# Solid-state HDTV RECORDER

# JP2pro_rev.S

## Instruction Manual

**REV. 1.0**

**Gigabit Systems Inc.**

WWW.gigabitsystems.com

# FCC Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

# Safety Precautions

To use this product safely, review the following safety precautions.

To avoid potential hazards, use this product only as specified.

### Mark for Precautions

Mark and its term labeled on the machine is as follows:



Shows a caution, warning and danger.



Shows high voltage. Don't touch in this area.

## Injury Precautions

### Use Proper Power Cord
To avoid fire hazard, only use the power code specified for this product.

### Avoid Electric Overload
To avoid electric shock or fire hazard, do not apply a voltage to a terminal that is outside the range specified for the terminal.

### Ground the Product
This product is grounded through the grounding conductor of the power code. To avoid electric shock, the grounding conductor must be connected to earth ground. Before connecting the input or output cables, ensure that the product is properly grounded.

### Do Not Operate Without Covers.
To avoid electric shock or fire hazard, do not operate this product with covers or panels removed.

### Do Not Operate in Wet Conditions.
To avoid electric shock, do not operate this product in wet or damp conditions.

The apparatus shall not be exposed to dripping or splashing and that no objects filled with liquids, such as vases, shall be placed on the apparatus.

### Do Not Operate in an Explosive Atmosphere.
To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.

## Product Damage Precautions

### Use proper power source.

Do not operate this product from a power source that applies more than the voltage specified. The specified voltage of this product is within 90-264 VAC, 50-60Hz.

### Provide Power Ventilation.

To prevent product overheating, provide proper ventilation.

### Prevent Impact

Prevent an impact during transportation. Do not move this product during operation.

### Do Not Operate With Suspected Failures.

If you suspect there is damage to this product, have it inspected by qualified service personnel.

### Repair and Maintenance

Only qualified service personnel should perform repairs and maintenances. Contact the sales office in those cases.

## Recommended Replacement Period.

The following parts of this product are recommended to replace within the specified term. Lifetime of parts is influenced by an environment, a frequency of use and a preservation condition.

(1) Cooling fans: Two years..
(2) Power supply unit: Five years.

**INDEX**

## PREFACE

### Outline of the JP2pro_rev.S

JP2pro_rev.S is a professional recorder aiming to record and reproduce the studio quality HDTV pictures for very long hours. This product is using the JPEG2000 compression technology, and easy replaceable SSD (Solid State Drive) Magazine.

### Features

◆ Very high quality compression by the JPEG2000 standard. (Inc. reversible Lossless)
◆ Very log recording time of studio quality HDTV content.
◆ Easy operation of the Intermittent (Time-laps) recording.
◆ Overall JPEG2000 compression/de-compression monitoring.
◆ HD-SDI input/output.
◆ Multi-format HDTV standard (4:2:2 10bits)
◆ Embedded AUDIO 8 channels.
◆ AES/EBU AUDIO 4 channels.
◆ TIME CODE input/output.
◆ Character insertion.
◆ Remote control with RS-422, RS232C, GPI or Ethernet.
◆ GEN-LOCK to external reference sync.
◆ VANC meta data
◆ Internal test signal generation.
◆ Lossless compression mode (OPTION).
◆ RAID-1 (Mirroring) configuration.
◆ Up to 8 partitions
◆ Simultaneous record/play

### Initial inspection.

Confirm the contents and damages of this product before initial use.

### Standard Accessories

| Instruction Manual | 1 |
|---|---|
| Power cable | 1 |

## Control means of the JP2pro_rev.S

The following control means are recommended to perform all of the JP2pro_rev.S functions.

(1) Front control panel option
(2) Dedicated RS-422 remote controller option, "SYNCHRO-CONT 2000"
(3) Control utility software "JP2pro-controller" for Ethernet option,

You can use commercially available editors (e.g. BVE-9100) or slow-motion controllers, but note that most of such controllers are only adapting the VTR commands, so some features needing the Disk Protocol are not possible.

## Important notice for the Raid Configuration

You can choose the Raid-0 (striping) or the Raid-1 (mirroring) disk configuration. Note that the actual recording capacity and the bandwidth of the hard disk drive decreases by 1/3 when using the RAID-1, so there are some cautions described below.

(1) Maximum recording time in RAID-1 configuration is 1/3 of the RAID-0.
(2) You cannot use the Lossless mode with the RAID-1.
(3) Normally, the simultaneous record/play operation is possible with the RAID-0 and the lossy compression mode. Only the LP2 mode can use with the RAID-1.

| RAID | Capability of simultaneous record/play | | | |
|---|---|---|---|---|
| | LOSSLESS | HQ | LP1 | LP2 |
| RAID-0 | NO | YES | YES | YES |
| RAID-1 | NO | NO | NO | YES |

## About recording time

JP2pro_rev.S adopts constant quality (Variable Bit Rate) compression method. The total recording time varies depending on the following factors.

(1) Capacity of the SSD Magazine.
(2) Raid configuration: The recording time of RAID-1 is 1/3 of the RAID-0.
(3) Quality mode: Lossless, High quality (HQ), Long play 1(LP1) or Long play 2(LP2).
(4) Active pixel number and bit depth
(5) Picture complexity

Table below shows the relationship between the average recording time and the picture quality when recording relatively busy (complex) HDTV signal.

| Compression Mode | Picture Quality | Recording Time | |
|---|---|---|---|
| | | 768 GB SSD | 1,536 GB SSD |
| LOSSLESS | Uncompressed | Approx. **2.8H** | Approx. **5.6H** |
| HQ | Visually lossless | Approx. **8.8H** | Approx. **17.6H** |
| LP1 | HD-D5 class | Approx. **11.2H** | Approx. **22.4H** |
| LP2 | HDCAM class | Approx. **20H** | Approx. **40H** |

# 1. INSTALLATION

Review the "Safety precautions" of this manual before installation of this product.

## 1-1. Confirmation of Environment

This product operates properly within the temperature range of +0-45℃ and the humidity range of 10-90% (Non-condensing). If the temperature of this product is out of this range due to a transportation or preservation, do not power on until the temperature reaches the specified range.

To prevent an over-heat, do not disturb the airflow of this product. Keep a certain space open, at least 5 cm on the front and the rear of this product.

## 1-2. Assurance of Mains Voltage

Assure that the mains AC voltage to this product is within the range of 90-264V 50/60 Hz.

## 1-3. Connection of Power Cable and Power ON

The power cable must be connected properly to the AC IN connector on the rear panel.
Switch on the BREAKER on the rear panel ("1" of 1/0 indication shows ON state).
Push the POWER SWITCH on the front panel for more than 1 second.
All fans are rotated, and the system comes into Setup routine. All LEDs are lit during the Setup routine. After completion of the Setup routine, most of the LEDs go out and come into a normal state. The color of the POWER SWITCH lights in orange and the system is ready to operate.

