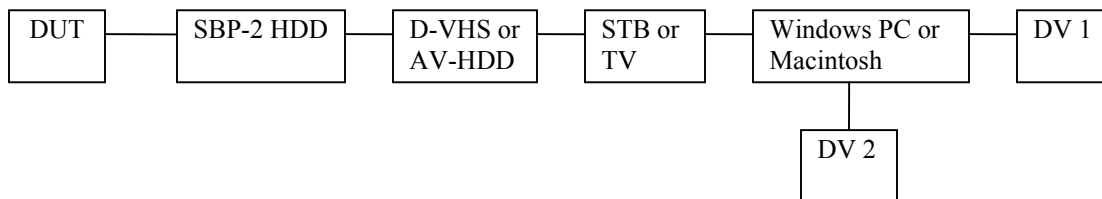
Connect the following devices to the bus (one from each)

- D-VHS or AV-HDD
- STB or TV
- 2 DV Devices
- (Windows PC^{*1} + an application) or (Macintosh^{*2} + an application)
- SBP-2 HDD

^{*1} Windows XP service pack 1 or later is recommended.

^{*2} Mac OS 9 or later is recommended.

The topology is in the following order:



Hub is not basically required: however, if PC has only two 1394 ports or less, a hub may be used. In this case, any topology may be used.

When the DUT cannot control its own isochronous transmission and cannot control the isochronous data from the basic configuration device, a controller device may be added to operate the DUT.

5.3 Rule regarding the way to determine a reference device

This section is about how to select reference devices:

Select the device from each category according to the following order of priority.

- a) Select the device with 1394 TA compliance logo from other company.
- b) Select the device from other company that is (was) available on the market.
- c) Select the device with 1394 TA compliance logo from a tester's company.
- d) Select the device from a tester's company that is (was) available on the market.

5.4 Common Test

Common test must be executed regardless of the types of the DUT.

This test is to check that both Isochronous and Asynchronous transmissions of the other devices are not affected while they are operating on the bus, when the DUT was connected and disconnected.

Operations such as “start recording,” “start playback” may be accomplished by any procedure.

5.4.1 Common test 1

Connect and disconnect the DUT while the DV signal is running on the bus and Asynchronous data is being transmitted.

- (a) Disconnect the DUT from the basic configuration.
- (b) Start the playback on the DV device 1.
- (c) Check that the audio and images played back on the DV device 1 are displayed on the DV device 2 correctly.
- (d) Start transferring the file between the PC and the SBP-2HDD.
- (e) Connect the DUT according to the specified topology during the file transfer.
- (f) Check that (c) is operated properly.
- (g) Check that the file transfer has been completed successfully and that the file transferred is the same as the original file.
- (h) Start transferring the file between the PC and the SBP-2HDD.
- (i) Disconnect the DUT from the bus during the file transfer.
- (j) Check that (c) is operated properly.
- (k) Check that the file transfer has been completed successfully and that the file transferred is the same as the original file.
- (l) Repeat (d) to (k) for once.

Check items:

- (1) Check whether (c) was OK? (Y/N)
- (2) Check whether the first and the second (f), (g), (j), (k) were OK? (Y/N)
- (3) When (e), (i), (m), (when connecting/disconnecting DUT), check that audio and images from the DV device 1 were not distorted on the DV device 2. (Distortion is tolerated, if for a short while.)

5.4.2 Common test 2

Connect and disconnect the DUT while the MPEG2-TS signal is running on the bus and Asynchronous data is being transmitted.

- (a) Disconnect the DUT from the basic configuration.
- (b) Start the playback on the D-VHS or the AV-HDD and start viewing them on the STB or the TV.
- (c) Check that the audio and images played back on the D-VHS or the AV-HDD are displayed on the STB or the TV.
- (d) Start transferring the file between the PC and the SBP-2HDD.
- (e) Connect the DUT according to the specified topology during the file transfer.
- (f) Check that (c) is operated properly.
- (g) Check that the file transfer has been completed successfully and that the file transferred is the same as the original file.
- (h) Start transferring the file between the PC and the SBP-2HDD.
- (i) Disconnect the DUT from the bus during the file transfer.
- (j) Check that (c) is operated properly.
- (k) Check that the file transfer has been completed successfully and that the file transferred is the same as the original file.
- (l) Repeat (d) to (k) for once.

