

# SONY®

Digital Master Disc Recorder

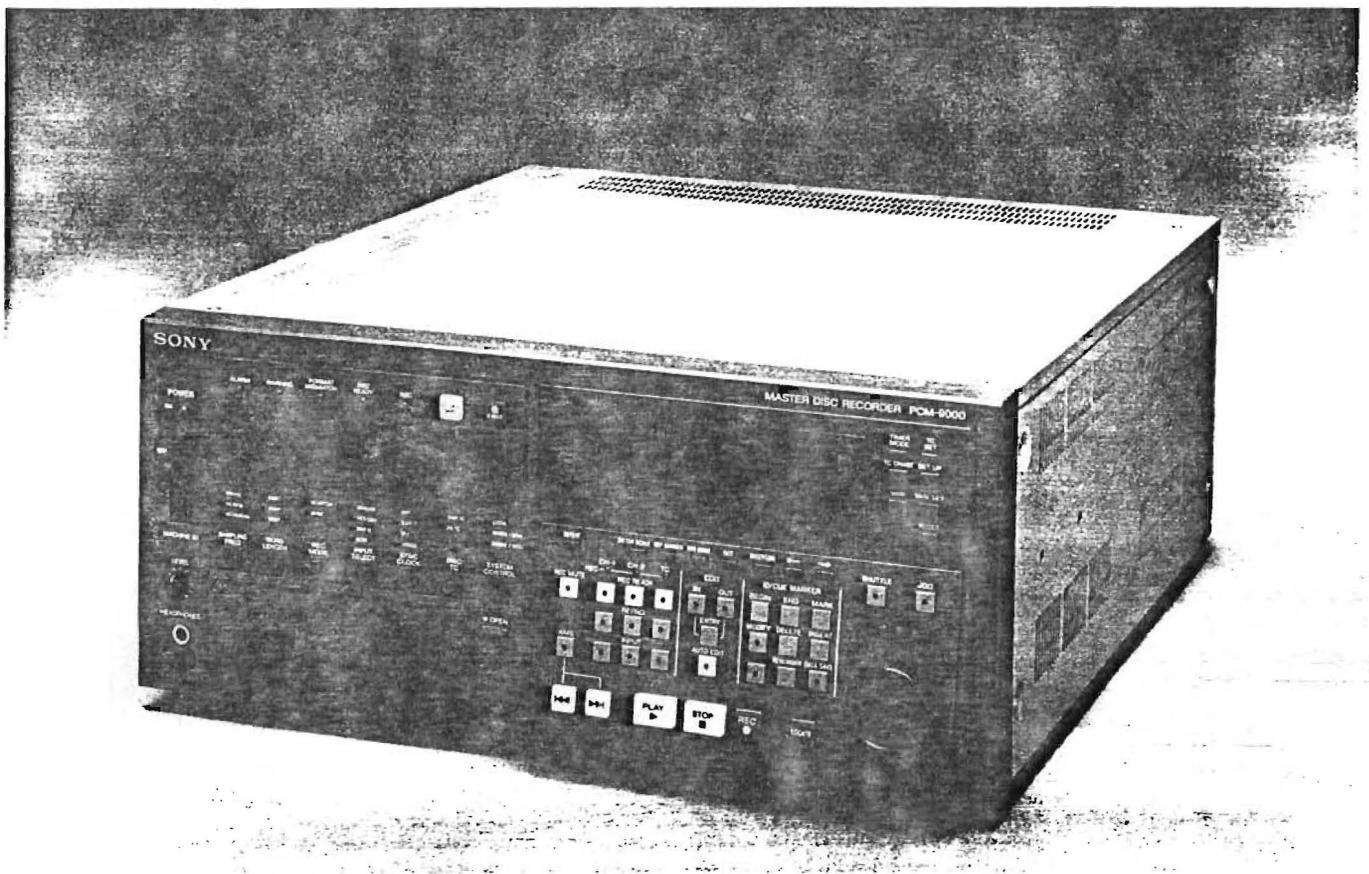
## PCM-9000

In recent years, the search for better sound quality in professional digital audio processing has seen a move away from 16-bit system towards those with 20-bit resolution. This move has gained momentum with the introduction of 20-bit A/D and D/A conversion technology.

As part of its extensive range of digital audio equipment, Sony already offers a CD Mastering system and now introduces the PCM-9000 Digital Master Disc Recorder that uses MO (Magneto-Optical) disc as its recording medium.

This significant advance in audio recording technology enables up to 80 minutes of two-channel audio to be stored in 20-bit linear mode - making it suitable for applications ranging from making master recordings in a studio to CD/MD pre-mastering and cutting.

Using an overwriteable MO disc not only brings excellent sound quality to this Digital Master Disc Recorder, it provides operational advantages such as quick access and non-linear editing. It also means that the recording medium can be removed for storage, or interchanged with other machines.



## Features

### MO Disc Advantages

The adoption of a new, single sided, 133mm (5.25-inch) MO (Magneto-Optical) disc makes repeated recording and playback possible, and because there is no contact with the medium during the operation of the unit, excellent durability of the discs is achieved.

### Long Recording Time

The combination of a newly developed recording format and a highdensity MO disc means that up to 80 minutes of continuous recording is now possible in 20-bit linear mode. Sync-REC and Monitor-REC, two functions that are very attractive in a master recorder, are both provided and REC/READY operation of each channel allows single channel or two-channel recordings to be made.

### User Data Recording

Cue data and nondestructive editing data can be recorded in the AUX-data area, making possible nonlinear editing in which the main data.

### Time Code Recording

Absolute Address is pre-mastered on to the MO disc during manufacture. External time code can also be recorded.

### Quick Access for Improved Operating Efficiency

Quick access, one of the benefits of a disc recorder, has been implemented by means of a linear motor thread mechanism.

### Three Sampling Frequencies and Quantizations

This unit is compatible with three sampling frequencies: 48kHz, 44.1kHz, and 44.056kHz. In addition, 16-bit, 20-bit or 24-bit quantization can be selected.

### Sync Signal Input Flexibility

Reference video sync, D-I sync or word sync signals can be used as an external synchronization signal.

### Variable Speed Recording/Playback

The speed can be varied by  $\pm 12.5\%$  of normal, in steps of 0.1%.

### Double-Speed Copying

Double-speed copying is provided through the SCSI interface, together with double-speed copying of the AUX-data.

### AES/EBU Insertion Interface

This unit is equipped with an AES/EBU insertion interface so that external digital effectors can be connected.

### Disc Check Function

The unit is equipped with a disc check function that allow the user to check the condition of the medium before it is used.

### Disc Erase

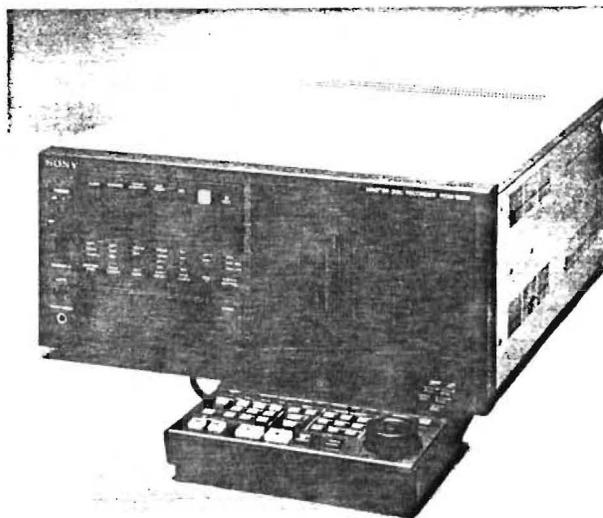
There are two erase modes: instant erase and disc erase. Instant erase erases only the data in the AUX data area, while disc erase erases all of the data on the disc.

### Wide Options Range

A wide variety of options has been developed, making for users to customize the recorder for their particular application.

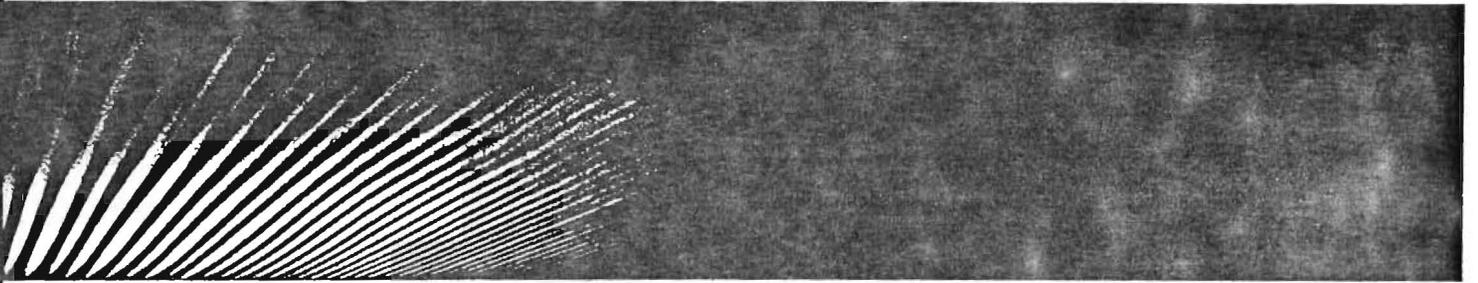
## Specifications

Disc Size:	ø133mm (5.25-inch)
No. of Channels:	2 channels
Recording Time:	80 minutes (Sampled at 20-bit Fs=44.1kHz)
Rotational Mode:	CLV (Constant Linear Velocity)
Sampling Frequency:	44.056/44.1/48kHz
Quantization:	16/20/24-bit Linear, Selectable
Error Correction:	CIRC (Cross Interleave Reed Solomon Code)
Variable Speed:	$\pm 12.5\%$ at 0.1% steps
Digital I/O:	AES/EBU IN: XLR-3-31 type (x1) AES/EBU OUT: XLR-3-32 type (x1) SDIF-2 unbalanced (Optional): TTL level, 75Ω, BNC (x2)
Analog I/O:	18-bit or 20-bit AD/DA board (Optional) IN: XLR-3-31 type (x2) OUT: XLR-3-32 type (x2)
Sync Signal:	Reference Video IN: BNC (x2) AES/EBU D-I Sync IN: XLR-3-31 type (x1) Word Sync IN: BNC (x2) OUT: BNC (x2)
Power Requirements:	AC100V to 240V, 50/60Hz
Power Consumption:	130W
Dimensions:	424(W) x 176(H) x 455(D) mm (16 3/4 x 7 x 17 3/4 inches)
Weight:	18kg (39 lb 11 oz)



**SONY**

# Magneto Optical Disk



## Technical Manual

Internal use only

# The reasons behind Sony's promotion of optical disks

## Preserving human culture for posterity requires extraordinary reliability

The lives of our remote ancestors are recorded on media such as the Rosetta Stone and parchment, and still give us valuable messages, even after many thousands of years. The more human culture advances, the greater the importance of passing it on to future generations on a reliable medium. Therefore, we at Sony have committed ourselves to optical disks on account of their extreme reliability, and their ability to store information stably without influence from environmental conditions, for an almost indefinite period of time. Moreover, in consideration of the trend towards "multi-media" combining words, numbers, sound and pictures, optical disks, with their flexibility and applicability, are sure to play a leading role in future recording media.

## Low environment-impact information-storage is vital for the future

As economic activities rise, so inevitably does worldwide consumption of paper. Mankind can no longer ignore the fact that continued deforestation at our present rate will result in environmental disaster. In fact, one of the overriding factors when evaluating a recording medium is how well it records large volumes of information, how well it avoids wasting resources, and therefore how many trees it can save. Indeed, seen from the viewpoint of recording density, optical disks offer extraordinary performance: the capacity of a 12-inch writable optical disk is an astonishing 6.55 gigabytes. As new technology is developed, the recording density of optical disks is sure to increase.

## Optical disks have already stimulated new cultural forms

Another factor to be considered when evaluating general-purpose media for wide use in the areas of business, entertainment and instruction is ease of handling. Optical disks such as the compact disc (CD), laser videodisc (LD), \*CD-ROM, \*CD-I etc. are already enjoying widespread use, and have actually stimulated the emergence of new cultural forms. In addition to their ability to store large quantities of data in a small physical space, they also offer ease of access, easy transportability, low recording cost, and a semi-permanent life. It is really no exaggeration to say that optical disks are without drawbacks and have proven the practicality of their performance.

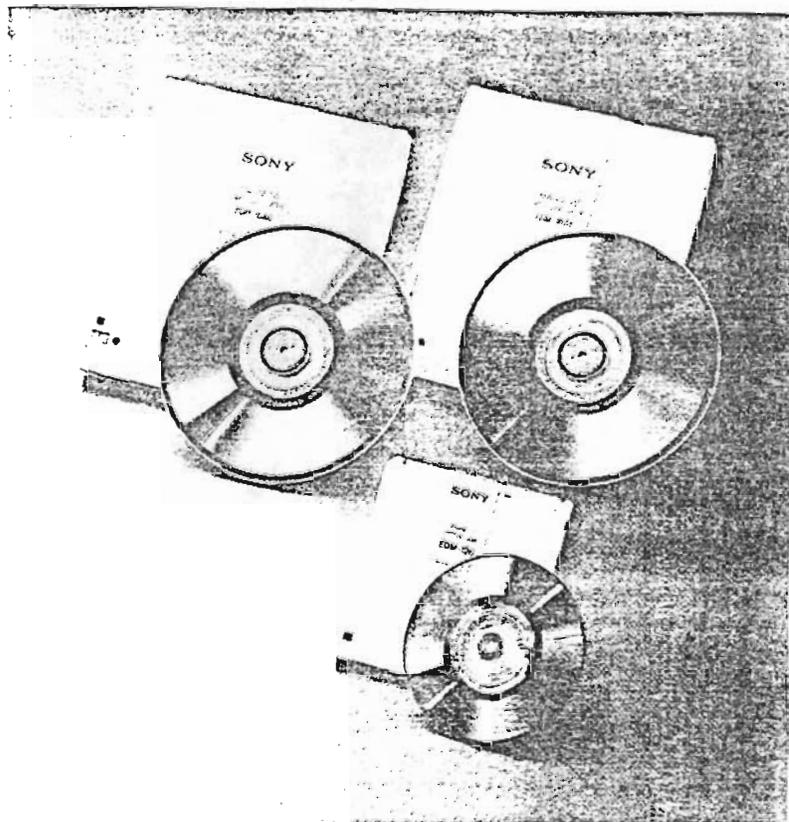


Photo 1 5.25" MO disk (upper), 3.5" MO disk (lower)

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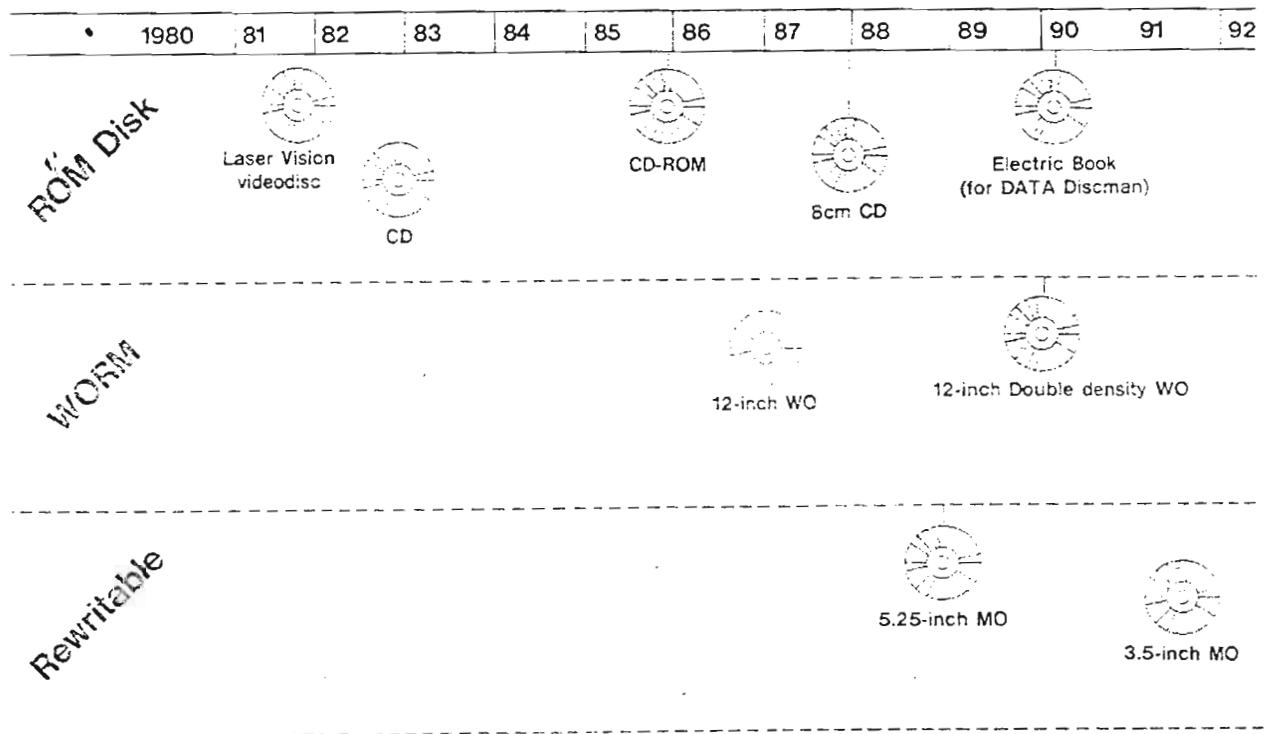
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\* Terms marked \* are explained in the last chapter.

The potential of optical disks was first recognized at Sony more than 20 years ago, in 1970, when research and development into this new medium was started. Our target was to develop a medium with a semi-permanent life, a non-contact read-write system, high speed random access and low memory cost. With the advent of compact, low cost, high power semiconductor lasers, we were able to manufacture high performance optical disks. Since then, we have released a number of read-only optical disk systems: the Laser Vision videodisc in 1981, the audio compact disc in 1982 and the CD-ROM in 1984, confirming our position as the leader of the optical disc industry worldwide.

From the latter half of the 1970s, Sony began research into writable and rewritable optical disks which users could employ in a manner similar to magnetic tape. With the data storage capacity and reliability of the medium as an overriding consideration, we began to develop the mass-production technology required to manufacture a storage medium to answer the demands of the times for large storage capacity at low cost. These technological developments resulted in the release of a recordable optical disk, the "Writeable Optical Disk", in 1985 and the rewritable "Magneto Optical Disk" in 1986. In 1991, we announced our most advanced technology, the "TRISTAR", which we expect to enable up to 6 times the recording density of previous disks in this field, as in so many others, Sony has again revealed its technical lead over competing manufacturers.

Fig.1: History of Sony's optical disk development



Sony's optical disks are manufactured under a total development system that includes the medium itself, hardware and laser diodes as its most important components, as well as systems for their application. It is only with such a total development system that products can be manufactured with the highest quality and reliability, to meet the demands and conditions of actual use.

The Materials Research Section conducts a wide range of basic research into various materials including magnetic particles and semiconductors, to collect and analyze the data that is the basis of future technical developments. The Systems Device Section conducts research into total performance, combining the media themselves and drive systems. In this section, all the technologies and the data concerning media design are concentrated and a steady stream of industry-leading technologies have been developed. Some examples of its achievements include polycarbonate disk substrates and alloy-mode writing recordable disk. The Manufacturing Research Section is responsible for the establishment of thin-film forming technology, the improvement of current models and research and development into new products. Data from these sections and analyses performed by them are quickly fed back to the Manufacturing Section and used to improve products. The close co-operation of these sections is one of the secrets of Sony's success.

Sony's total manufacturing system is housed in clean rooms and features the most up-to-minute facilities, from stampers used for molding blank disks to high precision cartridges. Sony's high quality, high reliability optical disks are manufactured under a total quality control system.

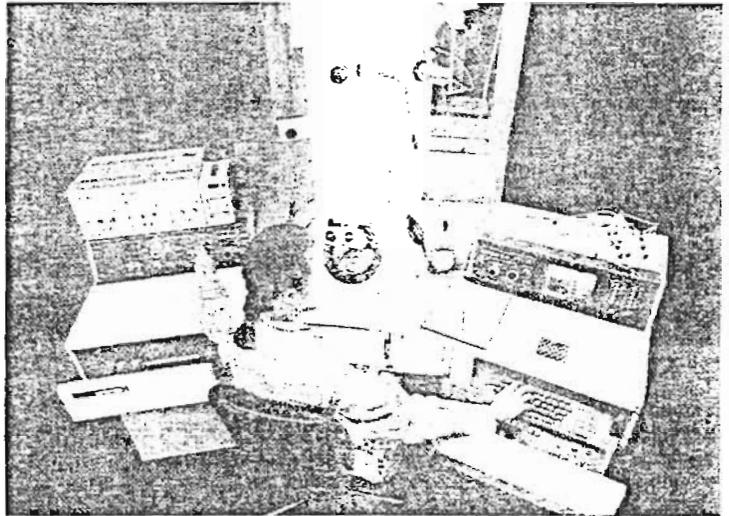


Photo 2 Basic research into materials

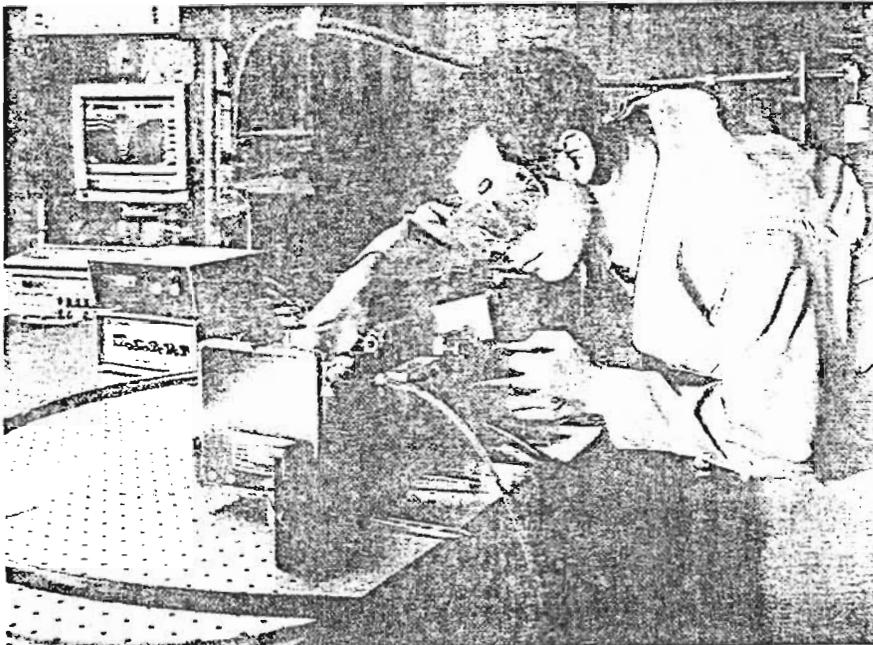


Photo 3 Laser experiment in Applications Research Section

# MO: The most promising optical disk

The rewritable optical disk was introduced to the market just a short time ago, in 1988. Although it is still new technology from the viewpoint of technological maturity, the optical disk already offers astonishing performance with a greater capacity than hard disks, and a better access time than floppy disks, as shown in Fig. 2. If one considers the extremely mature technical level of conventional magnetic recording media such as floppy disks and hard disks and also the future technical improvements possible for magneto optical disks, their future is most promising. Fig. 3 shows estimated improvements in recording density for different recording media in the near future. With technical innovations such as the development of lasers with shorter wavelengths and narrower track widths, it is considered that magneto optical disks will soon have a memory capacity exceeding the gigabyte order.

In addition to magneto optical (MO) disks, there are various other types of rewritable optical disks, including "Phase-change" optical disks, "Dye-polymer" optical disks, etc. The reasons for Sony's choice of the magneto optical recording system therefore requires some explanation. To read and write data, the magneto optical recording system uses absorbed heat from a laser beam together with an applied magnetic field to change the orientation of magnetic domains on the disk. In reading, data is detected by the Kerr effect under which the characteristics of the reflected laser beam are changed depending on the direction of the

magnetic field. In contrast, reading and writing of data in the phase change and organic pigment systems depends on the absorption of heat generated by a laser beam as well as changes in the atomic structure of the recording layer or reversibility of its molecular structure. Sony examined all of these systems and chose the magneto optical recording system for the following reasons:

Fig.2 Memory capacity and access time of various recording media

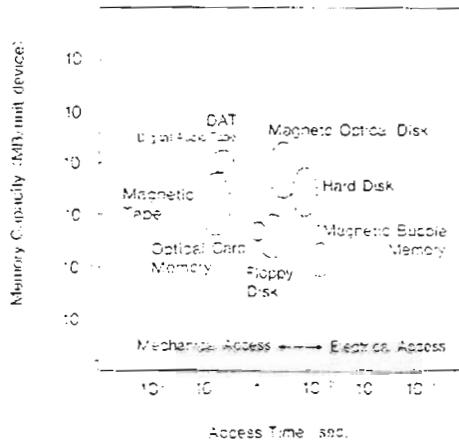
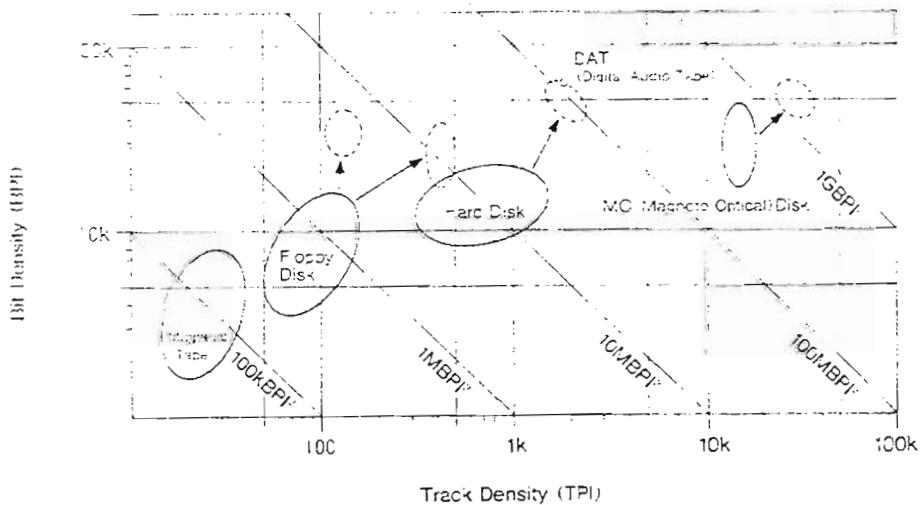


Fig.3 Bit density and track density of each recording media



(1) Cycle of rewrites is virtually unlimited

Since the magneto optical recording system writes data by magnetizing a magnetic film having vertical magnetic anisotropy using the heat of a laser beam and an external magnetic field, as shown in Fig. 4, the error rate will not change even if the disk is rewritten more than 10 million times. On the other hand, the phase change system, considered to be the strongest competitor of MO disks, uses the ability of the atomic structure of its recording film to alternate between a crystal structure and an amorphous structure. Since this is thermally unstable, rewriting is possible only about 1000 times, rendering the phase change system less than ideally suited to computer applications.

(2) Linear speed dependency

Fig. 5 shows the basic principle of the phase change optical recording system. When writing, the atomic structure is changed to an amorphous structure by suddenly cooling from the high melting temperature. When erasing, it is returned to a crystal structure by holding for a fixed time at a lower temperature than in writing and then cooling more gradually. Since the phase change system requires two conflicting operations, it is difficult to overwrite data, and at the same time, there are limitations placed on the combination of drive and media. On the other hand, as the magneto optical recording system is less dependent on linear speed, it has fewer limitations than the phase change system. In addition, although the magneto optical recording system uses magnetism for write and read operations similar to conventional magnetic recording media, its coercive force is high at 10 kOe; after data has once been written, it is maintained in stable condition and is not affected by stray magnetic fields in a normal environment. This is one more decisive factor in Sony's choice of the magneto optical recording system.

Fig.4 Principle of Magneto Optical recording system:

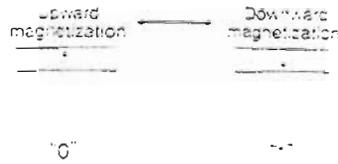


Fig.5 Principle of Phase Change system

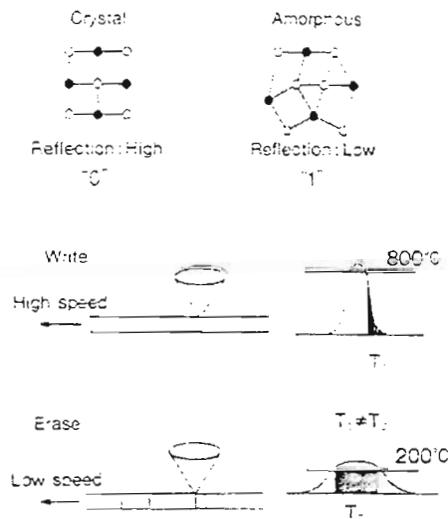


Table 1 Comparison of Magneto Optical Recording system and Phase Change system

Change system	Magneto Optical	Phase Change	
M	Layer structure	4-layer	4-layer
E	Number of rewrites	>10 <sup>7</sup>	>10 <sup>3</sup>
D	Erasure rate	50dB	25-35dB
I	Reliability of recorded data	Favorable	Not favorable
A	Linear speed dependency of recording layer	None	High
	Actual results	ISO 5.25, 3.5" CD-MO and others	5.25" Less than 1 year
	Laser power	Low, 20 mW	High, 30-40mW
Optical system	Magnetic field	Laser pickup + bias magnetic block	Laser pickup only

MO: Recording with heat and magnetic field  
 PC: Recording with heat only

Al Reflective layer Au  
 SiN Conductivity ZnS-SiO<sub>2</sub> PC  
 Tb FeCo Recording -GeS<sub>2</sub>Se  
 SiN Conductivity ZnS-SiO<sub>2</sub>

# 5.25-inch and 3.5-inch — Two MO disk specifications

5.25-inch MO disks are double-sided, as a rule. With their size advantage, 5.25-inch MO disks are ideal for providing large

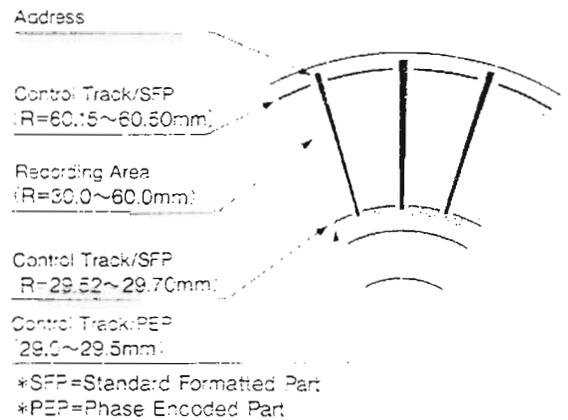
memory capacity. They are now being proposed for use as computer memory storage devices and they promise to be useful in a wide range of applications as a data storage medium.

Table 2 5.25-inch MO Disk Specifications

	EDM-1DA0	EDM-1DA1
<b>Format</b>		
User area (radius)	30~60mm	
Number of user tracks	16751 Tracks side	
Sector size	1024 Bytes/sector	512 Bytes/sector
Number of sectors/track	17	31
Configuration of track	Spiral	
Track pitch	1.6 $\mu$ m	
Direction of rotation	CCW (Seen from optics side)	
<b>Mechanical characteristics</b>		
Outer diameter of disk	130mm	
Diameter of hub	25mm	
Cartridge dimensions (W/D/H)	135 x 153 x 7mm	
Disk weight without cartridge	45g	
Total weight	165g	
Radial run-out	$\leq 50\mu$ m p-p	
Axial run-out	$\leq 300\mu$ m p-p	
Tilt	$\leq 5$ mrad	
<b>Optical characteristics</b>		
Substrate thickness	1.2mm	
Refractive index	1.57	
Reflectivity at blank area	19%	
<b>Read/Write characteristics</b>		
Nominal read power at 2400rpm	1.5mW*	
Nominal write power at 2400rpm	9.0mW*	
Nominal erase power at 2400rpm	10.0mW*	
Nominal write/erase magnetic field strength	18000~32000A/m (225~400 Oe)	
Carrier to noise ratio	$\geq 47$ dB	
Raw byte error rate	$\leq 5 \times 10^{-6}$	
<b>Groove conditions</b>		
Push-pull ratio	0.40~0.65	
Track-cross ratio	0.30~0.60	
<b>Recording capacity</b>		
Unformatted	433.5MB, side	
Formatted	325 MB, side	297 MB, side
Number of side used	2 (Double-sided)	
<b>Reliability (Acceleration test result)</b>		
Read cycle	$\geq 10$	
Erase/write/read cycle	$\geq 10$	
Load/unload cycle	$\geq 2 \times 10^6$	
Archival life	$\geq 15$ years	
Shelf life	$\geq 15$ years	
<b>Environmental requirements</b>		
Operating temperature	5~55°C	
Operating humidity	10~80%RH**	
Storage temperature	-10~55°C	
Storage humidity	10~90%RH**	

\* When used with Sony drives.  
\*\* Maximum wet bulb temperature: 29°C

Fig. 6 5.25-inch MO Disk Pre-formatting



Major information on control Track

[PEP Section]

- Sector length
- Modulation system
- Rotation mode
- ECC type
- Reflectivity
- Read power
- Media type
- Supplier
- Others

[SFP Section]

- Other than left:
- Detailed write/erase conditions
  - Detailed information concerning tracks

### 3.5-inch MO Disk Specifications

In spite of its compact size, the 3.5-inch MO disk provides a larger capacity than other media. It is expected to be used in

Table 3 3.5-inch MO Disk Specifications

MO	
<b>Format</b>	
User area (radius)	24~40mm
Number of user tracks	10000 Tracks, single side
Sector size	512 Bytes/sector
Number of sector/track	25
Configuration of track	Spiral
Track pitch	1.6 $\mu$ m
Direction of rotation	CCW (Seen from optics side)
<b>Mechanical characteristics</b>	
Outer diameter of disk	86mm
Diameter of hub	15mm
Cartridge dimensions (W/D/H)	90/94/6mm
Disk weight without cartridge	10g
Total weight	40g
Radial run-out	$\leq 50\mu$ m (p-p)
Axial run-out	$\leq 220\mu$ m
Tilt	$\leq 5$ mrad
<b>Optical characteristics</b>	
Substrate thickness	1.2mm
Refractive index	1.57
Reflectivity of blank area	19%
<b>Read/Write characteristics</b>	
Carrier to noise ratio	$\geq 48$ dB
Raw byte error rate	$\leq 5 \times 10^{-7}$
<b>Groove conditions</b>	
Push-pull ratio	0.5~0.7
Track-cross ratio	0.2~0.6
<b>Recording capacity</b>	
Disk recording capacity	128 MB/side
Number of side used	Single sided
<b>Reliability (Acceleration test result)</b>	
Read cycle	$\geq 10^7$
Erase/write/read cycle	$\geq 10^7$
Load/unload cycle	$\geq 10^7$
Archival life	$\geq 10$ years
Shelf life	$\geq 10$ years
<b>Environmental requirements</b>	
Operating temperature	5~55°C
Operating humidity	3~85%RH*
Storage temperature	-10~55°C
Storage humidity	3~90%RH*

\*Maximum wet bulb temperature : 29°C

many applications including the memory of "notebook type" personal computers. A total of three 3.5-inch optical disk standards are now being proposed, "CD-ROM" and "P-ROM" as well as the MO disk.

Table 4 3.5-inch ROM Disk Specifications

	OD-ROM	P-ROM
<b>Format</b>		
User area (radius)	24~40mm	
Number of user tracks	10000 Tracks, single side	
Sector size	512 Bytes/sector	
Number of sector/track	25	
Configuration of track	Spiral	
Track pitch	1.6 $\mu$ m	
Direction of rotation	CCW (Seen from optics side)	
<b>Mechanical characteristics</b>		
Outer diameter of disk	86mm	
Diameter of hub	15mm	
Cartridge dimensions(W/D/H)	90/94/6mm	
Disk weight without cartridge	10g	
Total weight	40g	
Radial run-out	$\leq 50\mu$ m (p-p)	
Axial run-out	$\leq 220\mu$ m	
Tilt	$\leq 5$ mrad	
<b>Optical characteristics</b>		
Substrate thickness	1.2mm	
Refractive index	1.57	
Reflectivity of blank area	75%	19%
<b>Read/Write characteristics</b>		
Carrier to noise ratio	—	$\geq 48$ dB
Raw byte error rate	—	$\leq 5 \times 10^{-7}$
<b>Groove conditions</b>		
Push-pull ratio (ROM area)	0.35~0.70	
(Rewritable area)	— 0.50~0.70	
Track-cross ratio (ROM area)	0.10~0.60	
(Rewritable area)	— 0.20~0.60	
<b>Recording capacity</b>		
Disk recording capacity	123 MB/side	128 MB/side
Number of side used	Single sided	
<b>Reliability (Acceleration test result)</b>		
Read cycle	$\geq 10^7$	
Erase/write/read cycle	— $\geq 10^7$	
Load/unload cycle	$\geq 10^7$	
Archival life	$\geq 10$ years	
Shelf life	$\geq 10$ years	
<b>Environmental requirements</b>		
Operating temperature	5~55°C	
Operating humidity	3~85%RH*	
Storage temperature	-10~55°C	
Storage humidity	3~90%RH*	

\*Maximum wet bulb temperature : 29°C

# Writing, Erasing, Operation and Principle of MO Disk

## MO Disk Layer Structure

The MO disk consists of four layers on a polycarbonate substrate (see Fig. 7). The signal is recorded in the perpendicular magnetization film (MO layer) made of TbFeCo while dielectric SiN films sandwiching the MO layer to protect it and enhance the Kerr effect. The fourth layer, an Al film, is used to reflect the laser beam.

## MO (Magneto Optical) disk

The MO (Magneto Optical) disk is essentially a type of magnetic memory device. Writing and erasing data are performed using a laser heat source and an external magnetic field (thermo-magnetic recording), while reading data is performed by the laser beam alone (optical playback). The basic principles of these operations are shown in Fig. 8-10.

**Writing** As shown in Fig. 8, in the MO drive, a powerful electromagnet is located above the disk and a laser diode is located under the disk.

In the initial status (Fig. 9-a), the direction of magnetization of the MO layer is upward. When writing data, a downward external magnetic field is applied while the laser beam is applied for the data recording period. In the MO layer, the temperature at the point where the laser beam is applied rises and when it reaches the Curie temperature, the coercive force of the MO layer is decreased and in the required sections the magnetization is inverted due to the external magnetic field (Fig. 9-b), thus recording data.

**Erasing** In the reverse way to the above, an upward external magnetic field is applied while the laser beam is applied to the MO layer. When the temperature reaches the Curie point, the direction of magnetization is returned to its initial status, thereby erasing data (Fig. 9-c).

**Reading** To read the recorded data, i.e., to read whether the magnetization direction of the MO layer is upward or downward, a magneto optical phenomenon called the "Kerr effect" is used. As shown Fig. 10, this phenomenon appears as a slight rotation of the plane of polarization of the reflected laser striking the MO layer at about 0.2-0.4°. This change of rotation angle ( $\theta$ ) is converted into a change of light intensity using an analyzer (Polarized Beam Splitter) and this is applied to a photodetector so it can be converted to an electric signal.

Fig. 7 MO Disk Layer Structure

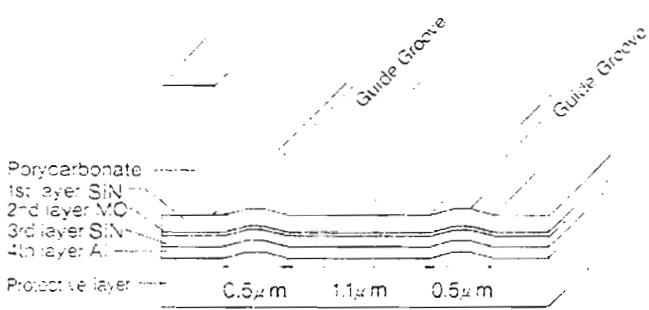


Fig. 8 MO Disk Drive Structure

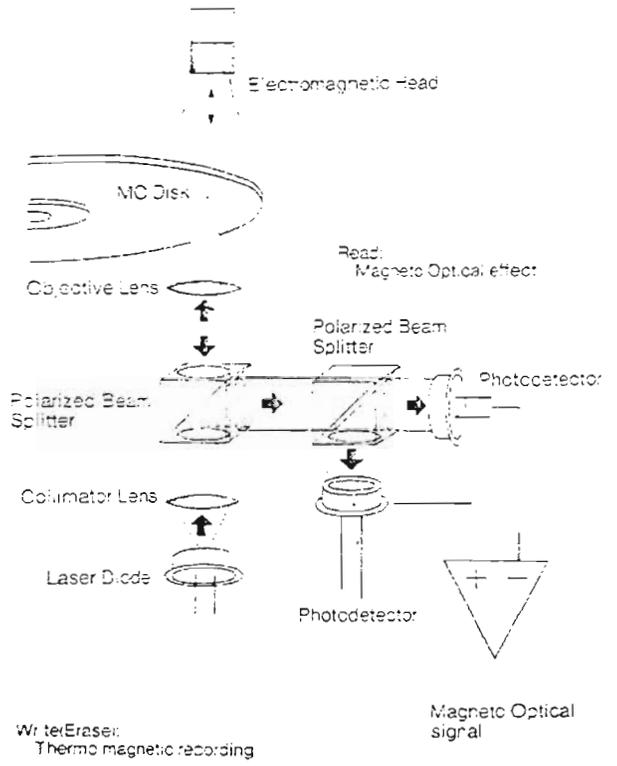


Fig. 9 Write/Erase Operation Principle of MO Disk

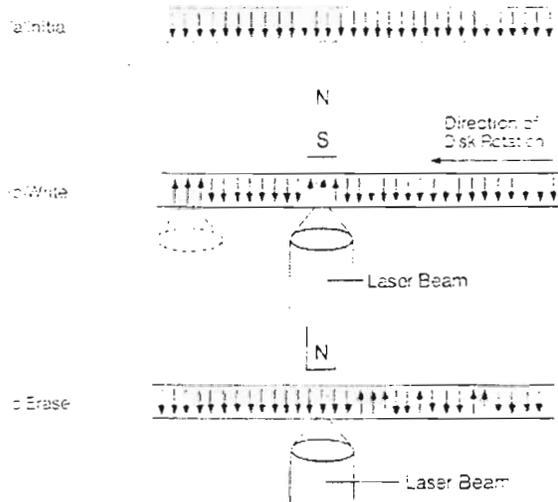
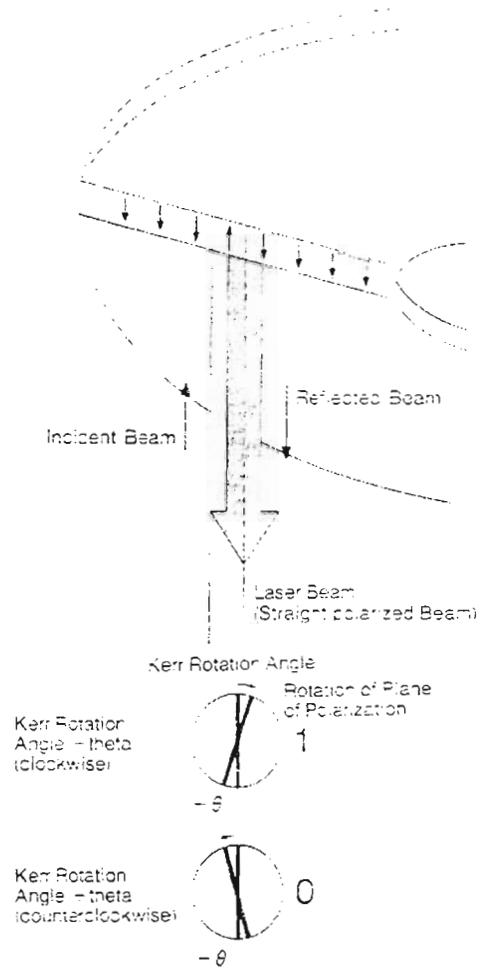


Fig. 10 Read Operation Principle of MO Disk



Upward or downward magnetization appears as a rotation of the plane of polarization of the laser beam (difference between  $-\theta$  and  $+\theta$ ).

# Sony MO disks: manufactured by the most adv

Sony's MO disks are manufactured in a class-100 clean room, equivalent to that of a plant used to fabricate semiconductors with sub-micron order precision. Their excellent performance and quality are the result of a highly advanced manufacturing system with quality inspection procedures implemented at many points on the manufacturing line. These strict process control measures assure extraordinary reliability allowing the disks to handle important data with virtually no possibility of a crash.

## GLASS SUBSTRATE PROCESS

Sony developed its own laser cutting machine for use in the mastering process. Long experience manufacturing compact discs and Laser Vision videodisks allows us to make high-quality stampers to accommodate any required format.

## GLASS POLISHING PROCESS

In this process, the polycarbonate substrate is made using an injection molding machine. To pass severe standards for birefringence, flatness, signal transfer rate, etc., Sony employs carefully selected materials as well as highly advanced molding technology.

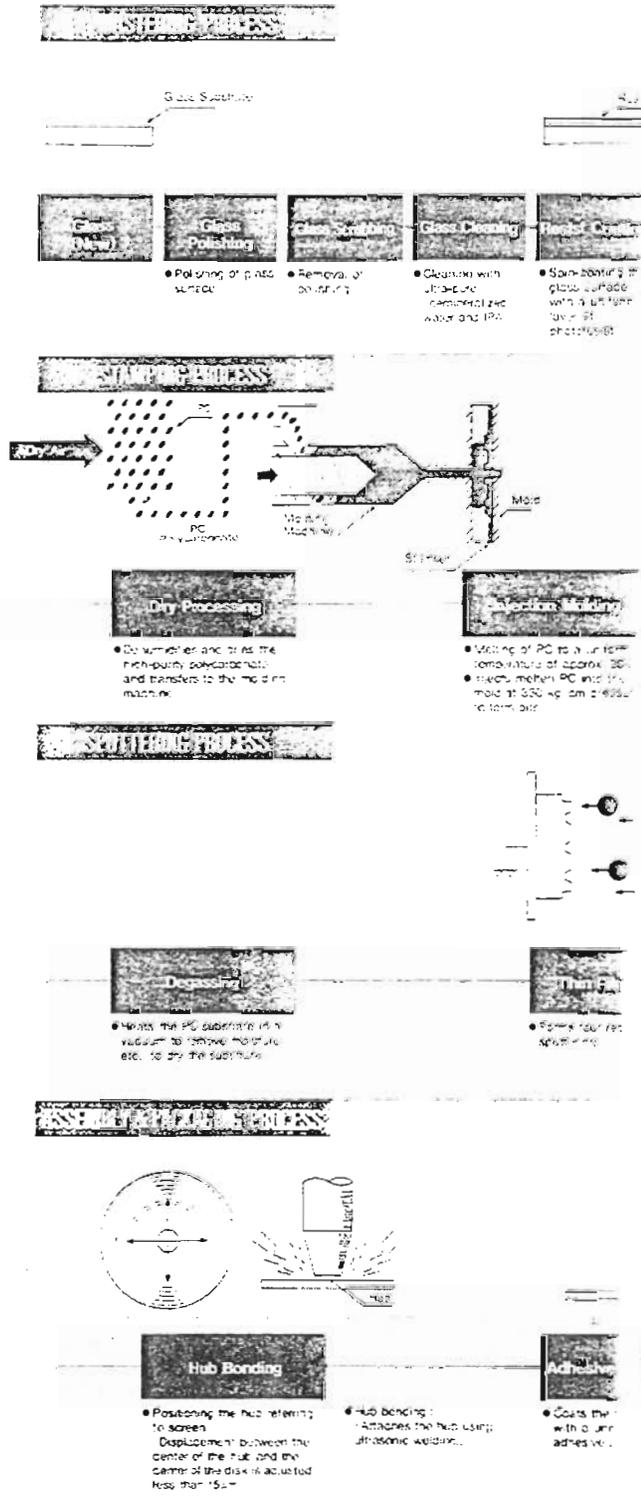
## DRY PROCESS

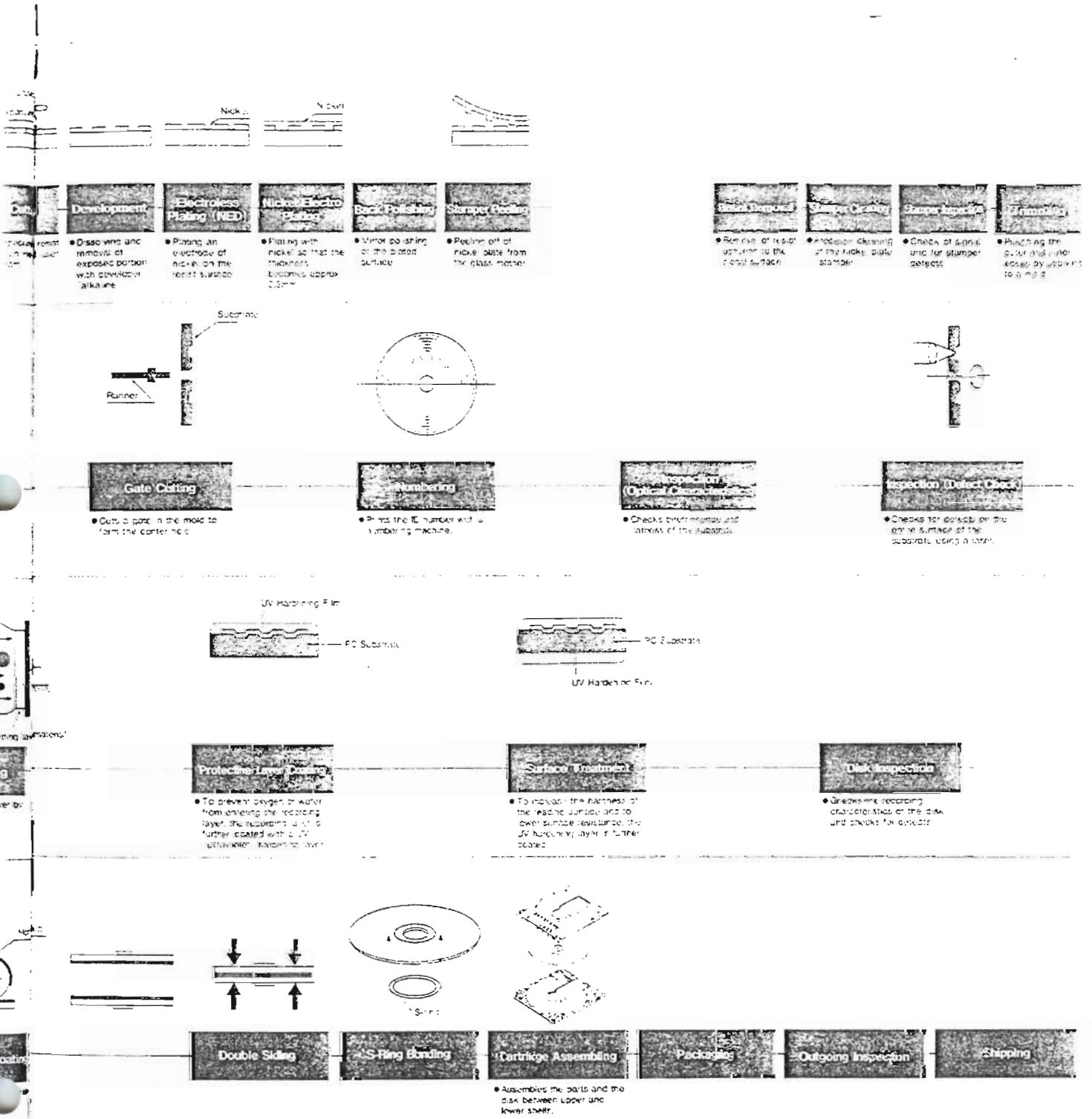
In this process, the thin films for recording, reflection, etc., are deposited on the substrate. Here, it is vital to maintain the optimum combination of materials, uniformity of layer thickness and reproducibility. To achieve the required accuracy, Sony uses high-precision sputtering machines and know-how gained through long experience.

## DISK FINISHING PROCESS

In this process, the hubs are mounted on the disks. To construct a 5.25-inch MO disk, two disks are bonded together to create a double-sided disk. Then, the S-rings are attached and the completed disk is placed in a cartridge. Strict quality checks are repeatedly applied before final shipment.

Fig. 11 Total Manufacturing system of Sony MO Disk





# Maximizing the performance of Sony MO disks

## Reflectivity

This should be neither too high nor too low, otherwise it may cause problems in operation of the focusing servo or tracking servo.

Although the ISO standard (wave-length: 825 nm) defines the reflectivity as 10-34% (14-29% for 3.5-inch), Sony's media standards are set at 19% which is about the center point, in consideration of compatibility with the drives of various manufacturers.

## Signal Imbalance

To read data recorded on MO disks, the drive detects

which allows differentiation of the direction of magnetization corresponding to binary ones and zeros. However, due to substrate birefringence and other external factors, phase shift does occur.

This phase shift results in a problem called signal imbalance which causes influences mainly of the kind listed below.

### 1) Effect on servo operation:

Large signal imbalance, because of irregular distribution of reflected light intensity may cause loss of focus on the signal surface (de-focusing), or inability to follow the center of the recorded signal track (de-tracking).

### 2) Deterioration of MO signal quality:

Ordinarily, MO drives perform signal detection using a differential detection system (optical phase difference or polarized plane) and the signal may be modulated by birefringence caused by the substrate.

This substrate birefringence varies together with disk rotation in general, so it can not be completely eliminated and as a result it becomes a cause of signal quality deterioration.

Sony uses high purity polycarbonate for the substrate to improve durability and long term stability. Although polycarbonate has a large birefringence value when compared with glass, Sony has achieved characteristics closer to those of glass by using highly advanced forming technology.

**Table 5 Comparison of Signal Imbalance of MO Disks from Various Manufacturers (Wavelength: 825 nm, inner section)**

Sony	1.7(%)
Company A	2.9
Company B	6.6
Company C	2.2
Company D (glass)	1.0
ISO standard	6.0

## A disk's physical or mechanical characteristics are critical for writing/reading stability using the laser beam formed by the drive's optical pickup.

Sony MO disks are designed with superior mechanical characteristics to assure stable performance is maintained during high speed rotation. In the ISO Standard, various parameters are specified at 1800 rpm rotational speed, as described below.

### Tilt

Shows the inclination of the disk. When there is a large amount of tilt, the light reflected from the disk may not return to the pickup correctly, and this may cause errors.

### Deflection

Shows the amount of deviation of the disk rotational plane from the reference plane.

### Axial acceleration

Shows the acceleration when the objective lens, which focuses the laser light, follows the axial direction along the disk during rotation. The smaller this value, the less the load on the drive (focus servo).

### Radial run-out

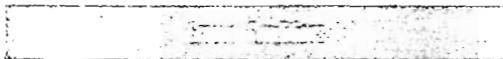
Shows the variation (radial direction) of the track when the disk is rotating, that is, its "Radial run-out".

### Radial acceleration

Shows the acceleration when the objective lens follows the radial direction during rotation. The smaller this value, the less the load on the drive (tracking servo).

**Table 6 ISO Standards for Mechanical Characteristics of 5.25-inch MO Disks**

Tilt	5
Deflection	300
Axial Acceleration	20
Track Eccentricity	50
Radial Acceleration	6



This simulates the shape of the groove as an electrical signal from a photodetector which detects the distribution of reflected light intensity. Since this is also dependent on the plane of polarization of the incident light, in the development of MO disks Sony has always taken into consideration compatibility with various other drives and has incorporated such characteristics into its standards.

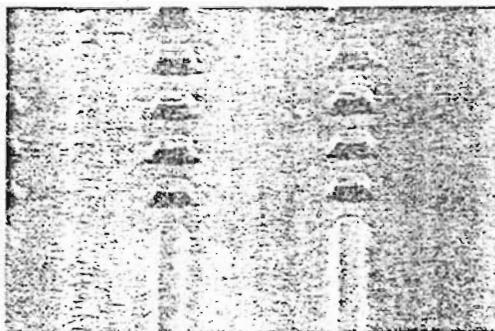
**Push-pull Signal Ratio**

The drive ordinarily maintains tracking by using the push-out method, so it is desirable to conform with the servo characteristics applied at this time. Problems will arise if the figure is either too large or too small, so ISO standards specify 0.4 to 0.65 (0.5 to 0.7 for 3.5-inch).

**TCS (Track Cross Signal)**

Shows the modulation when the pickup crosses the track. Track seek operation is performed based on this signal. It is defined as 0.2 to 0.6 (0.3 to 0.6 for 3.5-inch) in the ISO standard.

Photo4 Scanning electron micrograph of groove pre-pit portion of Sony 5.25-inch MO disk (2500 times)



# Checking the performance of Sony MO disk wit

## Low Byte Error Rate

MO recording depends on heat (laser power) and a magnetic field (bias field), so a wide tolerance for variations in these two parameters is an important factor in performance. For example, dust on the disk or lens, or variations in ambient temperature (write/erase temperature difference), may cause applied heat (power) variations.

Keeping such conditions firmly in mind, Sony takes due consideration of optical and thermal aspects of construction. The recording surface of Sony disks is designed based on plentiful test data, using advanced computer simulation.

In addition, since the recording surface design is premised on future increases in rotational speed, it readily handles 1800 to 3600 rpm speeds to assure broad drive compatibility.

### High Carrier to Noise Ratio

This shows the quality of the recorded data, using the carrier (signal) to noise ratio. ISO specifies 45dB or better but Sony MO disks boast 47dB or better.

### Low Byte Error Rate

Shown in the graph is shift in error rate for Sony 5.25-inch MO disks for particular monthly output. As you can see, an error rate on the  $10^{-11}$  level is achieved. Using the latest manufacturing technology and process management systems, we are constantly working to further minimize this figure.

Fig. 12 Sony 5.25-inch MO disks error rate characteristics on month of manufacture basis.

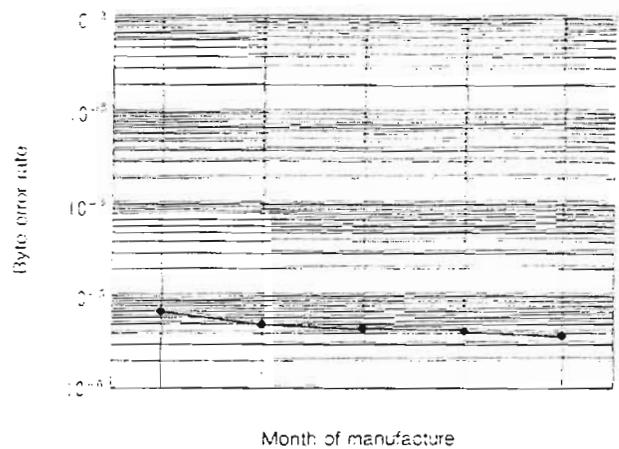
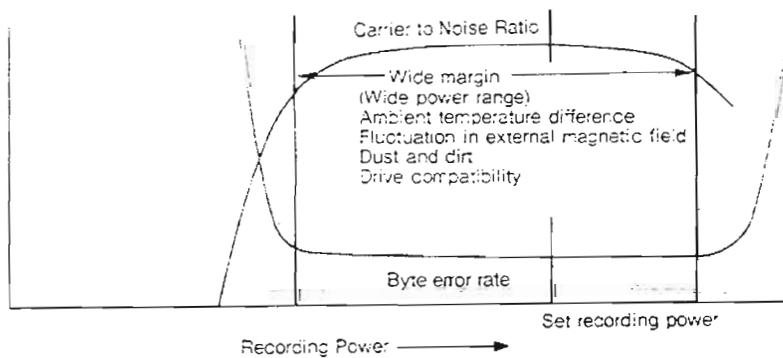


Fig. 13 Sony 5.25-inch MO disk Write characteristics.



At Sony we believe that one of the most important prerequisites for use as computer data storage media is the capability for repeated writing and reading operations.

We perform tests under a wide range of conditions including harsh environments, and check on repeated operation and long-term storage performance in the making of Sony MO disks. Therefore this computer data storage media provides the reliability and durability that users demand for real-world applications and archiving.

**The Number of Repeated Read Times**

Sony MO disks achieve at least  $10^7$  repeated data read operation of recorded data under harsh test conditions. This repeated read test is performed with media at high temperature ( $60^{\circ}\text{C}$ ), with maximum magnetic field applied, and with maximum read power. In a typical office environment, the media can provide repeated read operations well beyond this  $10^7$  figure.

**The Number of Repeated Erasure, Write, and Read Times**

As a highly reliable and highly durable media that is capable of rewriting data, the Sony MO disk attains rewrite performance exceeding  $10^7$  times.

In fact, as the results of our tests shown in the figure verify, more than 30,000,000 rewrites are actually achieved.

This data bears witness to the superiority of Sony MO disks as storage media that assure high reliability and high durability.

Fig. 14 Sony 5.25-inch MO disk Repeated rewrite characteristics

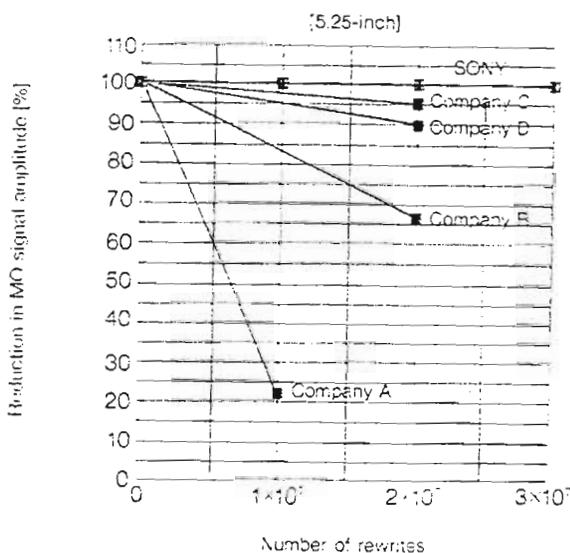
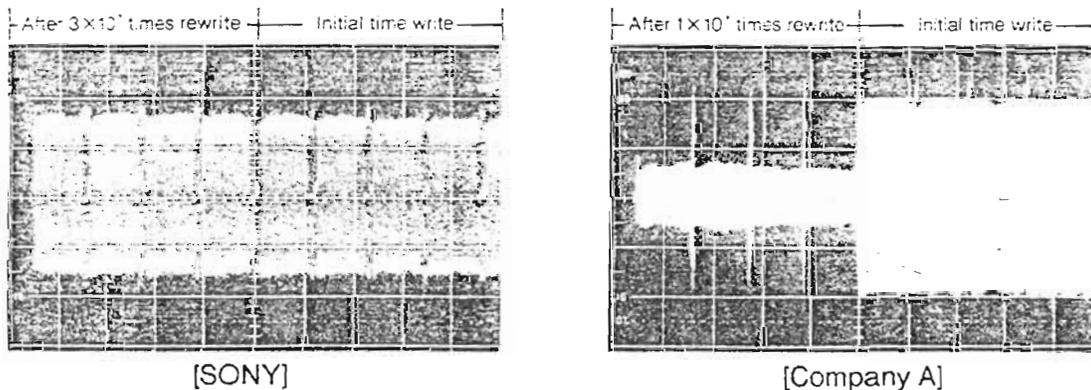


Fig. 15 Sony 5.25-inch MO disk Signal waveform after repeated rewrite.

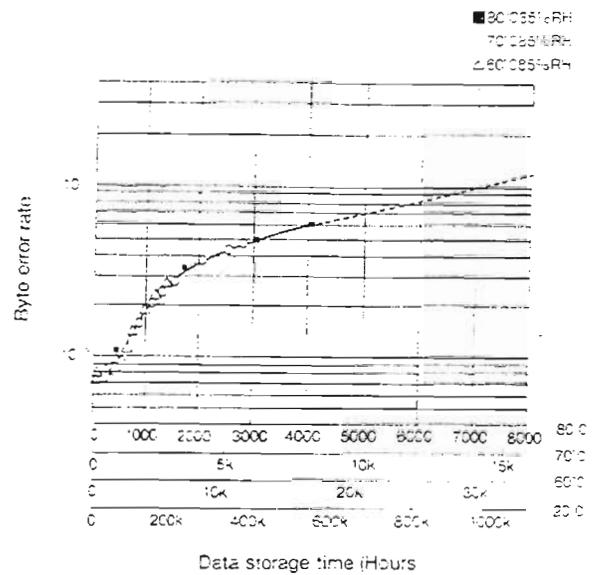


# Maximizing the performance of Sony MO disk with the Sony MO Auto Disk Cleaner

## Data Archiving Capability

Sony MO disk life prediction is determined in a variety of ways, using a range of tests. In figure 16 is shown one example of accelerated aging test results which reveal a predicted life of at least 15 years.

Fig. 16 Sony 5.25-inch MO Disk data storage life.

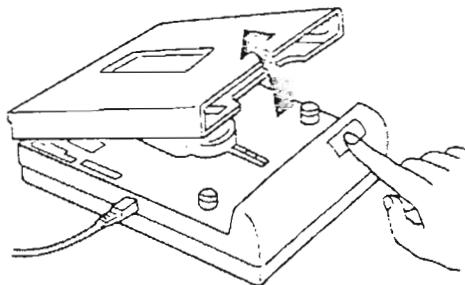


Data obtained from accelerated aging tests under various environmental conditions is plotted as a curve with a normalized time axis.

For example, if a byte error rate of 10 is set as the limit to life then life at 20°C (room temperature) can be forecasted to be about 100 years (1000K hours).

## Auto Disk Cleaner MOA-D55

This is an auto disk cleaner exclusively for 5.25-inch magneto optical disks. Periodically cleaning with this will remove dust and dirt from the disk and maintain the initial performance over a long period. It is recommended that MO disks be cleaned once every three months.



- Clean the disk twice, replacing the moistened and dry pads.

MO Disk Cartridge

As the MO disk is made of plastic, it has a tendency to generate static electricity which attracts dust to the disk surface causing, in the worst case, write and read defects. However, while it is necessary to clean the disk when dust or dirt has accumulated on it, directly wiping the disk surface with a cloth, etc., could scratch or damage it. To both maintain anti-static characteristics as well as improve surface hardness, Sony uses a special hard coating treatment on its MO disks, thereby satisfying these two factors at the same time. With this coating, accumulation of dust is reduced by approximately  $1/2$ , while higher durability is obtained without any scratches, even when cleaning is performed repeatedly.

Fig. 17 Structure of Sony MO Disk Cartridges.

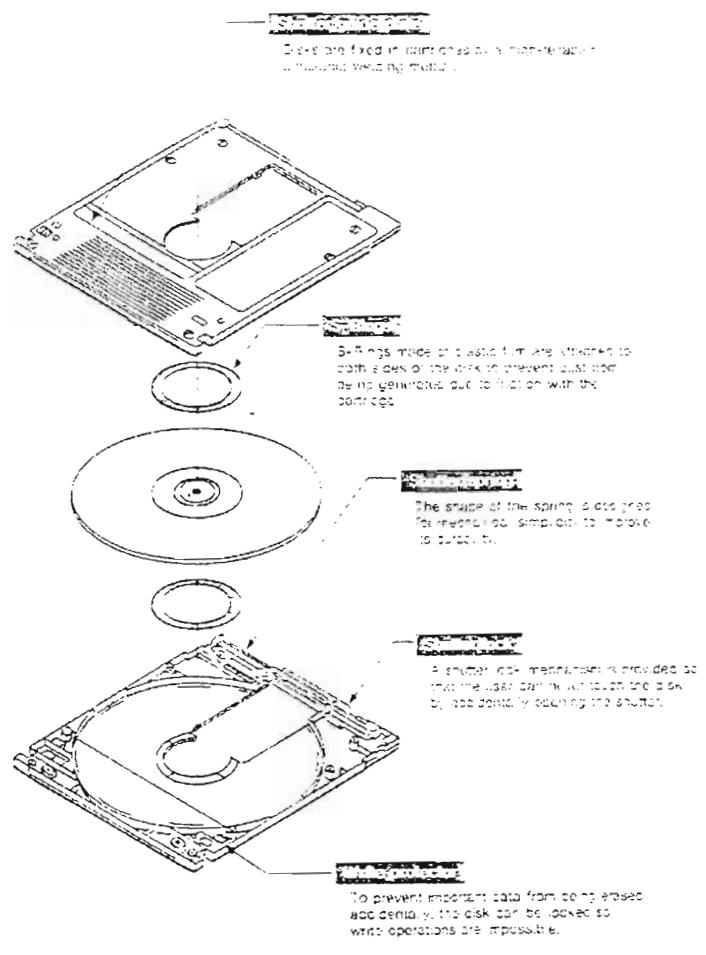
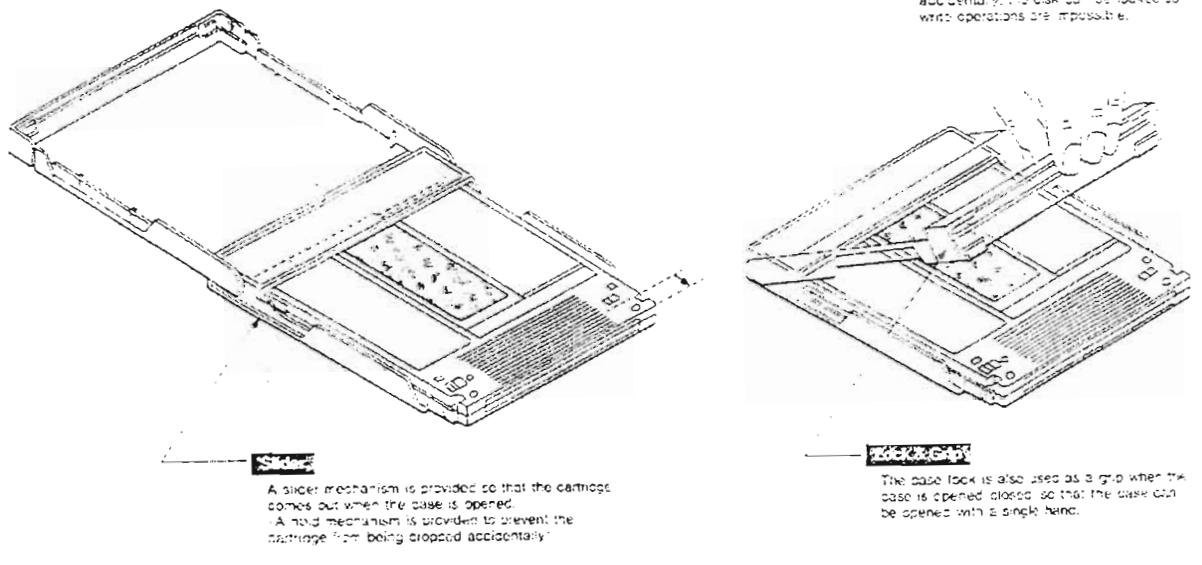


Fig. 18 Structure of Sony MO Disk Plastic Case.



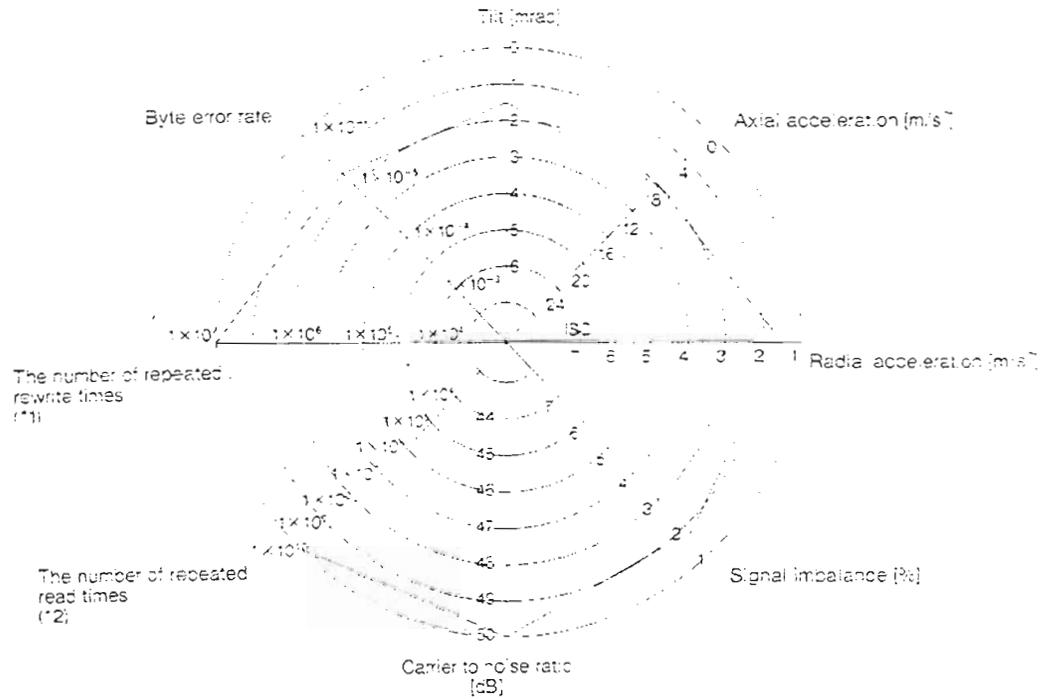
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# Overall Evaluation

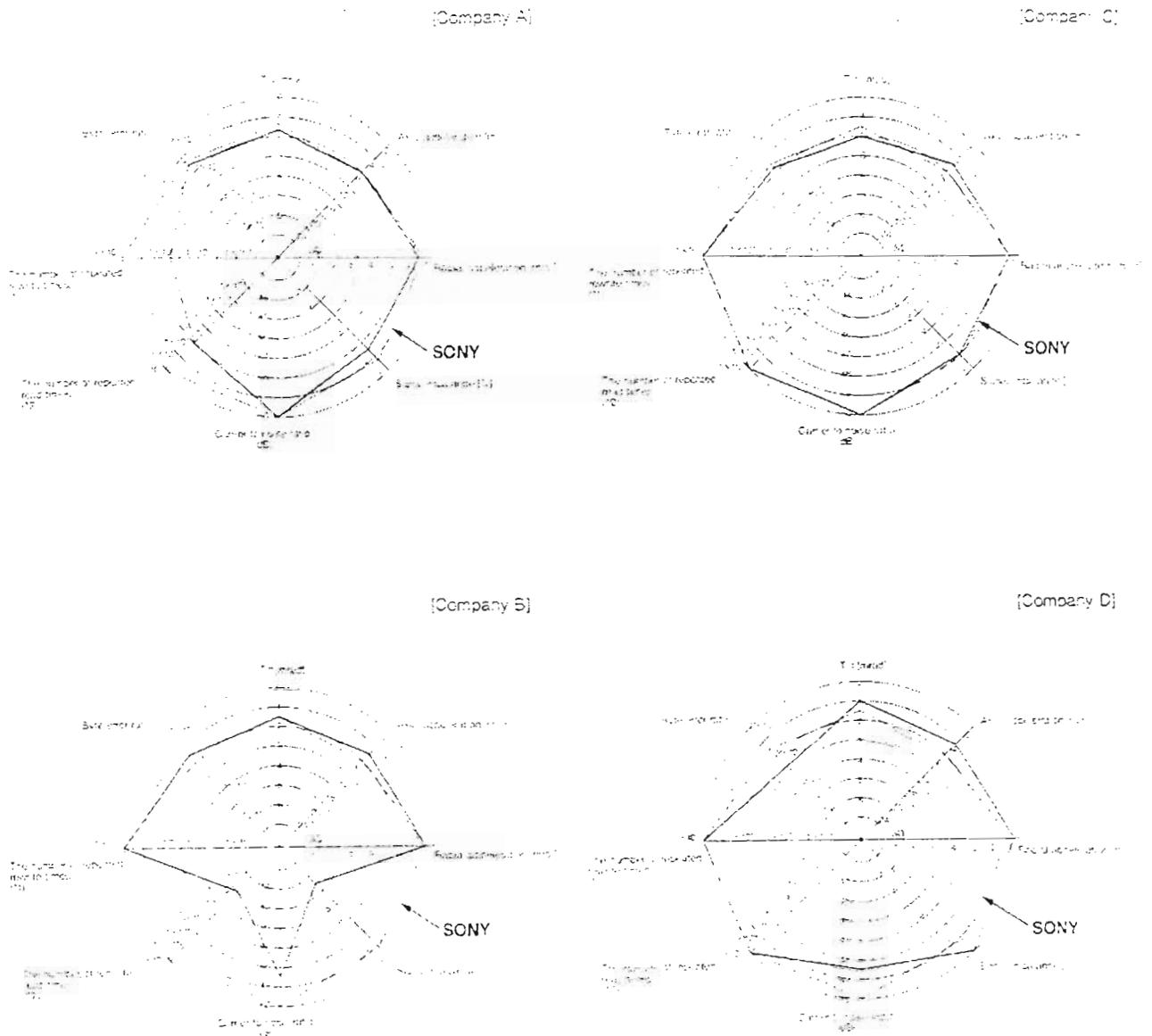
Based on the above data, the most important factors are summarized in the following graphs. The larger the size of the blue section made by connecting the points plotted for each characteristic, the better the performance of the disk, generally speaking. The shapes formed in these results show the overall quality of each disk. At Sony, to accommodate a wider range of drives, we emphasize balancing the characteristics of all factors. Our development policy can best be understood by looking at the following graphs.

Graph 1 Overall Characteristics of Sony MO Disks



- \*1. When used with Sony drives.
- \*2. The number of times which 3 dB carrier to noise ratio is deteriorated under the conditions of  
Disk temperature: 60°C  
Bias magnetic field: 32,000 A/m (400 Oe) at 2,400 r.p.m.

Graph 2 Overall Evaluations of MO Disks from Various Manufacturers (Shaded section shows Sony)



# Glossary of Optical Disk Terms

**High-density write/read technology.** Announced by Sony in February, 1981, to achieve high-capacity magneto-optical disks.

**Latency.** The time required to retrieve data from a storage device and transmit it to a specified location.

**Material.** Lacking distinct crystalline structure with random arrangement of atoms or molecules.

**Error Correction Code.** A code system designed to allow data errors to be corrected.

**Ring.** A transparent plastic ring affixed to the outer edge of the clamping zone (the transparent unwritten part) on the inside of a disk on a Sony 5.25-inch optical disk. This ring assures stability and guards against heavy dust, dust such as with a jukebox automatic changer.

**Overwrite.** To write new data on top of existing data, so that it takes place of the previous data.

**Optical Disk-Read Only Memory.** A special optical disk of pre-written data, programs, or other material for reading on a 3.5-inch optical disk drive.

**Pure "clean room" environment.** In which the number of minute particles larger than 0.5  $\mu\text{m}$  in a cubic foot of air is 100 or less.

**Self-tuning.** A system that detects any deviation in performance of a device from an ideal and makes adjustments to bring performance into line with the ideal.

**Separation system.** During optical disk drive read operations, this system separates reflected light from the medium into two polarized components, detects each of them, and then amplifies them.

**Compact Disc-Interactive.** A format for storing audio, video, and data for computer or special CD-i player use that maintains physical compatibility with CD-ROM.

**Compact Disc-Read Only Memory.** A compact disc having programs, data, and other information for computer applications.

**Fixed memory.** A kind of magnetic data storage memory that uses no moving parts.

**Orientation.** Orientation of magnetic domains vertical to the magnetic membrane surface.

**Master.** A master etched with grooves and addresses for the mass production of magneto-optical disk substrates.

**Phase change disk.** A disk on which data is written by changing areas in the recording membrane between amorphous and crystalline states. Data is detected differences in reflectivity during read operations.

**WORM (Write Once Read Many) disk.** A disk on which data can be recorded or changed but which does not permit actual overwrite or erasure of previous data.

**Tracking system.** The process or system that controls the position of the optical pickup over the desired disk tracks to assure precise reading and writing.

**Tracks Per Inch.** The number of tracks that can be written in a one inch wide space.

**Fixed magnetic data storage disk.** Providing high-speed access for high-speed data processing.

**Partial-Read Only Memory.** A 3.5-inch optical disk drive compatible ROM disk with some space available for the user to write in.