## 1-4. Power OFF

Push the POWER SWITCH on the front panel more than two second for shutting down the power. Do not turn the BREAKER on the rear panel off, until the illumination of the POWER SWITCH turns off.

(NOTE) In the power off process, all the set-ups done by the operator are stored in the non-volatile RAM. These set-ups are reattributed when power is on again.

BREAKER



AC IN
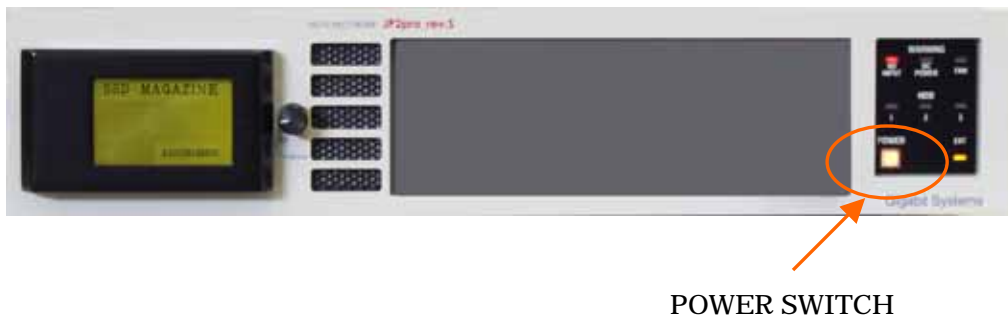


POWER SWITCH

# 2. OPERATION

## 2-1. Front Panel

Names and functions of the Front Panel switch and LED indicators are as follows:
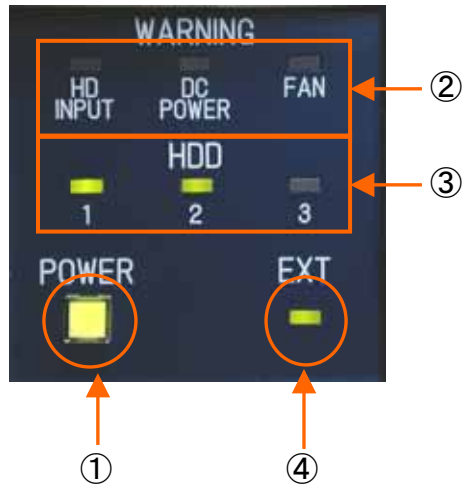


① **POWER SWITCH**

This switch turns on or turns off the system. Color of this switch is red in the "Standby" mode, and orange when the system is ready to operate. In case of shut down, do not turn the BREAKER on the rear panel off, until the illumination of the POWER SWITCH turns off.

In the power off process, all the set-ups done by the operator are stored in the non-volatile RAM. These set-ups are reattributed when power is on again.

② **WARNING INDICATOR**

・**HD INPUT :** Lit red when HD-SDI VIDEO signal is not connected to the HD-SDI IN or the connected signal is abnormal.

・**DC POWER :** Lit red when internal +3.3VDC or +5VDC is out of the specified voltage range.

・**FAN :** Lit red when the cooling fans come to a stop.

③ **HDD INDICATOR**

There are three indicators, HDD1, 2 and 3. Blinked orange when the Disks are in write operation (RECORD). Blinked green when the Disks are in read operation (PLAY SLOW etc). When one of the Disks is fail, the corresponding indicator stops blinking and keeps to light red

11

④ **EXT INDICATOR**

Lit green when this recorder synchronizes to the external reference signal while one of the following GEN-LOCK modes are selected:

· EXT REF

· VIDEO INPUT

· AUTO

Lit amber at the following cases:

- External Reference signal is not connected when the EXT mode is selected.
- Input Video signal is not connected when the INPUT VIDEO mode is selected.
- Both External Reference signal and Input video signals are not connected when the AUTO mode is selected.
- When INTERNAL mode is selected.

## 2-2. Rear Panel

Names and functions of parts, connectors and switches on the rear panel are as follows:

### 2-2-1. Power Supply Part
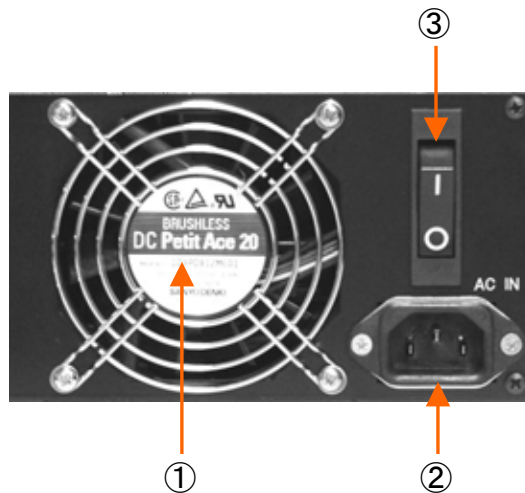


① **Cooling Fan**

This fan starts to rotate when the BREAKER on the rear panel and the POWER SWITCH on the front panel are activated. If this fan is stopped by any reason, the FAN warning LED on the front panel turns on red.

② **Mains Connector　(AC IN)**

Connects AC cable. Please use specified power cable to connect AC power. The voltage range is within 90-264V, 50/60Hz.

③ **Power Breaker/SW**

This is a Non-fuse Breaker/Switch to protect from over current. The "1" indicates ON position and the "0" indicates OFF position.

## 2-2-2. Signal Input Part
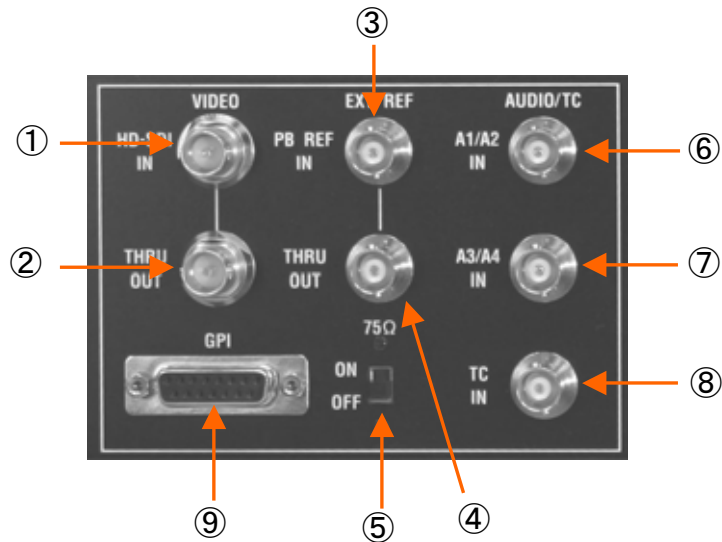


① **HD-SDI VIDEO IN**

This coaxial connector is the HD-SDI VIDEO INPUT.

