Sony 9-Pin Remote Protocol

This is not the offical Sony 9-pin protocol. It is a summary for reference puroposes only. To obtain the protocol document, contact Sony directly.

Updated 6/16/96. Fixed the Prog Speed formula. Added Tables. Added all group 20 descriptions, more info on status bits, and most of the group 40 commands.

Communication Format

The protocol is based on the EIA RS-422-A signal standard, usually at 38.4 kBit/s. The data are sent as 1 start bit + 8 data bits + 1 parity bit + 1 stop bit. Parity is odd: the bitwise sum of data bits 0 -7 and the parity bit is an odd number.

Command Block Format

The controlling device and the controlled device communicate through the interchange of command blocks. The bytes in each command block are assigned as follows:

- **CMD-1/DATA COUNT**. **CMD-1** is the upper 4 bits, **DATA COUNT** is the lower 4.
- **CMD-2**.
- **DATA-1** up to **DATA-N**, where n is the value in data count
- **CHECKSUM**

CMD-1

> Indicates the function and direction of the command, according to:

0	System control (Master->Slave)
1	Return for 0,2, or 4 of cmd-1 (Slave->Master)
2	Transport Control (Master->Slave)
4	Preset/Select control (Master->Slave)
6	Sense Request (Master->Slave)
7	Sense Return (Slave->Master)

DATA COUNT
> Indicates the number of bytes (max 15) inserted between **CMD-2** and **CHECKSUM**

CMD-2
> Designates the command. Refer to the command table for definitions. Ex. **CMD-1**=0 and **CMD-2**=0C means LOCAL DISABLE.

DATA-1 to **DATA-N**
> Data which correspond to those indicated by the command. Refer to the command table for data formats.

CHECKSUM
> Lower eight bits of the sum of the bytes in the command block.

Communication Protocol

The protocol is initiated by the master. The slave should return a response within 9 msec. The response may be:

- NAK + Error Data: Undefined command or communication error
- COMMAND + Data: if Command requested data
- ACK: if Command did not request data

The master should not send another command until receiving a response from the slave device. The master must also insure that no more than 10 msec lapses between bytes in a command block. The master must immediatly stop sending data when it receives a NAK + Error Data message. If the Error Data contains "Undefined Command" the master may immediatley send another command, otherwise it must wait at least 10 msec before sending another command. When the master does not receive a response from the slave within the 10 msec timeout, it may assume that communications have ceased and take appropriate measures.

Cabling

The pin assignments for the 9-pin cable are as follows:

Pin	Master	Slave
1	Ground	Ground
2	Rcv A	Xmit A
3	Xmit B	Rcv B
4	Xmit Common	Rcv Common
5	Spare	Spare
6	Rcv Common	Xmit Common
7	Rcv B	Xmit B
8	Xmit A	Rcv A
9	Ground	Ground

Auth - this varies alot: contact individual manufacturers for pinouts.

Command Table

This is the command table for the DVR-2000/2100. It is summarised here for reference purposes only. If you want to order it from Sony call the Kansas City supply center and hope you get someone who knows the part number for the recorder whose protocol you want to use.

	Command		Response
00 0C	Local Disable	10 01	Ack
00 11	Device Type Request	12 11	Device Type
00 1D	Local Enable	10 01	Ack
20 00	Stop	10 01	Ack
20 01	Play	10 01	Ack
20 02	Record	10 01	Ack
20 04	Standby Off	10 01	Ack
20 05	Standby On	10 01	Ack
20 0F	Eject	10 01	Ack
20 10	Fast Fwd	10 01	Ack
2X 11	Jog Fwd	10 01	Ack
2X 12	Var Fwd	10 01	Ack
2X 13	Shuttle Fwd	10 01	Ack
20 20	Rewind	10 01	Ack
2X 21	Jog Rev	10 01	Ack
2X 22	Var Rev	10 01	Ack

2X 23	Shuttle Rev	10 01	Ack
20 30	Preroll	10 01	Ack
24 31	Cue up with Data	10 01	Ack
20 34	Sync Play	10 01	Ack
21 38	Prog Speed Play +	10 01	Ack
21 39	Prog Speed Play -	10 01	Ack
20 40	Preview	10 01	Ack
20 41	Review	10 01	Ack
20 42	Auto Edit	10 01	Ack
20 43	Outpoint Preview	10 01	Ack
2X 54	Anti-Clog Timer Disable	10 01	Ack
2X 55	Anti-Clog Timer Enable	10 01	Ack
20 60	Full EE Off	10 01	Ack
20 61	Full EE On	10 01	Ack
20 63	Select EE On	10 01	Ack
20 64	Edit Off	10 01	Ack
20 65	Edit On	10 01	Ack
20 6A	Freeze Off	10 01	Ack
20 6B	Freeze On	10 01	Ack
44 00	Timer-1 Preset	10 01	Ack
44 04	Time Code Preset	10 01	Ack
44 05	User Bit Preset	10 01	Ack
40 08	Timer-1 Reset	10 01	Ack
40 10	In Entry	10 01	Ack
40 11	Out Entry	10 01	Ack
40 12	Audio In Entry	10 01	Ack
40 13	Audio Out Entry	10 01	Ack
44 14	In Data Preset	10 01	Ack
44 15	Out Data Preset	10 01	Ack
44 16	Audio In Data Preset	10 01	Ack
44 17	Audio Out Data Preset	10 01	Ack
40 18	In + Shift	10 01	Ack
40 19	In - Shift	10 01	Ack
40 1A	Out + Shift	10 01	Ack
40 1B	Out - Shift	10 01	Ack
40 1C	Audio In + Shift	10 01	Ack
40 1D	Audio In - Shift	10 01	Ack
40 1E	Audio Out + Shift	10 01	Ack
40 1F	Audio Out - Shift	10 01	Ack
40 20	In Flag Reset	10 01	Ack