Check items:

- (1) Check whether (c) was OK? (Y/N)
- (2) Check whether the first and the second (f), (g), (j), (k) were OK? (Y/N)

- (3) When (e), (i), (m), (when connecting/disconnecting DUT), check that audio and images from the D-VHS or AV-HDD device are not distorted on STB or TV. (Distortion is tolerated, if for a short while.)

5.5 Individual test

Individual test must be executed for each DUT.

Check that the DUT's isochronous transmission operates correctly when there is no other isochronous transmission on the bus.

Also, check that the DUT is operating correctly when asynchronous transmission is made between the PC and the SBP-2 HDD.

Refer to the document of each DUT for the procedures of the tests.

Annex

Annex A: Test Procedures for DV

A.1 Point-to-Point Test Procedure for DV

A.1.1 Category of reference device

- DV
- Windows PC^{*1} + applications
- Macintosh^{*2} + applications

^{*1} Windows XP service pack 1 or later is recommended.

^{*2} Mac OS 9 or later is recommended.

Select five devices from the above categories. It is recommended to include devices from as many categories as possible.

A.1.2 Test procedures

(A) When the reference device is DV:

- (a) Connect a DUT and the reference device
- (b) Play back the reference DV device
- (c) Check that the audio and images played back by the reference DV device are displayed on the DUT.
- (d) Stop the playback on the reference DV device.
- (e) Disconnect the cable between the DUT and the reference device.
- (f) Connect the cable between the DUT and the reference device.
- (g) Repeat (b) to (d) for once.
- (h) Play back on the DUT
- (i) Check that the audio and images played back by the DUT are displayed on the reference device.
- (j) Stop the playback on the DUT
- (k) Disconnect the cable between the DUT and the reference device.
- (l) Connect the cable between the DUT and the reference device.
- (m) Repeat from (h) to (j) for once.

Note: (b) through (g) does not need to be tested for the DUT without 1394 input function.

Check items:

- (1) Check whether the first and the second (c) were OK? (Y/N)
- (2) Check whether the first and the second (i) were OK? (Y/N)

(B) When the reference device is Windows PC + applications

- (a) Connect the DUT and the reference device
- (b) Check that “***** DV Camcorder” or “***** DV Tape Recorder/Player” indicating the DUT is displayed on the Device Manager of the reference device.
- (c) Start up the software that can input/output the DV on the reference device and play back images.
- (d) Check that the audio and images played back by the reference device are displayed on the DUT.
- (e) Stop the playback of images on the reference device.
- (f) Disconnect the cable between the DUT and the reference device
- (g) Connect the cable between the DUT and the reference device
- (h) Repeat (b)-(e) for once.
- (i) Play back on the DUT

- (j) Check that the audio and images played back by the DUT are displayed on the reference device.
- (k) Stop the playback on the DUT.
- (l) Disconnect the cable between the DUT and the reference device.
- (m) Connect the cable between the DUT and the reference device.
- (n) Repeat (i)-(k) for once.

Note: (d) through (h) does not need to be tested for the DUT without 1394 input function.

Check items:

- (1) Check whether the first and the second (b) and (d) were OK? (Y/N)
- (2) Check whether the first and the second (j) were OK? (Y/N)

(C) When the reference device is Macintosh + applications

- (a) Connect the DUT and the reference device.
- (b) Check that the device indicating the DUT is displayed on the Apple System Profile of the reference device.
- (c) Start up the software that can input/output the DV on the reference device and play back images.
- (d) Check that the audio and images played back by the reference device are displayed on the DUT.
- (e) Stop the playback of images on the reference device.
- (f) Disconnect the cable between the DUT and the reference device.
- (g) Connect the cable between the DUT and the reference device.
- (h) Repeat (b)-(e) for once.
- (i) Play back on the DUT
- (j) Check that the audio and images played back by the reference device are displayed on the DUT.
- (k) Stop the playback on the DUT.
- (l) Disconnect the cable between the DUT and the reference device.
- (m) Connect the cable between the DUT and the reference device.
- (n) Repeat (i)-(k) for once.