② **THRU OUT**

This coaxial connector is the HD-SDI ACTIVE THROUGH OUTPUT. Equivalent HD-SDI INPUT signal can be output, to feed the INPUT signal to the other equipments.

③ **EXT REF IN**

This coaxial connector is the EXTERNAL REFERENCE INPUT. Tri-level HDTV sync or BB can be connected as a GEN-LOCK source.

④ **THRU OUT**

This coaxial connector is the THROUGH OUTPUT of the EXT REF IN. This is not the active through. The 75Ω termination switch should be off when using this connector to feed the EXT REF signal to the other equipment.

⑤ **75Ω TERMINATION SWITCH**

This switch is the 75ΩTERMINATION SWITCH for the EXT REF IN. 75Ω resister is inserted between the signal line and the GRD when this switch is ON. This switch should be OFF when connecting the coaxial cable to the THRU OUT connector.

⑥ **A1/A2 IN**

This coaxial connector is the Ch1/Ch2 INPUT for AES3 AUDIO. The impedance is 75Ω. If the audio cable has a XLR connector, the conversion connector should be used.

⑦ **A3/A4 IN**

This coaxial connector is the Ch3/Ch4 INPUT for AES3 AUDIO. The impedance is 75Ω. If the audio cable has a XLR connector, the conversion connector should be used.

⑧ **TC IN**

This coaxial connector is the TIME CODE INPUT for connecting the external time code. The impedance is 75Ω. If the audio cable has a XLR connector, the conversion connector should be used.

⑨ **GPI IN/OUT**

This D-SUB 15-pin female connector is used for a parallel remote.

## 2-2-3. Signal Output Part
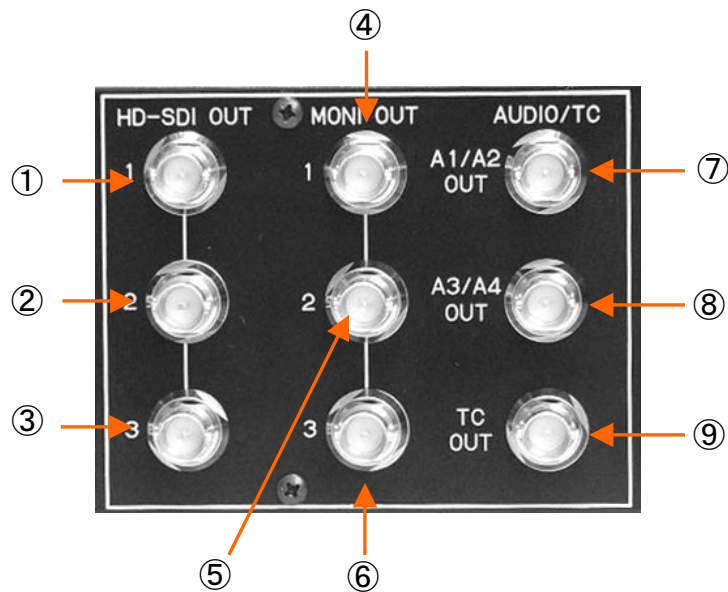


① **HD-SDI VIDEO OUT 1**

This coaxial connector is the HD-SDI VIDEO OUT 1.

② **HD-SDI VIDEO OUT 2**

This coaxial connector is the HD-SDI VIDEO OUT 2.

③ **HD-SDI VIDEO OUT 3**

This coaxial connector is the HD-SDI VIDEO OUT 3.

④ **HD-SDI MONI OUT 1**

This coaxial connector is the HD-SDI MONITOR OUT 1. Character information can be inserted on this output.

⑤ **HD-SDI MONI OUT 2**

This coaxial connector is the HD-SDI MONITOR OUT 2. Character information can be inserted on this output.

⑥ **HD-SDI MONI OUT 3**

This coaxial connector is the HD-SDI MONITOR OUT 3. Character information can be inserted on this output.

⑦ **A1/A2 OUT**

This coaxial connector is the Ch1/Ch2 OUTPUT for AES3 AUDIO. The impedance is 75Ω. If the audio cable has a XLR connector, the conversion connector should be used.

⑧ **A3/A4 OUT**

This coaxial connector is the Ch3/Ch4 OUTPUT for AES3 AUDIO. The impedance is 75Ω. If the audio cable has a XLR connector, the conversion connector should be used.

⑨ **TC OUT**

This coaxial connector is the TIME CODE OUTPUT. The impedance is 75Ω. If the audio cable has a XLR connector, the conversion connector should be used.

### 2-2-4. Remote Interface Part
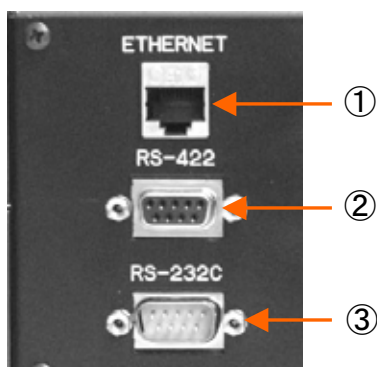


① **ETHERNET Connector**

This RJ-45 connector is the 10/100 Base-T Ethernet connector. Remote control is possible by using the dedicated GUI. The Ethernet (10/100Base-T) is an Option.

② **RS-422 Connector**

This D-Sub 9-pin female connector is for the RS-422. Remote control by editors or slow motion controllers is possible by using RS-422 protocol.

③ **RS-232C/GPI Connector**

This D-Sub 9-pin female connector is for the RS-232C. This is used for the service purpose usually. But remote control from external PC or equivalent controller is also possible by using the RS-232C protocol.

# 3. REMOTE CONTROL

## 3-1. RS-422 Control

### 3-1-1. Outline

JP2pro_rev.S has a D-SUB 9-pin female connector on the rear panel that conforms to EIA RS-422 Serial Remote Control Protocol. Most of controllers with the same control protocol can remotely control this product. The following description explains the contents of the serial protocol and the serial transmission sequence.

### 3-1-2. Architecture of the serial transmission data

- 4-wire-transmission system.
- Asynchronous bit-serial word-serial data transmission.
- Data structure: 1 Start bit+8 Data bits+1 Parity bit+1 Stop bit

|  |  |  |  |  |  |  |  |  |  | Mark |
|---|---|---|---|---|---|---|---|---|---|---|
| Start bit | D0 (LSB) | D1 | D2 | D3 | D4 | D5 | D6 | D7 (MSB) | Parity (Odd) | Space |
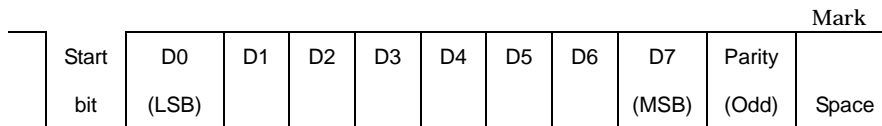
(Note 1) Odd Parity: The sum of the D0+D1+---D7 and Parity bit is an odd number.