40 21	Out Flag Reset	10 01	Ack
40 22	Audio In Flag Reset	10 01	Ack
40 23	Audio Out Flag Reset	10 01	Ack
40 24	In Recall	10 01	Ack
40 25	Out Recall	10 01	Ack
40 26	Audio In Recall	10 01	Ack
40 27	Audio Out Recall	10 01	Ack
40 2D	Lost Lock Reset	10 01	Ack
4X 30	Edit Preset	10 01	Ack
44 31	Preroll time preset	10 01	Ack
41 32	Tape/Auto Select	10 01	Ack
41 33	Servo Ref Select	10 01	Ack
41 34	Head Select	10 01	Ack
41 35	Color Frame select	10 01	Ack
41 36	Timer Mode Select	10 01	Ack
41 37	Input Check	10 01	Ack
41 3A	Edit Field Select	10 01	Ack
41 3B	Freeze Mode Select	10 01	Ack
4X 3E	Record Inhibit	10 01	Ack
40 40	Auto Mode Off	10 01	Ack
40 41	Auto Mode On	10 01	Ack
40 42	Spot Erase Off	10 01	Ack
40 43	Spot Erase On	10 01	Ack
40 44	Audio Split Off	10 01	Ack
40 45	Audio Split On	10 01	Ack
4X 98	Output H Phase	10 01	Ack
4X 9B	Output Video Phase	10 01	Ack
4X A0	Audio Input Level	10 01	Ack
4X A1	Audio Output Level	10 01	Ack
4X A2	Audio Adv Level	10 01	Ack
4X A8	Audio Output Phase	10 01	Ack
4X A9	Audio Adv Out Phase	10 01	Ack
4X AA	Cross Fade Time Preset	10 01	Ack
4X B8	Local Key Map	10 01	Ack
42 F8	Still Off time	10 01	Ack
42 FA	Stby Off time	10 01	Ack
61 0A	TC Gen Sense	74 08	Gen Time Data
		79 09	Gen User Bits Data
		74 00	Timer-1 Data
		74 01	Timer-2 Data

		74 04	LTC Time Data
		74 05	User Bits (LTC) Data
61 0C	Current Time Sense	74 06	VITC Time Data
		74 07	User Bits (VITC) Data
		74 14	Corrected LTC Time Data
		74 15	Hold User Bits (LTC) Data
		74 16	Hold VITC Time Data
		74 17	Hold User Bits (VITC) Data
60 10	In Data Sense	74 10	In Data
60 11	Out Data Sense	74 11	Out Data
60 12	Audio In Data Sense	74 12	Audio In Data
60 13	Audio Out Data Sense	74 13	Audio Out Data
61 20	Status Sense	7X 20	Status Data
61 21	Extended VTR Status	7X 21	Extended Status Data
62 23	Signal Control Sense	7X 23	Signal Control Data
6X 28	Local Key Map Sense	7X 28	Local Key Map
61 2A	Head Meter Sense	7X 2A	Head Meter Data
60 2B	Remaining Time Sense	76 2B	Remaining Time
60 2E	Cmd Speed Sense	7X 2E	Cmd Speed Data
61 30	Edit Preset Sense	7X 30	Edit Preset Status
60 31	Preroll Time Sense	74 31	Preroll Time
60 36	Timer Mode Sense	71 36	Timer Mode Status
60 3E	Record Inhibit Sense	72 3E	Record Inhibit Status
60 52	DA Inp Emph Sense	71 52	DA Input Emphasis Data
60 53	DA PB Emph Sense	71 53	DA Playback Emphasis Data
60 58	DA Samp. Freq. Sense	71 58	DA Sampling Frequency Data
61 AA	Cross Fade Time Sense	7X AA	Cross Fade Time Data

Command Formats

00 0C Local Disable
   Disables operation of the slave device from its control panel.
00 11 Device Type Request
   Slave Responds with
12 11 Device Type
   message, with 2 bytes of data:

Model	Data
BVU-800	10 00
BVW-10	2X 00
BVW-11	2X 02
BVW-15	2X 03
BVW-35	2X 10

BVW-40	2X 01
BVW-50	2X 30
BVW-60	2X 20
BVW-65	2X 21
BVW-95	2X 22
BVW-96	2X 23
BVW-70	2X 24
BVW-75	2X 25
BVW-D75	2X 46
BVW-9000	2X 47
PVW-2600	2X 40
PVW-2800	2X 41
BVW-35PM	20 18
BVW-65PM	20 29
BVW-95PM	20 2A
BVW-75PM	20 2D
BVW-85P	21 26
BVW-70S	21 2C
BVW-75S	21 2D
WBR-700	21 2D
DVR-2000	3X 10
DVR-2100	3X 11

Where X=0 for NTSC/PAL-M (525) models and 1 for PAL/SECAM models.

