SONY
Automation/Drive Serial Interface Proposed Specification

Internal Document (Version March 14th 2002)

NOTE:

This document is submitted from Sony Corporation to ANSI/T10 committee for the purpose of standardization business of the Automation/Drive Serial Interface (ADI). The ANSI/T10 members should be able to use the content of this document.

Table of Contents

1 Scope

This document specifies the five types of physical interface as Clause 9 and one type of communication protocol as Clause 7 between Automation and Drives.

2 Conformance

Automation and Drive shall support at least one physical interface.

Automation and a Drive shall be in conformance with this document if it meets all the mandatory requirements specified herein.

3 Reference

ANSI SPC-3	SCSI Primary Commands – 3 (Revision 04 or later, Sections 5.9, 7.14, 7.31 and 8.3.).
ANSI SSC-2	SCSI Stream Commands – 2 (Revision 07 or later).
ANSI SMC-2	SCSI-3 Media Changer Commands – 2 (Revision 02 or later).
ANSI/TIA/EIA-232	Serial Interface Specification
ANSI/TIA/EIA-422	Balanced Serial Interface Specification
ANSI/TIA/EIA-423	Unbalanced Serial Interface Specification

4 Definitions

For the purposes of this document the following definitions, apply.

4.1 Automatic Track Finding (ATF)

The method by which tracking is achieved.

4.2 Automation

The robotics including its controller.

4.3 byte

An ordered set of bits acted upon as a unit.

4.4 Drive

The removable data storage device.

4.5 End of Data (EOD)

The point on the tape at the end of the group which contains the last user data.

4.6 Frame

A pair of adjacent tracks with azimuths of opposite polarity, in which the track with the positive azimuth precedes that with the negative azimuth.

4.7 Physical Beginning of Tape (PBOT)

The point where the leader tape is joined to the magnetic tape.

4.8 Physical End of Tape (PEOT)

The point where the trailer tape is joined to the magnetic tape.

4.9 Track

A diagonally positioned area on the tape along which a series of magnetic signals may be recorded.

5 Conventions and notations

5.1 Representation of numbers

The following conventions and notations apply in this document unless otherwise stated.

- In each block and in each field the bytes shall be arranged with Byte 0, the most significant, first. Within each byte the bits shall be arranged with Bit 7, the most significant, first and Bit 0, the least significant bit, last.
- Letters and digits in parentheses represent numbers in hexadecimal notation.
- Letters and digits in square parentheses represent numbers in BCD notation.
- The setting of bits is denoted by ZERO or ONE.
- Numbers in binary notation and bit patterns are represented by strings of digits 0 and 1 shown with the most significant bit to the left. Within such strings, X may be used to indicate that the setting of a bit is not specified within the string.

5.2 Names

The names of basic elements, e.g. specific fields, are written with a capital initial letter.

5.3 Alphanumeric string encoding

Unless otherwise stated, all alphanumeric strings shall be encoded using ISO/IEC 646.

6 Acronyms

BCD	Binary Code Decimal
MSB	Most Significant Bit
LSB	Least Significant Bit
CRC	Cyclic Redundancy Code
EDC	Error Detecting Code
msb	Most Significant Bit
MSB	Most Significant Byte
lsb	Least Significant Bit
LSB	Least Significant Byte

7 Communication between Automation and Drive

Automation and Drive shall be communicating each other by the Packet specified in this clause. The Packet shall be transferred through the serial interface specified in clause 9.

The communication between the Automation and the Drive shall be periodic manner. The communication shall be initiated by the polling from the Drive every 250 ms.

7.1 Packet from Drive to Automation (22 bytes)

The length of a packet, which is transferred from Drive to Automation, shall be 22 bytes. A Packet shall consist of SYNC, Drive Status, Command, Parameter, and Checksum. Automation shall return its status as the response towards Drive. See table 1.