(Note 2) Mark B>A;   (Voltage on line B is higher than that on Line A)

   Space A>B    (Voltage on line A is higher than that on Line B)

### 3-1-3. Command Format

Communication between control systems and this product uses the following command telegram format:

CMD 1/Data count, CMD 2, and data checksum (CHECKSUM).

If Data count is zero, no data is transmitted. If it is not zero, the data corresponding to the existing values are inserted between CMD2 and CHECKSUM.

| Bit 4-7 | Bit 0-3 |  |  |  |  |  |
|---|---|---|---|---|---|---|
| CMD 1 | Data count | CMD 2 | DATA 1 | -------- | DATA N N=15max | CHECKSUM |
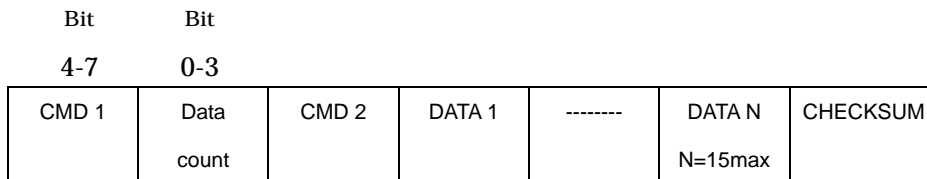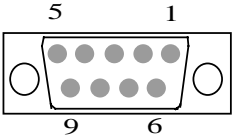
- **CMD 1:** CMD 1 assigns the command to the following main function groups that serve to define the function, and the transfer direction of the data words that follows.

| CMD 1 | Function | Transfer Direction Controller---Recorder |
|---|---|---|
| 0 | System control | ⟶ |
| 1 | System control-Return message | ⟵ |
| 2 | Recorder control | ⟶ |
| 4 | Setup and selection control | ⟵ |
| 8 | Data request | ⟶ |
| 7 | Data request-Return message | ⟵ |

- **Data count:** Defines the number of data words that are inserted after CMD2 (0x0-0xF).
- **CMD 2:** Is the specific command to the recorder or the command return message from the recorder, respectively.
- **DATA:** The number of data words and their contents are defined by the CMD2 command.
- **CHECKSUM:** The sum of the data (D0-D7) contained in each data word, from CDM 1/DATA COUNT to the last data word before the checksum.

## 3-1-4. Connector Pin Assignment

D-SUB 9-pin female connector pin assignment is as follows:

| | Pin Number | Signal |
|---|---|---|
| | 1 | GND |
| | 2 | TX-A |
| 5　　　1 | 3 | RX-B |
| | 4 | GND |
| | 5 | NC |
| 9　　　6 | 6 | GND |
| | 7 | TX-B |
| D-SUB  9 -pin | 8 | RX-A |
| Female | 9 | GND |

**A and B are defined as:**
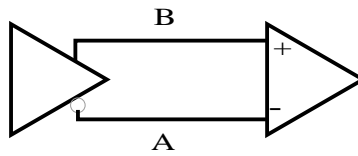
### 3-1-5. Communication Protocol

When the recorder receives a command from the control system, it sends back the following return telegram.

- ・ If the recorder receives a command without data request:
  ACK (10h, 01h)=Acknowledgement of receipt.
- ・ If the Recorder receives a command with data request:
  Answer code + data
- ・ If transmission error is detected or undefined command is received:
  NAK (11h, 12h) + error code.
  <u>Error Code:</u>
  Bit 0 (01h)=Command not defined.
  Bit 2 (04h)=Checksum error.
  Bit 4 (10h)=Parity error.
  Bit 5 (20h)=Overrun error.
  Bit 6 (40h)=Start/Stop bit error.
  Bit 7 (80h)=Time out.

The control system must not send any additional command before having received a corresponding response to the previous command.

The control system must not interrupt the transmission of a command for more than 10 ms. As soon as the recorder detected such a break longer than 10 ms, it proceeds with a time out error sequence. The recorder ignores the command received and transmits a NAK (time out).

As soon as the recorder receives a command from the control system, it sends a return message within 9 ms. Therefore, unless having a received a return message from the recorder within 10 ms after execution of a command transmission, the control system must proceed as if the communication had not taken place under normal circumstances.

When an error is detected, the recorder immediately sends a NAK to the control system. Upon receipt of a NAK, the control system in turn must immediately abort the data block transmission.

## 4-1-6. RS-422A Command List

| CODE | Recorder command | Meaning | Response | Footnote |
|------|------------------|---------|----------|----------|
| 00 11 | DEVICE TYPE REQUEST | Machine ID | 12 11 XX YY | *0) |
| 20 00 | STOP | | 10 01 (ACK) | |
| 20 01 | PLAY | | 10 01 | |
| 20 02 | RECORD | Crash-Record | 10 01 | |
| 20 04 | STANDBY OFF | | 10 01 | |
| 20 05 | STANDBY ON | | 10 01 | |
| 20 10 | FAST FWD | Max speed forward | 10 01 | |
| 21 11 | JOG FWD | Slow motion | 10 01 | *1) *2) |
| 22 11 | JOG FWD high-reso. | Slow motion | 10 01 | *1) *4) |
| 21 12 | VAR FWD | Variable | 10 01 | *1) *2) |
| 22 12 | VAR FWD high-reso. | Variable | 10 01 | *3) *4) |
| 21 13 | SHUTTLE FWD | | 10 01 | *2) |
| 22 13 | SHUTTLE FWD high-reso | | 10 01 | *4) |
| 20 14 | STEP FWD | Field step | 10 01 | |
| 20 20 | REWIND | Max speed reverse | 10 01 | |
| 21 21 | JOG REV | Slow motion | 10 01 | *1) *2) |
| 22 21 | JOG REV high-reso. | Slow motion | 10 01 | *1) *4) |
| 21 22 | VAR RVS | Variable | 10 01 | *1) *2) |
| 22 22 | VAR REV high-reso. | Variable | 10 01 | *1) *4) |
| 21 23 | SHUTTLE REV | | 10 01 | *2) |
| 22 23 | SHUTTLE REV high-reso. | | 10 01 | *4) |
| 20 24 | STEP REV | Field step | 10 01 | |
| 20 30 | PREROLL | Cue up | 10 01 | *5) |
| 24 31 | CUE UP WITH DATA | TC search | 10 01 | *5) *6) |
| 20 40 | PREVIEW | Edit simulation | 10 01 | *8) *9) *10) |
| 20 41 | REVIEW | Edit review | 10 01 | *8) *9) *10) |
| 204-1 | AUTO EDIT | | 10 01 | *8) *9) *10) |
| 20 60 | FULL EE OFF | All PB | 10 01 | |
| 20 06 | FULL EE ON | All EE | 10 01 | |
| 20 63 | SELECT EE ON | EE on select channel | 10 01 | *9) *11) |
| 20 64 | EDIT OFF | Play from record | 10 01 | |
| 20 65 | EDIT ON | Record from play | 10 01 | *9) |