**Bits Per Inch.** The number of bits that can be written along one inch of a track.

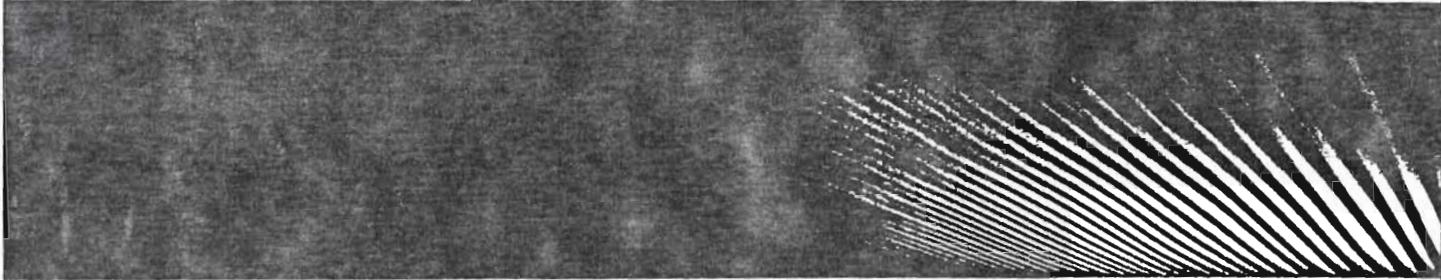
**Focus control system.** The process or system that keeps the optical pickup laser accurately focused on the recording layer of the disk.

**Shell and substrate.** Engineering plastic used for the shell and substrate of Sony magneto-optical disks.

**Two-layer disk.** A disk system for reading and writing data using materials with two different absorption spectrums.

**Random access.** A system that can retrieve data within a particular time, regardless of the location of the data.

# Magneto Optical Disk Technical Manual



**SONY**

Sony Corporation  
Printed in Japan

ACG-5114 SKT9108 P1-C

**SONY**

DIGITAL MASTER DISC RECORDER

**PCM-9000**

REMOTE CONTROLLER

**RM-D9000**

DABK-9001    DABK-9003    DABK-9004  
DABK-9005    DABK-9006

OPERATION MANUAL    English

1st Edition (Revised 2)

Serial No. 10001 and Higher

## WARNING

To prevent fire or shock hazard, do not expose the unit to rain or moisture.

To avoid electrical shock, do not open the cabinet. Refer servicing to qualified personnel only.

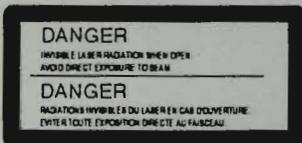


This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

**WARNING:** Using this unit at a voltage other than 120V may require the use of a different line cord or attachment plug, or both. To reduce the risk of fire or electric shock, refer servicing to qualified service personnel.

## CAUTION

As the laser beam used in this HD videodisc recorder is harmful to the eyes, do not attempt to disassemble the cabinet. Refer servicing to qualified personnel only.



This label is located on the top of the unit.

### For the customers in the USA

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.

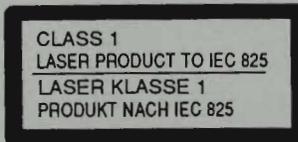
You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

The shielded interface cable recommended in this manual must be used with this equipment in order to comply with the limits for a digital device pursuant to Subpart B of Part 15 of FCC Rules.

## VORSICHT

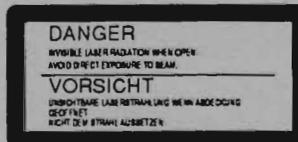
Um Feuergefahr und die Gefahr eines elektrischen Schlages zu vermeiden, darf das Gerät weder Regen noch Feuchtigkeit ausgesetzt werden.

Um einen elektrischen Schlag zu vermeiden, darf das Gehäuse nicht geöffnet werden. Überlassen Sie Wartungsarbeiten stets nur einem Fachmann.

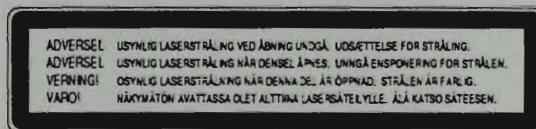


This Master Recorder is classified as a CLASS 1 LASER PRODUCT. The CLASS 1 LASER PRODUCT label is located on the rear panel of the recorder.

Bei diesem Master-Recorder handelt es sich um ein Gerät der Laser-Klasse 1. An der Rückseite des Gerätes befindet sich ein Aufkleber mit der Beschriftung LASER KLASSE 1 PRODUKT.



Dieser Aufkleber befindet sich oben am Gerät.



This label is located on the top of the unit.

### For the customers in Europe

#### WARNING

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

#### Pour les utilisateurs en Europe

#### AVERTISSEMENT

Il s'agit d'un produit de Classe A. Dans un environnement domestique, cet appareil peut provoquer des interférences radio, dans ce cas l'utilisateur peut être amené à prendre des mesures appropriées.

#### Für Kunden in Europe

#### Warnung

Dies ist eine Einrichtung, welche die Funk-Entstörung nach Klasse A besitzt. Diese Einrichtung Kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen.

#### For the customers in Canada

This apparatus complies with the Class A limits for radio noise emissions set out in Radio Interference Regulations.

#### Pour les utilisateurs au Canada

Cet appareil est conforme aux normes Classe A pour bruits radioélectriques, spécifiés dans le Règlement sur le brouillage radioélectrique.

#### Laser Diode Properties

Material	GaAlAs
Wave length	785 nm
Emission duration	Continuous
Laser output power	35 mW (max.)
Beam divergence	(H) $12 \pm 1.5^\circ$ (V) $24 \pm 1.5^\circ$

#### Daten der Laser diode

Material	GaAlAs
Wellenlänge	785 nm
Emissionsdauer	Kontinuierlich
Laser-Ausgangsleistung	35 mW (max.)
Strahldivergenz	(H) $12 \pm 1.5^\circ$ (V) $24 \pm 1.5^\circ$

#### Laser diode data

Materiale	GaAlAs
Bølgelængde	785 nm
Strålingsvarighed	Kontinuerlig
Lasereffekt	35 mW (max.)
Strålens divergens	(H) $12 \pm 1.5^\circ$ (V) $24 \pm 1.5^\circ$

#### Laserdiodes egenskaper

Material	GaAlAs
Våglängd	785 nm
Strålingstid	utan avbrott
Laserut effekt	35 mW (maxvärde)
Strålens divergens	(H) $12 \pm 1.5^\circ$ (V) $24 \pm 1.5^\circ$

#### Laserdiodes egenskaper

Materiale	GaAlAs
Bølgelengde	785 nm
Emisjonslengde	Kontinuerlig
Laser utgangseffekt	35 mW (max)
Stråledivergens	(H) $12 \pm 1.5^\circ$ (V) $24 \pm 1.5^\circ$

#### Für Kunden in Deutschland

Dieses Produkt kann im kommerziellen und in begrenztem Maße auch im industriellen Bereich eingesetzt werden.

#### For the customers in the United Kingdom

#### WARNING

**THIS APPARATUS MUST BE EARTHED**

#### IMPORTANT

The wires in this mains lead are coloured in accordance with the following code:

Green-and-yellow:	Earth
Blue:	Neutral
Brown:	Live

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug proceed as follows:

The wire which is coloured green-and-yellow must be connected to the terminal in the plug which is marked by the letter E or by the safety earth symbol Y or coloured green or green-and-yellow.

The wire which is coloured blue must be connected to the terminal which is marked with the letter N or coloured black.

The wire which is coloured brown must be connected to the terminal which is marked with the letter L or coloured red.

#### LUOKAN 1 LASERLAITE

#### VAROITUS!

Laitteen käyttäminen muulla kuin tässä käyttöohjeessa mainitulla tavalla saattaa altistaa käyttäjän turvallisuusluokan 1 ylittävälle näkymättömälle lasersäteilylle.

#### KLASS 1 LASER APPARAT

#### WARNING!

Om apparaten används på annat sätt än i denna bruksanvisning specificerats, kan användaren utsättas för osynlig laserstrålning, som överskrider gränsen för laserklass 1.

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# About This Manual

## **Purpose and audience**

This manual is provided as the Operation Manual for the PCM-9000 Digital Master Disc Recorder. It contains the information you need to operate the PCM-9000, the RM-D9000 Remote Controller, and their peripherals.

The manual is aimed at professional operators in production companies, recording studios or broadcasting stations. It is assumed that the user has experience of using digital audio recorders.

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## **Organization**

This manual is divided into the following eight chapters and appendixes.

### **Chapter 1 Overview**

Introduces the PCM-9000 features and optional equipment.

### **Chapter 2 Location and Function of Parts and Controls**

Gives the names and functions of the controls and other parts.

### **Chapter 3 Preparations**

Describes the basic connections, settings and disc handling, with which you should be familiar before operating the PCM-9000.

### **Chapter 4 Basic Operations**

Describes basic operations such as recording, playback, and search. It also explains operation modes, one of the main features of the PCM-9000.

### **Chapter 5 Program Editing**

Describes program editing, performed in units of tracks and files.

### **Chapter 6 Time Code Chase**

Explains synchronized operation with the time code chase function.

### **Chapter 7 Optimum Use of a Disc**

Describes the disc check and the deletion of the contents of a disc.

### **Chapter 8 Advanced System Configurations**

Presents several example system configurations based on the PCM-9000.

### **Appendixes**

Include the specifications of this unit and its optional boards.

## About This Manual

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### Reference

As well as this manual, the following manual is supplied with the PCM-9000. Refer to this as necessary.

#### **Maintenance Manual**

Provides the technical information necessary for installing and maintaining the PCM-9000 and its peripherals.

# Chapter 1 Overview

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This chapter introduces the features of the PCM-9000 and optional equipment. Read this chapter to help you make the best use of the PCM-9000.

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## 1-1. Features of the PCM-9000

The PCM-9000 Digital Master Disc Recorder is a 2-channel digital audio recorder, which uses a magneto-optical (MO) disc as its external storage device. The PCM-9000 system is composed of the master disc recorder unit and the RM-D9000 Remote Controller.

The use of MO discs allows the PCM-9000 to provide quick and easy operation. In addition, you can configure versatile systems with a variety of features such as program edit, automatic punch in/out, record/monitor channel setting, variable speed playback, time code chase, and digital copy through a SCSI (Small Computer System Interface).

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### Optional equipment

#### **RM-D9000 Remote Controller**

Enables the remote control of the PCM-9000. Many of the PCM-9000's functions, including program edit, can be accessed via the remote controller.

#### **DABK-9001 Converter Board**

Converts an analog input signal into a 20-bit digital signal, or a 20-bit digital signal into an analog output signal.

#### **DABK-9003 Interface Board**

Enables the PCM-9000 to input/output external time codes, parallel remote signals and 9-pin remote control signals. This board is necessary to record an external time code onto the time code channel.

#### **DABK-9004 Digital I/O Board**

Adds SDIF-2 format digital audio input and output connectors, each having two channels, to the PCM-9000.

#### **DABK-9005 Interface Board**

Adds SCSI connectors. The PCM-9000 can be controlled from an external editor or computer through the SCSI. This board is necessary to perform double-speed digital copy between two PCM-9000 units.

#### **DABK-9006 Interface Board**

Enables the PCM-9000 to be connected to the DAQ-1000 Cue Editor. This lets you make master discs onto which cue signals have been recorded.

## Chapter 2

# Location and Function of Parts and Controls

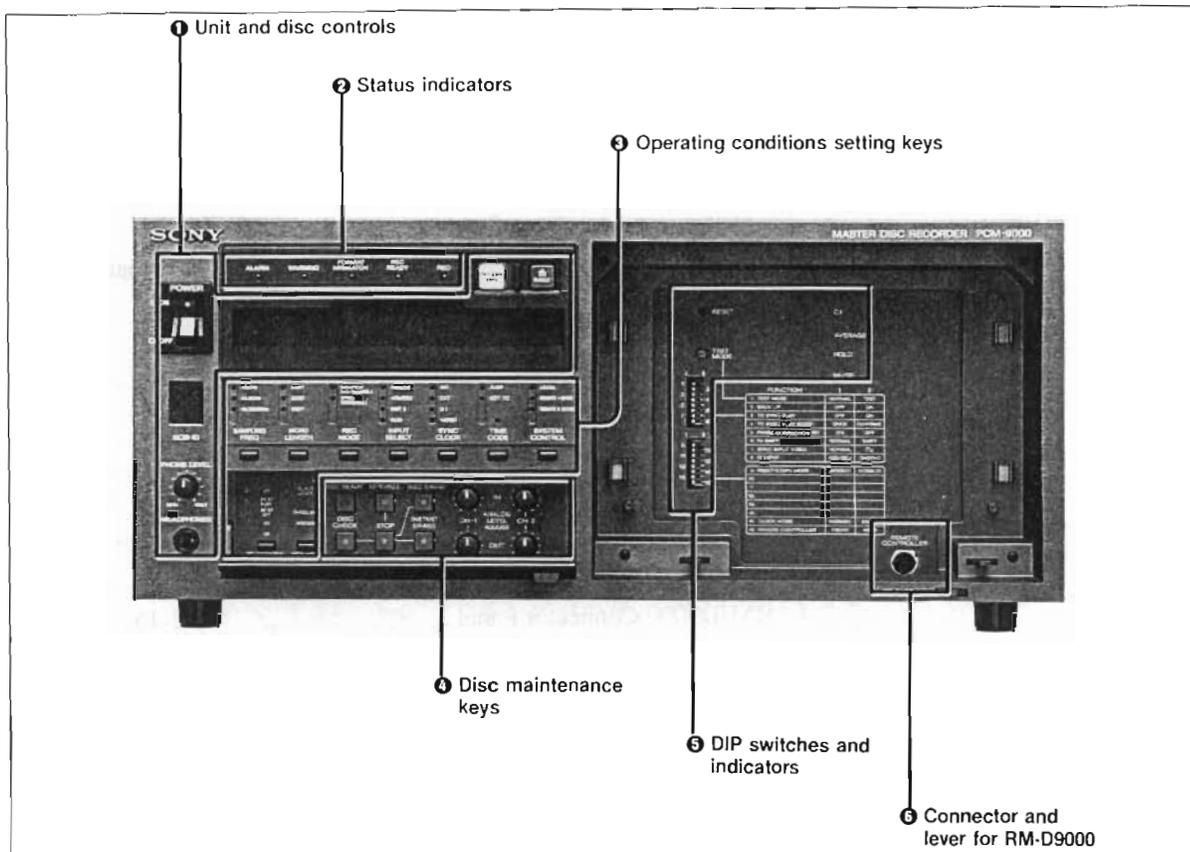
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This chapter briefly describes the functions and purposes of the principal controls and connectors. Read this chapter before moving on to the operating procedures, covered in chapter 3 and subsequent chapters.

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## 2-1. PCM-9000

### 2-1-1. PCM-9000 Control Panel



PCM-9000 Control panel

#### (1) Unit and disc controls

##### EDIT DATA SAVE key

Press to save edit data from memory to the loaded disc.

*For details, see "5-5. Saving the Edit Data"*

##### EJECT key

Press to eject the disc.

##### POWER switch

Turns the power on and off.

##### SCSI ID indicator

Shows the ID number of this unit, as set with the ADDRESS switch on the optional DABK-9005.

##### PHONE LEVEL (headphones level) control

Adjusts the volume level of the headphones.

##### HEADPHONES (headphones) connector

Used to connect a set of stereo headphones for monitoring the output sound.

#### (2) Status indicators

##### ALARM indicator

Lights if a fault arises in the PCM-9000.

##### WARNING indicator

Lights when a disc which has only partial INSTANT ERASE/DISC ERASE is loaded.

**REC READY (recording ready) indicator**  
Lights when the REC PROTECT switch on the loaded disc is set to the recording enable position, provided the unit is set to recording ready status.

**REC (recording) indicator**  
Lights while recording to a disc.

### (3) Operating condition setting keys

**SAMPLING FREQ (frequency) key**  
Press to select the recording sampling frequency to be used by the unit. During playback, the sampling frequency setting follows that recorded on the disc. One of the following indicators lights, according to your selection.

- 48 kHz: the sampling frequency is set to 48 kHz
- 44.1 kHz: the sampling frequency is set to 44.1 kHz
- 44.056 kHz: the sampling frequency is set to 44.056 kHz

Setting DIP switch number 6 on the PCM-9000 to II (Fs-shift mode) allows you to reduce the 48-KHz sampling frequency in units of 0.1%. The corresponding indicator flashes when using the sampling frequency shift function.

#### Notes

- To adjust the Fs-shift mode, contact your Sony system engineer
- You cannot record data using a sampling frequency that differs from that already recorded on the disc.

#### WORD LENGTH key

Press to select the quantization word length for recording. During playback, the word length setting follows that recorded on the disc. One of the following indicators lights, according to your selection.

- 24 BIT: word length is 24 bits
- 20 BIT: word length is 20 bits
- 16 BIT: word length is 16 bits

#### Notes

- You can set the word length regardless of the word length set for the installed converter board.
- You cannot record data using a word length that differs from that already recorded on the disc.

**REC MODE (recording mode) key**  
Press to set the recording mode to either monitor or sync. One of the following indicators lights, according to your selection.

- MONITOR: Audio channels 1 and 2, as well as the time code channel, are all used for recording or playback. During recording, the sampling frequency and word length correspond to those set with the PCM-9000, or those recorded on the disc.
- SYNC: Audio channels 1 and 2, as well as the time code channel, can be used independently while playing back a previously recorded signal. The sampling frequency and word length settings follow those of the previously recorded material.

#### INPUT SELECT key

Press to select the input audio signal. One of the following indicators lights, according to your selection.

- ANALOG: analog audio signal (the optional DABK-9001 Converter Board must be installed.)
- AES/EBU: AES/EBU format digital audio signal
- SDIF 2: SDIF-2 format digital audio signal (the optional DABK-9004 Digital I/O Board must be installed.)
- SCSI: SCSI format digital audio signal (the optional DABK-9005 Interface Board must be installed.)

#### Note

- If you try to select a format for which the required options are not installed, the corresponding indicator will not light.
- When you select AES/EBU or SDIF-2, the corresponding indicator flashes if the required signal is not being supplied to the PCM-9000.

## 2-1. PCM-9000

### SYNC CLOCK key

Press to select the reference signal to be used to synchronize the PCM-9000. One of the following indicators lights, according to your selection.

- INT: internal master clock
- EXT: word sync signal input to the WORD SYNC INPUT connector
- D-I: digital signal input to the D-I SYNC connector or DIGITAL I/O AES/EBU D-I connector.
- VIDEO: video signal input to the REFERENCE VIDEO INPUT connector

#### Note

The corresponding indicator flashes if the required signal is not supplied to the PCM-9000.

### TIME CODE key

Press to select the time code to be used for search. One of the following indicators lights, according to your selection.

- AAIP: time code converted from the address that is pre-grooved on a disc (AAIP—Absolute Address In Pre-groove). When using this time code, you cannot record an external time code.
- EXT TC: external time code, input to the unit, and recorded to the time code channel. To use this time code, an external time code must be recorded onto the disc (the optional DABK-9003 Interface Board must be installed).

### SYSTEM CONTROL key

Press to select the unit to be used to control the PCM-9000. One of the following indicators lights, according to your selection.

- LOCAL: any unit connected to the PCM-9000
- REMOTE 1 (9 PIN): the unit connected to the REMOTE (9 PIN) connector on the rear of the PCM-9000 (the optional DABK-9003 Interface Board must be installed)
- REMOTE 2 (SCSI): an editor or computer connected to the SCSI connector (the optional DABK-9005 Interface Board must be installed)

### FORMAT (time code format) key

When AAIP is selected as the time code, press to select the format of the time code displayed on the RM-D9000 and output from the PCM-9000. One of the following indicators lights, according to your selection.

- 30: 30 frames/second, non-drop frame mode (NTSC)
- 29.97 NDF: 29.97 frames/second, non-drop frame mode (NTSC)
- 29.97 DF: 29.97 frames/second, drop frame mode (NTSC)
- 25: 25 frames/second (EBU)
- 24: 24 frames/second (film)

#### Notes

- You cannot convert from the selected time code format to another.
- The corresponding indicator flashes if the selected format differs from that of the input or playback time code.

### GEN MODE (generator mode) key

Press to select the operating mode of the internal time code generator. One of the following indicators lights, according to your selection.

- THROUGH: the input time code is recorded as is
- REGEN: the input time code is regenerated before being used

### SLAVE LOCK indicator

Lights while the time code format and signal phase between the internal time code generator and external time code match during regenerating.

### (4) Disc maintenance keys

#### REC READY (recording ready) key

Press to set three channels (audio channels 1 and 2, and the time code channel) to recording ready status.

#### STOP key

Press to stop the disc transport. If you leave the unit in the stop state, the STOP key starts flashing after about 3 minutes. To resume the operation in this state, press the STOP key so that it lights.

**DISC CHECK key**

While holding down the STOP key, press this key to check a disc.

*For details, see "7-1. Checking a Disc".*

**DISC ERASE key**

While holding down the STOP key (in recording ready status), press this key to delete all data on the disc. Deleting all data on a disc takes about 20 minutes.

*For details, see "7-2-2. Full Erasing".*

**INSTANT ERASE key**

While holding down the STOP key (in recording ready status), press this key to delete all disc management data (rec IDs, BEGINS, ENDS and so on).

*For details, see "7-2-1. Instant Erase".*

**Note**

After using this function, any audio signals recorded to the main data area of a disc cannot be played back, as all rec IDs will have been erased.

**ANALOG LEVEL ADJUST controls**

Control the levels of the analog input and output signals. Channels 1 and 2 can be adjusted independently within a range of  $\pm 2$  dB.

*For details, see "4-2-3. Adjusting the Input/Output Signal Levels".*

**(5) DIP switches and indicators**

Used to set modes and functions.

Switch number	Function	Set to I	Set to II
1	Test mode <sup>1)</sup>	Normal mode	Test mode
2	Memory backup function <sup>2)</sup>	Disabled	Enabled
3	TC sync playback	Disabled	Enabled
4	TC sync playback mode	ONCE	CONTINUE
5	Phase correction bit function	Enabled	Disabled
6	Sampling frequency shift function	Disabled	Enabled (0.1% shift down)
7	Video input signal	Video signal	Clock pulse
8	Reference signal	Sync component in the AES/EBU signal being input	Reference D-I sync signal being input
9	Parallel remote	Mode(1)	Mode(2)
10 - 14	For future use	————	————
15	Clock mode <sup>3)</sup>	Normal	Sharp
16	Conector for RM-D9000	PCM-9000 front panel	PCM-9000 connector panel

Factory setting: All switches set to I

- 1) To set the PCM-9000 to test mode, first turn off the power before setting the mode.  
To set to the PCM-9000 back to normal mode, first turn off the power before resetting the mode.
- 2) When the memory backup function is enabled, the following settings are held for three days.
  - Basic settings (recording mode and input signal, variable speed value, Fs, word length)
  - Time code settings (format, generator mode)
  - Offset value (AAIP and time code chase offset and parameters)
- 3) When the clock mode is set to sharp mode, you cannot execute variable speed playback and recording, or time code sync playback.  
To execute time code chase, switch to normal mode.
- 4) Switching of DIP switch number 16 must be executed while PCM-9000 is stopped or while the power supply is turned off.

## 2-1. PCM-9000

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### **RESET button**

Press to reset the PCM-9000 to its power-on status. Any unsaved edit data in the PCM-9000's RAM (Random Access Memory) will be lost.

### **TEST MODE switch**

Select test mode to check the performance of the PCM-9000. This switch is activated when DIP switch 1 is set to II(test mode).

### **C1 indicator**

Lights when the PCM-9000 detects, during playback, a C1 error in the playback signal that cannot be corrected by C1 correction. In this case, the unit automatically applies C2 correction to correct the error.

### **AVERAGE indicator**

Lights when error correction cannot be applied to the playback signal, and the signal has been interpolated.

### **HOLD indicator**

Lights when error correction cannot be applied to the playback signal, and the signal has been held, that is, the last value is repeated.

### **MUTE indicator**

Lights when error correction cannot be applied to the playback signal, and the signal has been muted.

### **(6) Connector and release lever for RM-D9000**

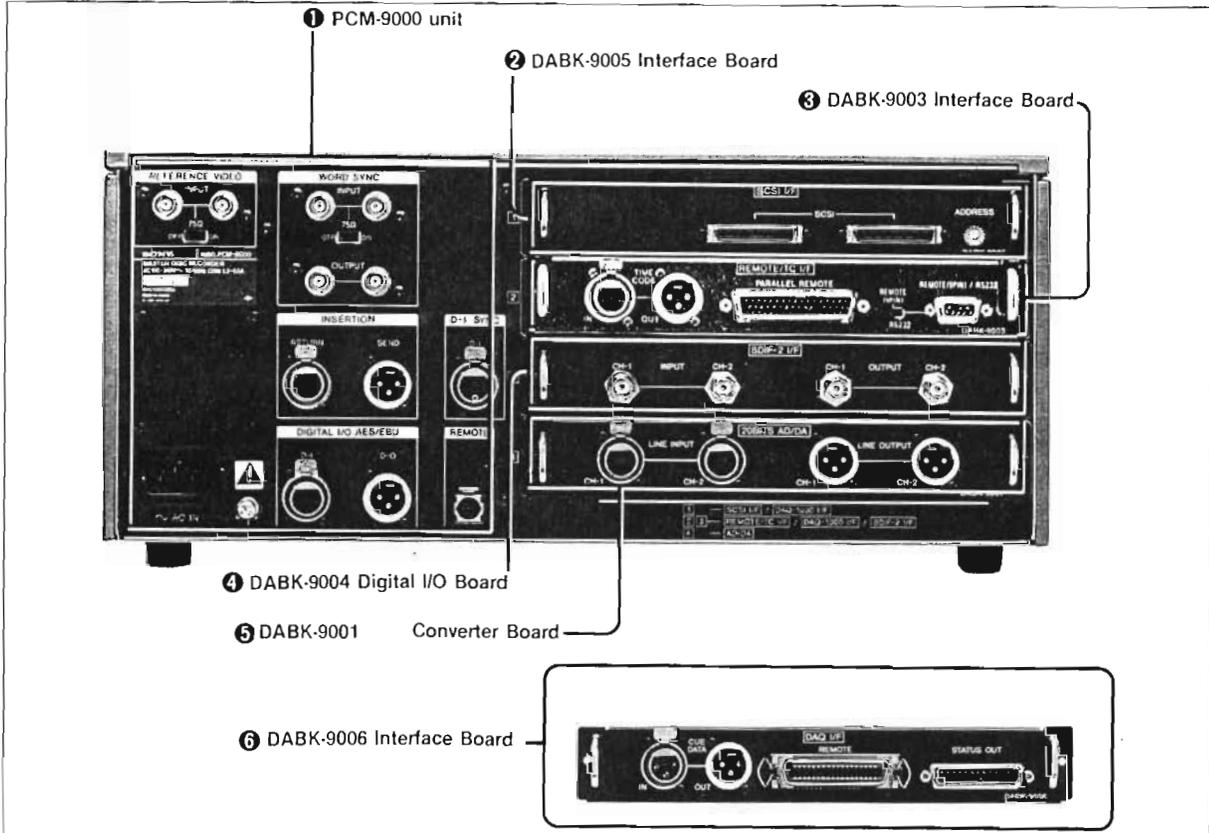
#### **REMOTE CONTROLLER connector (Round 10 pin)**

Used to connect the PCM-9000 to the RM-D9000, using the supplied cable. When the RM-D9000 is connected to this connector, DIP switch No.16 must be set to I.

#### **RELEASE lever**

Move to the right to detach the RM-D9000 from the PCM-9000.

## 2-1-2. PCM-9000 Connector Panel



PCM-9000 connector panel

### (1) PCM-9000 unit

**REFERENCE VIDEO INPUT connectors (BNC type) and 75-ohm termination switch**  
 Input the reference video signal to one of the two connectors. When outputting the input signal through the other connector, set the 75-ohm termination switch to OFF. Otherwise, set it to ON.

### AC IN connector

Connect to an AC outlet using the supplied power cord.

### ⏏ (ground) terminal

### WORD SYNC INPUT connectors (BNC type) and 75-ohm termination switch

Input the word sync signal for synchronization reference to one of the two connectors. When outputting the input signal through the other connector, set the 75-ohm termination switch to OFF. Otherwise, set it to ON.

**Note**

If you connect PCM-3402 to PCM-9000, use the switch setting to stabilize the operation.

### WORD SYNC OUTPUT connector (BNC type)

Outputs the word sync signal.

### INSERTION RETURN connector (XLR-3-31)

When using the insertion function, this connector is used to input the AES/EBU-format digital audio signal, output from the INSERTION SEND connector, for processing by an external effector.

### INSERTION SEND connector (XLR-3-32)

When using the insertion function, this connector is used to output the AES/EBU digital audio signal to be processed.

### D-I SYNC connector (XLR-3-31)

Inputs the D-I signal used for synchronization reference.

### DIGITAL I/O AES/EBU D-I connector (XLR-3-31)

Inputs an AES/EBU-format 2-channel digital audio signal.

### DIGITAL I/O AES/EBU D-O connector (XLR-3-32)

Outputs an AES/EBU-format 2-channel digital audio signal.

### REMOTE connector (Round type 10-pin)

Connects the PCM-9000 to the RM-D9000 when it is detached from the PCM-9000 front panel. Set DIP switch 16 on the PCM-9000 to II when connecting the RM-D9000 to this connector.

### (2) DABK-9005 (Optional): Install this board in slot 1.

#### SCSI connectors (50-pin)

Input and output SCSI-format signals.

#### ADDRESS switch

Used to set the SCSI ID. The SCSI ID is displayed in the SCSI ID indicator.

#### Note

Do not set the same SCSI ID for different PCM-9000s connected through the SCSI interface. Doing so will cause a malfunction.

### (3) DABK-9003 (Optional): Install this board in slot 2 or 3.

#### TIME CODE IN connector (XLR-3-31)

Inputs SMPTE/EBU-format time code signals.

#### TIME CODE OUT connector (XLR-3-32)

Outputs SMPTE/EBU-format time code signals.

#### PARALLEL REMOTE connector (D-sub 50-pin, female)

Used when controlling the PCM-9000 with 50-pin parallel remote control signals.

#### REMOTE (9PIN) /RS-232 connector (D-sub 9-pin, female)

Used when controlling the PCM-9000 with 9-pin

remote control signals. Use this connector to connect the DAE-3000 digital audio editor. This connector can also be connected with RS-232C by changeovering REMOTE (9PIN)/RS-232 Switch.

#### REMOTE (9PIN)/RS-232 Switch

Changes the function of the D-SUB 9 pin connector. Either 9 pin remote or RS-232C is selectable.

*For details of how to output RS-232C format signals, see the maintenance manual.*

### (4) DABK-9004 (Optional): Install this board in slot 2 or 3.

#### INPUT CH-1 and CH-2 connectors (BNC type)

Input SDIF-2 format digital audio signal channels 1 and 2.

#### OUTPUT CH-1 and CH-2 connectors (BNC type)

Output SDIF-2 format digital audio signal channels 1 and 2.

### (5) DABK-9001 (Optional): Install one of these board in slot 4.

#### LINE INPUT CH-1 and CH-2 connectors (XLR-3-31)

Input analog audio signal channels 1 and 2.

#### LINE OUTPUT CH-1 and CH-2 connectors (XLR-3-32)

Output analog audio signal channels 1 and 2.

### (6) DABK-9006 (Optional): Install this board in slot 1, 2, or 3.

#### CUE DATA IN connector (XLR-3-31)

Inputs cue data from the DAQ-1000.

#### CUE DATA OUT connector (XLR-3-32)

Outputs cue data to the DAQ-1000.

#### REMOTE connector (36-pin)

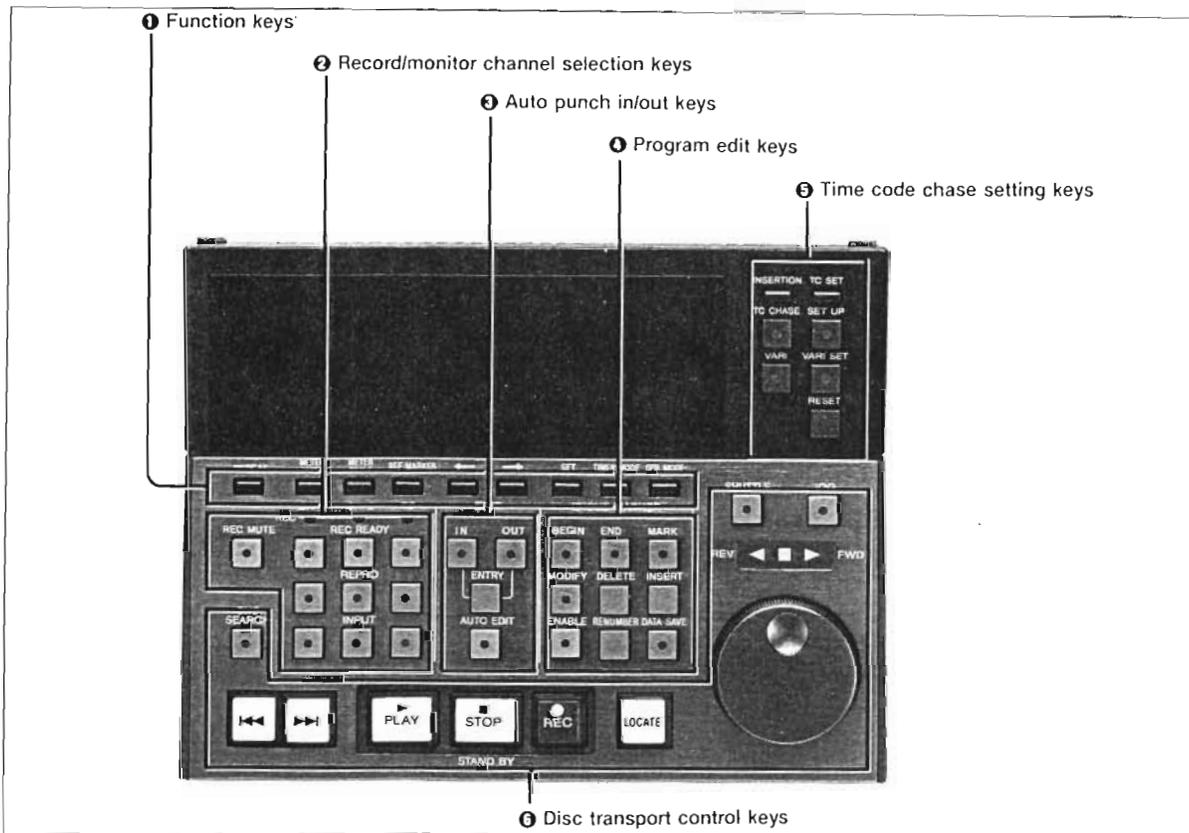
Connects to the VTR REMOTE connector of the DAQ-1000 to enable control of the PCM-9000 from the DAQ-1000.

#### STATUS OUT connector (D-sub 25-pin)

Connects to the EDITOR TRANSFER INPUT connector on the DAQ-1000.

## 2-2. RM-D9000

### 2-2-1. RM-D9000 Control Panel



RM-D9000 control panel

#### (1) Function keys

##### REPEAT key

Used to repeatedly play back audio between two specified points (repeat playback).

Press this key to select the point from which repeat playback will start, then press the key again at the end point. Repeat playback starts. To stop repeat playback, press the STOP key.

*For details, see "4-3-1. Playing Back".*

##### METER RESET key

Press to reset the held peak level when the level meter is in peak hold status.

##### METER SCALE key

Press to set the display scale of the level meter to normal, fine, or bit mode.

*For details, see "3-3. Setting the Level Meter Display".*

##### REF MARKER (reference marker setting) key

Used to adjust the reference marker.

*For details, see "4-2-3. Adjusting the Input/Output Signal Levels".*

##### ← and → keys

Press these keys to move the cursor to the left or right when entering time code data, and so on.

##### SET key

Used to register files, and so on.

*For details, see "5-3. Making Files".*

##### TIMER MODE key

Press to select the timer display mode. Every time the key is pressed, the mode changes.

*For details, see "3-2. Time Data Display".*

### OPR MODE (operation mode selection) key

Press to set the disc, file, copy, or normal operation mode. The selected mode indicator appears in the display window.

*For details, see "4-1. Overview of Operation Modes".*

### (2) Record/monitor channel selection keys

#### REC MUTE (mute signal recording) key

Press to record mute signals on the channels set to recording ready status.

*For details, see "4-2-5. Recording".*

#### REC READY (recording ready) keys

Press the REC READY key corresponding to the channel to set to recording ready status. When the PCM-9000 is set to sync recording mode, audio channels 1 (CH-1) and 2 (CH-2), as well as the time code channel (TC), can be selected independently.

In monitor recording mode, all channels are set to recording ready status when one of the REC READY keys is pressed.

#### REPRO (playback monitor) keys

Press the REPRO key corresponding to the channel to be set to playback signal monitoring status.

When the PCM-9000 is set to sync recording mode, audio channels 1 (CH-1) and 2 (CH-2), as well as the time code channel (TC), can be selected independently. In monitor recording mode, all channels are set to the playback signal monitoring status when one of the REPRO keys is pressed.

#### INPUT (input monitor) keys

Press the INPUT key corresponding to the channel to be set to input signal monitoring status. When the PCM-9000 is set to sync recording mode, audio channels 1 (CH-1) and 2 (CH-2), as well as the time code channel (TC), can be selected independently. Regardless of the setting, the selected channels are automatically set to input signal monitoring status during sync recording. In monitor recording mode, all channels are set to the input signal monitoring status when one of the INPUT keys is pressed.

### (3) Auto punch in/out keys

#### IN key

While holding down the ENTRY key, press this key to specify the recording start point (in point) for automatic punch in/out.

#### OUT key

While holding down the ENTRY key, press this key to specify the recording end point (out point) for automatic punch in/out.

#### ENTRY key

Press this key and the IN or OUT key simultaneously to specify the in or out point for automatic punch in/out.

#### AUTO EDIT key

Press to execute automatic punch in/out recording.  
*For details, see "4-2-6. Automatic Punch In/Out".*

### (4) Program edit keys

#### BEGIN key

Press to specify or recall the begin point (track start point).

*For details, see "5-2. Making Tracks".*

#### END key

Press to specify or recall the end point of a track.

*For details, see "5-2. Making Tracks".*

#### MODIFY key

Press to modify the registered begin, end or mark point.

*For details, see "5-2-2. Modifying Tracks/ and Mark Points".*

#### MARK key

Press to specify or recall the mark point.

*For details, see "4-4-3. Searching with the Registered IDs".*

#### DELETE key

Used to delete a specified mark point, track or file.

*For details, see "5-2-3. Deleting Tracks and Mark Points" or "5-3-2. Deleting a File".*

#### INSERT key

Used to insert a new track into a specified file.

*For details, see "5-3-1. Making a File".*

**ENABLE key**

Press this key, such that its indicator lights, to enable the registration, modification, or deletion of mark points, tracks and files, as well as the renumbering of tracks.

**RENUMBER key**

Used to renumber mark point and track ID numbers according to the AAIP order on a disc.

*For details, see "5-2-4. Renumbering Tracks and Mark Point".*

**DATA SAVE key**

Press to save edit data to the disc.

*For details, see "5-5. Saving the Edit Data".*

**(5) Time code chase setting keys****INSERTION key**

Press to activate the insertion function. This function allows you to use external equipment to add an effect to the playback signal, and to record the modified signal with another PCM-9000.

**TC SET (time code set) key**

Used to set the offset time of the disc time code (AAIP).

**TC CHASE (time code chase) key**

Press to execute time code chase. To execute the time code chase function, the optional DABK-9003 must be installed.

*For details, see "6-3. Executing Time Code Chase".*

**SETUP key**

Press to set the time code chase parameters to one of the following:

- Disc time/locate point display (normal display)
- Chase mode menu: used to set time code chase mode.
- Lock window setting menu: used to set the lock window value (the allowable difference between the playback and external time codes) for time code chase.
- Display window setting menu: used to set the display window value (the PLAY key flashes if the difference exceeds this value) for time code chase.
- Re-sync window setting menu: used to set the re-sync window value (allowable variation in playback speed for vari-sync playback) for time code chase.
- Offset time setting menu: used to set the sync offset time (a constant margin relative to an external time code) for time code chase.
- Offset error display: shows the offset error ((playback time code) - (external time code) - (sync offset time)).

**VARI (variable) key**

Press to execute variable speed playback at a specified vari speed.

*For details, see "4-3-2. Variable Speed Playback".*

**VARI SET (variable speed set) key**

Press to set the variable speed.

*For details, see "4-3-2. Variable Speed Playback".*

**RESET key**

Press to reset the sync offset time, parameters for time code chase or to reset the vari speed and time code offset.

*For details, see "3-2-2. Setting the Time Code Offset", "4-3-2. Variable Speed Playback", "6-2. Setting for Time Code Chase".*

**(6) Disc transport control keys****END SEARCH (recording end point search) key**

Press to locate a point 2 seconds after the final recording end point (the rec ID whose address is the largest in AAIP).

### ◀◀ (previous recID/track search) key

Press to locate the previous rec ID in normal operation mode. In disc or file operation mode, press this key to locate the previous track begin point.

*For details, see "4-4-3 Searching with the Registered IDs".*

### ▶▶ (next rec ID/track search) key

Press to locate the next rec ID. In disc or file operation mode, press this key to locate the next track begin point.

*For details, see "4-4-3. Searching with the Registered IDs".*

### PLAY key

Press to start playback.

*For details, see "4-3-1. Playing Back".*

### STOP key

Press to stop the disc transport. If you leave the unit in the stop state, the STOP key starts flashing after about 3 minutes. To resume the operation in this state, first press the STOP key again, so that it lights steadily.

### REC (recording) key

Press this key and the PLAY key simultaneously to start recording.

*For details, see "4-2-5. Recording".*

### LOCATE key

Press to locate the specified mark, rec in, rec out, track begin and track end point.

*For details, see "4-4-2. Searching with Specified Address", "4-4-3. Searching with the Registered IDs".*

### SHUTTLE key

Press this key, such that it lights, to enable shuttle mode playback. In this mode, you can make an appropriate search, at a speed corresponding to the rotation angle of the search dial.

*For details, see "4-4-1. Searching with the Jog/Shuttle Dial".*

### JOG key

Press this key, such that it lights, to enable jog mode playback. In this mode, you can make a precise search for a point by rotating the search dial.

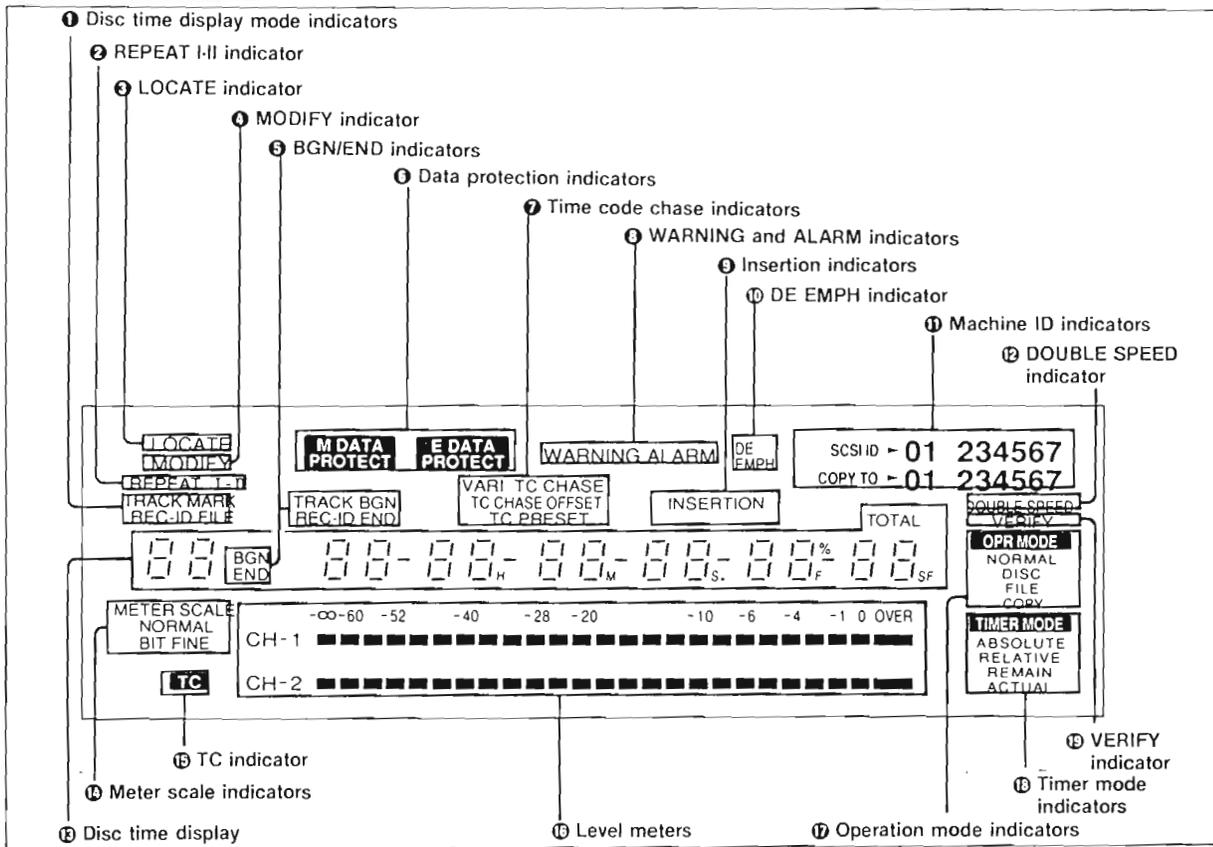
*For details, see "4-4-1. Searching with the Jog/Shuttle Dial".*

### Search dial

The search dial has the following two functions.

- Changing the search speed during jog/shuttle mode playback
- Setting parameters (begin/end points of a track, mark points, and so on)

## 2-2-2. Display Window



Display window

### (1) Entry ID indicators

Light to indicate the conditions of the entry ID indication area, as follows:

- TRACK: The track number is displayed.
- MARK: The mark point number is displayed.
- REC-ID: The rec ID number is displayed.
- FILE: FILE number is displayed.

### (2) REPEAT I-II indicator

Lights during repeat playback. Press the REPEAT key once at the repeat start point. The REPEAT I-II indicator starts flashing. Press the REPEAT key again at the repeat end point. The REPEAT I-II indicator stops flashing and lights steadily, after which repeat playback starts.

### (3) MODIFY indicator

Lights while you are modifying edit data.

### (4) Current ID indicators

One of following indicators lights to distinguish the type of data being displayed:

- TRACK: lights while the BGN or END indicator is lit for a track.
- REC-ID: lights while the BGN or END indicator is lit for a rec ID.
- BGN: lights while a track begin or recording in point is being displayed by the disc time display.
- END: lights while a track end or recording out point is being displayed by the disc time display.

### (5) Data protection indicators

Indicate the data protection status of the loaded disc, as follows:

- **M. DATA PROTECT:** Audio data on the disc is protected (the REC PROTECT switch on the disc is set to the MAIN DATA position).
- **E. DATA PROTECT:** Audio and edit data on the disc is protected (the REC PROTECT switch on the disc is set to the MAIN/EDIT DATA position).

#### Note

A lit E. DATA PROTECT indicator does not mean that edit data in the PCM-9000 memory is protected, but that the edit data recorded on the disc is protected. In this status, you cannot save new edit data to the disc.

*For details, see "3-4-4. Preventing Accidental Erasure".*

### (6) Time code chase indicators

Indicate the status of the time code chase function, as follows:

- **VARI:** lights during variable speed playback
- **TC CHASE:** lights during time code chase
- **TC CHASE OFFSET:** lights while the sync offset time is being displayed by the disc time display
- **TC PRESET:** lights while the time code offset is being set. (This offset time is not related to the sync offset time for time code chase.)

### (7) WARNING and ALARM indicators

Light in the following cases:

- **WARNING:** Lights when a disc which has only partial INSTANT ERASE/DISC ERASE is loaded.
- **ALARM:** Lights if a misoperation is detected.

### (8) INSERTION Indicator

Lights while insertion is being performed.

### (9) DE EMPH (de-emphasis) Indicator

Lights when playback signals are emphasized.

### (10) SCSI ID Indicators

Indicate the following:

- **SCSI ID:** displays the SCSI ID of this unit.

### (11) DOUBLE SPEED Indicator

Lights when REMOTE2(SCSI) is selected.

This function requires the installation of the optional DABK-9005 SCSI Interface Board.

### (12) Disc time display

Shows the following three kinds of information:

- **Time code:** the AAIP (converted from block addresses that have been pre-grooved on a disc) or the EXT TC (recorded to a disc from external equipment) for the currently located position, a track BEGIN/END point, or a mark point.
- Track numbers registered in the file
- Messages

#### Note

If the time code chase mode is EXT TC mode, the RM-D9000 will freeze the displayed time at the last read value under the following conditions.

- when playing parts where time code is not recorded with the time code channel in REPRO mode.
- when there is no time code being input during INPUT mode.

### (13) Meter mode indicators

One of the following indicators lights to

indicate which level meter scale is being used.

- **NORMAL:** Normal scale (peak meter mode)
- **FINE:** Fine (magnified) scale
- **BIT:** Bit length scale

*For details, see "3-3. Setting the Level Meter Display".*

### (14) TC (time code) Indicator

When you select EXT TC as the time code while the external time code is being input to the unit while in input signal monitoring status, or the unit is playing back the time code signal in playback signal monitoring status, this indicator displays the time code signal level, as follows:

- **Flashes:** level of the time code signal is too high.
- **Lights:** time code signal is of an appropriate level.
- **Goes out:** time code signal is too low.

**(15) Level meters**

Indicate the input or playback signal levels.

**(16) Operation mode indicators**

One of the following indicators lights to indicate the current operation mode.

- **NORMAL:** Normal operation mode (with a sequential recording/playback operation, such as with a conventional tape recorder)
- **DISC:** Disc operation mode (playback only, such as with a CD player)
- **FILE:** File operation mode (file playback only)  
See "4-1. Overview of Operation Modes" for details of operation modes.

**(17) Timer mode indicators**

One of the following indicators lights to indicate the current timer mode.

- **ABSOLUTE:** Absolute time code
- **REMAIN:** Remaining time left on a disc, or remaining play time left in a track/file
- **ACTUAL:** Elapsed playback time for a track/file

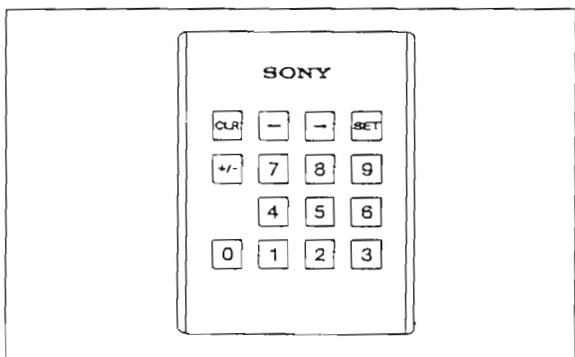
**Characters used in the disc time display**

The following characters are used to represent numeric and alphabetic characters in the disc time display.

1	2	3	4	5	6	7	8	9	0
1	2	3	4	5	6	7	8	9	0
A	B	C	D	E	F	G	H	I	J
A	b	c	d	E	F	G	H	I	J
	c					g	h		
K	L	M	N	O	P	Q	R	S	T
※	L	※	n	o	P	q	r	s	t
	l		n	o					
U	V	W	X	Y	Z				
u	v	※	※	y	※				

※ Not used in the display

**2-2-3. 10 Key Unit**

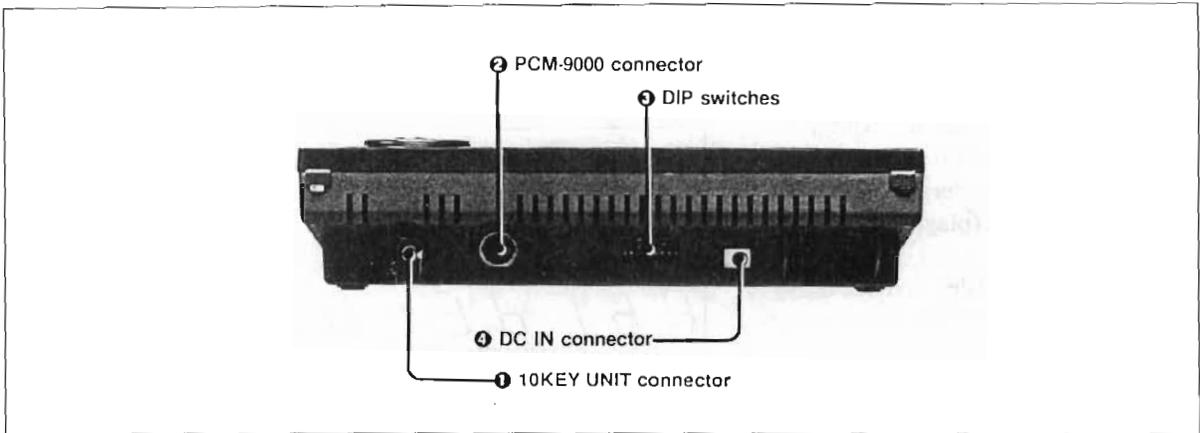


10 key unit

The 10 key unit (numeric keypad) allows you to enter time code addresses and other values directly, without using the search dial.

You cannot connect the 10 key unit while the RM-D9000 is attached to the PCM-9000 front panel. Connect the RM-D9000 to the connector on the PCM-9000 rear panel, then connect the 10 key unit to the RM-D9000.

2-2-4. RM-D9000 Connector Panel



RM-D9000 connector panel

**(1) PCM-9000 connector (Round 10-pin)**

Used to connect the RM-D9000 to the REMOTE CONTROLLER connector on the front panel or connector panel of the PCM-9000, using the 10-pin cable supplied with the RM-D9000.

**(2) DIP switches**

**Switches 1 to 3:** Overload indication adjustment switches

Used to set the number of words corresponding to full scale (overload signals) which are continuously input to the unit, and which are indicated with the OVER level indicators of the level meters.

Number of words	Switch 1	Switch 2	Switch 3
1	OFF	OFF	ON
2	OFF	ON	OFF
3	OFF	ON	ON
4	ON	OFF	OFF
5	ON	OFF	ON
6	ON	ON	OFF
7	ON	ON	ON

Factory setting: 4 words (Switch 1: ON, Switch 2 and 3: OFF)

**Note**

If all switches (switches 1 to 3) are set to OFF, the meters will always indicate an overload level. Set at least one of these switches to ON.

**Switches 4 to 8:** Mode selectors

Used to select the level meter indication mode. They set the peak hold time and determine whether the overload peak level indication is to be held.

Switch Number	Function	Set to ON	Set to OFF
4	Overload level setting	-0.2 dB	0 dB
5	Reserved	——	——
6	Peak hold time (when switch number 7 is set to ON)	1.5 seconds	Continuous
7	Peak holding	Held	Not held
8	Test mode	Test mode	Normal mode

Factory setting: Switch 4 is set to ON, all other switches are set to OFF.

**Notes**

- Set switch 4 to ON when the DABK-9001 Converter Board is installed.
- Turn off the power before attempting to set DIP switch 8 to ON.

**(3) DC IN connector**

Connects the unit to an external power supply (9 V to 12 V DC). By using an external power supply and optional cable, the RM-D9000 can be remotely controlled from a distance of up to 20 m.

**(4) 10KEY UNIT connector (Round 8-pin)**

Used to connect the 10 key unit supplied with the RM-D9000.



## Chapter 3 Preparation

---

This chapter describes the preparations necessary prior to operating the PCM-9000. Included are basic connections, switch settings, and disc handling.

<b>3-1. Basic System Connections .....</b>	<b>3- 2</b>
<b>3-2. Time Data Display .....</b>	<b>3- 4</b>
3-2-1. Operation Modes and Time Data Display .....	3- 4
3-2-2. Setting the Time Code Offset .....	3- 6
<b>3-3. Setting the Level Meter Display .....</b>	<b>3- 8</b>
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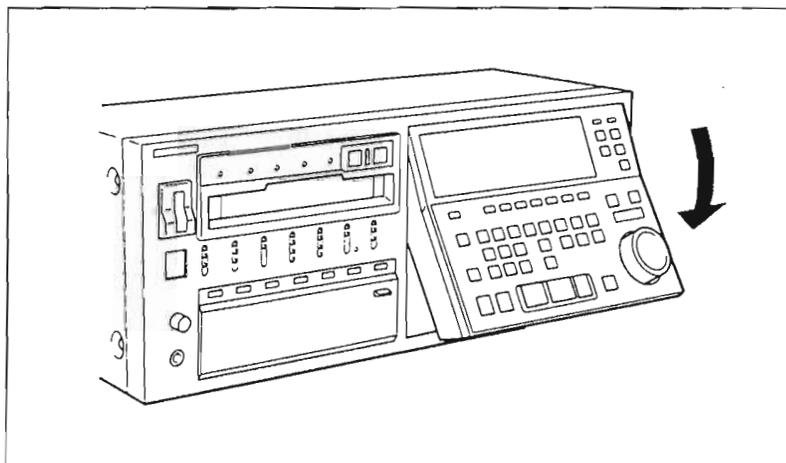
## 3-1. Basic System Connections

This section describes how to attach/detach the RM-D9000, and presents basic system configurations.

### Attaching the RM-D9000

Attach the RM-D9000 to the PCM-9000 by following the procedure below.

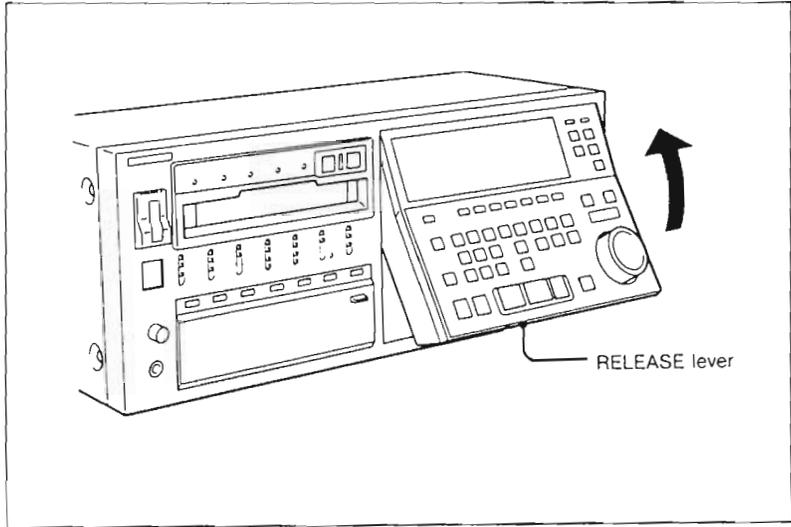
- 1** Connect the REMOTE CONTROLLER connector on the PCM-9000 front panel to the PCM-9000 connector on the RM-D9000 upper side panel, using the 10-pin cable supplied with the RM-D9000.
- 2** Align the top edge of the RM-D9000 with the recess in the PCM-9000 front panel, then push the RM-D9000 into the PCM-9000.



Attaching the RM-D9000

**Detaching the RM-D9000**

Move the RELEASE lever to the right, then detach the RM-D9000 from the PCM-9000. This lever is located at the lower edge (right side) of the PCM-9000 front panel.



Detaching the RM-D9000

## 3-2. Time Data Display

### 3-2-1. Operation Modes and Time Data Display

The time data displayed in the disc time display differs with the operation mode, kind of time code (AAIP/EXT TC), and timer mode. The following tables list the time data displayed in each operation mode.

For details of the operation modes, see "4-1. Overview of Operation Modes".

#### Time data display in normal operation mode

In normal operation mode, the ABSOLUTE and REMAIN timer modes can be used when you select AAIP as the operating time code. Only the ABSOLUTE time code is output as the time code signal. When you select EXT TC as the operating time code, ABSOLUTE timer mode is automatically set as the timer mode.

Timer Mode	Time code	AAIP offset setting	Time data displayed
ABSOLUTE	AAIP	Available	(AAIP absolute value) = (Time code converted from block address on disc) + (AAIP offset)
REMAIN	AAIP	Unavailable	(Largest AAIP value for a disc (Total recording time available on a disc)) - (Current AAIP address)
ABSOLUTE	EXT TC	Unavailable	External time code, recorded on time code channel of the disc

#### Time data display in disc operation mode

In disc operation mode, the ACTUAL and REMAIN timer modes can be used.

Timer mode	Time code	AAIP offset setting	Time data displayed
ACTUAL	AAIP	Unavailable	(Elapsed time from track begin point) = (Current AAIP absolute value) - (AAIP value of track begin point)
REMAIN	AAIP	Unavailable	(Remaining time till track end point) = (Current AAIP absolute value) - (AAIP value of track end point)

#### Notes

- The time code is automatically set to AAIP in disc operation mode, regardless of any previous switch settings.
- The unit outputs only the ACTUAL time code as the output time code (with the optional DABK-9003 Interface Board installed).
- In disc operation mode, time code offset cannot be added to either the display time code or output time code.

## Time data display in file operation mode

In file operation mode, you can select either indication of the file contents or the timer indication. When you select the timer indication, the following two modes are available.

- Timer indication for a file
- Timer indication for a track

The time code is automatically set to AAIP in file operation mode.

*For details of setting the time code offset in file operation mode, see "3-2-2. Setting the Time Code Offset".*

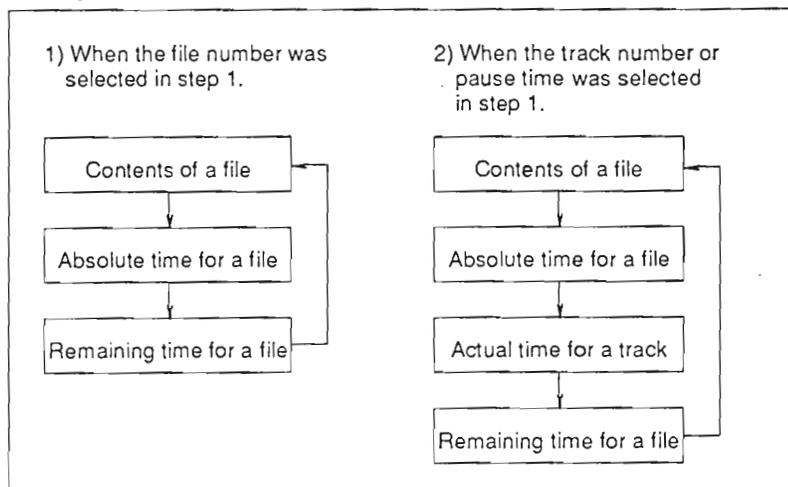
### Timer mode and displayed information

You can display the information listed in the table below by changing the timer mode.

Timer mode	Time code	AAIP offset setting	Time data displayed
Absolute	AAIP	Available	Elapsed time from beginning of the file
Remain	AAIP	Unavailable	Remaining time until the end of the playback file
Actual	AAIP	Unavailable	Elapsed time from the begin point of the playback file
Remain	AAIP	Unavailable	Remaining time until the end of the playback file

### Timer mode selection while the PCM-9000 is stationary

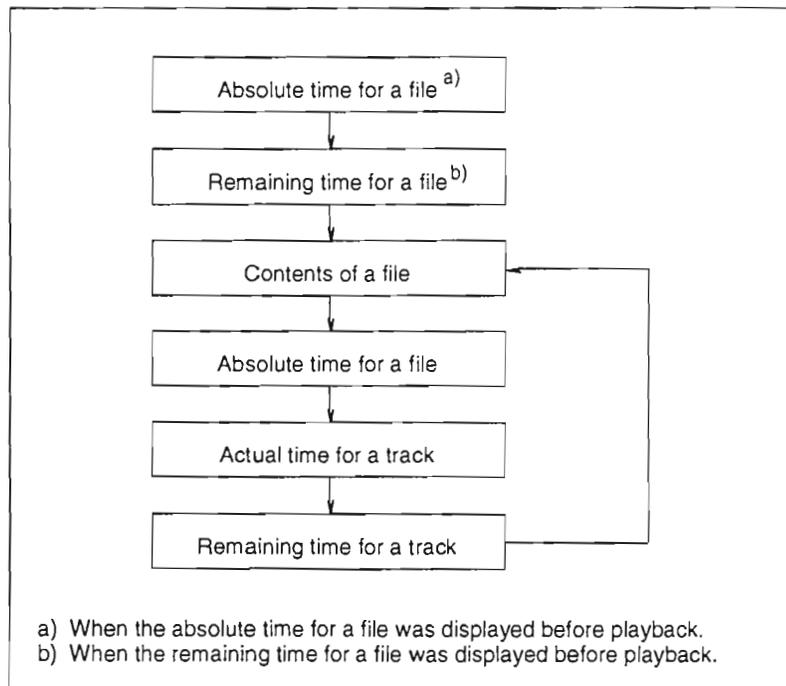
- 1 Press the ← or → key to position the cursor to the desired file number, track number, or pause time indication.
- 2 Press the TIMER MODE key.  
Every time you press the TIMER MODE key, the display indication changes, in the order shown below. The display order depends on the selection you made in step 1.



## 3-2. Time Data Display

### Timer mode selection during playback

Press the TIMER MODE key to display the desired indication. The timer indication changes in the order shown below.



#### Notes

- The duration between two tracks constitutes about 0.1 seconds, as though no pause time is registered in the file. Note that the total file playback time contains this duration time.
- You cannot display track time information if the track is not registered in the file.
- The unit outputs only the actual time code as the output time code (with the optional DABK-9003 Interface Board).

### 3-2-2. Setting the Time Code Offset

When AAIP is selected as the time code, you can add the time code offset to the displayed time code address in the following cases.

- Normal operation mode is selected.
- File operation mode is selected.
- In file operation mode, you can set the time code offset on each file.

#### Note

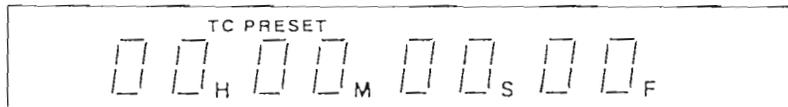
It is impossible to set the time code offset during the disc operation. If you set the offset when EXT TC is selected, the Time code offset of the AAIP TC mode will be set.

---

## Setting the offset time

- 1 Press the TC SET key.

The disc time display changes as shown below. The cursor is positioned to the seconds digit and flashes.



- 2 Press the ← or → key to move the cursor to the digit you want to change.  
The selected digit flashes.

- 3 Use the search dial or 10 key unit to enter the desired value.

When you set the offset time with the 10 key unit, position the cursor to the lowest-order digit of the value which you want to modify. Then, input the value in the order of hours ("H"), minutes ("M"), seconds ("S") and frames ("F").

- 4 Press the SET key.

The designated value is registered as the offset time.

- 5 Press the TC SET key.

### Notes

- When using the 10 key unit, input the value in the order of hours ("H"), minutes ("M"), seconds ("S") and frames ("F").
- In file operation mode, select the file number before setting the time code offset.
- If you change the time code format, the offset value is automatically converted to the corresponding value in the designated time code format.
- The offset value with time code format can be saved by saving the data.

---

## To reset the offset value to 0

- 1 While the offset time is displayed, press the RESET key on the RM-D9000 or the CLR key on the 10 key unit.

- 2 Press the SET key.

The offset time is reset to 0.

## 3-3. Setting the Level Meter Display

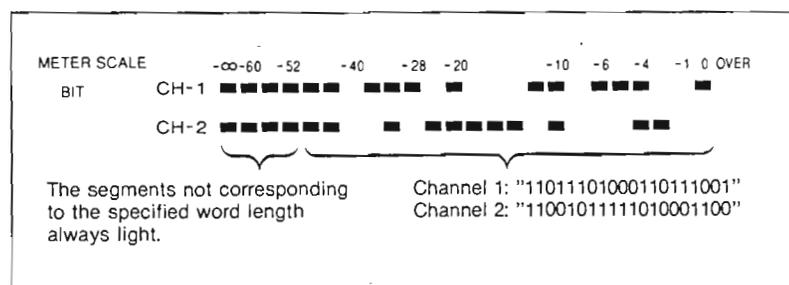
The PCM-9000 allows you to set the scale and peak hold mode of the level meters.

### Setting the meter scale

Press the METER SCALE key to change the level meter scale. The mode indicators light in the following order:

- NORMAL mode: Normal peak level meter display
- FINE mode: Each segment of the display represents 0.2 dB, with a reference marker indicating the reference level. The "0" segment flashes when the level exceeds the scale range (over scale), and the "-60" segment flashes when the level is below the scale range (under scale).
- BIT mode: Each segment of the display represents a single bit. When the unit is set to input signal monitoring status, the number of segments flashing indicates the word length of the input signal. So, you can check the word length.

When the unit is in playback signal monitoring status, the indication word length varies with the word length of the playback signal. Those segments that do not correspond to the specified word length do not light (in the left part of the level meter).



BIT mode (Example: word length = 20bits) level meter display

### Setting the meter mode

By setting the DIP switches on the RM-D9000 connector panel, you can switch the peak hold and over-scale indications of the level meters, adjust the over scale, and so on.

*For details of the mode and parameters that can be set with the DIP switches, see "2-2-4. RM-D9000 Connector Panel".*

## 3-4. Handling the PCM-9000 and Discs

The PCM-9000 uses 5.25-inch magneto-optical (MO) discs as its recording medium. This section provides notes on the installation, disc handling, data protection, and so on.

### 3-4-1. Notes on Installation

When installing the PCM-9000, note the following:

- Install the unit on a level surface, no more than 5 degrees from the horizontal. If the unit is not level, it may malfunction.
- Install the unit in a location where it will not be subjected to vibration or shock. Failure to do so may result in sound skipping.
- Do not install the unit in locations subject to high temperatures (more than 40 C°). High temperature will shorten the life of the laser.

### 3-4-2. Supported Discs and Notes on Disc Handling

#### Supported discs

Use MSD-1200 Digital Audio Master Discs which are designed for use with the master disc recorder.

Note that you cannot use MO discs designed for computer data storage.

#### Handling discs

- Do not drop a disc cartridge or subject it to any extreme shocks or vibration.
- Do not open the shutter of the disc cartridge or touch the disc inside.
- Do not use the disc under conditions such as high humidity or wide temperature fluctuations. If condensation forms on the disc's surface, the unit will be unable to read or write data.

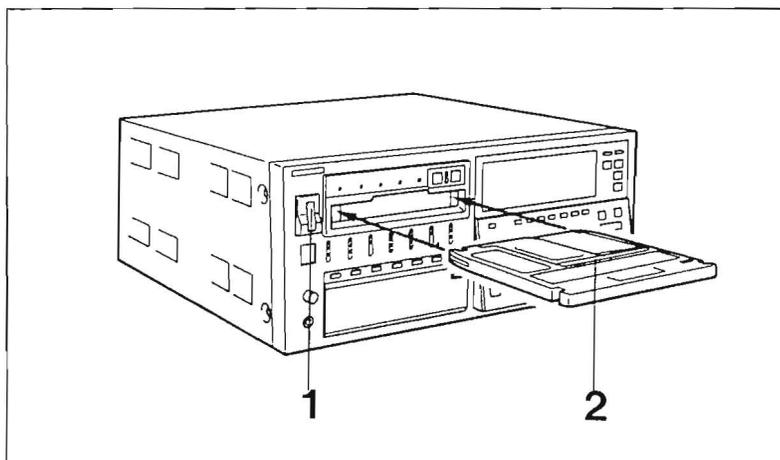
#### Storing discs

Store disc cartridges, in their cases, in a cool place.

## 3-4. Handling the PCM-9000 and Discs

### 3-4-3. Inserting and Ejecting a Disc

#### Inserting a disc



- 1 Turn on the PCM-9000.
- 2 Insert a disc.

The disc is automatically loaded.

After the unit reads the auxiliary data on the disc, the STOP key lights to indicate that the unit is ready for operation.

If data cannot be read from the disc, eject the disc and insert it again.

**Note**

If you turn on the power of the PCM-9000 while a disc is loaded, the disc is automatically ejected.

#### Ejecting a disc

Upon pressing the EJECT key, one of following will occur.

**If you have neither recorded new material or performed program editing**

The disc is ejected immediately. Also, even if you have performed either operation, but have already saved your data before pressing EJECT key, the disc will be ejected immediately.

---

**If you have recorded new material**

The EDIT DATA SAVE key lights, and the REC ID data is automatically recorded onto the disc. Once the data has been saved, the disc is ejected automatically.

**If you have performed program editing but have not yet saved your data**

The EDIT DATA SAVE key flashes to warn you that the edit data has not yet been saved.

To save the edit data: press the EDIT DATA SAVE key.

The unit writes the data to the disc. Then, press the EJECT key.

The disc will be ejected.

To abandon your edit data: press the EJECT key again. The disc is ejected.

If the REC PROTECT switch on the disc is set to any recording protect position, EDIT DATA SAVE key is flashing after you press EJECT key. In this case, you press EJECT key again, then the disc is ejected. No data can be written to the disc.

To save your editing, set the REC PROTECT switch to the recordable position, then insert the disc again. Then, press the EDIT DATA SAVE key.

If you do not want to save the edit data, press the EDIT DATA SAVE key, after ejecting the disc such that the key indicator goes out.

If you insert another disc, the EDIT DATA SAVE key will go out.

For details of REC PROTECT, see "3-4-4. Preventing Accidental Erasure".

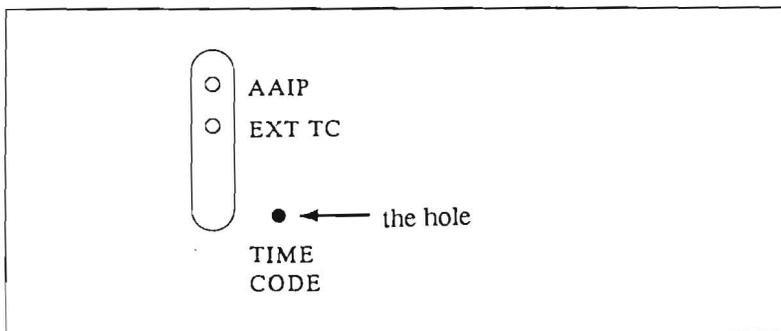
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**Manually ejecting a disc**

In emergencies, you can manually eject a disc.

- 1 Turn off the power.
- 2 Insert the supplied L-wrench into the hole illustrated below, and push.

The disc is ejected.



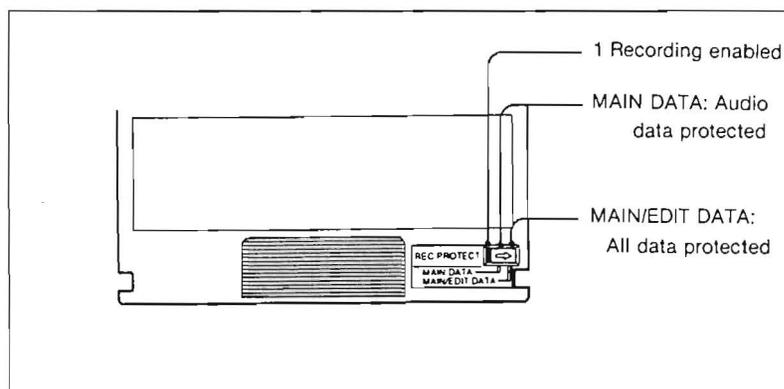
## 3-4. Handling the PCM-9000 and Discs

### 3-4-4. Preventing Accidental Erasure

Disc cartridges are equipped with a REC PROTECT switch (a red tab) to prevent the accidental erasure of data on the disc or the inadvertent writing of unwanted data.

The REC PROTECT switch can be set to any of three positions: two for protection, and one for writing.

- Leftmost position: Both audio and edit data can be written.
- MAIN DATA: Audio data on the disc is protected. You can write edit data.
- MAIN/EDIT DATA: All data (audio and edit data) is protected. You can only read data from the disc.



### 3-4-5. Cleaning a Disc

Dust and stains may accumulate on a disc when it is used for a long period of time. To avoid resultant data read/write errors, clean the disc using the optional disc cleaning kit. To maintain high performance and prolong the useful life of a disc, clean it at least once every three months.

In addition, check your data, by performing disc checks periodically. See "7-1. Checking a Disc".

#### Cleaning kit

Use the optional MOA-D51 Disc Cleaning Kit. Do not use any other type of disc cleaner as this may result in data read/write errors. Cleaning instructions are given in the manual supplied with the disc cleaning kit.

# Chapter 4

## Basic Operation

---

This chapter explains the basics of PCM-9000 operation, and includes an explanation of the operation mode, recording, playback, and searching.

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## 4-1. Overview of Operation Modes

You can operate the PCM-9000 in any of the following four operation modes. While the unit is stationary, you can select the desired operation mode by pressing the OPR MODE key.

### **Normal operation mode**

This mode is used to record the external audio data to be edited. You can make tracks and register mark points in this mode. The locating of desired points by using registered rec IDs, track begin/end points and mark points, is supported.

### **Disc operation mode**

This mode is used to play back tracks. You can register mark points to enable the easy location of points on the disc.

### **File operation mode**

This mode is used to make files and execute program editing. Only registered files can be played back in this mode. By manipulating the editing data in this mode, you can make and play back files, containing desired tracks, in any order.

*For details of making tracks and files, see "Chapter 5 Program Editing".*

## 4-2. Recording

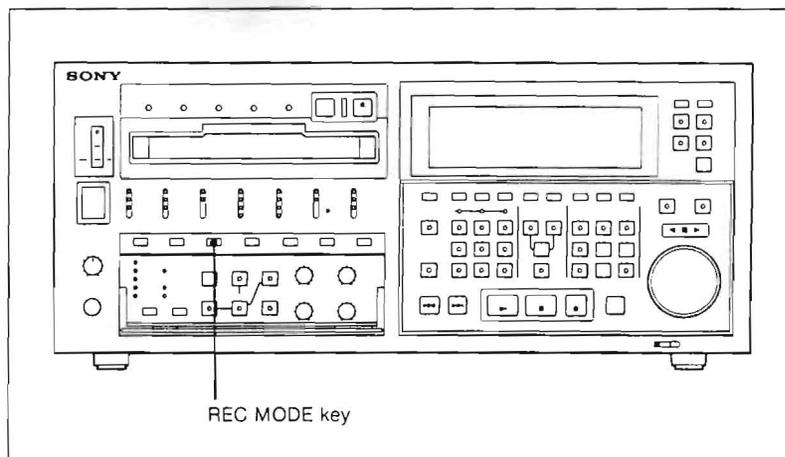
This section explains recording procedures, in the following order:

- Recording mode selection
- Record/monitor channel selection
- Input/output signal level adjustment
- Recording an external time code
- Recording operation
- Automatic punch in/out

### 4-2-1. Selecting the Recording Mode

You can operate in either of two recording modes: monitor recording mode or sync recording mode.

Select the recording mode appropriate to the recording situation and source.



Selecting the recording mode

#### Selecting monitor recording mode

Monitor recording mode is intended for monitoring sound while it is being recorded. In this mode, continuity of the PCM data between previously and newly recorded signals is not preserved and the setting of individual channels for recording is impossible. Recording is performed for all channels (CH-1, CH-2, TC) together.

To select monitor recording mode, press the REC MODE key on the PCM-9000, such that the MONITOR indicator lights.

#### Notes

- When you record in monitor recording mode, record a blank area for a few seconds at the head of the recording.
- When inserting new material over previously recorded parts in monitor recording mode, there is some possibility that noise will be recorded at the begin/end point. Insert in sync recording mode.

## 4-2. Recording

### Selecting sync recording mode

In sync recording mode, recording is executed while preserving the continuity of the PCM data.

Therefore, punch in/out is possible in this recording mode, as is individual channel setting.

To select sync recording mode, press the REC MODE key on the PCM-9000, such that the SYNC indicator lights.

#### Notes

- When you record with executing SYNC CLOCK by external synchronizing, do not change the frequency of external sync signal.
- When connection of the synchronizing signal is cut by mistake, press STOP key immediately and cancel the recording, and start the recording again.

### 4-2-2. Selecting Record/Monitor Channels

You can select the channel status for each channel (CH-1, CH-2, TC) when recording, playing back or monitoring.