00 1D Local Enable

Enable operation of slave device from local panel according to the local enable map set by the "4X B8" Local Key Map command.

10 01 ACK

Slave Sends this when it receives a command from Master.

11 12 NAK

When a communication error is detected, the slave sends this command with a "1" in the following position indicating the appropriate error condition:

7	6	5	4	3	2	1	0
Time Out	Framing Error	Overrun Error	Parity Error	X	Checksum Error	X	Undefined command

20 00 Stop

Slave stops current motion.

20 01 Play

Slave Starts to play from current location. When the "Sync play" mode is selected from the System menu on the slave, "Play" has the same effect as 20.34 "Sync Play".

20 02 Record

Slave begins recording. Exactly what happens depends on Auto Mode, record lockout, and edit presets.

20 04 Standby Off

Turns off standby mode. For VTR, this causes the machine to unthread in stop. Affects EE/Tape selection. Available only in Stop mode.

20 05 Standby On

Turns on standby mode. For VTR, this causes the machine to stay threaded when in stop. Affects EE/Tape selection.

20 0F Eject

When this command is received, the slave will eject the tape.

20.10 Fast Fwd

When this command is received, the slave device will run in fast forward mode. The speed depends on the VTR; for the DVR2000 series it is 50 x play speed.

2X.11 Jog Forward
2X.12 Var Forward
2X.13 Shuttle Forward

When these commands are received the slave device will move forward with the speed indicated by DATA-1 and DATA-2.

When only DATA-1 is given, the speed wil be given by

$$\text{Tape Speed} = 10^{((N/32)-2)} \times \text{play speed.}$$

where N is the value of DATA-1. Some sample values are:

Speed	Speed Data
0.1	32 (20H)
1.0	64 (40H)
2.9	79 (4FH)
48.7	118 (76H)

When a more precise speed value is required, then DATA-2 will be added. The speed formula for this case is

$$\text{Tape Speed} = 10^{((N/32)-2)} + N'/256*(10^{(((N+1)/32)-2)}-10^{((N/32)-2)})$$

where N is the value of DATA-1 and N' is the value of DATA-2.

auth - in more standard terms, the formula says that DATA-2 is used to linealy interpolate between the value given by N and that of N+1.

The maximum jog speed is set in the System:System menu. The maximum Var speed is 3X play speed. The maximum shuttle speed is 50X play speed.

auth - There is considerable controversy over the minimum speed. For a speed value of 0, the above formula with only DATA-1 gives 10^-2, or .01 x play speed. The standard states that when a speed between 0 and the minumum is given, the slave moves at minimum speed. In fact, many editors and control systems intend a "Shuttle 0" command (21 13 00) to pause the device and have it stop without disengaging. Devices which fail to do so will creep about 1 frame/second in this situation.

20 20 Rewind

When it receives this command, the slave runs in reverse at maximum speed: on the DVR2000, this is 50xplay speed.

2X 21 Jog Rev
2X 22 Var Rev
2X 23 Shuttle Rev

When receiving one of the above commands, the slave will start running in accordance with the speed data defined by DATA-1 and DATA-2. For the maximum and minimum speed see the 2X.12 Shuttle Fwd command.

20 30 Preroll

When this command is received the slave will search to the preroll position defined as the value obtained by subtracting the preroll time set by the 44.31 Preroll Time Preset command from the IN POINT data stored in the IN ENTRY memory by the 40.10 In Entry command.

24 31 Cue Up With Data

Cues the slave to the indicated time. Time is formatted as follows:

```
        data-1        data-2        data-3        data-4
     | Frame |    | Seconds |    | minutes |    | hours |
     | 10  1 |    |  10  1  |    |   10  1  |    | 10  1 |
```

auth - this is how time is represented in all commands and responses using a time code. The numbers indicate that the 10s value is stored in the high nibble and the 1s value in the low nibble. This is not to be confused with the 80-bit SMPTE timecode which is present in the analog timecode track on tape, or with the VITC timecode.

20 34 Sync Play

Prerolls the slave for the preset preroll time, then enters play mode.

21 38 Prog Speed Play +

21 39 Prog Speed Play -

These commands play back the slave device in steps of 0.1% within the range of +/- 25.5% of play speed. DATA-1 contains an 8-bit speed value. The deviation from nominal play speed is

```
        Deviation(%)=0.1 x speed value
```

20 40 Preview

20 41 Review

20 42 Auto Edit

When one of these commands is received the slave goes into the indicated mode.