Table 1 – Packet Structure (from Drive to Automation)

Field	Byte Offset	Number of Bytes	Description
SYNC	0	1	See 7.1.1. Shall be set to (AA).
Drive Status 1	1	1	See 7.1.1.
Drive Status 2	2	1	See 7.1.2.
Drive Status 3	3	1	See 7.1.3.
Drive Status 4	4	1	See 7.1.4.
Reserved	5	3	Shall be set to all ZEROs.
Command	8	1	See 7.1.5
Parameter 1	9	4	See 7.1.5
Parameter 2	13	4	See 7.1.5
Parameter 3	17	4	See 7.1.5
Checksum	21	1	See 7.1.7.

There is a 2 seconds time-out that the Drive will waiting for the Automation to response after it sent the command packet. If the time-out occurred, the Drive will retry for 600 times then post a communication error D3h if the Automation did not respond at all.

7.1.1 SYNC

The SYNC represents the beginning of a packet and shall be set to (AA).

7.1.2 Drive status 1

Bit 0 to Bit 3: Shall be set to ZERO.

Bit 4: Cassette WP (Yes = ONE, No = ZERO)
If the tape in the Drive is WP then this field shall be set to ONE else shall be set to ZERO.

Bit 5: Shall be set to ZERO.

Bit 6: Cassette in Drive (Yes = ONE, No = ZERO)

If the tape is in the Drive then this field shall be set to ONE else shall be set to ZERO.

Bit 7: Cleaning Request (Yes = ONE, No = ZERO)

If the Drive is requesting for its head to be cleaned then this field shall be set to ONE else shall be set to ZERO.

7.1.3 Drive status 2

This field shall represent the current SCSI command in operation.

7.1.4 Drive status 3

Bit 0 to Bit 2: Shall be set to ZERO.

Bit 3: Tape Stuck in Drive. (Yes = ONE, No = ZERO)

If a Drive mechanical error has occurred and the tape is stuck un-ejectable inside the Drive then this field shall be set to ONE else shall be set to ZERO.

Bit 4 to 7: Tape Status. (Yes = ONE, No = ZERO)

This field shall be 4-bit information. Tape Status shall be set to the value below which describes the status of the tape inside the Drive.

0 NO TAPE

1 STOP

2 LOADING

3 UNLOADING

4 FWD

5 Reserved

6 FF

7 REWIND

8 Search progressing (Optional)

9 Read progressing (Optional)

10 Write progressing (Optional)

Other setting are prohibited by this document.

7.1.5 Drive status 4

Bit 0: Host Command Busy. (Busy = ONE, Idle = ZERO)

If the Drive is processing an Automation Command then this field shall be set to ONE else shall be set to ZERO.

The Host Command Busy bit shall be set to prevent the operator from accessing the front panel when the Drive is processing a SCSI Changer Command. It will bring the Automation ONLINE. This flag is also set when a SCSI Prevent Allow Media Removal command is issued to LUN 0 with the prevent bit set.

Bit 1 to Bit 7: Shall be set to all ZEROs.

7.1.6 Command

See 7.3.

7.1.7 Checksum

Checksum shall be the exclusive OR between the sum of all data [*i*] including SYNC (*i* = 0 to 21) and (FF). It shall be the 22nd byte (last byte) of the sending packet.

7.2 Packet from Automation to Drive (30 bytes)

If the load/unload button of the Automation was pushed, the Automation shall notify the Drive to load/unload a tape by setting byte 1 of the bit 5 or 6, respectively. The Automation shall also request the Drive to rescan the Automation by setting byte 3 of the bit 0.

The length of a Packet, which is transferred from Automation to Drive, shall be 30 bytes. A Packet shall consist of SYNC, Automation Status, Tape Number, Command, Data, Cartridge Slot Info, and Checksum. Automation shall notify Drive to load/unload a tape. Automation shall request Drive to rescan the Automation.

Table 2 – Packet Structure (from Automation to Drive)

Field	Offset	Number of Bytes	Description
SYNC	0	1	See 7.2.1. Shall be set to (AA).
Automation Status 1	1	1	See 7.2.2.
Tape Number for Load	2	1	See 7.2.3.
Automation Status 2	3	1	See 7.2.4.
Reserved	4	4	Shall be set to all ZEROs.
Command	8	1	See 7.2.5.
Data 1	9	4	See 7.2.5.
Data 2	13	4	See 7.2.5.
Data 3	17	4	See 7.2.5.
Cartridge Slot Info	21	5	See 7.2.6.
Reserved	26	3	Shall be set to all ZEROs.
Checksum	29	1	See 7.2.7.