#### Setting a channel to recording ready status

- In sync recording mode, you can set each channel's status individually: press the REC READY key on the RM-D9000 corresponding to the channel to be set. The corresponding indicator will light.
- In monitor recording mode, you cannot set each channel's status individually. If you press any of the REC READY keys on the RM-D9000, all channels are set to recording ready status.
- In both recording modes, you can simultaneously set all channels to recording ready status simply by pressing the REC READY key on the PCM-9000.

#### Setting a channel to playback signal monitoring status

Press the REPRO key on the RM-D9000 corresponding to the channel to be set. The corresponding indicator will light.

In sync recording mode, all channels are automatically set to input signal monitoring status while recording (the REPRO and INPUT key indicators light).

#### Setting a channel to input signal monitoring status

Press the INPUT key on the RM-D9000 corresponding to the channel to be set. The corresponding indicator lights.

### 4-2-3. Adjusting the Input/Output Signal Levels

You can adjust the analog input/output signal level by using the reference marker (with the optional DABK-9001 Converter Board installed).

---

## Selecting a channel to be adjusted

Set the DIP switches on the DABK-9001 Converter Board corresponding to the channel and level range you want to adjust.

	Switch Number		DIP switch setting	Maximum input level		Head room	
	To adjust the input level	To adjust the output level		Range	Center	Range	Center
CH 1	S103	S104	Only bit 4 is set to ON	+22 to +26 dBs	+24 dBs	+18 to +22 dB	+20 dB
			Only bit 3 is set to ON	+19 to +23 dBs	+21 dBs	+15 to +19 dB	+17 dB
CH 2	S203	S204	Only bit 2 is set to ON	+16 to +20 dBs	+18 dBs	+12 to +16 dB	+14 dB
			Only bit 1 is set to ON	+13 to +17 dBs	+15 dBs	+ 9 to +13 dB	+11 dB

For details of the location of the level range setting switches, see Chapter 5 of the Maintenance Manual.

---

## Adjusting the input signal level

- 1 Press the METER SCALE key, such that the FINE indicator lights in the display window.

The -16 dB segment indicator of the level meter lights. The unit enters fine indication mode.

- 2 Press the REF MARKER key.

Each time you press the REF MARKER key, the reference marker on the level meter moves to the right in steps of 2 dB. The reference marker returns to the -20 dB position after exceeding the -10 dB position.

The level indication shows the head-room relative to digital full scale.

- 3 Select the channel to be set to input signal monitoring status by pressing the corresponding INPUT key.

- 4 Input the reference signal to the LINE INPUT CH-1 or CH-2 connector of the DABK-9001 Converter Board.

- 5 Adjust the appropriate ANALOG LEVEL ADJUST IN control to match the input signal level indication to the reference marker.

**Note**

In fine level indication mode, each segment corresponds to 0.2 dB.

## 4-2. Recording

---

### Adjusting the output signal level

After adjusting the input signal level, adjust the output signal level. Adjust the appropriate ANALOG LEVEL ADJUST OUT control to set the output signal to the desired level.

#### Performing adjustment using the level meter of the mixing console

- 1 Press the INPUT key corresponding to the channel to be adjusted. The channel is set to input signal monitoring status.
- 2 Adjust the ANALOG LEVEL ADJUST OUT control, such that the level meter on the mixing console indicates the desired level.

#### Using a recorded disc for adjustment

- 1 Record the adjusted input reference signal onto a disc.  
*For details of the recording procedure, see "4-2-5. Recording".*
- 2 Press the REPRO key corresponding to the channel to be adjusted. The channel is set to playback signal monitoring status.
- 3 Press the PLAY key such that the recorded reference signal is played back.
- 4 Adjust the ANALOG LEVEL ADJUST OUT control, such that the level meter connected to the output signal indicates the desired level.

#### Note

When you use a digital audio signal (AES/EBU and SDIF-2 format) as the input signal, level adjustment is not possible.

### 4-2-4. Recording an External Time Code

You can record an external SMPTE/EBU-format time code signal onto the TC (time code) channel by installing the optional DABK-9003 Interface Board.

*For details of playing back the time code signal, see "4-3-3. Time Code Sync Playback".*

---

## Notes on recording an external time code

- When you record external time code signals, the unit should be synchronized with the external equipment from which the external time code is supplied. But, to record external time code signals from equipment that has no function for synchronization (such as an analog tape recorder), synchronization is not necessary.
- You cannot record external time code signals that are not supported by the PCM-9000, such as MIDI-format time codes, and so on.
- It is recommended that time code be continuously recorded from disc top to disc end for the correct operation of the following functions (to do the finding in BGN, END, MARK, REC ID correctly, or to do the time code chasing correctly).

---

## Recording an external time code with synchronization

- 1** Press the SYNC CLOCK key, such that the VIDEO indicator lights.
- 2** Press the TIME CODE key, such that the EXT TC indicator lights.
- 3** Press the TC FORMAT key, such that the indicator corresponding to the desired time code format lights.
- 4** Press the REC READY key of the TC channel.
- 5** Record the input signals.  
*For details of the recording procedure, see "4-2-5. Recording".*

### Recording an external time code without synchronization

The operation is the same as that explained above, except that synchronizing signal is not performed.

---

## To output an input time code signal

The PCM-9000 can output time code signals when the optional DABK-9003 Interface Board is installed.

The output time code depends on the TC channel status, as follows:

- Input signal monitoring status: time code signal input to the TIME CODE IN connector is output
- Playback signal monitoring status: time code recorded on the TC channel (playback time code) is output

### Note

You cannot add an offset to the output time code.

## 4-2. Recording

---

### Regenerating an external time code

An input time code can be regenerated even if the input time code has many dropouts. To regenerate an input time code, press the GEN MODE key, such that the REGEN indicator lights.

#### Notes

- The time code offset, phase shift, and related functions are not available with the regenerated time code. Becomes free running mode when no time code is input.
- Cancel regeneration when performing time code chase.

### If the FORMAT indicator does not light steadily

If there is any difference between the input and regenerated time codes, the FORMAT indicator flashes. Press the TC FORMAT key, such that the FORMAT indicator lights steadily.

#### Note

The internal time code reader cannot discriminate between the 30-frame/s and 29.97-frame/s NDF formats.

## 4-2-5. Recording

Once you have performed recording mode selection, channel setting and input signal level adjustment (when an analog signal is input), the unit is ready to be used for recording.

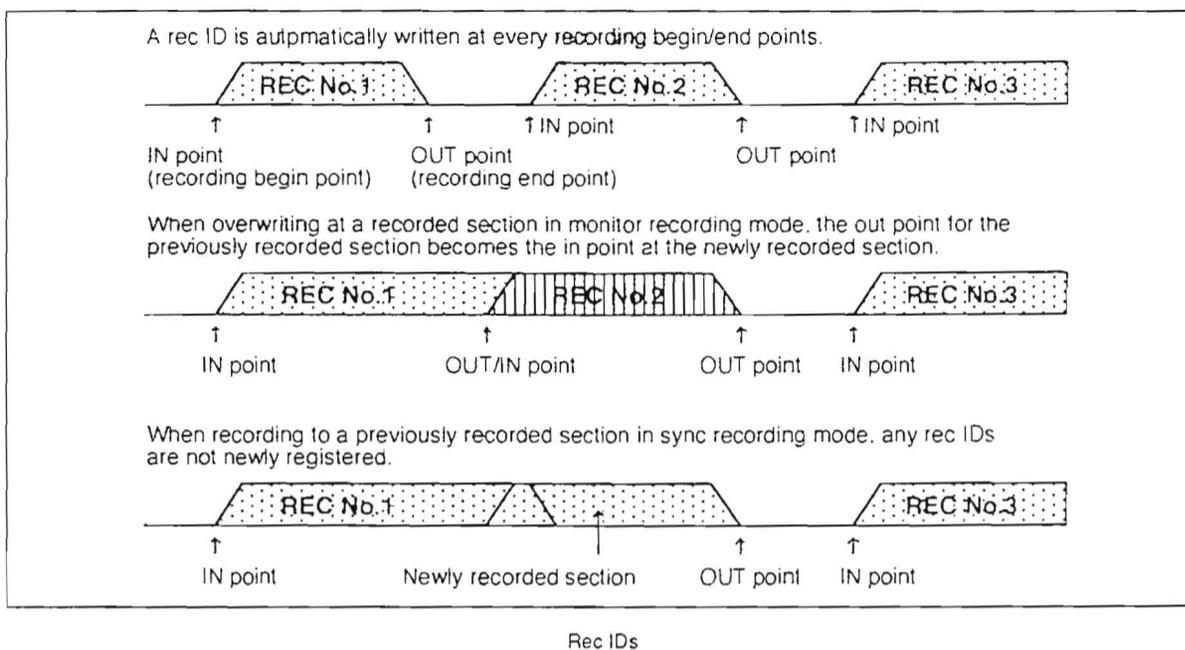
### What are rec IDs?

The MS disc format adopts a rec ID system. When you record new material on the disc, rec IDs are automatically registered at the recording begin/end points, together with a number (rec ID number). You cannot specify or change a rec ID number, as rec ID numbers are assigned automatically.

When recording over a previously recorded section in sync recording mode, the rec IDs are not newly registered.

#### Notes

- No rec ID is registered if the recording duration is less than two seconds.
- After maximum rec ID number has been registered, no further material can be recorded onto that disc.



## Executing recording

To execute recording, follow the procedure below:

- 1** When executing monitor recording
  - (1) Press the REC MODE key, such that the MONITOR indicator lights.
  - (2) Select the sampling frequency, word length, time code format, and so on.

When executing sync recording  
Press the REC MODE key, such that the SYNC indicator lights.
- 2** Press the REC READY key to set the desired channel to recording ready status.  
In monitor recording mode, all channels are set to recording ready status by pressing one of the REC READY keys (If the DABK-9003 Interface Board is not installed, the REC READY key corresponding to the TC channel is disabled).
- 3** While holding down the REC key of the RM-D9000, press the PLAY key.  
A rec ID (in point) is registered at the recording start point, and recording starts.

### Stopping recording

Press the STOP key on the PCM-9000 or RM-D9000.  
A rec ID (out point) is registered at the recording end point, and recording ends.

## 4-2. Recording

---

### Recording muting signals

- 1** Press the REC MUTE key, such that its key indicator lights.
- 2** Press the REC READY key corresponding to the channels on which you want to record (in sync recording mode). Or, press the REC READY key, such that its key indicator lights (in monitor recording mode)
- 3** While holding down the REC key, press the PLAY key.  
  
Recording starts, and muting signals are written to those channels that are in recording ready status.
- 4** Press the REC READY key corresponding to the recording channel. The indicator will go out.  
  
Recording ends.
- 5** Press the REC MUTE key, such that its key indicator goes out.

### Variable speed recording

You can execute variable speed recording at -12.5% to +12.5% normal recording speed, in increments of 0.1% normal playback speed.

- 1** Set the recording speed.  
*For details, see "4-3-2.Variable Speed Playback"*
- 2** Press the VARI key, such that its key indicator lights.
- 3** Press the REC READY key corresponding to the channels to which you want to record (in sync recording mode). Or, press the REC READY key, such that its key indicator lights (in monitor recording mode)
- 4** While holding down the REC key, press the PLAY key.  
  
Recording starts at the stored variable speed.

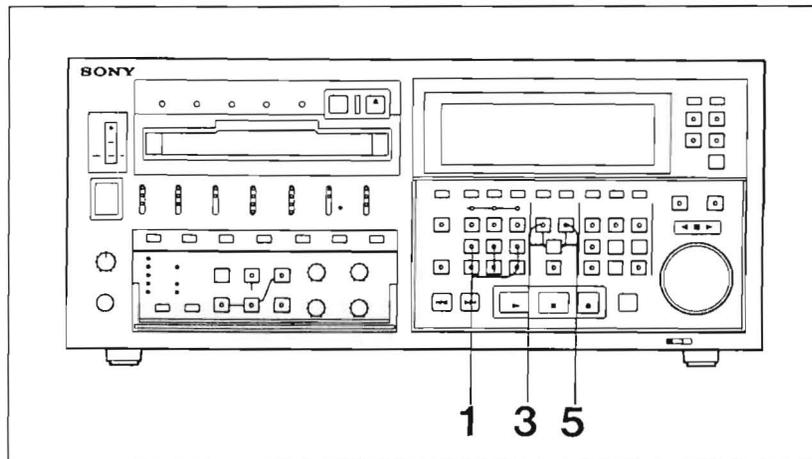
#### Notes

- You cannot execute variable speed recording while executing time code chase in address mode.
- If the clock mode is set to sharp, you cannot execute variable speed recording and playback.

## 4-2-6. Automatic Punch In/Out

You can execute recording automatically between a designated recording start point (in point) and recording end point (out point) (automatic punch in/out).

### Registering an in/out point



Registering an in/out point

- 1** Press the REPRO key to set the desired channel to playback signal monitoring status.
- 2** Locate the in point.
- 3** While holding down the ENTRY key, press the IN key.  
The IN key indicator lights, showing that the in point has been registered.  
The OUT key indicator flashes.
- 4** Locate the out point.
- 5** While holding down the ENTRY key, press the OUT key.  
The OUT key indicator lights, showing that the out point has been registered.

#### Notes

- When you register only an in point, the out point is automatically registered at the end of the disc.
- When you register only an out point, the in point is automatically registered at the beginning of the disc.

## 4-2. Recording

---

### Re-registering an in/out point

- 1** Press the IN (or OUT) key.  
  
The current in (or out) point address appears in the display window.
- 2** While holding down the IN (or OUT) key, press the LOCATE key.  
  
The time code address is positioned to the displayed address.
- 3** Locate the desired address.  
*For details of the jog function, see "4-4-1. Searching with Jog/Shuttle".*
- 4** While holding down the ENTRY key, press the IN (or out) key.  
  
The in (or out) point is re-registered.

---

### Trimming an in/out point directly

- 1** While holding down the IN (or OUT) key, rotate the search dial.  
  
The in (out) point indication in the display window changes as you rotate the search dial. Do not release the IN (OUT) key yet, even once the desired in (out) point address appears.
- 2** Press the ENTRY key.
- 3** Release the IN (OUT) key.  
  
The stored in (out) point address data is changed to the new address data, then stored in memory.

**Note**

Trimming is canceled if you release the IN (OUT) key while rotating the search dial in Step 1.

---

### Recalling an in/out point

Press the IN (OUT) key.  
Pressing either key causes the corresponding address data to be displayed.

---

### Locating an in/out point

While holding down the IN(or OUT) key, press the LOCATE key.

---

## Rehearsing automatic punch in/out

- 1 Press the REC MODE key, such that the SYNC indicator lights.
- 2 Press the REPRO and REC READY key corresponding to the channel for which you want to execute automatic punch in/out.
- 3 Check that both the IN and OUT key indicators are lit. Then, hold down the AUTO EDIT key and press the PLAY key.

Automatic punch in/out rehearsal is executed for selected channels, while you can monitor the input signal between the in and out points.

The preroll time (about 8 seconds) and postroll time (about 3 seconds) are fixed.

---

## Executing automatic punch in/out

- 1 Press the REC MODE key, such that the SYNC indicator lights.
- 2 Press the REPRO and REC READY keys corresponding to the channel for which you want to execute automatic punch in/out.
- 3 Check that both the IN and OUT key indicators are lit. Then, while holding down the AUTO EDIT key, press the REC key.

Recording is automatically executed to the channels between the in and out points. During punch in/out, the channels being recorded are automatically set to input signal monitoring status. After automatic punch in/out has been completed, the indicators of the IN and OUT keys go out. The in and out point data remains stored, however.

### Notes

- If an out point precedes an in point, "ILLEGAL" appears in the display window and automatic punch in/out is canceled.
- You cannot execute automatic punch in/out in monitor recording mode.
- The preroll time (about 8 seconds) and postroll time (about 3 seconds) are fixed.
- When performing automatic punch in during time code sync play, use ONCE mode.
- It is impossible to do automatic punch in during time code chase.

## 4-2. Recording

---

### **Re-executing automatic punch in/out after canceling execution**

After checking that the IN/OUT key indicators light, hold down the AUTO EDIT key and press the REC key. (When the indicators are not lit, press the IN or OUT key, such that the corresponding indicators light.)

### **Re-executing automatic punch in/out after completing execution**

Press the IN or OUT key.

The indicators of the IN and OUT keys light.

While holding down the AUTO EDIT key, press the REC key.

---

### **Positioning to the IN or OUT point**

While holding down the IN or OUT key, press the LOCATE key.

## 4-3. Playing Back in Normal Operation Mode

The PCM-9000 supports various playback functions such as normal playback, repeat playback and variable speed playback.  
*For details of playing back tracks and files, see "Chapter 5 Program Editing".*

### 4-3-1. Playing Back

#### Playing back

- 1 Press the OPR MODE key, such that the NORMAL indicator appears in the display window.
- 2 Press the REPRO key corresponding to the channel to be played back, such that its key indicator lights.
- 3 Press the PLAY key.  
  
Playback starts. You can monitor the sound being played back from a channel in playback signal monitoring status.
- 4 To stop playback, press the STOP key.

#### Executing repeat playback

During playback, you can execute repeat playback between two designated points by pressing the REPEAT key.

- 1 Press the OPR MODE key, such that the NORMAL indicator appears in the display window.
- 2 To start playback, press the REPRO key, such that its key indicator lights, then press the PLAY key.
- 3 While monitoring the playback signal, press the REPEAT key at the point where you want to start repeat playback.  
The repeat start point is stored, and "REPEAT I-" flashes in the display window.
- 4 Press the REPEAT key again at the point where you want to end repeat playback.  
The repeat start and end points are stored, and the repeat indication changes to "REPEAT I-II" and lights steadily.  
Repeat playback between the two designated points starts.
- 5 To stop repeat playback, press the STOP key.

The repeat indication in the display window disappears, and repeat playback is canceled.

## 4-3. Playing Back in Normal Operation Mode

---

### 4-3-2. Variable Speed Playback

You can execute variable speed playback at -12.5% to +12.5% normal playback speed in increments of 0.1% normal playback speed.

---

#### Setting the variable speed value

##### When not executing variable speed playback

- 1** Press the VARI SET key, such that its key indicator lights.  
The stored variable speed value appears in the display window.
- 2** Set the desired variable speed value by rotating the search dial, or input the speed value by using the 10 key unit.
- 3** Press the VARI SET key.  
The designated variable speed value is stored as the speed for variable speed playback. The display window indication returns to its original status.

##### When executing variable speed playback

- 1** Press the VARI SET key, such that its key indicator lights.  
The stored variable speed value appears in the display window.
- 2** Set the desired variable speed value by rotating the search dial, or input the speed value by using the 10 key unit.  
The playback speed changes as the displayed value changes.
- 3** Press the VARI SET key.  
The designated variable speed is stored as the speed for variable speed playback. The display window indication returns to its previous status.

**Note**

When using the 10 key unit, input a "+" or "-" sign after inputting the variable speed value.

---

#### Executing variable speed playback

- 1** Press the VARI key, such that its indicator lights.
- 2** Press the PLAY key.  
Playback starts at the stored variable speed.

**Note**

When you use the variable speed function, set DIP switch number 15 (clock mode) on the PCM-9000 to I.

---

### 4-3-3. Time Code Sync Playback

During playback, you can synchronize the sync phase of the playback time code or disc time code with the sync phase of the external composite video signal. To execute this function, the optional DABK-9003 Interface Board must be installed.

**Note**

Use the normal mode when performing time code sync play.

---

#### Setting time code sync playback

There are two time code sync playback modes, as follows.

**ONCE:** After initial synchronization with the sync phase of the external composite video signal, the unit terminates time code sync playback. The unit returns to normal playback.

**CONTINUE:** After initial synchronization with the sync phase of the external composite video signal, the unit automatically executes re-synchronizing if any discrepancy between the external and playback syncs occurs, such that synchronization of the sync phase with the external composite video signal is maintained throughout the operation.

To select time code sync playback mode, set DIP switch 4 on the PCM-9000 as necessary.

**Note**

When you record during the time code sync playing, use ONCE mode.

---

#### Executing time code sync playback

- 1** Set DIP switch number 3 on the PCM-9000 to II.
- 2** Set DIP switch number 15 on the PCM-9000 to I.
- 3** Press the SYNC CLOCK key, such that the VIDEO indicator lights.
- 4** Press the REPRO key of the TC (time code) channel, such that its indicator lights.
- 5** Press the PLAY key.

While the unit is synchronizing with the external composite video sync phase, the PLAY key flashes.

Once synchronization has been achieved, the PLAY key indicator lights steadily.

## 4-3. Playing Back in Normal Operation Mode

### Note

You can select either the AAIP time code or recorded external time code as the playback time code, which is output from the TIME CODE OUT connector of the DABK-9003 Interface Board.

### 4-3-4. Insertion Function

By using the insertion function, you can process the signal, output from the INSERTION SEND connector, using an external effector or mixer. The processed signal can be returned to the INSERTION RETURN connector of the PCM-9000.

**1** Press the INPUT SELECT key, such that the indicator corresponding to the desired signal lights.

**2** Press the INSERTION key.

The INSERTION indicator appears in the display window.

**3** To cancel the insertion, press the INSERTION key again, such that the INSERTION indicator disappears.

### Notes

- You can use only AES/EBU-format signals as the insertion send/return signal.
- You cannot record processed insertion signals on the PCM-9000 to which the insertion signal is input. To record processed insertion signals, use an external unit connected to the PCM-9000.

## 4-4. Searching in Normal Operation Mode

This section explains how to locate a point in normal operation mode. You can search for a specified address by using the jog/shuttle function (while monitoring the sound), by specifying a desired address, or by using registered IDs (rec IDs, track IDs or mark points). You can also locate a recording end point simply by pressing the END SEARCH key.

### 4-4-1. Searching with the Jog/Shuttle Dial

You can locate a point roughly in shuttle mode, then locate it precisely in jog mode.

#### Searching in jog mode

Press the JOG key, such that its indicator lights.

The unit enters jog mode. Subsequently, you can locate a desired point in units of WORD by rotating the search dial.

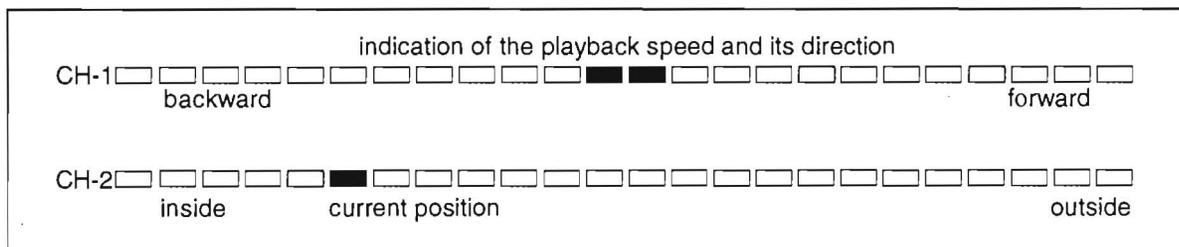
#### Releasing jog mode

Press the JOG key, such that its indicator goes out. Pressing any other disc transport key also releases jog mode.

#### Searching in shuttle mode

Press the SHUTTLE key, such that its indicator lights.

The unit enters shuttle mode. The disc is played back at a speed corresponding to the angle of rotation of the search dial. The unit displays the playback speed and current position on the disc in the level meter.



Indication of the current position on the disc

#### Releasing shuttle mode

Press the SHUTTLE key, such that its indicator goes out. Pressing any other disc transport key also releases shuttle mode.

#### Note

The time display or the time code output during JOG, SHUTTLE in EXT TC mode is generated from the absolute address. The time display or the time code output is indicated and is output automatically also in the parts where the time code is not recorded.

## 4-4. Searching in Normal Operation Mode

---

### 4-4-2. Searching for a Specified Address

You can locate a desired time code address by using the search dial or the 10 key unit.

---

#### Searching with the search dial

- 1 Press the → key.  
  
A flashing cursor appears at the seconds digit in the display window.
- 2 Press the ← or → key to move the cursor to the desired digit.
- 3 Rotate the search dial until the desired value appears.
- 4 Repeat steps 2 and 3 until you have set all the digits as required.
- 5 Press the LOCATE key.

The unit locates the designated address.

**Note**

When performing time code locate, there will sometimes be a 1 or 2 frames discrepancy between the PCM-9000 and an external time code reader. This is because the time code value is calculated from the absolute address of the DISC.

---

#### Searching with the 10 key unit

- 1 Press the → key.  
  
A flashing cursor appears at the seconds digit in the display window.
- 2 Press the CLR key.  
The displayed address is reset to "00H 00M 00S 00F".
- 3 Press the ← or → key to move the cursor to the desired digit.
- 4 Input the desired value by using the 10 key unit in order of Hours, Minutes, Seconds, and frames.
- 5 Press the LOCATE key.

The unit locates the designated address.

---

### 4-4-3. Searching with the Registered IDs

You can search by using the registered rec IDs, track IDs and mark points.

*For details of registering the begin/end points of tracks, see "5-2-1. Registering Tracks", and for details of modifying/deleting mark points, see "5-2-2. Modifying Tracks/Marks" or "5-2-3. Deleting Tracks/Marks".*

---

#### Registering mark point

- 1 Locate the point that you want to register as a mark point.
- 2 Press the ENABLE key, such that its indicator lights.
- 3 Press the MARK key.

The displayed time code address is stored as a mark point. Each mark point has a mark number, which is automatically assigned in order. You cannot assign a mark number arbitrarily. *For details of registering begin and end points, see "5-2-1. Registering Tracks".*

---

#### Recalling a mark, begin, or end point

- 1 While the ENABLE key indicator is not lit, press the MARK (BEGIN, END) key, such that its indicator lights.

The mark (begin, end) point number and the last displayed time code address appear in the display window.

- 2 Rotate the search dial until the desired mark (begin, end) number appears. Or input the desired number by using 10 key unit. The corresponding time code address appears in the display window.
- 3 After recalling a mark (begin,end) point, press the MARK (BEGIN,END) key, such that its key indicator goes out.

If you do not perform any operation for a few seconds, the display window also returns to its previous status.

## 4-4. Searching in Normal Operation Mode

---

### Locating a mark, begin, or end point

- 1 While the ENABLE key indicator is not lit, press the MARK (BEGIN, END) key, such that its indicator lights.
- 2 Rotate the search dial until the desired mark (begin, end) number appears. Or, input the desired number by using the 10 key unit. The corresponding time code address appears in the display window.
- 3 Press the LOCATE key.  
The LOCATE key lights, and the unit locates the designated address. After locating, the STOP key lights.

**Note**

To designate a single-digit number in step 2, enter "0" before you enter the desired number.

---

### Locating rec IDs

#### Locating the rec ID by designating a rec ID number

- 1 Press the ENABLE key, such that its indicator goes out.
- 2 Press the key, if the REC ID indicator is not lit at the entry ID indication area in the display window.  
  
The cursor flashes at the entry ID indication area.
- 3 Rotate the search dial until the desired rec ID number appears, or input the number by using the 10 key unit. The corresponding time code address appears.
- 4 Press the LOCATE key.  
The unit locates the time code address of the designated rec ID. If you designate rec ID number "00", the unit locates "00H 00M 00S 00F".

#### Locating the rec ID next/ previous to the current position

Press the **◀◀** or **▶▶** key while the ENABLE, BEGIN, END, and MARK keys are not lit.

- By pressing the **◀◀** key, the unit locates the previous recording in point
- By pressing the **▶▶** key, the unit locates the next recording in point

**Note**

**◀◀** or **▶▶** key are not accepted during locate.

#### 4-4-4. Locating a Recording End Point

You can locate a recording end point by using the automatically registered rec ID.

##### When recording ends

The following functions are possible if the locate key is pressed immediately after recording is stopped. See also the figure below.

##### Sync recording mode

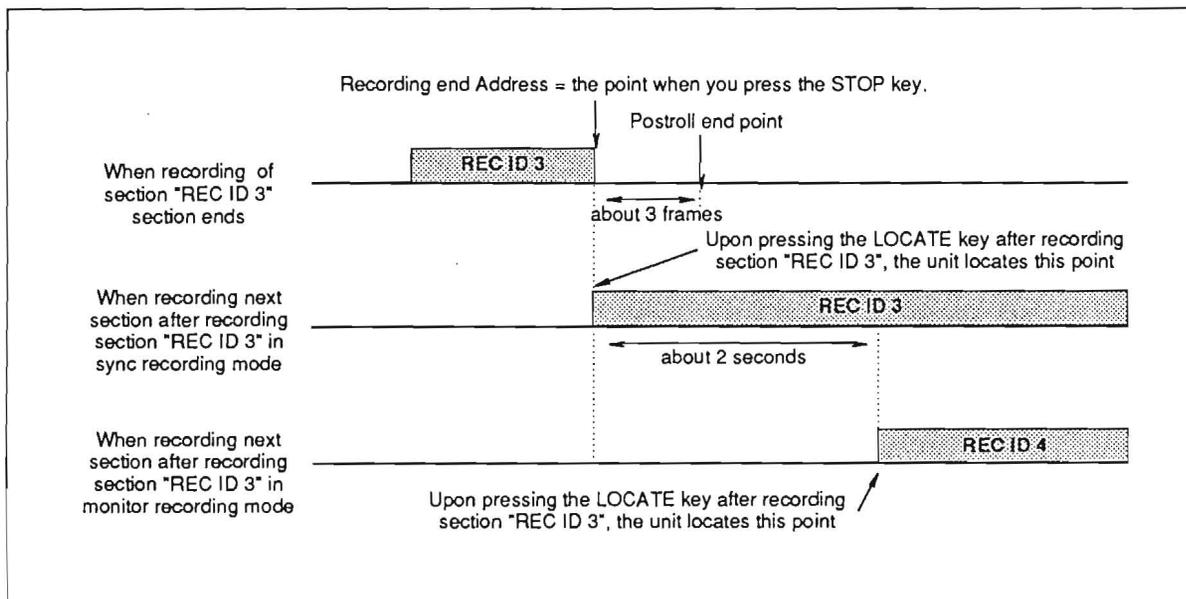
As the unit postrolls for 3 frames after you press the STOP key (recording ends), the displayed time code is advanced for 3 frames to the real recording end point. To locate the real recording end point, press the LOCATE key, such that the displayed time code address changes to the real recording end point.

If you then start sync recording, the PCM data of the newly recorded section will have continuity with the already recorded section. The rec ID is not registered with this recording.

##### Monitor recording mode

As the unit postrolls for 3 frames after pressing the STOP key (recording ends), the displayed time code is advanced for 3 frames to the real recording end point. When you press the LOCATE key in this status, the unit locates to a point the 2 seconds after real recording end point.

If you then start monitor recording, the PCM data of the newly recorded section will have no continuity with the already recorded section. The rec ID is registered with this recording.



## 4-4. Searching in Normal Operation Mode

---

### Locating the recording end point

#### Locating the final recording end point on the disc

Press the END SEARCH key.

The unit locates the point 2 seconds after the final recording end point (the rec ID whose address is the largest in AAIP), regardless of the recording mode selection.

# Chapter 5

## Program Editing

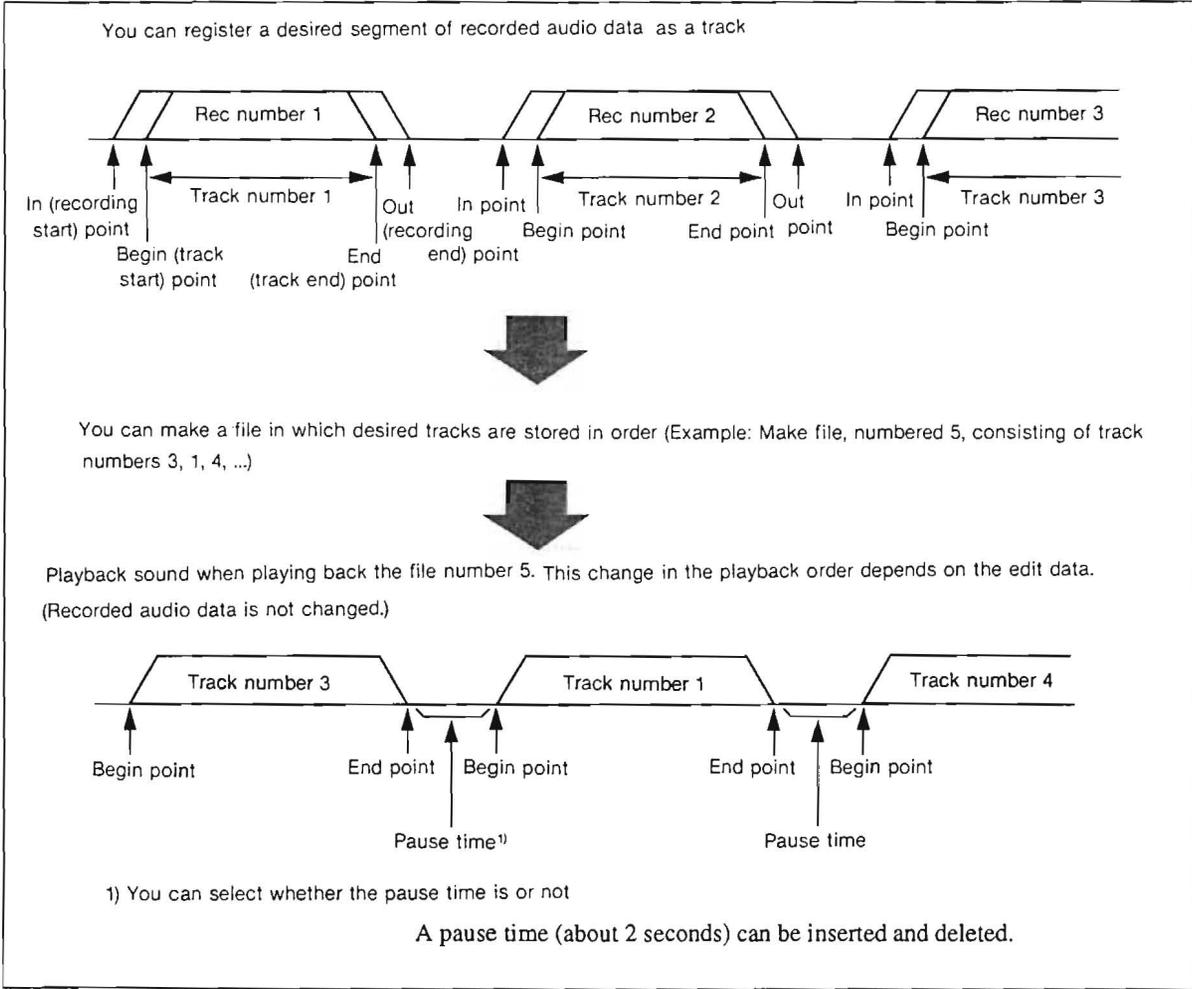
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This chapter explains the main function of the PCM-9000; program editing. The explanations of program editing include making tracks and files, saving edit data, copying files, and so on.

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# 5-1. What are Tracks and Files?

You can register a desired segment of audio data as a track by designating two points (the track begin and end points). A track is handled as a single unit in disc operation mode. You can also make a file in which tracks are stored in a desired order. Making tracks and files does not affect the audio data, because the registration data for tracks and files is recorded on the edit data recording area. You can also save or delete only this edit data.



## 5-2. Making Tracks

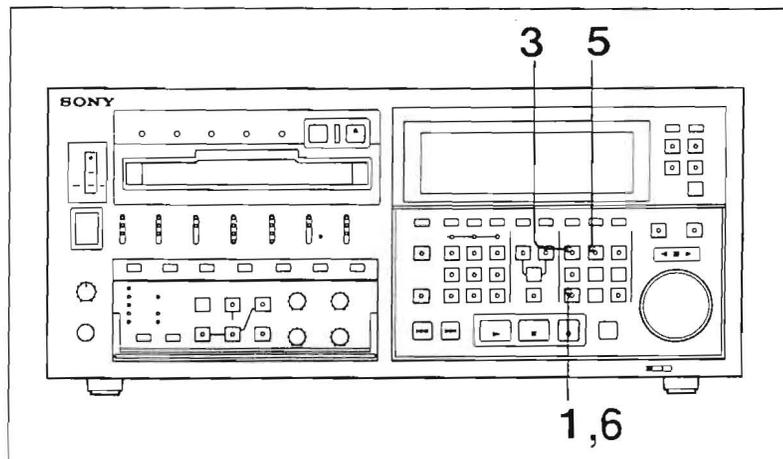
You can edit recorded audio data, while not affecting the recorded audio data itself, by using tracks and files. This section explains how to make tracks.

You can make tracks only in normal operation mode.

### 5-2-1. Registering Tracks

To register a track, you must register two points: a begin (track start) and an end (track end) point.

To register a track, follow the procedure below.



Registering tracks

#### Registering a track while monitoring the playback sound

- 1** Press the ENABLE key, such that its indicator lights.
- 2** Press the BEGIN key, such that its indicator lights.

The indicated time code address is registered as the begin point. The track number flashes in the entry ID indication area of the display window. Track numbers are assigned automatically.

- 3** Press the END key, such that its indicator lights.

The indicated time code address is registered as the end point. The "TRACK" and "END" indicators light and track number indication lights steadily.

- 4** Press the ENABLE key, such that key indicator goes out.

## 5-2. Making Tracks

---

### Registering a single point as both the end point of a track and the begin point of the next track

In Step 4, on the previous page, press the BEGIN key instead of the END key.

The time code address, indicated when the BEGIN key is pressed, is registered as the end point.

At the same time, the indicated time code address is registered as the begin point of the next track. The track number flashes.

*For details of modifying or deleting tracks, see "5-2-2. Modifying Tracks and Mark Points" and "5-2-3. Deleting Tracks and Mark Points".*

#### Notes

The track length must be longer than 2 seconds.

You cannot register a begin point before starting recording.

You cannot register an end point after stopping recording.

---

### Registering tracks by designating the time code address directly

While the ENABLE key is lit, follow the procedure below.

#### Designating the desired address by using jog/shuttle

- 1** Locate the desired address to be registered as the begin (or end) point.
- 2** Press the BEGIN (or END) key.  
The begin (or end) point is registered.  
Repeat steps 1 and 2 to register the corresponding end (or begin) point.
- 3** Press the ENABLE key, such that its key indicator goes out.

#### Designating the desired address by using the search dial

- 1** Press the → key, such that a flashing cursor appears at the seconds digit of the displayed current time code address.
- 2** Rotate the search dial until the desired value appears.
- 3** Press the ← or → key, to position the cursor to the digit you want to set.  
Repeat steps 2 and 3 until all the digits to be registered have been set.
- 4** Press the LOCATE key.

- 
- 5** Press the BEGIN (or END) key.  
The designated time code address is registered as the track begin (or end) point.  
Repeat steps 1 to 4 to register the corresponding end (or begin) point.
  - 6** Press the ENABLE key, such that its key indicator goes out.

#### Designating a desired address by using the 10 key unit

- 1** Press the → key to position the cursor to the digit of seconds digit of the displayed current time code address.
- 2** Input the desired value by using the 10 key unit.
- 3** Press the LOCATE key.
- 4** Press the BEGIN (or END) key.  
The designated time code address is registered as the track begin (or end) point.  
Repeat steps 1 to 4 to register the corresponding end (or begin) point.
- 5** Press the ENABLE key, such that key indicator goes out.

---

#### Recalling a registered begin/end point

You can recall and display a registered begin or end point time code address in the display window.

- 1** While the ENABLE key indicator is not lit, press the BEGIN or END key, such that its indicator lights.  
The most recently displayed track number and its time code address briefly appear in the display window.
- 2** Rotate the search dial, until the desired track number and begin or end point appear in the display window. Or, input the desired track number directly by using the 10 key unit.  
The designated track number and its time code address briefly appear in the display window.
- 3** Press the BEGIN (or END) key such that its indicator goes out.

#### Locating a recalled begin/end point

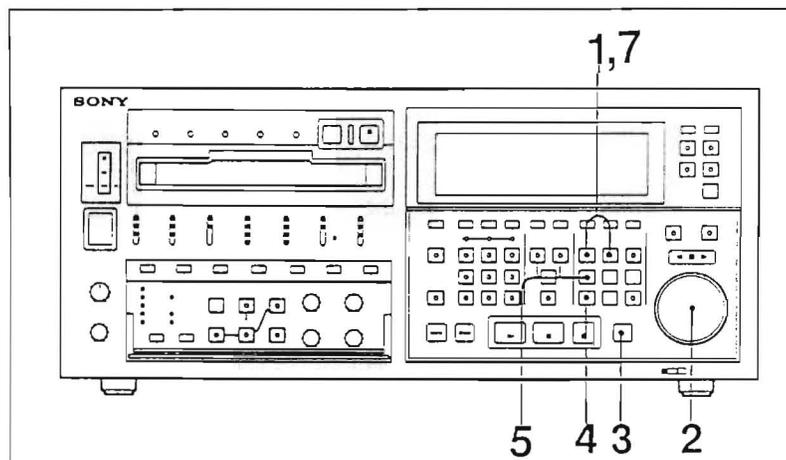
Press the LOCATE key while the track number appears in the display window.

The LOCATE key lights and the unit locates the displayed begin/end point time code address. After locating, the LOCATE key goes out.

## 5-2. Making Tracks

### 5-2-2. Modifying Tracks and Mark Points

You can modify a begin, end or mark point.



Modifying tracks

- 1** While the ENABLE key indicator is not lit, press the BEGIN, END or MARK key, such that its key indicator lights.
- 2** Rotate the search dial, such that the desired ID number and its time code address appear. Or, input the desired ID number directly by using the 10 key unit.
- 3** Press the LOCATE key.  
The LOCATE key lights and the unit locates the specified ID address.
- 4** Press the ENABLE key, such that its indicator lights.
- 5** Press the MODIFY key, such that its indicator lights.  
The MODIFY indicator appears in the display window, and the BEGIN, END or MARK key indicator flashes.  
To cancel modifying, press the ENABLE or MODIFY key, such that its indicator goes out.
- 6** Locate the desired time code address as a new ID address. Or, input the desired ID address directly by using the 10 key unit.
- 7** Press the BEGIN, END or MARK key.  
The begin, end or mark point is modified to the indicated time code address.

**Note**

When modifying both the begin and end point, note ensure that the modified begin point address is not subsequent to the end point address.

### 5-2-3. Deleting Tracks and Mark Points

You can delete registered tracks or mark points. Deleting a track or mark does not affect the audio data recorded on the disc.

**1** While the ENABLE key indicator is not lit, press the BEGIN, END or MARK key such that its indicator lights.

**2** Rotate the search dial, until the track or mark point number to be deleted appears. Or, input the track or mark point number directly by using the 10 key unit.

**3** Press the ENABLE key, such that its indicator lights.

The BEGIN, END or MARK key indicator flashes.

**4** Press the DELETE key.

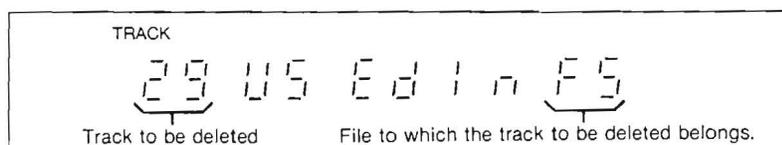
“DELETE” appears in the display window.

**5** To delete the track or mark point, press the BEGIN, END or MARK key.

The designated track is deleted.

#### Note

When the track to be deleted is registered as part of a file, the following appears in the display window.



To delete the track, press the DELETE key again. The track is deleted. Otherwise, press the ENABLE key, such that its indicator goes out.

## 5-2. Making Tracks

---

### 5-2-4. Renumbering Tracks and Mark Points

As track or mark numbers are assigned automatically, you cannot assign an arbitrary number to a track or mark point. You can, however, renumber all the tracks or marks recorded on a disc, in the order of their AAIP addresses.

- 1** While the ENABLE key indicator is not lit, press the BEGIN, END or MARK key, such that its indicator lights.
- 2** Press the ENABLE key, such that its indicator lights. The BEGIN, END or MARK key indicator flashes.
- 3** Press the RENUMBER key. "RENO" appears in the display window.
- 4** Press the BEGIN, END or MARK key.

All tracks or marks are renumbered, in the order of their AAIP addresses from 1. If some of the tracks to be renumbered are registered in files, the track numbers of those files are also renumbered accordingly.

### 5-2-5. Playing Back in Disc Operation Mode

The PCM-9000 supports a variety of playback options in disc operation mode. This mode is specifically for playback. Press the OPR MODE key, such that the DISC indicator appears in the display window. While the unit is in disc operation mode, the BEGIN key indicator lights automatically, and the unit enters track playback mode.

When the unit enters disc operation mode, the unit recalls the smallest numbered track and locates its begin point time code address.

---

#### Track begin point playback

- 1** Press the OPR MODE key, such that the DISC indicator appears in the display window.
- 2** Press the BEGIN key, such that its indicator lights.
- 3** Rotate the search dial, until the desired track number appears. Or, input the desired track number directly by using the 10 key unit.
- 4** Press the LOCATE key. The unit locates the designated track begin point.
- 5** Press the PLAY key. Playback starts. After playing back the specified track, the unit automatically locates the same track begin point, then stops.

---

### Track end point playback

- 1** Press the OPR MODE key, such that the DISC indicator appears in the display window.
- 2** Press the END key, such that its indicator lights.
- 3** Rotate the search dial, until the desired track number appears. Or, input the desired track number directly by using the 10 key unit.
- 4** Press the LOCATE key.  
The unit locates the point 8 seconds ahead of the designated track end point address.
- 5** Press the PLAY key.  
Playback starts. After playing back the specified track, the unit automatically locates the point 8 seconds ahead of the same track end point address as that now being played back, then stops.

---

### Track mark point playback

- 1** Press the OPR MODE key, such that the DISC indicator appears in the display window.
- 2** Press the BEGIN or END key, such that its indicator lights.
- 3** Rotate the search dial, until the desired track number appears. Or, input the desired track number directly by using the 10 key unit.
- 4** Press the LOCATE key.
- 5** Press the MARK key.
- 6** Rotate the search dial, until the desired mark number appears. Or, input the desired mark number directly by using the 10 key unit.  
You can specify a mark point within the track specified in step 3.
- 7** Press the LOCATE key.  
The unit locates the specified mark point address.
- 8** Press the PLAY key.  
Playback starts. After playing back from the mark point to the track end point, the unit automatically locates the same mark point address, then stops.

## 5-2. Making Tracks

---

### Operation of the ◀◀ (previous) and ▶▶ (next) keys in disc operation mode

In disc operation mode, the operation of the ◀◀ and ▶▶ keys differs from that in normal operation mode.

#### During begin point recall condition (BEGIN LED Lights)

- Upon pressing the ◀◀ key, the unit locates the same track begin point, then starts playback.
- Upon pressing the ▶▶ key, the unit locates the next track begin point, then starts playback.

#### During end point recall condition (END LED Lights)

- Upon pressing the ◀◀ key, the unit locates the point 8 seconds ahead of the same track end point, then starts playback.
- Upon pressing the ▶▶ key, the unit locates the point 8 seconds ahead of the next track end point, then starts playback.

#### During mark point recall condition (MARK LED Lights)

- Upon pressing the ◀◀ key, the unit locates the previous mark point, then starts playback.
- Upon pressing the ▶▶ key, the unit locates the next mark point, then starts playback.

When using the ◀◀ and ▶▶ keys during track mark point playback, “previous” and “next” simply means that the mark point exists at a previous or subsequent in AAIP time code.

#### Note

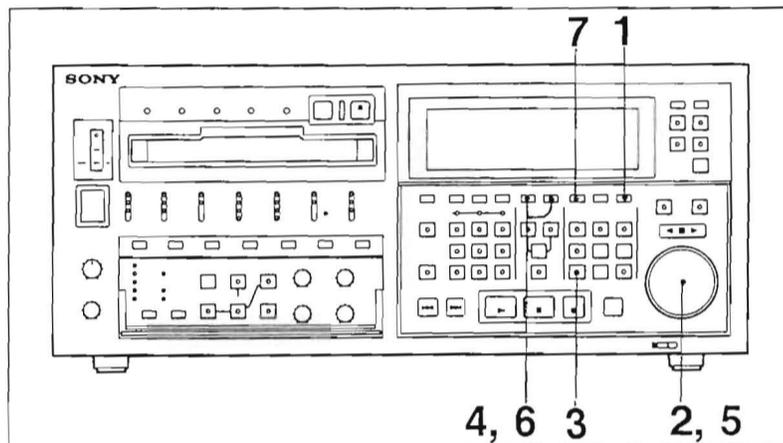
Key input is inhibited while the unit is locating.

## 5-3. Making Files

By using tracks and files, you can edit recorded audio data without affecting the recorded audio data itself. This section explains how to make and delete files.

### 5-3-1. Making a File

#### Registering a file



Registering a file

- 1** Press the OPR MODE key, such that the FILE indicator appears in the display window.

File number 1 appears in the entry ID indication area, and the tracks registered as the contents of the corresponding file and the total number of tracks appear in the display window. If no tracks are registered for the displayed file, no track numbers are displayed.

- 2** Rotate the search dial until the desired file number appears, or input the desired file number directly by using the 10 key unit.
- 3** Press the ENABLE key, such that its indicator lights.
- 4** Press the ← or → key to position the cursor to the current display area.
- 5** Rotate the search dial until the desired track number appears, or input the value directly by using the 10 key unit.

(Continued)

## 5-3. Making Files

---

**6** Press the → key to position the cursor to the next track number. To correct a previously set track number, press the ← key to position the cursor to the track number to be corrected. Repeat steps 5 and 6 until you have designated all the track numbers to be registered.

**7** Press the SET key.

The designated file is registered as a new file with registered tracks.

### Notes

- The total time of a file cannot exceed 24 hours.
- If you press the SET UP key or disc transport control key (PLAY, LOCATE key etc.) before pressing the SET key, the ENABLE key indicator goes out and the registered file contents are cleared.

---

### Copying a file to another file with a different file number

You can copy a file to another file having a different file number.

**1** Recall the file to be copied.

*For details, see "5-3-1. Registering a File" .*

**2** Press the ENABLE key, such that its indicator lights.

**3** Press the ← or → key, to position the cursor to the file number indication.

**4** Rotate the search dial until the desired file number appears. Or, input the value directly by using the 10 key unit.

**5** Press the SET key.

The file is copied to a file having the designated file number. The contents of the original file remain as is.

If the specified file number is already in use, the contents of the file are re-registered to the new one.

### Note

If you press the SET UP key or a disc transport control key (PLAY, LOCATE key etc.) before pressing the SET key, the ENABLE key indicator goes out and copying is canceled.

---

## Modifying a file

The following types of file modification are supported.

- Changing a track in a file.
- Deleting a track or a pause from a file.
- Inserting a track or a pause into a file.

To modify a file, follow the procedure below:

- 1** Recall the file to be modified.  
*For details, see "5-3-1. Registering a File" .*
- 2** Press the ENABLE key, such that its indicator lights.
- 3** **To change a track number**
  - (1) Press the ← or → key to position the cursor to the track number that you want to change.
  - (2) By rotating the search dial, or by using the 10 key unit, input a value for the new track number.

**To delete a track or pause**

- (1) Press the ← or → key to position the cursor to the track number or pause you want to delete.
- (2) Press the DELETE key.

**To insert a pause (2 seconds)**

- (1) Press the ← or → key to position the cursor to the point (between two tracks) where you want to insert a pause.
- (2) Press the INSERT key.  
"-" appears at the designated point.

**To insert a track**

- (1) Press the ← or → key to position the cursor to the point where you want to insert a new track.
- (2) Press the INSERT key.  
The smallest track number of all the registered tracks appears at the designated point. All the previously displayed tracks move to the right.
- (3) By rotating the search dial, or by using the 10 key unit, input a value for the new track number.

- 4** Press the SET key.

The modified file is registered.

*(Continued)*

## 5-3. Making Files

### To cancel inserting/deleting of a track or pause

Before pressing the SET key in step 4 above, press the ENABLE key, such that its indicator goes out.

#### Notes

- You cannot insert a pause where a pause already exists.
- When you have not registered a pause in a file, the no break playback between tracks can be performed by 5 ms-cross fade (linear).
- If you press the SET UP key or a disc transport control key (PLAY, LOCATE key etc.) before pressing the SET key, the ENABLE key indicator goes out and file modifying is canceled.

### 5-3-2. Deleting a File

You can delete a registered file.  
To delete a file, follow the procedure below.

- 1** Press the OPR MODE key, such that the FILE indicator appears in the display window.  
File number 1 appears in the entry ID indication area, and the tracks registered as the contents of the corresponding file, as well as the total number of tracks in the file, appear in the display window.
- 2** Rotate the search dial until the file number corresponding to the file to be deleted appears. Or, input the number directly by using the 10 key unit.
- 3** Press the ENABLE key, such that its indicator lights.
- 4** Press the DELETE key.
- 5** Press the SET key.

The designated file is deleted.

#### Note

If you press the SET UP key or a disc transport control key (PLAY, LOCATE key etc.) before pressing the SET key, the ENABLE key indicator goes out and deleting is canceled.

## 5-4. Playing Back a File

This section explains how to play back a registered file. You can also execute repeat playback and variable speed playback during file playback.

---

### Playing back a file

- 1 Press the OPR MODE key, such that the FILE indicator appears in the display window.

File number 1 appears in the entry ID indication area, and the tracks registered as the contents of the corresponding file, as well as the total number of tracks, appear in the display window.

- 2 Rotate the search dial until the playback file number appears, or input the number directly by using the 10 key unit.
- 3 Press the PLAY key.

File playback starts.

---

### Playing back a specified track

- 1 Press the OPR MODE key, such that the FILE indicator appears in the display window.
- 2 Rotate the search dial until the playback file number appears, or input the number directly by using the 10 key unit.
- 3 Press the → key, to position the cursor to the track number from which file playback is to start.

The unit automatically locates the specified track begin point.

- 4 Press the PLAY key.

Playback starts from the specified track, in the registered file order.

## 5-4. Playing Back a File

---

### Function of the I◀◀ (previous) and ▶▶I (next) keys during file playback

In file operation mode, the I◀◀ and ▶▶I keys function in basically the same way as in disc operation mode.

Although you can locate or specify any registered track in disc operation mode, you can locate or specify any track in a specified file in file operation mode.

When you press the I◀◀ key while playing back a track in disc operation mode, the unit locates the begin point of the track that is being played back. In file operation mode, the unit locates the begin point of the previous track.

### Function of the cursor keys during file playback

When the unit enters file operation mode, the cursor is positioned to the entry ID indication area. Once file playback starts, the cursor moves to the corresponding playback tracks.

#### To move the cursor to the entry ID display area

- 1 Hold down the ← key until the cursor is positioned to the first track indication of the file.
- 2 Release the ← key, then press the ← key again.

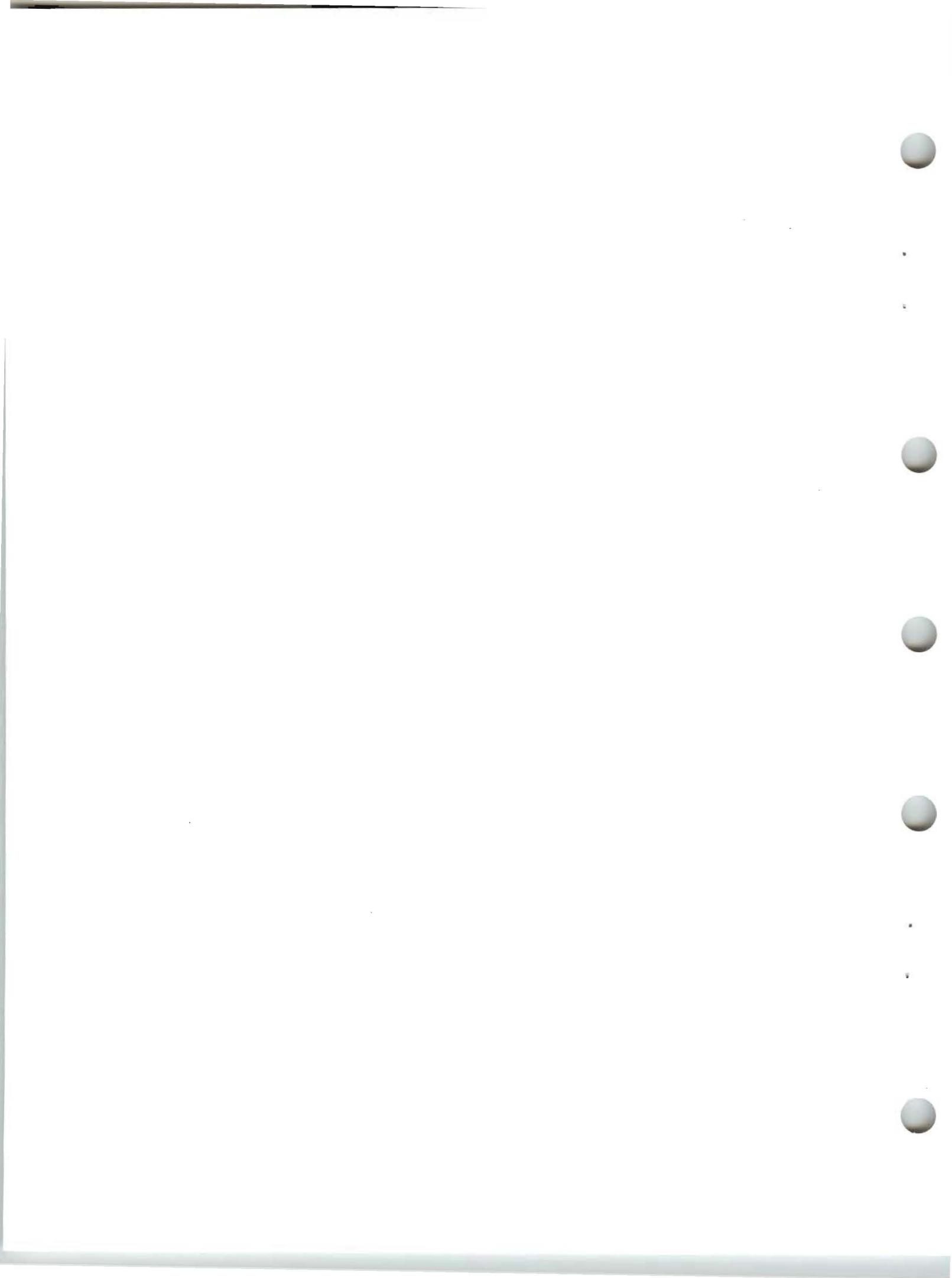
The cursor moves to the entry ID indication area.

### Function of the jog/shuttle function during file playback

While playing back a file, you can apply the jog and shuttle function only to the track that is being played back. To apply the jog or shuttle function to other tracks, cancel jog or shuttle operation by pressing the STOP key, then press the ← or → key to position the cursor to the desired track. You can then apply the jog and shuttle function to that track.

When you press the JOG or SHUTTLE key during pause, the unit locates the next track and enters jog or shuttle mode.





# Chapter 6

## Time Code Chase

---

This chapter explains the time code chase function. An overview, as well as details of setting and executing are given. To execute time code chase, the optional DABK-9003 Interface Board must be installed.

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## 6-1. Overview of Time Code Chase

The time code chase function is a synchronization function whereby a fixed sync offset is maintained between the playback time code and an external time code. To execute time code chase, the optional DABK-9003 Interface Board must be installed.

### Chase mode

During time code chase, the unit is locked to the external time code in units of  $\pm 1$  sub-frame (1/100 frame). Both the AAIP time code and recorded external time code can be used for time code chase.

This function has the following two modes. Address mode accept INT (internal) or VIDEO as the external synchronization. Free mode accept INT (internal), EXT (external word sync), DI (AES/EBU signal), or VIDEO.

#### Note

Cancel the regeneration of the time code when executing the time code chase in EXT TC mode.

### Address mode

After initial synchronization with an external time code is achieved, if the discrepancy between the external time code and the playback time code exceeds a predetermined amount, the signals are re-synchronized, such that synchronization with the external time code is maintained throughout the operation.

- This mode should be used when an external time code can be supplied continuously and with no defects or errors. If there is any deviation in the time code frequency (standard is 0.5~1%), you can chase using slow resync.
- This mode has three operation windows, used to specify the error range, beyond which re-synchronization is performed, the maximum variation range vari-speed playback with synchronization, and so on. *For details, see "6-2-2. Time Code Chase Operation Windows".*

### Free mode

After initial synchronization with the external time code is achieved, time code chase terminates. The unit returns to normal playback synchronizing with the reference signal.

This mode should be used when the external time code is prone to discontinuities or errors.

For example, when synchronizing the slave and master units to an external reference video signal and executing time code chase in free mode, once the slave unit and master unit time codes have been synchronized, even if the master unit time code contains discontinuities, synchronization is maintained by the reference video signal.

These two modes provide different functions, as listed in the following table.

Differences between address and free modes

Function	Address mode	Free mode
Lock window, display window and re-sync window settings <sup>a)</sup>	Yes	No
Re-synchronization	Yes	No
Slow re-sync operation <sup>a)</sup>	Yes	No
Variation of the time offset during time code chase operation	Yes	Yes
Variation of the time offset after time code synchronization	Yes	No
Chasing a time code signal that is not synchronized with a video signal	Yes <sup>c)</sup>	No
Synchronization with an external time code signal when you select EXT with the SYNC CLOCK key	No	Yes <sup>b)</sup>

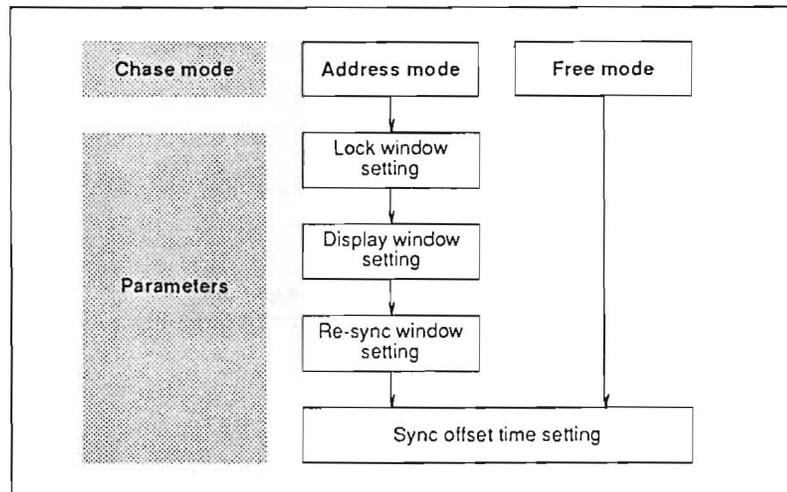
a) For details, see "6-2-2. Time Code Chase Operation Windows".

b) After synchronizing with an external time code, the slave unit is synchronized with the word sync signal supplied from the master unit.

c) Synchronization can be achieved using the slow resync function.

## 6-2. Setting for Time Code Chase

Before executing time code chase, you must set the necessary parameters with the setting window. To enter each of the setting menus, press the SETUP key to display the corresponding menu. By repeatedly pressing the SETUP key, the setting menu cycles as follows: Normal indication → Chase mode setting menu → Lock window setting menu → Display window setting menu → Re-sync window setting menu → Sync offset time setting menu → Offset error indication → Normal indication



### 6-2-1. Selecting Chase Mode

- 1 Press the SETUP key, such that the chase mode setting menu appears in the display window.
- 2 Rotate the search dial, until the desired chase mode ("ADDRESS" or "FREE") appears.
- 3 Press the SET key.  
The designated mode is set as the chase mode.

### 6-2-2. Time Code Chase Operation Windows

#### What are time code chase operation windows ?

In address mode, time code chase is based on three operation windows, used to specify the error range, beyond which re-synchronization is executed, the variation range for variable speed playback synchronizing with a reference video signal, and so on. You can set each of three time code chase operation windows at any point during the operation. Note that, although you can set these windows in free mode, the settings so made have no effect. These settings are not saved by the memory back-up function.

---

### Lock window

If the discrepancy between the playback time code and the external time code exceeds the setting made with this window, re-synchronization begins.

Setting range: 1 to 99 subframes

Default setting: 1 subframe

### Display window

If the discrepancy between the playback time code and the external time code exceeds the setting made with this window, the PLAY key flashes to alert you that the unit is re-synchronizing.

You cannot set the display window value that is smaller than the value set for the lock window value.

Setting range: 1 to 99 subframes

Default setting: 2 subframes

### Re-sync window

This window setting determines the range of variation in the playback speed for variable speed playback during re-synchronization.

Setting range: 0.2% to 12.5% (in 0.1% units)

Default setting: 12.5%

- **When the window setting is narrow:** Re-synchronization varies the playback speed only slightly during vari-sync playback. This requires a greater time to achieve synchronization, but any variation in the pitch are not so apparent. This technique is referred to as slow re-sync. This setting should be used when using an analog tape recorder as the master unit.
- **When the window setting is wide:** Re-synchronization applies wide variations in the playback speed for vari-sync playback. This reduces the time required to achieve synchronization, but the variations in the pitch may be noticeable.  
This setting should be used to chase variable speed playback when using a digital tape recorder as the master unit.

---

## Setting lock/display/re-sync window

- 1** Press the SETUP key, such that the lock, display or re-sync window setting menu ("LOCK", "DISPLAY", or "RE-SYNC") appears in the display window.
- 2** Rotate the search dial until the desired window value appears, or input the value directly by using the 10 key unit.
- 3** Press the SET key.  
The designated value is registered as the lock, display or re-sync window value. The lock/display/re-sync window value indication appears.

### Recalling the lock/display/re-sync window value

Press the SETUP key, such that the lock/display/re-sync window setting menu appears in the display window.

## 6-2. Setting for Time Code Chase

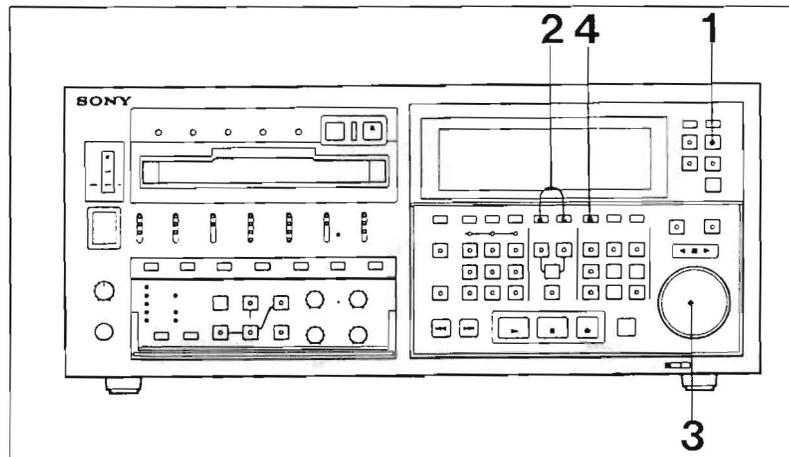
### 6-2-3. Setting the Sync Offset Time

The sync offset time value, which is the difference between the external time code and the time code of the PCM-9000, must be set before executing time code chase.

There are two ways of setting the sync-offset time, as follows:

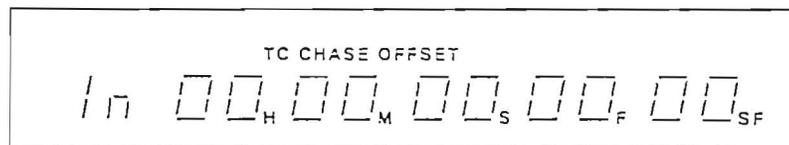
- Setting a desired value as the sync offset time
- Automatically setting the difference between the external input time code and the internal time code as the sync offset time

#### Setting a desired value as the sync offset time



Setting a desired value as the sync offset time

- 1** Press the SETUP key, such that the sync offset time setting menu appears in the display window.



- 2** Press the ← or the → key to position the cursor to the digit you want to set.

As the cursor moves, the digit to which the cursor is positioned flashes.

The cursor can be positioned to the hours, minutes, seconds and frames digit by pressing the ← or → key.

- 3** Rotate the search dial, until that the desired sync offset time appears, or input the value directly by using the 10 key unit.

- 4** Press the SET key.

The sync offset time is registered.

**Note**

In place of steps 3 and 4, you can also hold down the SET key and rotate and rotate the search dial.

---

**Setting the difference between the external input time code and internal time code as the sync offset time**

- 1** Press the SETUP key, such that the sync offset time setting menu appears in the display window.
- 2** Press the ← or → key, to position the cursor to the "In" indication in the entry ID indication area of the display window.

The time code value (the sync offset time), that is the difference between the external input time code and the internal time code, flashes.

- 3** Press the SET key.

The sync offset time is registered, and the value instead lights steadily.

**Recalling the sync offset time**

Press the SETUP key, such that the sync offset time setting menu appears.

---

**6-2-4. Setting the Mode and Parameters**

Before executing time code chase, you must select the reference signal, time code format, and so on.

According to the external input signal, set the following:

- Time code format: TC FORMAT key
- Generator mode: GEN MODE key
- Reference signal: SYNC CLOCK key

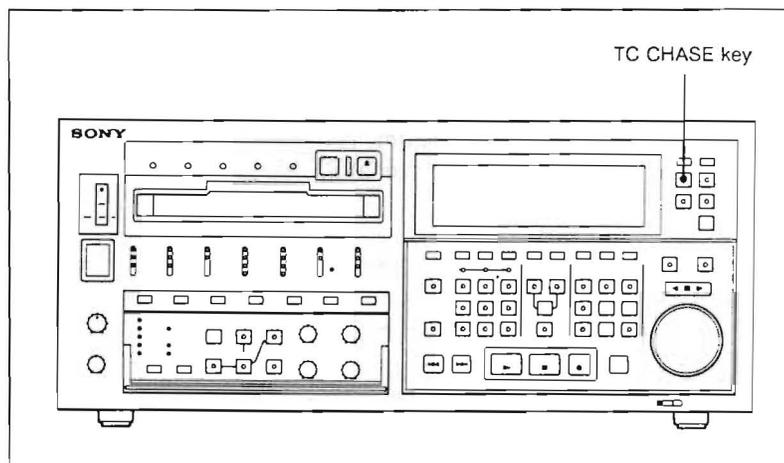
*For details of making these settings, see "Chapter 2 Location and Functions of Parts and Controls".*

## 6-3. Executing Time Code Chase

Before executing time code chase, set the chase mode and parameters.  
See "6-2. Setting for Time Code Chase".

### 6-3-1. Playback with Time Code Chase

To execute playback with time code chase, follow the procedure below.



Executing time code chase

- 1 Start playback on the external master machine, or input the external time code signal to the PCM-9000.
- 2 Check that the slave PCM-9000 is stationary, then press the TC CHASE key such that its indicator lights.

Time code chase is executed, and the unit of disc time indication changes from frames to sub-frames.

Once synchronization has been established, the TC CHASE indicator lights in the display window.

#### Note

All disc transport keys, except for STOP, PLAY and REC are disabled during time code chase.

#### Canceling time code chase

Press the TC CHASE key, such that its indicator goes out. Or, press the STOP key.

The disc transport stops, the TC CHASE indicator in the display window disappears, and the STOP key lights.

The minimum unit of disc time indication changes to frames.

### Pausing time code chase (in address mode)

Stop playback or recording from the master machine, or stop inputting the time code to the PCM-9000.

When the master machine stops, the slave machine (PCM-9000) also stops.

### Confirming the offset error

Press the SETUP key, such that the offset error indication appears in the display window. The unit of disc time indication changes to sub-frames.

#### Notes

- The PLAY lamp of the PCM-9000 will turn on and off. When an offset error is in effect.
- Cancel the regeneration of the time code during EXT TC mode.

## 6-3-2. Recording with Time Code Chase

To record the external source signal with time code chase, follow the procedure below.

### Address mode

- 1** Start playback on the external master machine, or input the external time code signal to the PCM-9000.
- 2** Check that the slave PCM-9000 is stationary, then press the TC CHASE key such that its indicator lights.

Time code chase is executed, and the unit of disc time indication changes from frames to sub-frames.

Once synchronization has been established, the TC CHASE indicator lights in the display window.

- 3** While holding down the REC key, press the PLAY key.

Recording starts, with each unit synchronized with the external time code.

If you press the FF, REW or STOP key on the master machine during recording, recording is canceled, and the unit starts locating. Once the unit has established synchronization with the external time code, the unit starts playback with time code chase.

### Canceling recording without pausing time code chase

Press the PLAY key while recording with time code chase.

Recording ends, and the unit starts normal playback.

If you press the STOP key, TC CHASE recording and the chasing is canceled, and TC CHASE key and TC CHASE indicator on the display window turns off.

## 6-3. Executing Time Code Chase

---

### Notes

- Chase recording in Address mode is possible only when REC mode is SYNC REC MODE.
- When the lock releases during chase recording, the recording is canceled.

### Free mode

- 1** Start playback on the external master machine, or input external time code signal to the PCM-9000.
- 2** Check that the slave PCM-9000 is stationary, then press the TC CHASE key such that its indicator lights. TC CHASE indicator lights in the display window.
- 3** Time code chase is executed, and PLAY key flashes on and off. Once synchronization has been established, the PLAY key lights on steady. TC CHASE and TC CHASE indicator turns off.
- 4** While the PLAY key is lit, press PLAY key and REC key.
- 5** Executing the Recording with Time code chase. Even if you press the FF, REW or STOP key on the master machine during recording, this unit continues the recording.

# Chapter 7

## Optimum Use of a Disc

---

The PCM-9000 provides some disc utility functions. The disc check function, which can check whether there is anything wrong with a disc, and an instant/full erasing function are supported. This chapter explains these functions.

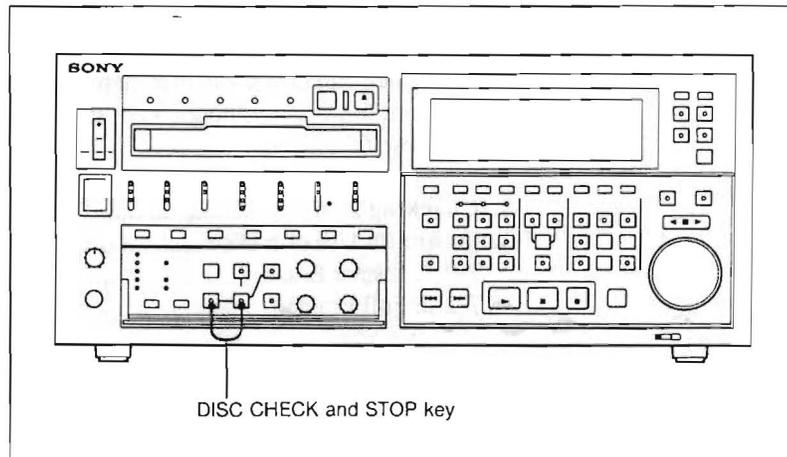
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<b>7-2. Optimum Use of a Disc .....</b>	<b>7- 4</b>
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7-2-2. Full Erasing .....	7- 5

## 7-1. Checking a Disc

Dust and stains may accumulate on discs after they have been used for a long period of time. To avoid data read/write errors, the PCM-9000 supports a disc check function which verifies the condition of the disc. You can check not only the audio data area, but also the edit data area of the disc by using this function.

### Checking a disc

To check a disc, follow the procedure below.



- 1 Press the OPR MODE key, such that the NORMAL indicator appears in the display window.
- 2 Simultaneously press the DISC CHECK key and STOP key on the PCM-9000 while the unit is stationary.

The DISC CHECK key lights steadily, and checking starts. "D-ch ON" appears in the display window.

Once the check has been completed, the DISC CHECK key goes out. If the disc is normal, "GOOD" appears. If there is something wrong with the disc, "NEED CLEAN" appears. See the next paragraph "When a disc error is detected".

#### Note

All keys, other than the STOP and EJECT keys, are disabled during disc checking.

#### Canceling disc checking

Press the STOP key.

Disc checking is canceled. To restart disc checking, repeat the procedure from the beginning.

---

### When a disc error is detected

If an error is detected as a result of checking a disc, clean the disc. If, after cleaning the disc, the error is still detected, clean the lens of the PCM-9000.

*For details of cleaning a disc, see "3-4-5. Cleaning a disc"*

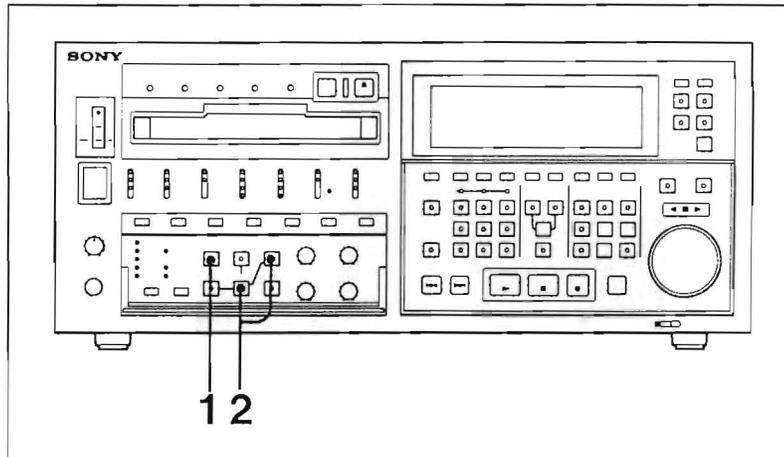
*For details of cleaning the PCM-9000's lens, refer to the maintenance manual.*

Check the disc again after cleaning the lens. If an error is still reported, discard the disc.

## 7-2. Optimum Use of a Disc

### 7-2-1. Instant Erasing

By deleting the rec ID data recorded on the disc, you can overwrite existing data with new audio and edit data. This function enables the re-use of a previously recorded disc. Note that once you apply this function, the unit cannot read the data recorded on that disc.



- 1** Press the OPR MODE key, such that the NORMAL indicator appears in the display window.
- 2** Press the REC READY key on the PCM-9000, such that its indicator lights.
- 3** Press the INSTANT ERASE key and the STOP key on the PCM-9000, while the unit is stationary.

"ERASE ON" appears in the display window, and deleting starts. After deleting, the INSTANT ERASE key indicator goes out.

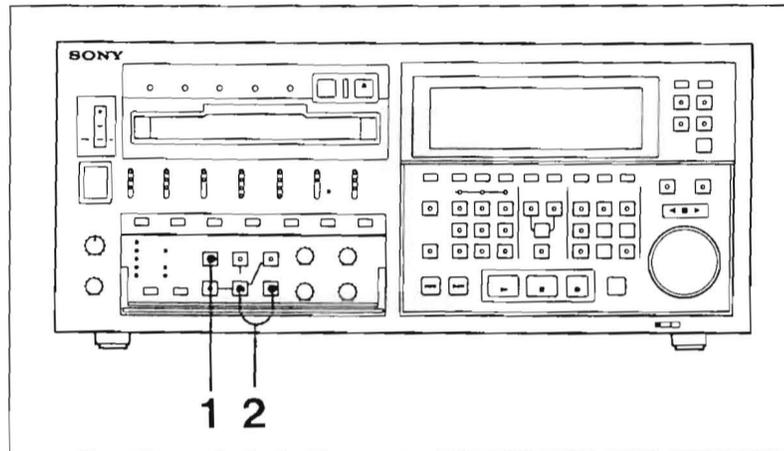
#### Note

Instant erasing takes less than one minute. You can cancel erasing by pressing the STOP key.

If you insert a disc for which erasing has not been completed, "NEED ERASE" appears in the display window. In this case, complete the erasing procedure by repeating the steps described above.

## 7-2-2. Full Erasing

You can initialize a previously used disc by deleting all data on that disc.



- 1** Press the OPR MODE key, such that the NORMAL indicator appears in the display window.
- 2** Press the REC READY key on the PCM-9000, such that its indicator lights.
- 3** Press the DISC ERASE key and the STOP key on the PCM-9000, while the unit is stationary.

"ERASE ON" appears in the display window, and deleting starts.

It takes about 20 minutes to delete all the data on a disc.

Once deleting has been completed, the DISC ERASE key indicator goes out.

### Canceling deleting

Press the STOP key.

Deleting is canceled.

#### Note

If you insert a disc for which erasing has not been completed, "NEED ERASE" appears in the display window. In this case, complete the erasing procedure by repeating the steps described above or on the previous page.



