48-Channel Digital Audio Recorder

PCM-3348HR
Developed based on the experience and know-how attained through the success of the PCM-3348, the PCM-3348HR uses the basic framework of its predecessor, maintaining its system configuration, tape transport and operational style, while implementing innovative functions such as a vocal selector function, an enhanced sound memory function and Sony 9-pin serial remote interface capability.

The PCM-3348HR, a product of the latest innovative Sony technology, is set to create a new standard for the next generation of high-quality digital audio multichannel recorders and is proof of the continuing Sony commitment to maintaining outstanding excellence in sound quality.

In particular the Sony PCM-3348, the world’s first 16-bit, 48-track recorder when it was introduced in 1988, has achieved a legendary status in many top-class recording studios worldwide. For its supreme sound quality, high performance, excellent reliability and convenient operational features, it is still used as the most powerful and reliable workhorse at the front-line of audio production.

However, the growing demand for higher sound quality and the ability to master at resolutions higher than 16-bit have become essential. As part of its overall strategy to provide the recording industry with an enhanced, but affordable, production platform, Sony has developed a full range of products for recording, producing and mastering at 24 bits. Along with the OXF-R3 Digital Audio Mixing Console and PCM-9000 Master Disc Recorder, Sony takes pride in introducing the PCM-3348HR 48-track DASH PLUS 24-bit recorder.

Sony mastery of digital audio technology has been clearly demonstrated over many years. Of the developments that it has pioneered, that of the 16-bit DASH (Digital Audio Stationary Head) format has to be one of the most significant. Over the past fifteen years, Sony has introduced a range of 24 and 48-track DASH recorders that have made the format a de-facto standard in multichannel recording.
24-bit 48-channel Capability
Supported by its highly reliable tape transport and refined servo control system, the PCM-3348HR provides 24-bit 48-channel recording/playback by increasing the tape speed to 1.5 times that of current 16-bit DASH machines. By employing this technique, it can perform both 16-bit (at 30ips and 48kHz) and 24-bit (at 45ips and 48kHz) recording/playback without changing the type of tape used.
A maximum of 44 minutes of 24-bit 48-channel recording can be achieved on a standard 14-inch reel of 1/2-inch tape at 44.1kHz.

Master Clock System
Three types of oscillator are available in the Master Clock System of the PCM-3348HR; a crystal oscillator, a Voltage Controlled Crystal Oscillator (VCXO) and a Voltage Controlled Oscillator (VCO). The type of oscillator is selected according to the operational mode of the machine so that clock jitter is kept as low as possible, and sound quality maximized.

Dither Circuit
With dither circuits incorporated in the A/D conversion circuitry, superb sound quality is assured even when recording the output of the internal high-quality 20-bit convertors in 16-bit mode.

Compatibility with DASH Recorders: DASH PLUS Format
The PCM-3348HR employs the DASH PLUS format. This is an extension of the DASH format that allows recording and playback of 24-bit signals exclusively but also retains compatibility with the 16-bit DASH format. The PCM-3348HR can therefore both record in 16-bit and playback tapes recorded by current 16-bit DASH recorders by using its 16-bit mode.

Same Operational Style as the PCM-3348
The operational style of the PCM-3348 is preserved for the PCM-3348HR, allowing users of the PCM-3348 to operate the PCM-3348HR without any special training or preparation in advance.

DASH Synchronization
Sample-accurate synchronization between 16-bit and 24-bit modes on two machines is made possible by the same recording sector address frequency being applied for CTL recording. This enables DASH synchronization between a PCM-3348HR and other Sony 16-bit DASH recorders even if the PCM-3348HR operates in 24-bit mode.
Under control of the supplied RM-3348HR Remote Control Unit, a PCM-3348HR can be operated in perfect DASH synchronization with up to two other PCM-3348HRs or Sony 16-bit DASH recorders.