7.2.1 SYNC

The SYNC represents the beginning of a packet and shall be set to (AA).

7.2.2 Automation Status 1

Bit 0: Communication Status. (Busy = ONE, Idle = ZERO)

Communication status shall be set when the Automation is processing a Command from the Drive. This Bit shall be cleared by the Automation after the Drive sends the AUTOMATION_NOP command to let the Automation know that it has received the Status for the Command it had been processing. For the power up sequence, this Bit shall be cleared when the Automation is ready to accept a Command from the Drive.

Bit 1: Checksum Error. (Error = ONE, No error = ZERO)

Checksum Error shall be set when the command packet sent by the Drive runs into a Checksum Error.

Bit 2: Illegal Command. (True = ONE, False = ZERO)

Illegal Command shall be set when the Command sent by the Drive was illegal.

Bit 3: Illegal Parameter. (True = ONE, False = ZERO)

Illegal Parameter shall be set when a parameter set in the Command packet was illegal.

Bit 4: Emergency Eject. (True = ONE, False = ZERO)

Emergency Eject shall be set by the Automation to notify the Drive that the operator has requested for the tape stuck in the Drive (due to a hardware or mechanical failure) to be ejected. The Operation Panel sequence to initiate an emergency eject is TBD.

Bit 5: Front Panel Unload. (True = ONE, False = ZERO)

Front Panel Unload shall be set by the Automation to let the Drive know that the operator has chosen to unload the tape via Operation Panel. The Automation shall wait for the Drive to issue an UNLOAD (C6) Command after the tape has been ejected from the Drive.

Bit 6: Front Panel Load. (True = ONE, False = ZERO)

Front Panel Load shall be set by the Automation to let the Drive know that the operator has chosen to load a tape via Operation Panel. The Automation shall set Byte 2 (Tape Number for Load) to notify the Drive which tape the operator has chosen. The Automation shall wait for the Drive to issue a LOAD CARTRIDGE (C5) command.

Bit 7: Automation Busy. (True = ONE, False = ZERO)

Automation busy shall be set by the Automation whenever the Automation is processing a robotic Command and does not want any SCSI Automation Commands coming in from the host. It shall also be set in OFFLINE mode when the operator may have accessed the Operation Panel. Finally, it shall be set when the robotic is not initialised or currently initialising.

7.2.3 Tape Number for Load

Tape Number for Load shall be set to a slot number when the Front Panel Load Bit (Bit 6 of Byte 1) is set. This represents the tape number that the operator has chosen to be inserted into the Drive via Operating Panel.

7.2.4 Automation Status 2

Bit 0: Scan Automation. (Scan request = ONE, Default = ZERO)

Scan Automation shall be set by the Automation whenever it requires the Drive to issue a Scan Automation Command to determine which cartridges are present. This can occur when the operator has imported or exported a cartridge into or out of the Automation.

Bit 1: Media Auxiliary Memory Reader (Available = ONE, Not available = ZERO)

This field shall be set when the Media Auxiliary Memory Reader option is installed and operational. This field shall be set to ZERO if not used.

Bit 2: Barcode Reader (Available = ONE, Not available = ZERO)

This field shall be set when the Barcode Reader option is installed and operational. This field shall be set to ZERO if not used.

Bit 3: Automation Mechanical Error (Error = ONE, No error = ZERO)

This field shall be set when the Automation has run into a fatal mechanical failure.

Bit 4: Sequential Mode (On = ONE, Off = ZERO)

Sequential Mode shall be set if Sequential mode is selected on the OCP (Operator Control Panel).

Bit 5: Loop Mode (On = ONE, Off = ZERO)

Loop Mode shall be set if Loop mode is selected on the OCP when Sequential mode is active.

Bit 6: Auto Clean (On = ONE, Off = ZERO)

Auto Clean shall be set if Auto Clean is selected on the OCP.