| | | | | |
|---|---|---|---|---|
| 20 6A | FREEZE OFF | | 10 01 | |
| 20 6B | FREEZE ON | | 10 01 | |
| 44 04 | TIME CODE PRESET | | 10 01 | *6) |
| 44 05 | USER BIT PRESET | | 10 01 | *12) |
| 40 10 | IN ENTRY | Mark as IN point | 10 01 | *8) |
| 40 11 | OUT ENTRY | Mark as OUT point | 10 01 | *9) |
| 44 14 | IN DATA PRESET | Set IN point | 10 01 | *6) *9) |
| 44 15 | OUT DATA PRESET | Set OUT point | 10 01 | *6) *9) |
| 40 18 | IN SHIFT+ | IN=IN+1 | 10 01 | |
| 40 19 | IN SHIFT- | IN=IN-1 | 10 01 | |
| 44 1A | OUT SHIFT+ | OUT=OUT+1 | 10 01 | |
| 44 1B | OUT SHIFT- | OUT=OUT-1 | 10 01 | |
| 40 20 | IN FLAG RESET | Clear IN point | 10 01 | |
| 40 21 | OUT FLAG RESET | Clear OUT point | 10 01 | |
| 40 24 | IN RECALL | Recall IN point | 10 01 | |
| 40 25 | OUT RECALL | Recall OUT point | 10 01 | |
| 41 30 | EDIT PRESET | | 10 01 | *13) |
| 42 30 | EDIT PRESET high-r. | | 10 01 | *13) |
| 44 31 | PREROLL TIME PRESET | Set preroll time | 10 01 | *6) |
| 41 32 | TAPE/AUTO SELECT | Select automatic EE | 10 01 | *14) |
| 41 33 | REF SELECT | Select reference signal | 10 01 | *15) |
| 41 3A | EDIT FIELD SELECT | Select field as edit point | 10 01 | *16) |
| 41 3B | FREEZE MODE SELECT | | 10 01 | *17) |
| 40 40 | AUTO MODE OFF | | 10 01 | |
| 40 41 | AUTO MODE ON | | 10 01 | |
| 61 0A | TC GEN DATA SENSE | | TC data | *18) |
| 61 0C | CURRENT TIME SENSE | | TC data | *19) *20) *21) |
| 61 10 | IN DATA SENSE | | 74 10 TC | |
| 61 11 | OUT DATA SENSE | | 74 11 TC | |
| 61 20 | STATUS SENSE | | Status data | *22) |
| 60 30 | EDIT PRESET SENSE | | Edit preset | *14) |
| 60 31 | PREROLL TIME SENSE | | Preroll time | |

## Footnote

**\*0)** xx=data-1, yy=data-2. Default: data-1=00, data-2=E0

**\*1)** The slow motion speed range is 0±3 times PLAY speed.

**\*2)** The low resolution speed data consists of one byte (Value=0～255).

The real speed in multiplies of play is defined as:

$$\text{Tape speed}=10^{(\text{Value}/32-2)}$$

This means the speed data is the logarithmic of the tape speed.　　　(e.g. Value=32: 0.1xplay, Value=64: 1xplay, Value=96: 10xplay)

**\*3)** 0±3 times PLAY speed is executed as VARIABLE. More than this speed are executed as SHUTTLE to allow synchronization of the machine with this command. (0±50 times PLAY)

**\*4)** The high resolution speed data consists of two bytes, but only the first data byte is used to calculate the tape speed (refer to the foot note \*2).

**\*5)** The parking accuracy is 0 frame.

**\*6**) The time code data consists of four bytes coded BCD(Binary coded decimal).

- ・ Data 1=Frames
- ・ Data 2=Seconds
- ・ Data 3=Minutes
- ・ Data 4=Hours

**\*8)** The time base for this operation can be set with the TAPE CODE SELECT command.

**\*9**) This operation is done with the selected tracks and the record mode of the EDIT PRESET command.

**\*10**) The IN point and the OUT point must be set before, with IN/OUT ENTRY command or IN/OUT DATA PRESET command.

**\*11**) If the servo is not locked, this command is executed as a FULL EE ON to allow to do BVB（Black-VIDEO-Black）　simulation.

**\*12**) The user bit data consists of four bytes (high nibble, low nibble

- ・ data-1: binary group 2 / binary group 1
- ・ data-2: binary group 4 / binary group 3
- ・ data-3: binary group 6 / binary group 5
- ・ data-4: binary group 8 / binary group 7

**\*13**) The high resolution EDIT PRESET is the bit transparent representation of record mode and the track selection

Data 1:

| Bit0 | Not used | Bit4 | Video track |
|------|----------|------|-------------|
| Bit1 | Not used | Bit5 | Assemble mode |
| Bit2 | Time-code track | Bit6 | Insert mode |
| Bit3 | Not used | Bit7 | Not used |

Data 2:

| Bit0 | A1/A2 track | Bit4 | Not used |
|------|-------------|------|----------|
| Bit1 | A3/A4 track | Bit5 | Not used |
| Bit2 | A5/A6 track | Bit6 | Not used |
| Bit3 | A7/A8 track | Bit7 | Not used |

**\*14)** The TAPE/AUTO SELECT data is defined as:

    00h: Automatic (tape or EE)

    01h: tape

    FF h : as locally selected

**\*15)** The REFERENCE SELECT data is defined as:

    01h:  PB EXT REF

    02h:  INPUT VIDEO

    FFh:  as locally selected.

**\*16)** The EDIT FIELD SELECT data is defined as:

    00h:  edit starts every field depending on a receipt of edit command.

    01h:  edit starts in field 1.

    02h:  edit starts in field 2.

    FFh:  as selected locally.

**\*17)** The FREEZE MODE SELECT data is defined as:

    00h:  Field freeze

    11h:  Frame freeze

**\*18)** The TC GENE DATA SENSE data is defined as:

| Data | Definition | Response |
|------|------------|----------|
| 01h | Request Time code | 74h, 08h, 4 bytes BCD Time code |
| 10h | Request User bit | 74h, 09h, 4 bytes User bit |
| 11h | Request Time code + User bit | 78h, 08h, 8 bytes BCD Time code＋User bit |

**\*19)** The CURRENT TIME SENSE data is defined as:

| Data | Definition | Response |
|---|---|---|
| 01h | Request Time code | 74h, 04h, 4 bytes BCD Time code |
| 10h | Request User bit | 74h, 15h, 4 bytes User bit |
| 11h, | Request Time code ＋ User bit | 78h, 04h, 8 bytes BCD Time code + User bit |

**\*20)** There is a field-ID in the time code data:

| 60Hz／DATA2 | 50Hz／DATA4 | Field |
|---|---|---|
| MSB | MSB | Selection |
| 0 | 0 | Field 1 |
| 1 | 1 | Field 2 |