DABK-3343HR: 20-bit A/D D/A Convertor Board Pack
The PCM-3348HR will frequently be used in conjunction with mixing consoles, such as the Sony OXF-R3, which already incorporate high resolution A/D and D/A conversion. For this reason, convertor boards for the PCM-3348HR are provided separately as the optional DABK-3343HR A/D D/A Convertor Board Pack. The DABK-3343HR consists of twelve A/D D/A convertor boards, each board having a four channel capability, and the complete set of boards can be installed into the slots provided inside the front doors of the main unit.
To provide ultimate sound quality for analog input signals, 1-bit 64 times oversampling \( \Delta \Sigma \) type A/D convertors and 20-bit decimation filters are used for A/D conversion. For D/A conversion, 24-bit eight times oversampling interpolation filters and 20-bit multibit type D/A convertors are employed.
By selecting this mode, any part of different source channels can be selected into one destination channel, with variable cross fade time, by simple key strokes. Cross fade time is selectable in 16 steps by the X'FADE TIME knob on the supplied RM-3348HR Remote Control Unit.

**Sound Memory Function**

The sound memory function is enhanced both in quality and recording time. At 48kHz, a maximum of approximately 80 seconds of 24-bit stereo sound memory data can be stored in the sound memory. This sampling time can be extended to around 160 seconds in mono mode.

The sound memory function is available in three modes: manual, auto start and external trigger modes. In auto start mode, the digital audio data of a source channel can be recorded automatically in the sound memory and also played back from the sound memory at a designated CTL address. In external trigger mode, at the input of an external analog signal, the digital audio data of a source channel can be recorded automatically in the sound memory and played back from the sound memory. Reverse playback of the digital audio data stored in the sound memory is also available and it can be used for creating sound effects.

Accurate trimming of the start and/or end points of the stored data in the sound memory to be copied to a destination channel can be done by the TRIM +/- buttons whatever display resolution is selected in time code frames.

**Continuous Auto Punch IN/OUT**

Unlike the PCM-3348, which is capable of storing only one set of auto punch in/out points, a continuous auto punch in/out mode is added enabling up to nine sets of auto punch in/out points to be registered. Sequential execution of the nine sections by using this mode is supported.

In this mode, the tape is played back from the start of the pre-roll point set before the first section of auto punch in/out points and stopped at the end of the post-roll point set after the last section of auto punch in/out points.

**System Expandability**

**9-Pin Serial I/F Control**

With a Sony 9-pin RS-422A serial remote interface connector now provided as the REMOTE-2 port at the rear panel, the PCM-3348HR can be conveniently controlled from an external machine, facilitating systematization with audio and video equipment.

**Versatile Digital Audio I/F**

The PCM-3348HR is equipped with four types of digital audio interface all with 24-bit resolution:

- 48-channel MADI I/O
- 48-channel balanced SDIF-2 D I/O
- 8-channel AES/EBU D I/O
- 2-channel unbalanced SDIF-2 D I/O

For multichannel digital I/O, MADI I/O connectors are provided in addition to the 48-channel balanced SDIF-2 digital I/O connectors. This allows interfacing with an even wider range of digital audio equipment such as MADI interfacing to an OXF-R3 Digital Audio Mixing Console. This further supports the concept of a complete 24-bit recording system using the Sony PCM-9000 Digital Audio Master Disc Recorder for the highest quality audio production. For 2-channel digital I/O, four 2-channel AES/EBU digital I/O boards and one 2-channel unbalanced SDIF-2 board are provided as standard. Any combination of four of these five boards can be installed into the four slots reserved in the rear panel.

![Rear Panel](image)
Built-In Time Code Generator/Reader

The PCM-3348HR is equipped with a built-in time code generator/reader which can handle all time code formats, including SMPTE (drop-frame and non-drop frame), EBU and FILM. It can also regenerate and record time code locked to an incoming external time code read by the built-in time code generator/reader, or regenerate and reproduce time code recorded on the time code track.

Time code sync playback is possible when the PCM-3348HR is synchronized to an external composite video signal. This enables the deck to playback tape with the phase of its time code synchronized to the sync phase of an external reference video signal, ideal in an audio-for-video editing environment.