# Chapter 8

## Advanced System Configurations

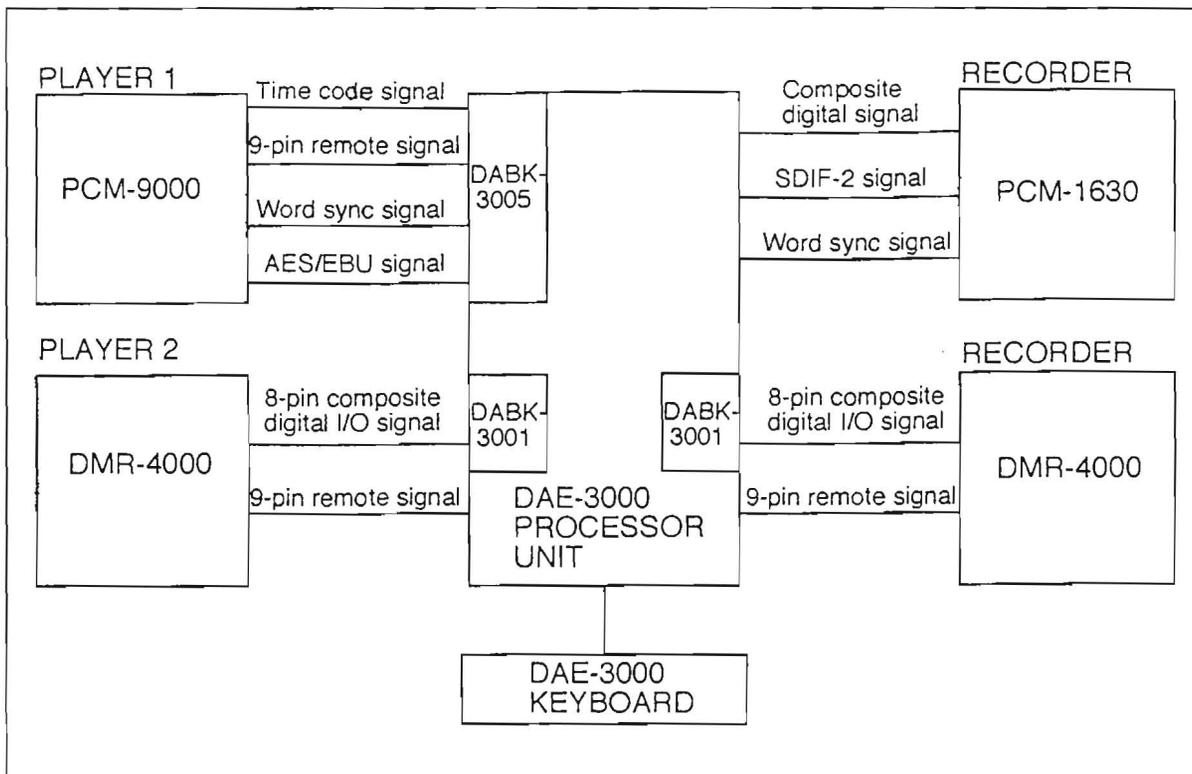
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This chapter explains the configuration of advanced systems. You can use this chapter as a system configuration reference.

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## 8-1. Editing System with DAE-3000

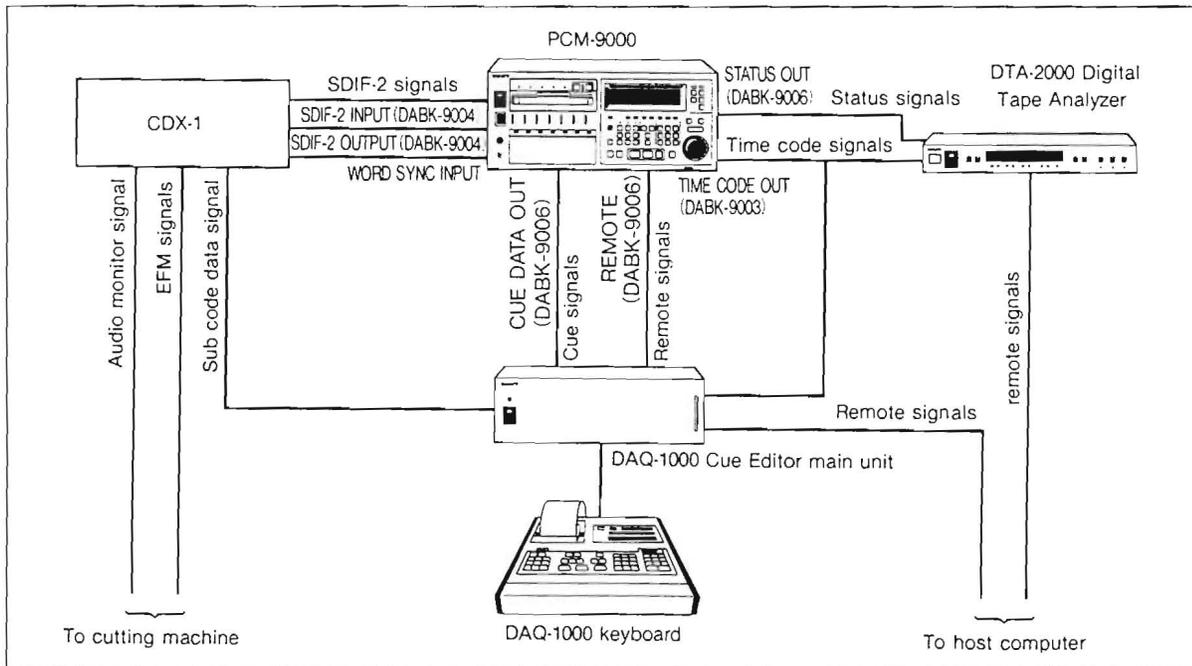
The figure below shows an example system controlled by the DAE-3000 Digital Audio Editor, using the PCM-9000 as the player.



Example system using the DAE-3000 as a controller

## 8-2. CD Cutting System

The figure below shows an example CD cutting system that uses the PCM-9000 as the master recorder.



Example CD cutting system

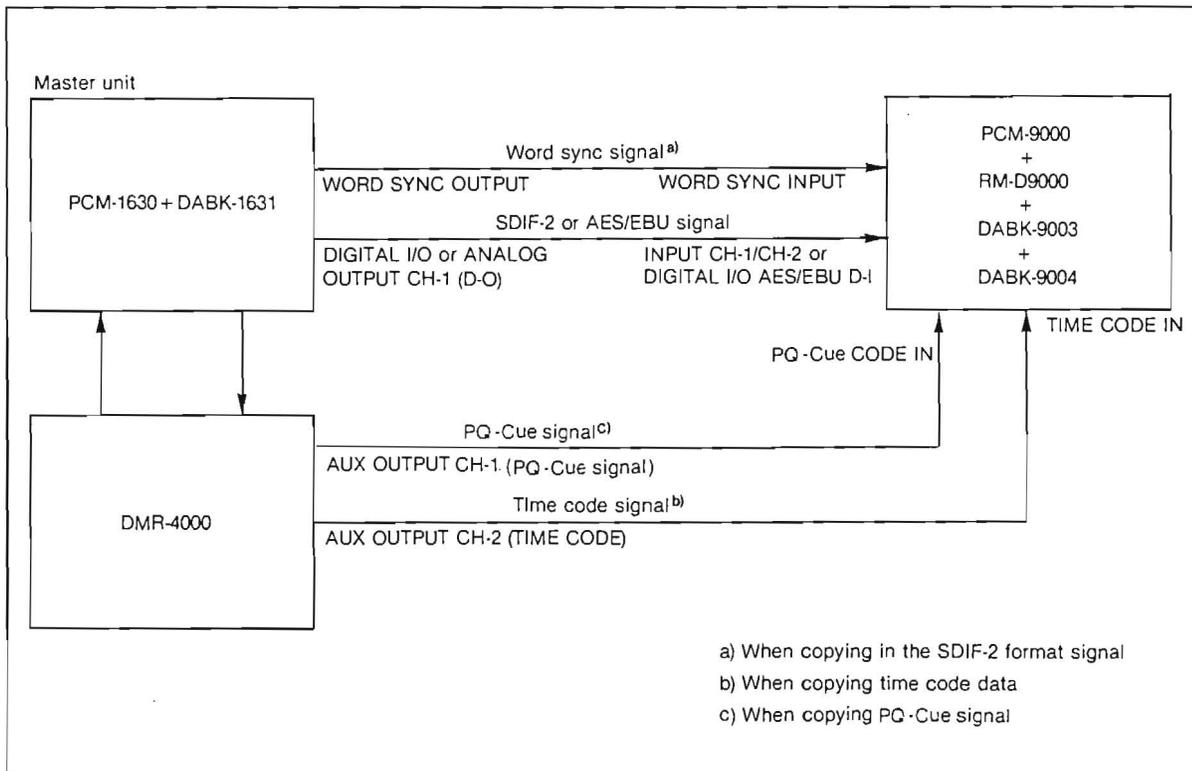
## 8-3. Digital Copying between PCM-9000 and PCM-1630 System

The PCM-1630 system consists of the following equipment:

- PCM-1630 Digital Audio Processor
- DMR-4000 Digital Master Recorder
- DABK-1631 Digital I/O Option

### Digital copying from the PCM-1630 system to the PCM-9000

You can make a CD master disc by copying a master tape from the DMR-4000 to the PCM-9000.



### Notes on copying from the PCM-1630 system to the PCM-9000

Set the following values:

- Sampling frequency for system: 44.1 kHz
- Time code format for system: 30 (frame/s)
- TIME CODE of the PCM-9000: EXT TC
- GEN MODE of the PCM-9000: REGEN
- DABK-9006: Switch ON only the DIP SW (S102) No. 3 on IF-438 board, or short pins 21 & 36 of the REMOTE connector on the panel of DABK-9006.

### When copying the AES/EBU-format signal

- SYNC CLOCK of the PCM-9000: D-I
- DIP switch 8 on the PCM-9000: I

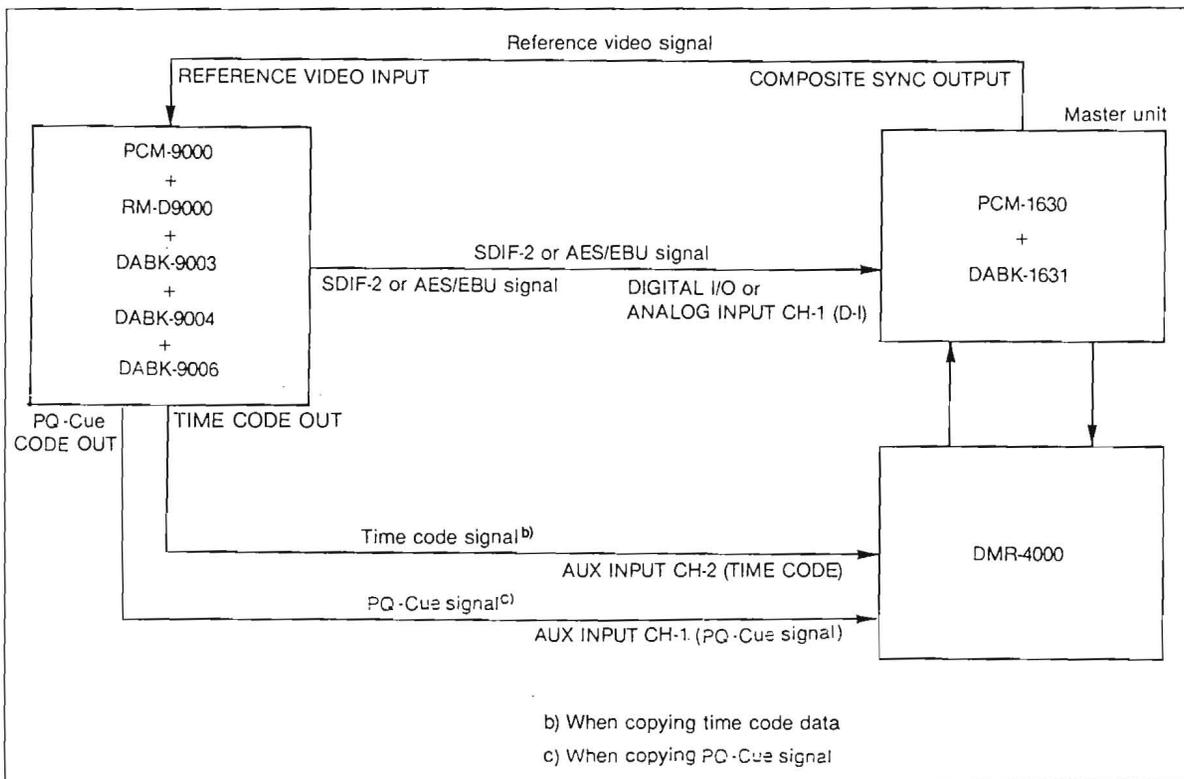
**When copying the SDIF-2 format signal**  
 SYNC CLOCK of the PCM-9000: EXT

**Notes**

- To copy the PQ cue on the master tape, the optional DABK-9006 Interface Board must be installed.
- You can use the AES/EBU D-I signal as the external sync signal when copying an SDIF-2 format signal. Set the same values as those set for “When copying the AES/EBU format signal”, above.

**Digital copying from the PCM-9000 to the PCM-1630 system**

You can make a CD by using a master disc recorded on the PCM-9000.



**Notes on copying from the PCM-9000 to the PCM-1630 system**

Set the following values:

Make the PCM-1630 system the master unit for system synchronization.

- Sampling frequency for system: 44.1 kHz
- Time code format for system: 30 (frame/s)
- SYNC CLOCK of the PCM-9000: VIDEO

(Continued)

## 8-3. Digital Copying between PCM-9000 and PCM-1630 System

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### When copying time code data together with audio data

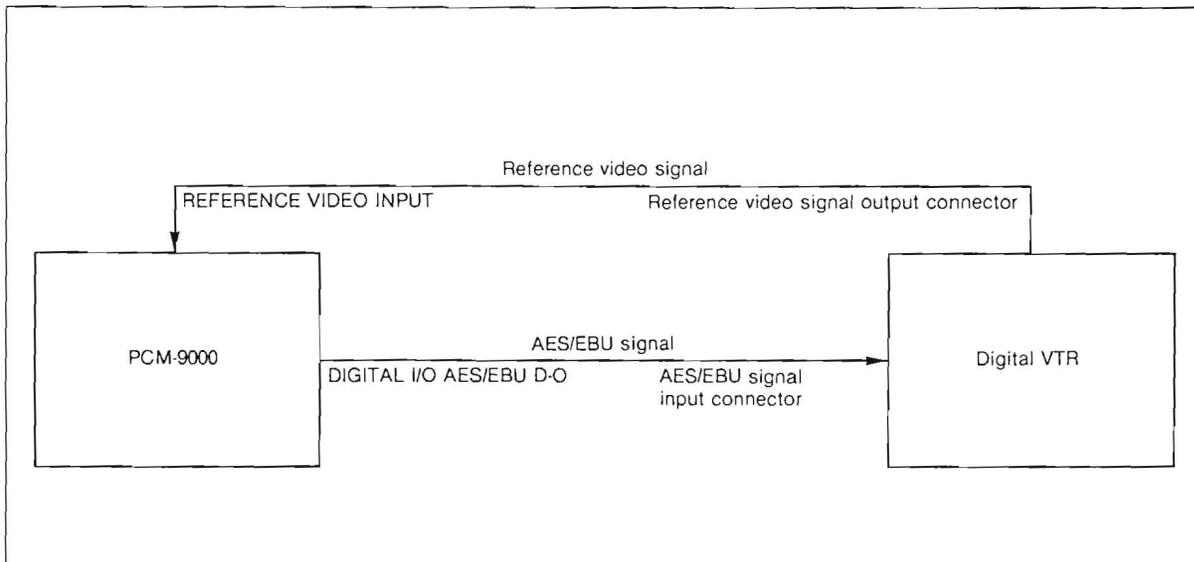
- (1) Press the FORMAT key of the PCM-9000, such that the 30 indicator lights.
- (2) Set the time code format of the DMR-4000 to non-drop frame mode (NDF).
- (3) Start time code sync playback on the PCM-9000 by pressing the PLAY key.  
*For details of time code sync playback, see "4-3-3. Time Code Sync Playback".*
- (4) After starting playback on the PCM-9000, start recording on the DMR-4000.

#### Notes

- You cannot copy to the PCM-1630 system if you select a system sampling frequency other than 44.1 kHz.
- While copying, you must execute time code sync playback. Otherwise, time code data may be recorded incorrectly.
- You cannot execute digital copying while executing variable speed playback on the PCM-9000. If you want to record a signal, played back at variable speed by the PCM-9000, on the DMR-4000, copy the analog audio signal.

## 8-4. Digital Copying to a Digital VTR

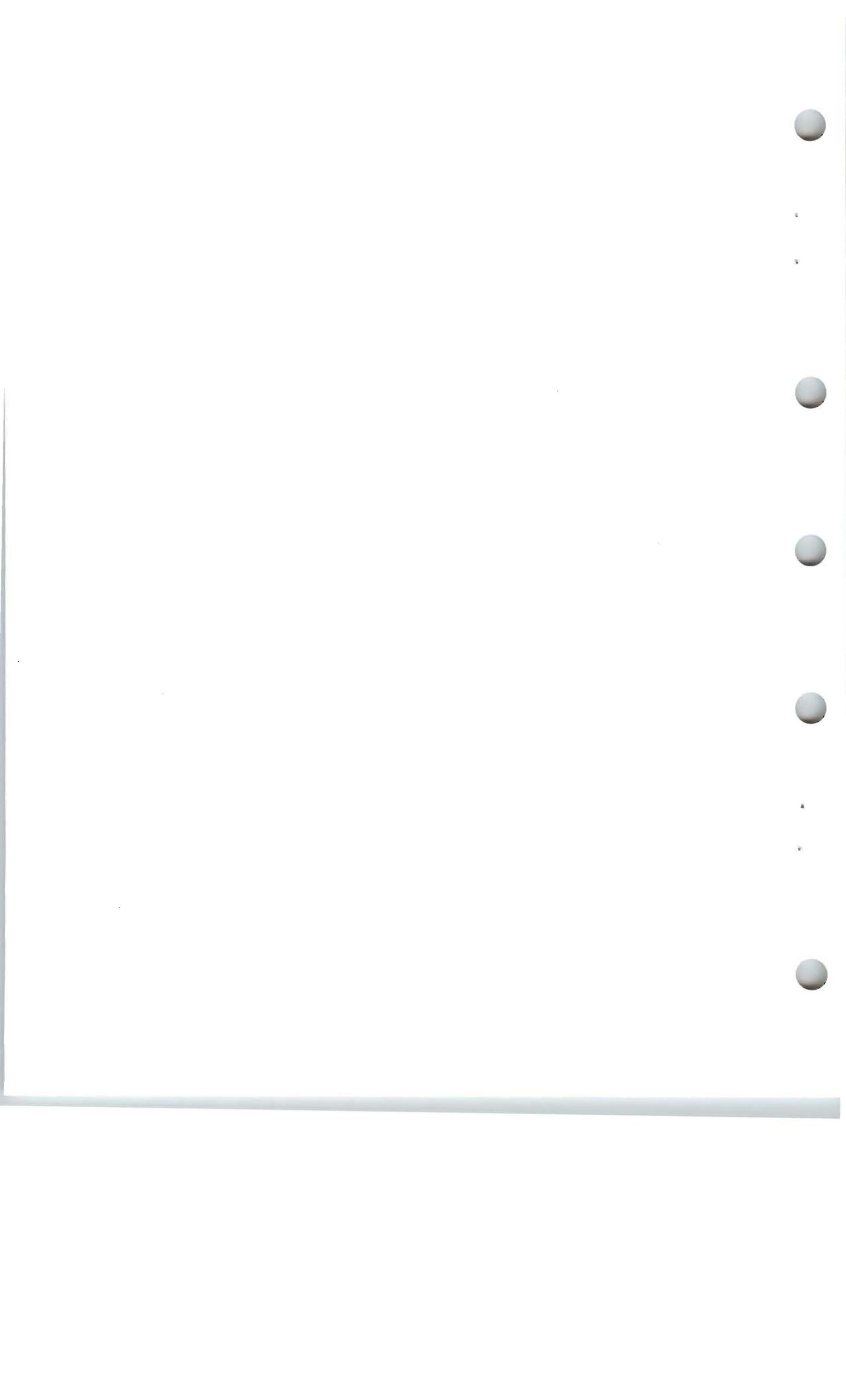
You can copy audio data recorded on the master disc to a digital VTR in AES/EBU digital audio format.



### Notes on copying to a digital VTR

Set the following values:

- Make the digital VTR the master unit for system synchronization.
- Connect the composite sync (reference video) signal to the PCM-9000 and the digital VTR.
- Sampling frequency: 48 kHz
- SYNC CLOCK of the PCM-9000: VIDEO



# Appendix

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Specifications .....A- 2

# Specifications

## General

Dimensions	423 x 177 x 455 mm (16 <sup>3</sup> / <sub>4</sub> x 7 x 17 <sup>3</sup> / <sub>4</sub> inches) (w x h x d, excluding projections)
Mass	17 kg (37 lb 8 oz)
Power requirements	100 to 240 VAC, 50/60 Hz
Power consumption	130 W, 2.4-0.5 A
Operating temperature	10°C to 35°C
Operating humidity	30% to 70%
Storage temperature	-20°C to +55°C
Storage humidity	20 % to 75 % RH
Maximum angle from horizontal	-7° to +7° (to guarantee performance) -10° to -10° (to guarantee operation)

## Format

Recording Format	MS disc format
Number of digital audio channels	2
Quantization	16-, 20-, 24-bit
Error correction	Sony super strategy cross interleave Reed Solomon Code (CIRC)
Recording time	80 minutes (20-bit, Fs=44.1 kHz)
Disc speed variation range	±12.5%
Disc used	MO (Magneto-Optical) disc

## Audio characteristics (with optional DABK-9001 Converter Board)

Frequency response	20 Hz to 20 kHz ±0.5 dB (Fs=48 kHz)
Dynamic range	104 dB typical (emphasis off)
Total harmonic distortion	0.03% maximum
Sampling frequency	44.056 kHz, 44.1 kHz, 48 kHz
Signal processing system delay time	66.712 ms maximum (16-bit, Fs=44.056 kHz)
Delay time of A/D, D/A	1.8 ms

---

## Input/Output connectors

### PCM-9000

#### REFERENCE VIDEO connectors

Format	NTSC/PAL/SECAM composite video, or rectangular wave
Levels	0.3 Vp-p (Burst signal) 4.0 Vp-p (Composite sync signal) 0.3 to 5 Vp-p (rectangular wave)
Impedance	75 ohm, unbalanced
Connector	BNC type (2), loop-through

#### WORD SYNC INPUT connectors

Format	50% duty, with rectangular pulse leading edge
Level	TTL compatible
Input level	3 Vop minimum
Impedance	75 ohm, unbalanced
Connector	BNC type (2), loop-through

#### WORD SYNC OUTPUT connectors

Format	50% duty, with rectangular pulse leading edge
Level	TTL compatible
Output level	3V or more
Impedance	75 ohm, unbalanced
Connector	BNC type (2)

#### D-I SYNC connector

Format	AES 3-1992
Impedance	110 ohm
Connector	XLR-3-31 (1)

#### INSERTION RETURN connector

Format	AES 3-1992
Impedance	110 ohm
Transfer rate	3.840 Mbit/s (20-bit, Fs=48 kHz) 3.072 Mbit/s (16-bit, Fs=48 kHz)
Connector	XLR-3-31 (1)

#### INSERTION SEND connector

Format	AES 3-1992
Connector	XLR-3-32 (1)

#### DIGITAL I/O AES/EBU D-I connector

Format	AES 3-1992
Impedance	110 ohm
Connector	XLR-3-31 (1)

#### DIGITAL I/O AES/EBU D-O connector

Format	AES 3-1992
Connector	XLR-3-32

#### REMOTE connector

Format	Serial
Level	RS-422A
Connector	Round type 10-pin, female (1)

#### DABK-9001 Converter Board (20-bit A/D, D/A)

## Specifications

---

### DABK-9001 Converter Board (20-bit A/D, D/A)

#### LINE INPUT CH-1, CH-2 connectors

Reference level	+4 dBs
Maximum Level	+26 dBs
Impedance	20 kohm/600 ohm, balanced/unbalanced
Connector	XLR-3-31 (2)

#### LINE OUTPUT CH-1, CH-2 connectors

Reference level	+4 dBs
Maximum level	+26 dBs
Impedance	Less than 60 ohm, balanced/unbalanced
Connector	XLR-3-32 (2)

### DABK-9003 Interface Board (Time code/Remote)

#### TIME CODE IN connector

Format	IEC 461 (SMPTE/EBU)
Level	0.5 to 10 Vp-p (10 kohm, balanced)
Connector	XLR-3-31 (1)

#### TIME CODE OUT connector

Format	IEC 461 (SMPTE/EBU)
Level	2.4±0.1 Vp-p (100 ohm or less, balanced)
Connector	XLR-3-32 (1)

#### PARALLEL REMOTE connector

Format	Parallel
Level	TTL compatible
Connector	D-SUB 50-pin (1)

#### REMOTE (9PIN) connector

Format	Sony 9-pin
Level	RS-422A
Connector	D-SUB 9-pin

### DABK-9004 Digital I/O Board (SDIF-2)

#### INPUT CH-1, CH-2 connector

Format	SDIF-2, unbalanced
Level	TTL compatible
Transfer rate	1.536 Mbit/s (16-bit, Fs=48 kHz)
Connector	BNC type (2)

#### OUTPUT CH-1, CH-2 connectors

Format	SDIF-2, unbalanced
Level	TTL compatible
Connector	BNC type (2)

### DABK-9005 Interface Board (SCSI)

#### SCSI connector

Format	SCSI
Connector	Half-pitch 50-pin (2)

---

### DABK-9006 Interface Board (DAQ)

#### CUE DATA IN connector

Format	FM
Level	1.2 to 10 Vp-p (10 kohm)
Transfer rate	4800 bits/s
Connector	XLR-3-31 (1)

#### CUE DATA OUT connector

Format	FM
Level	2.4 +-0.5 Vp-p (10 kohm load)
Transfer rate	4800 bits/s
Connector	XLR-3-32 (1)

#### REMOTE connector

Format	Parallel
Level	TTL compatible
Connector	Amphenol 36-pin (1)

#### STATUS OUT connector

Format	Parallel
Level	TTL compatible
Connector	D-SUB 25-pin (1)

---

### Accessories supplied

Ball-point L wrench BL2MM	(1)
Blanking panel	(1)
Maintenance manual	(1)
Operation manual	(1)
Plug holder	(1)
Power cord	(1)
Rack angle assembly	(2)
Screw (B4 x 16)	(4)
Screw (RK5 x 16)	(4)
Trapezoid decorative washer (ø5)	(4)

Appendix |||||

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### Optional accessories

AC-E6AM JE3	AC Power Adapter (for RM-D9000)
DABK-9001	Converter Board (20-bit A/D, D/A)
DABK-9003	Interface Board (Time code/Remote)
DABK-9004	Digital I/O Board (SDIF-2)
DABK-9005	Interface Board (SCSI)
DABK-9006	Interface Board (DAQ)
MOA-D51	Disc Cleaning Kit
MSD-1200	Digital Audio Master Disc

Design and specification are subject to change without notice.

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PCM-9000 (UC/EK, 英)  
3-184-407-03(1)

**Sony Corporation**  
Broadcast Products Company

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## Notes when using PCM-9000 V2.0

### Notes for PCM-9000 V2.0

- Notes on switching to REMOTE-2(SCSI)

If the DABK-9005(SCSI I/F Board) is installed in the PCM-9000, it is possible to switch control to REMOTE-2(SCSI) by pressing the SYSTEM CONTROL key on the control panel.

However, it may not be possible to change to REMOTE-2(SCSI)mode if the EDIT DATA SAVE key starts to flash ON/OFF when the SYSTEM CONTROL key is pressed. This is not a fault condition. In this case, please press the EDIT DATA SAVE key.

After the EDIT DATA SAVE key is pressed, its indicator will light ON steady and then go OFF. Then the system can be switched to REMOTE-2(SCSI) by pressing the SYSTEM CONTROL key.

However, if the AUX DATA area of the disc is record protected, then the EDIT DATA SAVE key will continue to flash ON/OFF even if that key is pressed. In this case, first eject the disc, set the disc to record enable, then perform the operation mentioned above.

- Notes for JOG during FILE mode

In FILE mode with V2.0, it is possible to JOG/SHUTTLE operations between the programmed TRACKs.

However, the JOG sound may change speed or even stop when performing JOG at or near the point connecting 2 adjacent tracked. This symptom only occurs when performing JOG during FILE mode. Normal FILE mode PLAY should not have any problems.

- Notes for the RM-D9000 display

If all TRACKs of a particular file are deleted during FILE mode, then, "COPY TO" or "0", "1" may be indicated on the SCSI display of RM-D9000. These indications have no meaning. If you want to clear those indications, then eject the disc and reset the power to the unit.

SONY corporation BC company

A/V production department 2

September 1st, 1995

## DABK-9003 Version 1.0 について

DABK-9003 Version1.0はデジタルオーディオエディターDAE-3000のプレーヤーとしての機能に対応しております。

タイムコード機能を単独で使用する場合は、下記のように設定してお使い下さい。

- タイムコードモードはAAIP TCモードでお使い下さい。
- タイムコードチェイス機能およびタイムコードシンク再生はオペレーションモードをNORMALモードに設定してお使い下さい。
- タイムコードチェイス機能はフリーランモードでお使い下さい。
- お使いになるタイムコードに合わせて、PCM-9000のタイムコードフォーマットスイッチを設定して下さい。

なお、タイムコードシンク再生についてはPCM-9000の取り扱い説明書4章(4-3-3)、またタイムコードチェイスについては6章をご覧ください。

# DAE-3000との接続と設定

## DAE-3000のプレーヤーとして使用する時の接続と設定

接続はPCM-9000の取扱説明書の8-1章 DAE-3000を中心としたシステムの説明に従って行って下さい。

また、以下の設定を手動で行ってください。

- DABK-9003 パネル上の切り換えスイッチをREMOTE(9Pin)に設定して下さい。

TC-78基板上のスライドスイッチS1~5を次のように設定して下さい。 S1:ON S2~5:OFF

- DAE-3000 DABK-3005 (PCM-7030/7050用 I/Fボード)を使用して下さい。

SUBメニューでマシンアサインにPCM-7030としてPCM-9000が表示されるので、PLAYERにアサインして下さい。

- PCM-9000 オペレーションモード・・・NORMAL (FILE,DISCモードに設定しないで下さい。)

TC MODE …… 30Hz NDF

SYNC CLOCK …… EXT

REC MODE …… MONITOR / SYNC 任意

INPUT …… AES / ANALOG / SDIF-2 任意

SYSTEMコントロール・・・REMOTE-1

## DAE-3000の操作

DAE-3000の取り扱い説明書をご覧ください。

なお、DAE-3000でのPCM-9000のプリロール時間は、7秒以上に設定してお使い下さい。

# 9Pinリモートコントロールに関する機能

## サポートコマンド一覧

DABK-9003 Version1.0は、DAE-3000のプレーヤーとなる機能のみをサポートしております。下記にサポートコマンド一覧を示します。

コマンド	コマンド名	コマンド	コマンド名
20 00	STOP	21 37 00	CHASE
20 01	PLAY	4X 30	EDIT RESET
20 10	FAST FWD	45 78	CHASE OFFSET PRESET
20 13	SHUTTLE FWD	61 0C	CURRENT TIME SENSE
20 20	REWIND	61 20	STATUS SENSE
20 23	SHUTTLE REV	74 04	LTC TIME DATA
		7X 20	STATUS DATA

## システムコントロール

SYSTEM CONTROLのスイッチは、REMOTE-1の設定でご使用ください。

# パラレルリモートコントロールに関する機能

## サポートコマンド一覧

下記のコマンドならびにステータスがサポートされています。

ピン番号	信号名	ピン番号	信号名
1	STOP Command	26	----
2	PLAY Command	27	----
3	REC Command	28	----
4	----	29	----
5	----	30	STOP Status
6	FF Command	31	PLAY Status
7	REW Command	32	REC Status
8	NEXT Command	33	----
9	PREVIOUS Command	34	----
10	----	35	FF Status
11	----	36	REW Status
12	----	37	----
13	----	38	----
14	----	39	----
15	----	40	----
16	----	41	----
17	D1 REC READY Command	42	----
18	D2 REC READY Command	43	----
19	----	44	----
20	----	45	----
21	----	46	D1 REC READY Status
22	----	47	D2 REC READY Status
23	----	48	----
24	----	49	+5V OUT
25	----	50	GND(FG)

## システムコントロール

パラレルリモートコントロールを使用する場合PCM-9000のSYSTEM CONTROL 切り換えスイッチでLOCALにして下さい。

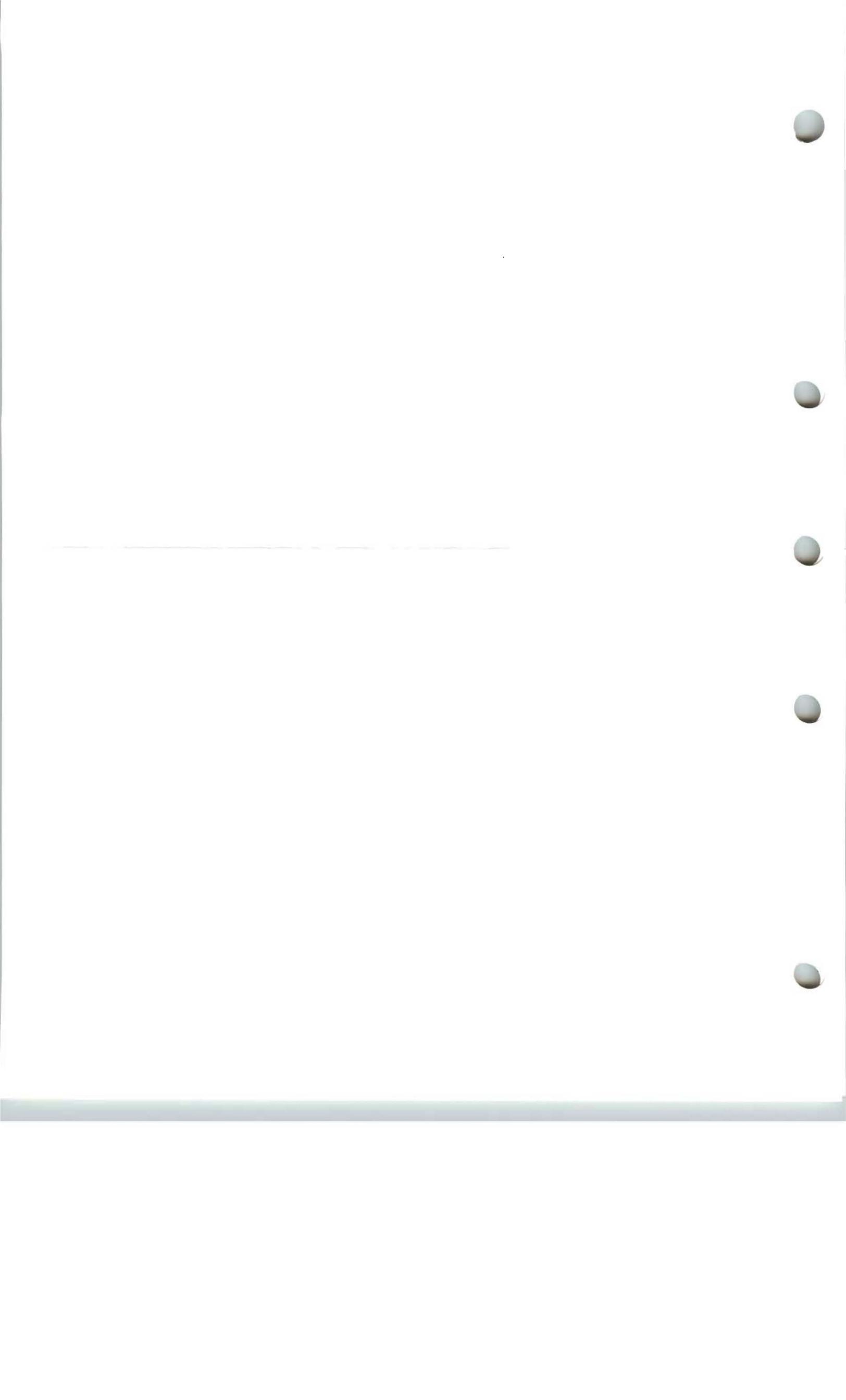
**SONY**

INTERFACE BOARD

**DABK-9003**

SUPPLEMENT

Serial No. 10001 and Higher



# DABK-9003 Version 1.0

The DABK-9003 Version1.0 supports the functions of the PCM-900 as a PLAYER of the digital audio editor DAE-3000.

When using the time code functions individually, use as follows.

- Use the time code in the AAIP TC mode.
- Use the time code chase and time code sync playback functions in the NORMAL mode of the OPERATION mode.
- Use the time code chase function in the FREE mode.
- Manually set the time code format to fit using time code.

Refer to 4-3-3 of section 4 of the operation manual for the PCM-9000 for the time code sync playback function. Also refer to section 6 for the time code chase function

# Connections and settings with DAE-3000

## Connections and switch settings of the editing system with the DAE-3000

Connect the cables as shown in Section 8-1 "Editing System with DAE-3000" of the operation manual of the PCM-9000.

Set the switches of the DABK-9000, the DAE-3000 and the PCM-9000 as follows.

- DABK-9003 Set the REMOTE(9PIN)/RS232 switch on the panel of the DABK-9003 to REMOTE (9PIN). Set the switches (S1-S5) on the TC-78 board as follows  
S1 : ON S2~5 : OFF

- DAE-3000 Use with the DABK-3005 (PCM-7030/7050 I/F board). Assign the PCM-9000 as PLAYER on the machine assignment screen.  
On this screen, the PCM-9000 is shown as a "PCM-7030" instead of a "PCM-9000".

- PCM-9000
- |                |     |   |
|----------------|-----|---|
| Operation mode | ... | NORMAL<br>(never set to FILE<br>or DISC mode) |
| TC FORMAT      | ... | 30Hz NDF                                      |
| SYNC CLOCK     | ... | EXT   |
| REC MODE       | ... | MONITOR or SYNC                               |
| INPUT          | ... | AES, ANALOG or<br>SDIF-2                      |
| SYSTEM CONTROL | ... | REMOTE-1(9PIN)                                |

## Operations of the DAE-3000

Refer to the operation manual of the DAE-3000.

Set the preroll time for the PCM-9000 as PLAYER to 7 seconds or more.

# Functions of 9Pin Remote control

## Supported commands

The 9pin serial remote control of DABK-9003 supports the commands as follows .

Codes	Commands	Codes	Commands
20 00	STOP	21 37 00	CHASE
20 01	PLAY	4X 30	EDIT RESET
20 10	FAST FWD	45 78	CHASE OFFSET PRESET
20 13	SHUTTLE FWD	61 0C	CURRENT TIME SENSE
20 20	REWIND	61 20	STATUS SENSE
20 23	SHUTTLE REV	74 04	LTC TIME DATA
		7X 20	STATUS DATA

## Setting of SYSTEM CONTROL switch

When using the 9pin serial remote control with the DAE-3000, changeover the SYSTEM CONTROL on the front panel of the PCM-9000 to REMOTE-1 position.

# Functions of PARALLEL REMOTE CONTROL

When using parallel remote control, change the SYSTEM CONTROL switch on the front panel of the PCM-9000 to LOCAL.

## Supported commands and status

The commands and status are supported as follows.

pin No.	Descriptions	pin No.	Descriptions
1	STOP Command	26	----
2	PLAY Command	27	----
3	REC Command	28	----
4	----	29	----
5	----	30	STOP Status
6	FF Command	31	PLAY Status
7	REW Command	32	REC Status
8	NEXT Command	33	----
9	PREVIOUS Command	34	----
10	----	35	FF Status
11	----	36	REW Status
12	----	37	----
13	----	38	----
14	----	39	----
15	----	40	----
16	----	41	----
17	D1 REC READY Command	42	----
18	D2 REC READY Command	43	----
19	----	44	----
20	----	45	----
21	----	46	D1 REC READY Status
22	----	47	D2 REC READY Status
23	----	48	----
24	----	49	+5V OUT
25	----	50	GND(FG)

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DABK-9003

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Broadcast Company

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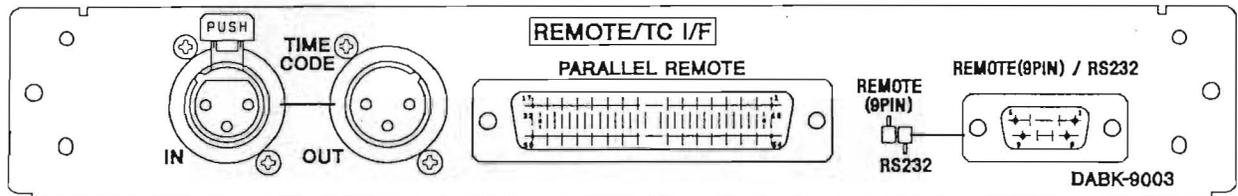
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# PCM-9000取扱説明書についてのご注意

DABK-9003 Version1.0を装着した場合、機能や動作が下記のようにPCM-9000の取扱説明書の内容と一部、変わるところがありますのでご注意ください。

- 4-2-2 記録、モニターチャンネルの選択  
EXT TC(外部タイムコード)には対応していません。
- 4-2-3 シンクオフセット時間の設定  
"任意のシンクオフセット値を設定するには....."でのマイナス値の設定は付属のテンキーで入力して下さい。
- 4-2-4 タイムコードの記録  
EXT TC(外部タイムコード)には対応していません。
- 4-3-3 タイムコードシンク再生  
NORMALモードのみでお使い下さい。FILE、DISCモードでは動作致しません。
- 6-1 タイムコードチェース機能の概略  
フリーランモードでお使い下さい。アドレスモードには対応していません。
- 6-3-1 タイムコードチェース再生  
タイムコードチェースモードの解除を行った時、RM-D9000の表示にはその直前までのものが表示されます。
- 6-3-2 タイムコードチェイス記録  
アドレスモードでのみ行えますが、アドレスモードのTCチェイスに対応していません。
- 6-3-3 タイムコードチェース中のオートパンチインアウト  
この機能は動作致しません。

# DABK-9003のパネル説明



## TIMECODE IN端子 (XLR-3-31)

SMPTE/EBUタイムコードを入力します。

## TIMECODE OUT端子 (XLR-3-32)

SMPTE/EBUタイムコードを出力します。

## PARALELL REMOTE端子

50ピンパラレル信号で外部機器からコントロールする際に使用します。

## REMOTE(9PIN)/RS-232端子 (D-SUB9ピン)

9ピンリモート信号で外部機器からコントロールする際に使用します。

DAE-3000と接続する場合はこの端子に接続します。また、REMOTE(9PIN)/RS-232スイッチによりRS-232C信号と9ピンリモート信号とを切り換えることができます。

## REMOTE(9PIN)/RS-232スイッチ

D-SUB 9ピンの機能を9ピンリモートとRS-232Cとに切り換えるスイッチです。

# Notes of the manual of PCM-9000

For the DABK-9003, Version 1.0 supports the functions as the PLAYER of the digital audio editor DAE-3000. there are differences in the functions of the PCM-9000 which has the DABK-9003 Version 1.0 installed from what are explained in the original operation manual of the PCM-9000.

## 4-2-2 Selecting Record/Monitor Channels

EXT TC (External Time Code) function does not work.

## 4-2-4 Recording External Time Code

EXT TC (External Time Code) function does not work.

## 4-3-3 Time Code Sync Playback

Use the time code sync playback in the NORMAL mode of the operation mode.

## 6-1 Overview of Time Code Chase

Use the time code chase in the FREE mode.

The ADDRESS mode chase function does not work.

## 6-2-3 Setting the Sync Offset Time

When setting minus values, use the 10 key unit.

## 6-3-1 Playback with Time Code Chase

When canceling time code chase, the display of the RM-D9000 shows the same value before canceling.

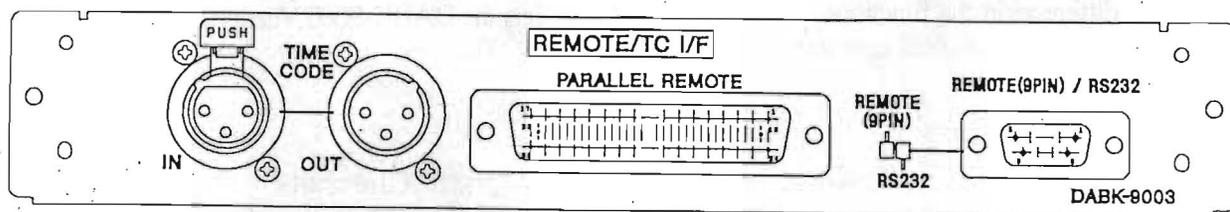
## 6-3-2 Recording with Time code Chase

The time code chase function in address mode does not work.

## 6-3-3 Automatic Punch-In/Out during Time Code Chase

This function does not work.

# Panel of DABK-9003



**TIMECODE IN (XLR-3-31)**

Inputs the SMPTE/EBU-format time code signals.

**TIMECODE OUT (XLR-3-32)**

Outputs SMPTE/EBU-format time code signals.

**PARALELL REMOTE (D-SUB 50pin, female)**

Used when controlling the PCM-9000 with 50pin parallel remote control signals.

**REMOTE(9PIN)/RS-232 (D-SUB 9pin, female)**

Used when controlling the PCM-9000 with 9pin remotecontrol signals. Use this connector to connect the DAE-3000 digital audio editor.

This connector can also be connected with RS-232C by changeovering REMOTE(9PIN)/RS-232 Switch.

**REMOTE(9PIN)/RS-232 Switch**

Changes the function of the D-SUB 9pin connector. Eiter 9pin remote or RS-232C is selectable.

# SONY®

REMOTE CONTROLLER

## RM-D9000

CONVERTER BOARD

## DABK-9001

CONVERTER BOARD

## DABK-9002

INTERFACE BOARD

## DABK-9003

DIGITAL I/O BOARD

## DABK-9004

INTERFACE BOARD

## DABK-9005

INTERFACE BOARD

## DABK-9006

MEMORY BOARD

## DABK-9007

### 取り扱い操作、保守などに関する情報について

本製品の操作方法については、PCM-9000 OPERATION MANUALを、設置、保守についてはMAINTENANCE MANUALをご覧ください。

#### ご注意

本製品を取り付けるときは、必ずPCM-9000のPOWERスイッチをOFFにしてください。

### Instructions about Operation, Installation and Maintenance

Refer to the PCM-9000 OPERATION MANUAL for operating instructions and the MAINTENANCE MANUAL for instructions about installation and maintenance of this equipment.

#### Note

Turn the PCM-9000's POWER switch off before installing this equipment.

### Instructions d'utilisation, d'installation et de maintenance

Reportez-vous au OPERATION MANUAL du PCM-9000 pour les instructions d'utilisation, et au MAINTENANCE MANUAL pour les instructions concernant l'installation et la maintenance de ce matériel.

#### Remarque

Mettez le PCM-9000 hors tension par l'interrupteur POWER avant d'installer cette carte.

### Zur Bedienung, Installation und Wartung

Zur Bedienung, Installation und Wartung des PCM-9000 siehe das OPERATION MANUAL bzw. das MAINTENANCE MANUAL.

#### Hinweis

Vor der installation schalten Sie den POWER-Schalter des PCM-9000 aus.

## OPERATION GUIDE

Japanese/English/French/German

1st Edition

Serial No. 10001 and Higher

RM-D9000, DABK-9001/9002

DABK-9003/9004/9005/9006/9007

(J,UC,EK,和,英,仏,独)

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#### **For customers in the USA**

##### **WARNING**

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.

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

The shielded interface cable recommended in this manual must be used with this equipment in order to comply with the limits for a digital device pursuant to Subpart B of Part 15 of the FCC Rules.

#### **For customers in Canada**

This apparatus complies with the Class A limits for radio noise emissions set out in Radio Interference Regulations.

#### **Pour les utilisateurs au Canada**

Cet appareil est conforme aux normes Classe A pour bruits radioélectriques, spécifiées dans le Règlement sur le brouillage radioélectrique.

#### **Bescheinigung des Herstellers**

Hiermit wird bescheinigt, daß die Fernbedienungseinheit RM-D9000, der Konvertersatz DABK-9001/9002 und die Digital-E/A-Leiterplatte DABK-9004 in Übereinstimmung mit den Bestimmungen der BMPT-Amtsblatt Vfg 243/1991 und Vfg 46/1992 funktentstört ist. Der vorschrittmäßige Betrieb mancher Geräte (z.B. Meßsender) kann allerdings gewissen Einschränkungen unterliegen. Beachten Sie deshalb die Hinweise in der Bedienungsanleitung. Dem Bundesamt für Zulassungen in der Telekommunikation wurde das Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprüfung der Serie auf die Einhaltung der Bestimmungen eingeräumt.

Sony Deutschland GmbH  
Hugo Eckener Str. 20  
D-5000 Köln 30

#### **Hinweis**

Gemäß der Amtsblätter des BMPT Nrn. 61/1991 und 6/1992 wird der Betreiber darauf aufmerksam gemacht, daß die von ihm mit diesem Gerät zusammengestellte Anlage auch den technischen Bestimmungen dieser Amtsblätter genügen muß.

# SONY®

REMOTE CONTROLLER

## RM-D9000

CONVERTER BOARD

## DABK-9001

CONVERTER BOARD

## DABK-9002

INTERFACE BOARD

## DABK-9003

DIGITAL I/O BOARD

## DABK-9004

INTERFACE BOARD

## DABK-9005

INTERFACE BOARD

## DABK-9006

MEMORY BOARD

## DABK-9007

### 取り扱い操作、保守などに関する情報について

本製品の操作方法については、PCM-9000 OPERATION MANUALを、設置、保守についてはMAINTENANCE MANUALをご覧ください。

### ご注意

本製品を取り付けるときは、必ずPCM-9000のPOWERスイッチをOFFにしてください。

### Instructions about Operation, Installation and Maintenance

Refer to the PCM-9000 OPERATION MANUAL for operating instructions and the MAINTENANCE MANUAL for instructions about installation and maintenance of this equipment.

### Note

Turn the PCM-9000's POWER switch off before installing this equipment.

### Instructions d'utilisation, d'installation et de maintenance

Reportez-vous au OPERATION MANUAL du PCM-9000 pour les instructions d'utilisation, et au MAINTENANCE MANUAL pour les instructions concernant l'installation et la maintenance de ce matériel.

### Remarque

Mettez le PCM-9000 hors tension par l'interrupteur POWER avant d'installer cette carte.

### Zur Bedienung, Installation und Wartung

Zur Bedienung, Installation und Wartung des PCM-9000 siehe das OPERATION MANUAL bzw. das MAINTENANCE MANUAL.

### Hinweis

Vor der installation schalten Sie den POWER-Schalter des PCM-9000 aus.

OPERATION GUIDE

Japanese/English/French/German

1st Edition

Serial No. 10001 and Higher

RM-D9000, DABK-9001/9002

DABK-9003/9004/9005/9006/9007

(J,UC,EK,和,英,仏,独)

3-757-475-01

**Sony Corporation**  
Broadcast Products Group

Printed in Japan

1993. 07. 13

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Published by Broadcast Products Group

## For customers in the USA

### WARNING

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### For customers in Canada

This apparatus complies with the Class A limits for radio noise emissions set out in Radio Interference Regulations.

### Pour les utilisateurs au Canada

Cet appareil est conforme aux normes Classe A pour bruits radioélectriques, spécifiées dans le Règlement sur le brouillage radioélectrique.

## Bescheinigung des Herstellers

Hiermit wird bescheinigt, daß die Fernbedienungseinheit RM-D9000, der Konvertersatz DABK-9001/9002 und die Digital-E/A-Leiterplatte DABK-9004 in Übereinstimmung mit den Bestimmungen der BMPT-Amtsblatt Vfg 243/1991 und Vfg 46/1992 funktentstört ist. Der vorschriftsmäßige Betrieb mancher Geräte (z.B. Meßsender) kann allerdings gewissen Einschränkungen unterliegen. Beachten Sie deshalb die Hinweise in der Bedienungsanleitung. Dem Bundesamt für Zulassungen in der Telekommunikation wurde das Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprüfung der Serie auf die Einhaltung der Bestimmungen eingeräumt.

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Hugo Eckener Str. 20  
D-5000 Köln 30

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# SONY®

REMOTE CONTROLLER

## RM-D9000

CONVERTER BOARD

## DABK-9001

CONVERTER BOARD

## DABK-9002

INTERFACE BOARD

## DABK-9003

DIGITAL I/O BOARD

## DABK-9004

INTERFACE BOARD

## DABK-9005

INTERFACE BOARD

## DABK-9006

MEMORY BOARD

## DABK-9007

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### Note

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This apparatus complies with the Class A limits for radio noise emissions set out in Radio Interference Regulations.

#### Pour les utilisateurs au Canada

Cet appareil est conforme aux normes Classe A pour bruits radioélectriques, spécifiées dans le Règlement sur le brouillage radioélectrique.

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#### Pour les utilisateurs au Canada

Cet appareil est conforme aux normes Classe A pour bruits radioélectriques, spécifiées dans le Règlement sur le brouillage radioélectrique.

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## RM-D9000

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#### **Pour les utilisateurs au Canada**

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#### **Bescheinigung des Herstellers**

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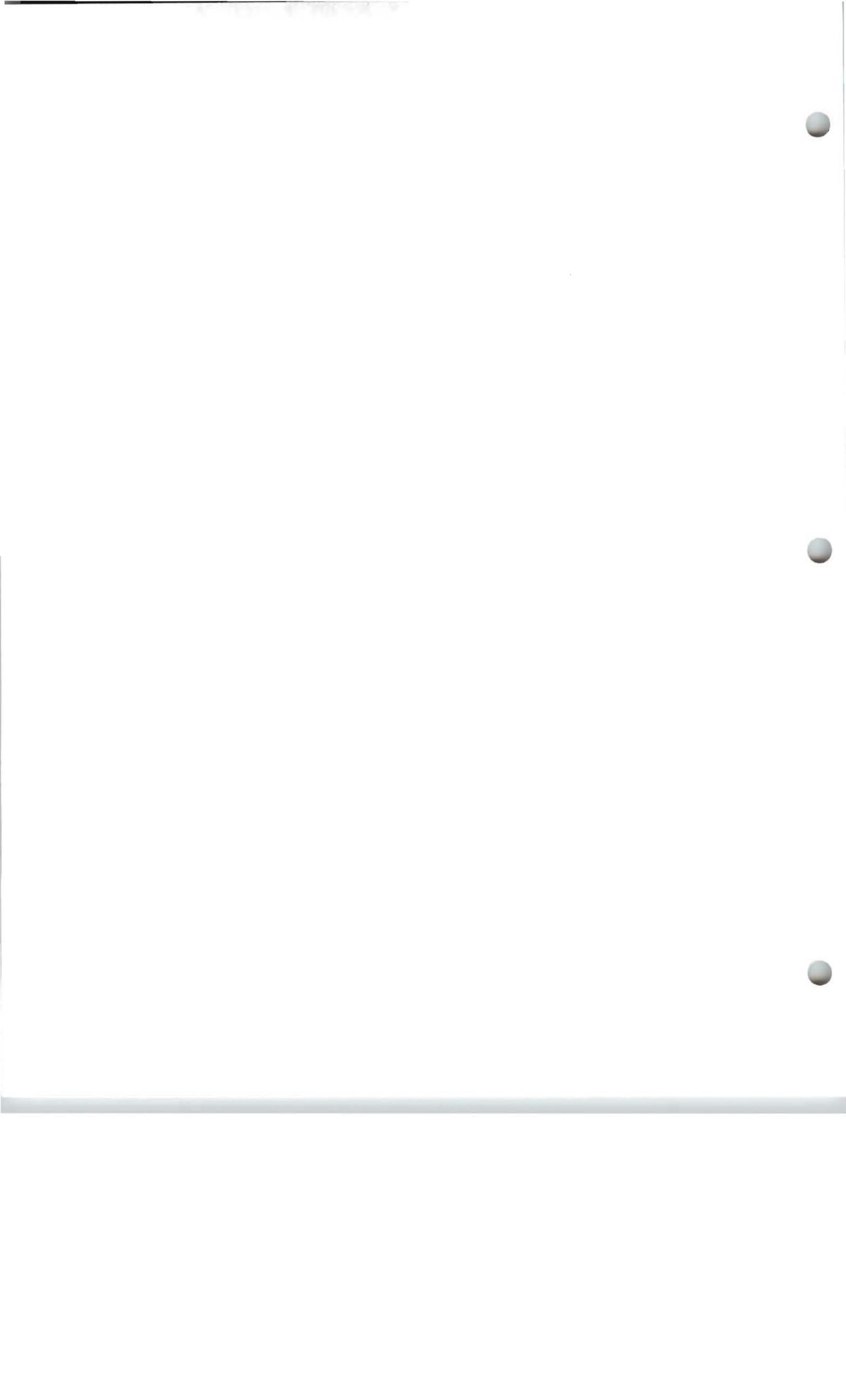
**NOTES**

Lined writing area with horizontal lines and three binder holes on the left side.



Faint, illegible text, possibly bleed-through from the reverse side of the page.









**SONY**<sup>®</sup>

DIGITAL MASTER DISC RECORDER

# PCM-9000

REMOTE CONTROLLER

## RM-D9000



CONVERTER BOARD  
**DABK-9001**

INTERFACE BOARD  
**DABK-9003**

DIGITAL I/O BOARD  
**DABK-9004**

INTERFACE BOARD  
**DABK-9005**

INTERFACE BOARD  
**DABK-9006**

MEMORY BOARD  
**DABK-9007**

MAINTENANCE MANUAL Part 1  
1st Edition (Revised 1)

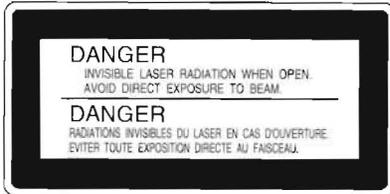
PCM-9000	Serial No. 10001 and Higher
RM-D9000	Serial No. 10001 and Higher
DABK-9001	Serial No. 10001 and Higher
DABK-9003	Serial No. 10001 and Higher
DABK-9004	Serial No. 10001 and Higher
DABK-9005	Serial No. 10001 and Higher
DABK-9006	Serial No. 10001 and Higher
DABK-9007	Serial No. 10001 and Higher

## CAUTION

As the laser beam used in this Master Disc Recorder is harmful to the eyes, do not attempt to disassemble the cabinet. Refer servicing to qualified personnel only.

### Laser Diode Properties

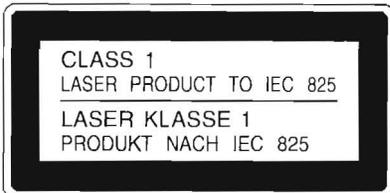
Material	: GaAlAs
Wave length	: 785 nm
Emission duration	: Continuous
Laser output power	: 35 mW (max)
Beam divergence	: (H) $12^\circ \pm 1.5^\circ$ (V) $24^{+4.5}_{-4}$



This label is located on the top of the unit.

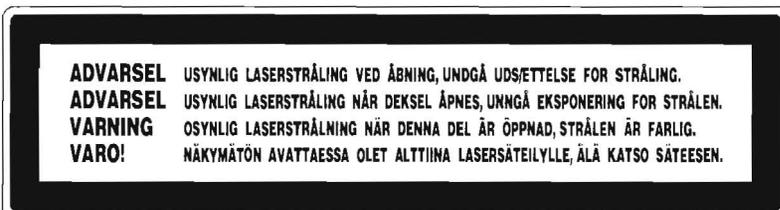


Dieser Aufkleber befindet sich oben am Gerät.



This Master Disc Recorder is classified as a  
**CLASS 1 LASER PRODUCT.**

The **CLASS 1 LASER PRODUCT**  
label is located on the top panel.



This label is located on the top of the unit.

**VARO!** Avattaessa ja suojalukitus ohitettaessa olet alltiina näkymättömälle lasersäteilylle. Älä katso säteeseen.

**VARNING!** Osynlig laserstrålning när denna del är öppnad och spärren är urkopplad. Betrakta ej strålen.

## SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer:

Check the metal trim, "metallized" knobs, screws, and all other exposed metal parts for AC leakage. Check leakage as described below.

## LEAKAGE TEST

The AC leakage from any exposed metal part to earth ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 3.5 mA. Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA WT-540A. Follow the manufacturers' instructions to use these instruments.
2. A battery-operated AC milliammeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The "limit" indication is 5.25V, so analog meters must have an accurate low-voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 20V AC range are suitable. (See Fig. A)

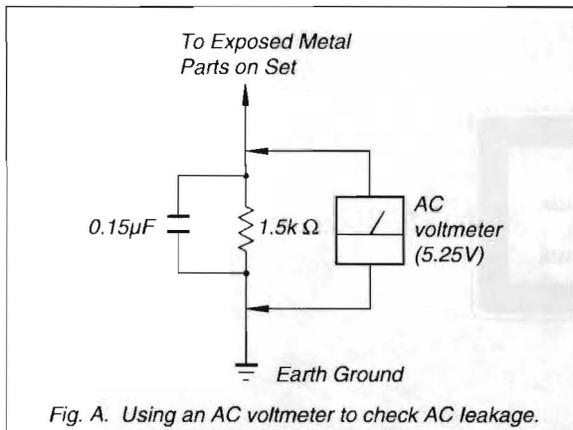


Fig. A. Using an AC voltmeter to check AC leakage.

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## このマニュアルについて

### 本書の目的

本書はデジタルマスターディスクレコーダーPCM-9000とその別売アクセサリーのRM-D9000、DABK-9001、DABK-9003～9007のメンテナンスマニュアルパート1です。本書はシステム/サービスエンジニアの方々にご使用していただくことを想定し、本機の保守に関する情報と主なブロックおよび基板交換によるサービスを前提とした情報を記載しています。

### 構成

本書の構成を把握していただくために、全章の概略を以下に説明します。

### 第1章 設置

本機の設置に関する情報を記載しています。

### 第2章 サービスインフォメーション

本機のサービス時に必要な情報を記載しています。

### 第3章 自己診断

自己診断の方法、エラーメッセージが表示された場合の対処方法を記載しています。

### 第4章 主要部品の交換および調整

主要部品のうち、サービス対象の部品の交換方法及び交換後の調整を記載しています。

### 第5章 電気調整

プリント基板を交換した場合などで、基板を調整する必要が生じた場合の調整方法を説明しています。

### SEC. 6 BLOCK DIAGRAMS AND FRAME WIRINGS

本機全体および、プリント基板ごとの機能構成をまとめて掲載しています。

### SEC. 7 SPARE PARTS

使用部品のうち、サービス対象に指定されている部品（電気部品を除く）を掲載しています。

## MANUAL STRUCTURE

### PURPOSE OF THIS MANUAL

This is a maintenance manual part1 of the digital master disc recorder PCM-9000, their optional accessories RM-D9000, DABK-9001 and DABK-9003 through 9007.

This manual describes the maintenance information of this unit, and the information on primary services such as the replacement of main blocks and circuit boards.

### CONTENTS

The outlines of all the section is explained as follows for understanding of these composition.

### SEC. 1 INSTALLATION

Describes the informations for the installation of the PCM-9000.

### SEC. 2 SERVICE OVERVIEW

Describes necessary service informations for the PCM-9000.

### SEC. 3 DIAGNOSTICS

Describes the methods of diagnostics and coping in case of the error message is indicated.

### SEC. 4 REPLACEMENT OF MAJOR PARTS & ALIGNMENT

Describes the methods of service parts replacement and alignment after their replacement.

### SEC. 5 ELECTRICAL ALIGNMENT

Explains the methods of the adjustment in case of the board adjustment has developed by parts replacement.

### SEC. 6 BLOCK DIAGRAMS AND FRAME WIRINGS

Explains the composition of the system overall block diagrams and every boards function.

### SEC. 7 SPARE PARTS

Explains the subject parts to service (except for the electrical parts) of the original parts.

## 関連マニュアル

本機にはこの「メンテナンスマニュアルパート1」のほかに、下記のマニュアルが用意されています。

- オペレーションマニュアル (本機に付属しています)
- クイックリファレンス (本機に付属しています)  
本機を実際に運用および操作するのに必要なマニュアルです。
- メンテナンスマニュアルパート2 (本機に付属していません)  
PCM-9000, RM-D9000および別売アクセサリ (DABK-9001, DABK-9003~9007) の部品レベルまでのサービスを前提とした情報 (回路図、マウント図、詳細パーツリスト等) を記載したマニュアルです。必要な方は、担当のサービス窓口にお問い合わせください。
- プロトコルマニュアル (本機に付属していません)  
9 pin PROTOCOL  
本機をRS-422A (9ピンシリアルリモート) にて制御するためのプロトコルについて説明したマニュアルです。必要な方は、担当のサービス窓口にお問い合わせください。

## RELATIVE MANUAL

It is prepared besides this "maintenance manual part1" as follows.

- **Operation Manual** (Supplied with the PCM-9000.)
- **Quick Reference** (Supplied with the PCM-9000.)  
This is necessary manual for the operation and, application.
- **Maintenance Manual Part2**  
(Not supplied with the PCM-9000.)  
This manual describes the information items (adjustments, board layouts, schematic diagrams, detailed parts list, etc.) that premise the service based on parts. If this manual is required, please contact to Sony's service organization.
- **Protocol Manual** (Not supplied with the PCM-9000.)  
9 pin PROTOCOL  
This manual explains the protocol for controlling the PCM-9000 via the RS-422A (9-pin serial remote). If this manual is required, please contact to Sony's service organization.

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# 第1章 設置

## 1-1. 使用環境

セット動作温度 : 10°C~35°C  
セット保存温度 : -20°C~55°C  
セットの質量(重量) : 17 kg

### 設置禁止場所

- 太陽光線または強力ライトが直接当たる場所
- ほこりや振動の多い場所
- 強電界や強磁界の場所
- 熱源のそば
- 電氣的なノイズの多い場所
- 静電ノイズの発生しやすい場所

### 設置時の注意

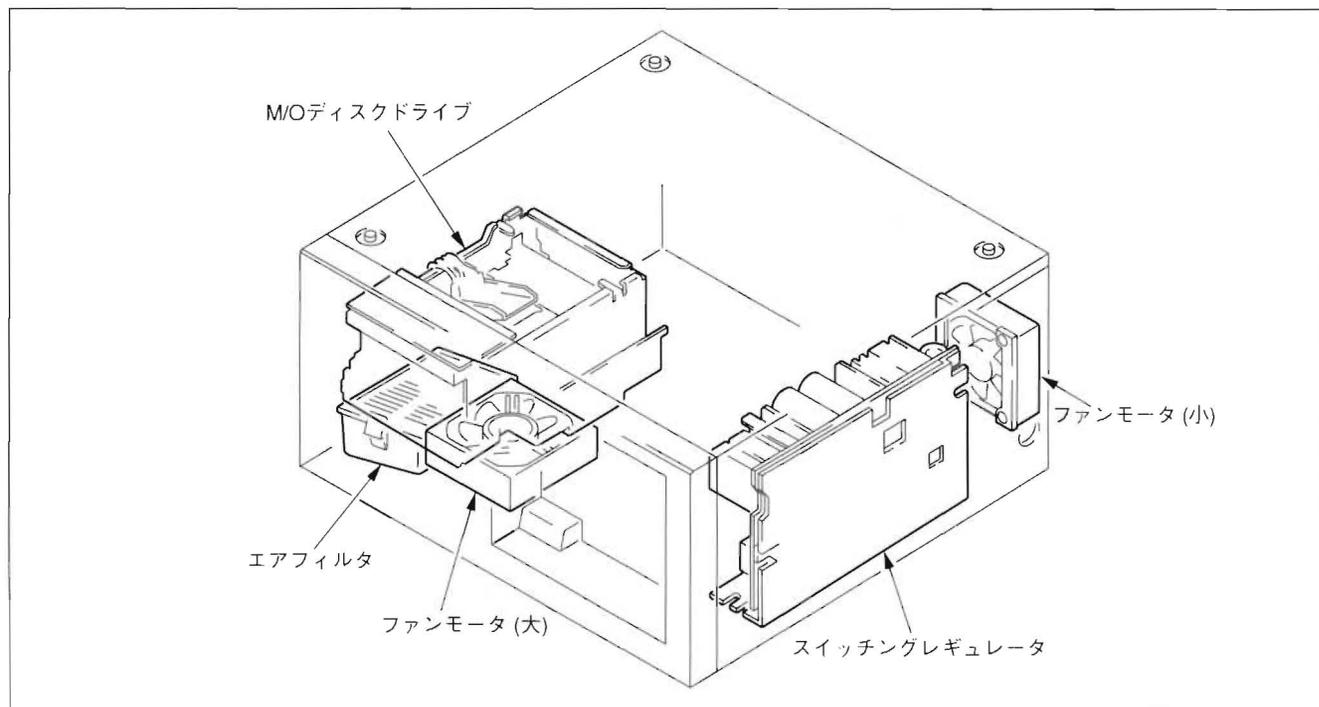
- セットの後方は、換気およびサービス性の点から、壁などから最低40 cm離すこと。
- セットの左側面は吸気口があるため、最低10 cm離すこと。
- 机の上などに置いて使用する時には、セット上部はプリント基板のサービス性の点から最低40 cmあけること。ただし、ラックマウントした時には、セットを引き出すことにより、プリント基板のメンテナンスができるようになっているので、この必要はない。
- 本機は、水平位置で使用するよう設計されている。従って、本機を垂直にしたり、傾けての使用は避けること。

### 換気/放熱

- 本機では2個のファンを使用している。

- ① 電源部のファンは、排気用として使用している。後面の排気部がふさがれたり、ファンが停止すると電源が故障するおそれがある。点検時等、ファンの風が確保されない状態では、負荷を長時間かけないようにすること。
- ② M/O ディスクドライブ用のファンは、吸気用として使用している。また、本機内の圧力を外気圧に対して高く保ち、エアフィルタと共に、外部からのほこり等の進入を防ぎ、M/O ディスクドライブおよびM/O Discの信頼性を確保している。

エアフィルタは、M/Oディスクドライブへの空気流入口であり、ちり、ほこり等の侵入を防止している。エアフィルタが、目づまりすると、M/O Discの信頼性の確保が低減してしまうので、エアフィルタの交換、掃除は定期的に行うことを推奨する。(年1~2回)  
エアフィルタの交換方法については、「4.2. 項 ファンモータ/エアフィルタの交換」を参照。



## 1-2. 電源

### 1-2-1. AC電源の容量

PCM-9000は、スイッチング電源を使用しており、切り換えなしで使用することができます。

電源電圧 : AC 100 V~120 V または AC 220 V~240 V

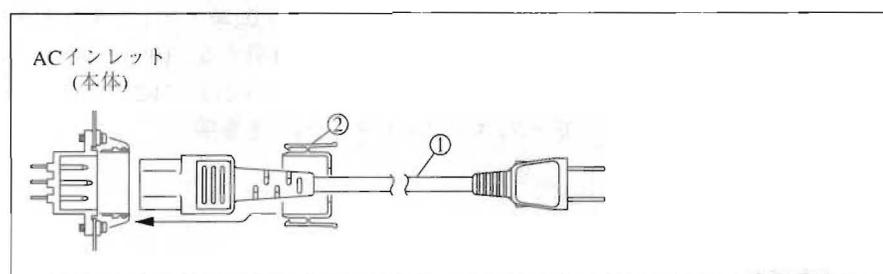
電源周波数 : 50/60 Hz

消費電力 : 130 W

### 1-2-2. 電源コード

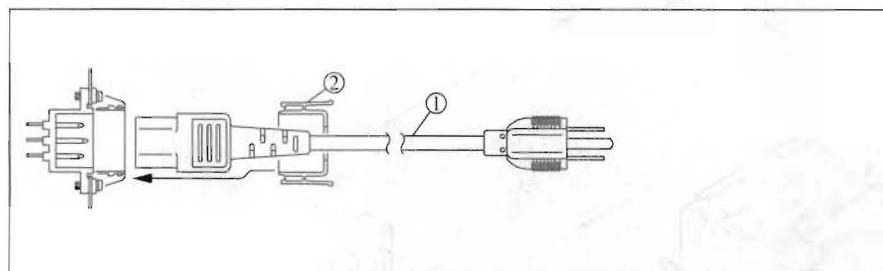
#### (J) 使用部品

- ① 電源コード
- ② プラグホルダ (黒)



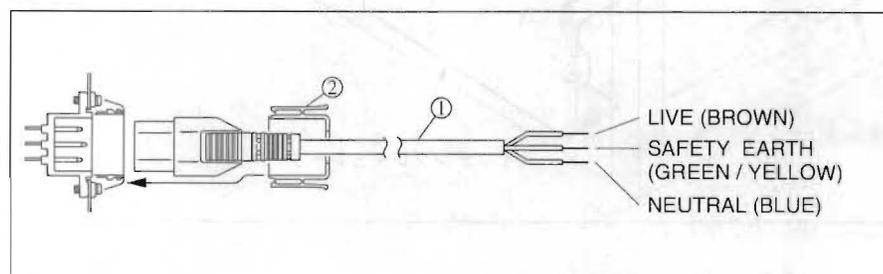
#### (UC) 使用部品

- ① 電源コード
- ② プラグホルダ (黒)



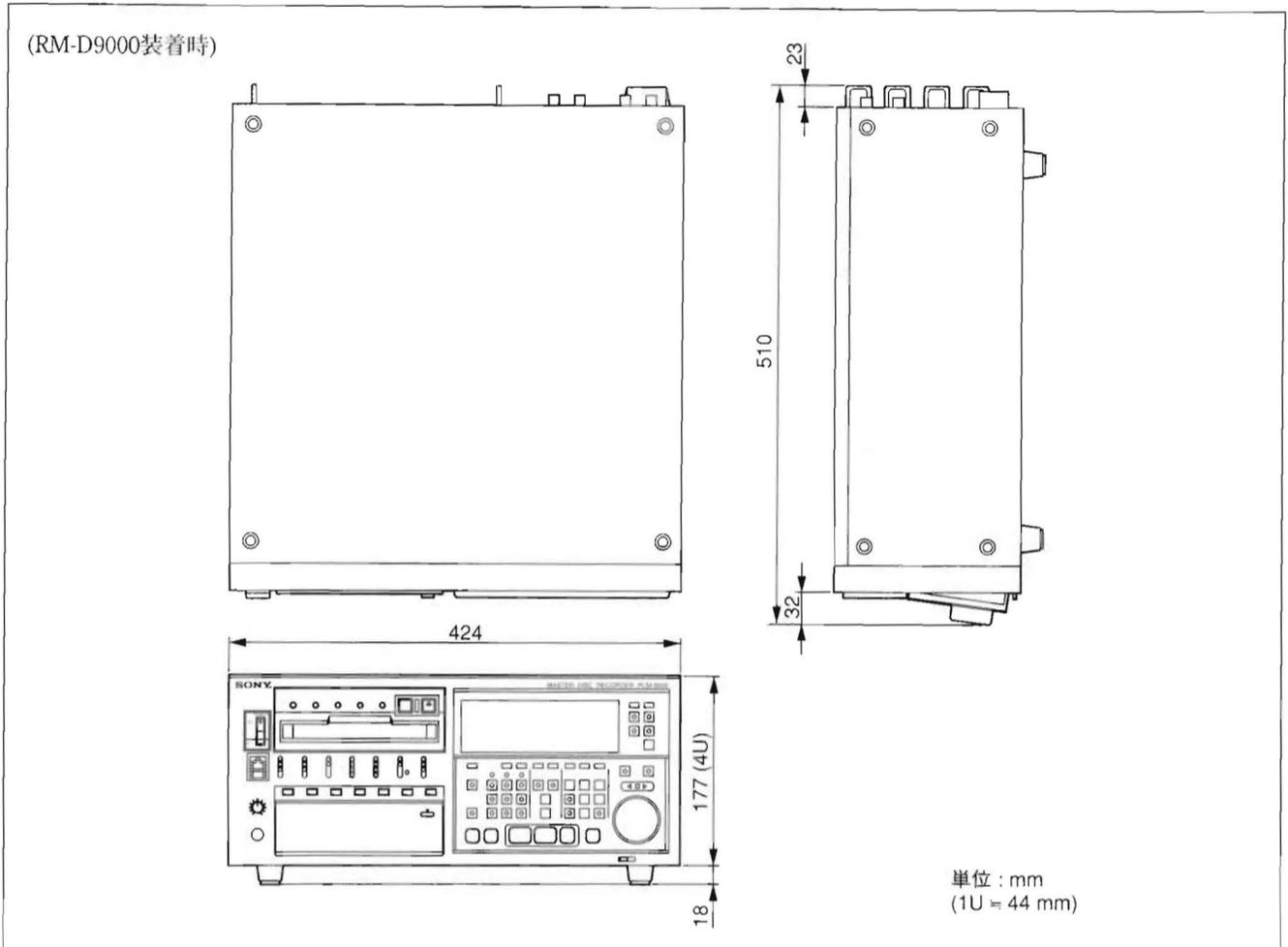
#### (EK) 使用部品

- ① 電源コード
- ② プラグホルダ (グレー)

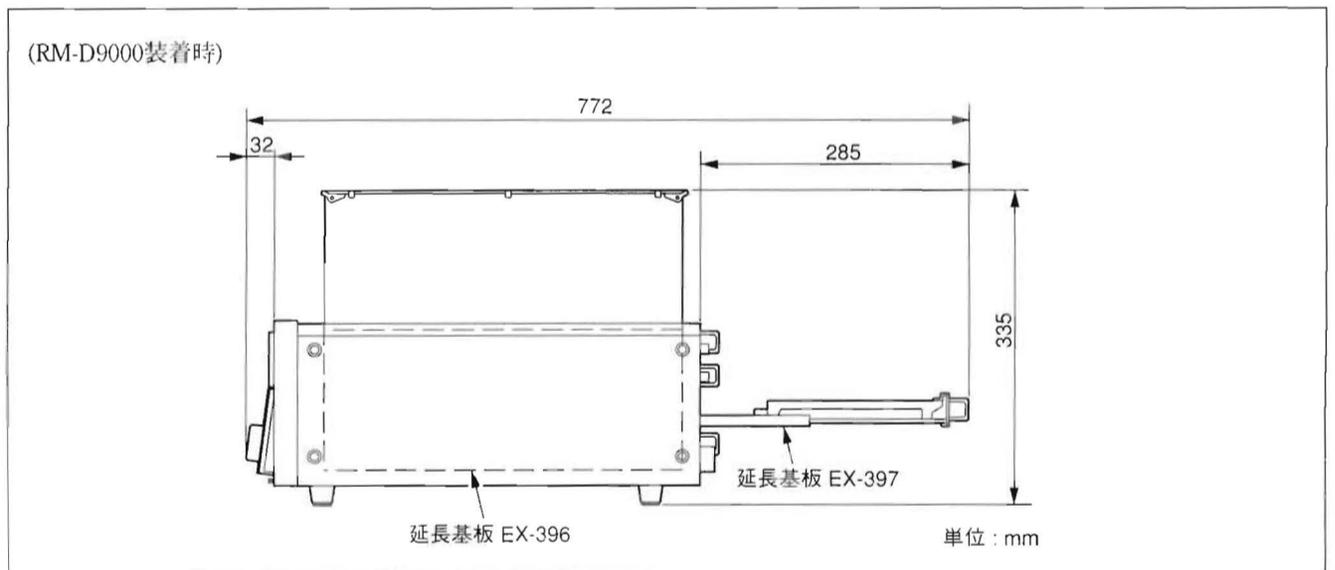


### 1-3. 設置スペース

#### (1) 外形寸法



#### (2) 作業寸法



#### 1-4. 標準付属品

##### PCM-9000

電源コード	: 1
プラグホルダ	: 1
ボールポイントレンチ BL2MM	: 1
ラックアングルAss'y (4U)	: 2
ネジ (B 4×16)	: 4
(ラックアングル取付用)	
ネジ (RK 5×16)	: 4
ネジ (B 4×8)	: 4
(ラックマウントレール取付用)	
台形かざりワッシャ (φ5用)	: 4
オペレーションマニュアル	: 1
メンテナンスマニュアルパート1	: 1
クイックリファレンス	: 1