Bit 7: Door Status (Close = ONE, Open = ZERO)

Door Status shall be set when the Door is closed. It is cleared when the Door is open. This bit may be used for Tape Alert support. This field shall be set to ONE if not used.

7.2.5 Command

See 7.3.

7.2.6 Cartridge Slot Information

The Slot Status Definitions shall be as follows:

0000: No Cartridge Present	1000: No Cartridge Present (Cleaning Cartridge)
0001: Cartridge in Slot	1001: Cartridge in Slot (Cleaning Cartridge)
0010: Cartridge in Transit	1010: Cartridge in Transit (Cleaning Cartridge)
0011: Cartridge in Drive	1011: Cartridge in Drive (Cleaning Cartridge)
0100: Cartridge Missing	1100: Cartridge Missing (Cleaning Cartridge)
0101: Reserved	1101: Reserved (Cleaning Cartridge)
0110: Reserved	1110: Reserved (Cleaning Cartridge)
0111: Reserved	1111: Reserved (Cleaning Cartridge)

Byte position	Bit position 7 to 4	Bit position 3 to 0
21	Slot 2 status	Slot 1 status
22	Slot 4 status	Slot 3 status
23	Slot 6 status	Slot 5 status
24	Slot 8 status	Slot 7 status
25	Slot 10 status	Slot 9 status

7.2.7 Checksum

Checksum shall be the exclusive OR between the sum of all data[i] including SYNC (i = 0 to 28) and (FF). It will be the 30th byte of the received packet.

7.3 Command

Byte 8 shall contain the Command shown below. Bytes 9 to 20 shall contain the corresponding Parameters.

Command Op Code	Command Name
(00)	AUTOMATION_NOP
(A0)	AUTOMATION_REPROGRAM

(BD)	AUTOMATION_LOG
(C3)	RESET
(C4)	RETRIEVE_SLOT_STATUS
(C5)	LOAD_CARTRIDGE
(C6)	UNLOAD
(C7)	SCAN_AUTOMATION
(C8)	UNLATCH_DOOR
(D4)	SEND_PVT
(DD)	REPORT_REVISION
(E8)	SET_ERROR_CODE
(E9)	MECHINIT
(EC)	SET_PARITY
(ED)	REPORT_SERIAL_NUMBER
(EE)	SET_SERIAL_NUMBER
(EF)	SET_SCSI_ID_NUMBER
(F0)	LATCH_DOOR
(F1)	MOVE_CARTRIDGE
(F2)	READY_SET_GO
(FF)	AUTOMATION_WAIT

7.3.1 AUTOMATION_NOP (00)

Function: Command issued when the Drive has nothing to offer.

Parameter: None

Data 1: Error Code (Only Byte 12. Byte 9 to 11 shall be set to all ZEROs.)

7.3.2 AUTOMATION_REPROGRAM (A0)

Function: Command issued to the Automation just before sending the Automation firmware file via XMODEM protocol. Details are TBD.

Parameter: None.

Data: None.

7.3.3 AUTOMATION_LOG (BD)

Function: This command is issued to the Automation to retrieve Automation log information.

Parameter: Byte 12 shall contain the log page number in range 1 to 64.

Data 2: Bytes 13 shall contain the type. Byte 14 shall contain the error code. Byte 15 shall contain script line. Byte 16 shall be set to 0.

7.3.4 RESET (C3)

Function: Command issued to reset the Automation. No status needs to be returned to the Drive. The Drive will wait 12 seconds (TBD) after Reset is issued so that the Automation will be able to run hardware tests before executing any serial interface commands with the Drive similarly to the power ON sequence. After this 12 second wait, the Drive will issue a AUTOMATION_WAIT command until the Automation becomes ready.

Parameter: None.

Data: None.

7.3.5 RETRIEVE_SLOT_STATUS (C4)

Function: This command is sent to the Automation to instruct the Automation to retrieve the status information for 10 slots, starting from the requested Slot Number.

Parameter 1: Byte 11 and 12 (LSB) shall contain Slot Number in range 1 to 65535.

Cartridge Slot Info: Byte 21 through byte 25 shall contain the status information for 10 slots.