**\*21)** There is a DROP-FRAME-ID in the time code data:

| DATA 1 | Drop Frame |
|---|---|
| Bit 6 | |
| 0 | OFF |
| 1 | ON |

**\*22)** The STATUS SENSE data is defined as:

- High nibble (Bit4-7): the first data byte number of status field.
- Low nibble (Bit0-3): number of data bytes out of status field.
- Response: 7xh, 20h, and x data bytes of status field is:

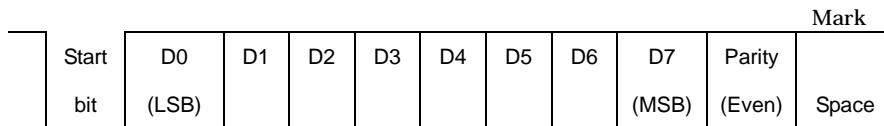| Data byte Number | Bit Number | Status | Bit Number | Status |
|---|---|---|---|---|
| Byte 0 | Bit 0 | LOCAL | | |
| Byte 1 | Bit 0 | PLAY | Bit 1 | RECORD |
| | Bit 2 | FAST FWD | Bit 3 | REWIND |
| | Bit 5 | STOP | Bit 7 | STANDBY |
| Byte 2 | Bit 0 | CUE UP | Bit 1 | STILL |
| | Bit 2 | DIRECTION | Bit 3 | VAR |
| | Bit 4 | JOG | Bit 5 | SHUTTLE |
| | Bit 7 | SERVO LOCK | | |
| Byte 3 | Bit 0 | IN DATA SET | Bit 1 | OUT DATA SET |
| | Bit 6 | FREEZE | Bit 7 | AUTO MODE |
| Byte 4 | Bit 0 | PREROLL | Bit 1 | PREVIEW |
| | Bit 2 | AUTO EDIT | Bit 3 | REVIEW |
| | Bit 4 | EDIT | Bit 6 | FULL EE ON |
| | Bit 7 | SELECT EE ON | | |
| Byte 5 | Bit 0 | A1 | Bit 1 | A2 |
| | Bit 2 | A3 | Bit 3 | A4 |
| | Bit 4 | VIDEO | Bit 5 | ASSEMBLE |
| | Bit 6 | INSERT | | |
| Byte 6 | Not used | | | |
| Byte 7 | Not used | | | |
| Byte 8 | Bit 0 | REC INHIBIT | Bit 4 | EOT |
| Byte 9 | Bit 7 | FUNCTION ABORT | | |

## 3-2. RS-232C Control

### 3-2-1. Outline

JP2pro_rev.S has a D-SUB 9 pin male connector conforms to EIA RS-232C remote control protocol. This connector is used for the service use normally, but upon customers request, it can be used for connections with various controllers.

The following description explains the RS-232C serial transmission protocol.

### 3-2-2. Architecture of the serial transmission data.

- ・ Asynchronous bit serial transmission.
- ・ Character length: 8 bits
- ・ Stop bit: 2 bits
- ・ Parity: EVEN PARITY
- ・ Data structure: 1 Start bit+8 Data bits+1 Parity bit+2 Stop bit

|  |  |  |  |  |  |  |  |  |  | Mark |
|---|---|---|---|---|---|---|---|---|---|---|
| Start bit | D0 (LSB) | D1 | D2 | D3 | D4 | D5 | D6 | D7 (MSB) | Parity (Even) | Space |

(Note 1)    Parity: The sum of data D0～D7 and the Parity bit is even number.

### 3-2-3. Connector Pin Assignment

D-SUB 9-pin male connector pin assignment is as follows

<table>
<tr><td rowspan="10"><br>1     5<br><br>6   9<br><br>D-SUB 9-pin<br>Male</td><td>Pin number</td><td>Signal</td></tr>
<tr><td>1</td><td>CD</td></tr>
<tr><td>2</td><td>RXD</td></tr>
<tr><td>3</td><td>TXD</td></tr>
<tr><td>4</td><td>DTR</td></tr>
<tr><td>5</td><td>GND</td></tr>
<tr><td>6</td><td>DSR</td></tr>
<tr><td>7</td><td>RTS</td></tr>
<tr><td>8</td><td>CTS</td></tr>
<tr><td>9</td><td>RI</td></tr>
</table>

### 3-2-4. Transmission Protocol and Commands

The transmission protocol and commands are user defined.

### 3-3. GPI Control
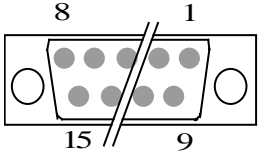
#### 3-3-1. Outline

JP2pro_rev.S has a D-SUB 15 pin female connector for parallel remote, the GPI (General Purpose Interface). The following description explains the GPI control protocol.

#### 3-3-2. Connector Pin Assignment

D-SUB 15-pin female connector pin assignment is as follows:

**Default setting**

| | Pin number | Signal |
|---|---|---|
| | 1 | GND |
| | 2 | Reserved Command |
| | 3 | Reserved Command |
| | 4 | PLAY Command |
| | 5 | PLAY-STOP Command |
| | 6 | REC Command |
| | 7 | REC-STOP Command |
| | 8 | Reserved Command |
| D-SUB 15-pin Female | 9 | Reserved Command |
| | 10 | REC Tally |
| | 11 | PLAY Tally |
| | 12 | POWER+FAN Alarm |
| | 13 | Hard Error |
| | 14 | Soft Error |
| | 15 | +12 V |

#### 3-3-3. Commands

Thirteen pins excluding the pin 1 (GND) and the pin 15 (+12V) can be used for commands (eight pins) or tallies (five pins). These pin assignments are user defined. The default settings are shown in the above table.

# 4. Synchronous Record/Play

## 4-1 Outline

You can combine plural numbers of the JP2pro_rev.S machines for recording of the Dual-link HD-SDI, Quad-link HD-SDI and more. JP2pro_rev.S can run in synchronized, so you can operate plural machines as if you are controlling only one machine. Optional SYNCHRO-CONT 2000 or optional Control Utility Software can be used for the Synchronous Record/Play operation. In this section, dual-link two-machine system with the SYNCHRO-CONT 2000 is explained.

## 4-2   Needed Condition

(1)  For recording

- ・ Synchronized HD-SDI inputs are connected to all machines.
- ・ The RS-422 cables are connected to all machines.
- ・ The same time code value is preset to all machines in Internal-REC time code mode, or same time code is fed to TC IN of all machines in the EXT time code mode.
- ・ The common REC-file number is used for all machines.

(2)  For playback

- ・ Common EXT REF signals are connected to all machines. Or HD-SDI VIDEO OUT signal of the master machine is connected to the HD-SDI VIDEO IN of the slave machine. Gen-lock of the master machine is Internal and that for the slave machine is VIDEO IN.
- ・ The RS-422 cables are connected to all machines.