##### RM-D9000

接続コード 0.8 m	: 1
接続コード 10 m	: 1

#### 1-5. 別売アクセサリ

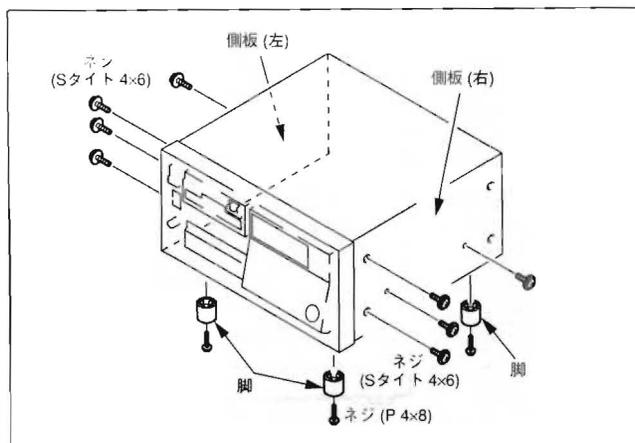
RM-D9000	Sony Remote Control Unit
DABK-9001	Sony Converter Board (20 bit A/D, D/A)
DABK-9003	Sony Interface Board (Remote/TC interface)
DABK-9004	Sony Digital I/O Board (SDIF-2 interface)
DABK-9005	Sony Interface Board (SCSI interface)
DABK-9006	Sony Interface Board (DAQ-1000 interface)
DABK-9007	Sony Memory Board (Memory)
MSD-1200	Sony Digital Audio Master Disc (For UC)
MSD-1200	Sony Digital Audio Master Disc (For J, EK)

#### 1-6. ラックマウント方法

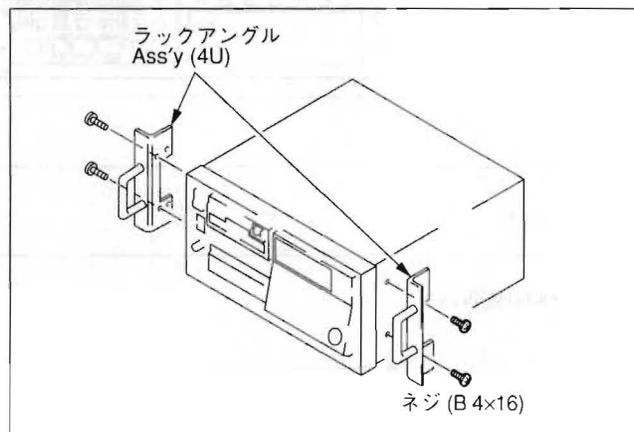
PCM-9000はEIA規格19インチ標準ラックに組み込んで使用することができる。

##### ラックマウント手順

- (1) PCM-9000の脚 (4本) を外す。
- (2) 側板 (左) (右) を止めているネジ (4×6 Sタイト 左右各4本) を外す。



- (3) ラックアングルAss'y (4U) をPCM-9000に取り付ける。  
注意: 取り付けには必ず付属のネジ (B 4×16) を使用すること。



- (4) 19インチラックに、付属の台形かざりワッシャ (φ5用) とネジ (RK 5×16) 各4本で取り付ける。

## 1-7. オプション基板の取り付け (DABK9001/9003/9004/9005/9006/9007)

注意: 取り付けは、PCM-9000の電源 (POWER) スイッチをOFFにした状態で行うこと。

各オプション基板の装着箇所

### 1-7-1. DABK-9001/9003/9004/9005/9006の取り付け

注意: 各オプション基板は、下記装着箇所以外には、装着しないこと。

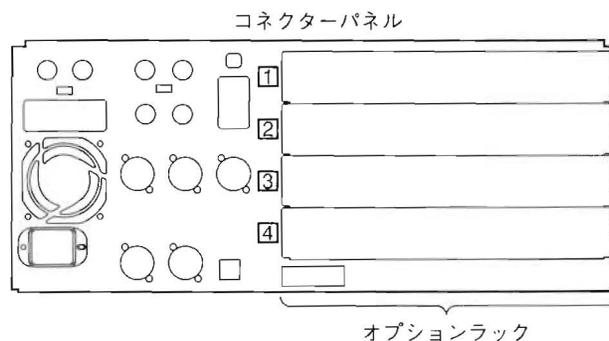
• DABK-9001の構成  
ADA-28基板 :1

• DABK-9003の構成  
TC-77/78基板 :1

• DABK-9004の構成  
DIO-28基板 :1

• DABK-9005の構成  
IF-436/437基板 :1  
ケーブル :1

• DABK-9006の構成  
IF-438基板 :1

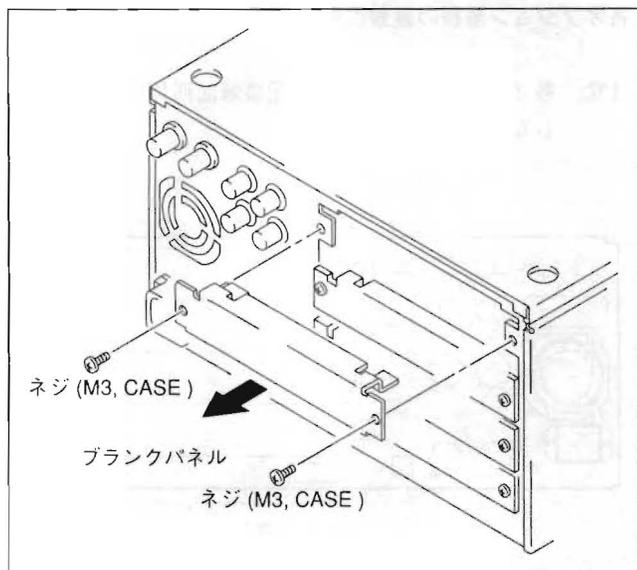


スロット No.	DABK -9001	DABK -9003	DABK -9004	DABK -9005	DABK -9006
1	×	×	×	○	○
2	×	○	○	×	○
3	×	○	○	×	○
4	○	×	×	×	×

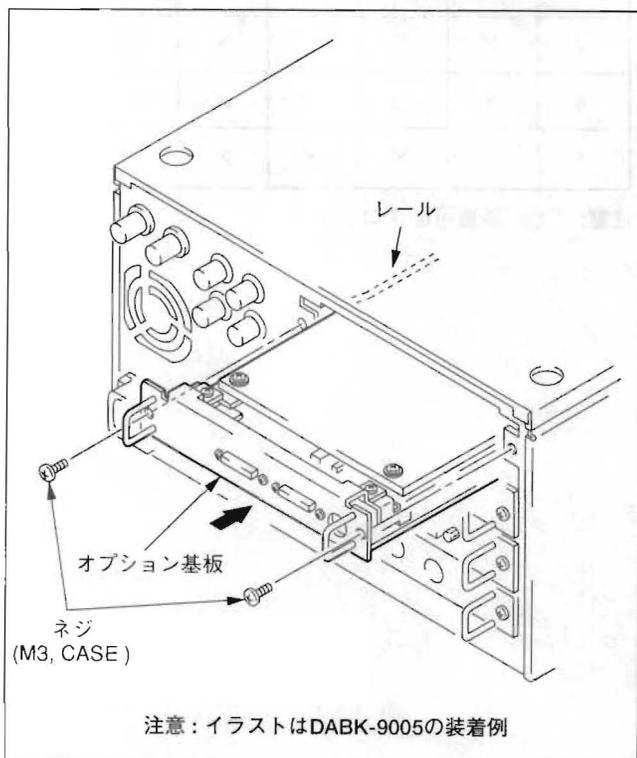
注意: ○ ... 装着可能スロットを示す。

手順

- (1) ネジ (M3, CASE) 2本を外し、装着するオプション基板の該当するスロットのブラックパネルを取り外す。



- (2) ブラックパネルを取り外した箇所にオプション基板をスロットの奥まで確実に差し込む。
- (3) 取り付けしたオプション基板をブラックパネルを取り付けていたネジ (M3, CASE) 2本で固定する。



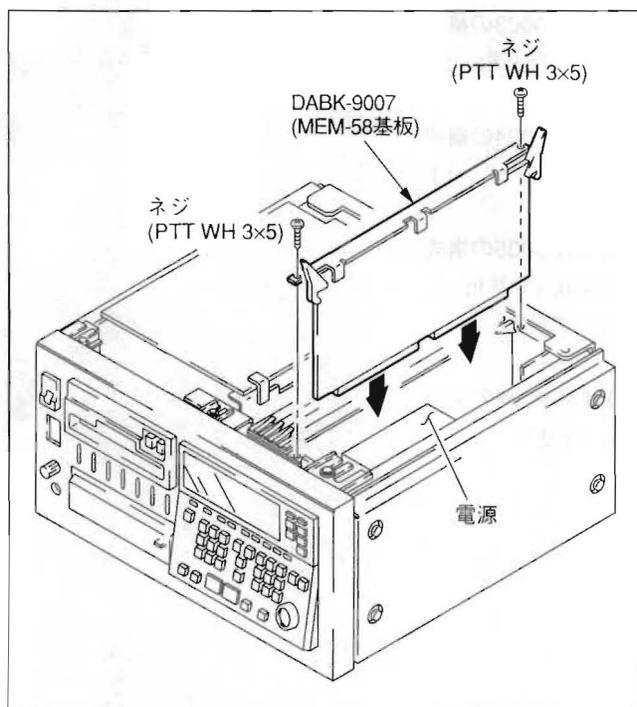
1-7-2. DABK-9007の取り付け

構成

- MEM-58基板 : 1
- 取り付けネジ (PTTWH 3×5) : 2

手順

- (1) 天板を外す。(2-3. 項 参照)
- (2) DABK-9007を図の装着スロットに差し込む。
- (3) イジェクトレバーを閉じて、ネジ (PTTWH 3×5) 2本で固定する。



- (4) 天板を取り付ける。

## 1-8. 入/出力インターフェース

### 1-8-1. 適合コネクタ/ケーブル

コネクタパネルにあるコネクタに接続するコネクタ/ケーブルは次に記すコネクタ/ケーブルまたはその同等品を使用すること。

#### 1. PCM-9000

PCM-9000側コネクタ		適合コネクタ/ケーブル	
使用先	名称	名称	ソニー部品番号
INSERTION RETURN DIGITAL I/O AES/EBU D-I D-I SYNC	XLR, 3 PIN, 雌	XLR, 3 PIN, 雄	1-508-084-11 (CANNON XLR-3-12Cまたは相当品) 別売アクセサリ ECD-3C (3 m)/10C (10 m) /15C (15 m)
INSERTION SEND DIGITAL I/O AES/EBU D-0	XLR, 3 PIN, 雄	XLR, 3 PIN, 雌	1-508-083-11 (CANNON XLR-3-11Cまたは相当品) 別売アクセサリ ECD-3C (3 m)/10C (10 m) /15C (15 m)
REFERENCE VIDEO INPUT WORD SYNC INPUT/OUTPUT	BNC	BNC	—
REMOTE	丸型, 10 PIN, 雌	接続コード { 0.8 m 10 m	(RM-D9000の付属品)

#### 2. RM-D9000

RM-D9000側コネクタ		適合コネクタ/ケーブル	
使用先	名称	名称	ソニー部品番号
PCM-9000	丸型, 10 PIN, 雌	接続コード { 0.8 m 10 m	(RM-D9000の付属品)

#### 3. DABK-9001

DABK-9001 側コネクタ		適合コネクタ/ケーブル	
使用先	名称	名称	ソニー部品番号
LINE INPUT CH1, CH2	XLR, 3 PIN, 雌	XLR, 3 PIN, 雄	1-508-084-11 (CANNON XLR-3-12Cまたは相当品)
LINE OUTPUT CH1, CH2	XLR, 3 PIN, 雄	XLR, 3 PIN, 雌	1-508-083-11 (CANNON XLR-3-11Cまたは相当品)

## 4. DABK-9003

DABK-9003側コネクタ		適合コネクタ/ケーブル	
使用先	名称	名称	ソニー部品番号
TIME CODE IN	XLR, 3PIN, 雌	XLR, 3PIN, 雄	1-508-084-11 (CANNON XLR-3-12Cまたは相当品)
TIME CODE OUT	XLR, 3PIN, 雄	XLR, 3 PIN, 雌	1-508-083-11 (CANNON XLR-3-11Cまたは相当品)
PARALLEL REMOTE	D-sub, 50 PIN, 雌	D-sub, 50 PIN, 雄	1-566-358-11
REMOTE (9 PIN) /RS232	D-sub, 9 PIN, 雌	D-sub, 9 PIN, 雄	別売アクセサリ, RCC 5 G (5 m) /10 G (10 m) /15 G (15 m) または1-560-651-00(コネクタ), 1-561-749-00(シェル)

## 5. DABK-9004

DABK-9004側コネクタ		適合コネクタ/ケーブル	
使用先	名称	名称	ソニー部品番号
INPUT CH-1/CH-2	BNC	BNC	—
OUTPUT CH-1/CH-2	BNC	BNC	—

## 6. DABK-9005

DABK-9005側コネクタ		適合コネクタ/ケーブル	
使用先	名称	名称	ソニー部品番号
SCSI I/F	ハーフピッチ アンフェノール, 50 PIN, 雌	接続コード, 1m	1-696-776-11 (DABK-9005の付属品)

## 7. DABK-9006

DABK-9006側コネクタ		適合コネクタ/ケーブル	
使用先	名称	名称	ソニー部品番号
CUE DATA IN	XLR, 3 PIN, 雌	XLR, 3 PIN, 雄	1-508-084-11 (CANNON XLR-3-12Cまたは相当品)
CUE DATA OUT	XLR, 3 PIN, 雄	XLR, 3 PIN, 雌	1-508-083-11 (CANNON XLR-3-11Cまたは相当品)
REMOTE	アンフェノール, 36 PIN, 雌	アンフェノール, 36 PIN, 雄	別売アクセサリ, RCC 5 D (5 m) /10 D (10 m) または 1-557-482-00 (ケーブル)
STATUS OUT	D-sub, 25 PIN, 雌	D-sub, 25 PIN, 雄	1-558-116-00 (ケーブル)

## 1-8-2. コネクタの入/出力信号

コネクタパネル部の入/出力信号は、以下のようになっている。

### 1. PCM-9000

#### 入力

REFERENCE VIDEO INPUT : Composite Video, Composite Sync信号, 矩形波, インピーダンス75  $\Omega$ , 75  $\Omega$ 終端スイッチ

WORD SYNC INPUT : 3 V以上, インピーダンス75  $\Omega$  (不平衡型), 75  $\Omega$ 終端スイッチ

INSERTION RETURN : AES3-1992, デジタルオーディオインターフェース (AES/EBU)

DIGITAL I/O AES/EBU D-I : AES3-1992, デジタルオーディオインターフェース (AES/EBU)

D-I SYNC : AES3-1992, デジタルオーディオインターフェース (AES/EBU)

#### 出力

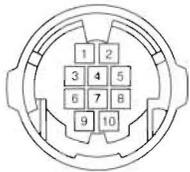
WORD SYNC OUTPUT : TTLレベル, インピーダンス75  $\Omega$  (不平衡型)

INSERTION SEND : AES3-1992, デジタルオーディオインターフェース (AES/EBU)

DIGITAL I/O AES/EBU D-O : AES3-1992, デジタルオーディオインターフェース (AES/EBU)

REMOTE: Round, 10 Pin, Female

- OUTSIDE VIEW -

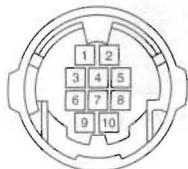


ピン番号	信号名	信号レベル	内容
1	RAES-	RS-422A	DIGITAL AUDIO出力
2	SR-RX+	RS-422A	リモートコマンド入力
3	+12 Vdc	—	—
4	+12 Vdc	—	—
5	SR-RX-	RS-422A	リモートコマンド入力
6	GND	—	—
7	GND	—	—
8	SR-TX-	RS-422A	コマンド出力
9	RAES+	RS-422A	DIGITAL AUDIO出力
10	SR-TX+	RS-422A	コマンド出力

## 2. RM-D9000

REMOTE: Round, 10 Pin, Female

- OUTSIDE VIEW -



ピン番号	信号名	信号レベル	内容
1	RAES-	RS-422A	DIGITAL AUDIO入力
2	SR-RX+	RS-422A	リモートコマンド出力
3	+12 Vdc	—	—
4	+12 Vdc	—	—
5	SR-RX-	RS-422A	リモートコマンド出力
6	GND	—	—
7	GND	—	—
8	SR-TX-	RS-422A	コマンド入力
9	RAES+	RS-422A	DIGITAL AUDIO入力
10	SR-TX+	RS-422A	コマンド入力

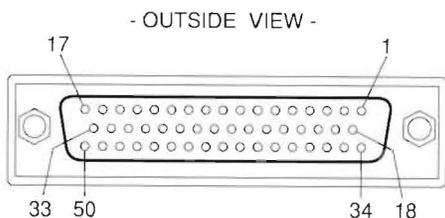
## 3. DABK-9001

LINE INPUT CH-1/CH2 : 基準レベル +4 dBs, 最大レベル +26 dBs, インピーダンス 10 k $\Omega$ /600  $\Omega$  (基板内SWで設定), 平衡  
 LINE OUTPUT CH-1/CH-2 : 基準レベル +4 dBs, 最大レベル +26 dBs, インピーダンス 50  $\Omega$ 以下, 平衡

4. DABK-9003

TIME CODE IN : IEC461 (SMPTE/EBU), 0.5~10 V<sub>p-p</sub> (10 kΩ, 平衡)  
 TIME CODE OUT : IEC461 (SMPTE/EBU), 2.4 ±0.1 V<sub>p-p</sub> (100 Ω以下, 平衡)  
 PARALLEL REMOTE : パラレル, TTLコンパチブル  
 REMOTE (9 Pin) /RS232 : RS-422A またはRS-232C (SW切換式)

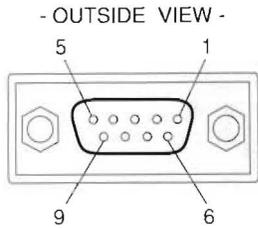
PARALLEL REMOTE : D-sub, 50 Pin, Female



ピン番号	信号名	ピン番号	信号名
1	STOP COMMAND	26	SPEED B COMMAND
2	PLAY COMMAND	27	SPEED C COMMAND
3	REC COMMAND	注) 28	(Reserved)
4	REH COMMAND	29	GND
5	REH-ST COMMAND	30	STOP STATUS
6	FF COMMAND	31	PLAY STATUS
7	REW COMMAND	32	REC STATUS
8	NEXT COMMAND	33	REH STATUS
9	PREV COMMAND	注) 34	(Reserved)
注) 10	(Reserved)	35	FF STATUS
注) 11	(Reserved)	36	REW STATUS
注) 12	(Reserved)	注) 37	(Reserved)
注) 13	(Reserved)	注) 38	(Reserved)
注) 14	(Reserved)	注) 39	(Reserved)
注) 15	(Reserved)	注) 40	(Reserved)
16	TC REC READY COMMAND	注) 41	(Reserved)
17	D1 REC READY COMMAND	注) 42	(Reserved)
18	D2 REC READY COMMAND	注) 43	(Reserved)
注) 19	(Reserved)	注) 44	(Reserved)
注) 20	(Reserved)	45	TC REC READY STATUS
注) 21	(Reserved)	46	D1 REC READY STATUS
22	EXT SOURCE COMMAND	47	D2 REC READY STATUS
23	EXT SOURCE (9.6 K) INPUT	注) 48	(Reserved)
24	REVERSE COMMAND	49	+5 V OUT
25	SPEED A COMMAND	50	GND (FG)

注) Reservedの端子はオープンにして何も接続しないこと。

REMOTE (9 PIN) /RS-232: D-sub, 9 Pin, Female



〈SONY 9ピン シリアルモードとして使用した時〉

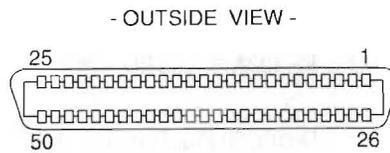
ピン番号	信号名
1	FG
2	TX-
3	RX+
4	RX GND
5	DG
6	TX GND
7	TX+
8	RX-
9	FG

〈RS-232として使用した時〉

ピン番号	信号名
1	DCD
2	RXD
3	TXD
4	DTR
5	DG
6	DSR
7	RTS
8	CTS
9	FG

6. DABK-9005

SCSI: Half pitch unphenol, 50 Pin, Female



ピン番号	信号名	ピン番号	信号名
1	D. G.	26	$\overline{DB0}$
2	D. G.	27	$\overline{DB1}$
3	D. G.	28	$\overline{DB2}$
4	D. G.	29	$\overline{DB3}$
5	D. G.	30	$\overline{DB4}$
6	D. G.	31	$\overline{DB5}$
7	D. G.	32	$\overline{DB6}$
8	D. G.	33	$\overline{DB7}$
9	D. G.	34	$\overline{DBP}$
10	D. G.	35	D. G.
11	D. G.	36	D. G.
12	D. G.	37	D. G.
13	(OPEN)	38	TERMPWR
14	D. G.	39	D. G.
15	D. G.	40	D. G.
16	D. G.	41	$\overline{ATN}$
17	D. G.	42	D. G.
18	D. G.	43	$\overline{BSY}$
19	D. G.	44	$\overline{ACK}$
20	D. G.	45	$\overline{RST}$
21	D. G.	46	$\overline{MSG}$
22	D. G.	47	$\overline{SEL}$
23	D. G.	48	$\overline{C/D}$
24	D. G.	49	$\overline{REQ}$
25	D. G.	50	$\overline{I/O}$

5. DABK-9004

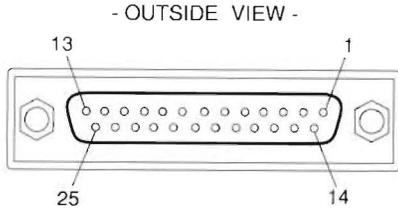
INPUT CH-1/CH-2 : SDIF-2 不平衡, TTLコンパチブル,  
1.536 M bit/s (48 kHz, 16 bit)

OUTPUT CH-1/CH-2 : SDIF-2 不平衡, TTLコンパチブル

7. DABK-9006

CUE DATA IN : FM, 0.5~10 V<sub>p-p</sub> (10 kΩ), 4800 bit/s  
 CUE DATA OUT : FM, 2 ±0.5 V<sub>p-p</sub> (600 Ω), 4800 bit/s  
 REMOTE : 平行, TTLコンパチブル  
 STATUS OUT : 平行, TTLコンパチブル

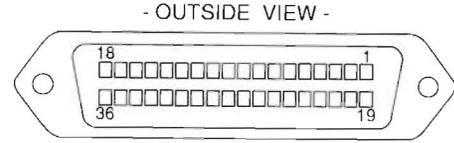
STATUS OUT: D-sub, 25 Pin, Female



ピン番号	信号名	内容
1	D. G.	
2	STS A/B	常時 H
3	REC/PB SW	未使用
4	F. G.	FRAME GROUND
5	STS HOLD	HOLD
6	D. G.	
7	D. G.	
8		N. G.
9	STS AVE	AVERAGE
10		
11	STS CRC	CRCエラー
12		
13	STS FS ID	H: 48 or 44.056 kHz/L: 44.1 kHz
14	STS EMP	EMPHASIS (H: ON/L: OFF)
15	D. G.	
16	STS MUTE	MUTING
17	WCK+	WORD CLOCK (RS-422)
18	WCK-	
19	BCK+	BIT CLOCK (RS-422)
20	BCK-	
21	DT1+	Ch-1 DATA (RS-422)
22	DT1-	
23	DT2+	Ch-2 DATA (RS-422)
24	DT2-	
25	STS PAR	パリティエラー

◎ RS-422以外は、全てオープン・コレクタ出力

REMOTE: Unphenol, 36 Pin, Female

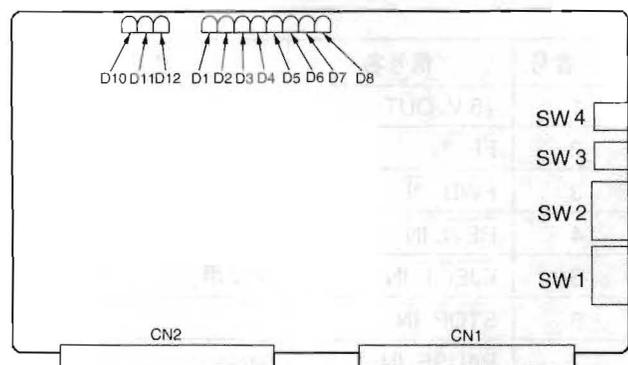


ピン番号	信号名	内容
1	+5 V. OUT	
2	FF. IN	
3	FWD. IN	
4	REW. IN	
5	EJECT. IN	未使用
6	STOP. IN	
7	PAUSE. IN	
8	REC. IN	未使用
9	CUT-IN. IN	
10	EDIT. IN	
11	CUT-OUT. IN	
12	FF. OUT	
13	FWD. OUT	
14	REW. OUT	
15	STNBY. OUT	
16	STOP. OUT	
17	PAUSE-1. OUT	
18	REC. OUT	常時 H (OFF)
19	INS. OUT	
20	V-INS. IN	未使用
21	A1-INS. IN	
22	A2-INS. IN	未使用
23	REV. IN	
24	SPEED-A. IN	
25	SPEED-B. IN	
26	CTL. OUT	未使用
27	TACH. OUT	未使用
28	CAPSTAIN. OUT	未使用
29	SYNC. IN	未使用
30		N. C.
31	H-NORM-FWD. IN	未使用
32	PAUSE-2. OUT	
33	SEARCH. IN	
34		N. C.
35	D. G.	
36	D. G.	

# 1-9. 基板内スイッチ/LED/ジャンパーの設定

## 1. PCM-9000

### MC-41基板



#### スイッチ

SW1/2: 本体動作モード設定スイッチ  
 (詳細はオペレーションマニュアル参照)  
 工場出荷時の設定: SW1-1~SW1-8すべて "I"  
 SW2-1~SW2-8すべて "I"

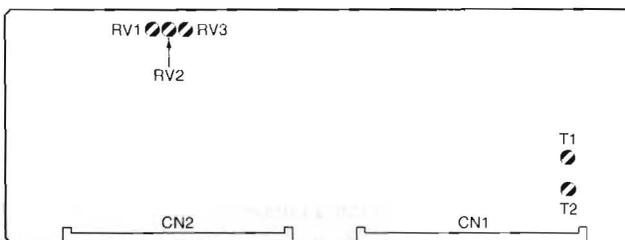
SW2 : 本体テストモード設定スイッチ  
 (詳細はオペレーションマニュアル参照)  
 工場出荷時の設定: 0

SW3 : CPUリセットスイッチ

#### LEDインジケータ

- D1 : MEM-58基板 実装時点灯
- D2 : ED-37基板 実装時点灯
- D3 : CK-41基板 実装時点灯
- D4 : DIO-27基板 実装時点灯
- D5 : OPTION SLOT 1に基板実装時点灯
- D6 : OPTION SLOT 2に基板実装時点灯
- D7 : OPTION SLOT 3に基板実装時点灯
- D8 : OPTION SLOT 4に基板実装時点灯
- D10: CPU RESET時点灯
- D11: CPU停止時点灯
- D12: CPU BUS ERROR時点灯

### CK-41基板



#### ボリューム

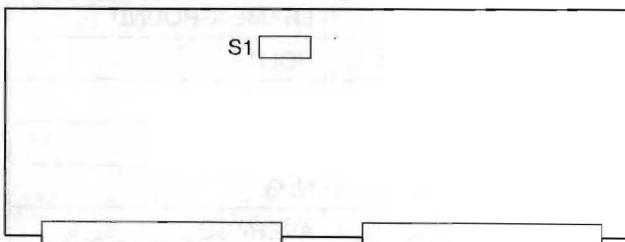
- RV1: Video PLLフリーラン調整 (44.056 k)
- RV2: Video PLLフリーラン調整 (44.1 k)
- RV3: Video PLLフリーラン調整 (48 k)

T1 : VARI PLL調整

T2 : 256Fs PLL調整

調整方法の詳細は "5章 電気調整" 参照。

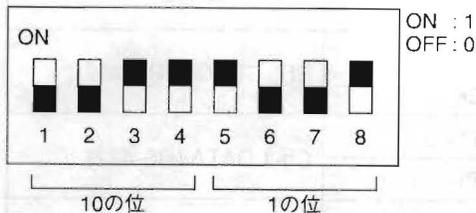
### DIO-27基板



#### スイッチ

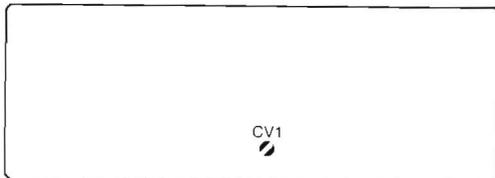
S1 : ソースオリジンデータ (下2桁) 設定スイッチ  
 データはBCDコード  
 S1-1~S1-4 ..... 10の位の設定  
 S1-5~S1-8 ..... 1の位の設定  
 各々の位は2進数 (ON: 1, OFF: 0) で設定  
 工場出荷時の設定: 全てOFF

例 データ (下2桁): 39



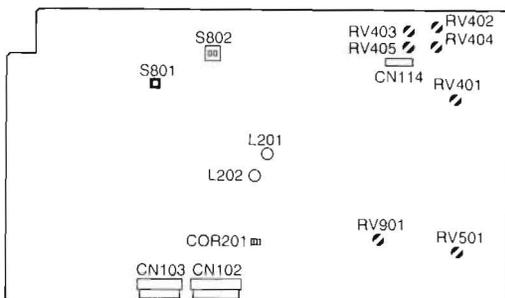
- |            |           |            |     |
|------------|-----------|------------|-----|
| S1-1 → OFF | } 3       | S1-5 → ON  | } 9 |
| S1-2 → OFF |           | S1-6 → OFF |     |
| S1-3 → ON  |           | S1-7 → OFF |     |
| S1-4 → ON  | S1-8 → ON |            |     |

GPM-11基板



CV1: ギャップアクチュエーターの0点調整  
調整方法の詳細は、"4.4. 項 調整" 参照

SV-144基板



ボリューム

- L201 : PLL調整
  - L202 : PLL調整
  - RV401 : PULL INオフセット調整
  - RV402 : フォーカスバイアス調整
  - RV403 : フォーカスゲイン調整
  - RV404 : トラッキングオフセット調整
  - RV405 : トラッキングゲイン調整
  - RV501 : スピンドルオフセット調整
  - RV901 : 磁界ヘッドギャップオフセット調整
- 調整方法の詳細は、"4.4. 項 調整" 参照

スイッチ

- S801 : サーボCPUリセットスイッチ
- S802 : CPU治具モード設定スイッチ

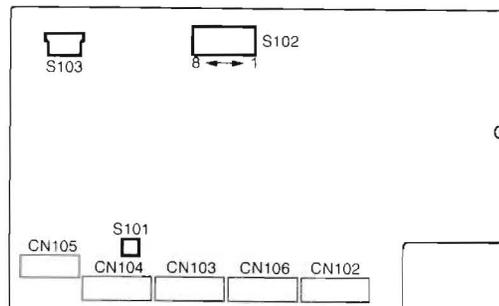
スイッチの設定		説明
S801-1	S802-2	
OFF	OFF	トラックジャンプ単発モード
ON	OFF	
OFF	ON	絶対アドレスアクセス
ON	ON	相対アドレスアクセス

工場出荷時の設定

S802-1, 2 : OFF (通常動作時)

2. RM-D9000

KC-32基板

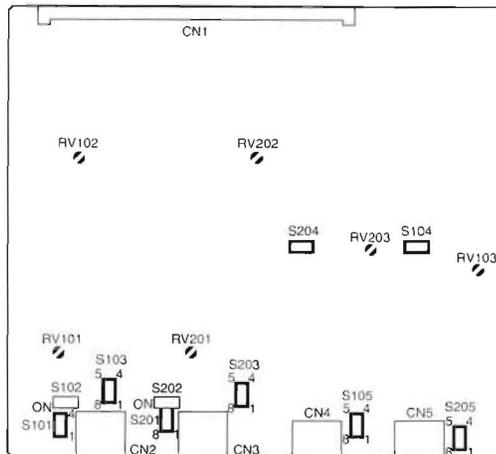


スイッチ

- S101 : RESETスイッチ
  - S102 : モード設定スイッチ  
(詳細はオペレーションマニュアル参照)
- 工場出荷時の設定
- S102-1, 4 : ON
  - S102-2, 3, 5, 6, 7, 8 : OFF
- S103 : RM-D9000電源オン/オフスイッチ

3. DABK-9001

ADA-28基板



ボリューム

- RV101 : 入力CMR調整用 (CH1)
  - RV102 : ADコンバーターOFF SET調整 (CH1)
  - RV103 : 出力平衡アンプバランス調整 (CH1)
  - RV201 : 入力CMR調整用 (CH2)
  - RV202 : ADコンバーターOFF SET調整 (CH2)
  - RV203 : 出力平衡アンプバランス調整 (CH2)
- 調整方法の詳細は "5章 電気調整" 参照。

スイッチ

S101 (S101-1~S101-4): ANALOG INPUT CH1コネクタに入力するアナログオーディオ信号のHOT, COLDを切り換える。

S201 (S201-1~S201-4): ANALOG INPUT CH2コネクタに入力するアナログオーディオ信号のHOT, COLDを切り換える。

S101, S201スイッチの設定により、下表のように、CH1, CH2コネクタのピン配置が変わる。

スイッチの設定								ANALOG AUDIO INPUT CH1 およびCH2コネクタのピン配置		
S101				S201				ピン番号		
-1	-2	-3	-4	-1	-2	-3	-4	1	2	3
ON	ON	OFF	OFF	ON	ON	OFF	OFF	GND	HOT	COLD
OFF	OFF	ON	ON	OFF	OFF	ON	ON	GND	COLD	HOT

←工場出荷時の設定

S103 (S103-1~S103-4),

S203 (S203-1~S203-4): AD変換FULL BIT入力切り換え

スイッチの設定								内容
S103				S203				
-1	-2	-3	-4	-1	-2	-3	-4	
OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	+24 dBs入力時、Full Bit
OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	+21 dBs入力時、Full Bit
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	+18 dBs入力時、Full Bit
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	+15 dBs入力時、Full Bit

←工場出荷時の設定

S104 (S104-1~S104-4),

S204 (S204-1~S204-4): DA変換FULL BIT入力時、LINE OUT出力レベル切り換え

スイッチの設定								内容
S104				S204				
-1	-2	-3	-4	-1	-2	-3	-4	
OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	LINE OUT出力レベル
OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	Full Bit時に+24 dBs出力
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	Full Bit時に+21 dBs出力
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	Full Bit時に+18 dBs出力
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	Full Bit時に+15 dBs出力

←工場出荷時の設定

S105 (S105-1~S105-4): ANALOG OUTPUT CH1コネクタから出力されるアナログオーディオ信号のHOT, COLDを切り換える。

S205 (S205-1~S205-4): ANALOG OUTPUT CH2コネクタから出力されるアナログオーディオ信号のHOT, COLDを切り換える。

S105, S205スイッチの設定により、下表のように、CH1, CH2コネクタのピン配置が切り換わる

スイッチの設定								ANALOG AUDIO OUTPUT CH1 およびCH2コネクタのピン配置		
S105				S205				ピン番号		
-1	-2	-3	-4	-1	-2	-3	-4	1	2	3
ON	ON	OFF	OFF	ON	ON	OFF	OFF	GND	HOT	COLD
OFF	OFF	ON	ON	OFF	OFF	ON	ON	GND	COLD	HOT

←工場出荷時の設定

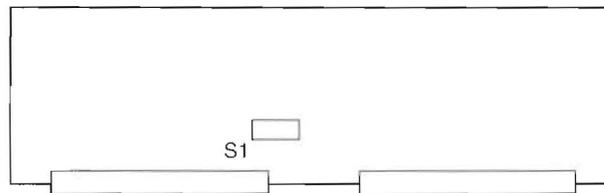
S102, S202: AUDIO INPUT端子CH1, CH2に入力されるアナログオーディオ信号の入力インピーダンスを設定する。

スイッチの設定		機能
S102	ON	CH1の入力インピーダンス : 600Ω
	OFF	CH1の入力インピーダンス : 20kΩ
S202	ON	CH2の入力インピーダンス : 600Ω
	OFF	CH2の入力インピーダンス : 20kΩ

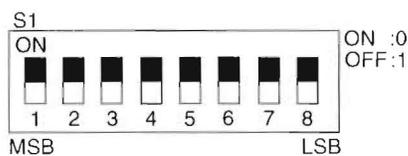
工場出荷時の設定; S102, S202ともOFFに設定

#### 4. DABK-9007

##### MEM-58基板



S1: インサクションモードでの外部接続機器処理ディレーの補正



インサクションモードで使用する時は、接続する機器の処理ディレー量を設定する。

各ビットの重みづけは、下表のようにになっている。目的のディレー量になるように、各ビットを組み合わせて設定する。

S1の設定		ディレー量
S1-1	ON	0
	OFF	128
S1-2	ON	0
	OFF	64
S1-3	ON	0
	OFF	32
S1-4	ON	0
	OFF	16
S1-5	ON	0
	OFF	8
S1-6	ON	0
	OFF	4
S1-7	ON	0
	OFF	2
S1-8	ON	0
	OFF	1

(単位: WORD数)

##### 工場出荷時の設定

S1-1~S1-8 : すべてON

例: 100 WORDディレーの場合

$$100 = 64 + 32 + 4$$

##### S1の設定

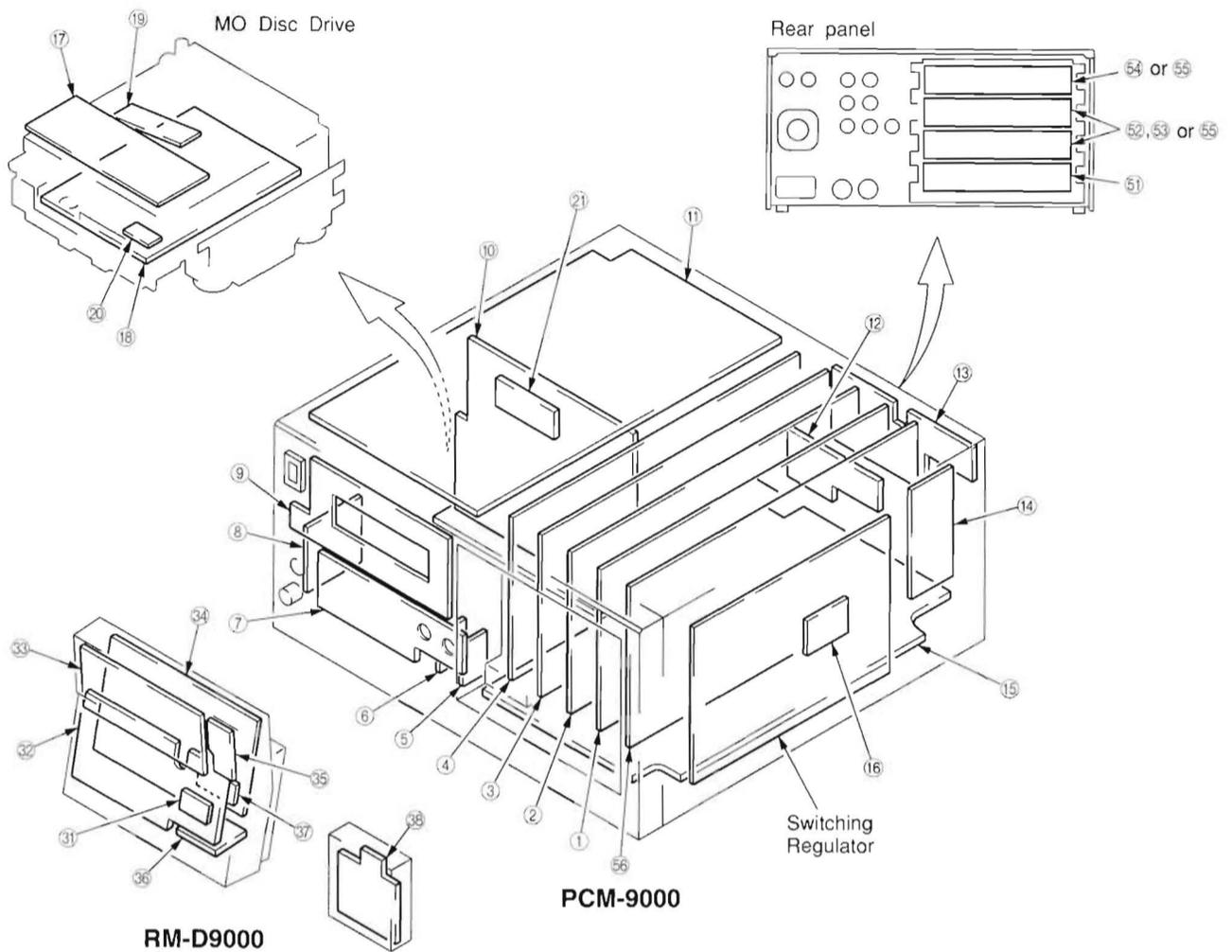
S1-2, 3, 6 : OFF

S1-1, 4, 5, 7, 8 : ON



## 第 2 章 サービスインフォメーション

### 2-1. 主要部品配置図



#### PCM-9000

- |          |                      |
|----------|----------------------|
| ① ED-37  | ⑪ SV-144             |
| ② CK-41  | ⑫ CN-915             |
| ③ DIO-27 | ⑬ CN-902             |
| ④ MC-41  | ⑭ PS-345             |
| ⑤ VR-169 | ⑮ MB-490             |
| ⑥ VR-168 | ⑯ PS-354             |
| ⑦ KY-264 | ⑰ SVD-9              |
| ⑧ JK-42  | MO Disc Drive        |
| ⑨ KY-265 | ⑰ MD-87              |
| ⑩ MB-491 | ⑱ TR-82              |
|          | ⑲ GPM-11 (OWH Ass'y) |
|          | ⑳ SE-209             |

#### RM-D9000

- |          |
|----------|
| ⑳ LE-120 |
| ㉑ KY-267 |
| ㉒ DP-195 |
| ㉓ KC-32  |
| ㉔ KY-269 |
| ㉕ CN-883 |
| ㉖ ROM-16 |
| ㉗ KY-297 |

#### DABK-9001

- |                  |
|------------------|
| ㉘ ADA-28         |
| <b>DABK-9003</b> |
| ㉙ TC-77/78       |
| <b>DABK-9004</b> |
| ㉚ DIO-28         |

#### DABK-9005

- |                  |
|------------------|
| ㉛ IF-436/437     |
| <b>DABK-9006</b> |
| ㉜ IF-438         |
| <b>DABK-9007</b> |
| ㉝ MEM-58         |

2-2. 回路構成

機種名	基板名	機能
PCM-9000	CK-41	CLOCK BOARD
	CN-902	CONNECTOR BOARD
	CN-915	CONNECTOR BOARD
	DIO-27	AES/EBU DIGITAL I/O, HEADPHONES BOARD
	ED-37	EDIT BOARD
	GPM-11	GAP SENSOR BOARD
	JK-42	HEADPHONES BOARD
	KY-264	KEY SWITCH BOARD
	KY-265	KEY SWITCH BOARD
	MB-490	MOTHER BOARD
	MB-491	MOTHER BOARD
	MC-41	MAIN CPU BOARD
	MD-87	MAGNETIC HEAD DRIVE BOARD
	PS-345	D/C CONVERTER BOARD
	PS-354	SWITCHING BOARD
	SE-209	SENSOR BOARD
	SV-144	SERVO BOARD
	SVD-9	SERVO DRIVER BOARD
	TR-82	RF BOARD
	VR-168	VR BOARD
VR-169	VR BOARD	
RM-D9000	CN-883	CONNECTOR BOARD
	DP-195	FL DRIVER BOARD
	KC-32	KEY CONTROL BOARD
	KY-267	KEY BOARD
	KY-269	KEY BOARD
	LE-120	LED BOARD
	KY-297	TEN KEY BOARD
DABK-9001	ADA-28	AD/DA CONVERTER BOARD
DABK-9003	TC-77, TC-78	REMOTE/TC I/F BOARD
DABK-9004	DIO-28	SDIF-2 I/F BOARD
DABK-9005	IF-436, IF-437	SCSI I/F BOARD
DABK-9006	IF-438	DAQ-1000 I/F BOARD
DABK-9007	MEM-58	MEMORY BOARD

## 2-3. 外装の取り外し

### 2-3-1. 天板、側板(左/右)、底板の取り外し

#### 天板

固定しているネジA (4×6 Sタイト) 4本を外し、天板を取り外す。

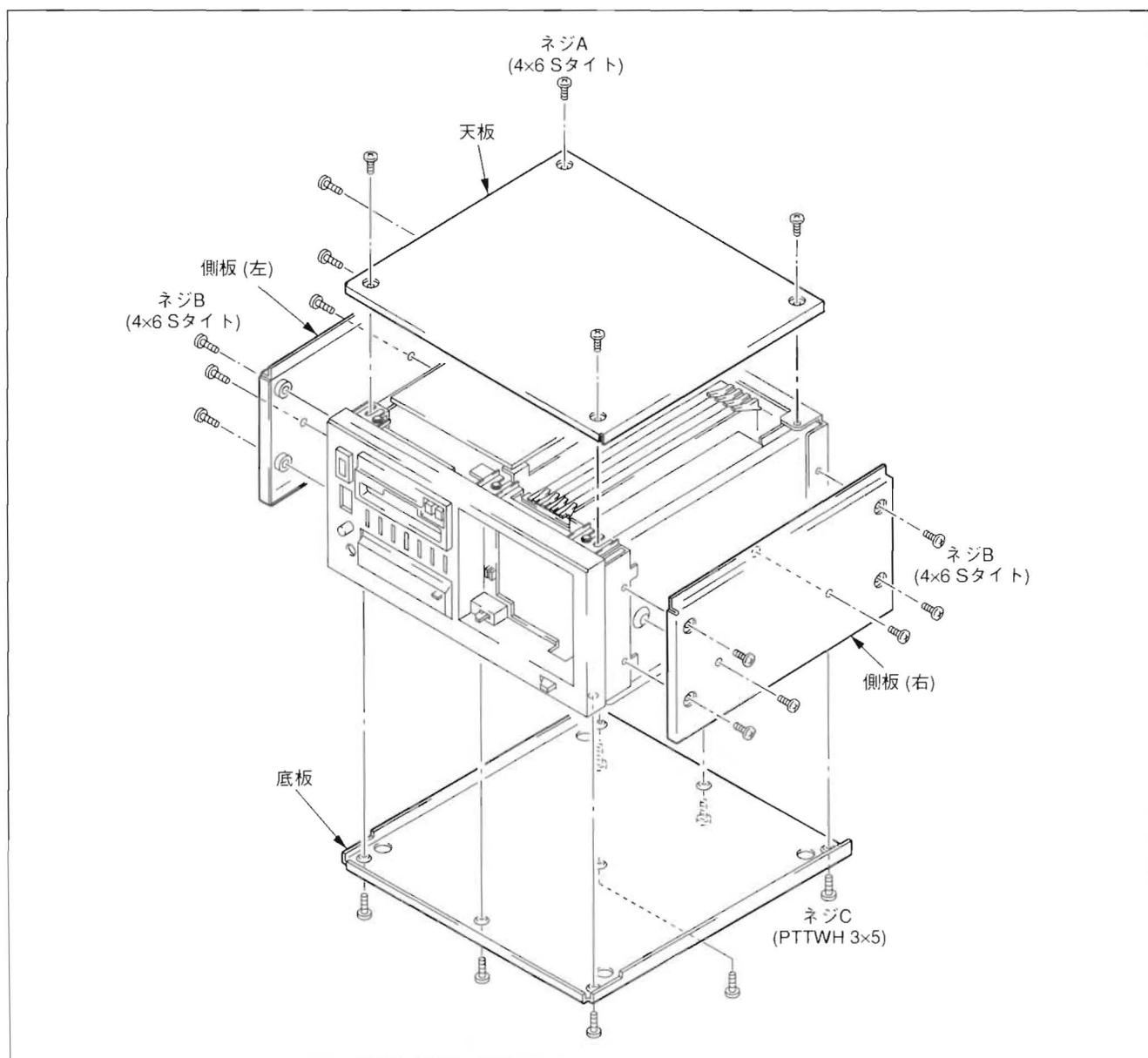
#### 側板

固定しているネジB (4×6 Sタイト) 6本を外し、側板 (右または左) を取り外す。

注意: 側板 (左) には吸気用の穴があいている。側板 (右) には穴はない。取り付けの際、(左) (右) の側板を間違えないようにする。

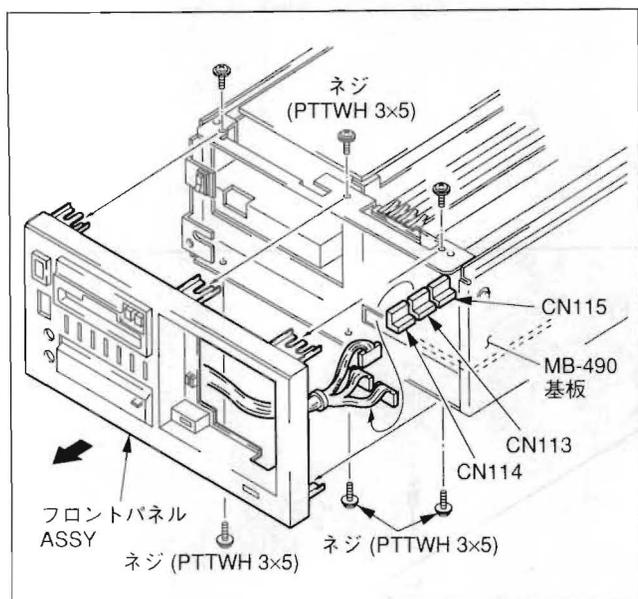
#### 底板

左右の側板を緩めるか、取り外してから固定しているネジC (PTTWH 3×5) 7本を外し、底板を取り外す。



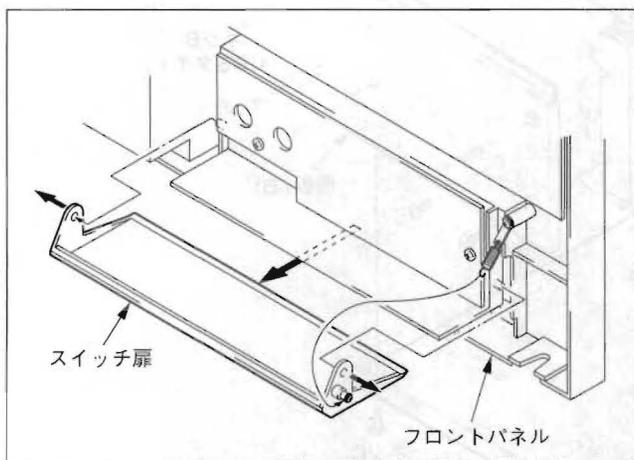
### 2-3-2. フロントパネル Ass'yの取り外し

- (1) 天板を外す。(2-3. 項 参照)
- (2) プラグイン基板を全て引き抜く。(2-4. 項 参照)
- (3) ネジ (PTTWH 3×5) 6本を外す。
- (4) MB-490基板のコネクターCN113, CN114, CN115よりハーネスを外す。
- (5) フロントパネル Ass'yを矢印方向に外す。



### 2-3-3. スイッチ扉の取り外し

- (1) フロントパネルを取り外す。(2-3. 項 参照)
- (2) フロントパネルの裏側から、図のようにスイッチ扉を取り外す。



### 2-4. プラグイン基板の引き抜き/挿入

下記プラグイン基板の抜き差しは以下のように行う。

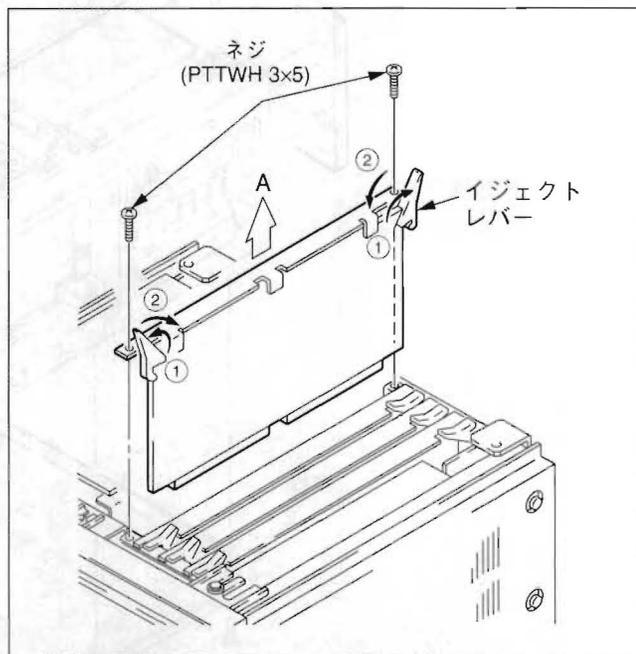
- MC-41基板
- DIO-27基板
- CK-41基板
- ED-37基板
- MEM-58基板 (DABK-9007装着時)

注意: 基板の着脱は、PCM-9000の電源 (POWER) スイッチをOFFにした状態で行うこと。

#### 準備

天板を外す。(2-3. 項 参照)

1. プラグイン基板の引き抜き
  - (1) 固定ネジ (PTTWH 3×5) 2本を外す。
  - (2) イジェクトレバーを矢印方向①に起こし、プラグイン基板を矢印方向Aに引き抜く。
2. プラグイン基板の挿入
  - (1) イジェクトレバーを矢印方向②に倒す。
  - (2) プラグイン基板を、スロットに差し込む。
  - (3) ネジ (PTTWH 3×5) 2本でプラグイン基板を固定する。



## 2-5. 延長基板の使用法

注意: 基板の着脱は、PCM-9000の電源 (POWER) スイッチをOFFにした状態で行うこと。

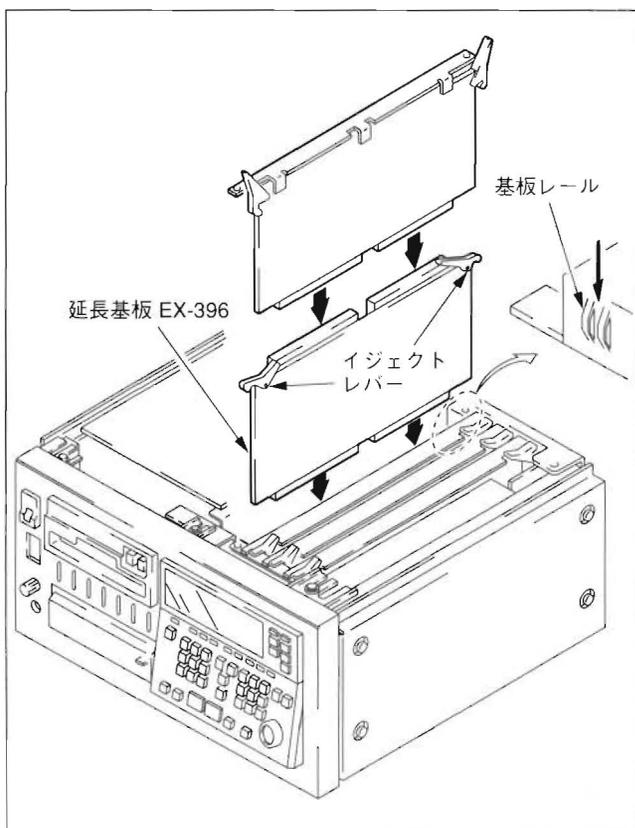
### 2-5-1. 延長基板EX-396の使用法

延長基板EX-396は下記基板を点検等で延長する際に使用する。

- MC-41基板
- DIO-27基板
- CK-41基板
- ED-37基板
- MEM-58基板 (DABK-9007装着時)

#### 手順

- (1) 天板を外す。(2-3. 項 参照)
- (2) 延長する基板のネジ2本を外す。  
左右のイジェクトレバーを開き、基板を本体より引き抜く。(2-4. 項 参照)
- (3) 基板を抜いた後に、延長基板EX-396のイジェクトレバーを閉じ、基板レールに合わせ矢印方向に差し込む。
- (4) 延長基板EX-396のコネクターに取り外した基板を差し込む。



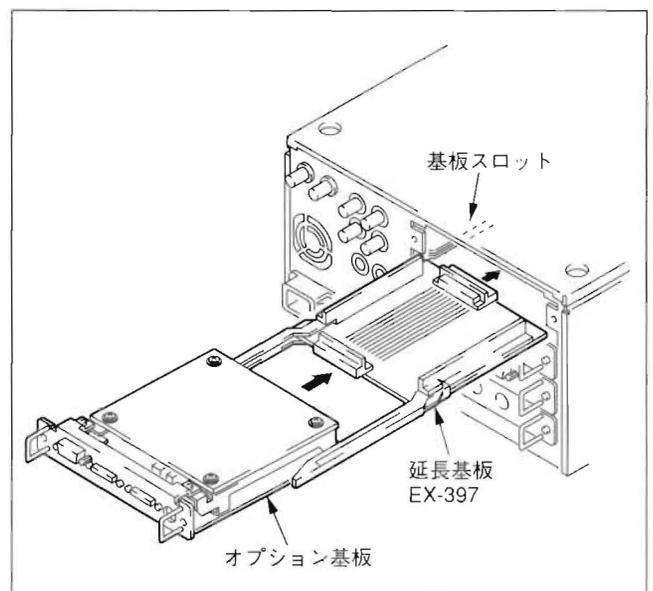
### 2-5-2. 延長基板EX-397の使用法

延長基板EX-397は下記オプション基板を点検等で延長する際に使用する。

- DABK-9001 (ADA-28基板)
- DABK-9003 (TC-77/78基板)
- DABK-9004 (DIO-28基板)
- DABK-9005 (IF-436/437基板)
- DABK-9006 (IF-438基板)

#### 手順

- (1) 延長するオプション基板のネジ2本を外す。  
基板パネル両わきの取っ手を持ち、オプション基板を矢印方向に本体より引き抜く。
- (2) オプション基板を抜いた後に、延長基板EX-397を基板スロットに合わせ、矢印方向に差し込む。
- (3) 延長基板EX-397のコネクターに取り外したオプション基板を差し込む。



## 2-6. 緊急時のディスクの取り出し方法

ユニットの故障等でディスクが取り出せないときは、以下のようにしてディスクを取り出すことができる。

### 用意する部品

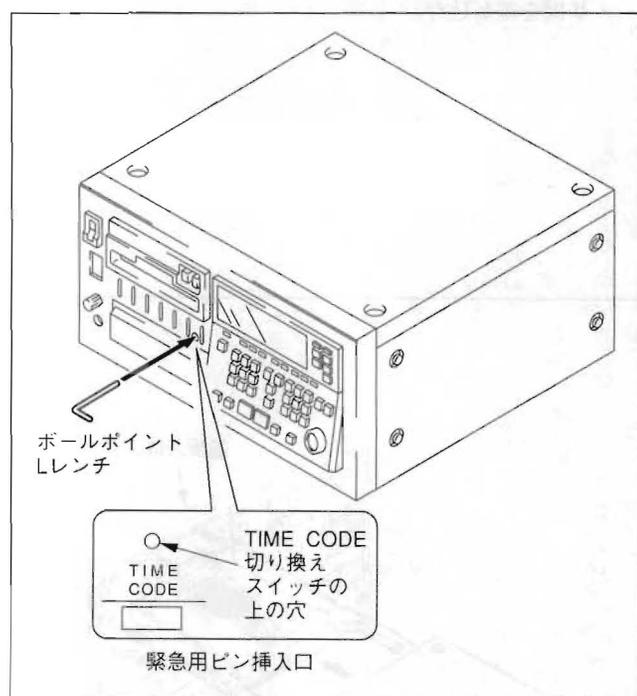
ボールポイントレンチ BL2MM (付属品)

### 手順

- (1) 電源 (POWER) スイッチを切る。
- (2) 図のボールポイントレンチを緊急用ピン挿入口に差し込み、まっすぐに強く押す。

ディスクがイジェクトされ、取り出すことができる。

注意: 緊急イジェクト後、初めてディスクを挿入したとき、ディスクを排出するが、異状ではない。2度目の挿入からは、通常にローディングを行うことができる。



## 2-7. 治工具、測定器

### 使用機器

名称	仕様 (minimum)	機器名
オシロスコープ	周波数帯域 : DC-20 MHz以上 掃引時間 : 20 ns/divまで可能	Tektronix 2445, 475または相当品
2針式レベルメータ	分解能 : 0.1 dB以上	Leader LMV1815, LMV189ARまたは相当品
DC電圧計	分解能 : 1 mV以上	Advantest TR-6855または相当品
周波数カウンタ	有効桁数 : 8桁以上 周波数 : 20 MHzまで測定可能	Advantest TR-5822または相当品
ビデオモニタ	ビデオ入力端子 (BNC) 付のモニタ	—————
BNCケーブル	使用ケーブル : 同軸ケーブル3C-2V	SONY UGC -0.5 (0.5 m) SONY UGC -1 (1 m) SONY UGC -2 (2 m) } または相当品

### 治工具

名称	部品番号	備考
簡易MC治具	J-6400-850-A	調整用ROM付属
サーボゲイン調整治具	J-6400-890-A	
磁界ヘッドギャップ調整ディスク	J-6405-010-A	
ヘッドポジション調整治具 (NTSC)	J-6405-020-A	CCDカメラ, レンズ, カメラアダプタ, カメラケーブル, カメラホルダ付属
ヘッドポジション調整治具 (PAL)	J-6405-350-A	CCDカメラ, レンズ, カメラアダプタ, カメラケーブル, カメラホルダ付属
ヘッドポジション調整用 カートリッジ	J-6405-320-A	
偏芯ドライバ (2-4)	3-702-390-01	
延長基板 EX-396	J-6400-860-A	メイン基板用
延長基板 EX-397	J-6400-870-A	オプション基板用
テストディスク (3T-熱イレース)	J-6401-060-A	
ブロックエラーレートチェッカー	J-6400-880-A	
AAIPエラーレートチェッカー	J-6400-840-A	
ローパスフィルター治具	J-6401-070-A	

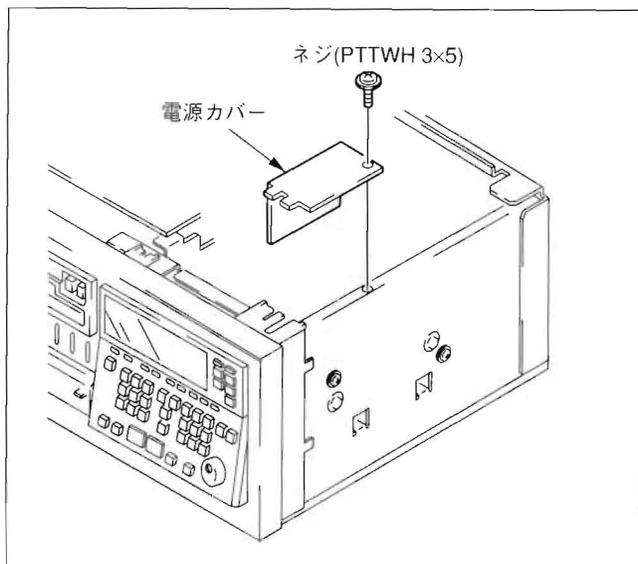
## 第4章 主要部品の交換および調整

### 4-1. 電源の交換

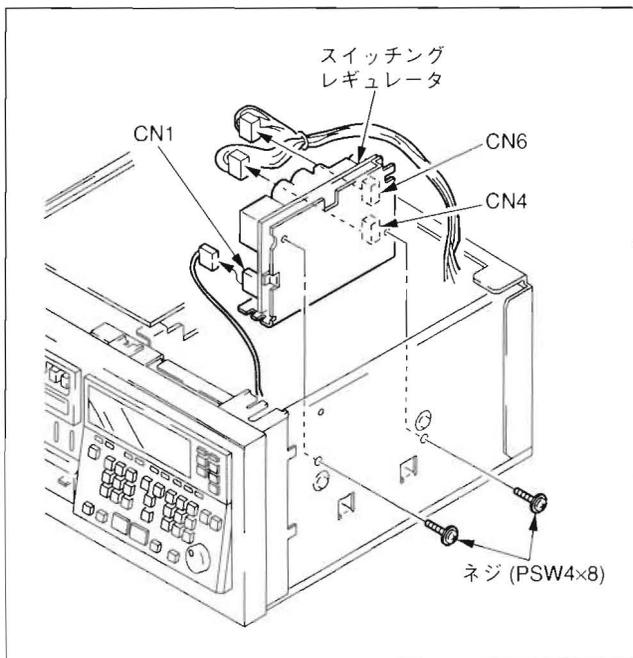
#### 4-1-1. スイッチングレギュレータの交換

注意: 必ず電源コードをコンセントから外した状態にして行う。

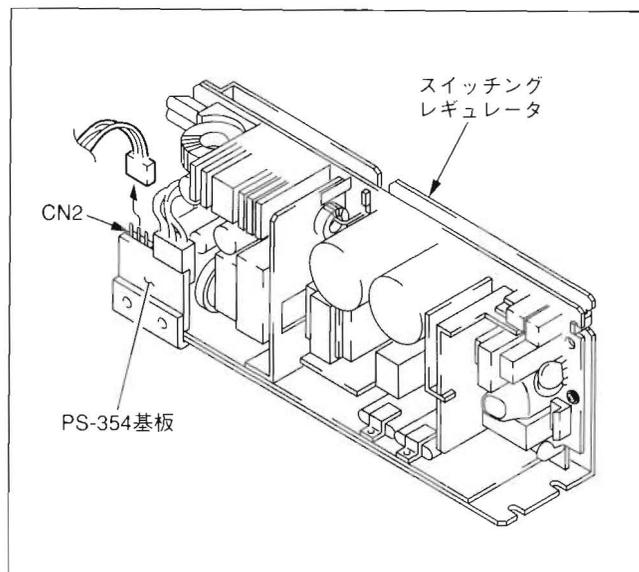
- (1) 天板および側板(右)を取り外す。(2-3.項 参照)
- (2) ネジ(PTTWH 3×5) 1本を外し、電源カバーを取り外す。



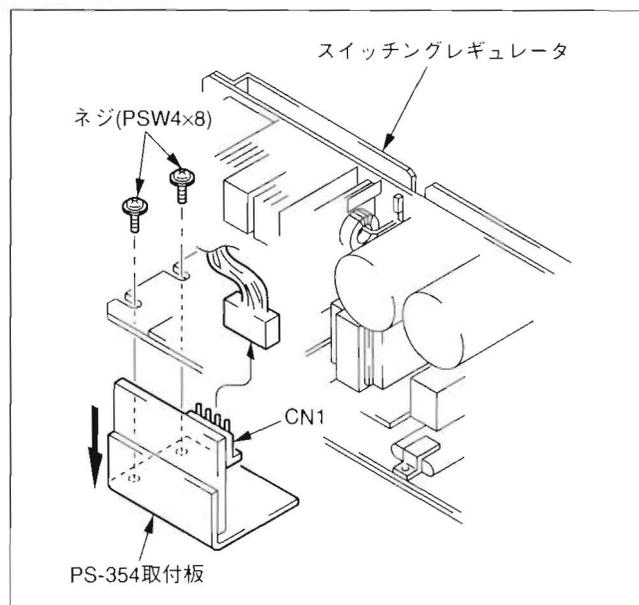
- (3) ネジ(PSW 4×8) 2本を外す。スイッチングレギュレータのコネクタ3個(CN1, CN4, CN6)よりハーネスを外す。



- (4) PS-354基板のコネクタ(CN2)よりハーネスを外し、スイッチングレギュレータを取り外す。



- (5) PS-354基板のコネクタ(CN1)よりハーネスを外す。ネジ(PSW 4×8) 2本を外し、PS-354取付板をスイッチングレギュレータから取り外す。

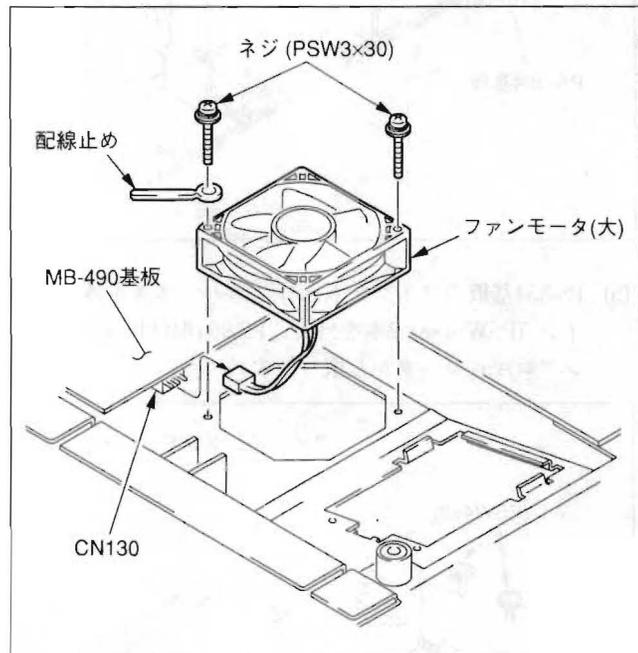


- (6) 新しいスイッチングレギュレータを(1)~(5)の逆の手順で取り付ける。
- (7) スイッチングレギュレータを交換後は、"4-4. 調整"を行う。

## 4-2. ファンモーター/エアフィルタの交換

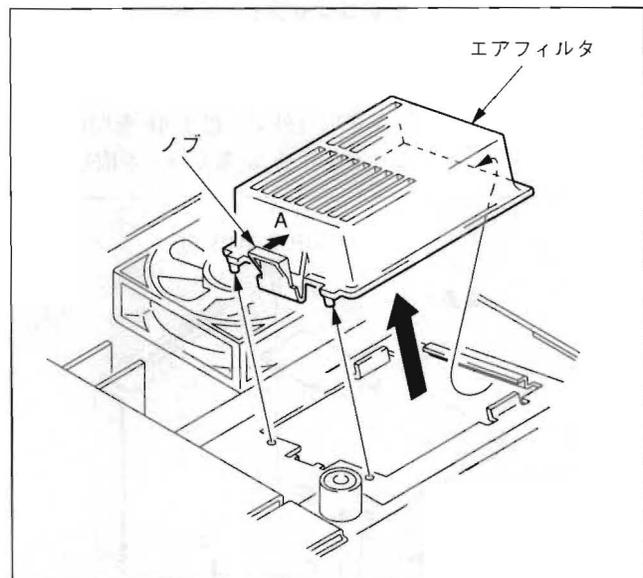
### 4-2-1. ファンモーター (大) の交換

- (1) セットの底板側を上にして置く。
- (2) 底板を取り外す。(2-3. 項 参照)
- (3) ファンモーター (大) のハーネスをMB-490基板のコネクタ (CN130) より外す。
- (4) ネジ (PSW 3×30) 2本を外し、ファンモーター (大) を取り外す。
- (5) 新しいファンモーター (大) を(1)～(4)の逆の手順で取り付け。取り付け時には、ファンモーター (大) のハーネスがたるまないように配線止めで固定する。



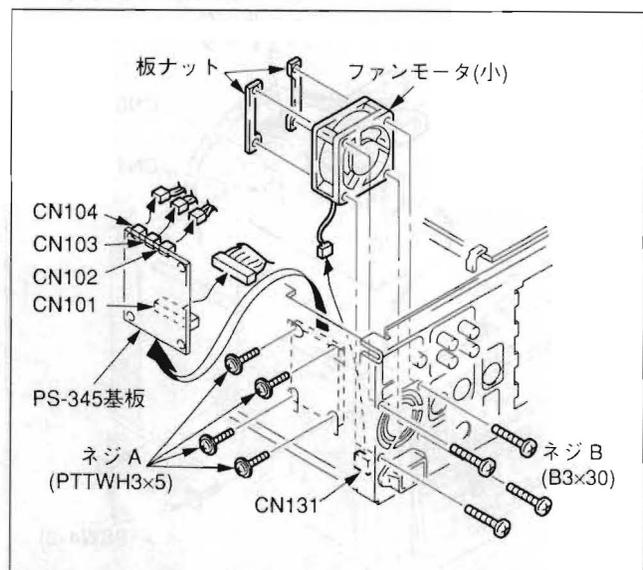
### 4-2-2. エアフィルタの交換

- (1) セットの底板側を上にして置く。
- (2) 底板を取り外す。(2-3. 項 参照)
- (3) 図に示すノブをAの方向に押し、エアフィルタを取り外す。
- (4) (1)～(3)の逆の手順で取り付ける。



### 4-2-3. ファンモーター (小) の交換

- (1) PS-345基板のハーネスをコネクタ (CN101～CN104) から外す。ネジ (PTTWH 3×5) 4本を外し、PS-345基板を取り外す。
- (2) ファンモーター (小) のハーネスをMB-490基板のコネクタ (CN131) より外す。
- (3) 板ナット2個、ネジ (B 3×30) 4本を外してファンモーター (小) を取り外す。



- (4) 新しいファンモーターおよびPS-345基板を(1)～(3)の逆の手順で取り付ける。

### 4-3. M/Oディスクドライブの交換

この項では、M/Oディスクドライブの下記部品の交換方法を説明する。

- 注意: 1. M/Oディスクドライブの部品の交換/修理/調整は、ソニーのサービスセンターに依頼すること。  
2. 作業は必ず電源スイッチをOFFにして行う。

#### 4-3-1. OWH Ass'yの交換

#### 4-3-2. ローディングAss'yの交換

#### 4-3-3. スピンドルモータの交換

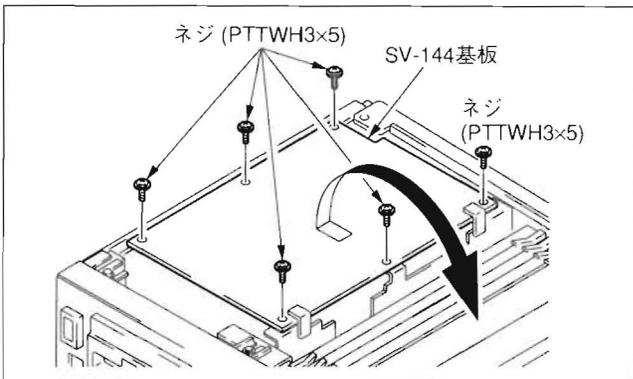
#### 4-3-4. 光学ピックアップの交換

#### 4-3-5. ギアードモータの交換

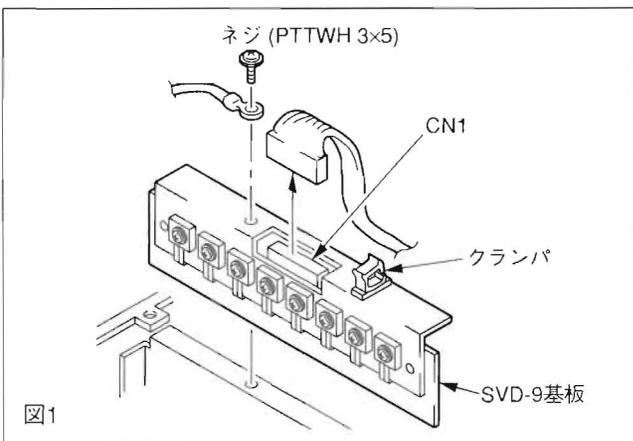
### 準備

#### M/Oディスクドライブの取り外し

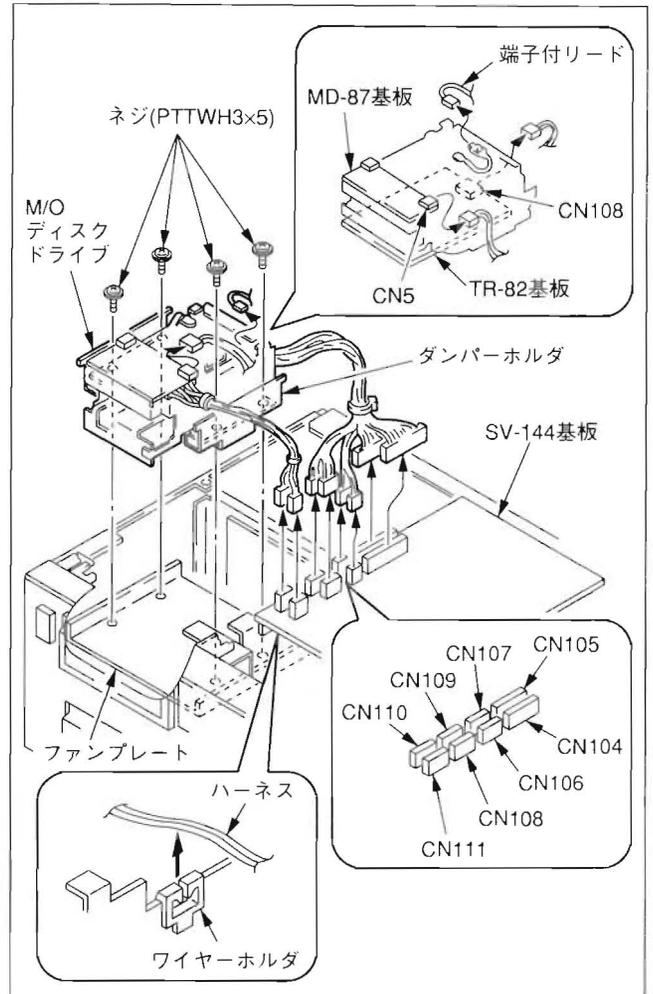
- (1) 天板を取り外す。(2-3. 項 参照)  
ネジ (PTTWH 3×5) 6本を外して、SV-144基板を開く。



- ① SVD-9基板のハーネスを図1に示すクランパから外し、SVD-9基板のコネクタ (CN1) から外す。
- ② ネジ (PTTWH 3×5) 1本を外して、SVD-9基板を取り外す。



- (2) M/OディスクドライブのハーネスをSV-144基板のコネクタ8個 (CN104~CN111), およびMD-87基板のコネクタ (CN5) より外す。
- (3) SV-144基板のCN110, CN111から外したハーネスをワイヤーホルダから外す。
- (4) 端子付リードを外す。
- (5) ネジ (PTTWH 3×5) 4本を外して、M/Oディスクドライブのリア側を先に持ち上げながら取り外し、TR-82基板のコネクタ (CN108) よりハーネスを外す。

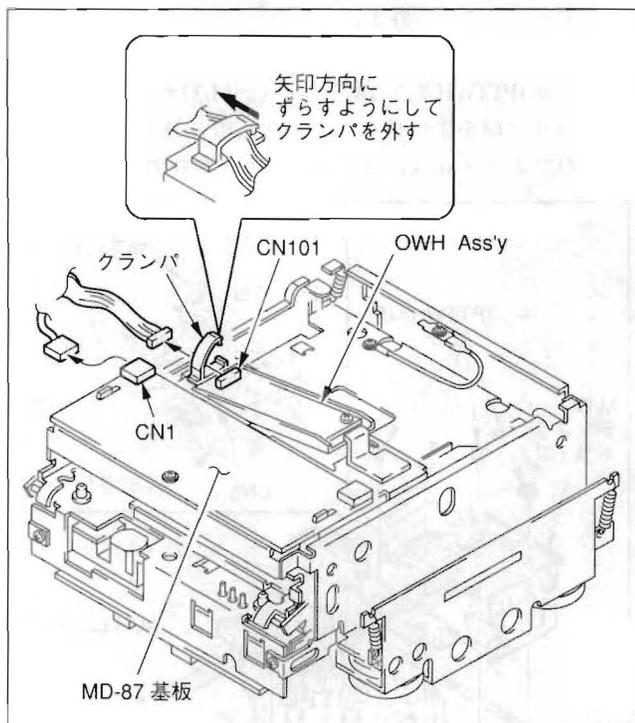


- (6) (1)~(5) の逆の手順でM/Oディスクドライブを取り付ける。

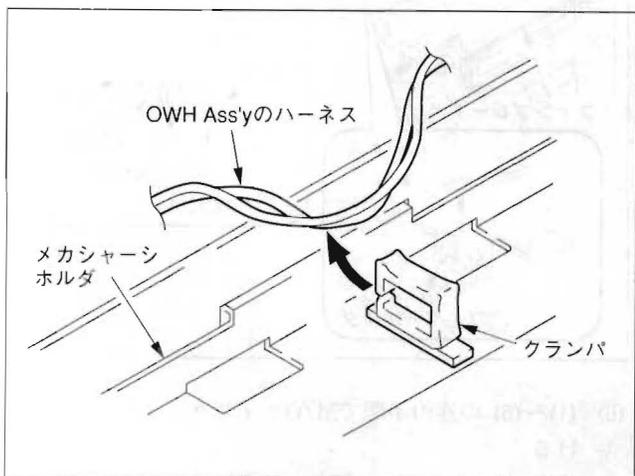
注意: M/Oディスクドライブを取り付ける時、ダンパーホルダのダボとファンプレートの穴を合わせる事。