7.3.5 LOAD_CARTRIDGE (C5)

Function: This command is sent to the Automation to instruct the Automation to move the cartridge from the specified slot into the Drive.

Parameter 1: Byte 11 and 12 (LSB) shall contain Slot Number in range 1 to 65535.

Data 1: Byte 12 shall contain the Error Code.

7.3.6 UNLOAD (C6)

Function: The Automation will return the cassette from the Drive to the slot it came from. This command assumes that the tape has already been ejected from the Drive.

Parameter: None.

Data 1: Byte 12 shall contain the Error code.

7.3.7 SCAN_AUTOMATION (C7)

Function: This command is issued to the Automation to scan the Automation to determine what cartridges are present. This command will be issued to the Automation when the Automation sets the Scan Automation bit (byte 3, bit 0) or when a SCSI Initialise Element Status command is issued from the Host.

Parameter: None.

Data 1: Byte 12 shall contain the Error code.

Data 2: Byte 15 and 16(LSB) shall contain the total number of slots in the Automation.

7.3.8 UNLATCH_DOOR (C8)

Function: This command is issued to the Automation to unlatch the door. This command will be issued to the Automation when a SCSI Allow Media Removal command is issued to LUN1.

Parameter: None.

Data 1: Byte 12 shall contain the Error code.

7.3.9 SEND_PVT (D4)

If the Automation does not have either Barcode Reader nor Media Auxiliary Memory Reader then this Command may not be needed. See 7.2.4.

Function: This command is issued to the Automation to retrieve PVT info for the selected slot.

Parameter 1: Byte 11 & 12(LSB): Shall contains the Slot Number in range 1 to 65535.

Data 1: Byte 9: Shall be set to 0.

Byte 10: Shall contain the Scan Status.

Byte 11: Shall contain Character 1 Code.

Byte 12: Shall contain Character 2 Code.

Data 2: Byte 13: Shall contain Character 3 Code.

Byte 14: Shall contain Character 4 Code.

Byte 15: Shall contain Character 5 Code.

Byte 16: Shall contain Character 6 Code.

Data 3: Byte 17: Shall contain Character 7 Code.

Byte 18: Shall contain Character 8 Code.

Byte 19: Shall contain Character 9 Code.

Byte 20: Shall contain Character 10 Code.

7.3.10 REPORT_REVISION (DD)

Function: This will be the first command issued from the Drive to the Automation. This command is issued to provide the Automation the Drive Firmware Revision and to retrieve the Hardware and Firmware Revision levels of the Automation.

Parameter 1: Byte 9: Drive Firmware Version (Product Revision Level)

Byte 10:

Byte 11:

Byte 12:

Parameter 2: Byte 13: (20)

Byte 14: (20)

Byte 15: (20)

Byte 16: (20)

Data 2: Byte 13: Hardware Revision

Byte 14: Vendor unique data

Byte 15: Firmware Revision

Byte 16: Mechanical Revision

7.3.11 SET_ERROR_CODE (E8)

Function: This command is issued to let the Automation know of a Drive error. The First Error Code (Byte 12) will be set to (0D) to indicate a Drive error. The Second Error Code (Byte 16) represents the Drive error code (See 7.3.11.1). These error codes can possibly be indicated on the Op-Panel.

Parameter 1: Byte 9: Shall be set to 0.

Byte 10: Shall be set to 0.

Byte 11: Shall be set to 0.

Byte 12: Shall be set to (0D).

Parameter 2: Byte 13: Shall be set to 0.

Byte 14: Shall be set to 0.

Byte 15: Shall be set to 0.

Byte 16: Shall contain the Error Code (See 7.3.11.1).

Data: None.

7.3.11.1 Error Codes (Byte 16)

Mechanical Initialisation Failure	(90)
Scan Failure	(91)
Cartridge Load Failure	(93)
Cartridge Unload Failure	(94)
Import Failure	(95)
Export Failure	(96)
Belt Axis Failure	(A0)
Slider Axis Failure	(A1)
Gripper Position Error	(A2)
Cartridge Pick Error	(A3)

Door Function Error ..... (A4)

Fan Error ..... (A5)

7.3.12 MECHINIT (E9)

Function: This command is issued to the Automation to perform a mechanical initialisation similar to the one that it performs upon power on. This command will be issued to the Automation when a SCSI SEND DIAGNOSTIC l command is issued to LUN1.