This is all the spec states here. What actually happens is determined by the edit presets, in and out point selections, and ee/tape settings. Basically, all three set the device to the preroll position, and run at play speed up to the in point. In Preview, the slave switches to EE mode at the in point, and out at the out point, simulating the edit without disturbing the recording media. In review, the slave simply continues to play at the in point and rolls to the outpoint. In Auto Edit, the channels indicated by the edit presets are put into record at the in point and the recoding proceeds to the out point.

20 43 Outpoint Preview

Sends transport to preset out point if insert mode is preset.

2X 54 Anti-Clog Timer Disable

Disables the anti-clog timer. This timer is responsible for unthreading the tape upon timeout to save wear on the heads. If a system disables this timer, it should take responsibility for head wear avoidance itself.

2X 55 Anti-Clog Timer Enable

Enables anti-clog timer.

20 60 Full EE Off

Clears all channels from EE mode regardless of EDIT PRESET channels assigned by the 41.30 EDIT PRESET command. It takes the slave 5 frames to perform this operation after it receieves the command.

20 61 Full EE On

Sets all channels to EE mode regardless of EDIT PRESET channels assigned by the 41.30 EDIT PRESET command. It takes the slave 5 frames to perform this operation after it receieves the command.

20 63 Select EE On

This command sets only the preset channels assigned by the 41.30 Edit Preset command to EE mode. The EE mode is cleared by the 20.64 Edit Off command. It takes the slave 5 frames to perform this operation after receiving the command.

20 64 Edit Off

This command will stop recording without affecting the state of motion of the device. Any channels in record will come out in response to this command, after 5 frames of delay. This command also clears the Manual Edit Record mode and the Select EE mode.

20 65 Edit On

This command is used to actually initiate recording. When the device is playing, and the edit presets set by the 4X 30 Edit Preset command are in place, the preset channels will enter record a fixed delay after this command is received. The slave will enter Edit Rec mode at this point. It takes the slave 5 frames to enter Edit Rec after receiving this command.

20 6A Freeze Off

This command un-freezes the output of the device.

20 6A Freeze On

This command freezes the output of the device. There is usually a 2-5 frame delay associocated with the actual freeze.

44 00 Timer-1 Preset

Sets the Timer-1 value to the time code indicated by DATA-1 thru DATA-4. For the time format see the 24.31 Cue Up With Data command.

44 04 Time Code Preset

Sets the Time Code Generator value to the time code indicated by DATA-1 thru DATA-4. The data format is as per the 24.31 Cue Up With Data command, with two additional bits to indicate Color Frame and Drop Frame mode as follows:

Data-1 Bit 7	CF	Data-1 Bit 6	DF
0	Off	0	Off
1	On	1	On

44 05 User Bit Preset

This command presets the value given by DATA-1 through DATA-4 to the User Bits of the Time Code Generator

DATA-1		DATA-2		DATA-3		DATA-4	
MSD	**LSD**	**MSD**	**LSD**	**MSD**	**LSD**	**MSD**	**LSD**
Bin Grp 2	Bin Grp 1	Bin Grp 4	Bin Grp 3	Bin Grp 6	Bin Grp 5	Bin Grp 8	Bin Grp 7

40 08 Timer-1 Reset

Clears Tape timer 1 to 0

40 10 In Entry

Sets the video in point to the value displayed on the slave. This is the value of the selected tape timer.

40 11 Out Entry

Sets the video out point to the value displayed on the slave. This is the value of the selected tape timer.

40 12 Audio In Entry

Sets the audio in point to the value displayed on the slave. This is the value of the selected tape timer.

40 13 Audio Out Entry

Sets the audio out point to the value displayed on the slave. This is the value of the selected tape timer.

44 14 In Data Preset

Set the Video In Point to the value indicated by DATA-1 thru DATA-4. The time format is as per the 24.31 Cue Up With Data command.

44 15 Out Data Preset

Set the Video Out Point to the value indicated by DATA-1 thru DATA-4. The time format is as per the 24.31 Cue Up With Data command.

44 16 Audio In Data Preset

Set the Audio In Point to the value indicated by DATA-1 thru DATA-4. The time format is as per the 24.31 Cue Up With Data command.

44 17 Audio Out Data Preset

Set the Audio Out Point to the value indicated by DATA-1 thru DATA-4. The time format is as per the 24.31 Cue Up With Data command.

40 18 In + Shift

Increments the Video in point by one frame.

40 19 In - Shift

Decrements the Video in point by one frame.

40 1A Out + Shift

Increments the Video out point by one frame.

40 1B Out - Shift

Decrements the Video out point by one frame.

40 1C Audio In + Shift

Increments the Audio in point by one frame.

40 1D Audio In - Shift

Decrements the Audio in point by one frame.

40 1E Audio Out + Shift

Increments the Audio out point by one frame.

40 1F Audio Out - Shift

Decrements the Audio out point by one frame.