Note: (d) through (h) does not need to be tested for the DUT without 1394 input function.

Check items:

- (1) Check whether the first and the second (b) and (d) were OK? (Y/N)
- (2) Check whether the first and the second (j) were OK? (Y/N)

A.2 Network Test Procedure for DV

A.2.1 Test Procedure of Common Test

Common Test 1 and Common Test 2 are executed as specified in Section 5.4.

A.2.2 Test Procedure of Individual Test

- (a) Disconnect the DUT from the basic configuration.
- (b) No isochronous transmissions on the bus
- (c) Connect the DUT according to the specified topology.
- (d) Start the playback on the DUT.
- (e) Check that the audio and images played back on the DUT are displayed on the reference DV 1.
- (f) Start the file transfer between the PC and the SBP-2 HDD.
- (g) Check that the audio and images on the reference DV 1 are not distorted during the file transfer.
- (h) Stop the playback on the DUT.
- (i) Start the playback on the reference DV 1.

- (j) Check that the audio and images played back on the reference DV 1 are displayed on the DUT correctly during the file transfer..

Note: (i) and after does not need to be tested for the DUT without 1394 input function.

Check items:

- (1) Check whether (e), (g), (j) were OK? (Y/N)

Annex B: Test Procedures for D-VHS

B.1 Point-to-Point Test Procedure for D-VHS

B.1.1 Category of reference device

- TV
- STB
- D-VHS with MPEG encoder and decoder

Select two or more devices from the TV and/or the STB, and select two or more from the D-VHS.

Select the total of 5 devices for the test.

B.1.2 Test procedure

(A) When the reference device is either TV or STB:

- (a) Connect the DUT and the reference device (TV or STB).
- (b) Check that the DUT is recognized from the reference device (TV or STB).
- (c) Start recording images from the reference device (TV or STB) on the DUT.
- (d) Stop the recording on the DUT.
- (e) Disconnect the cable between the DUT and the reference device.
- (f) Connect the cable between the DUT and the reference device.
- (g) Repeat (b)-(d) for once.
- (h) Play back the recorded images on the DUT and start viewing them on the reference device (TV or STB)
- (i) Check that the audio and images played back by the DUT are displayed on the reference device (TV or STB).
- (j) Stop the playback on the DUT
- (k) Disconnect the cable between the DUT and the reference device.
- (l) Connect the cable between the DUT and the reference device.
- (m) Check that the DUT is recognized from the TV or the STB.
- (n) Repeat (h)-(j) for once.

Check items:

- (1) Check whether the first and the second (b) were OK? (Y/N)
- (2) Check whether the first and the second (i) were OK? (Y/N)
- (3) Check whether (m) was OK? (Y/N)

(B) When the reference device is D-VHS:

- (a) Connect the DUT and the reference device (D-VHS).
- (b) Check that the reference D-VHS is recognized from the DUT.
- (c) Start the playback on the reference D-VHS and start recording on the DUT. Note that the self-encoded signal is recorded on the tape.
- (d) Stop the playback on the reference D-VHS and the recording on the DUT.
- (e) Disconnect the cable between the DUT and the reference
- (f) Connect the cable between the DUT and the reference device.
- (g) Repeat (b)-(d) for once.
- (h) Play back the recorded images on the DUT and start recording on the reference D-VHS.
- (i) Stop the playback on the DUT and the recording on the reference D-VHS.
- (j) Disconnect the cable between the DUT and the reference device.
- (k) Connect the cable between the DUT and the reference device.

- (l) Check that the DUT is recognized on the reference D-VHS
- (m) Repeat (h)-(i) for once.
- (n) Play back the tape recorded on the reference D-VHS, and check that dubbing in the middle of the operation was executed correctly.