Parameter: None.

Data 1: Error code (Byte 12)

7.3.13 SET_PARITY (EC)

Function: This command is issued to the Automation to set parity check condition.

Parameter 1: Byte 9: Shall be set to 0.

Byte 10: Shall be set to 0.

Byte 11: Shall be set to 0.

Byte 12: If this bit set to ONE then parity shall be ON

If this bit set to ZERO then parity shall be OFF.

Parameter 2: Byte 13: Shall be set to 0.

Byte 14: Shall be set to 0.

Byte 15: Shall be set to 0.

Byte 16: Shall contain the Error Code (See 7.3.11.1).

Data 1: Error code (Byte 12)

7.3.14 REPORT_SERIAL_NUMBER (ED)

Function: This command is issued to the Automation to retrieve the Automation's 10-digit serial number stored in the EEPROM.

Parameter: None.

Data 1-3 (Bytes 9 to 20):

Data 1: Byte 9: 0

Byte 10: 0

Byte 11: Character 9

Byte 12: Character 8

Data 2: Byte 13: Character 7

Byte 14: Character 6

Byte 15: Character 5

Byte 16: Character 4

Data 3: Byte 17: Character 3

Byte 18: Character 2

Byte 19: Character 1

Byte 20: Character 0

7.3.15 SET_SERIAL_NUMBER (EE)

Function: This command will be supported as debugger command so that the 10-digit serial number could be stored into the Automation's EEPROM.

Parameter 1: Byte 9: Shall be set to 0.

Byte 10: Shall be set to 0.

Byte 11: Character 9

Byte 12: Character 8

Parameter 2: Byte 13: Character 7

Byte 14: Character 6

Byte 15: Character 5

Byte 16: Character 4

Parameter 3: Byte 17: Character 3

Byte 18: Character 2

Byte 19: Character 1

Byte 20: Character 0

Data 1: Error Code (Byte 12).

7.3.16 SET_SCSI_ID_NUMBER (EF)

Function: Automation set new SCSI ID Number to Drive.

Parameter 1: Byte 12: SCSI ID Number.

Data 1: Error Code. (Byte 12)

7.3.17 LATCH_DOOR (F0)

If the Automation does not have door then this Command may not be needed.

Function: This command is issued to the Automation to latch the door. This command will be issued to the Automation when a SCSI Prevent Media Removal command is issued to LUN 1.

Parameter: None

Data 1:Error code (Byte 12)

7.3.18 MOVE_CARTRIDGE (F1)

If the Automation does not have I/E (Input/Output) Port then this Command may not be needed.

Function: This command instructs Automation to move cartridge from the specific slot into the specific Drive, from the specific Drive to the specific slot, from the specific I/E to the specific slot, and from the specific I/E to the specific Drive.

Parameter 1: Byte 9, Byte 10: Source Element Address.

Byte 11, Byte 12: Destination Element Address.

Data 1: Error Code (Byte 12).

7.3.19 READY_SET_GO (F2)

Function: The purpose of this command is to set Drive the hour. If the Drive has no watch the message may be tick count. If the Drive has no watch and no tick counter then this command may not be needed. Parameter 1 and 2 may be set to tick count.

Parameter 1: Byte 9: Shall be set to 0.

Byte 10: YY (year)

Byte 11: YY (year)

Byte 12: MM (month)

Parameter 2: Byte 13: DD (day)

Byte 14: HH (hour)

Byte 15: MM (minute)

Byte 16: SS (second)

Data 1: Error Code (Byte 12).

7.3.20 AUTOMATION_WAIT (FF)

Function: Command issued to the Automation when the Drive is waiting for a command to complete.