40 20 In Flag Reset
40 21 Out Flag Reset
40 22 Audio In Flag Reset
40 23 Audio Out Flag Reset

Turn off the In Entry, Out Entry Audio In, and Audio Out lamps.

auth - do these have any effect on the status bits?

40 24 In Recall
40 25 Out Recall
40 26 Audio In Recall
40 27 Audio Out Recall

Turn on the In Entry, Out Entry Audio In, and Audio Out lamps.

40 2D Lost Lock Reset

Resets (sets to 0) the Data-8/Bit-6 Lost Lock bit in the 7X.20 status data . The LOST LOCK staus will be set when the servo is unlocked in the Play, Rec, or Edit mode.

4X 30 Edit Preset

This command is used for selecting the edit mode and selection of preset audio and video channels. These values are used by the Edit On and Edit Off comands.

Byte	7	6	5	4	3	2	1	0
DATA-1:	X	Insert	Assemble	Video	X	TC	A2 (Cue)	A1 (Cue)
DATA-2:	X	X	X	X	DA4	DA3	DA2	DA1

when the 41.30 command is used, the audio channels are set as per the table in the Edit:Setup menu. When the 42.30 command is used and Bit1 or Bit0 of Data-1 are "1", the Cue channel is selected.

44 31 Preroll time preset

Presets the preroll time given by DATA-1 thru DATA-4. Only the seconds digit int DATA-2 is used, and must be in the range of 0-59. The time format is as per the 24.31 Cue Up With Data command.

41 32 Tape/Auto Select

the Tape/EE mode is seleted by DATA-1 as follows:

```
 Data-1  Mode
-----------------
00      Auto ( Tape/EE )
01      Tape
FF      Follows the mode set in the STATE MAP on the SYSTEM menu in Local.
```

41 33 Servo Ref Select

Selects the SERVO REFERENCE signal according to DATA-1:

```
 DATA-1  State
-----------------
00      Auto
01      External
02      Input
FF      Follows the mode set in REFERENCE on the SYSTEM:SYSTEM menu in Local.
```

41 34 Head Select

auth - this command is not implemented by the DVR2000, but many other systems use it to to select playback/record heads. On the DVR2000 the selection is automatic.

41 35 Color Frame select

Sets the COLOR FRAME mode of the servo system according to DATA-1:

```
 DATA-1  State
 ----------------
 01      2 Field
 02      4 Field
 03      8 Field
 FF      Follows the mode set in LOCK FIELD on the SYSTEM:SYSTEM menu in Local.
```

41 36 Timer Mode Select

Selects the TIMER system used in AUTO mode, and for display of the IN ENTRY, OUT ENTRY, IN PRESET, OUT PRESET, PREROLL, and CUE UP WITH DATA, etc. according to DATA-1:

```
 DATA-1  Mode
 ----------------
 00      TIME CODE
 01      TIMER-1
 02      TIMER-2
 FF      Follows the mode set in F6:CRNT TM on the HOME menu in Local.
```

41 37 Input Check

Switches the INPUT CHECK mode on/off as per DATA-1:

```
 DATA-1 Mode
 00     INPUT CHECK off
 01     INPUT signals sent out VIDEO and MONITOR AUDIO OUTPUT connectors.
```

41 3A Edit Field Select

Assigns the field on which to start the EDIT as per DATA-1:

```
DATA-1   Mode
-------------
00               Field1/Field2: The edit will start on the field the command
                 was received on
01       Field 1
02       Field 2
FF       Follows the mode set in F4:TIMING on the EDIT SETUP menu in Local.
```

The following commands use the field selection:
- [20.60 Full EE Off](#)
- [20.61 Full EE On](#)
- [20.63 Select EE On](#)
- [20.64 Edit Off](#)
- [20.65 Edit On](#)
- [4X.30 Edit Preset](#)

41 3B Freeze Mode Select

Assigns the contents of the freeze picture to be field or frame as per DATA-1:

```
DATA-1  Mode
------------
00      Field-1 or Field-2 ( not fixed )
01      Field 1
10      Field 2
11      Frame
```

4X 3E Record Inhibit
40 40 Auto Mode Off
40 41 Auto Mode On

These commands switch the AUTO mode off and on.

40 42 Spot Erase Off
40 43 Spot Erase On

These commands switch the spot erase mode off and on.

40 44 Audio Split Off
40 45 Audio Split On

These commands switch the audio split mode off and on.

4X 98 Output H Phase

Sets the output Horizontal phase. The 40.98 command sets the H Phase to 0, whereas the 41.98 command sets the H phase according to

```
H Phase = DATA_1 * 148 nsec
```

where DATA_1 is interpreted as a twos complement binary number in the range of -127 to 127.

4X 9B Output Video Phase

Sets the output sync phase. The 40.9B command sets the output sync phase to 0 whereas the 41.9B command sets the output sync phase according to

```
Sync Phase = DATA_1 * 74 nsec
```

where DATA_1 is interpreted as a twos complement binary number in the range of -127 to 127.