## 4-3 operation

Please refer to the USER MANUAL of the "SYNCHRO-CONT 2000" for the synchronous record/play operation.

## 4-4    Connection in Record



AUDIO

VIDEO

Connect synchronized
Video and Audio

AUDIO

VIDEO

RS422-1

RS422-2

Synchro-cont 2000
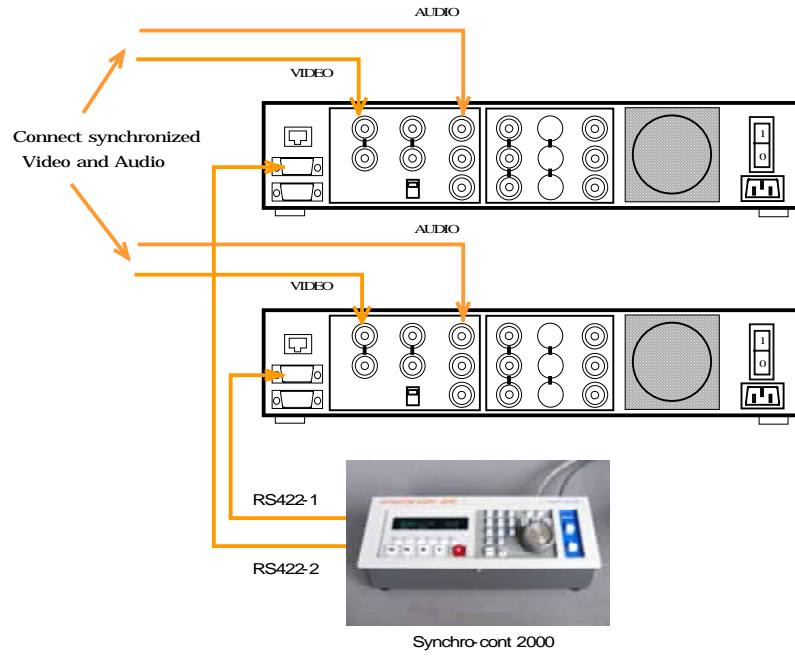
## 4-5    Connection in Playback



Connect EXT REF

VIDEO/AUDIO OUT-1

EXT REF
IN

THRU
OUT

75-ohm OFF

VIDEO/AUDIO OUT-2

EXT REF
IN

75-ohm ON

RS422-1

RS422-2

Synchro-cont 2000
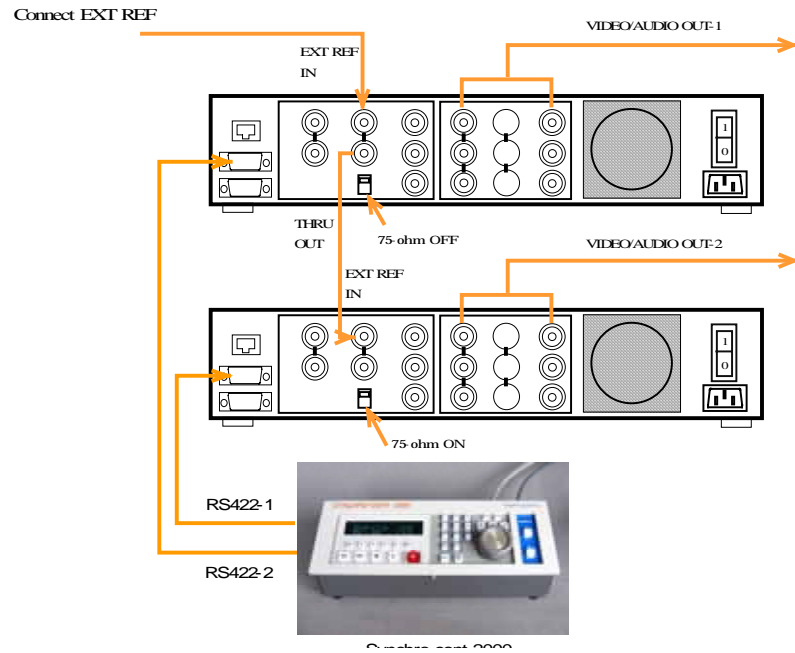
## 5. Edit operation

Some commercially available editors can control the JP2pro_rev.S and perform the ASSEMBLE and INSERT editing.

The parameters for BVE-9100 are as follows. We recommend 5 seconds for the PREROLL TIME.

| | |
|---|---|
| DEVICE TYPE (High byte) | 00h |
| (Low byte) | E0h |
| MIN PREROLL TIME | 60h |
| EDIT DELAY | 06h |
| EE DELAY | 02h |
| OVERRUN | 03h |
| TRAJECTORY | 8Ah |
| TC READ DELAY | BAh |
| START DELAY | 06h |
| AFTER SYNC DEL- | FBh |
| AFTER SYNC DEL+ | 00h |
| CONST 11 | 83 |
| CONST 12 | 4B |
| PREROLL SPEED | FFh |
| QUICK PVW PR TIME | 4Bh |

## 6. Exchange the SSD Magazine

The SSD Magazine is removable and can be exchanged from front side. Procedure for exchange the SSD Magazine is explained in this paragraph.

### 6-1 Open the Magazine lid

Make the recorder power off before replacing the SSD Magazine.

Rotate the Magazine lock knob about 90 degrees in counter-clockwise, then open the Magazine lid from right to left.



Magazine lock knob

**Picture of Magazine lid open**



SSD Magazine

## 6-2 Pulling out the Magazine

Pinch the upper and lower side of the Magazine and pull our to remove.



SSD Magazine

## 6-3 Re-insert the SSD Magazine

◆ Replace the SSD Magazine.

◆ Place the SSD Magazine on the magazine housing and push the SSD Magazine in until the stop position.

◆ Close the Magazine lid.

◆ Turn the Magazine lock knob about 90 degrees in clockwise to lock the Magazine lid.

# 7. Maintenance

## 7-1 Cleaning of the air filter

There is an air filter on the air intake window located on the front door (the picture below). Please clean up by a vacuum cleaner when the filter becomes dirty.



Air filter part

## 7-2　When warning LED is lit

Please contact the sales office if "DC POWER" or "FAN" LED Is lit.
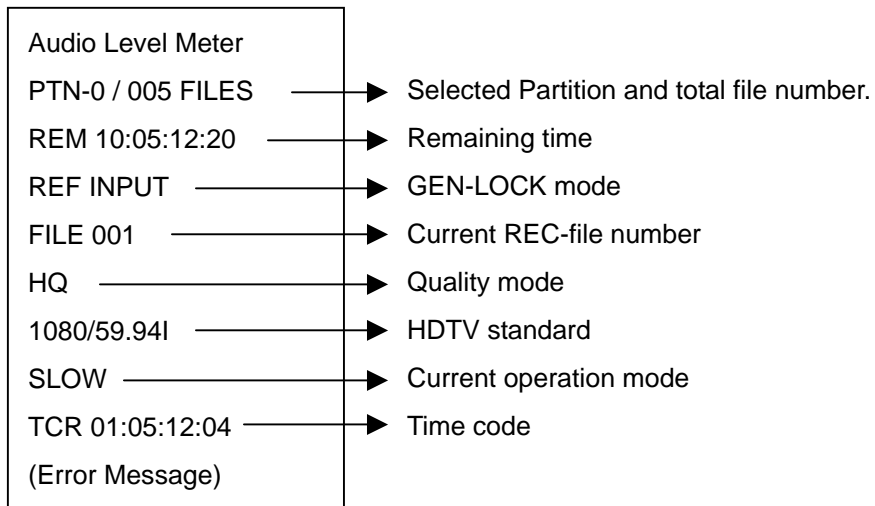
## 7-3　If JP2pro_rev.S is fail.