#### 4-3-1. OWH Ass'yの交換

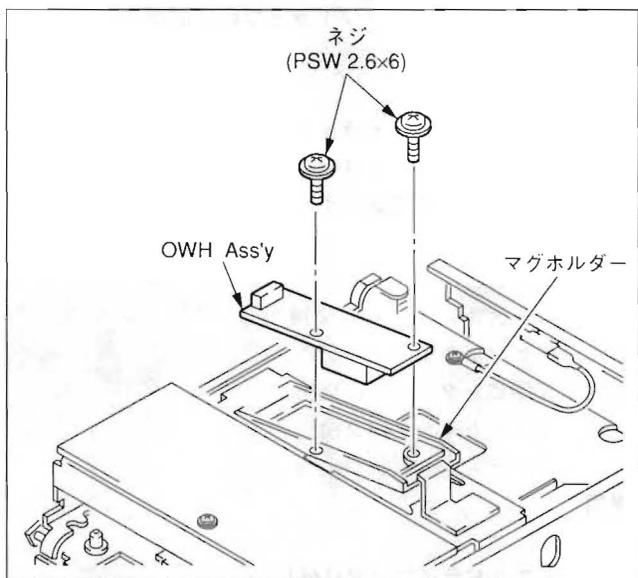
- (1) 図に示すクランパからハーネスを外し、OWH Ass'yのコネクタ (CN101), MD-87基板のコネクタ (CN1) よりハーネスを外す。



- (2) メカシャーシホルダ上のクランパからOWH Ass'y のハーネスを外す。



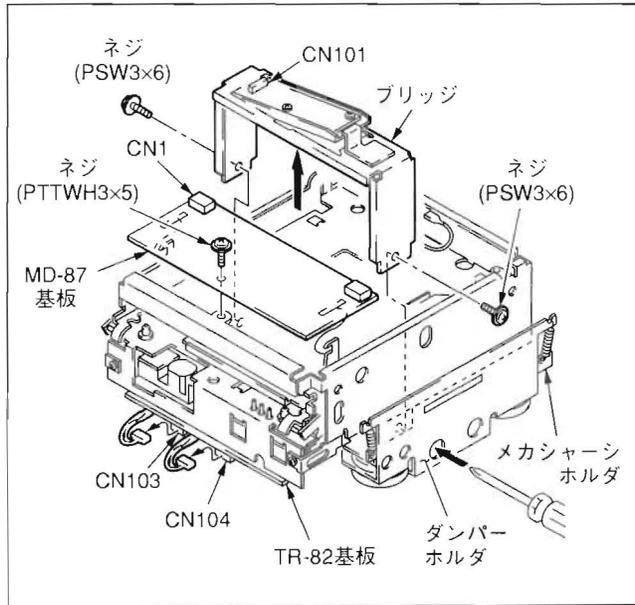
- (3) ネジ (PSW 2.6×6) 2本を外し、マグホルダーからOWH Ass'yを取り外す。



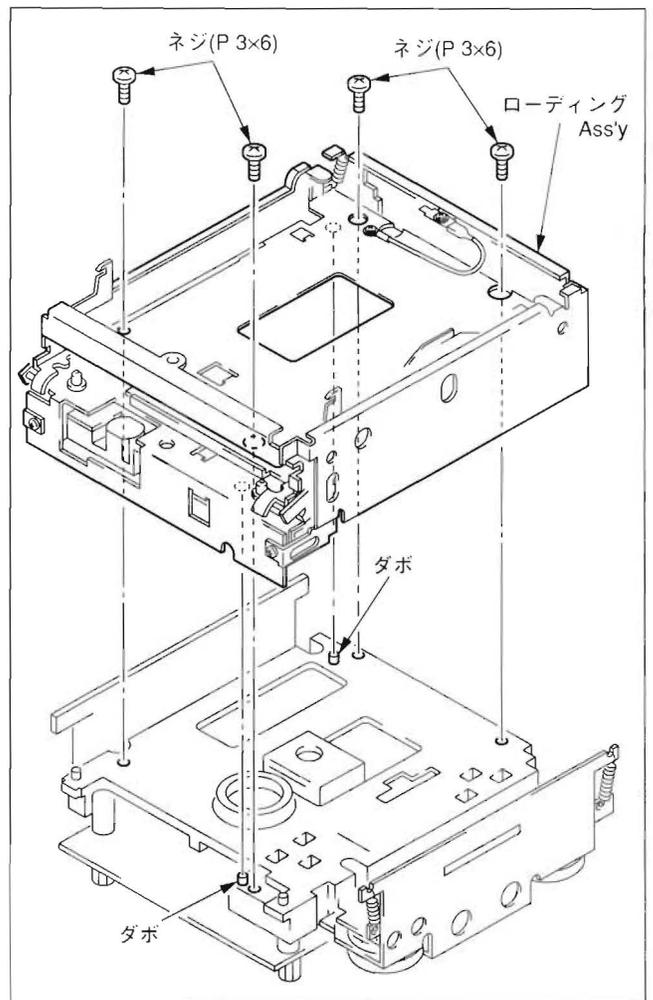
- (4) (1)~(3) の逆の手順で新しいOWH Ass'yを取り付ける。  
注意: OWH Ass'yのフレキシブルカード電線を折り曲げないように注意する。
- (5) M/Oディスクドライブを本体に取り付け後、"4.4. 調整"を行う。

#### 4-3-2. ローディングAss'yの交換

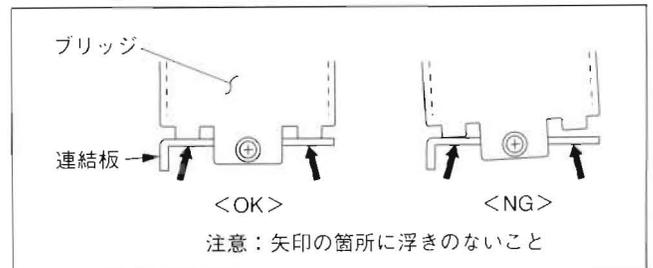
- (1) OWH Ass'yのコネクタ (CN101), MD-87基板のコネクタ (CN1) よりハーネスを外す。(4-3-1. 項 参照)
- (2) ダンパーホルダの穴からドライバを差し込み、ネジ (PSW 3×6), 2本を外してブリッジを取り外す。  
注意: ダンパーホルダの穴とネジの位置が合っていない場合には、TR-82基板を外し (4-3-3. 項 参照)、メカシャーシホルダをダンパーホルダごとメカシャーシから取り外してから上記の作業を行う。
- (3) ネジ (PTTWH 3×5) 1本を外し、MD-87基板を取り外す。
- (4) TR-82基板のコネクタ (CN103, CN104) からハーネスを外す。



- (5) 図示4ヶ所の穴からドライバを差し込み、ネジ (P 3×6) 4本を外してローディングAss'yを取り外す。



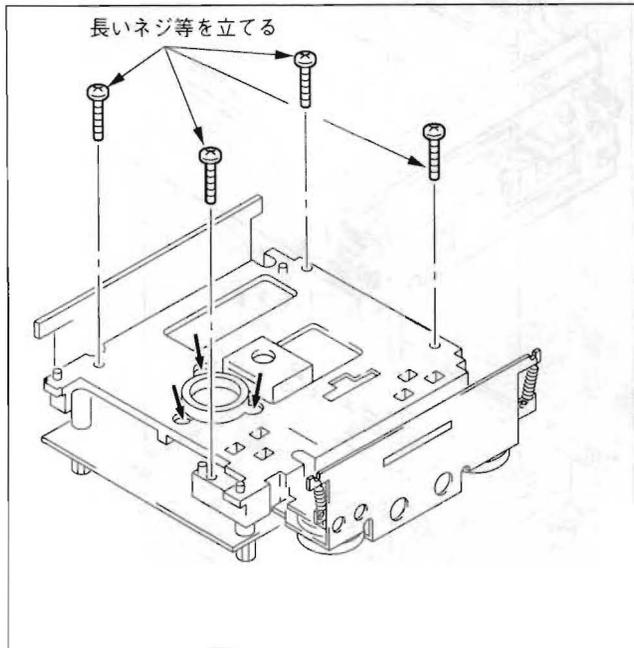
- (6) (1)~(5) の逆の手順で新しいローディングAss'yをM/Oディスクドライブに取り付ける。  
注意: 1. メカシャーシのダボ2ヶ所とローディングAss'yの穴を合わせてネジどめする。  
2. ブリッジを取り付ける時、連結板からの浮きが無いようにブリッジを連結板に押さえつけながらネジどめする。



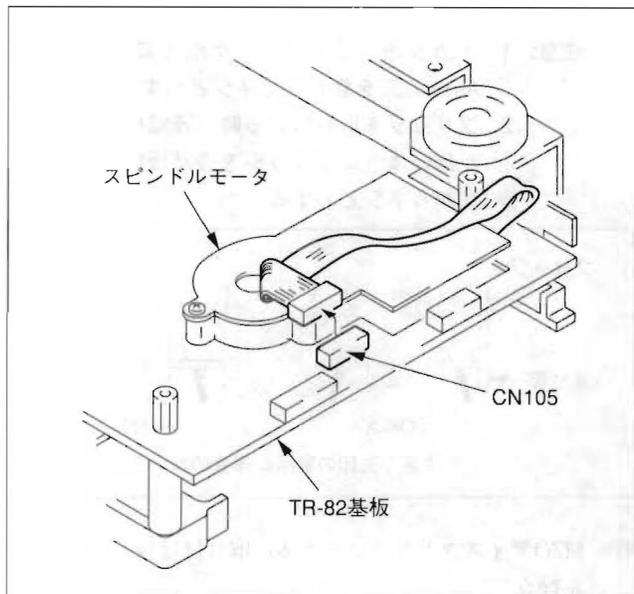
- (7) M/Oディスクドライブを本体に取り付け後、"4-4. 調整"を行う。

### 4-3-3. スピンドルモータの交換

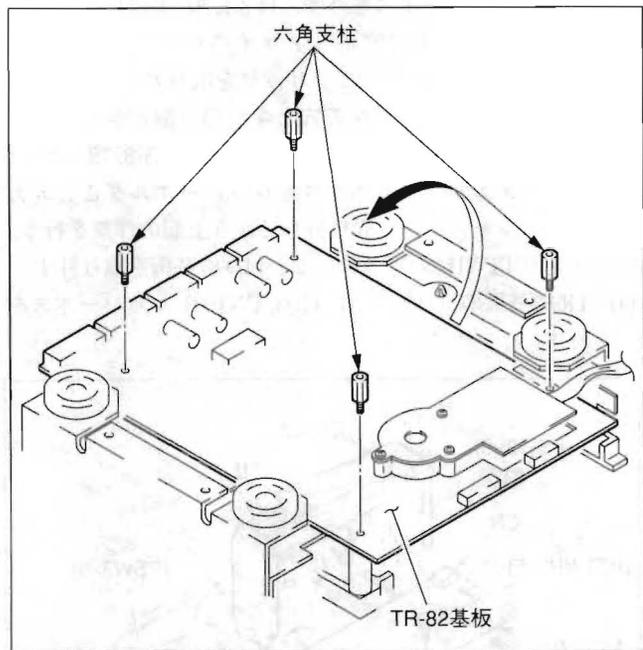
- (1) "4-3-2. ローディングAsslyの交換" を参照してローディングAsslyを取り外す。
- (2) 下図 → 部 (3ヶ所) のネジを緩める。  
注意: ネジを外さないこと。
- (3) M/Oディスクドライブの底面を上にして置く。  
注意: この時ターンテーブル、光学ピックアップに負担がかからないように図の位置に長いネジ等を立てること。



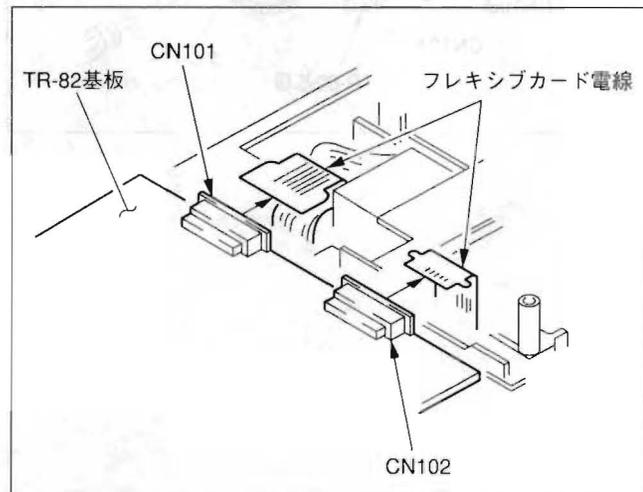
- (4) TR-82基板のコネクタ (CN105) からスピンドルモータのハーネスを外す。



- (5) 六角支柱4本をTR-82基板から外す。
- (6) TR-82基板を矢印方向に開く。

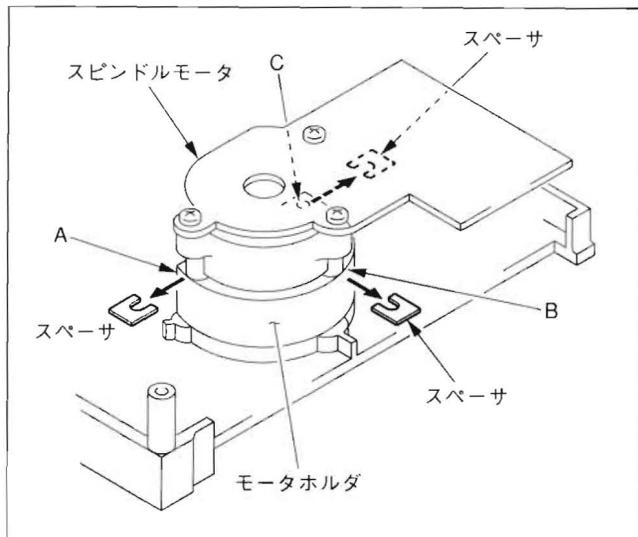


- (7) コネクタ2個 (CN101, CN102) からフレキシブルカード電線を外す。  
注意: フレキシブルカード電線は、折れに対し著しく寿命を短くするので取扱には十分注意すること。



- (8) スピンドルモーターとモーターホルダーの間のスペーサー (2枚) を取り外す。

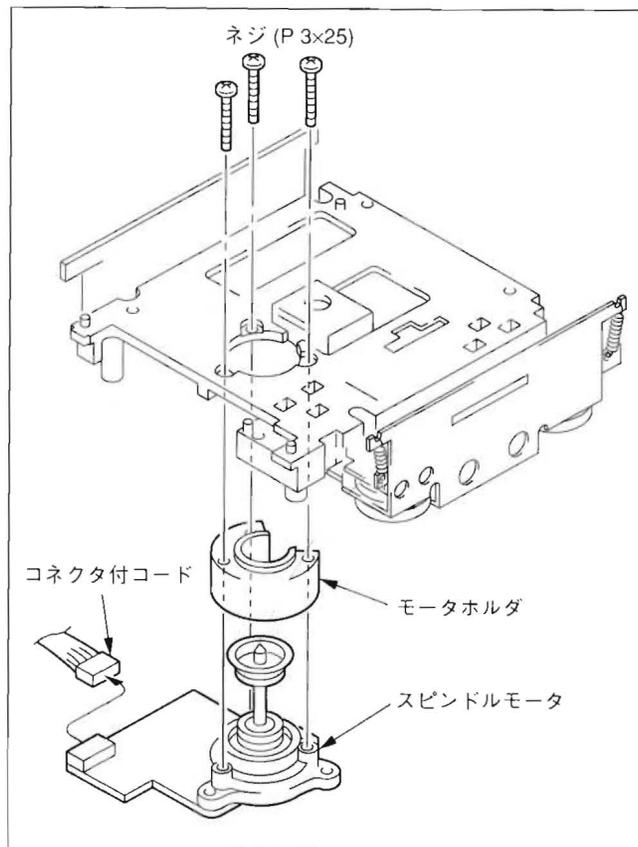
注意: スペーサーは光学ピックアップの対物レンズの傾きに合わせてスピンドルモーターを傾けるために使用しているもので、("4-3-4. 光学ピックアップの交換"参照) その厚さはM/Oディスクドライブ毎に異なる。また2枚のスペーサーの厚さも異なるため、スペーサーを外す時はどの位置に、どのスペーサーが取り付いていたか記録しておき、スピンドルモーター取付時には、元通りに戻すこと。尚、光学ピックアップの対物レンズの傾きがないものについてはスペーサーは使われていない。



スペーサーを使用している場合には図のAとB、またはBとCの位置のスピンドルモーターとモーターホルダーの間にはさまれている。2枚のスペーサーの厚さには必ず次のような関係がある。

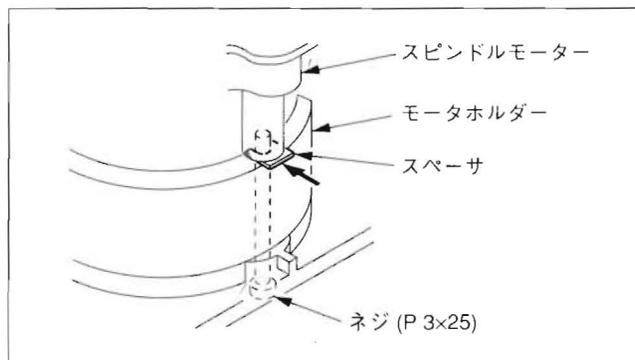
$$A > B, C > B$$

- (9) M/Oディスクドライブの底面を下にして置き (3) で緩めたネジ (+P3×25) 3本を外し、スピンドルモーター及びモーターホルダーを取り外してからコネクタ付コードを取り外す。



- (10) (1)～(9) の逆の手順で新しいスピンドルモーターを取付け、M/Oディスクドライブを本体に取付ける。スペーサーの取付けはネジ (+P3×25) をゆるめに止めた状態で、スピンドルモーターとモーターホルダーの間からスペーサーをネジ (+P3×25) に差し込むこと。取付後 "4.4. 調整" を行う。

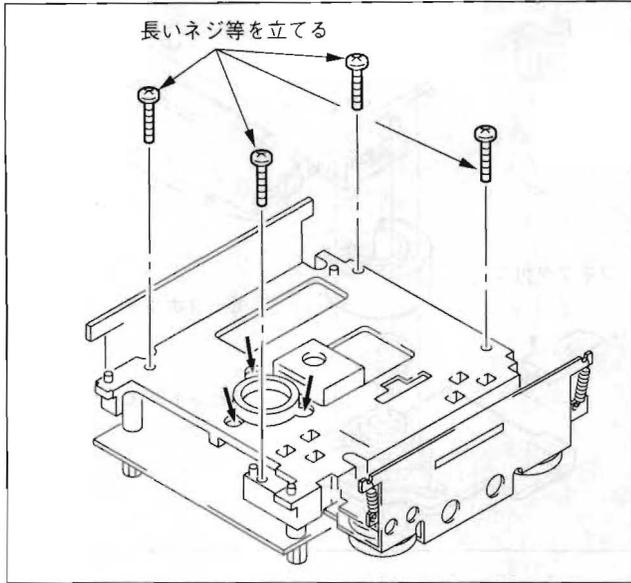
注意: スペーサーを取付ける際、取付位置及び厚さを絶対に間違えない様、注意すること。



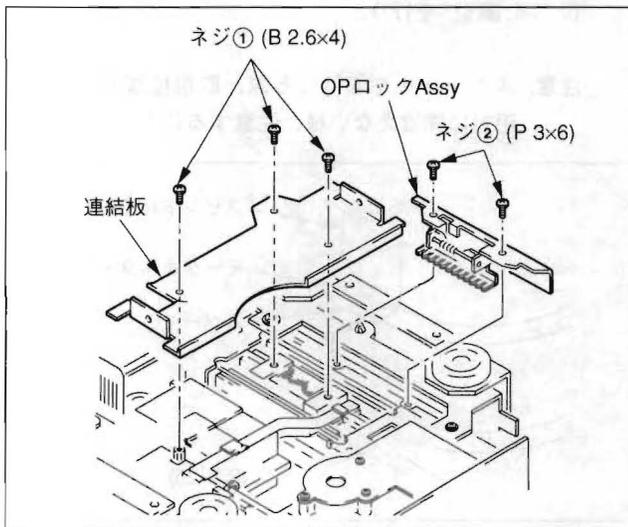
#### 4-3-4. 光学ピックアップの交換

光学ピックアップ交換時には、光学ピックアップの対物レンズの傾きに合わせてスピンドルモータの傾きを、スペーサーを用いて再調整する必要がある。

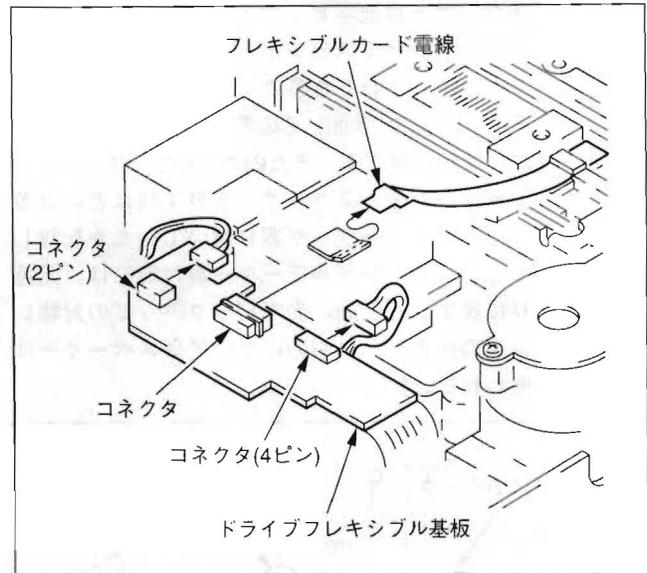
- (1) "4-3-2. ローディングAss'yの交換" を参照してローディングAss'yを取り外す。
- (2) 下図 → 部 (3ヶ所) のネジをゆるめる。  
注意: ネジを外さないこと。
- (3) M/Oディスクドライブの底面を上にして置く。  
注意: この時、ターンテーブル、光学ピックアップに負担がかからないように下図の位置に長いネジ等を立てること。



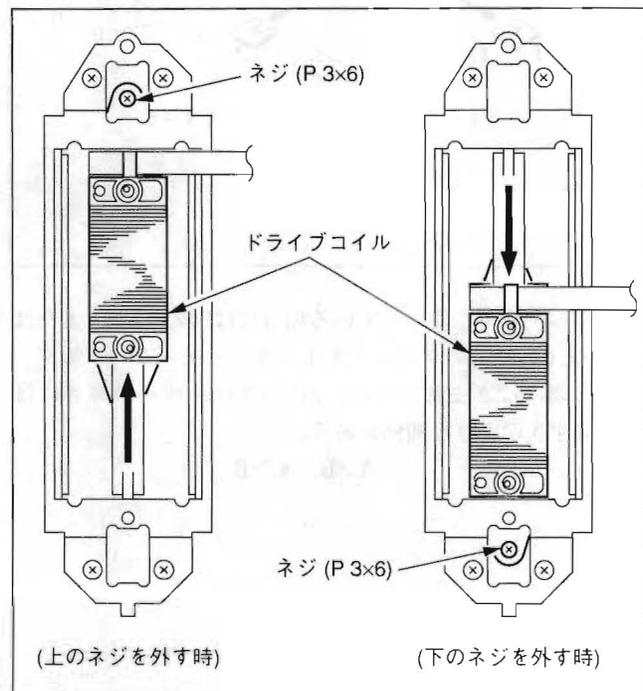
- (4) "4-3-3. スピンドルモーターの交換" の手順 (4) から (7) を行い、TR-82基板を取り外す。
- (5) ネジ① (B 2.6×4) 3本を外し、連結板を取り外す。  
ネジ② (P 3×6) 2本を外し、OPロックAss'yを取り外す。



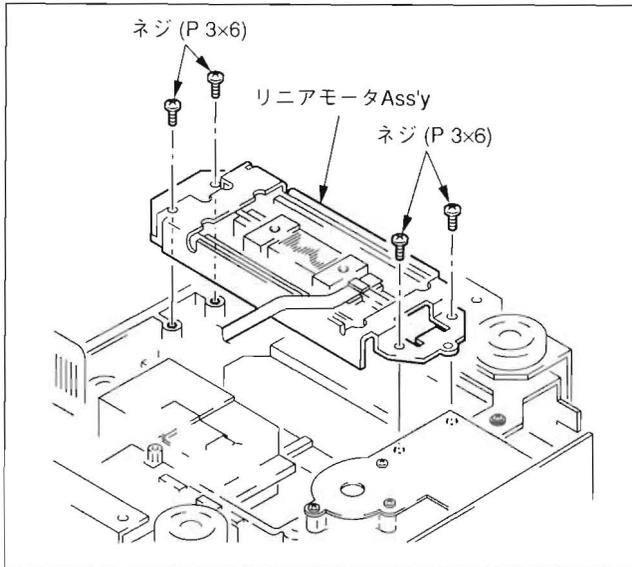
- (6) ドライブフレキシブル基板のコネクタよりハーネスおよびフレキシブルカード電線を外す。



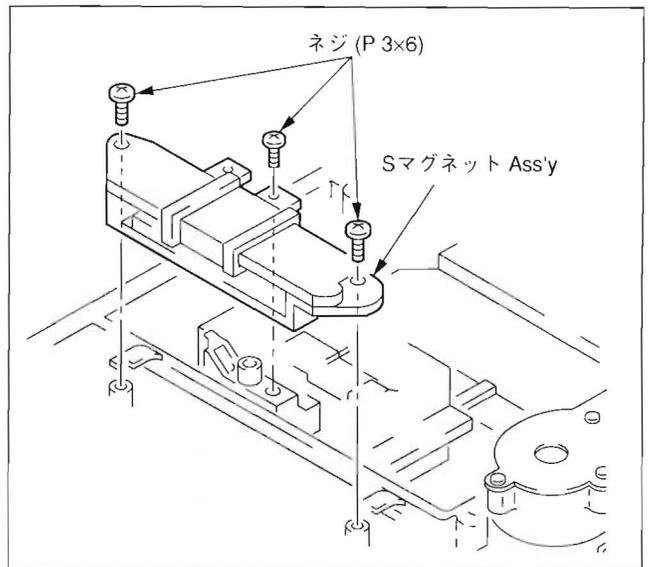
- (7) ドライブコイルを図のように動かして、ネジ (P 3×6) 2本を外す。



(8) ネジ (P 3×6) 4本を外し、リニアモータAss'yを取り外す。

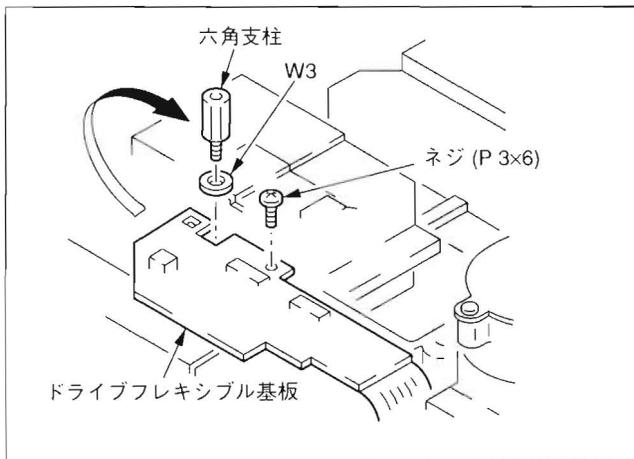


(10) ネジ (P 3×6) 3本を外し、SマグネットAss'yを取り外す。



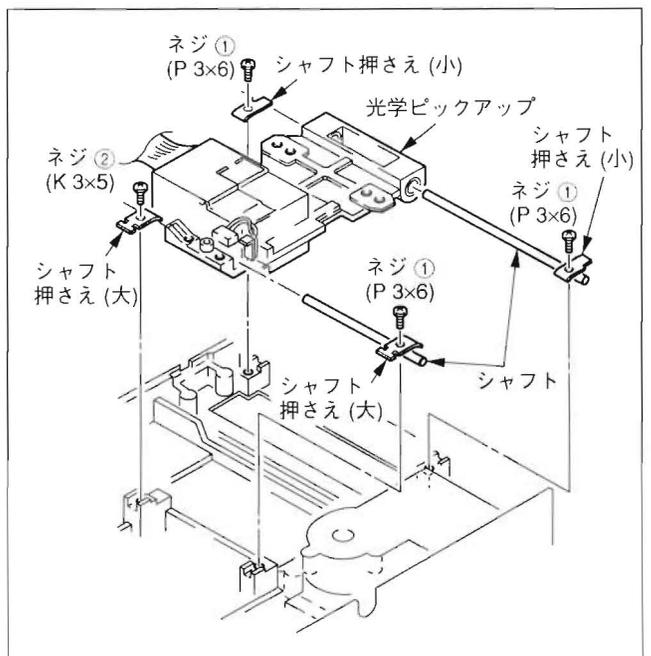
(9) ネジ (P 3×6) 1本、六角支柱、ワッシャ (W3) を外し、ドライブフレキシブル基板を開く。

注意: フレキシブルカード電線を折り曲げないように注意する。



(11) ネジ1 (P 3×6) 3本、ネジ2 (K 3×5) 1本を外し、シャフト押さえ4個を外す。光学ピックアップを取り外し、シャフトを引き抜く。

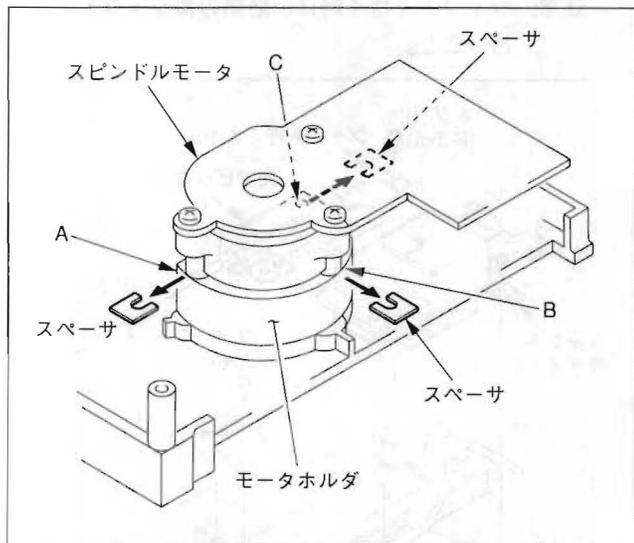
注意: シャフトを抜く時は、防錆の為シャフトの端を持つこと。



(12) スピンドルモーターとモーターホルダーの間のスペーサー2枚を取外す。(スペーサーを使用していない場合もある。)新しい光学ピックアップに同梱されたT. SKEWの値を基に図のA, B, Cのうちの2ヶ所に厚さ0.04 mm, 0.08 mm, 0.16 mmのうちいずれか2枚のスペーサーを取付ける。(スペーサーを使用しない場合もある) T. SKEWのデータとスペーサーの厚さ、取付位置の関係は下表による。

T. SKEW $\theta$ [°]	スペーサー厚さ [mm]		
	A	B	C
$+0.2 \leq \theta \leq +0.3$	0.16	0.08	—
$+0.05 < \theta < +0.2$	0.08	0.04	—
$-0.05 \leq \theta \leq +0.05$	—	—	—
$-0.2 < \theta < -0.05$	—	0.04	0.08
$-0.3 \leq \theta \leq -0.2$	—	0.08	0.16

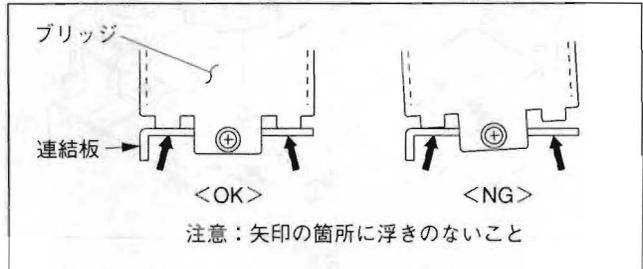
スペーサー部品番号	厚さ [mm]
3-183-914-01	0.04
3-183-914-11	0.08
3-183-914-21	0.16



(13) 光学ピックアップ交換後、(1)～(11)の逆の手順でM/Oディスクドライブを組み立てる。

注意: 1. シャフト押さえを取り付ける時、ネジ1 (P 3×6) とネジ2 (K 3×5) の位置を間違えないようにする。また、シャフト押さえ (大) とシャフト押さえ (小) の位置にも注意すること。

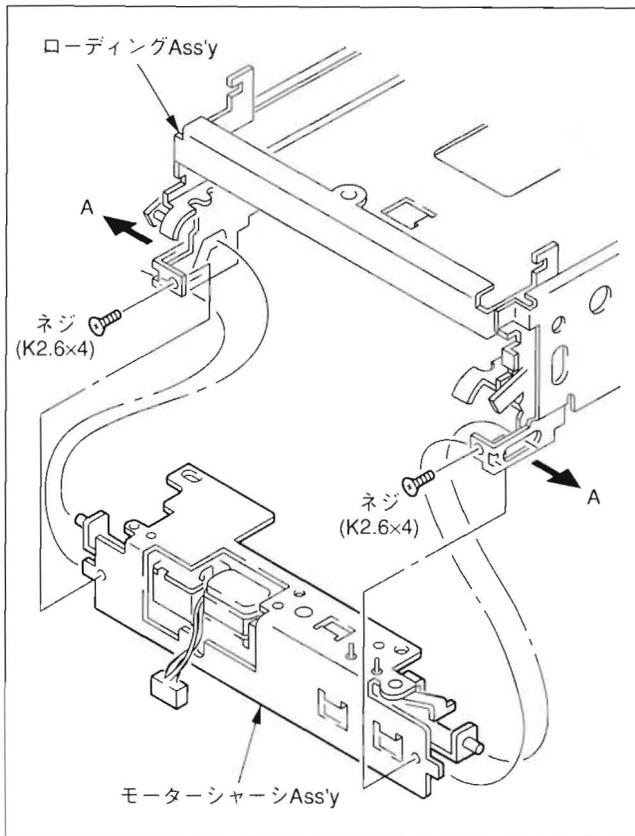
2. ブリッジを取り付ける時、連結板からの浮きが無いようにブリッジを連結板に押さえつけながらネジどめする。



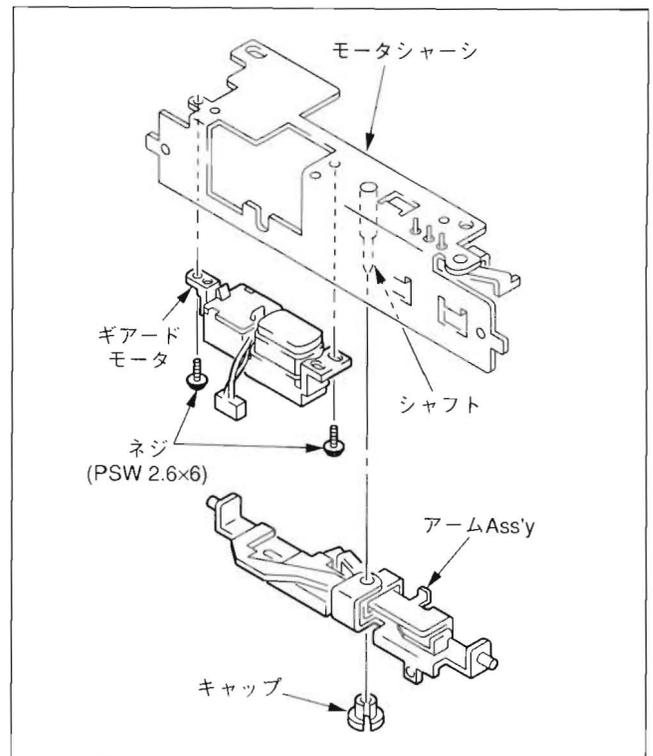
(14) M/Oディスクドライブを本体に取り付ける。取り付け後、"4.4. 調整"を行う。

#### 4-3-5. ギャードモータの交換

- (1) ローディングAss'yを取り外す。(4-3-2. 項 参照)
- (2) ネジ (K 2.6×4) 2本を外す。図のローディングAss'yの両端を矢印A方向に開くようにしてモータシャーシAss'yを取り外す。

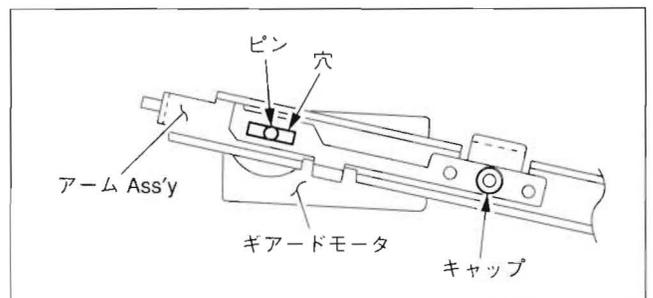


- (3) シャフトのキャップを外し、アームAss'yを取り外す。
- (4) ネジ (PSW 2.6×6) 2本を外し、ギャードモータを取り外す。



- (5) (1)～(4) の逆の手順で新しいギャードモータを取り付ける。

注意: アームAss'yを取り付ける時、アームAss'yの穴にギャードモータのピンを挿入しキャップを留めること。



- (6) M/Oディスクドライブを本体に取り付け後、"44. 調整"を行う。

#### 4-4. 調整

ここでは、下記部品を交換した際に必要な調整について述べる。全ての調整は、簡易MC治具を使用して行う。

注意: M/Oディスクドライブ部品の交換および調整はソニーサービスセンターに依頼すること。

1. M/Oディスクドライブ
  - (1) 光学ピックアップ
  - (2) スピンドルモータ
  - (3) OWH Ass'y
  - (4) TR-82基板およびTR-82基板上の部品  
(Q201~Q205, DL201, IC208, IC209)
  - (5) ブリッジの取り外しを必要とする部品  
(ローディングAss'yの交換時等)
2. PS-345基板およびPS-345基板上の部品
3. スイッチングレギュレータ
4. SV-144基板およびSV-144基板上の部品

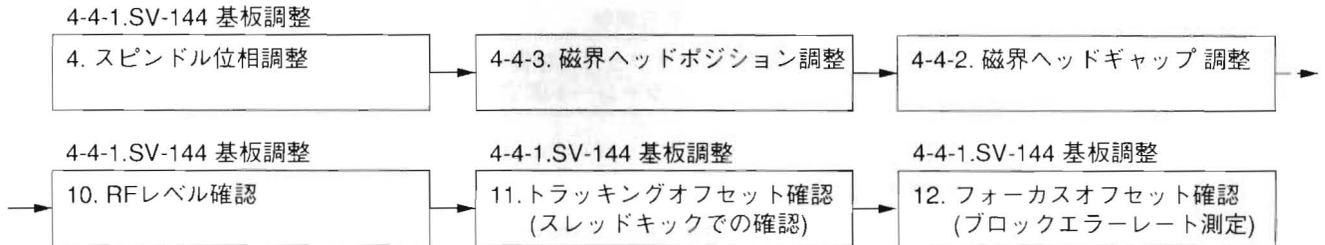
上記部品を交換した際に必要な調整/確認項目を以下に示す。

##### 部品交換時の調整項目

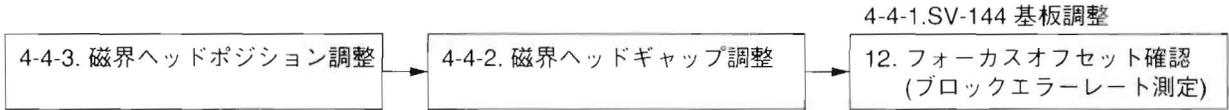
- (1) 光学ピックアップ



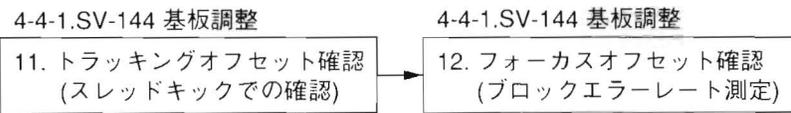
(2) スピンドルモータ



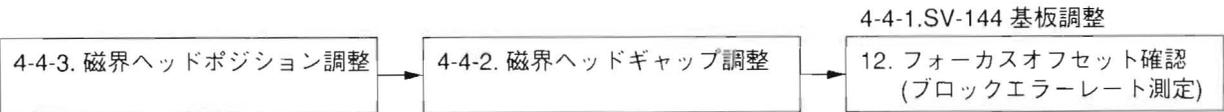
(3) OWH Ass'y



- (4) • TR-82基板および TR-82基板上のQ201~Q205,DL201,IC208,IC209  
• PS-345基板およびPS-345基板上の部品  
• スイッチングレギュレータ



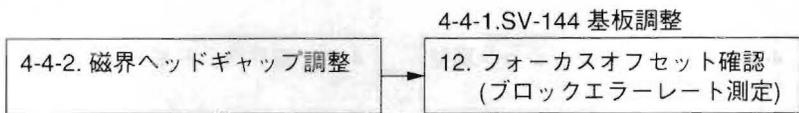
(5) ローディングAss'y等ブリッジの取り外しを必要とする部品



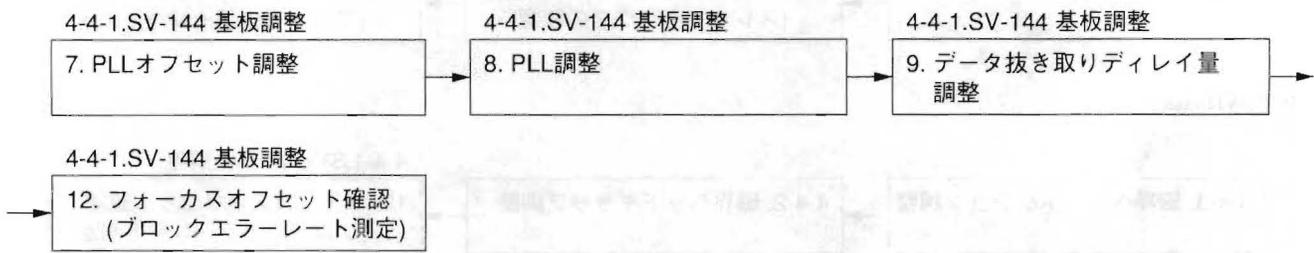
(6) SV-144基板



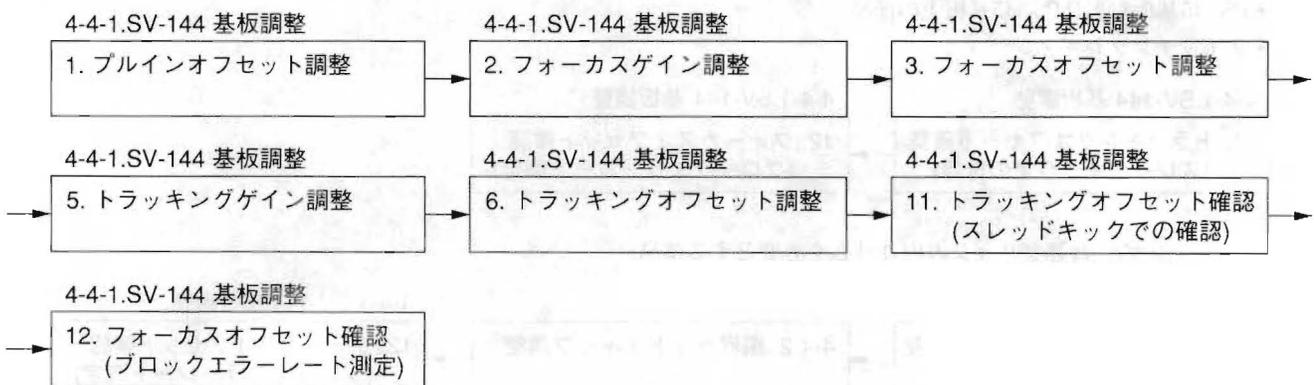
(7) GAP SERVOブロック/SV-144基板の部品



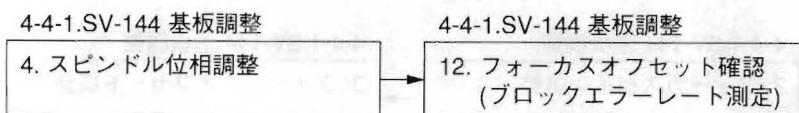
(8) PLLブロック/SV-144基板の部品



(9) SERVOブロック/SV-144基板の部品



(10) SPINDLEブロック/SV-144基板の部品



• 準備  
使用機器

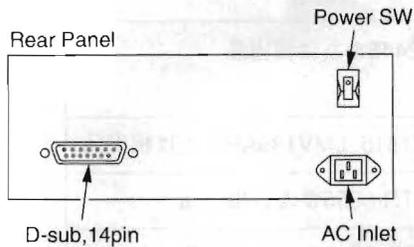
名称	仕様 (minimum)	機器名
オシロスコープ	周波数帯域 : DC-20 MHz以上 掃引時間 : 20 ns/divまで可能	TEKTRONIX 2445または相当品
2針式レベルメータ	分解能 : 0.1 dB以上	LEADER LMV1815. LMV189ARまたは相当品
DC電圧計	分解能 : 1 mV以上	ADVANTEST TR-6855または相当品
周波数カウンタ	有効桁数 : 6桁以上 周波数 : 20 MHzまで測定可能	ADVANTEST TR-5822または相当品
ビデオモニタ	ビデオ入力端子 (BNC) 付のモニタ	—————
BNCケーブル	使用ケーブル : 同軸ケーブル3C-2V	SONY UGC -0.5 (0.5 m) SONY UGC -1 (1 m) SONY UGC -2 (2 m) } または相当品

治工具

名称	部品番号	備考
簡易MC治具	J-6400-850-A	調整用ROM付属
サーボゲイン調整治具	J-6400-890-A	
磁界ヘッドギャップ調整用ディスク	J-6405-010-A	
ヘッドポジション調整治具 (NTSC)	J-6405-020-A	CCDカメラ、レンズ、カメラアダプタ、カメラケーブル、カメラホルダ付属
ヘッドポジション調整治具 (PAL)	J-6405-350-A	CCDカメラ、レンズ、カメラアダプタ、カメラケーブル、カメラホルダ付属
ヘッドポジション調整用カートリッジ	J-6405-320-A	
偏芯ドライバ (2-4)	3-702-390-01	
テストディスク	J-6401-060-A	
ローパスフィルター治具	J-6401-070-A	
ブロックエラーレートチェッカー	J-6400-880-A	
AAIPエラーレートチェッカー	J-6400-840-A	
EX-396エクステンションボード	J-6400-860-A	
EX-397エクステンションボード	J-6400-870-A	

## 簡易MC治具の使用法

### 簡易MC治具



### スイッチ

#### CPU RESETスイッチ:

簡易MC治具のCPUをリセットする。

#### 7 SEG表示切り換えスイッチ:

7 SEG LEDの表示 (下記1、2) を切り換える。

- 1 ディスク上のAAIPのアドレス表示
- 2 10キー入力の表示

### キースイッチ

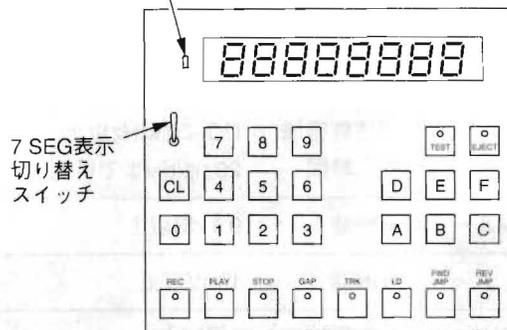
注意: 各キーはディスクが挿入されているとき有効となる。  
各キーがONのとき、それぞれのキーのLEDが点灯する。

<b>TEST</b> キー:	テストモードの設定。磁界ヘッドポジション調整時に使用。
<b>EJECT</b> キー:	ディスクをイジェクト。
<b>REC</b> キー:	RECモードの設定。RECモードの設定はPLAYモード ( <b>PLAY</b> キー: ON) 時に有効。
<b>PLAY</b> キー:	PLAYモードの設定。ディスクはコンティニューアスのPLAYモードになる。
<b>STOP</b> キー:	STOPモードの設定。ディスクの回転が止まり、レーザーはOFFになる。
<b>GAP</b> キー:	GAP TRIM ON/OFFの切り換え。
<b>TRK</b> キー:	TRK ON/OFFの切り換え。
<b>LD</b> キー:	LD ON/OFFの切り換え。

注意: **GAP**, **TRK**, **LD** キーはそれぞれ独立して働く。ただし、**STOP** キーを押すと、イニシャル状態 (全てOFF) に戻る。

**FWD JMP** キー: 10キーにて入力したアドレスの絶対アドレスジャンプ処理を行う。このキーは、PLAYモード時に有効。

### CPU リセットスイッチ



トップパネル

### コネクタ (Rear Panel)

D-sub, 14 PINコネクタ: 付属の接続コードを接続する。

### 付属品

- 接続コード : 1
- 調整用ROM : 1
- 電源コード : 1

### 接続/使用方法

注意: 簡易MC治具を本体 (PCM-9000) に接続する際は、PCM-9000および簡易MC治具の電源をOFFにする。

- (1) SV-144基板を開く。
- (2) PCM-9000のCN103/SV-144基板より接続されているハーネスを外す。
- (3) CN103/SV-144基板に簡易MC治具の接続コード (26ピンコネクタ) を接続する。
- (4) SV-144基板のROM (IC814) を外し、調整用ROM (簡易MC治具の付属品) を差し込む。
- (5) 簡易MC治具、本体 (PCM-9000) の順に電源をONにする。
- (6) ディスクを挿入 (ローディング) する。ディスクのローディング後、**EJECT**, **PLAY**, **STOP**, **GAP**, **TRK**, **TEST**, **LD** キーが有効になる。  
**REC** キーは、PLAYモード時のみ有効となる。
- (7) 各調整項目を手順に従って行う。

### キー、スイッチの初期設定

7 SEG表示切り換えスイッチ: 右側  
**REC**, **PLAY**, **STOP**, **GAP**, **TRK**,  
**LD**, **FWD JMP**, **TEST**, **EJECT**: OFF (LED消灯)

注意: 各調整項目において簡易MC治具のキー、スイッチ設定は、この初期設定から変更される設定のみ記載している。

#### 4-4-1. SV-144基板調整 (サーボ調整)

##### 使用機器

- オシロスコープ
- DC電圧計
- 2針式レベルメータ
- 周波数カウンタ

##### 治具

- 簡易MC治具
- 調整用ROM (簡易MC治具の付属品)
- サーボゲイン調整治具
- テストディスク (熱イレース/ランダム)
- 磁界ヘッドギャップ調整ディスク
- ローパスフィルタ治具
- ブロックエラーレートチェッカー

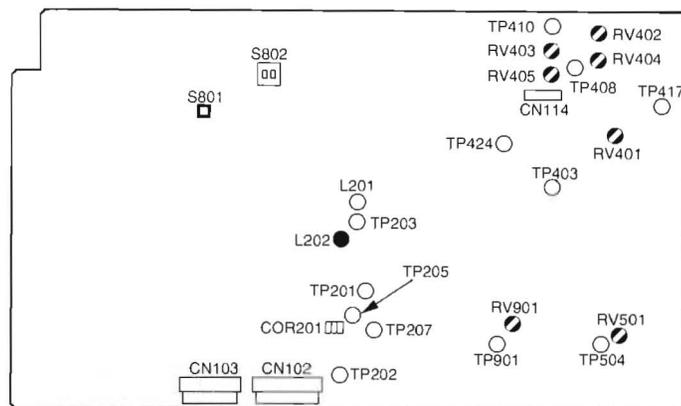
##### 準備

- (1) 簡易MC治具をCN103/SV-144基板に接続する。  
(接続は4-16ページ、簡易MC治具の "接続/使用方法" 参照)
- (2) SV-144基板のROM (IC814) を調整用ROMと交換する。
- (3) テストディスクまたはノーマルディスクを必要に応じて挿入する。

##### スイッチ設定

- SV-144基板
- S802-1: OFF
- S802-2: OFF

##### 調整箇所



SV-144 BOARD (A SIDE)

##### 1. プルインオフセット調整

調整時の状態	規格	調整箇所	使用ディスク
1. 簡易MC治具の設定 ・STOPモード (STOP キーを押す)  ・TP417/SV-144基板にローパスフィルタ治具を介して、DC電圧計を接続する。	TP417/SV-144基板 (N2) のレベル  $0 \pm 2 \text{ mV}$	●RV401/SV-144基板 (M3)	指定なし
接続 <div style="text-align: center;"> <p>SV-144 基板</p> </div>			

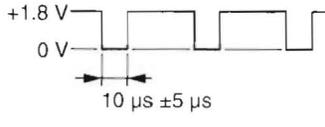
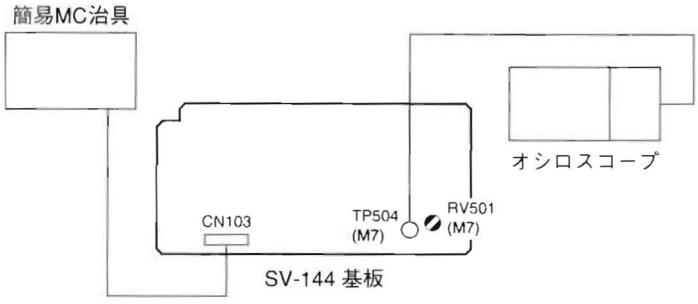
## 2. フォーカスゲイン調整

調整時の状態	調整方法/規格	調整箇所	使用ディスク
<p>1.簡易MC治具の設定</p> <ul style="list-style-type: none"> <li>• STOPモード ([STOP] キーを押す)</li> <li>• サーボゲイン調整治具をCN114/SV-144基板に接続する。(サーボゲイン調整治具の電源OFF)</li> <li>• 接続後、サーボゲイン調整治具の電源をONにする。</li> </ul> <p>2.サーボゲイン調整治具のTRACKING /FOCUS切換スイッチ : FOCUS側に設定</p> <p>3.簡易MC治具のトグルスイッチを左側 (入力データ表示) に設定し、10キーで下記指定番地を入力する。 指定番地 1: 90: 00</p> <p>4.簡易MC治具の [PLAY] キー, [JUMP FWD] キーを押して指定番地にロケートする。トグルスイッチを右側に戻す。</p>	<ul style="list-style-type: none"> <li>• 2針式レベルメータの2つの針の指示の差が規格に入るようにRVを調整する。</li> </ul> <p>規格: <math>-2 \text{ dB} \pm 0.1 \text{ dB}</math></p>	<p>●RV403/SV-144基板 (L1)</p>	<p>テストディスクの指定箇所 1: 90: 00番地</p>
<p>接続</p>			

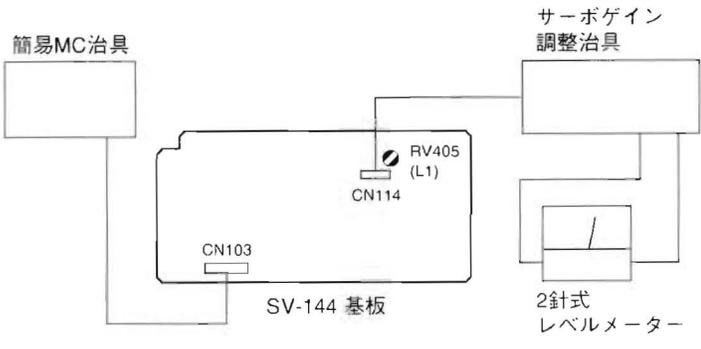
## 3. フォーカスオフセット調整

調整時の状態	調整方法/規格	調整箇所	使用ディスク
<p>ステップ1</p> <ul style="list-style-type: none"> <li>• TP403/SV-144基板にローパスフィルタ治具を介して、DC電圧計を接続する。</li> <li>• TP408/SV-144基板とE7 (GND) 間にオシロスコプのCH-2を接続する。</li> <li>• 簡易MC治具の操作 PLAYモード ([PLAY] キーを押す) で [TRK] キーを押し、トラッキングをオフにする。</li> </ul> <p>ステップ2</p> <ul style="list-style-type: none"> <li>• 簡易MC治具の [TRK] キーを押し、トラッキングをオンにする。</li> </ul>	<ul style="list-style-type: none"> <li>• オシロスコプの波形で振幅が最大になるようにRVを調整する。その時のDC電圧計の値をFpo mVとする。</li> <li>• RVを回しFpの値が規格に入るように調整する。</li> </ul> <p>規格: <math>F_p = (F_{po} + 20) \pm 20 \text{ mV}</math></p> <ul style="list-style-type: none"> <li>• ステップ2の時DC電圧計の値が規格に入っていること。</li> </ul> <p>規格: <math>-50 \text{ mV} \sim +30 \text{ mV}</math></p>	<p>●RV402/SV-144基板 (L1)</p>	<p>指定なし</p>
<p>接続</p>			

#### 4. スピンドル位相調整

調整時の状態	調整方法/規格	調整箇所	使用ディスク
<ul style="list-style-type: none"> <li>TP504/SV-144基板にオシロスコープを接続する。</li> <li>簡易MC治具の操作 [PLAY] キーを押してPLAYモードにし、[TRK] キーを押して、トラッキングをオンにする。</li> </ul>	<ul style="list-style-type: none"> <li>TP504/SV-144基板 (M7) の出力波形</li> </ul> 	●RV501/SV-144基板 (M7)	指定なし
<p>接続</p> 			

#### 5. トラッキングゲイン調整

調整時の状態	調整方法/規格	調整箇所	使用ディスク
<p>1. 簡易MC治具の設定</p> <ul style="list-style-type: none"> <li>STOPモード ([STOP] キーを押す)</li> <li>サーボゲイン調整治具をCN114/SV-144基板に接続する。(サーボゲイン調整治具の電源OFF)</li> <li>接続後、サーボゲイン調整治具の電源をONにする。</li> <li>サーボゲイン調整治具に2針式レベルメータを接続する。</li> </ul> <p>2. サーボゲイン調整治具のTRACKING/FOCUS切換スイッチ : TRACKING側に設定する。</p> <p>3. 簡易MC治具のトグルスイッチを左側に倒し10キーで指定番地を入力し、[PLAY] キー [JUMP] キーを押してロケートする。トグルスイッチを右側に戻す。 指定番地 1: 90: 00</p> <p>4. 簡易MC治具の [TRK] キーを押してトラッキングONモードにする。</p>	<p>2針式レベルメータの2つの指示が重なるように調整する。</p> <p>規格: <math>0 \pm 0.1</math> dB</p>	●RV405/SV-144基板 (L1)	テストディスクの指定箇所 1: 90: 00番地
<p>接続</p> 			

6. トラッキングオフセット調整

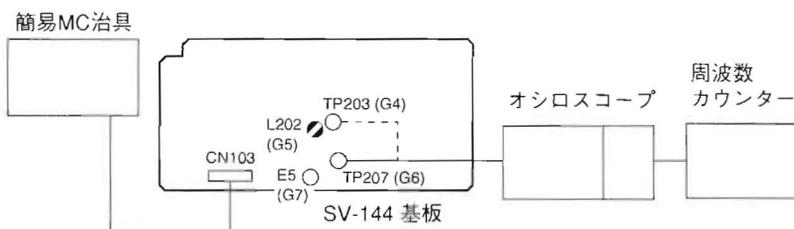
調整時の状態	調整方法／規格	調整箇所	使用ディスク
<ul style="list-style-type: none"> <li>TP404/SV-144基板にローパスフィルタ治具を介して、DC電圧計を接続する。</li> <li>簡易MC治具のPLAYキーを押してPLAYモードにし、TRKキーを押してトラッキングをオフにする。</li> <li>簡易MC治具のTRKキーを押してトラッキングをオンにする。</li> </ul>	<ul style="list-style-type: none"> <li>DC電圧計の指示が0 mVを中心に振れるように調整する。</li> </ul> <p style="text-align: center;">規格: 0±100 mV</p> <ul style="list-style-type: none"> <li>DC電圧計の値を確認する。</li> </ul> <p style="text-align: center;">規格: ±25 mV</p>	<ul style="list-style-type: none"> <li>RV404/SV-144基板 (M2)</li> </ul>	指定なし
	<p>接続</p>		

7. PLLオフセット調整

調整時の状態	調整方法／規格	調整箇所	使用ディスク
<ul style="list-style-type: none"> <li>TP203にDC電圧計を接続する。</li> <li>8. PLLの調整と同様の設定を行い、テストディスクの指定番地へロケットし、PLAYキーを押してPLAYモードにする。</li> </ul>	<ul style="list-style-type: none"> <li>DC電圧計の値が規格内になるようにRVを調整する。</li> </ul> <p style="text-align: center;">規格: 0±50 mV</p>	<ul style="list-style-type: none"> <li>IC203上に追加されたRV (基板 No. 1-647-007-11)</li> <li>RV201/SV-144基板 (G5) (基板 No. 1-647-007-12以降)</li> </ul>	
	<p>接続</p>		

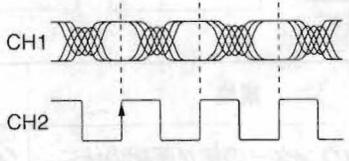
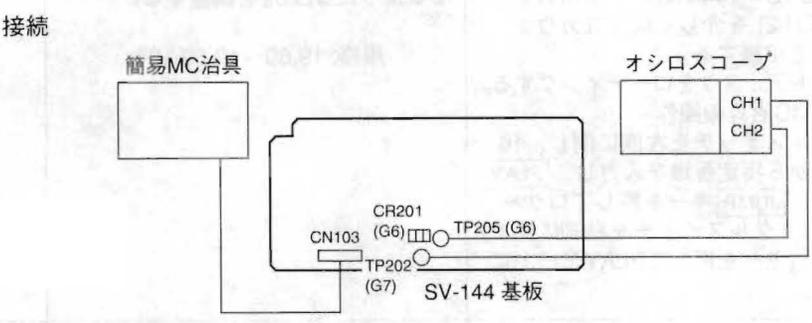
## 8. PLL調整

接続



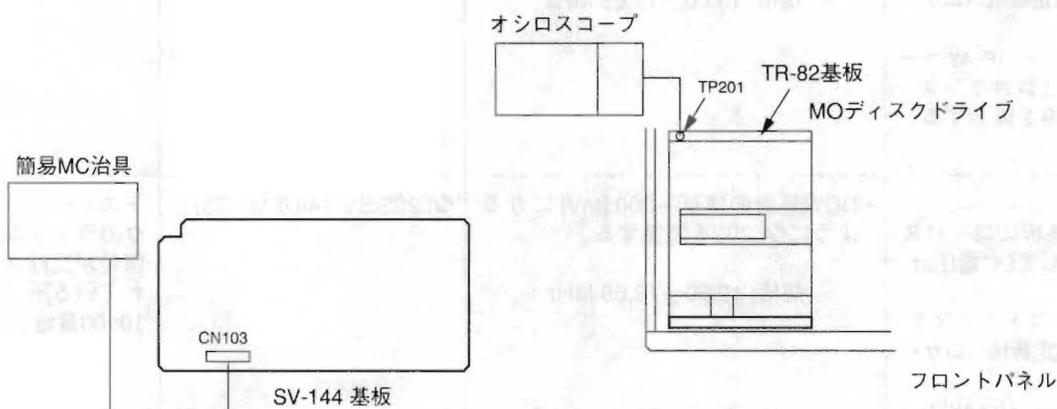
調整時の状態	規格	調整箇所	使用ディスク
<p>ステップ1</p> <ul style="list-style-type: none"> <li>TP207/SV-144基板にオシロスコープ (CH-2) を介して周波数カウンターを接続する。</li> <li>テストディスクをローディングする。</li> <li>簡易MC治具の操作 トグルスイッチを左側に倒し、10キーから指定番地を入力し、<b>PLAY</b>キー、<b>JUMP</b>キーを押してロケットし、トグルスイッチを右側に戻す。<b>PLAY</b>キーを押してPLAYモードにする。</li> </ul>	<p>周波数カウンターの値が下記の値になるようにL202を調整する。</p> <p>規格: 19.60~19.69 MHz</p>	<p>L202/SV-144基板 (G5)</p>	<p>テストディスクの熱イレーズされている所 10:00番地</p>
<p>ステップ2 (確認)</p> <ul style="list-style-type: none"> <li>TP203とE5/SV-144基板にローパスフィルター治具を介してDC電圧計を接続する。</li> <li>ステップ1と同様にテストディスクをローディングし、指定番地へロケットする。</li> <li>簡易MC治具の<b>STOP</b>キー、<b>PLAY</b>キーの順に押した時、周波数カウンターの値が規格内であることを確認する。3回行う。</li> </ul>	<ul style="list-style-type: none"> <li>簡易MC治具の<b>STOP</b>を押した時のDC電圧計値 (mV) を読む。</li> <li>DC電圧計の値が <math>i + 200</math> [mV] になるようにL202を調整する。</li> </ul> <p>規格: 19.60~19.69 MHz</p>	<p>L202/SV-144基板 (G5)</p>	<p>テストディスクのランダム信号が記録されている所 10:00番地</p>
<p>ステップ3 (確認)</p> <ul style="list-style-type: none"> <li>TP203とE5/SV-144基板にローパスフィルター治具を介してDC電圧計を接続する。</li> <li>ステップ1と同様にテストディスクをローディングし、指定番地へロケットする。</li> <li>簡易MC治具の<b>STOP</b>キー、<b>PLAY</b>キーの順に押した時、周波数カウンターの値が規格内であることを確認する。3回行う。</li> </ul>	<ul style="list-style-type: none"> <li>DC電圧計の値が <math>i - 200</math> [mV] になるようにL202を調整する。</li> </ul> <p>規格: 19.60~19.69 MHz</p>	<p>L202/SV-144基板 (G5)</p>	<p>テストディスクのランダム信号が記録されている所 10:00番地</p>
<p>ステップ4 (確認)</p> <ul style="list-style-type: none"> <li>TP203とE5/SV-144基板にローパスフィルター治具を介してDC電圧計を接続する。</li> <li>ステップ1と同様にテストディスクをローディングし、指定番地へロケットする。</li> <li>簡易MC治具の<b>STOP</b>キー、<b>PLAY</b>キーの順に押した時、周波数カウンターの値が規格内であることを確認する。3回行う。</li> </ul>	<ul style="list-style-type: none"> <li>DC電圧計の値が <math>i</math> [mV] になるようにL202を調整する。</li> </ul> <p>規格: 19.60~19.69 MHz</p>	<p>L202/SV-144基板 (G5)</p>	<p>テストディスクのランダム信号が記録されている所 10:00番地</p>

9. データ抜き取りディレイ量の調整

調整時の状態	調整方法	調整箇所	使用ディスク
<ul style="list-style-type: none"> <li>簡易MC治具の設定 "8. PLL調整"のステップ1の設定と同じ</li> <li>オシロスコープの接続 CN-1:TP202/SV-144基板 (G7) GND/SV-144基板 CN-2:TP205/SV-144基板 (G6) GND/SV-144基板 (トリガー) レンジ:20 ns/div</li> </ul>	<p>オシロスコープのCH1 (データ) の中心にCH2 (抜き取りクロック) の立ち上がりがあるようにする。</p> 	<p>ジャンパーピンをCOR201/SV-144基板 (G6) のいずれかに差し込む。</p>	<p>テストディスクのランダム信号が記録されている所</p>
<p>接続</p> 			

10. RFレベルの確認

接続



調整時の状態	調整方法	調整箇所	使用ディスク
<ul style="list-style-type: none"> <li>TP201/TR-82基板にオシロスコープを接続する。</li> <li>簡易MC治具のトグルスイッチを左側に設定し10キーで指定番地を入力する。</li> <li>PLAY キー JUMP FWD キーを押してロケートさせる。トグルスイッチを右側に戻す。</li> </ul>	<ul style="list-style-type: none"> <li>RFのレベルが規格以上であることを確認する。</li> </ul> <p>規格: RF level <math>\geq 2.8</math> Vp-p</p>		<p>テストディスクの指定箇所ランダム信号が記録されている箇所</p>

11. トラッキングオフセットの確認 (スレッドキックでの確認)

確認時の状態	確認方法	調整箇所	使用ディスク
<ul style="list-style-type: none"> <li>簡易MC治具を取り外す。</li> <li>ROMを通常のものに戻す。</li> <li>ハーネス類を全てもとどおりに接続する。</li> <li>下記に示したサンプルのようなファイルを作りそれを再生する。 サンプル: 下記Track 1とTrack 2を2~3回くり返した(登録した)ファイルをつくる。 Track 1 Begin点 1:00           End点   1:10 Track 2 Begin点 1:00:00           End点   1:00:10</li> </ul>	<ul style="list-style-type: none"> <li>ファイル通りに再生されること。</li> </ul>	—	指定なし ファイルを作成すること。

12. フォーカスオフセットの確認 (ブロックエラーレート/B.E.R.の測定)

調整時の状態	確認方法	調整箇所	使用ディスク
<p>ステップ1</p> <ul style="list-style-type: none"> <li>簡易MC治具を取り外す。</li> <li>ROMを通常のものに戻す。</li> <li>ハーネス類を全て元通りに接続する。</li> <li>ブロックエラーレートチェッカーをCN3/ED-37基板に接続する。</li> </ul>	—	—	
<p>ステップ2</p> <ul style="list-style-type: none"> <li>ディスクをローディングし、Monitor Recモードで記録、再生する。</li> <li>ディスクの内周(00 H:05 M:00 s)付近、中周(00 H:40 M:00 s)付近、および外周(01 H:15 M:00 s)付近で、ブロックエラーレートを測定する。</li> </ul>	<ul style="list-style-type: none"> <li>各測定箇所でもB.E.R.が5回平均で規格内であること。  規格 100/10000以下</li> </ul>	—	傷、ほこり等がない通常のディスク

4-4-2. 磁界ヘッドギャップ調整 (GPM-11基板/OWH Ass'y)

使用機器

オシロスコープ

治工具

簡易MC治具

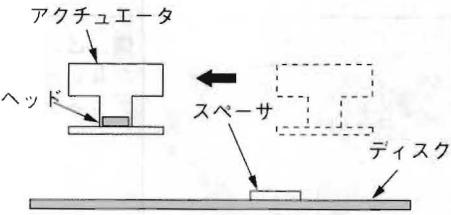
調整用ROM (簡易MC治具の付属品)

磁界ヘッドギャップ調整用ディスク

調整ドライバ

準備

1. SV-144基板を開いて、簡易MC治具をCN103/SV-144基板に接続する。  
(接続は、4-16ページ、簡易MC治具の "接続/使用方法" 参照)
2. SV-144基板のROM (IC814) を調整用ROMと交換する。
3. 磁界ヘッドギャップ調整用ディスクを挿入 (ローディング) する。

調整時の状態	規格	調整箇所
<p>ステップ1</p> <ul style="list-style-type: none"> <li>• TP901/SV-144基板にオシロスコープを接続する。</li> <li>• ●RV901/SV-144基板を反時計方向に回しきる。</li> <li>• スレッドをディスクの外周側に手で動かす。(簡易MC治具の設定STOPモードにして行う。) 外周側位置の目安 OWH Ass'yがスペーサーから20 mm以上離れる位置まで手で動かす。</li> </ul>  <ul style="list-style-type: none"> <li>• 簡易MC治具の設定             <ol style="list-style-type: none"> <li>① STOPモード</li> <li>② <b>GAP</b> キーを押してGAP ONモードにする。 (磁界ヘッドギャップ調整モード)</li> </ol> </li> </ul>	<p>TP901/SV-144基板 (オシロスコープ) の出力</p> <p style="text-align: center;"><math>0 \pm 10 \text{ mV}</math></p>	<p>●RV901/SV-144基板 (K6)</p>

ステップ2

• スレッドをディスクの最内周に手で動かす。(簡易MC治具の設定をSTOPモードにして行う。)

• オシロスコープおよびDC電圧計をTP901/SV-144基板、GND/SV-144基板に接続する。

●RV901/SV-144を反時計方向に回しきる。

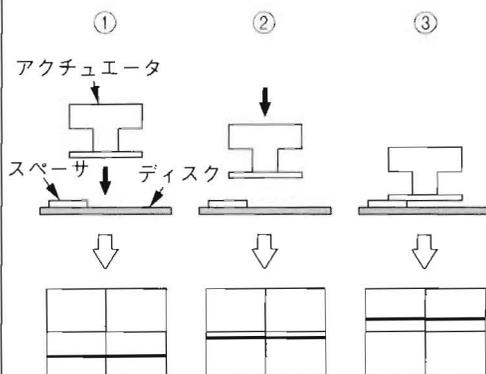
• 簡易MC治具の設定

① STOPモード

② **GAP** キーを押してGAP ONモードにする。  
(磁界ヘッドギャップ調整モード)

1. オシロスコープの出力波形を見ながら●RV901/SV-144基板を時計方向にゆっくり回す。

この操作でアクチュエータはゆっくりディスクのスペーサに当たって止まる。(図3) この時オシロスコープの波形はマイナスの値から次第に大きくなり、図3の③状態のところで上昇が急に止まる。



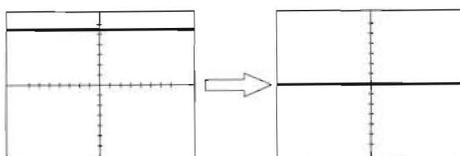
オシロスコープ出力波形

図3

2. オシロスコープの出力波形が動かなくなる点まで●RV901/SV-144基板をゆっくり回す。

3. この状態でDC電圧計が0 Vになるように●CV1/GPM-11基板を調整する。

オシロスコープ出力波形



規格:  $0 \pm 1 \text{ mV}$

4. 簡易MC治具の**GAP** キーを押して調整モードを解除する。(GAP OFFモード)

5. 簡易MC治具の**EJECT** キーを押してディスクを取出す。

6. 調整後、簡易MC治具の**EJECT** キーを押して磁界ヘッドギャップ調整用ディスクを取り出す。

●RV901/SV-144基板 (K6)

●CV1/GPM-11基板 (B2)

### 4-4-3. 磁界ヘッドポジション調整

#### 使用機器

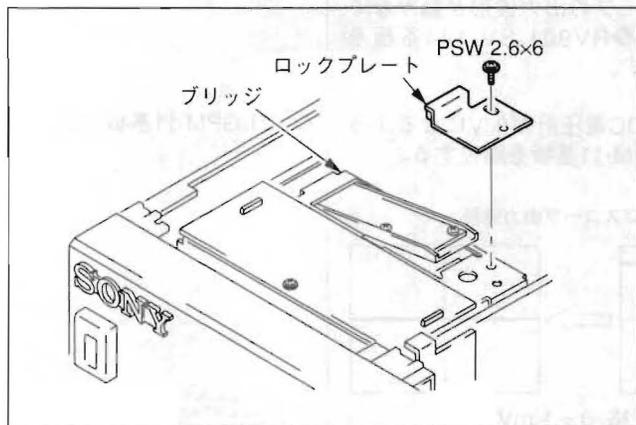
ビデオモニタ  
BNCケーブル

#### 治工具

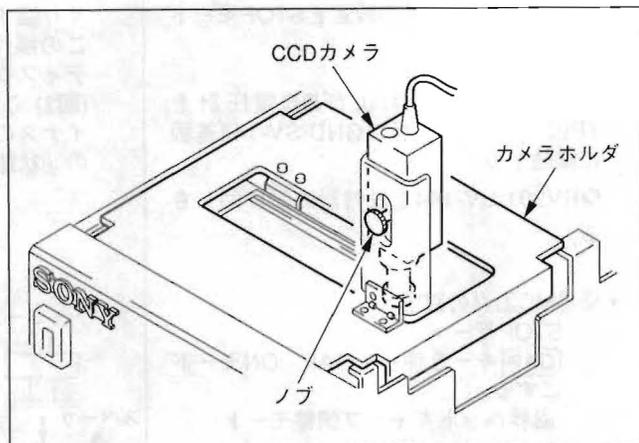
簡易MC治具  
調整用ROM (簡易MC治具の付属品)  
ヘッドポジション調整治具 (CCDカメラ、レンズ、カメラアダプタ、カメラケーブル、カメラホルダ付属)  
偏芯ドライバ (2-4)  
ヘッドポジション調整用カートリッジ

#### 1. 調整準備

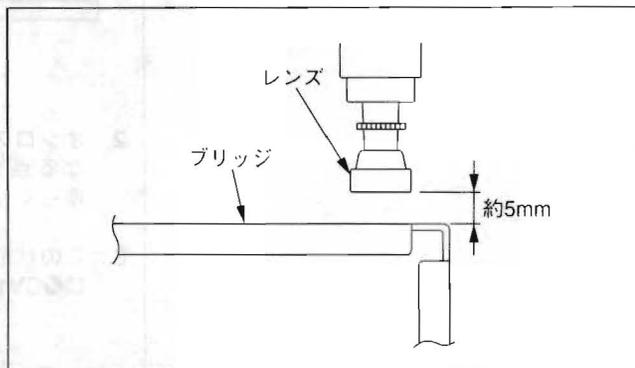
- (1) 簡易MC治具をCN103/SV-144基板に接続する。IC814/SV-144基板を調整用ROMと交換する。
- (2) ロックプレートを取り付けているネジ (PSW 2.6×6) 1本を外し、ブリッジからロックプレートを取り外す。
- (3) 本体および簡易MC治具の電源スイッチをONにし、ヘッドポジション調整用カートリッジを挿入してローディングさせる。



- (4) ヘッドポジション調整治具のCCDカメラをカメラホルダに取り付け、図を参照して本体フレーム上にセットする。



- (5) CCDカメラのレンズとブリッジの隙間が目視にて約5mmになるよう、カメラホルダのノブを緩めてカメラの高さを調節する。



- (6) CCDカメラとカメラアダプタ、カメラアダプタとビデオモニタを接続し、電源をONにする。
- (7) 簡易MC治具の **TEST** スイッチを押し次に **1** スイッチを押して、ビデオモニタ画面を観察する。

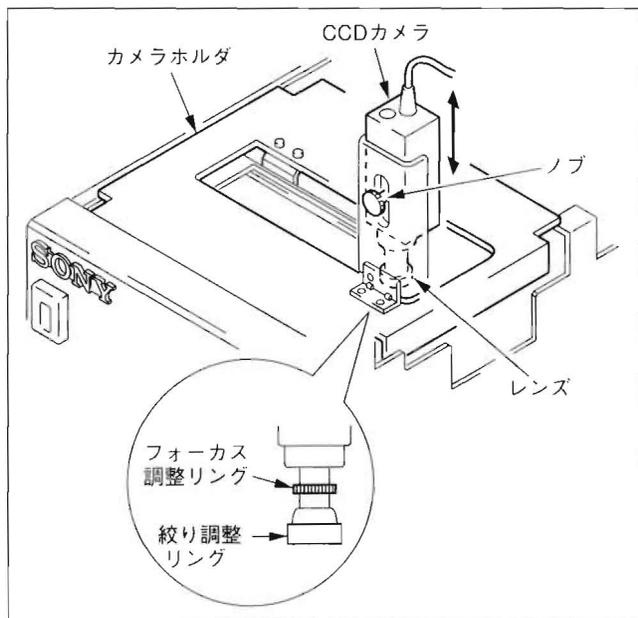
(8) レーザースポット及び磁界ヘッドコアの像が見えにくいときは、フォーカス調整または絞り調整を行う。

•フォーカス調整方法:

カメラホルダのノブを緩めてCCDカメラを上下させる。それでも焦点があわない場合は、フォーカス調整リングを緩めてレンズを上下させる。

•絞り調整方法:

レンズ先端の絞り調整リングを回す。

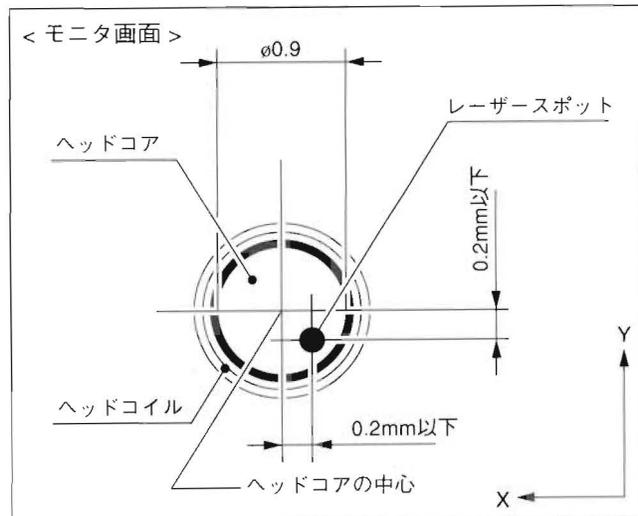


## 2. 磁界ヘッド調整

ビデオモニタ画面を見ながら、レーザースポットと磁界ヘッドコアの中心の位置ずれが規格を満足するように、以下の手順で調整を行う。

規格:

レーザースポットの位置がヘッドコアの中心から0.2 mm以下のこと。(ヘッドコアの直径が0.9 mmであることから判断する。)



(1) OWH Ass'yのネジ (A) 2本を緩める。図のC穴に偏芯ドライバを差し込み、X方向の調整を行う。

(2) ネジ (A) 2本を締め付ける。

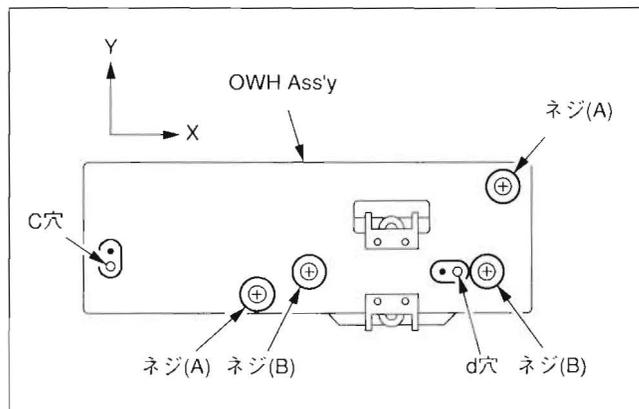
(3) ネジ (B) 2本を緩める。図のd穴に偏芯ドライバを差し込み、Y方向の調整を行う。

(4) ネジ (B) 2本を締め付ける。

(5) ネジを締め付け後、規格を満足していることを確認する。満足していない場合は再度調整を行う。

X方向にズレているとき: ステップ (1), (2) を行う。

Y方向にズレているとき: ステップ (3), (4) を行う。



## 3. 調整後の作業

(1) **TEST** スイッチを押して、テストモードを解除する。

(2) CCDカメラをカメラホルダごと取り出す。

(3) 簡易MC治具の **EJECT** スイッチを押して、ヘッドポジション調整用カートリッジを取り出す。

注意: 調整用カートリッジのローディング/イジェクトは、必ずCCDカメラ及びカメラホルダがセットされていない状態で行うこと。

(4) 本体および簡易MC治具のパワースイッチをOFFにする。

(5) ネジ (PSW 2.6×6) 1本で、ロックプレートをブリッジに取り付ける。

(6) CN103/SV-144より簡易MC治具の接続ハーネスを外し、外しておいた本体ハーネスを接続する。

(7) 調整用ROMをIC814/SV-144より外し、元のROMを差し込む。

## 第 5 章 電気調整

本章では、下記基板の修理および保守を行う際に必要な電気調整について述べている。

CK-41 基板  
ADA-28 基板

### 5-1. 準備

#### 使用機器

名称	仕様 (minimum)	機械名
オーディオアナライザ	<ul style="list-style-type: none"> <li>• オシレーター</li> <li>• 歪率計</li> <li>• レベルメーター</li> <li>• バランス入出力型</li> </ul>	TEKTRONIX SG505, SG5010, AA501, AA5001 または相当品
オシロスコープ	<ul style="list-style-type: none"> <li>• 周波数レンジ; DC to 100 MHz</li> <li>• 2現象</li> <li>• 感度; 5 mV/div</li> </ul>	TEKTRONIX 475, 465 または相当品
ビデオ信号発生器	—	TEKTRONIX 1410 または相当品
周波数カウンター	<ul style="list-style-type: none"> <li>• 有効桁数: 8桁以上</li> </ul>	ADVANTEST TR5822 または相当品

#### 治工具

名称	部品番号	備考
延長基板 EX-396	J-6400-860-A	メイン基板用
延長基板 EX-397	J-6400-870-A	オプション基板用

スイッチ、コントロールの初期設定  
下記以外の設定は任意。

#### コントロールパネル部

SAMPLING\_FREQ : 48 kHz  
WORD\_LENGTH : 20 BIT  
SYNC\_CLOCK : INT

#### コネクターパネル部

REFERENCE VIDEO INPUT 75 Ω : ON  
WORD SYNC INPUT 75 Ω : ON

#### MC-41基板

SW1-1~SW1-8 : すべて "I"  
SW2-1~SW2-8 : すべて "I"  
SW3 : "0"  
SW4 : OFF

#### SV-144基板

S801 : OFF

#### DIO-27基板

S1-1~S1-8 : すべて OFF

## 5-2. CK-41基板調整

この調整はCK-41基板を交換した際に行う。

### 使用機器、治工具

- オシロスコープ
- 周波数カウンタ
- ビデオ信号発生器
- 延長基板EX-396

### 準備

CK-41基板を延長基板EX-396で延長する。

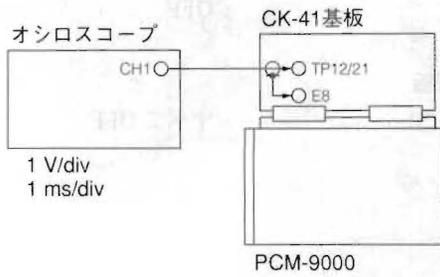
### 5-2-1. VARI PITCH調整

#### スイッチ、コントロール設定

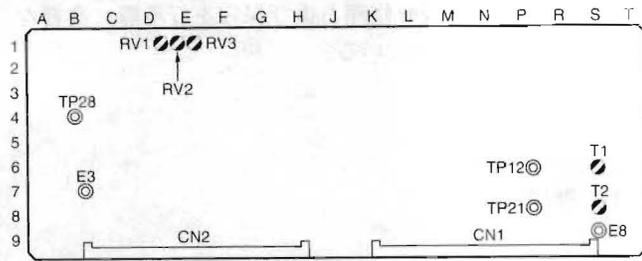
下記以外はスイッチ、コントロールの初期設定に同じ。

SAMPLING FERQ ; 48 kHz

#### 接続:



#### 調整箇所:



CK-41 BOARD (A SIDE)

#### 調整手順:

調整時の状態	規格	調整箇所
<ul style="list-style-type: none"> <li>• オシロスコープをTP12/CK-41 (P6), E8/CK-41 (GND) (S9) に接続する。</li> </ul>	TP12/CK-41 = +4.0 ± 0.1 V	● T1/CK-41 (S6)
<ul style="list-style-type: none"> <li>• オシロスコープをTP21/CK-41 (P8), E8/CK-41 (GND) (S9) に接続する。</li> </ul>	TP21/CK-41 = +2.0 ± 0.1 V	● T2/CK-41 (S8)

### 5-2-2. VIDEO PLLフリーラン調整

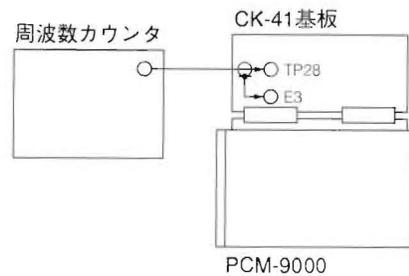
スイッチの設定:

下記設定以外はスイッチ、コントロールの初期設定に同じ。

コントロールパネル部

**SYNC CLOCK** : VIDEO

接続:

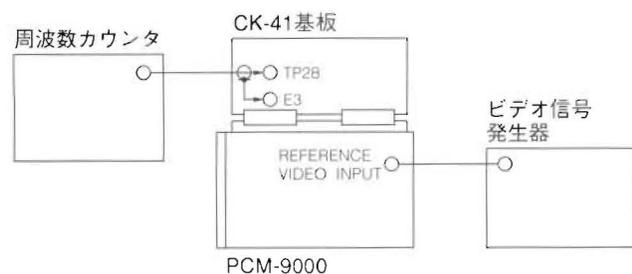


調整:

- (1) 周波数カウンターをTP28/CK-41 (B4), E3/CK-41 (B7) (GND) に接続する。
- (2) SAMPLING FREQ. を (48 kHz, 44.1 kHz, 44.056 kHz) に切り換えてSAMPLING FREQ. におけるTP28/CK-41 (B7) の周波数が下表の規格になるようにRV3/2/1をそれぞれ調整する。

SAMPLING FREQ.	規格	調整箇所
48 kHz	4.800000 MHz ±10Hz	RV3/CK-41 (E1)
44.1 kHz	4.410000 MHz ±10Hz	RV2/CK-41 (E1)
44.056 kHz	4.405600 MHz ±10Hz	RV1/CK-41 (E1)

- (3) VIDEO信号発生器よりREFERENCE VIDEO INPUT端子にビデオ信号を入力し、各SAMPLING FREQ. (サンプリング周波数) においてロックすることを確認する。



PCM-9000

### 5-3. ADA-28基板 (DABK-9001) 調整

この調整は、ADA-28基板 (DABK-9001) を交換した際に行う。調整はADA-28基板 (DABK-9001) を延長基板EX-397で延長して、PCM-9000に装着した状態で行う。

使用機器、治工具

- オーディオアナライザー
- オシロスコープ
- 延長基板EX-397

準備

ADA-28基板を延長基板EX-397で延長する。

スイッチ、コントロール設定

下記以外はスイッチ、コントロールの初期設定に同じ。

RM-D9000: INPUTモード

**INPUT** キーを押すと、インジケータCH-1/CH-2が点灯する。

ADA-28基板

S101/201/105/205: bit-1, 2がON、bit-3, 4がOFF  
または

bit-1, 2がOFF、bit-3, 4がON

S102/202: OFF

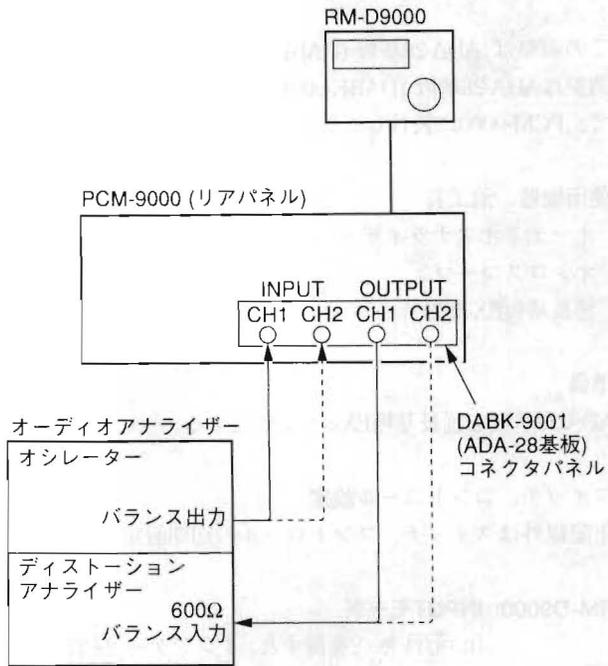
S103/104/203/204: bit-1, 2, 3がOFF、bit-4がON

RV101/201: 任意 (CMR調整用)

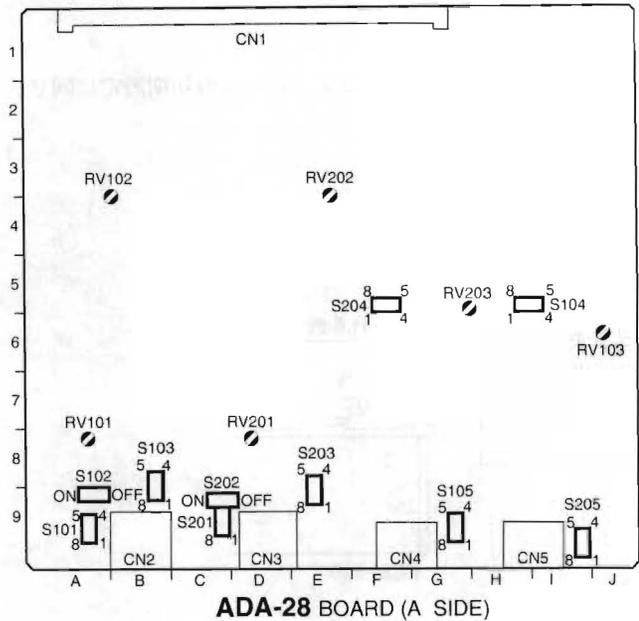
RV102/202: 任意 (ADオフセット調整用)

RV103/203: 任意 (DAラインアウトアンプBAL調整用)

接続:

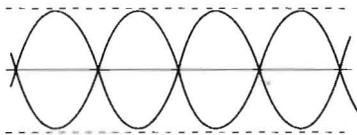
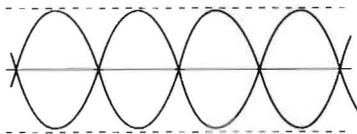


調整箇所:



調整手順:

ステップ	調整時の状態	規格	調整箇所
1	<ul style="list-style-type: none"> <li>LINE INPUT 端子 CH-1,CH-2を OPEN にして無信号入力とする。</li> <li>RM-D9000 CH-1/CH-2: INPUT</li> </ul>	RM-D9000のレベルメーターが CH-1/CH-2: $-\infty$ のみ点灯 CH1 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> CH2 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	CH-1: RV102/ADA-28 (B3) CH-2: RV202/ADA-28 (E3)
2	<ul style="list-style-type: none"> <li>LINE INPUT 端子 CH-1に1 kHz, +24dBsの信号を入力する。信号はコネクタのHOT,COLD (2ピンと3ピンにパラレル入力)とGND間に入力する。</li> <li>LINE OUTPUT CH-1端子にディストーションアナライザを接続する。</li> </ul>	LINE OUTPUT CH-1の 出力レベル=最小	RV101/ADA-28 (A8)
3	<ul style="list-style-type: none"> <li>LINE INPUT 端子 CH-2に1 kHz, +24dBsの信号を入力する。信号はコネクタのHOT,COLD (2ピンと3ピンにパラレル入力)とGND間に入力する。</li> <li>LINE OUTPUT CH-2端子にディストーションアナライザを接続する。</li> </ul>	LINE OUTPUT CH-2の 出力レベル=最小	RV201/ADA-28 (D8)

ステップ	調整時の状態	規格	調整箇所
4	<ul style="list-style-type: none"> <li>• LINE INPUT 端子 CH-1に1 kHz, +20dBsの信号を入力する。</li> <li>• LINE OUTPUT端子 CH-1のHOT, COLD (2ピン-1ピン, 3ピン-1ピン)の信号をオシロスコープに接続する。</li> </ul>	LINE OUTPUT CH-1のHOT,COLDの出力信号の振幅を同じにする。 	RV103/ADA-28 (J6)
5	<ul style="list-style-type: none"> <li>• LINE INPUT 端子 CH-2に1 kHz, +20dBsの信号を入力する。</li> <li>• LINE OUTPUT端子 CH-2のHOT, COLD (2ピン-1ピン, 3ピン-1ピン)の信号をオシロスコープに接続する。</li> </ul>	LINE OUTPUT CH-2のHOT,COLDの出力信号の振幅を同じにする。 	RV203/ADA-28 (H6)

参考: ADA-28基板は基板内に利得可変用ディップスイッチ (S103, 104, 203, 204) がある。ADA-28基板を装着するPCM-9000のフロントパネル部のANALOG LEVEL ADJUSTボリュームと組み合わせて+14 dBs~+26 dBsの最大入出力レベルの設定が可能となっている。基板内ディップスイッチは約3.0 dBステップの切り換え、フロントパネル部のボリュームは±2 dB以上の可変幅がある。AD側の利得可変用ディップスイッチ (S103, 203) とDA側の利得可変用ディップスイッチ (S104, 204) の設定に対する最大入/出力レベルの可変範囲は以下ようになる。

スイッチの設定 (S102/103/203/204)	ボリュームセンターの目安	ボリューム可変幅
bit-4のみ ON	+24 dBs	+22~+26 dBs
bit-3のみ ON	+21 dBs	+19~+23 dBs
bit-2のみ ON	+18 dBs	+16~+20 dBs
bit-1のみ ON	+15 dBs	+13~+17 dBs

# SECTION 1 INSTALLATION

## 1-1. OPERATING ENVIRONMENT

Equipment operating temperature : 10 °C to 35 °C  
Equipment preserving temperature : -20 °C to 55 °C  
Equipment Mass (weight) : 17 kg

### Prohibitive Space for Installation

- Places exposed directly to sun light or powerful light
- Dusty places
- Places exposed to strong electric or magnetic fields
- Areas near heat source
- Places Subjected to vibration
- Places a lot of electrical noise
- Places generated static noise

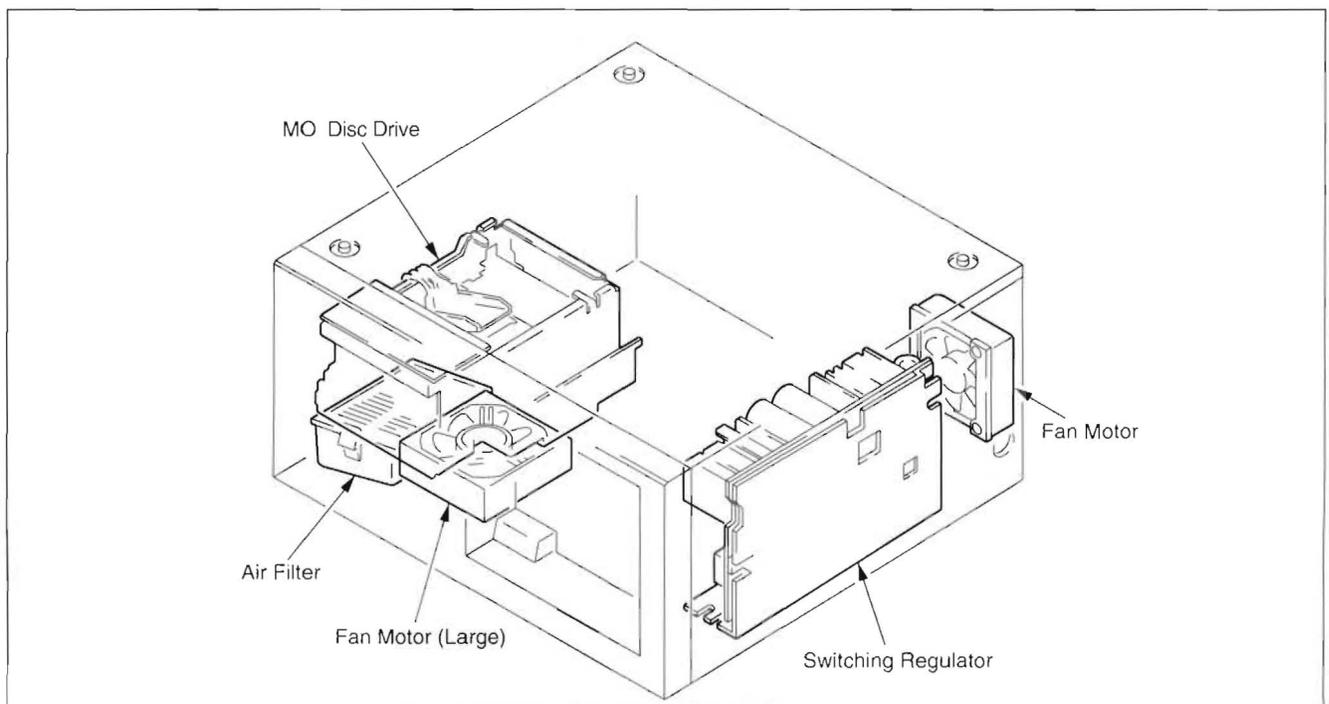
### Note on installation

- The back of the PCM-9000 should be at least 40 cm from the wall to aid ventilation and allow access for servicing.
- There must be at least 10 cm of clearance from the left side of the PCM-9000 for the air intake.
- When using the PCM-9000 on a desk, the above of the PCM-9000 should be at least 40 cm from the wall to allow access for servicing. The PCM-9000 can also be mounted in a rack, and can be pulled out for print board maintenance.
- The disc drive is built to be used when it is in a horizontal position, so do not use it in a vertical or tilted position.

### Ventilation/Radiation

- The PCM-9000 has two fans.

- ① The fan at the power source is an exhaust fan. If the rear exhaust vent becomes blocked, the fan will stop and the power source may be damaged. During checks, do not leave the power on for a long period of time without cooling from the fan.
- ② The fan at the M/O Disc Drive is an intake fan. The air pressure inside the disc drive is kept higher than the pressure outside. Together with the air filter, this pressure keeps dust out to maintain M/O disc and M/O Disc Drive reliability. The air filter at the air intake of the M/O Disc Drive prevents dust from getting inside. When the filter becomes clogged, the reliability of the M/O Disc will decline. The filter should be replaced or cleaned periodically (once or twice a year). For replacement of air filter, refer to "4-2. fan motor /air filter replacement".



## 1-2. POWER SUPPLY

### 1-2-1. Capacity of AC Power Supply

A switching regulator is used as the power source for the PCM-9000.

There is thus no need to change over the mains voltage setting for difficult mains voltages.

Power supply Voltage : AC 100 V to 120 V or  
AC 220 V to 240 V

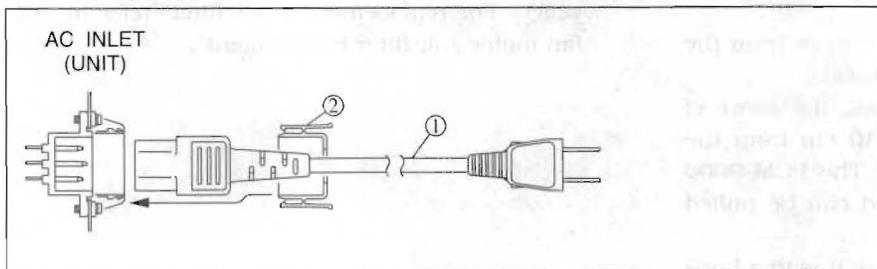
Power supply Frequency: 50/60 Hz

Power Consumption : 130 W

### 1-2-2. Power Cord

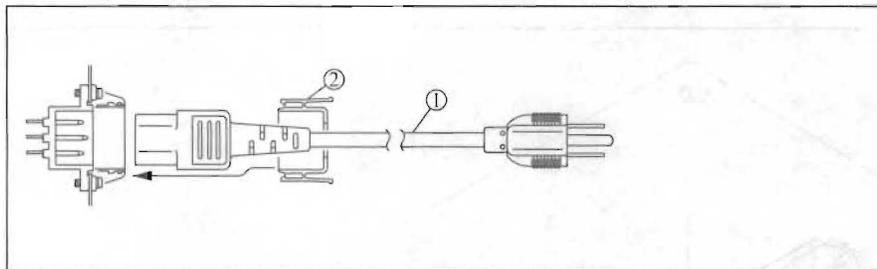
#### (J) Required Parts

- ① Power Cord
- ② Plug Holder (Black)



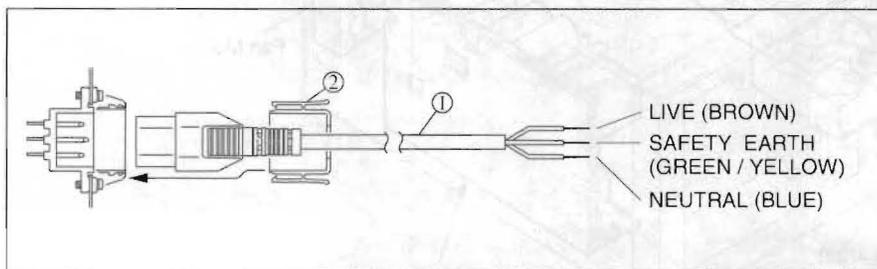
#### (UC) Required Parts

- ① Power Cord
- ② Plug Holder (Black)



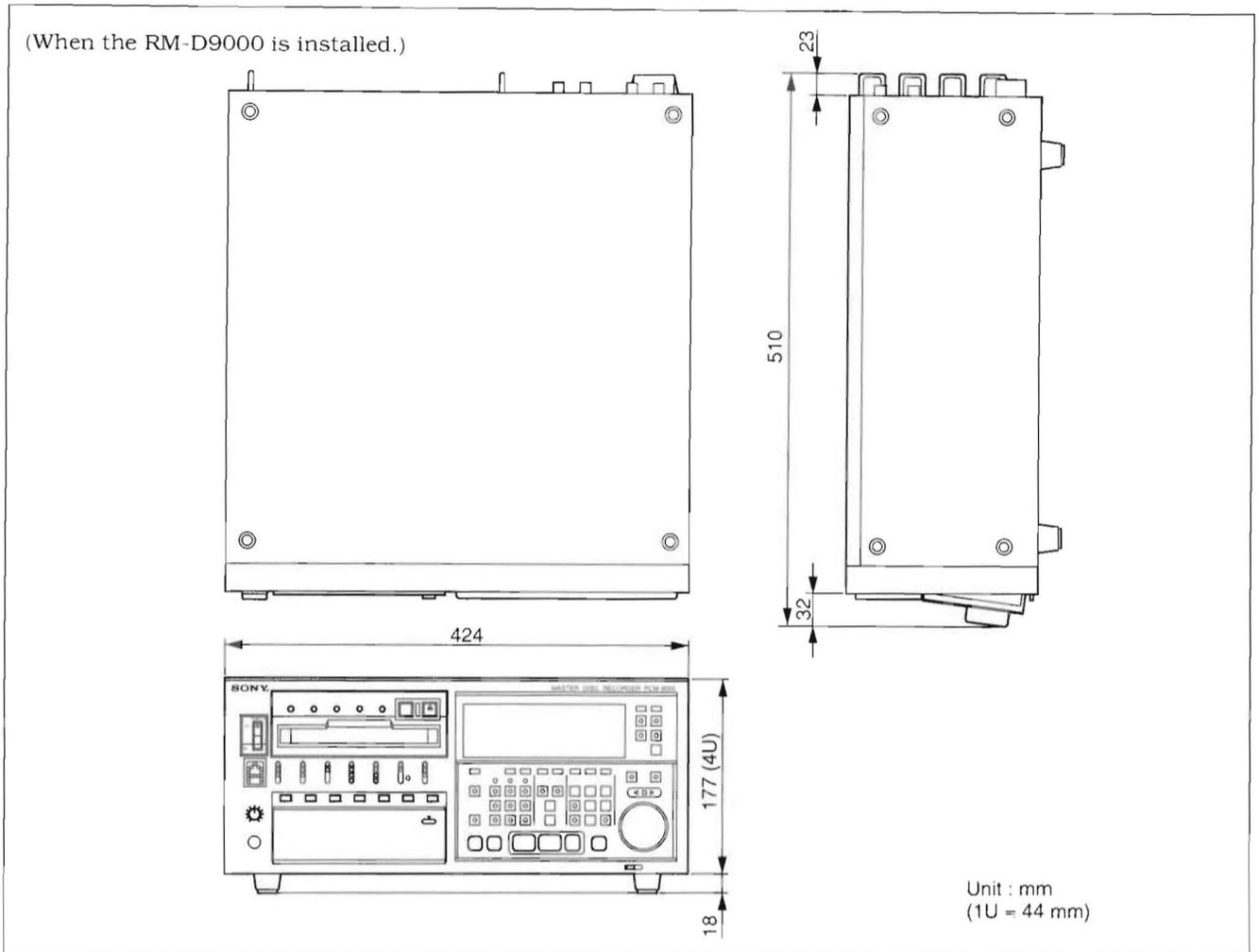
#### (EK) Required Parts

- ① Power Cord
- ② Plug Holder (Gray)

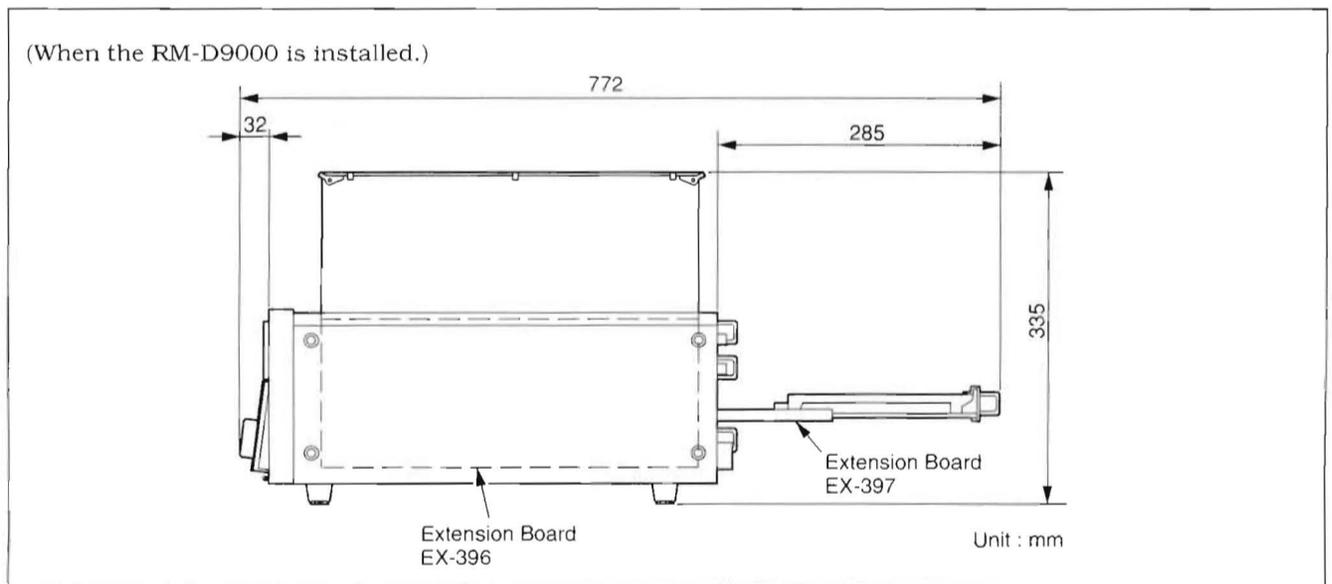


### 1-3. INSTALLATION SPACE

#### (1) Outside dimensions



#### (2) Operating dimensions



## 1-4. SUPPLIED ACCESSORIES

### PCM-9000

Power Cord	: 1
Plug Holder	: 1
Ball Point L Wrench BL2MM	: 1
Rack Ungle Assembly (4U)	: 2
screw (B 4x16)	: 4
(For Rack Ungle Assembly)	
screw (RK 5x16)	: 4
screw (B 4x8)	: 4
(For Rack Mount Rail)	
Trapezoid ornamental washer (#5)	: 4
Operation Manual	: 1
Maintenance Manual Part1	: 1
Quick Refalence	: 1

### RM-D9000

connection cord 0.8 m	: 1
connection cord 10 m	: 1

## 1-5. OPTIONAL ACCESSORIES

RM-D9000 Sony Remote Control Unit

- DABK-9001 Sony Converter Board (20 bit A/D, D/A)
- DABK-9003 Sony Interface Board (Remote TC interface)
- DABK-9004 Sony Digital I/O Board (SDIF-2 interface)
- DABK-9005 Sony Interface Board (SCSI interface)

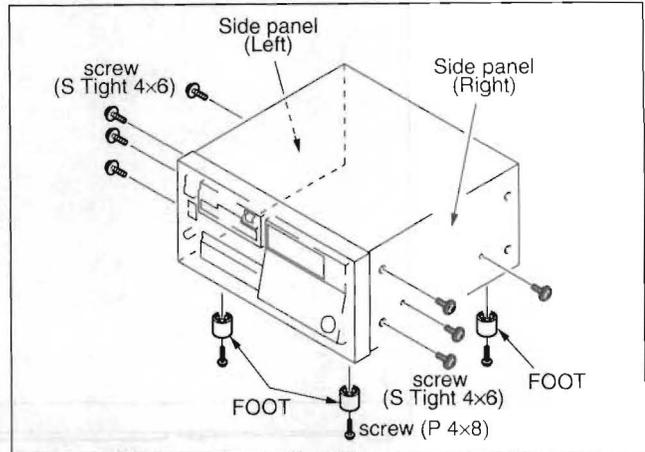
- DABK-9006 Sony Interface Board (DAQ-1000 interface)
- DABK-9007 Sony Memory Board (Memory)
- MSD-1200 Sony Digital Audio Master Disc (For UC)
- MSD-1200 Sony Digital Audio Master Disc (For J, EK)

## 1-6. RACK MOUNTING

This unit can be mounted on an EIA Standard 19 inch rack.

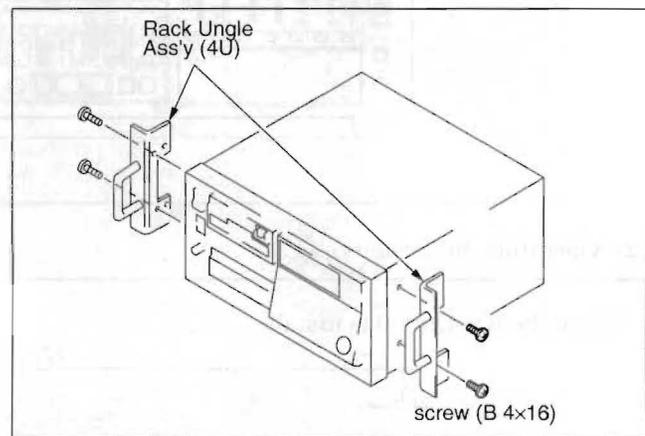
### Rack Mounting Procedure

- Remove the four feet from the bottom of the unit.
- Remove eight fixing screws (4x6 S Tight four each) on the side panel (left and right).



- Install the rack angle assembly (4U) (supplied accessory) to the PCM-9000.

**Note:** Use the screws (B 4x16) (supplied accessory) attached to rack angle.



- Install the PCM-9000 to 19 inch rack with four trapezoid ornamental washers (#5) and screws (RK 5x16).

## 1-7. INSTALLATION OF THE OPTIONAL BOARDS (DABK-9001/9003/9004/9005/9006/9007)

**Note:** Be sure to turn the POWER switch of PCM-9000 off before installing of the optional boards.

### 1-7-1. Installation of DABK9001/9003/9004/9005/9006

- **Configuration of DABK-9001**

ADA-28 board : 1

- **Configuration of DABK-9003**

TC-77/78 board : 1

- **Configuration of DABK-9004**

DIO-28 board : 1

- **Configuration of DABK-9005**

IF-436/437 board : 1

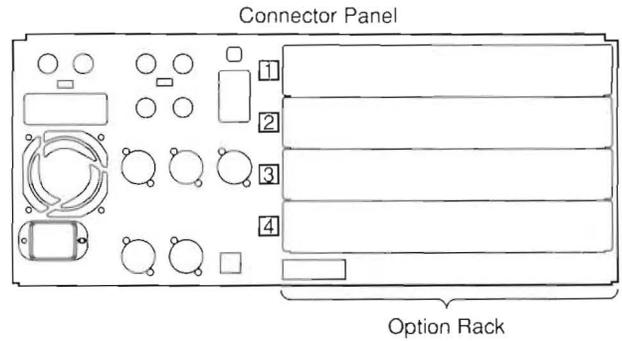
Cable : 1

- **Configuration of DABK-9006**

IF-438 board : 1

### The Slot of the Various Optional Components

**Note:** The various optional components should only be installed in the positions that are listed below.

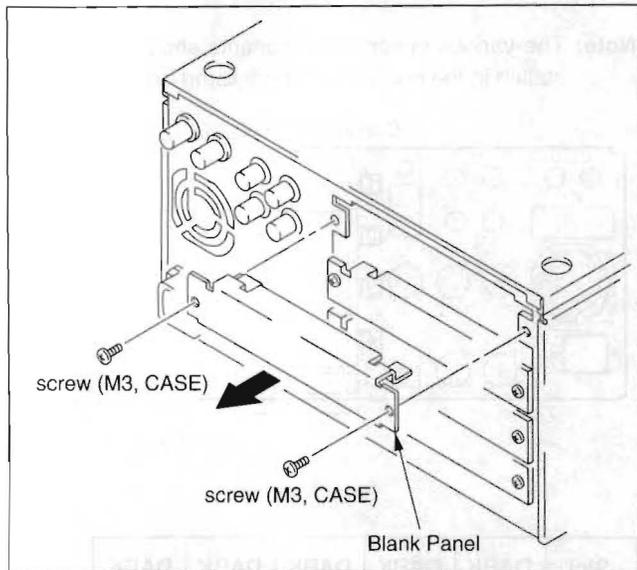


Slot No.	DABK -9001	DABK -9003	DABK -9004	DABK -9005	DABK -9006
1	×	×	×	○	○
2	×	○	○	×	○
3	×	○	○	×	○
4	○	×	×	×	×

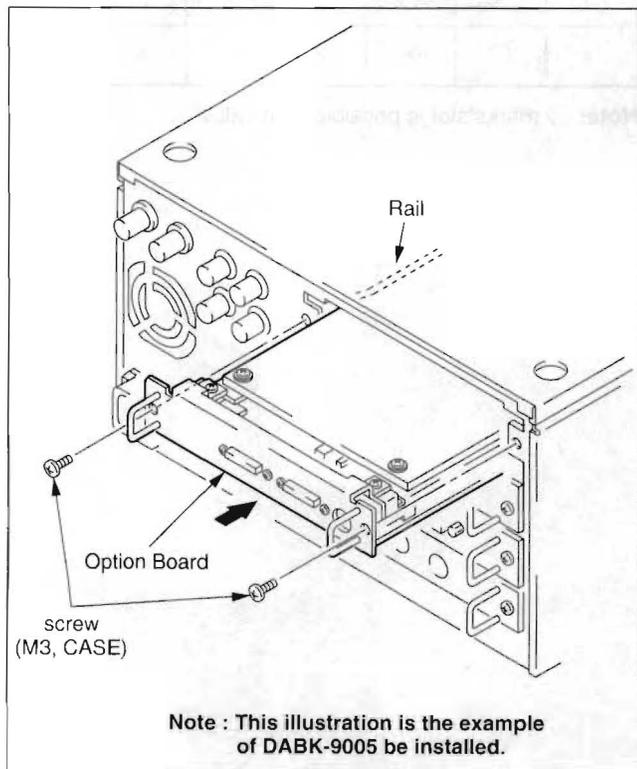
**Note:** ○ marks slot is possible to install.

### Procedure

- (1) For installation of the option boards, remove two fixing screws (M3, CASE) and the blank panel from the appropriate slot.



- (2) Firmly insert the option board into the position formerly occupied by the blank panel.
- (3) Use the two screws (M3, CASE) from the blank panel to fix the option board in place.



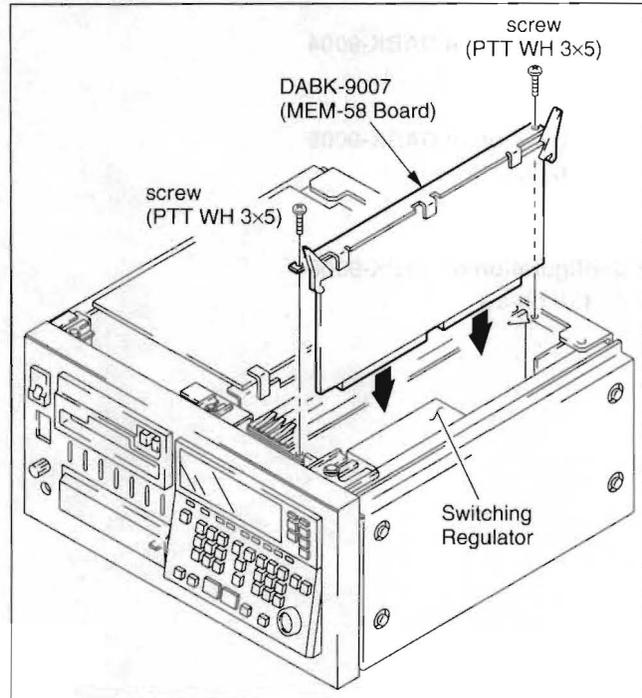
### 1-7-2. Installation of DABK-9007

#### Configuration

- MEM-58 board : 1  
Fixing screw (PTTWH 3x5) : 2

#### Procedure

- (1) Remove the top panel. (See section 2-3.)
- (2) Insert the DABK-9007 (MEM-58 board) into the board slot as a figure.
- (3) Turn the eject lever, then fasten the DABK-9007 with two screws (PTTWH 3x5).



- (4) Install the top panel.

## 1-8. INPUT/OUTPUT INTERFACE

### 1-8-1. Matching Connectors and Cables

When connecting cables to the connectors on the connector panel, use the connectors/cables or equivalent with each other as listed below.

#### 1. PCM-9000

PCM-9000 side connector		Matching connector/cable	
Used for	Type	Type	Sony Part No.
INSERTION RETURN DIGITAL I/O AES/EBU D-I D-I SYNC	XLR, 3 PIN, female	XLR, 3 PIN, male	1-508-084-11 (CANNON XLR-3-12C or equivalent) Optional accessory ECD-3C (3 m)/10C (10 m)/ 15C (15 m)
INSERTION SEND DIGITAL I/O AES/EBU D-0	XLR, 3 PIN, male	XLR, 3 PIN, female	1-508-083-11 (CANNON XLR-3-11C or equivalent) Optional accessory ECD-3C (3 m)/10C (10 m)/ 15C (15 m)
REFERENCE VIDEO INPUT WORD SYNC INPUT/OUTPUT	BNC	BNC	—
REMOTE	Round, 10 PIN, female	Connect Cord { 0.8 m 10 m	(Supplied with RM-D9000)

#### 2. RM-D9000

RM-D9000 side connector		Matching connector/cable	
Used for	Type	Type	Sony Part No.
PCM-9000	Round, 10 PIN, female	Connect Cord { 0.8 m 10 m	(Supplied with RM-D9000)

#### 3. DABK-9001

DABK-9001 side connector		Matching connector/cable	
Used for	Type	Type	Sony Part No.
LINE INPUT CH1, CH2	XLR, 3 PIN, female	XLR, 3 PIN, male	1-508-084-11 (CANNON XLR-3-12C or equivalent)
LINE OUTPUT CH1, CH2	XLR, 3 PIN, male	XLR, 3 PIN, female	1-508-083-11 (CANNON XLR-3-11C or equivalent)

4. DABK-9003

DABK-9003 side connector		Matching connector/cable	
Used for	Type	Type	Sony Part No.
TIME CODE IN	XLR, 3 PIN, female	XLR, 3 PIN, male	1-508-084-11 (CANNON XLR-3-12C or equivalent)
TIME CODE OUT	XLR, 3 PIN, male	XLR, 3 PIN, female	1-508-083-11 (CANNON XLR-3-11C or equivalent)
PARALLEL REMOTE	D-sub, 50 PIN, female	D-sub, 50 PIN, male	1-566-358-11
REMOTE (9 PIN) /RS232	D-sub, 9 PIN, female	D-sub, 9 PIN, male	Optional accessory RCC-5G (5m) /10 G (10 m) / 15 G (15 m) or 1-560-651-00 (connector) / 1-561-749-00 (shell)

5. DABK-9004

DABK-9003 side connector		Matching connector/cable	
Used for	Type	Type	Sony Part No.
INPUT CH-1/CH-2	BNC	BNC	—
OUTPUT CH-1/CH-2	BNC	BNC	—

6. DABK-9005

DABK-9003 side connector		Matching connector/cable	
Used for	Type	Type	Sony Part No.
SCSI I/F	Half pitch unphenol, 50 PIN, female	Connect Coad, 1m	1-696-776-11 (Supplied with DABK-9005)

7. DABK-9006

DABK-9003 side connector		Matching connector/cable	
Used for	Type	Type	Sony Part No.
CUE DATA IN	XLR, 3 PIN, female	XLR, 3 PIN, male	1-508-084-11 (CANNON XLR-3-12C or equivalent)
CUE DATA OUT	XLR, 3 PIN, male	XLR, 3 PIN, female	1-508-083-11 (CANNON XLR-3-11C or equivalent)
REMOTE	Unphenol, 36 PIN, female	Unphenol, 36 PIN, male	Optional accessory RCC-5D (5 m) /10D (10 m) or 1-557-482-00 (cable)
STATUS OUT	D-sub, 25 PIN, female	D-sub, 25 PIN, male	1-558-116-00 (cable)

## 1-8-2. Input/Output Signals of Connectors

The input and output signals of the connectors on the connector panel are as follows.

### 1. PCM-9000

#### Input

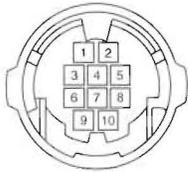
REFERENCE VIDEO INPUT : Composite Video, Composite Sync signal, Square wave, Impedance 75 ohms, terminated in 75 ohms  
 WORD SYNC INPUT : 3 V min., Impedance 75 ohms (unbalanced), terminated in 75 ohms  
 INSERTION RETURN : AES3-1992, Digital audio interface (AES/EBU)  
 DIGITAL I/O AES/EBU D-I : AES3-1992, Digital audio interface (AES/EBU)  
 D-I SYNC : AES3-1992, Digital audio interface (AES/EBU)

#### Output

WORD SYNC OUTPUT : TTL Level, Impedance 75 ohms (unbalanced)  
 INSERTION SEND : AES3-1992, Digital audio interface (AES/EBU)  
 DIGITAL I/O AES/EBU D-O : AES3-1992, Digital audio interface (AES/EBU)

REMOTE: Round, 10 Pin, Female

- OUTSIDE VIEW -

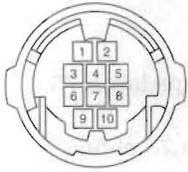


Pin No.	Signal Name	Signal Level	Function
1	RAES-	RS-422A	DIGITAL AUDIO OUTPUT
2	SR-RX+	RS-422A	REMOTE COMMAND INPUT
3	+12 Vdc	—	—
4	+12 Vdc	—	—
5	SR-RX-	RS-422A	REMOTE COMMAND INPUT
6	GND	—	—
7	GND	—	—
8	SR-TX-	RS-422A	COMMAND OUTPUT
9	RAES+	RS-422A	DIGITAL AUDIO OUTPUT
10	SR-TX+	RS-422A	COMMAND OUTPUT

## 2. RM-D9000

REMOTE: Round, 10 Pin, Female

- OUTSIDE VIEW -



Pin No.	Signal Name	Signal Level	Function
1	RAES-	RS-422A	DIGITAL AUDIO OUTPUT
2	SR-RX+	RS-422A	REMOTE COMMAND OUTPUT
3	+12 Vdc	—	—
4	+12 Vdc	—	—
5	SR-RX-	RS-422A	REMOTE COMMAND OUTPUT
6	GND	—	—
7	GND	—	—
8	SR-TX-	RS-422A	COMMAND INPUT
9	RAES+	RS-422A	DIGITAL AUDIO INPUT
10	SR-TX+	RS-422A	COMMAND INPUT

## 3. DABK-9001

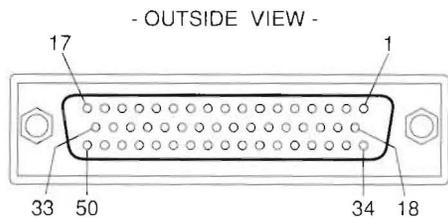
LINE INPUT CH-1/CH2 : Reference level +4 dBs, max. +26 dBs, Impedance 10 k ohms/600 ohms  
(Set up at the switch on the board.), balanced

LINE OUTPUT CH-1/CH-2 : Reference level +4 dBs, max. +26 dBs, Impedance 50 ohms max., balanced

#### 4. DABK-9003

TIME CODE IN : IEC461 (SMPTE/EBU), 0.5 to 10 Vp-p (10 k ohms, balanced)  
 TIME CODE OUT : IEC461 (SMPTE/EBU), 2.4 ±0.1 Vp-p (100 ohms max., balanced)  
 PARALLEL REMOTE : Parallel, TTL Compatible  
 REMOTE (9 PIN) /RS-232 : RS-422A or RS-232C (SW change-over)

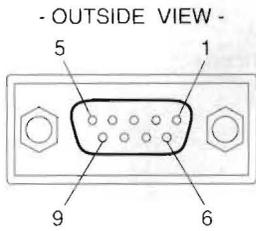
PARALLEL REMOTE : D-sub, 50 Pin, Female



Pin No.	Signal name	Pin No.	Signal name
1	STOP COMMAND	26	SPEED B COMMAND
2	PLAY COMMAND	27	SPEED C COMMAND
3	REC COMMAND	Note) 28	(Reserved)
4	REH COMMAND	29	GND
5	REH-ST COMMAND	30	STOP STATUS
6	FF COMMAND	31	PLAY STATUS
7	REW COMMAND	32	REC STATUS
8	NEXT COMMAND	33	REH STATUS
9	PREV COMMAND	Note) 34	(Reserved)
Note) 10	(Reserved)	35	FF STATUS
Note) 11	(Reserved)	36	REW STATUS
Note) 12	(Reserved)	Note) 37	(Reserved)
Note) 13	(Reserved)	Note) 38	(Reserved)
Note) 14	(Reserved)	Note) 39	(Reserved)
Note) 15	(Reserved)	Note) 40	(Reserved)
16	TC REC READY COMMAND	Note) 41	(Reserved)
17	D1 REC READY COMMAND	Note) 42	(Reserved)
18	D2 REC READY COMMAND	Note) 43	(Reserved)
Note) 19	(Reserved)	Note) 44	(Reserved)
Note) 20	(Reserved)	45	TC REC READY STATUS
Note) 21	(Reserved)	46	D1 REC READY STATUS
22	EXT SOURCE COMMAND	47	D2 REC READY STATUS
23	EXT SOURCE (9.6 K) INPUT	Note) 48	(Reserved)
24	REVERSE COMMAND	49	+5 V OUT
25	SPEED A COMMAND	50	GND (FG)

**Note:** Make sure the "Reserved" terminal is open and not contacting anything.

REMOTE (9 PIN) /RS-232: D-sub, 9 Pin, Female



⟨Using as SONY 9 Pin serial mode⟩

Pin No.	Signal name
1	FG
2	TX-
3	RX+
4	RX GND
5	DG
6	TX GND
7	TX+
8	RX-
9	FG

⟨Using as RS-232⟩

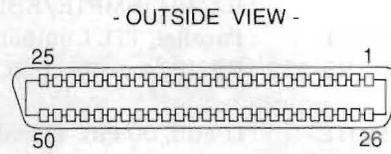
Pin No.	Signal name
1	DCD
2	RXD
3	TXD
4	DTR
5	DG
6	DSR
7	RTS
8	CTS
9	FG

5. DABK-9004

- INPUT CH-1/CH-2 : SDIF-2 unbalanced,  
TTL compatible,  
1.536 M bit/s (48 kHz, 16 bit)
- INPUT CII-1/CH-2 : SDIF-2 unbalanced,  
TTL compatible

6. DABK-9005

SCSI: Half pitch unphenol, 50 Pin, Female



Pin No.	Signal name	Pin No.	Signal name
1	D. G.	26	DB0
2	D. G.	27	DB1
3	D. G.	28	DB2
4	D. G.	29	DB3
5	D. G.	30	DB4
6	D. G.	31	DB5
7	D. G.	32	DB6
8	D. G.	33	DB7
9	D. G.	34	DBP
10	D. G.	35	D. G.
11	D. G.	36	D. G.
12	D. G.	37	D. G.
13	(OPEN)	38	TERMPWR
14	D. G.	39	D. G.
15	D. G.	40	D. G.
16	D. G.	41	ATN
17	D. G.	42	D. G.
18	D. G.	43	BSY
19	D. G.	44	ACK
20	D. G.	45	RST
21	D. G.	46	MSG
22	D. G.	47	SEL
23	D. G.	48	C/D
24	D. G.	49	REQ
25	D. G.	50	I/O

**7. DABK-9006**

CUE DATA IN : FM, 0.5 to 10 Vp-p (10 kΩ),  
4800 bit/s

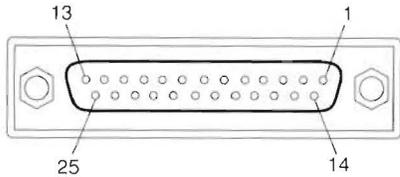
CUE DATA OUT : FM, 2 ±0.5 Vp-p (600 Ω),  
4800 bit/s

REMOTE : Parallel, TTL compatible

STATUS OUT : Parallel, TTL compatible

STATUS OUT: D-sub, 25 Pin, Female

- OUTSIDE VIEW -

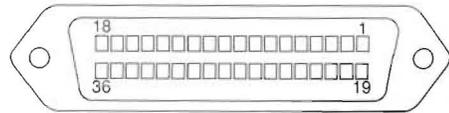


Pin No.	Signal name	Function
1	D. G.	
2	STS A/B	Always H
3	REC/PB SW	Not used
4	F. G.	FRAME GROUND
5	STS HOLD	HOLD
6	D. G.	
7	D. G.	
8	_____	N. G.
9	STS AVE	AVERAGE
10	_____	
11	STS CRC	CRC ERROR
12	_____	
13	STS FS ID	H: 48 or 44.056 kHz/L: 44.1 kHz
14	STS EMP	EMPHASIS (H: ON/L: OFF)
15	D. G.	
16	STS MUTE	MUTING
17	WCK+	WORD CLOCK (RS-422)
18	WCK-	
19	BCK+	BIT CLOCK (RS-422)
20	BCK-	
21	DT1+	Ch-1 DATA (RS-422)
22	DT1-	
23	DT2+	Ch-2 DATA (RS-422)
24	DT2-	
25	STS PAR	PARITY ERROR

⊙ OPEN COLLECTOR OUTPUT (Except for RS-422)

REMOTE: unphenol, 36 Pin, Female

- OUTSIDE VIEW -

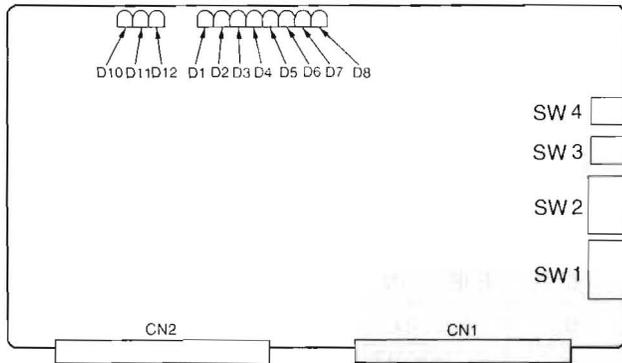


Pin No.	Signal name	Function
1	+5 V. OUT	
2	FF. IN	
3	FWD. IN	
4	REW. IN	
5	EJECT. IN	Not used
6	STOP. IN	
7	PAUSE. IN	
8	REC. IN	Not used
9	CUT-IN. IN	
10	EDIT. IN	
11	CUT-OUT. IN	
12	FF. OUT	
13	FWD. OUT	
14	REW. OUT	
15	STNBY. OUT	
16	STOP. OUT	
17	PAUSE-1. OUT	
18	REC. OUT	Always H (OFF)
19	INS. OUT	
20	V-INS. IN	Not used
21	A1-INS. IN	
22	A2-INS. IN	Not used
23	REV. IN	
24	SPEED-A. IN	
25	SPEED-B. IN	
26	CTL. OUT	Not used
27	TACH. OUT	Not used
28	CAPSTAIN. OUT	Not used
29	SYNC. IN	Not used
30	_____	N. C.
31	H-NORM-FWD. IN	
32	PAUSE-2. OUT	
33	SEARCH. IN	
34	_____	N. C.
35	D. G.	
36	D. G.	

## 1-9. SWITCHES/LED/JUMPERS SETTING

### 1. PCM-9000

#### MC-41 board



#### Switch

SW1/2 : Setting the unit operation mode  
(For details, refer to OPERATION MANUAL.)

**Factory setting:** SW1-1 to SW1-8 all "1"  
SW2-1 to SW2-8 all "1"

SW3 : Setting the unit test mode  
(For details, refer to OPERATION MANUAL.)

**Factory setting:** "0"

SW4 : CPU RESET switch

#### LED indicator

D1 : MEM-58 board mounting: Light on (green)

D2 : ED-37 board mounting: Light on (green)

D3 : CK-41 board mounting: Light on (green)

D4 : DIO-27 board mounting: Light on (green)

D5 : The board mounting to the OPTION SLOT 1:  
Light on (green)

D6 : The board mounting to the OPTION SLOT 2:  
Light on (green)

D7 : The board mounting to the OPTION SLOT 3:  
Light on (green)

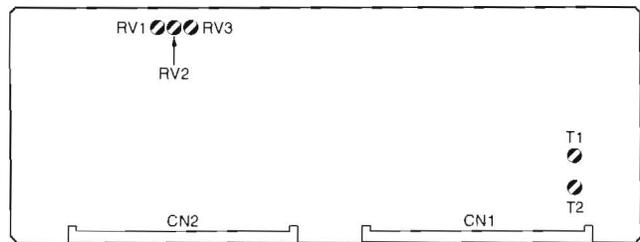
D8 : The board mounting to the OPTION SLOT 4:  
Light on (green)

D10: CPU RESET: Light on (red)

D11: CPU stopped: Light on (red)

D12: CPU BUS ERROR: Light on (red)

#### CK-41 board



#### Volume

RV1 : Video PLL FREE-RUN adjustment (44.056 k)

RV2 : Video PLL FREE-RUN adjustment (44.1 k)

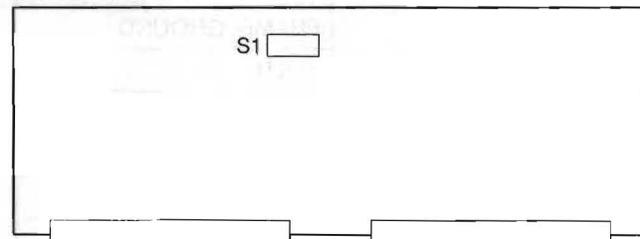
RV3 : Video PLL FREE-RUN adjustment (48 k)

T1 : VARI PLL adjustment

T2 : 256Fs PLL adjustment

For details of adjustment, refer to "5. ELECTRICAL ALIGNMENT".

#### DIO-27 board



#### Switch

S1 : Source origin data setting switch  
(the last two figures)

The Data is BCD code.

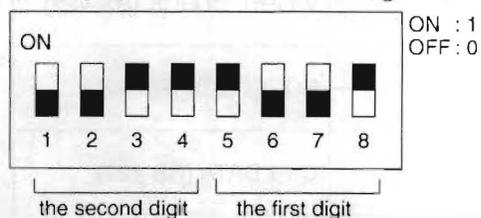
S1-1 to S1-4.....the second digit

S1-5 to S1-8 .....the first digit

Each digits are set by binary. (ON = 1, OFF = 0)

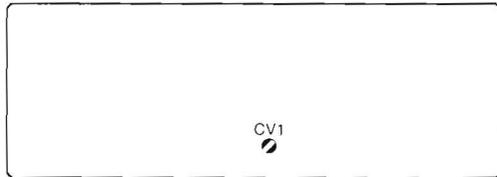
**Factory setting:** all OFF

**(Example)** Data (the last two figures): 39



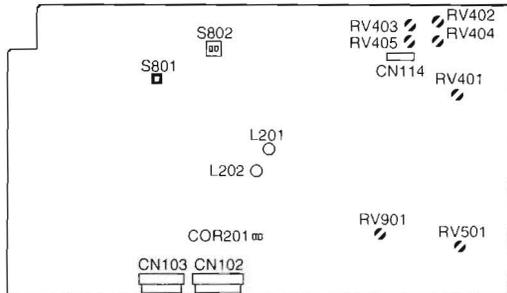
S1-1 → OFF	} 3	S1-5 → ON	} 9
S1-2 → OFF		S1-6 → OFF	
S1-3 → ON		S1-7 → OFF	
S1-4 → ON		S1-8 → ON	

**GPM-11 board**



CV1: Gap actuator zero point adjustment  
For details, refer to section "4-4. ALIGNMENT".

**SV-144 board**



**Volume**

L201/L202: PLL adjustment  
RV401 : PULL IN OFF SET adjustment  
RV402 : FOCUS BIAS adjustment  
RV403 : FOCUS GAIN adjustment  
RV404 : TRACKING OFF SET adjustment  
RV405 : TRACKING GAIN adjustment  
RV501 : SPINDLE OFF SET adjustment  
RV901 : MAGNETIC HEAD GAP OFF SET adjustment  
For details, refer to section "4-4. ALIGNMENT".

**Switch**

S801 : SERVO CPU reset switch  
S802 : CPU tool Mode setting switch

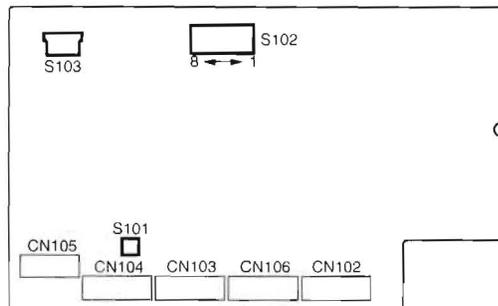
Switch setting		Explanation
S801-1	S802-1	Track jump single mode
OFF	OFF	
ON	OFF	
OFF	ON	Absolute address access
ON	ON	Relative address access

**Factory setting**

S802-1, 2: OFF (normal)

**2. RM-D9000**

**KC-32 board**



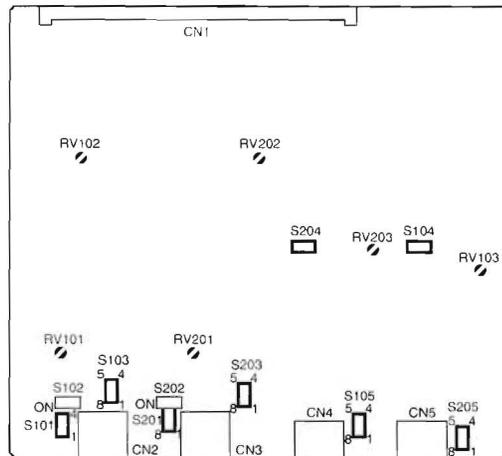
**Switch**

S101 : RESET switch  
S102 : Mode setting switch  
(For details, refer to OPERATION MANUAL.)

**Factory setting:**

S102-1, 4 : ON  
S102-2, 3, 5, 6, 7, 8: OFF  
S103 : RM-D9000 POWER ON/OFF switch

**3. DABK-9001**



**ADA-28 board**

**Volume**

RV101 : INPUT CMR adjustment (CH1)  
RV102 : AD CONVERTER OFF SET adjustment (CH1)  
RV103 : OUTPUT BALANCE AMP Balance adjustment (CH1)  
RV201 : INPUT CMR adjustment (CH2)  
RV202 : AD CONVERTER OFF SET adjustment (CH2)  
RV203 : OUTPUT BALANCE AMP Balance adjustment (CH2)

For details of adjustment, refer to "5. ELECTRICAL ALIGNMENT".

**Switch**

S101 (S101-1 to S101-4): Change over the analog audio signal HOT/COLD to be input to CH1 ANALOG INPUT connector.

S201 (S201-1 to S201-4): Change over the analog audio signal HOT/COLD to be input to CH2 ANALOG INPUT connector.

The pin assignment of the CH1/CH2 connectors change as follows depending on the switch setting.

Switch setting								ANALOG AUDIO INPUT CH1 /CH2 connector Pin assignment		
S101				S201				Pin No.		
-1	-2	-3	-4	-1	-2	-3	-4	1	2	3
ON	ON	OFF	OFF	ON	ON	OFF	OFF	GND	HOT	COLD
OFF	OFF	ON	ON	OFF	OFF	ON	ON	GND	COLD	HOT

← Factory setting

S103 (S103-1 to S103-4),

S203 (S203-1 to S203-4): AD CONVERTER FULL BIT input selector

Switch setting								Function
S103				S203				
-1	-2	-3	-4	-1	-2	-3	-4	
OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	+24 dBs Input: Full Bit
OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	+21 dBs Input: Full Bit
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	+18 dBs Input: Full Bit
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	+15 dBs Input: Full Bit

← Factory setting

S104 (S104-1 to S104-4),

S204 (S204-1 to S204-4): LINE OUT output level selector (When the DA CONVERTER FULL BIT to be input.)

Switch setting								Function
S104				S204				
-1	-2	-3	-4	-1	-2	-3	-4	
OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	LINE OUT Output level
OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	Full Bit: +24 dBs output
OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	Full Bit: +21 dBs output
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	Full Bit: +18 dBs output
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	Full Bit: +15 dBs output

← Factory setting

S105 (S105-1 to S105-4): Change over the analog audio signal HOT/COLD to be output to CH1 ANALOG OUTPUT connector.

S205 (S205-1 to S205-4): Change over the analog audio signal HOT/COLD to be output to CH2 ANALOG OUTPUT connector.

The pin assignment of the CH1/CH2 connectors change as follows depending on the switch setting.

Switch setting								ANALOG AUDIO OUTPUT CH1 /CH2 connector pin assignment		
S105				S205				Pin No.		
-1	-2	-3	-4	-1	-2	-3	-4	1	2	3
ON	ON	OFF	OFF	ON	ON	OFF	OFF	GND	HOT	COLD
OFF	OFF	ON	ON	OFF	OFF	ON	ON	GND	COLD	HOT

← Factory setting

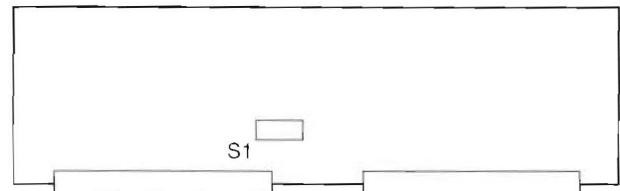
S102, S202: Set the input impedance of the analog audio signal to be input to the CH1 and CH2 AUDIO INPUT connectors.

Switch setting		Function
S102	ON	CH1 input impedance : 600Ω
	OFF	CH1 input impedance : 20kΩ
S202	ON	CH2 input impedance : 600Ω
	OFF	CH2 input impedance : 20kΩ

**Factory settings :** S102 and S202 are both set to OFF

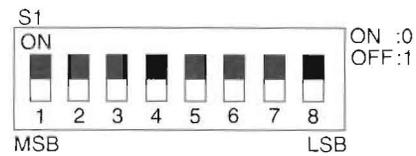
#### 4. DABK-9007

##### MEM-58 board



##### Switch

S1 : Correction for the disposal delay of the external equipment connection as the insertion mode.



In case of using as the insertion mode, sets the processing delay value of the external equipment connection.

Significance value of each switches (S1-1 to S1-8) is as follows:

S1 setting		Delay value
S1-1	ON	0
	OFF	128
S1-2	ON	0
	OFF	64
S1-3	ON	0
	OFF	32
S1-4	ON	0
	OFF	16
S1-5	ON	0
	OFF	8
S1-6	ON	0
	OFF	4
S1-7	ON	0
	OFF	2
S1-8	ON	0
	OFF	1

(Unit: WORD)

Set the combination of each switches (S1-1 to S1-8) so as to become satisfactory delay value.

##### Factory setting

S1-1 to S1-8 : all ON

**EX:** In case of 100 (WORD) delay value setting

$$100 = 64 + 32 + 4 \text{ (WORD)}$$

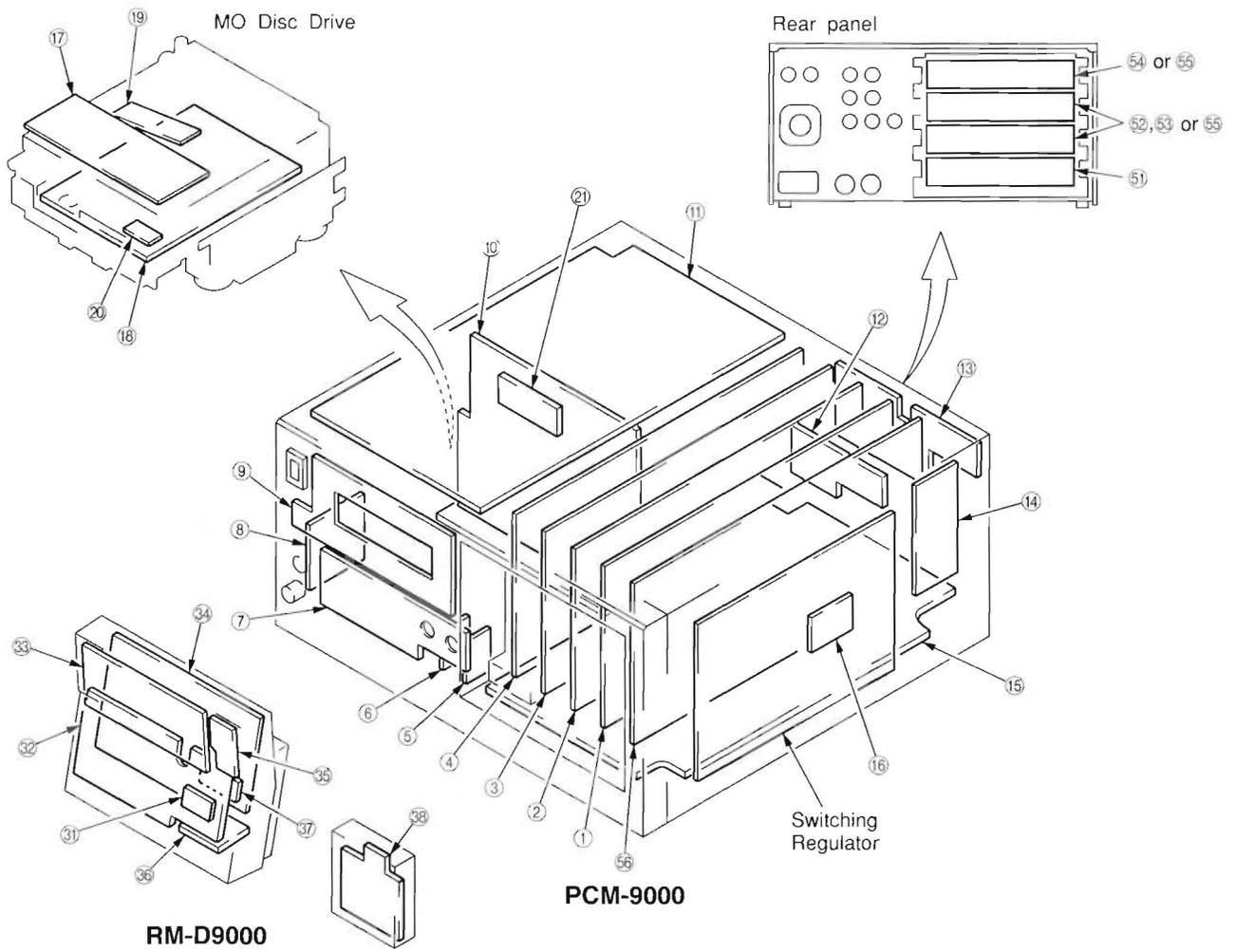
S1 setting

S1-2, 3, 6 : OFF

S1-1, 4, 5, 7, 8 : ON

## SECTION 2 SERVICE OVERVIEW

### 2-1. LOCATION OF MAIN PARTS



#### PCM-9000

- ① ED-37
- ② CK-41
- ③ DIO-27
- ④ MC-41
- ⑤ VR-169
- ⑥ VR-168
- ⑦ KY-264
- ⑧ JK-42
- ⑨ KY-265
- ⑩ MB-491

- ⑪ SV-144
- ⑫ CN-915
- ⑬ CN-902
- ⑭ PS-345
- ⑮ MB-490
- ⑯ PS-354
- ⑰ SVD-9

#### MO Disc Drive

- ⑱ MD-87
- ⑲ TR-82
- ⑳ GPM-11 (OWH Ass'y)
- ㉑ SE-209

#### RM-D9000

- ㉒ LE-120
- ㉓ KY-267
- ㉔ DP-195
- ㉕ KC-32
- ㉖ KY-269
- ㉗ CN-883
- ㉘ ROM-16
- ㉙ KY-297

#### DABK-9001

- ㉚ ADA-28
- DABK-9003**
- ㉛ TC-77/78
- DABK-9004**
- ㉜ DIO-28

#### DABK-9005

- ㉝ IF-436/437
- DABK-9006**
- ㉞ IF-438
- DABK-9007**
- ㉟ MEM-58

## 2-2. CIRCUIT CONFIGURATION

Model Name	Board Name	Function
PCM-9000	CK-41	CLOCK BOARD
	CN-902	CONNECTOR BOARD
	CN-915	CONNECTOR BOARD
	DIO-27	AES/EBU DIGITAL I/O, HEADPHONES BOARD
	ED-37	EDIT BOARD
	GPM-11	GAP SENSOR BOARD
	JK-42	HEADPHONES BOARD
	KY-264	KEY SWITCH BOARD
	KY-265	KEY SWITCH BOARD
	MB-490	MOTHER BOARD
	MB-491	MOTHER BOARD
	MC-41	MAIN CPU BOARD
	MD-87	MAGNETIC HEAD DRIVE BOARD
	PS-345	D/C CONVERTER BOARD
	PS-354	SWITCHING BOARD
	SE-209	SENSOR BOARD
	SV-144	SERVO BOARD
	SVD-9	SERVO DRIVER BOARD
	TR-82	RF BOARD
	VR-168	VR BOARD
VR-169	VR BOARD	
RM-D9000	CN-883	CONNECTOR BOARD
	DP-195	FL DRIVER BOARD
	KC-32	KEY CONTROL BOARD
	KY-267	KEY BOARD
	KY-269	KEY BOARD
	LE-120	LED BOARD
	KY-297	TEN KEY BOARD
DABK-9001	ADA-28	AD/DA CONVERTER BOARD
DABK-9003	TC-77, TC-78	REMOTE/TC I/F BOARD
DABK-9004	DIO-28	SDIF-2 I/F BOARD
DABK-9005	IF-436, IF-437	SCSI I/F BOARD
DABK-9006	IF-438	DAQ-1000 I/F BOARD
DABK-9007	MEM-58	MEMORY BOARD

## 2-3. CABINET REMOVAL

### 2-3-1. Top Panel, Side Panels and Bottom Panel Removal

#### Top panel

Remove the four screws (4×6 S Tight) which secure the top panel, and remove the top panel.

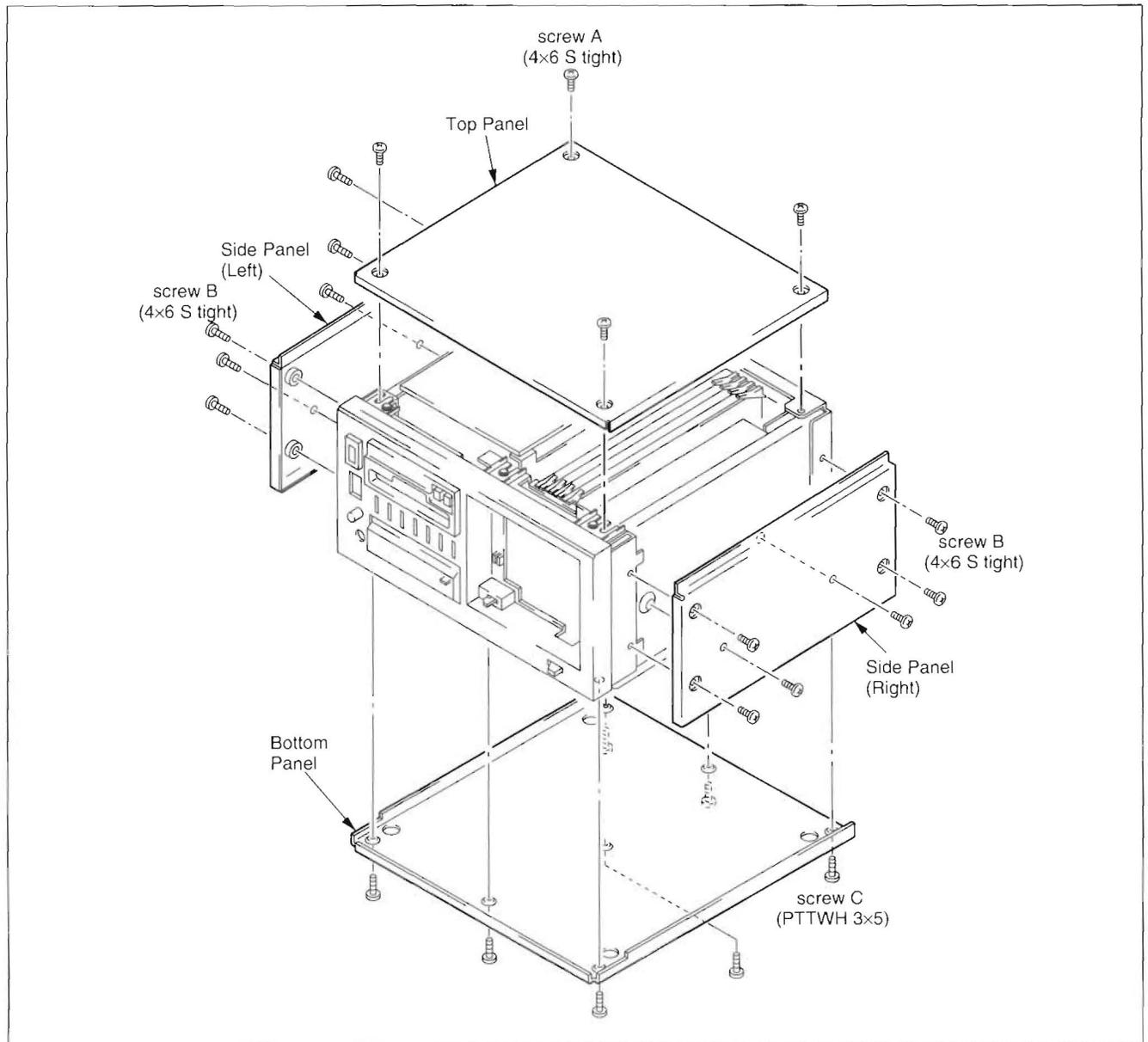
#### Side panels

Remove the six screws (4×6 S Tight) which secure the side panel, and remove the side panels (left or right).

**Note:** There is an air vent on the left side panel, but none on the right side panel. When installing these panels, be careful not to mix them up.

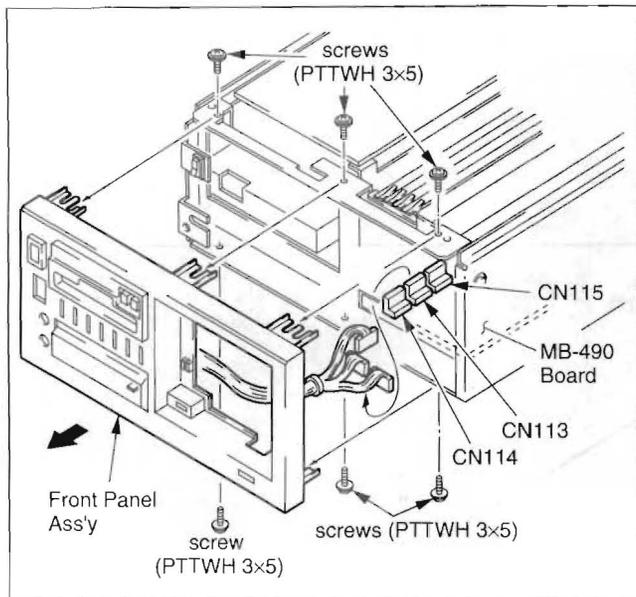
#### Bottom panel

Either loosen the left and right side panels or remove them. Remove the seven screws (PTTWH 3×5) C and remove the bottom panel.