Stable, High Speed Tape Transport

The mechanical clutch provided between the capstan and the capstan motor, the integrated microprocessor controlled servo system, and the rigid diecast chassis on which the tape transport is placed, give stable and high speed tape movement and fully support the higher tape speed of 1.5 times that required for 16-bit DASH recorders, thereby enabling 24-bit recording/playback.

Tape Tail End Slow

To avoid physical damage to the tape, it is automatically slowed down and stopped before the end of the reel in FF or REW mode. A further push on the FF orREW key, and the tape will be wound off completely.

Flexible Digital Performance

Selectable Sampling Frequency

The sampling frequency is selectable between 44.056kHz, 44.1kHz or 48kHz, making the PCM-3348HR suitable for use in a wide range of applications from CD mastering to digital video post production. By using an Fs shift mode, sampling frequencies of 1000/1001 times 48kHz and 44.1kHz can also be supported in playback or record.
Operational Advantages

Time Code Chase Synchronization
Time code chase synchronization is available with subframe accurate offset in two modes when under control of the supplied RM-3348HR Remote Control Unit.

- Address Mode
  After locking to an incoming time code, the PCM-3348HR will continuously monitor and chase the time code, maintaining complete synchronization with the master time code. The tape can be monitored as its speed varies.

- Free Mode
  After locking to an incoming time code, the PCM-3348HR returns to its normal playback mode and it will not be affected by any changes in the external time code.

Noiseless Punch IN/OUT with Cross Fade
A convenient punch in and out with cross fade operation becomes available when under RM-3348HR remote control, providing a smooth and noiseless transition at each punch in/out point. Cross fade time is adjustable in 16 steps over the range of from approximately 1 to 370 milliseconds and can be selected by turning the X'FADE TIME knob on the RM-3348HR.

Accurate Auto Location
Precise and instant auto location to a designated point is provided. A maximum of 100 points on the tape can be stored as cue points and trimmed as necessary. Both a locate function, which simply rewinds or fast forwards the tape to a designated locate point, and a zero locate function which enables the tape to be located to a point set as “00H00M00S” are provided. In addition, a roll-back function is available. This function rewinds or fast forwards the tape to a point which is a designated locate point minus the pre-roll time.

PWM Recording
Thanks to the use of PWM (Pulse Width Modulation) for recording and playback of cue tracks, a dynamic range of over 60dB is maintained for cue signals.

Variable Speed Playback –12.5%
Tape can be played back over a variable range of ±12.5% normal tape speed. It is also possible to indicate tape speed in semitones over the range from -2.31 to +2.04 on the RM-3348HR Remote Control Unit.

System Features

RM-3348HR: Supplied Remote Control Unit
All the functions of the PCM-3348HR can be controlled from the RM-3348HR.

- DASH synchronization
- Digital copy function
- Vocal selector function
- Sound memory function
- Cross fade time set up
- Time code chase
- Time code sync playback
- Auto punch IN/OUT
- Channel monitor setting
- Analog in-line monitoring
- Variable speed control
- Cue point store: max. 100 cue points
- Locate and rollback operation
- Pre/post-roll time setting
- Return/repeat playback
- Spot erase function
- Individual channel control
- Rec mute
- Rehearsal/Rec Disable
- 2CH D I/O setup
- Monitor mode control

DABK-3343HR: Optional Convertor Board Pack
Consisting of twelve DAD boards with each board having a four-channel processing capability, the DABK-3343HR performs 20-bit A/D D/A conversion ensuring high sound quality of analog input and output signals.

Dimensions: 340(W) x 31(H) x 272(D) mm each (13 1/2 x 1 1/4 x 10 3/4 inches)
Mass: 830g (1 lb 13 oz) each
Supplied accessory: installation guide

DMU-3048: Optional Digital Meter Unit
By connecting the DMU-3048 to the PCM-3348HR with a supplied meter cable and a remote cable, remote monitoring of channel status of all 48 channels of the PCM-3348HR is provided. Digital audio signal level, over level, tape condition (CRC error, interpolation, hold and mute) and recorder status (Rec and Rec Ready) can be indicated. And peak HOLD/2 seconds HOLD functions and a calibration adjustment are also available.