4X A0 Audio Input Level

Controls the audio input level. The control mode is assigned by bit 7 of DATA-1. , and the channel to be controled is assigned by bit 6 to bit 0 of DATA-1. When the 41 A0 command is received, the audio input levels of the channels assigned by DATA-1 will be set to their reference levels. When CMDLEN is not 1, the level data will be composed of two bytes per *assigned* channel in the order DA1, DA2, DA3, DA4, CUE. The DATA-1 bits look like:

Bit	7	6	5	4	3	2	1	0
Value	Mode	X	X	Cue	DA4	DA3	DA2	DA1

For Example, when the DATA-1 is 0x11, the command looks like:

DATA-1	DATA-2	DATA-3	DATA-4	DATA-5
11	DA1 LSB	DA1 MSB	CUE LSB	CUE MSB

The level data are interpreted as per the formula:

```
Input Level = 20 log [(Level Data)/(4000h)] (dB)
```

Which gives coverage over the range of +12dB to -infinity.

4X A1 Audio Output Level

Controls the audio output level. When the 41 A1 command is received, the audio output level of the channels selected in DATA-1 will be set to the reference level. Otherwise, it operates as per the 4X.A0 Audio input level command.

4X A2 Audio Adv Level

Controls the audio advance level. When the 41 A2 *fixed doc error here* command is received, the audio advance level of the channels selectd by DATA-1 will be set to the reference level. Otherwise, it operates as per the 4X.A0 Audio input level command.

4X A8 Audio Output Phase

Sets the autdio output phase. The 42.A8 command determines the audio output phase according to the 16-bit value encoded with the low byte in DATA-1 and the high byte in DATA-2. The values are interpreted as 2s complement binary, and currently have a range of +/- 80 samples. When the 40.A8 command is received, the slave will set the audio ouput phase to its nominal value.

4X A9 Audio Adv Out Phase

Sets the Advance audio output phase. The 42.A9 command determines the audio advance phase according to the 16-bit value encoded with the low byte in DATA-1 and the high byte in DATA-2. The values are interpreted as 2s complement binary, and currently have a range of +0/-50 samples. the 40.A9 will set the audio advance phase to its nominal value.

4X AA Cross Fade Time Preset

4X B8 Local Key Map

When the slave receives the 00.1D Local Enable command, the control panel may be used according to the local key map that was set by this command. When the slave receives the 00.0C Local Disable command all the keys, buttons, and adjustment controls on the control panel are disabled. The Eject button can always be used. If the slave receives the 41.B8 command, the local key map is preset by the block level in accordance with DATA-1. IF it receives the 4X.B8 command (X > 2) The local key map is preset by the Switch level.

Block Level switches:

```
      Bit 7 Bit 6 Bit 5   Bit 4   Bit 3   Bit 2   Bit 1   Bit 0
                        Tracking Monitor  Audio   Video Transport
                        Control  Control Control Control Control
```

```
"1": This function will be enabled when in remote
"0": This function will be disabled in remote.
```

When DATA-2 or more are added, control data with two bytes per each block assigned by DATA-1 are added following DATA-1.

At present the transport switches are defined as follows:

Bit	7	6	5	4	3	2	1	0
1st Byte	Execute	Preroll	Search		Rec	Play	Stop	Standby
2nd Byte						Var	Jog	Shuttle

None of the other blocks have any switches assigned, but rather operate as follows:

Video Control: Video phase and Sync phase can be adjusted on the system menu in remote mode.

Audio Control: Audio levels and output phase can be adjusted on the Audio:DA out menu in remote mode.

Monitor Control: the wfm monitor output selection on the system:wfm monitor menu and the montior level adjustments and monitor out selection on the system:audio monitor menu can be adjusted in remote mode.

Tracking Control: Tracking adjustments in the system:tracking menu can be made in remote mode.

42 F8 Still Off time
42 FA Standby Off time
61 0A TC Gen Sense
60 10 In Data Sense
60 11 Out Data Sense
60 12 Audio In Data Sense
60 13 Audio Out Data Sense
61 0C Current Time Sense

Requests the TIME DATA or USER BITS. Slave responds as per DATA-1:

```
   Bit 7    Bit 6   Bit 5   Bit 4   Bit 3   Bit 2   Bit 1   Bit 0
                    VITC    LTC    TIMER 2 TIMER 1  VITC    LTC
                    UB      UB                      TIME    TIME
```

That is to say that the response follows the bit set in DATA-1 as per the following table

Reqest	Response
DATA-1=01 LTC TIME	74.04: LTC TIME DATA
	74.14: CORRECTED LTC TIME DATA
DATA-1=02 VITC TIME	74.06: VITC TIME DATA
	74.16: HOLD VITC TIME DATA
DATA-1=04 TIMER-1	74.00: TIMER-1 DATA
DATA-1=08 TIMER-2	74.01: TIMER-2 DATA
DATA-1=10 LTC UB	74.05: UB (LTC) DATA

	74.15: HOLD UB (LTC) DATA
DATA-1=20 VITC UB	74.07: UB (VITC) DATA
	74.17: HOLD UB (VITC) DATA

Now, when requesting timecode, the results depend on the tape speed because at very low speeds (less than .25 play speed) it may not be possible to recover timecode. However, if VITC is present, that may be used instead. To automate this decision process, Sony has provided the special 61.0C.03 command which will return the best source of time code as per the table below. Note that when both LTC and VITC are not good you get back the 74.14 corrected LTC data. In this case, the time is actually the last good LTC time corrected by the tape timer.