Parameter: None

Data: None

7.4 Error Code (SET_ERROR_CODE command Parameter 1)

EOD_ENCOUNTERED ..... (30)

EOM_ENCOUNTERED ..... (31)

BLANK_ENCOUNTERED ..... (32)

NON_AIT_ENCOUNTERED ..... (33)

SUBCODE_UNCERTAIN ..... (34)

ECC_UNCORRECTABLE ..... (35)

SYSTEM_AREA_UNCERTAIN ..... (36)

BOM_ENCOUNTERED ..... (37)

READ_FRAME_OVER ..... (3A)

SYSTEM_AREA_TIMEOUT ..... (3B)

MISSING_TARGET ..... (40)

APPROACH_ERROR ..... (44)

LOCATION_MISMATCH ..... (49)

APPEND_ERROR ..... (50)

TOO_MANY_READ_AFTER_WRITE_ERROR ..... (51)

SYSTEM_LOG_FAILURE ..... (52)

FORMAT_FAILURE ..... (53)

EOM_DETECTED_ON_WRITE ..... (54)

APPEND_TIMEOUT ..... (55)

APPEND_NO_AFC ..... (56)

APPEND_OVER_POSITION ..... (57)

APPEND_POSITION_MISMATCH ..... (58)

ATF_UNLOCK ..... (59)

APPEND_DBP_NG ..... (5A)

FORMAT_TIMEOUT ..... (5B)

WRITE_FRAME_OVER ..... (5D)

WRITE_ECC_OVER ..... (5E)

ADA_FRAME_OVER ..... (67)

ECC_FRAME_OVER_DDS ..... (68)

MECHACON_IF_COMMAND_REJECT_ERROR ..... (6B)

CAPSTAN_NO_FG ..... (B4)
MECH_CON_COMM_TIMEOUT ..... (Bf)
UNKNOWN_BAT_ENTRY ..... (C0)
ILLEGAL_FORMAT ..... (C1)
FORMAT_DISCONTINUITY ..... (C2)
NON_DATA_COMPRESSION_ENCOUNTERED ..... (C9)
TARGET_NOT_FOUND ..... (CB)
UNEXPECTED_EOR ..... (CC)
ILLEGAL_SKIP_COUNT ..... (CD)
DATA_COMPRESSION_ERROR ..... (CE)
ILLEGAL_DMA_COMPLETION ..... (CF)
DMA_ABORT_ERROR ..... (E0)
FMK_ENCOUNTERED ..... (E4)
SMK_ENCOUNTERED ..... (E5)
BOP_ENCOUNTERED ..... (E6)
EOD_ENCOUNTERED_AT_BOT ..... (E7)
DMA_HARDWARE_ERROR ..... (E9)
MIC_BROKEN_ERR ..... (F0)
ILLEGAL_TAPE ..... (F8)
ILLEGAL_FIRMWARE ..... (F9)
UNDEFINED_TAPE ..... (FA)
FIRMWARE_VERIFICATION_FAILURE ..... (FC)
FIRMWARE_TAPE_FAILURE ..... (FD)
FIRMWARE_REPROGRAMMING_FAILURE ..... (FE)

7.5 Dialog

The example of communication sequences are as follows:

Table 3 - Typical Communication Sequence

Drive		Automation	
AUTOMATION_NOP (00)	→		
	←	Communication_status = IDLE command state = (7F)	
AUTOMATION_NOP	→		
	←	Communication_status = IDLE command state = (7F)	
	*		
	*		
	*		
AUTOMATION_NOP	→		
	←	Communication_status = IDLE command_state = (7F)	
LOAD_CARTRIDGE (C5)	→		
	←	Communication_status = BUSY command_state = (7F)	Automation moves the Cartridge into the drive
AUTOMATION_WAIT (FF)	→		
	←	Communication_status = BUSY command_state = (7F)	
	*		
	*		
	*		
AUTOMATION_WAIT	→		Automation has finished moving the Cartridge
	←	Communication_status = BUSY command_state = LOAD_CARTRIDGE (C5)	
AUTOMATION_NOP	→		
	←	Communication_status = IDLE command_state = (7F)	