Dimensions: 700(W) x 152(H) x 200(D) mm (27 3/4 x 6 x 7 3/8 inches)
Mass: 10kg (22 lb 1 oz)
Power requirements: AC 100V to 240V, 50/60Hz
Current consumption: 1.2A
Specifications:

**PCM-3348HR**

**Format/Performance**

- **Recording format**: DASH PLUS/DASH F Double Density
- **Digital audio channel**: 4 channels
- **Quantization**: 24 bits in 16-bit internal switchable
- **Error correction**: Error Interleave

**Recording**

- **Recording time**: 24 bits: 40 minutes, 16 bits: 60 minutes (Fs=48kHz, with 14-inch reel)
- **Tape speed**: 24 bits: 114.30m/s, 16 bits: 165.60m/s (Fs=44.1kHz, with 14-inch reel)

**Variable tape speed**

- **±5% to ±20%**

**Residual Tape Speed**

- **14.1/1.5 inches**

**Tape speed accuracy**

- **±1.2%**

**Fast Wind**

- **20 m/s**

**Slow Wind**

- **1.5 m/s**

**Reference Video**

- **0.3 Vp-p, 75Ω, black burst**

**Sync**

- **< 120 m**

**Input Sensitivity of External Phase Control**

- **±5%/V of playback speed**

**Input Sensitivity of External Speed Control**

- **±10V, 75Ω, XLR-3-31 type (x1)**

**Audio Characteristics**

- **Analog Audio Signal Characteristics**
  - **MADI unbalanced, ECL, 75Ω**
  - **AES/EBU IN (8 ch)**
  - **SDIF-2 unbalanced OUT (2 ch)**
  - **XLR-3-32 type (x1)**
  - **XLR-3-31 type (x4)**

- **Digital Audio Signal Characteristics**
  - **AES/EBU OUT (48 ch)**
  - **RS-422A, D-sub 50-pin (x2)**
  - **AES/EBU IN (8 ch)**
  - **SDIF-2 balanced OUT (48 ch)**
  - **TTL compatible, 75Ω**

- **Sampling frequency**: 8kHz to 22kHz

**Digital Copy**

- **2-channel model: max. 2 channels simultaneously**
- **Multichannel mode: max. 48 channels simultaneously**

**Time Code**

- **24 bits: 40 minutes, 16 bits: 60 minutes**
- **1 sector, +1/-0 sector accuracy**
- **Offset error detection: 1/100 frame**
- **Sync offset detection: 1/100 frame**

**Offset**

- **2:16 kbps**

**Error correction**

- **24-bit/16-bit linear switchable**

**Quantization**

- **48 channels**

**Recording Format**

- **DASH PLUS/DASH F Double Density**

**Remote Control**

- **Less than 100m**

**Remote**

- **Less than 20m**
- **Remote: less than 75m**
- **Remote: 1 less than 100m**
- **Remote: less than 20m, AUX, REC+RECV CONTROL**

**Power**

- **AC 100V to 240V, 50/60Hz**

**Dimensions**

- **Unit: 490(W) x 220(H) x 472(D) mm (19 3/8 x 8 3/4 x 18 5/8 inches)**

**Mass**

- **Approx. 220 kg (485 lb)**

**Power/current consumption**

- **7A (Europe)**

**Supplied accessories**

- **RM-3348HR with stand (x1)**
- **2-channel unbalanced SF-P-2 board (x1)**
- **AES/EBU board (x4)**
- **4-bit CSA board (x1)**
- **Remote cabinet (x1)**

**Optional accessories**

- **DASH PLUS/DASH F Dual Density**
- **AES/EBU OUT (48 ch)**
- **AES/EBU IN (8 ch)**
- **RS-422A, D-sub 50-pin (x2)**
- **AES/EBU OUT (48 ch)**
- **AES/EBU IN (8 ch)**
- **RS-422A, D-sub 50-pin (x2)**

**Power requirements**

- **AC 100V to 240V, 50/60Hz (Europe)**

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