Please contact the sales office if functions of the JP2pro_rev.S is abnormal.

## 8. Character display on the monitor

Characters can be inserted on the VIDEO MONITOR OUT.

### 9_1 Display contents

Character contents are as follows from top to bottom.

| | |
|---|---|
| Audio Level Meter | |
| PTN-0 / 005 FILES ⟶ | Selected Partition and total file number. |
| REM 10:05:12:20 ⟶ | Remaining time |
| REF INPUT ⟶ | GEN-LOCK mode |
| FILE 001 ⟶ | Current REC-file number |
| HQ ⟶ | Quality mode |
| 1080/59.94I ⟶ | HDTV standard |
| SLOW ⟶ | Current operation mode |
| TCR 01:05:12:04 ⟶ | Time code |
| (Error Message) | |

(NOTE) Error message is displayed on the bottom line.

### 8_2 Error message

Error massage and its meaning are as follows:

| | |
|---|---|
| DIAG. MEMORY | Detects MEMORY fail in the diagnostic process after power on. |
| DIAG. ENCODER | Detects a fail on the ENCODER board in the diagnostic process after power on. |
| DIAG. DECODER | Detects a fail on the DECODER board in the diagnostic process after power on. |
| DIAG. CORE | Detects a fail on the CORE board in the diagnostic process after power on. |
| POWER ALARM | Detects an abnormal voltage of the DC power supply. |
| FAN ALARM | Detects a stop of the cooling fan. |
| NO TIME CODE IN | There is no time code or an abnormal time code at the TC IN connector when EXT TC mode is selected. |
| NO EXT SYNC | There is no external sync or an abnormal sync at the EXT REF IN connector when EXT mode is selected as a GEN-LOCK source. |
| RAID1 DISK0 | Detects a fail on the DISK-0 when the RAID-1 is selected. |
| RAID1 DISK1 | Detects a fail on the DISK-1 when the RAID-1 is selected. |
| RAID1 DISK2 | Detects a fail on the DISK-2 when the RAID-1 is selected. |
| RAI0 DISK | Detects a fail on any one of three disks when the RAID-0 is selected. |
| DISK FORMAT | Detects an error during the DISK FORMAT process. The DISK FORMAT is not performed. |
| END OF DISK | The recording reaches the end of disk when the recording mode is NORMAL (not in Loop REC mode). |
| ILLEGAL QUALITY | The Lossless mode is selected in RAID-1 HDD configuration. |
| NO INPUT | There is no VIDEO INPUT or abnormal input at the start of recording. |
| FILE OVER FLOW | Number of REC files exceeds a maximum number of 512. |
| ILLEGAL FILE | Selected a REC file that is not existing. |
| ILLEGAL CLIP | Selected a CLIP that is not existing. |

| | |
|---|---|
| ILLEGAL CUE | Selected a CUE number that is not marked. |
| ILLEGAL SEQ | Selected a CLIP number for SEQ list that is not existing. |
| ILLEGAL CLIP IN SEQ | The selected CLIP for SEQ playback is invalid. (example: the original REC file which the CLIP appointed was already deleted) |
| REC ODD/EVEN FLAG | The odd/even sequence is not correct while recording the interlace signal. |
| REC INPUT UNSTABLE | The HD-SDI input disturbed during recording. |
| FILE ERASE INHIBIT | Tried to delete the REC file with the ERASE INHIBIT. |
| DC POWER | The input DC voltage drops below the specified voltage. (DC Battery version JP2pro_rev.SB only) |

# 9. JP2pro_rev.S Specifications

| Video in/out | Input | HD-SDI BNCx1, Active-through OUT BNCx1 |
|---|---|---|
| | Output | HD-SDI BNCx1, MONITOR OUT HD-SDI BNCx1 （+2 additional outputs optionally） |
| Video Standard | | 1080i/50, 1080i/59.94, 1080i/60 10 bit<br>1080psf/23.98, 1080psf/24, 1080psf/25, 1080psf/29.97, 1080psf/30 10 bit<br>720p/59.94, 720p/60 10 bit, 2K (OPTION, 2048x1080psf/23.98 or 24) |
| Audio in/out | Input | HD-SDI Embedded audio input (8 channels)<br>（OPTION）AES3 Digital audio input BNCx2 (4 channels) |
| | Output | HD-SDI Embedded audio output (8 channels)<br>（OPTION）AES3 Digital audio output BNCx2 (4 channels) |
| Time code in/out | Input | VITC input (Embedded on the HD-SDI)<br>（OPTION）LTC input BNCx1 |
| | Output | VITC output (Embedded on the HD-SDI)<br>（OPTION）LTC output BNCx1 |
| Internal Test Signals | | Video：COLOR BAR, RAMP, BLACK Audio: 1 kHz |
| VANC Data (OPTION) | | Conforms to ARIB TR-B23 |
| PB REF IN | | Tri-level SYNC or BB BNCx1<br>Through out BNCx1 (with 75 Ohm Termination switch) |
| Recording Media | | Removal SSD Magazine<br>Size: 76.8 mm (W) x 40 mm (H) x 105.4 mm (D) Weight: Approx. 400 g |
| Recording Capacity | | Selectable (192GB, 384GB, 768GB, 1536GB) |
| Interval Recording | | Selectable (1/2 to 1/999 Frames) |
| Remote Control | | ・ RS-422 (VTR Controller/Slow motion Controller etc.)<br>・ RS-422 2-ports (OPTION)<br>・ Ethernet 10/100 Base-T with GUI Application Software (OPTION)<br>・ RS-232C<br>・ (OPTION) GPI D-SUB 15-pin (8 Command inputs, 5 Status outputs) |
| Character Display | | Time code, Current mode, Audio level etc can be displayed on the HD-SDI MONITOR out. Character ON/OFF, Character size selection and position adjustment are possible. |
| Power | | AC100-240V ±10% 50/60 Hz, 85 W |
| Operating Environment | | 0 ～+45 ℃ 10～90% (Non-condensing) |
| Dimension | | 432 mm (W) x 88 mm (H) x 465 mm (D) |
| Weight | | Approx. 9 kg |