Table 4 - Communication Sequence with Error

Drive		Automation	
AUTOMATION_NOP (00)	→		
	←	communication_status = IDLE command state = (7F)	
AUTOMATION_NOP	→		
	←	communication_status = IDLE command state = (7F)	
	*		
	*		
	*		
AUTOMATION_NOP	→		
	←	communication_status = IDLE command_state = (7F)	
LOAD_CARTRIDGE (C5)	→		
	←	communication_status = BUSY command_state = (7F)	Automation moves the Cartridge into the drive
AUTOMATION_WAIT (FF)	→		
	←	communication_status = BUSY command_state = (7F)	
	*		
	*		
	*		
AUTOMATION_WAIT	→		Automation stop due to mechanical error
	←	communication_status = BUSY command_state = LOAD_CARTRIDGE (C5)	
	←	packet: Byte 3, Bit 3 (automation_mech_err) is set; Byte 9 - 12: Error Code is set	
AUTOMATION_NOP	→		
	←	communication_status = IDLE command_state = (7F)	

Table 5 - Power Up Sequence

Drive		Automation	
Drive executes its own power up sequence. Drive waits 12 sec.		Automation executes an internal Hardware test. Approximately 9 seconds.	
AUTOMATION_WAIT	→		
	←	Communication_status = BUSY command state = (7F)	Automation executes the mechanical initialisation and scanning of the cartridges (approximately 20 seconds.)
	*		
	*		
	*		
AUTOMATION_WAIT	→		
	←	Communication_status = IDLE command_state = (7F)	Automation is ready
REPORT_REV (DD)	→		
	←	Communication_status = BUSY command_state = REPORT_REV (DD)	
AUTOMATION_NOP	→		
	←	Communication_status = IDLE command_state = (7F)	
REPORT_SERIAL_NUMBER (ED)	→		
	←	Communication_status = BUSY command = REPORT_SERIAL_NUMBER (ED)	
AUTOMATION_NOP	→		
	←	Communication_status = IDLE command_state = (7F)	
SEND_PVT (D4) (Only when BCR is available)	→		
	←	Communication_status = BUSY command_state = SEND_PVT (D4)	
LOADER_NOP	→		
	←	Communication_status = IDLE command_state = (7F)	

9 Hardware Interface

In this document, five types of hardware interfaces are specified. They are the Type A, B, C, D, and E. Type A is a hassle-free profile. Type B is a classic profile. Type C is an average profile. Type D is a PC profile. Type E is a network savvy profile.

9.1 Type A

This hardware interface specifies the hassle-free profile. The profile will require a little resource to implement.

9.1.1 Connector

The 6 pin 1.5 mm Pitch header assembly (SMD).

9.1.2 Signal

Pin 1: + 5 V (75 mA max.)

Pin 2: Serial command drive out put --TXD0 (TTL level)

Iol is 10 mA max.

Ioh is 2 mA max.

Pin 3: Serial command drive in put --RXD0 (TTL level)

Pin 4: TXD1 -- Reserved

Pin 5: RXD1 -- Reserved

Pin 6: GND

9.1.3 Serial protocol

8bit, non parity, Stop bit 1, 9600 baud.

Asynchronous Transfer Mode.

9.2 Type B

This hardware interface specifies the classic profile.

9.2.1 Connector

TBD

9.2.2 Signal

ANSI/EIA/TIA-232

9.2.3 Serial protocol

8bit, non parity, Stop bit 1, TBD baud

Asynchronous Transfer Mode.

9.3 Type C

This hardware interface specifies the average profile.

9.3.1 Connector

TBD

9.3.2 Signal

ANSI/EIA/TIA-422

9.3.3 Serial protocol

8bit, non parity, Stop bit 1, TBD baud

Asynchronous Transfer Mode.

9.4 Type D

This hardware interface specifies the PC profile.

9.4.1 Connector

USB connector.

9.4.2 Signal

Shall use USB Client profile.

9.4.3 Serial protocol

TBD.

9.5 Type E

This hardware interface specifies the networking profile.

9.5.1 Connector

RJ45 (10BASE-T) connector.

9.5.2 Signal

Shall use Ethernet profile.

9.5.3 protocol

TCP, IP, UDP, etc.

Annex A

(informative)

The Sony current products SDX-300C, SDX-400C, SDX-500C, and SDX-700C are using the Type A specification as the physical interface.

SONY Automation/Drive Serial Interface
Proposed Specification

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