Tape speed > .25

LTC Status	VITC Status	Return Data	Return code
OK	OK	LTC	74.04 XX XX XX XX
NG	OK	VITC	74.06 XX XX XX XX
OK	NG	LTC	74.04 XX XX XX XX
NG	NG	LTC(*)	74.14 XX XX XX XX

Tape speed < .25

LTC Status	VITC Status	Return Data	Return code
OK	OK	VITC	74.06 XX XX XX XX
NG	OK	VITC	74.06 XX XX XX XX
OK	NG	LTC	74.04 XX XX XX XX
NG	NG	LTC(*)	74.14 XX XX XX XX

61 20 Status Sense

When the slave receives a 61.20 Status Sense command, it will respond with a 74 20 Status Data response. The starting byte number and number of bytes requested are encoded in DATA-1, with the starting reg in the high nibble (bits 7-4) and the requested byte count in the low nibble (bits 3-0).

61 21 Extended VTR Status
62 23 Signal Control Sense
6X 28 Local Key Map Sense
61 2A Head Meter Sense
60 2B Remaining Time Sense
60 2E Cmd Speed Sense
61 30 Edit Preset Sense
60 31 Preroll Time Sense
60 36 Timer Mode Sense
60 3E Record Inhibit Sense
60 52 DA Inp Emph Sense
60 53 DA PB Emph Sense
60 58 DA Samp. Freq. Sense
61 AA Cross Fade Time Sense
74 00 Timer-1 Data

DATA-1 thru DATA-4 contain the timer-1 data formatted as per the 24.31 Cue up with data command

74 01 Timer-2 Data

DATA-1 thru DATA-4 contain the timer-2 data formatted as per the 24.31 Cue up with data command

74 04 LTC Time Data

DATA-1 thru DATA-4 contain the LTC data formatted as per the 24.31 Cue up with data command

74 05 User Bits (LTC) Data

DATA-1 thru DATA-4 contain the LTC User bits data formatted at per the 44.05 User Bit Preset command.

74 06 VITC Time Data

DATA-1 thru DATA-4 contain the VITC data formatted as per the [24.31 Cue up with data](#)command

74 07 User Bits (VITC) Data

DATA-1 thru DATA-4 contain the VITC User bits data formatted at per the [44.05 User Bit Preset](#) command.

74 08 Gen Time Data

DATA-1 thru DATA-4 contain the Time code generator data formatted as per the [24.31 Cue up with data](#)command

79 09 Gen User Bits Data

DATA-1 thru DATA-4 contain the Time code generator User bits data formatted at per the [44.05 User Bit Preset](#)command.

74 10 In Data

74 11 Out Data

74 12 Audio In Data

74 13 Audio Out Data

74 14 Corrected LTC Time Data

74 15 Hold User Bits (LTC) Data

74 16 Hold VITC Time Data

74 17 Hold User Bits (VITC) Data

74 20 Status Data

When the slave receives a 61.20 Status Sense command, the following data will be sent back in response according to the request:

Byte No.	7	6	5	4	3	2	1	0
0	X	X	Tape Out	Servo Ref Missing	X	X	X	Local
1	Standby	X	Stop	Eject	Rewind	Fast Fwd	Record	Play
2	Servo Lock	TSO Mode	Shuttle	Jog	Var	Tape Dir	Still	Cue Up
3	Auto Mode	Freeze On	X	CF Mode	A Out	A In	Out	In
4	Select EE	Full EE	X	Edit	Review	Auto Edit	Preview	Preroll
5	X	Insert	Assemble	Video	A4	A3	A2	A1
6	X	Lamp Still	Lamp Fwd	Lamp Rev	Srch LED 8	Srch LED 4	Srch LED 2	Srch LED 1
7	X	X	Aud Split	Sync Act	X	Spot Erase	X	In/Out
8	Buzzer	Lost lock	Near EOT	EOT	CF Lock	Svo Alarm	Sys Alarm	Rec Inhib
9	Fnc Abort	X	X	X	X	X	X	X

Description of Bits:

Data 0:
- Bit 5: Tape Unthreaded (Cassette Out) When the tape is threaded, this is 0. When it is completely unthreaded this is 1. When threading or unthreading, who knows what it is.
- Bit 4: Servo Ref Missing When servo reference is absent this is 1.
- Bit 0: Local When remote operation is inhibited by the "remote/local" switch on the panel this is 1.