Check items:

- (1) Check whether the first and the second (b) were OK (Y/N)?
- (2) Check whether (l) was OK? (Y/N)
- (3) Check whether (n) was OK? (Y/N)

B.2 Network Test Procedure for D-VHS

B.2.1 Test Procedure of Common Test

Common Test 1 and Common Test 2 are executed as specified in Section 5.4.

B.2.2 Test Procedure of Individual Test

- (a) Disconnect the DUT from the basic configuration.
- (b) No isochronous transmissions on the bus
- (c) Connect the DUT according to the specified topology.
- (d) Start recording the images from the STB or the TV on the DUT
- (e) Start the file transfer between the PC and the SBP-2 HDD.
- (f) Complete the file transfer after the short while.
- (g) Stop the recording on the DUT.
- (h) Play back the recorded images on the DUT and start viewing them on the STB or the TV.
- (i) Check that the audio and images played back on the DUT are displayed on the STB or the TV correctly.
- (j) Start the file transfer between the PC and the SBP-2 HDD.
- (k) Check that the audio and images on the STB or the TV are good during the file transfer.

Check items:

- (1) Check whether (i), (k) were OK (Y/N)?

Annex C: Test Procedures for AV-HDD

C.1 Point-to-Point Test Procedure for AV-HDD

C.1.1 Category of reference device:

- TV
- STB

Select 5 devices from the above categories:

C.1.2 Test procedure

- (a) Connect the DUT and the reference device (TV or STB)
- (b) Check that the DUT is recognized from the reference device.
- (c) Start recording the images from the reference device on the DUT.
- (d) Stop the recording on the DUT
- (e) Disconnect the cable between the DUT and the reference device.
- (f) Connect the cable between the DUT and the reference device.
- (g) Repeat (b)-(d) for once.
- (h) Play back the recorded images on the DUT and start viewing them on the reference device.
- (i) Check that the audio and images played back by the DUT are displayed on the reference device.
- (j) Stop the playback on the DUT.
- (k) Disconnect the cable between the DUT and the reference device.
- (l) Connect the cable between the DUT and the reference device.
- (m) Check that the DUT is recognized from the reference device.
- (n) Repeat (h)-(j) for once.

Check items:

- (1) Check whether the first and the second (b) were OK? (Y/N)
- (2) Check whether the first and the second (i) were OK? (Y/N)
- (3) Check whether (m) was OK? (Y/N)

C.2 Network Test Procedure for AV-HDD

C.2.1 Test Procedure of Common Test

Common Test 1 and Common Test 2 are executed as specified in Section 5.4.

C.2.2 Test Procedure of Individual Test

- (a) Disconnect the DUT from the basic configuration.
- (b) No isochronous transmissions on the bus
- (c) Connect the DUT according to the specified topology.
- (d) Start recording the images from the STB or the TV on the DUT
- (e) Start the file transfer between the PC and the SBP-2 HDD.
- (f) Complete the file transfer after the short while.
- (g) Stop the recording on the DUT.
- (h) Play back the recorded images on the DUT and start viewing them on the STB or the TV.
- (i) Check that the audio and images played back on the DUT are displayed on the STB or the TV correctly.

- (j) Start the file transfer between the PC and the SBP-2 HDD.
- (k) Check that the audio and images on the STB or the TV are good during the file transfer.

Check items:

- (1) Check whether (i), (k) were OK? (Y/N)?

Annex D: Test Procedures for STB

D.1 Point-to-Point Test Procedure for STB

D.1.1 Category of reference device

- D-VHS
- AV-HDD
- Devices that can record and play back MPEG2-TS of the BS digital specifications.

Select 5 devices from the above categories for the test. It is recommended to select devices from as many categories as possible.

D.1.2 Test procedure

- (a) Connect the DUT and the reference device.
- (b) Check that the DUT is recognized by the reference device.
- (c) Start recording the images from the DUT on the reference device.
- (d) Stop the recording on the reference device.
- (e) Disconnect the cable between the DUT and the reference device.
- (f) Connect the cable between the DUT and the reference device.
- (g) Repeat (b)-(d) for once.
- (h) Play back the recorded images on the reference device and start viewing them on the DUT.
- (i) Check that the audio and images played back by the reference device are displayed on the DUT.
- (j) Stop the playback on the reference device.
- (k) Disconnect the cable between the DUT and the reference device.
- (l) Connect the cable between the DUT and the reference device.
- (m) Check that the DUT is recognized by the reference device.
- (n) Repeat (h)-(j) for once.

Check items:

- (1) Check whether the first and the second (b) were OK? (Y/N)
- (2) Check whether the first and the second (i) were OK? (Y/N)
- (3) Check whether (m) was OK? (Y/N)

D.2 Network Test Procedure for STB

D.2.1 Test Procedure of Common Test

Common Test 1 and Common Test 2 are executed as specified in Section 5.4.

D.2.2 Test Procedure of Individual Test

- (a) Disconnect the DUT from the basic configuration.
- (b) No isochronous transmissions on the bus
- (c) Connect the DUT according to the specified topology.
- (d) Start recording the images from the DUT on the D-VHS or the AV-HDD.
- (e) Start the file transfer between the PC and the SBP-2 HDD.
- (f) Complete the file transfer after the short while.
- (g) Stop the recording on the D-VHS or the AV-HDD.

- (h) Play back the recorded images on the D-VHS or the AV-HDD and start viewing them on the DUT.
- (i) Check that the audio and images played back on the D-VHS or the AV-HDD are displayed on the DUT correctly.
- (j) Start the file transfer between the PC and the SBP-2 HDD.
- (k) Check that the audio and images on the DUT are good during the file transfer.

Check items:

- (1) Check whether (i), (k) were OK? (Y/N)?

Annex E: Test Procedures for TV

E.1 Point-to-Point Test Procedure for TV

E.1.1 Category of reference device

- D-VHS
- AV-HDD
- Devices that can record and play back MPEG2-TS of the BS digital specifications.

Select 5 devices from the above categories for the test. It is recommended to select devices from as many categories as possible.

E.1.2 Test procedure

- (a) Connect the DUT and the reference device.
- (b) Check that the DUT is recognized by the reference device.
- (c) Start recording the images from the DUT on the reference device.
- (d) Stop the recording on the reference device.
- (e) Disconnect the cable between the DUT and the reference device.
- (f) Connect the cable between the DUT and the reference device.
- (g) Repeat (b)-(d) for once.
- (h) Play back the recorded images on the reference device and start viewing them on the DUT.
- (i) Check that the audio and images played back by the reference device are displayed on the DUT.
- (j) Stop the playback on the reference device.
- (k) Disconnect the cable between the DUT and the reference device.
- (l) Connect the cable between the DUT and the reference device.
- (m) Check that the DUT is recognized by the reference device.
- (n) Repeat (h)-(j) for once.

Check items:

- (1) Check whether the first and the second (b) were OK? (Y/N)
- (2) Check whether the first and the second (i) were OK? (Y/N)
- (3) Check whether (m) was OK? (Y/N)

E.2 Network Test Procedure for TV

E.2.1 Test Procedure of Common Test

Common Test 1 and Common Test 2 are executed as specified in Section 5.4.

E.2.2 Test Procedure of Individual Test

- (a) Disconnect the DUT from the basic configuration.
- (b) No isochronous transmissions on the bus
- (c) Connect the DUT according to the specified topology.
- (d) Record the images from the DUT on the D-VHS or the AV-HDD.
- (e) Start the file transfer between the PC and the SBP-2 HDD.
- (f) Complete the file transfer after the short while.
- (g) Stop the recording on the D-VHS or the AV-HDD.
- (h) Play back the recorded images on the D-VHS or the AV-HDD and start viewing them on the DUT.

- (i) Check that the audio and images played back on the D-VHS or the AV-HDD are displayed on the DUT correctly.
- (j) Start the file transfer between the PC and the SBP-2 HDD.
- (k) Check that the audio and images on the DUT are good during the file transfer.

Check items:

- (1) Check whether (i), (k) were OK? (Y/N)?