Data 1:

- Bit 7: Standby When the tape is threaded and the scanner is locked but the tape is stopped, this is 1.
- Bit 5: Stop When the machine is in full stop, this is 1. The thread state depends on the tape/ee and standby settings.
- Bit 4: Eject When the tape is ejecting this is 1.
- Bit 3: Rewind When the machine is in fast reverse this is 1.
- Bit 2: Fast Fwd When the machine is in fast forward this is 1.
- Bit 1: Record This bit goes from 0 to 1 some number of frames after the machine starts recording. For the DVR2000 we measured 5 frames. Others have varying delays on the record status.
- Bit 0: Play This bit goes from 0 to 1 some number of frames after the machine starts playing. For the DVR2000 we measured 5 frames. Others have varying delays on the play status.

Data 2:

- Bit 7: Servo Lock 1 indicates servos are locked. This is a necessary condition for an edit to occur correctly.
- Bit 6: TSO Mode Bit is 1 in tape speed override: in this mode, audio and video are still locked though speed is off play speed by +/- up to 15%.
- Bit 5: Shuttle
- Bit 4: Jog
- Bit 3: Var
- Bit 2: Tape Dir
- Bit 1: Still
- Bit 0: Cue Up

Data 3:

- Bit 7: Auto Mode
- Bit 6: Freeze On
- Bit 4: CF Mode
- Bit 3: A Out
- Bit 2: A In
- Bit 1: Out
- Bit 0: In

Data 4:

- Bit 7: Select EE
- Bit 6: Full EE
- Bit 4: Edit
- Bit 3: Review
- Bit 2: Auto Edit
- Bit 1: Preview
- Bit 0: Preroll

Data 5:

- Bit 6: Insert
- Bit 5: Assemble
- Bit 4: Video
- Bit 3: A4
- Bit 2: A3
- Bit 1: A2
- Bit 0: A1

Data 6:

- Bit 6: Lamp Still
- Bit 5: Lamp Fwd
- Bit 4: Lamp Rev
- Bit 3: Srch LED 8
- Bit 2: Srch LED 4
- Bit 1: Srch LED 2
- Bit 0: Srch LED 1

Data 7:

- Bit 5: Aud Split

- Bit 4: Sync Act
- Bit 2: Spot Erase
- Bit 0: In/Out

Data 8:

- Bit 7: Buzzer
- Bit 6: Lost lock This bit is controlled by the <u>Lost Lock Reset</u> command. It is set when the servos are unlocked in the PLAY, REC, or EDIT modes.
- Bit 5: Near EOT
- Bit 4: EOT
- Bit 3: CF Lock
- Bit 2: Svo Alarm
- Bit 1: Sys Alarm
- Bit 0: Rec Inhib

Data 9:

- Bit 7: Fnc Abort

---

auth - here's a code snippet for you c-heads.

```c
char *StatusBitStrings[][8] =
{
        // Data 0
        {"          "," "              ","Unthread  ","Svo Ref   ",
         "          "," "              "," "                ","Local     "},
        // Data 1
        {"Standby   "," "              ","Stop       ","Eject     ",
         "Rewind    ","Fast Fwd  ","Record     ","Play      "},
        // Data 2
        {"Servo Lock","TSO Mode  ","Shuttle   ","Jog       ",
         "Variable  ","Tape Rev  ","Still      ","Cue       "},
        // Data 3
        {"Auto Mode ","Freeze On ","          ","CF Mode   ",
         "A Out     ","A In      ","Out        ","In        "},
        // Data 4
        {"Select EE ","Full EE   ","          ","Edit      ",
         "Review    ","Auto Edit ","Preview    ","Preroll   "},
        // Data 5
        {"          ","Insert    ","Assemble  ","Video     ",
         "A4        ","A3        ","A2         ","A1        "},
        // Data 6
        {"          ","Lamp Still","Lamp Fwd  ","Lamp Rev  ",
         "Srch LED 8","Srch LED 4","Srch LED 2","Srch LED 1"},
        // Data 7
        {"          "," "              ","Aud Split ","Sync Act  ",
         "          ","Spot Erase"," "                ","In/Out    "},
        // Data 8
        {"Buzzer    ","Lost lock ","Near EOT  ","EOT       ",
         "CF Lock   ","Svo Alarm ","Sys Alarm ","Rec Inhib "},
        // Data 9
        {"Fnc Abort "," "              "," "              "," "              ",
         "          "," "              "," "              "," "              "},
};
```

The Status bits communicate much about the progress of a motion command. The precise timing of each signal varies almost from machine to machine, and many edit controlers expect certain timing behaviour of these signals. Herein lie many of the problems associated with edit controllers, edit timing, and just plain wacky transport behavior.

7X 21 Extended Status Data
7X 23 Signal Control Data
7X 28 Local Key Map
7X 2A Head Meter Data
76 2B Remaining Time
7X 2E Cmd Speed Data

7X 30 Edit Preset Status
74 31 Preroll Time
71 36 Timer Mode Status
72 3E Record Inhibit Status
71 52 DA Input Emphasis Data
71 53 DA Playback Emphasis Data
71 58 DA Sampling Frequency Data
7X AA Cross Fade Time Data

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