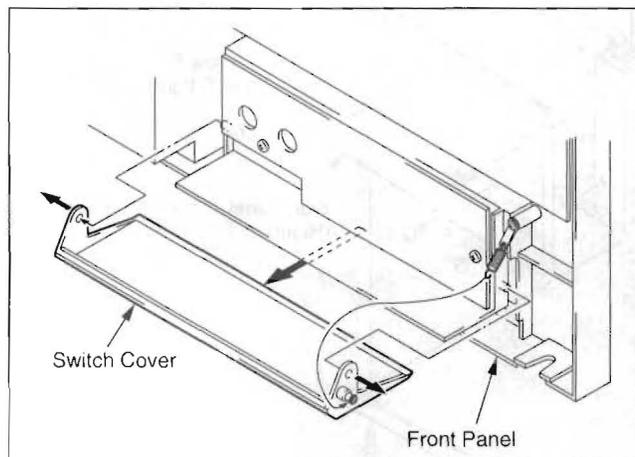
### 2-3-2. Front Panel Ass'y Removal

- (1) Remove the top panel. (See section 2-3.)
- (2) Remove all plug-in boards. (See section 2-4.)
- (3) Remove the six screws (PTTWH 3x5).
- (4) Disconnect the harness from the connector (CN113, CN114 and CN115) on MB-490 board.
- (5) Remove the front panel Ass'y out in the direction of the arrow.



### 2-3-3. Switch Cover Removal

- (1) Remove the front panel. (See section 2-3.)
- (2) Remove the switch cover by the back of the front panel as shown in the figure.



### 2-4. REMOVING/INSERTING PLUG-IN BOARDS

Removing and installing procedures of the plug-in board are as follows.

- MC-41 board
- DIO-27 board
- CK-41 board
- ED-37 board
- MEM-58 board (When the optional DABK-9007 is installed.)

**Note:** Be sure to turn the POWER switch of PCM-9000 off before removing and installing of the plug-in board.

#### Preparations

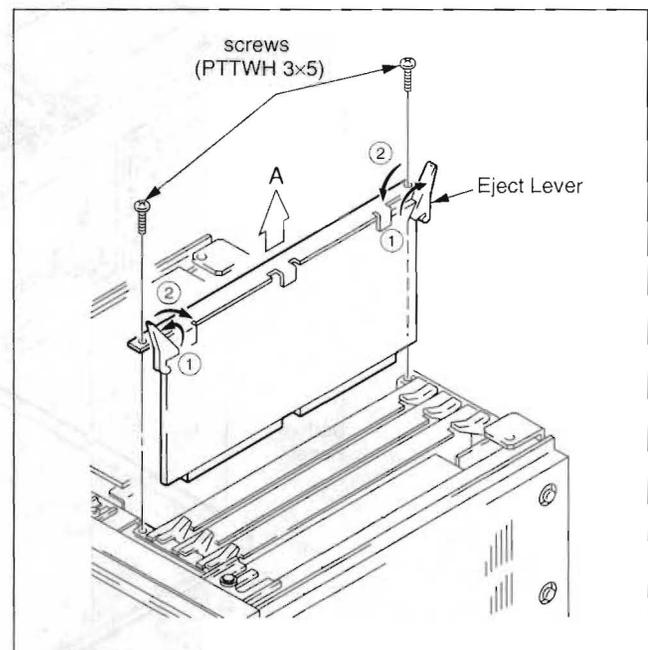
Remove the top panel. (See section 2-3.)

#### 1. Removing procedure of Plug-in board.

- (1) Remove the two screws (PTTWH 3x5) which secure the plug-in board.
- (2) Pull the eject levers in the direction of arrow (1), and pull the plug-in board out in the direction of arrow A.

#### 2. Inserting procedure of Plug-in board.

- (1) Push the eject levers in the direction of arrow (2).
- (2) Insert the plug-in board along the board slot.
- (3) Fasten the plug-in board with two screws (PTTWH 3x5).



## 2-5. USING THE EXTENSION BOARD

**Note:** Be sure to turn the POWER switch of PCM-9000 off before removing, and installing the plug-in board.

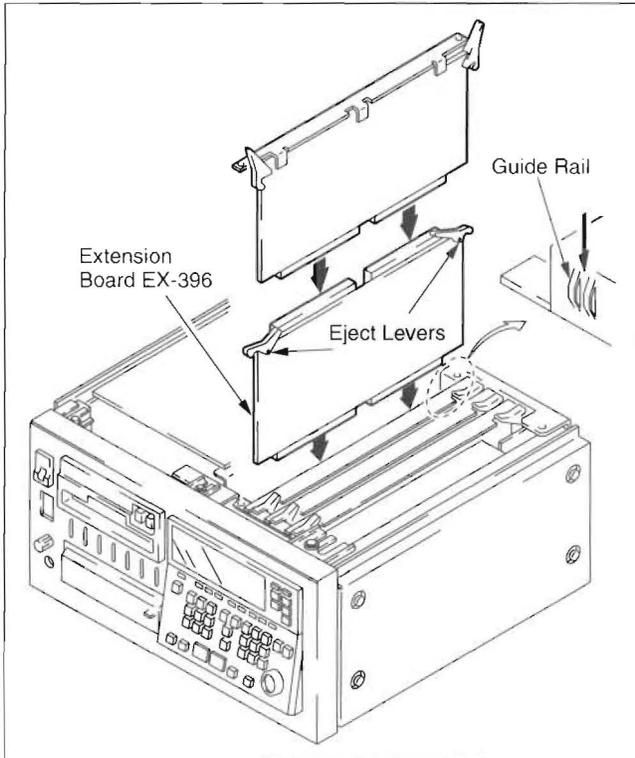
### 2-5-1. Using the Extension Board EX-396

Use to extend for maintenance of the following boards.

- MC-41 board
- DIO-27 board
- CK-41 board
- ED-37 board
- MEM-58 board(When the DABK-9007 is installed.)

**Procedure:**

- (1) Remove the top panel. (See section 2-3.)
- (2) Remove two screws of the plug-in board to extended.  
Open the eject levers of the plug-in board, then pull out the plug-in board from the unit. (See section 2-4.)
- (3) After the plug-in board removed, Push the eject levers of the extension board EX-396. Then insert the EX-396 board along the guide rail.
- (4) Insert the plug-in board to end of the extension board to EX-396 extend it.



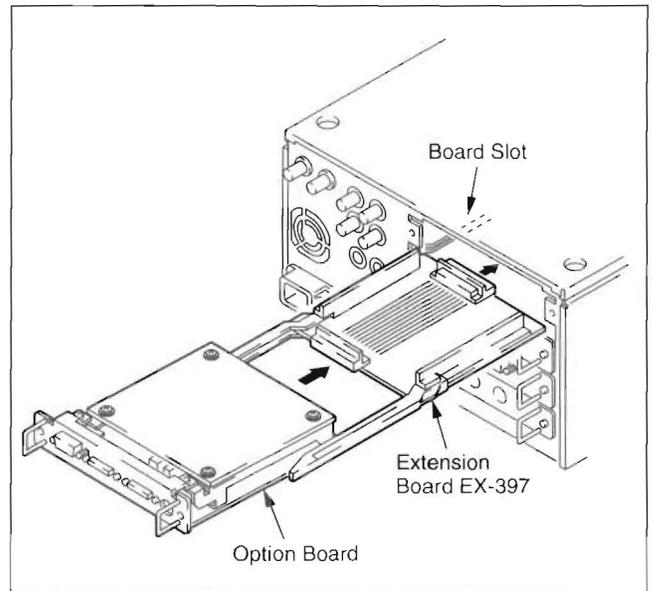
### 2-5-2. Using the Extension Board EX-397

Used to extend for maintenance of the following optional boards.

- DABK-9001 (ADA-28 board)
- DABK-9003 (TC-77/78 board)
- DABK-9004 (DIO-28 board)
- DABK-9005 (IF-436/437 board)
- DABK-9006 (IF-438 board)

**Procedure:**

- (1) Remove the two screws of the board to extended.
- (2) After the option board removed, insert the extension board EX-397 to direction of arrow along the board slot.
- (3) Insert the option board to end of the extension board to extend it.



## 2-6. REMOVING THE DISC IN EMERGENCIES

If the M/O disc drive unit is damaged and the disc will not come out even when you press the eject button, take the following steps to remove the disc.

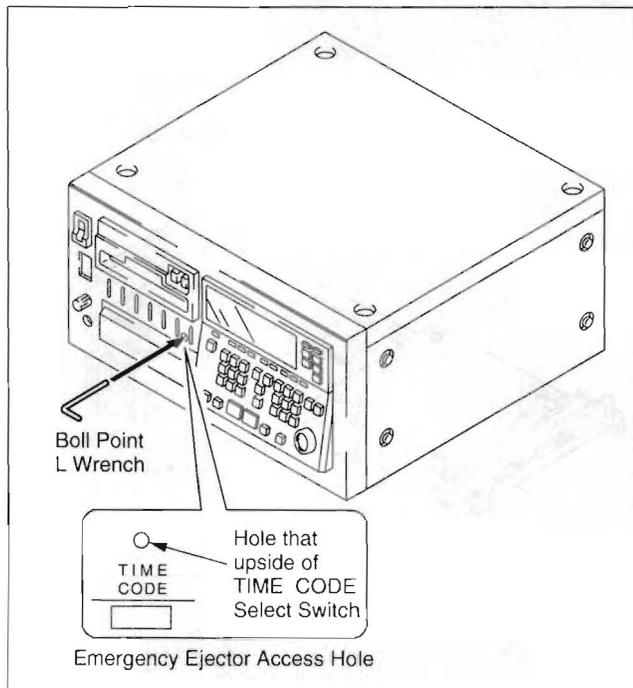
### Required Tool

Ball point L wrench BL2MM (Supplied accessories)

### Procedure

- (1) Turn off the POWER switch.
- (2) Insert a ball-point L wrench into the emergency ejector access hole, and push it straight with quiet force. The disc will be ejected and can be removed.

**Note:** Although the disc eject at first inserting after the emergency eject, nothing unusual has happened. After next inserting, the disc get back on its normal loading.



## 2-7. TOOLS AND EQUIPMENT

### Equipment:

Name	Minimum specifications	Name of instrument
Oscilloscope	Frequency bandwidth: DC–20 MHz or more Sweep time: 20 ns/div	Tektronix 2445, 475 or equivalent
Two channel Level meter	Resolution: 0.1 B or more	Leader LMV1815, LMV189AR or equivalent
DC voltmeter	Resolution: 1 mV or more	Advantest TR-6855 or equivalent
Frequency counter	Effective: 8 digits or more Frequency measurement capacity: 20 MHz	Advantest TR-5822 or equivalent
Video monitor	With video input terminal (BNC)	_____
BNC cable	Using cable: Coaxial cable 3C-2V	SONY UGC –0.5 (0.5 m) UGC –1 (1 m) UGC –2 (2 m) } or equivalent

### Tools:

Name	Part number	Remarks
Simple MC tool	J-6400-850-A	Adjustable ROM (supplied)
Servo Gain adjustment tool	J-6400-890-A	
Magnetic head gap adjustment disc	J-6405-010-A	
Head position adjustment tool (NTSC)	J-6405-020-A	CCD camera, Lens, Camera adaptor , Camera cable, Camera holder (supplied)
Head position adjustment tool (PAL)	J-6405-350-A	CCD camera, Lens, Camera adaptor , Camera cable, Camera holder (supplied)
Head position adjustment cartridge	J-6405-320-A	
Eccentricity driver (2-4)	3-702-390-01	
Test disc	J-6401-060-A	
Low pass filter tool	J-6401-070-A	
Block error rate checker	J-6400-880-A	
AAIP error rate checker	J-6400-840-A	
EX-396 Extension board	J-6400-860-A	
EX-397 Extension board	J-6400-870-A	

## SECTION 4

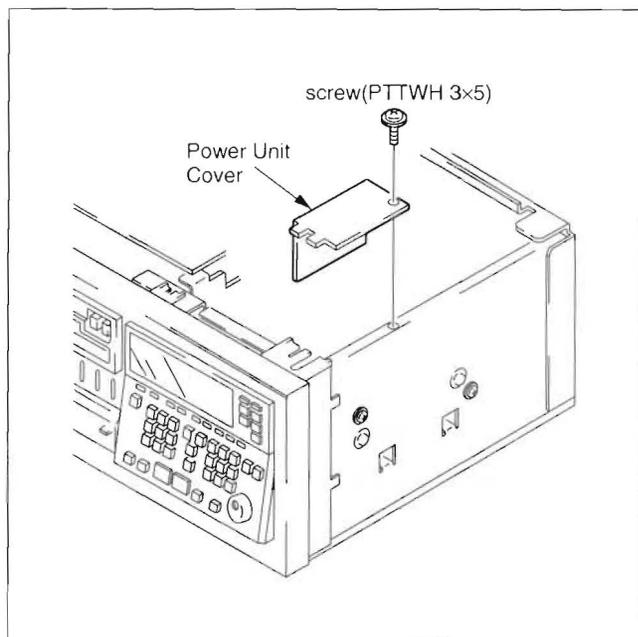
### REPLACEMENT OF MAJOR PARTS & ALIGNMENT

#### 4-1. POWER UNIT REPLACEMENT

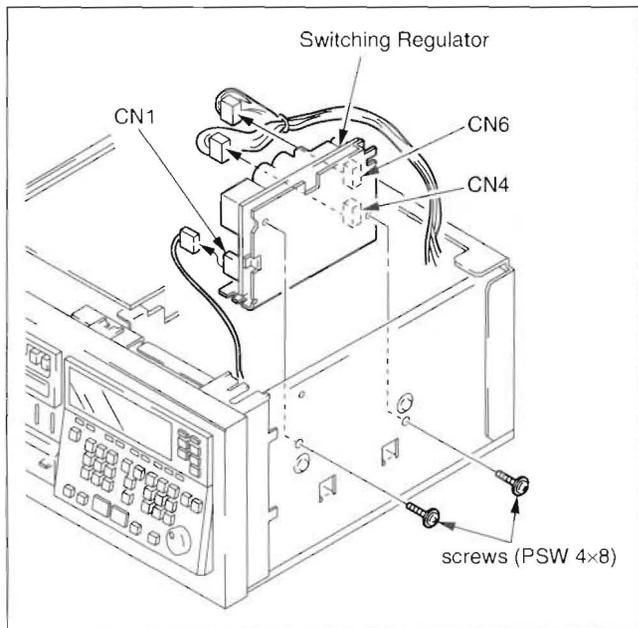
##### 4-1-1. Switching Regulator Replacement

**Note:** Always unplug the power plug from the socket.

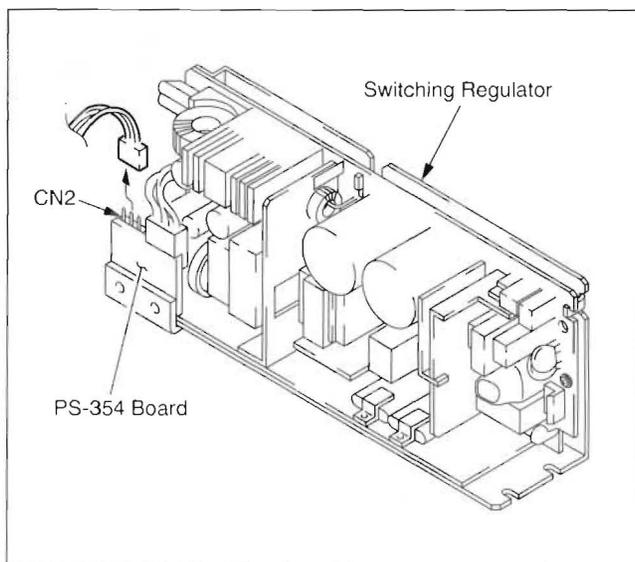
- (1) Remove the top and side (right) panel.  
(See section 2-3. )
- (2) Remove the screw (PTTWH 3x5), then remove the power unit cover.



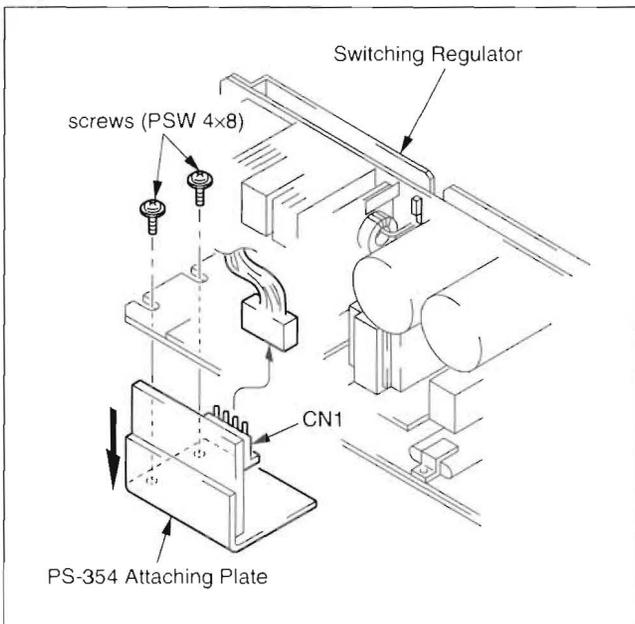
- (3) Remove the two screws (PSW 4x8). Disconnect the harness from three connectors (CN1, CN4, CN6) of the switching regulator.



- (4) Disconnect the harness from the connector (CN2) on the PS-354 board, then remove the switching regulator.



- (5) Disconnect the harness from the connector (CN1) on the PS-354 board. Remove the two screws (PSW 4x8), then remove the PS-354 Attaching plate from the switching regulator.

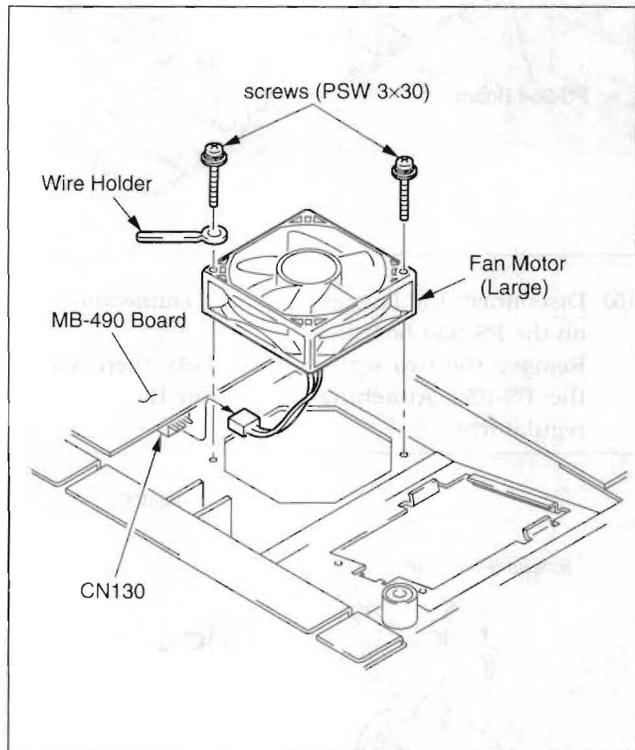


- (6) Install new switching regulator in the reverse order of steps 1 to 5.
- (7) After this replacement, perform "4-4. ALIGNMENT".

## 4-2. FAN MOTOR/AIR FILTER REPLACEMENT

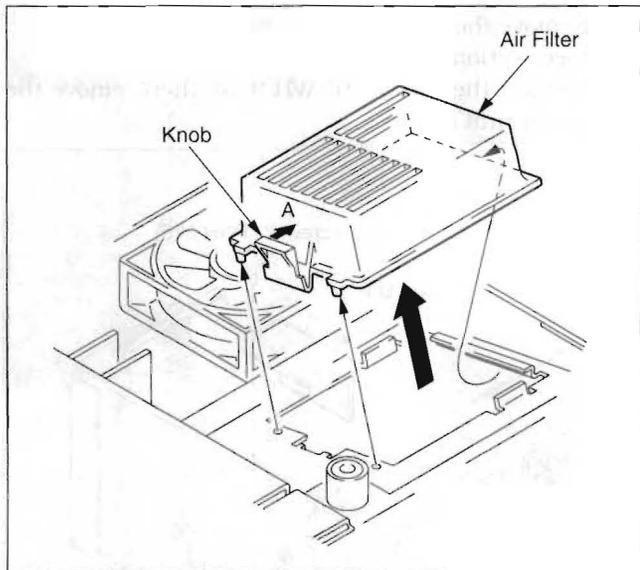
### 4-2-1. Fan Motor (Large) Replacement

- (1) Turn the PCM-9000 upside down.
- (2) Remove the bottom panel. (See section 2-3.)
- (3) Disconnect the harness of the fan motor (large) from the connector (CN130) on the MB-490 board.
- (4) Remove the two screws (PSW 3×30), then remove the fan motor (large).
- (5) Install new fan motor (large) in the reverse order of steps 1 to 4. During installation, fix the fan motor harness with a wire holder to prevent it from working loose.



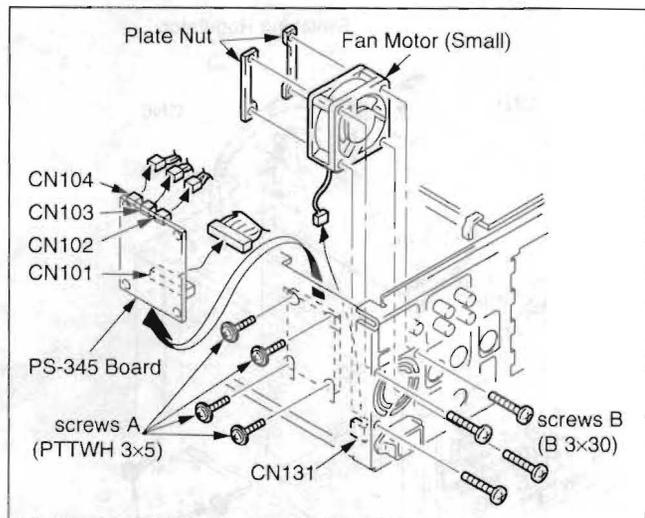
### 4-2-2. Air Filter Replacement

- (1) Turn the PCM-9000 upside down.
- (2) Remove the bottom panel. (See section 2-3.)
- (3) Push the knob toward (A) as illustrated, and remove the air filter.
- (4) Install new air filter in the reverse order of steps 1 to 3.



### 4-2-3. Fan Motor (Small) Replacement

- (1) Disconnect the harness of the PS-345 board from the connectors (CN101 to CN104). Remove the four screws (PTTWH 3×5), then remove the PS-345 board.
- (2) Disconnect the harness of the fan motor (small) from the connector (CN131) on the MB-490 board.
- (3) Remove the two plate nut and the four screws (B3×30), then remove the fan motor (small).



- (4) Install new fan motor (small) and the PS-345 board in the reverse order of steps 1 to 3.

### 4-3. M/O DISC DRIVE REPLACEMENT

This section describes the component parts replacement procedure of M/O Disc Drive as below.

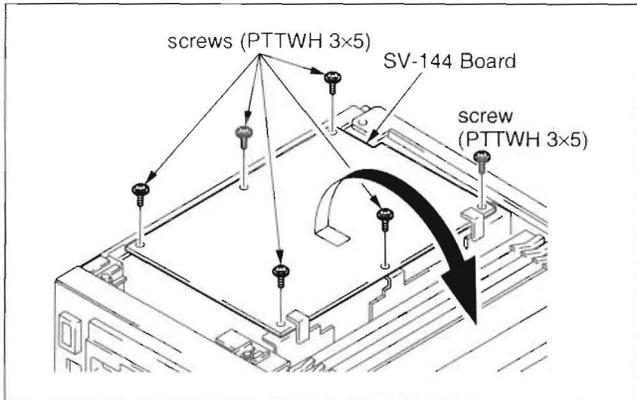
- Note:** 1. For replacement and adjustment of M/O Disc Drive parts, contact a SONY service center.  
2. Be sure turn the POWER switch off.

- 4-3-1. OWH Ass'y Replacement
- 4-3-2. Loading Ass'y Replacement
- 4-3-3. Spindle Motor Replacement
- 4-3-4. Optical pick-up Replacement
- 4-3-5. Geared Motor Replacement

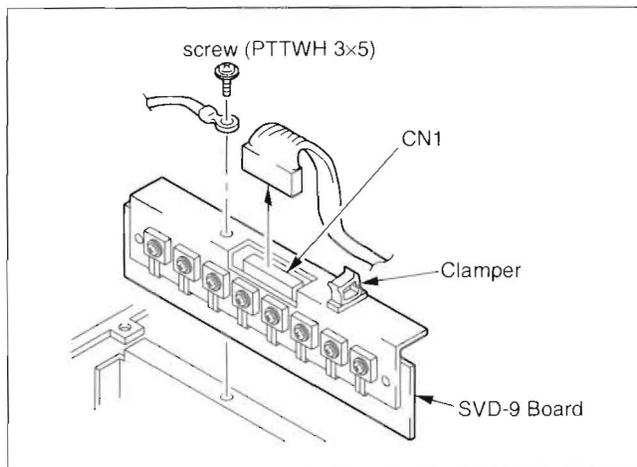
#### Preparation

#### Removal of M/O Disc Drive

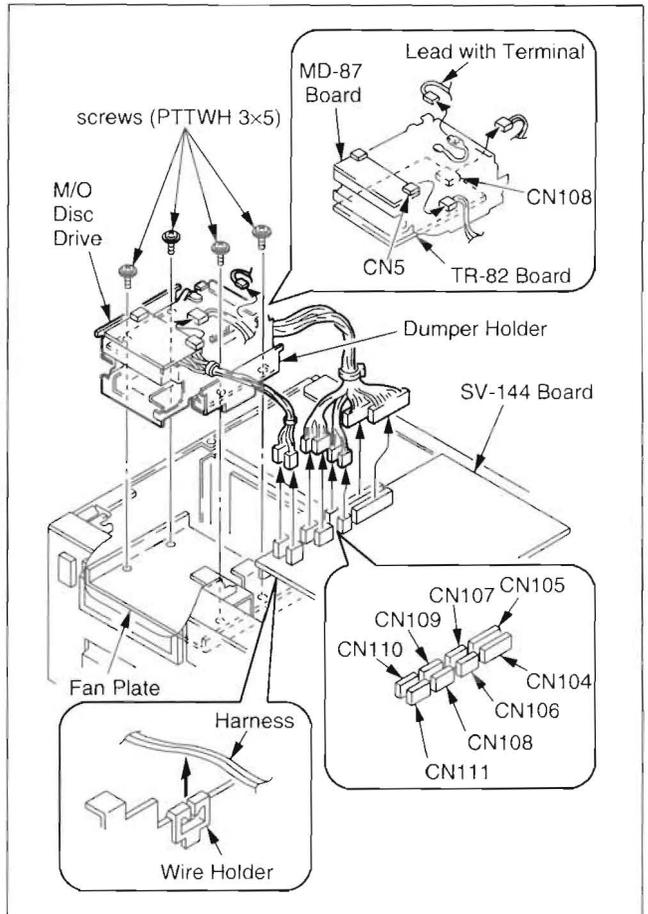
- (1) Remove the top panel. (See section 2-3.)  
Remove the six screws (PTTWH 3x5), then remove the SV-144 board.



- ① Release the harness of the SVD-9 board from the clamper shown in the illustration, and disconnect it from the connector (CN1) of the SVD-9 board.
- ② Remove one screw (PTTWH3x5), and remove the SVD-9 board.



- (2) Disconnect the harness of the M/O Disc Drive from eight connectors (CN104 to CN111) on the SV-144 board and the connector (CN5) on the MD-87 board.
- (3) Remove the harness from the wire holder that disconnected by the two connectors (CN110, CN111) on the SV-144 board.
- (4) Remove the lead with terminal.
- (5) Remove the four screws (PTTWH 3x5), then remove the M/O Disc Drive while lifting the rear side of the PCM-9000. And disconnect the harness from the connector (CN108) on the TR-82 board.

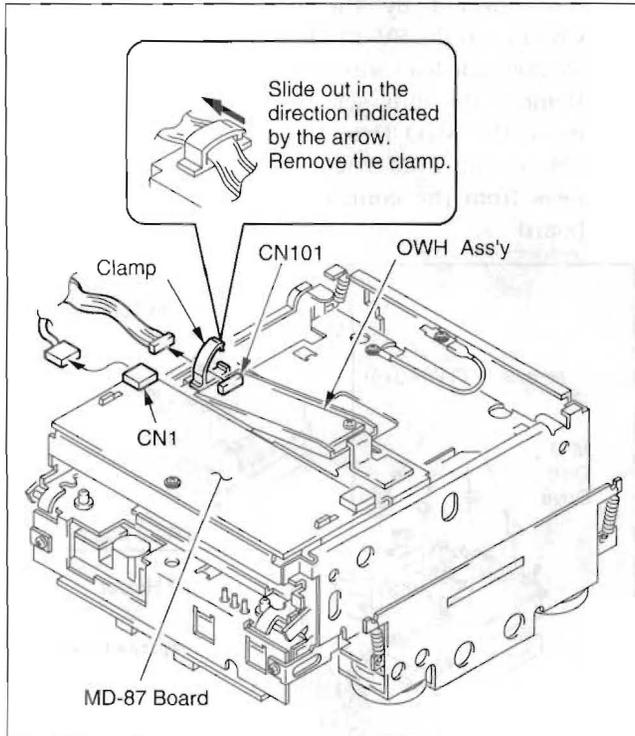


- (6) Install the M/O Disc Drive in the reverse order of steps 1 to 5.

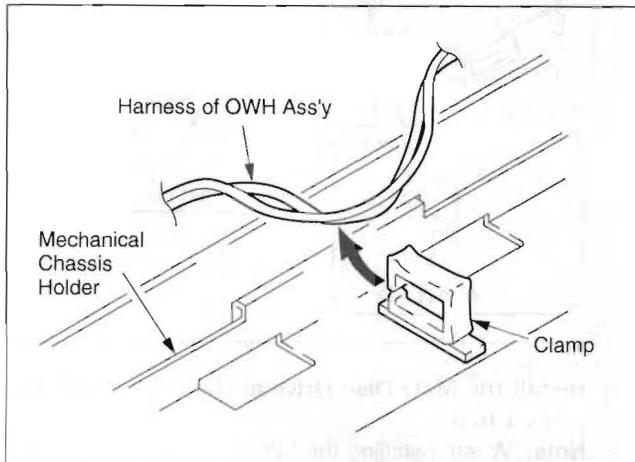
**Note:** When installing the M/O Disc Drive, line up the projection on the dumper holder with the hole in the fan plate.

#### 4-3-1. OWH Ass'y Replacement

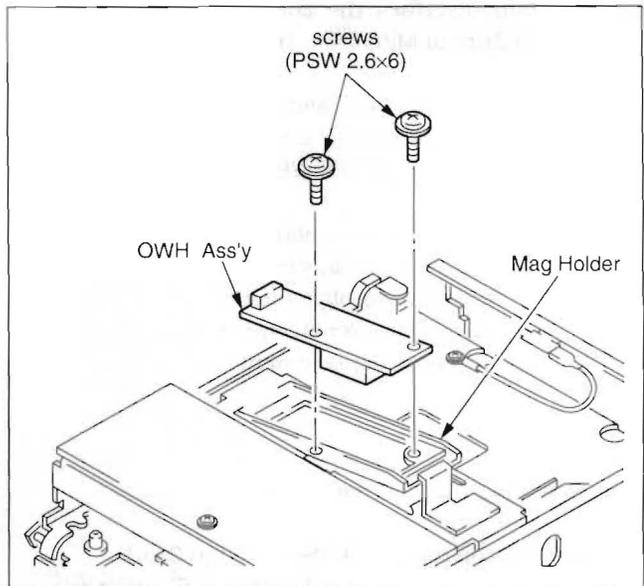
- (1) Remove the harness from the clamp as illustrated, then disconnect it from the connector (CN101) of the OWH Ass'y and the connector (CN1) on the MD-87 board.



- (2) Remove the harness of the OWH Ass'y from the clamp on the mechanical chassis holder.



- (3) Remove the two screws (PSW 2.6x6), then remove the OWH Ass'y from Mag holder.



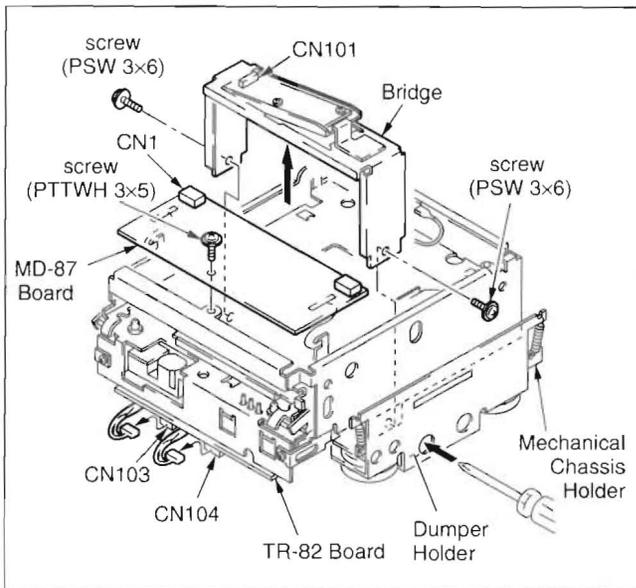
- (4) Install new OWH Ass'y in the reverse order of step 1 to 3.  
**Note:** Do not bend the OWH Ass'y flexible card wire.
- (5) Install the M/O disc drive into the PCM-9000, perform "4-4. ALIGNMENT".

### 4-3-2. Loading Ass'y Replacement

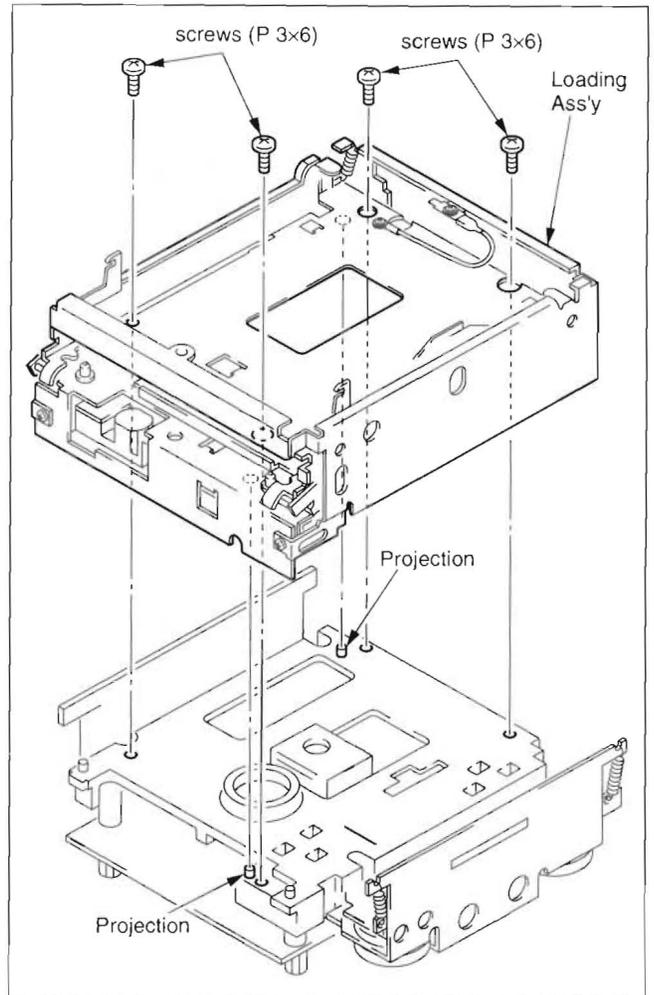
- (1) Disconnect the harness from the connector (CN101) of the OWH Ass'y and the connector (CN1) on the MD-87 board. (See section 4-3-1.)
- (2) Insert a screwdriver through the damper holder hole slot, remove the two screws (PSW 3x6) and take out the bridge.

**Note:** If the positioning of the screws and the holes in the damper holder and out of alignment, remove the TR-82 board (See section 4-3-3.) and remove both the mechanical chassis holder and the damper holder from the mechanical chassis before carrying out the previous adjustment mentioned above.

- (3) Remove the screw (PTTWH 3x5), then remove the MD-87 board.
- (4) Disconnect the harness from the connectors (CN103, CN104) on the TR-82 board.

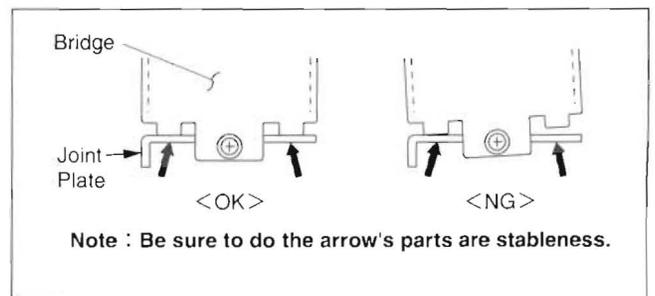


- (5) Insert a screwdriver through four holes as illustrated, remove the four screws (P 3x6) and take out the Loading Ass'y.



- (6) Install new Loading Ass'y into the M/O Disc Drive in the reverse order of steps 1 to 5.

- Note:**
1. Line up the two projections on the mechanical chassis with the holes in the loading ass'y and fasten the screws.
  2. When installing the bridge, press the bridge onto the joint plate and fasten the screws so the surface of the two will firmly come together.

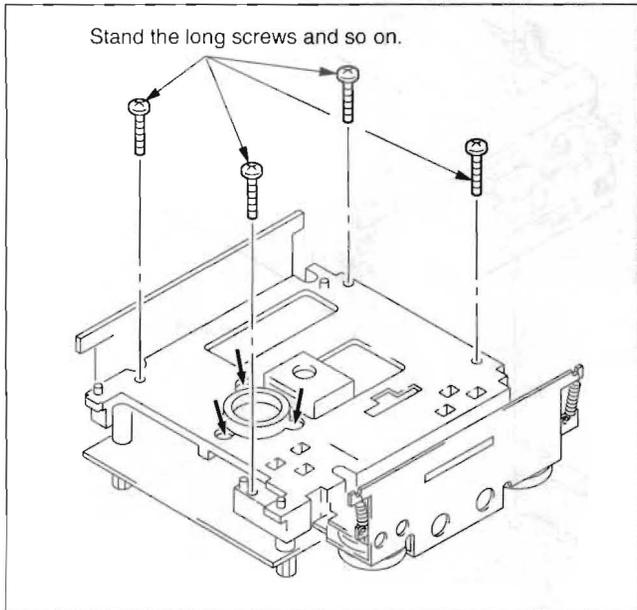


- (7) Install the M/O Disc Drive into the PCM-9000, and then perform "4-4. ALIGNMENT".

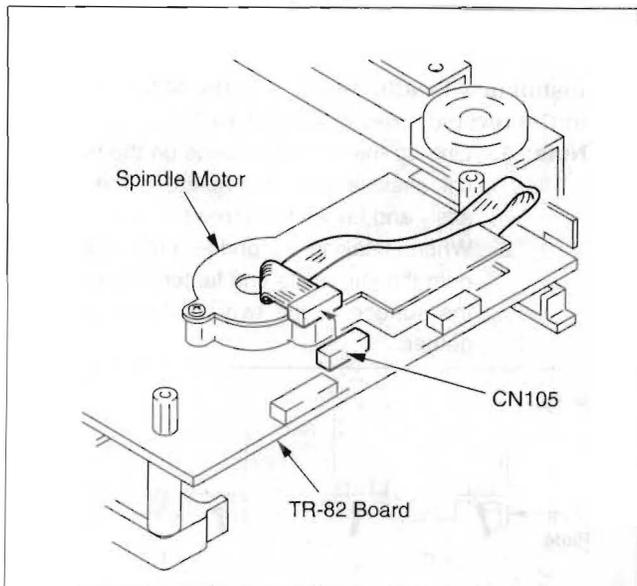
### 4-3-3. Spindle Motor Replacement

- (1) Remove the loading assembly by referring to "4-3-2. Loading Ass'y Replacement".
- (2) Loosen the (three) screws indicated by arrows.  
**Note:** Do not take out the screws.
- (3) Put down the M/O disc drive unit with the bottom up.

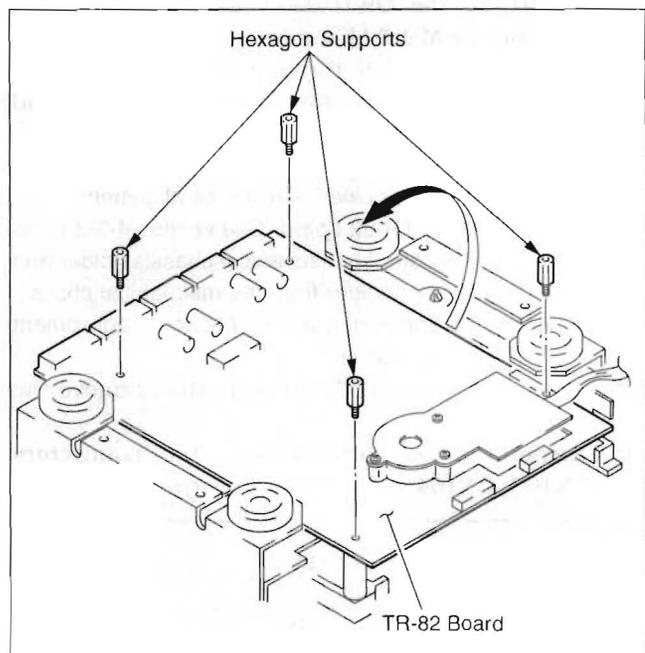
**Note:** Stand a long screw, etc. at the position indicated in the illustration to protect the optical pick-up of the turn table from a load.



- (4) Disconnect the harness of the spindle motor from the connector (CN105) of the TR-82 board.

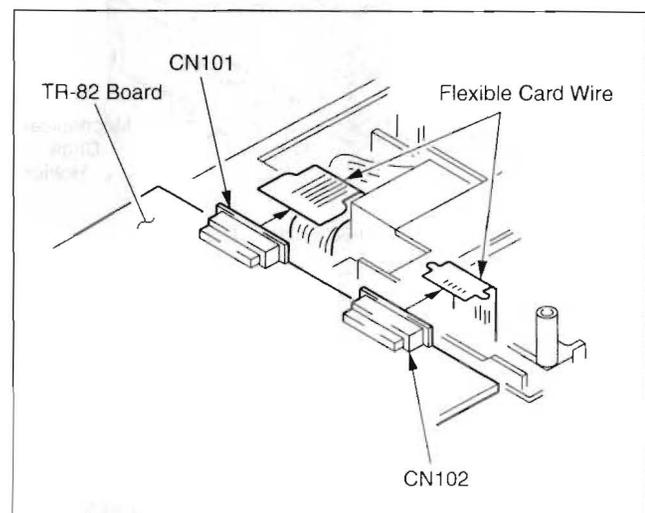


- (5) Remove the four hexagon supports.
- (6) Open the TR-82 board in the direction of the arrow.



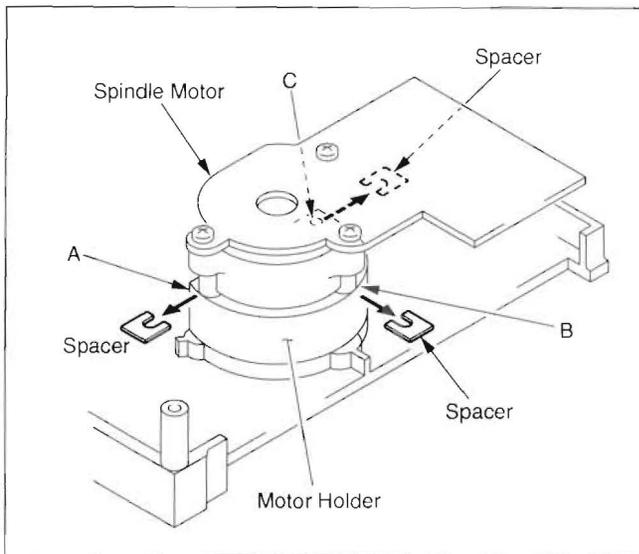
- (7) Disconnect the flexible card wire from two connectors (CN101, CN102).

**Note:** When handling the cable, be very careful not to bend it because it will markedly reduce its life.



- (8) Remove the (two) spacers between the spindle motor and the motor holder.

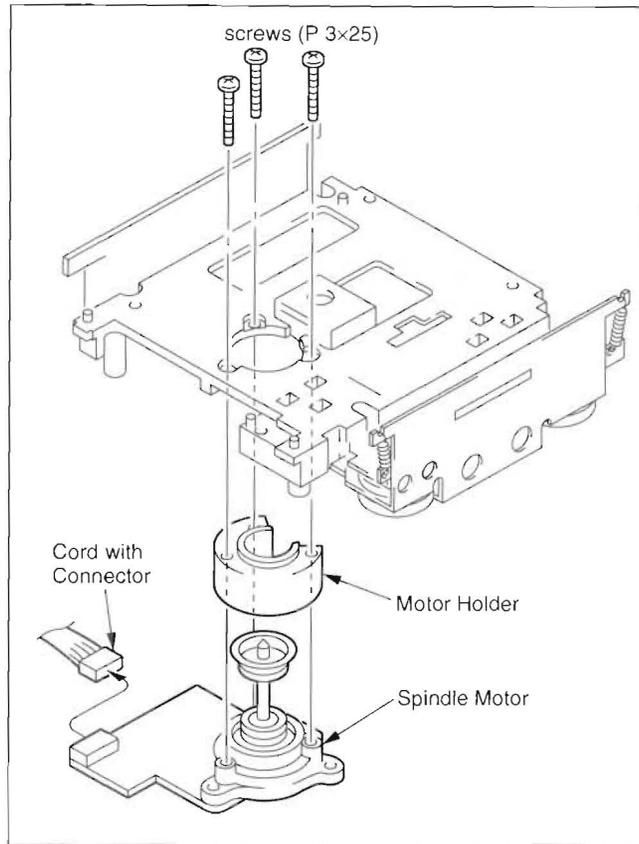
**Note:** Spacers are inserted to tilt the spindle motor according to the inclination of the objective lens of the optical pick-up. Their thickness depends on each M/O disc drive unit. (Refer to "4-3-4. Optical Pick-up Replacement".) Since the two spacers do not have the same thickness, write down the original position of each spacer, and mount them in the original position in mounting the spindle motor again. No spacer is used when the objective lens of the optical pick-up is not inclined.



When spacers are used, they are inserted between the spindle motor and the motor holder at A and B, or at B and C in the illustration. The two spacers always have following thickness relationship.

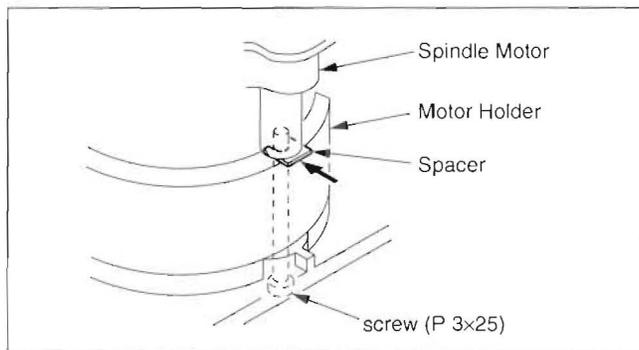
$$A > B, C > B$$

- (9) Put down the M/O disc drive unit with the bottom up. Take out the three screws (+P3×25) that were loosened in step (2). Remove the spindle motor and the motor holder. Then, disconnect the cord with connector.



- (10) Install a new spindle motor, and mount the M/O disc drive unit on the main unit by reversing the steps (1) through (9). To mount the spacers, set the screws (+P3×25) rather loosely, and insert the spacers to the screws (+P3×25) from the clearance between the spindle motor and the motor holder. After install them, perform "4-4. ALIGNMENT".

**Note:** Be sure to mount spacers of correct thickness in correct positions.



#### 4-3-4. Optical Pick-up Replacement

When the optical pick-up is replaced, the inclination of the spindle motor must be readjusted using spacers according to the inclination of the objective lens of the optical pick-up.

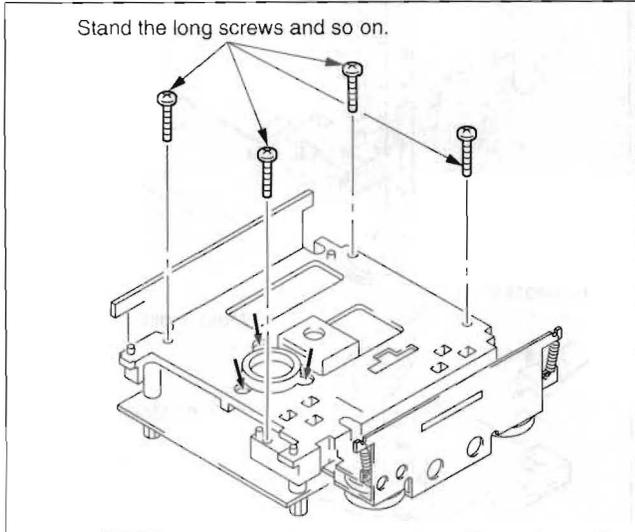
(1) Remove the loading Ass'y by referring to "4-3-2. Loading Ass'y Replacement".

(2) Loosen the (three) screws indicated by arrows.

**Note:** Do not take out the screws.

(3) Put down the M/O disc drive unit with the bottom up.

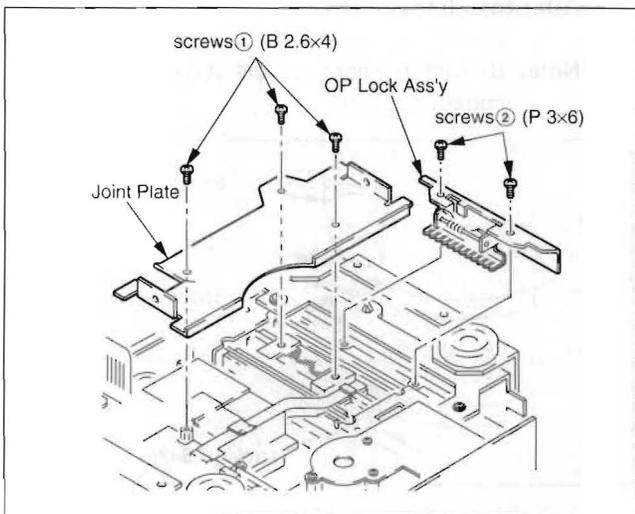
**Note:** Stand a long screw, etc. at the position indicated in the illustration to protect the optical pick-up of the turn table from a load.



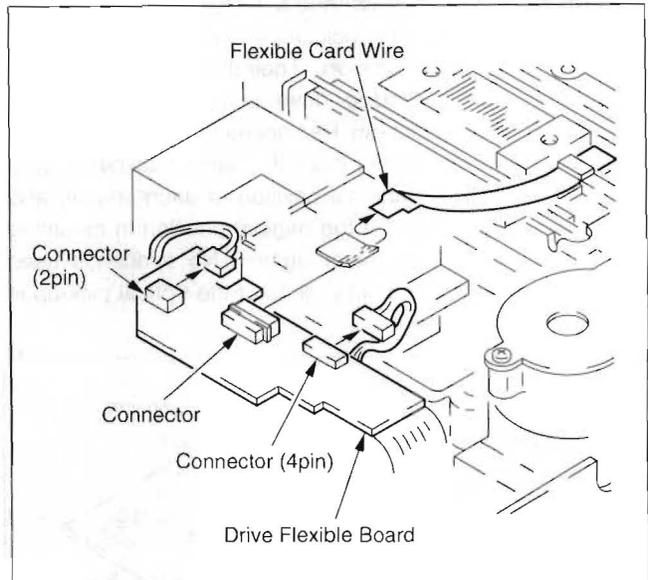
(4) Remove the TR-82 board by taking steps (4) through (7) of "4-3-3. Spindle Motor Replacement".

(5) Remove the three screws ① (B 2.6×4), then remove the joint plate.

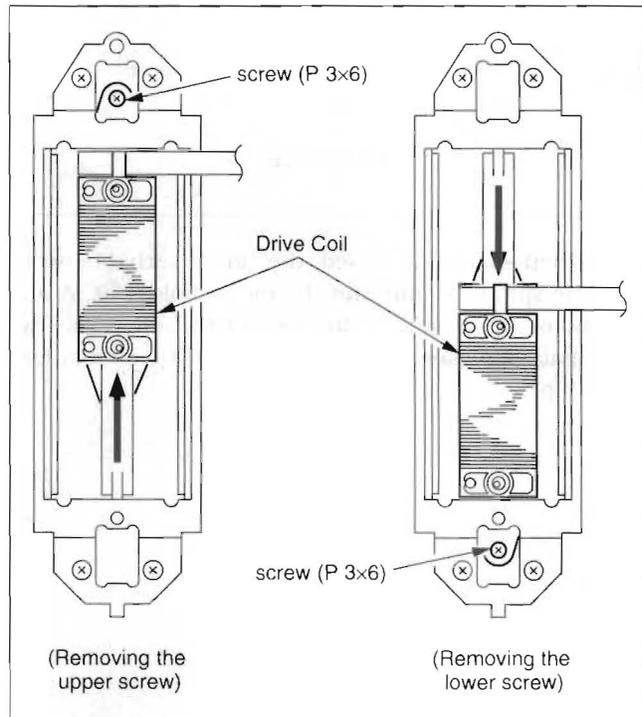
Remove the two screws ② (P 3×6), then remove the OP Lock Ass'y.



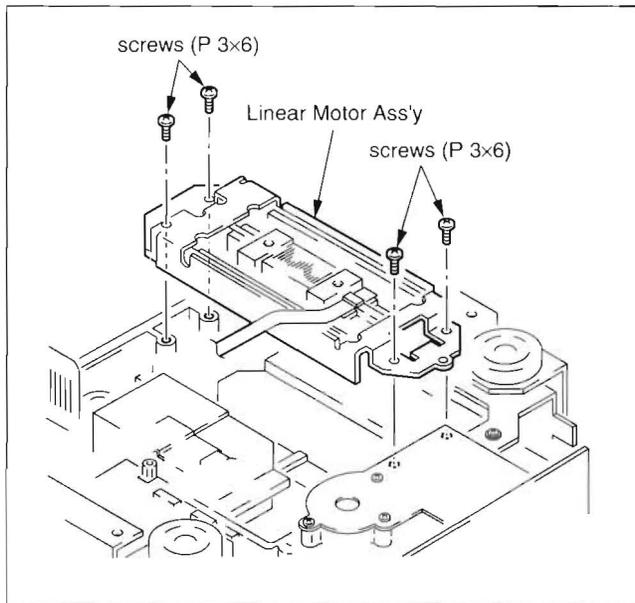
(6) Disconnect the harness and the flexible card wire from the connector on the drive flexible board.



(7) Move the drive coil as shown in the illustration, and remove the two screws (P 3×6).

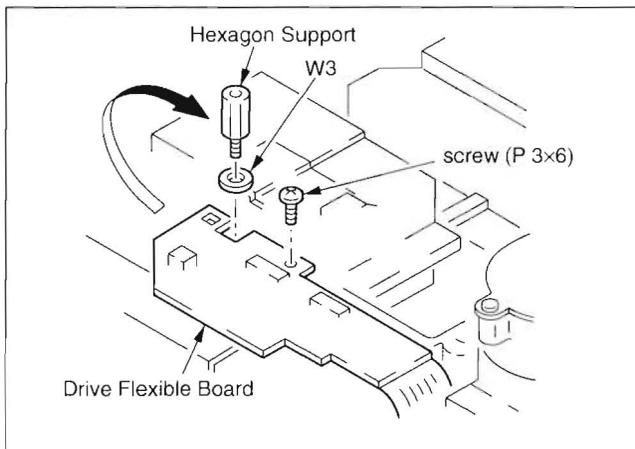


(8) Remove the four screws (P 3x6), then remove the Linear Motor Ass'y.

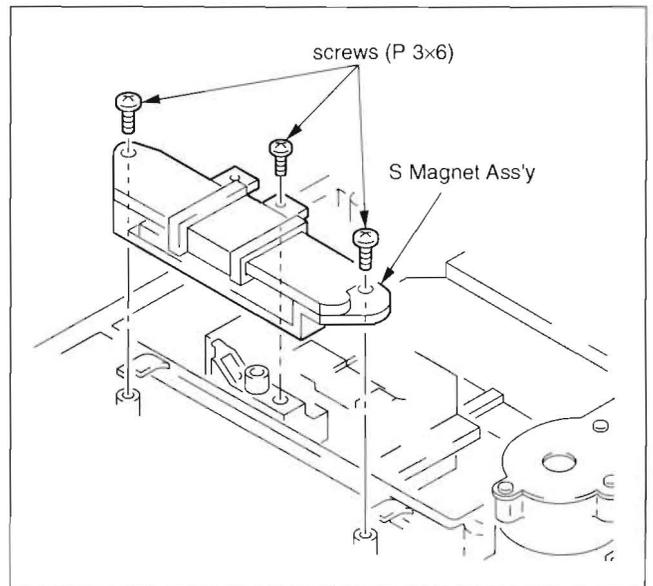


(9) Remove the screw (P 3x6), hexagon support and washer (W3), then move the drive flexible board in the direction of the arrow.

**Note:** Do not bend the OWH Ass'y flexible card wire.

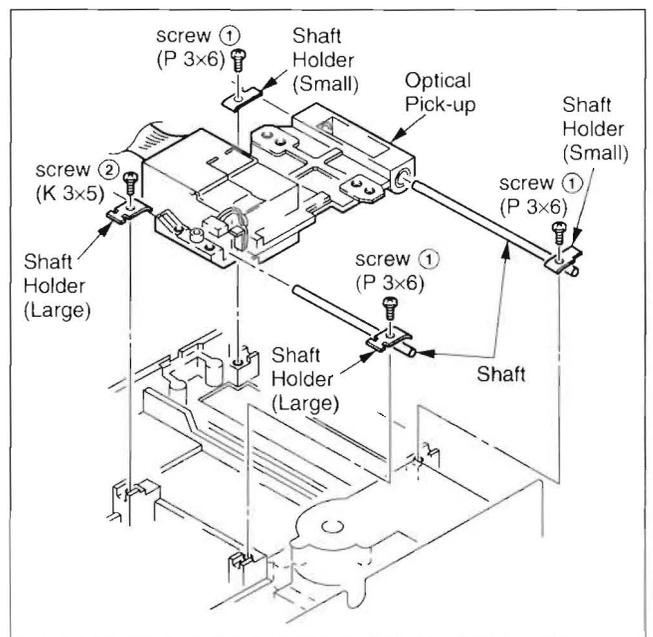


(10) Remove the three screws (P 3x6), then remove the S Magnet Ass'y.



(11) Remove the three screws 1 (P 3x6) and the screw 2 (K 3x5) and four shaft holders. Remove the Optical Pick-up and take out the shaft.

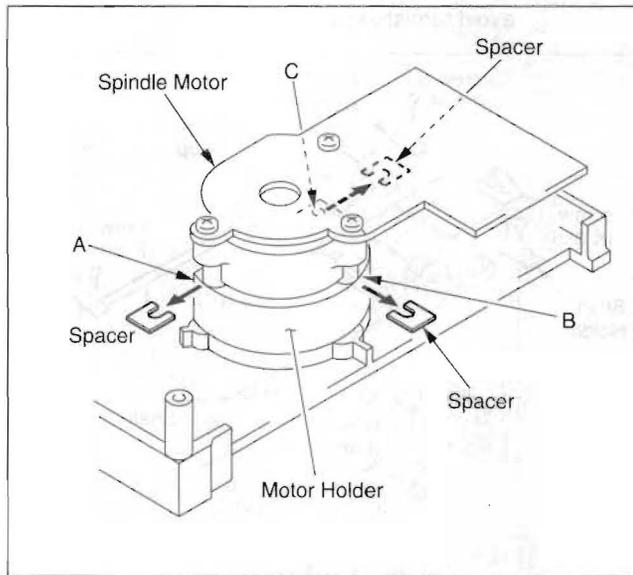
**Note:** Hold the end of the shaft when you remove it, to avoid tarnishing it.



(12) Remove the two spacers between the spindle motor and the motor holder. (No spacer is mounted in some cases.) Mount two of the 0.04 mm, 0.08 mm, and 0.16 mm spacers at two of the three positions (A, B, C) shown in the illustration based on the value of the T.SKEW that is found in the package of a new optical pick-up. (No spacer is necessary in some cases.) The following table shows the relationship between the T.SKEW data, spacer thickness, and positions.

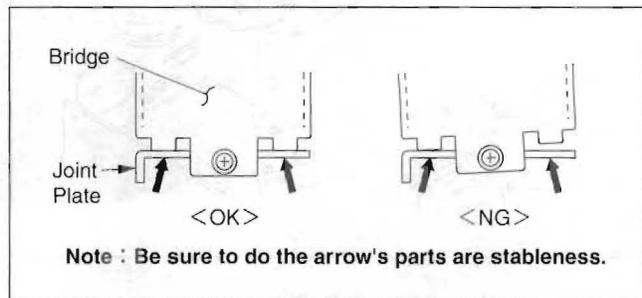
T.SKEW $\theta$ [°]	Spacer Thickness [mm]		
	A	B	C
$+0.2 \leq \theta \leq +0.3$	0.16	0.08	—
$+0.05 < \theta < +0.2$	0.08	0.04	—
$-0.05 \leq \theta \leq +0.05$	—	—	—
$-0.2 < \theta < -0.05$	—	0.04	0.08
$-0.3 \leq \theta \leq -0.2$	—	0.08	0.16

Part No. of Spacer	Thickness [mm]
3-183-914-01	0.04
3-183-914-11	0.08
3-183-814-21	0.16



(13) After the Optical Pick-up replacement, install the M/O Disc Drive in the reverse order of Steps 1 to 11.

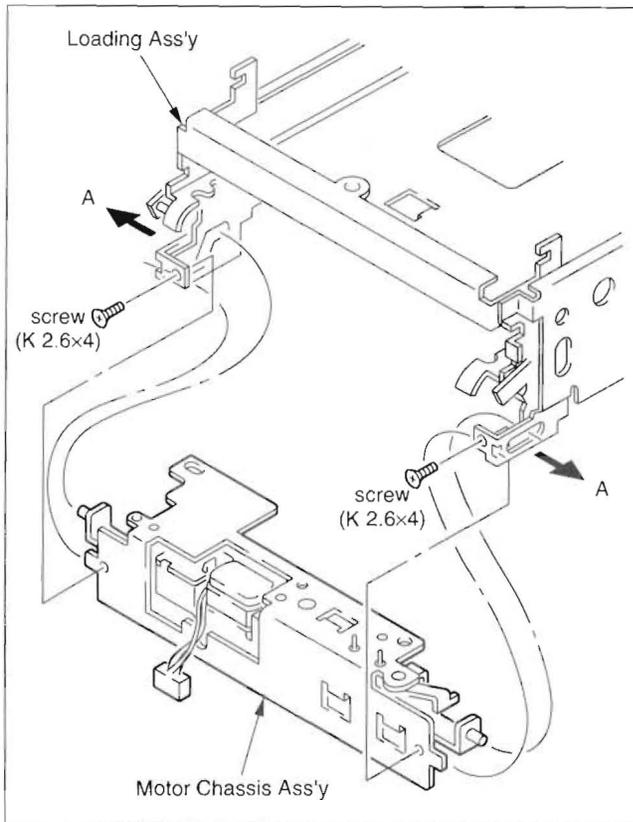
- Note:**
1. When installing the shaft holder, do not put screw 1 (P 3×6) and screw 2 (K 3×5) into the wrong positions. But do not put the shaft holder (large) and shaft holder (small) in to the wrong positions, too.
  2. When installing joint plate, press the bridge onto the joint plate and fasten the screws so the surface of the two will firmly come together.



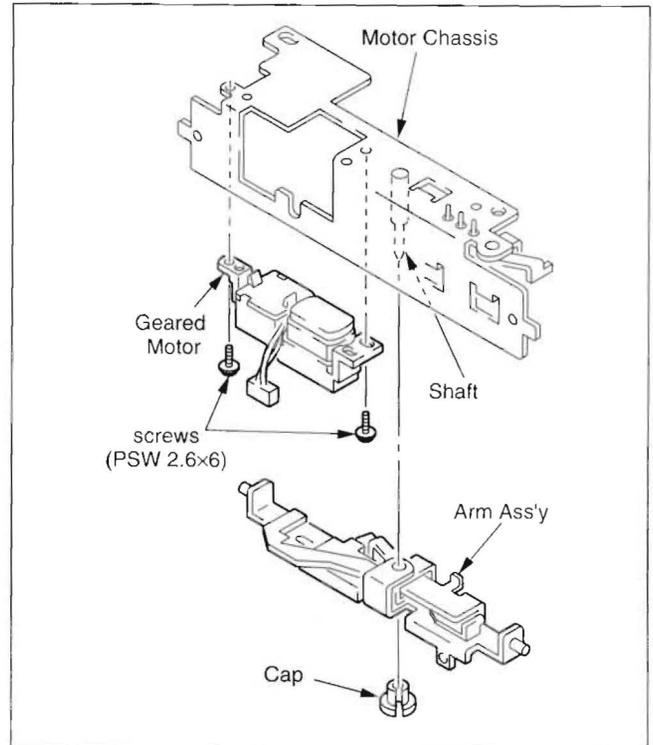
(14) Install the M/O disc drive into the PCM-9000, and then perform "4-4. ALIGNMENT".

#### 4-3-5. Geared Motor Replacement

- (1) Remove the Loading Ass'y. (See section 4-3-2. )
- (2) Remove the two screws (K 2.6x4). Open both ends of the Loading Ass'y in the direction of the arrow (A) and remove the Motor Chassis Ass'y.

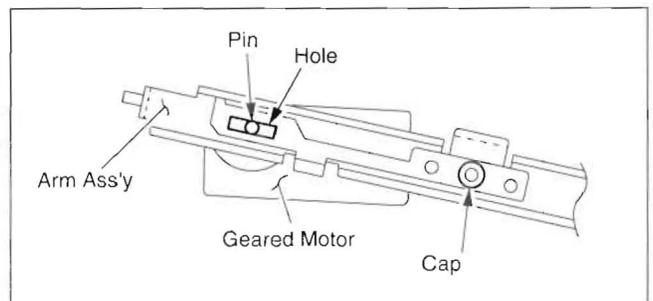


- (3) Remove the cap of the shaft, then remove the Arm Ass'y.
- (4) Remove the two screws (PSW 2.6x6), then remove the Geared Motor.



- (5) Install new Geared Motor in the reverse order of steps 1 to 4.

**Note:** When installing the arm ass'y, insert the Geared Motor pin into the hole in the arm ass'y and seal the cap.



- (6) Install the M/O disc drive into the PCM-9000, and then perform "4-4. ALIGNMENT".

#### 4-4. ALIGNMENT

This section describes the adjustment necessary to do after the parts replacement as below. All alignment use the simple MC tool.

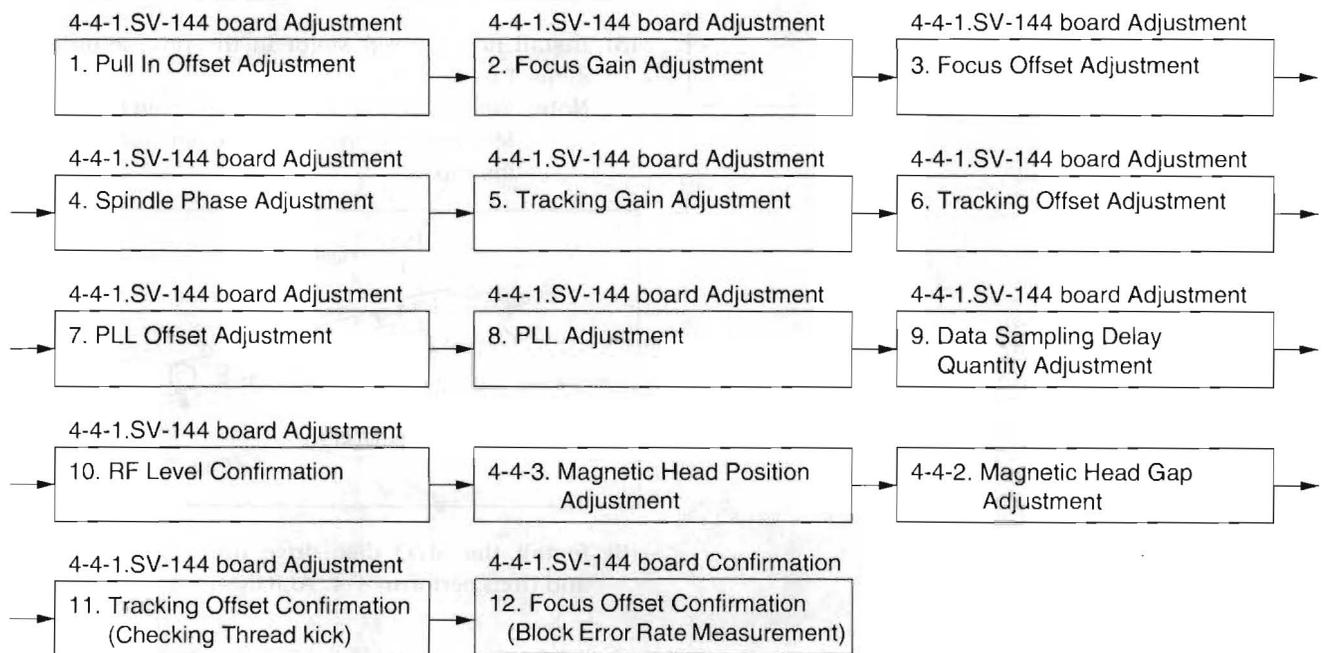
**Note:** For replacement and adjustment of M/O Disc Drive parts, contact a Sony service center.

1. M/O Disc Drive
  - (1) Optical Pick-up
  - (2) Spindle Motor
  - (3) OWH Ass'y
  - (4) TR-82 board and parts on the TR-82 board (Q201 to Q205, DL201, IC208, IC209)
  - (5) The parts necessary to remove the bridge (Loading Ass'y replaced so on)
2. PS-345 board and parts on the PS-345 board
3. Switching regulator
4. SV-144 board and parts on the SV-144 board

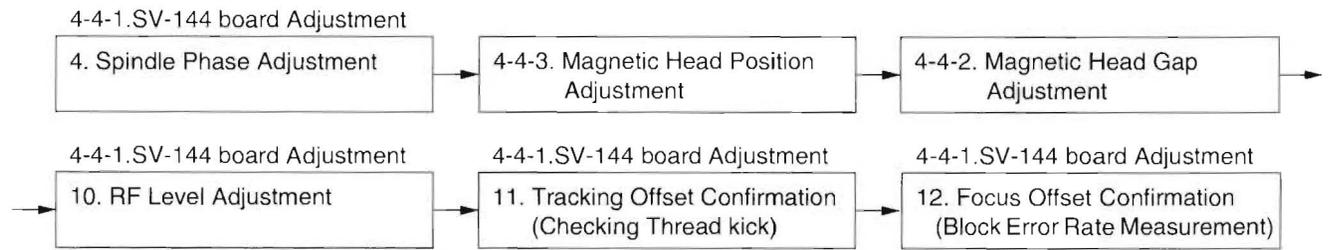
The adjustment/confirmation item necessary the above parts replacement as follows.

##### Adjustment Item when The Parts Replacement

- (1) Optical Pick-up



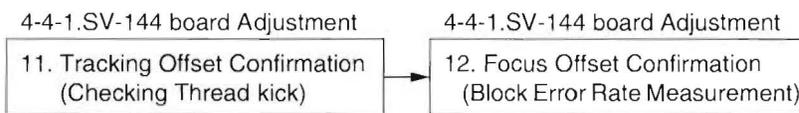
(2) Spindle Motor



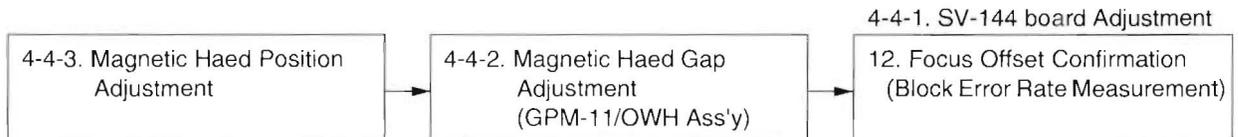
(3) OWH Ass'y



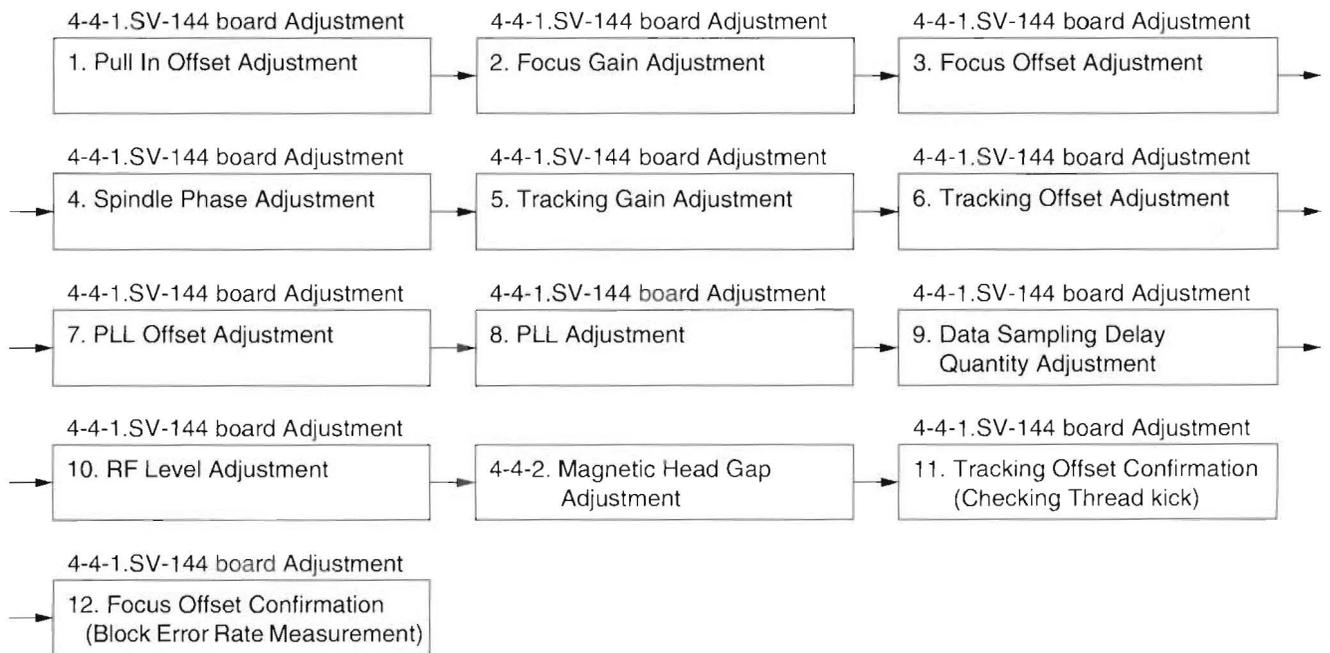
(4) • TR-82 board and Q201 to Q205, DL201, IC208, IC209 on the TR-82 board  
• PS-345 board and parts on the PS-345 board  
• Switching regulator



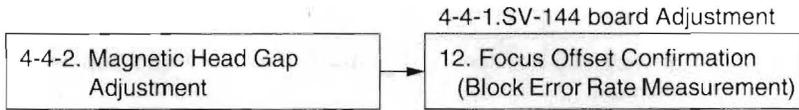
(5) The parts necessary to remove the Loading Ass'y and bridge



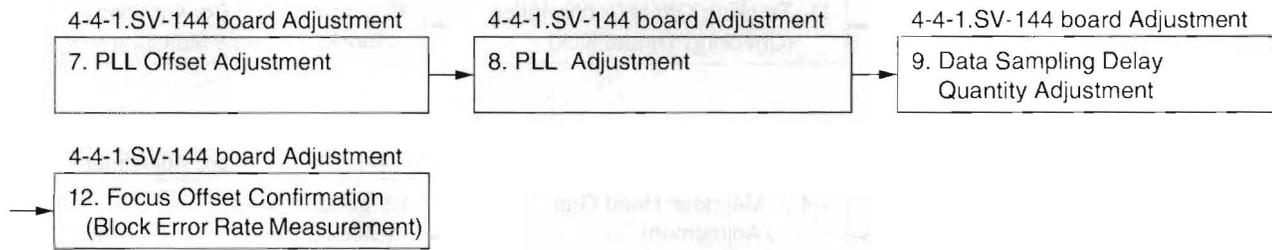
(6) SV-144 board



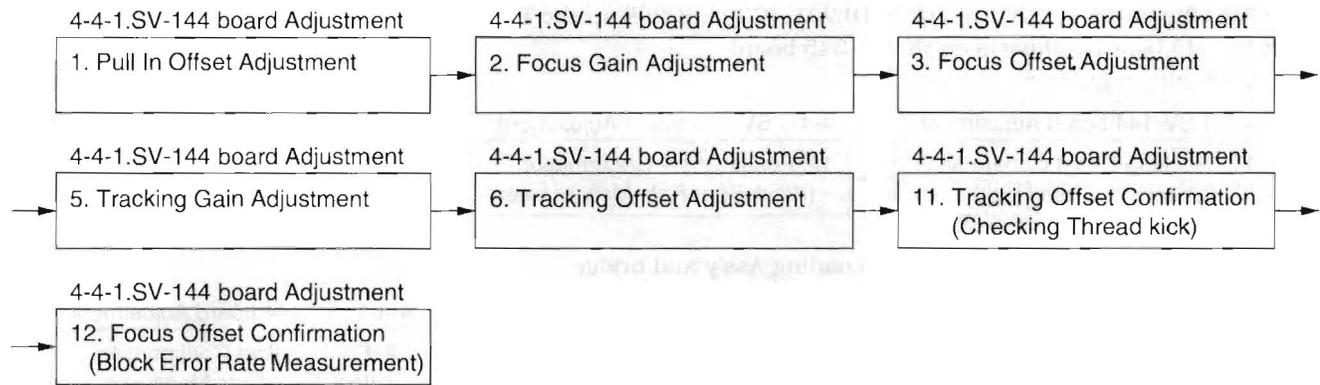
(7) GAP SERVO block/SV-144 board



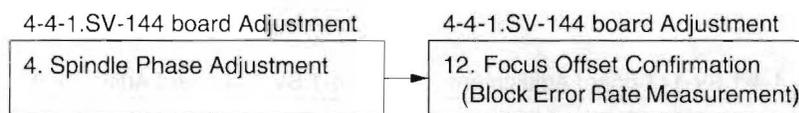
(8) PLL block/SV-144 board



(9) SERVO block/SV-144 board



(10) SPINDLE block/SV-144 board



• Preparation

Equipment Required:

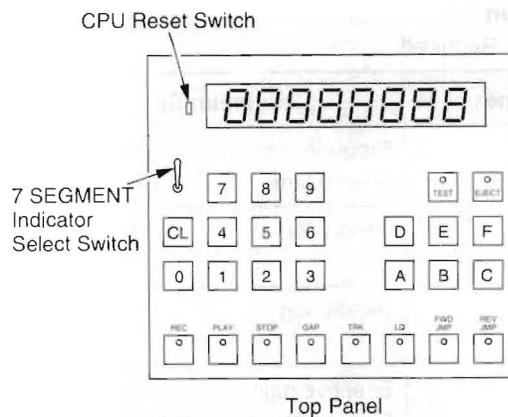
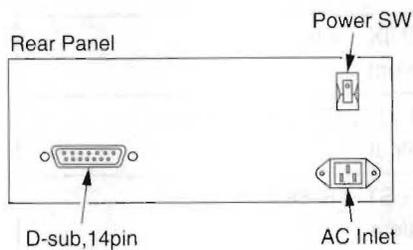
Name	Minimum Specifications	Name of instrument
Oscilloscope	Frequency bandwidth: DC-20MHz or more Sweep time : Possible to 20 ns/div	TEKTRONIX 2445 or equivalent
2-channel Level meter	Resolution : 0.1 dB or more	LEADER LMV1815, LMV189AR or equivalent
DC Voltmeter	Resolution : 1 mV or more	ADVANTEST TR-6855 or equivalent
Frequency counter	Effective digits : 6 digits or more Frequency measurement capacity: 20 MHz	ADVANTEST TR-5822 or equivalent
Video monitor	with video input terminal (BNC)	—————
BNC cable	Using cable : Coaxial cable 3C-2V	SONY UGC -0.5(0.5 m) SONY UGC -1 (1 m) SONY UGC -2 (2 m) } or equivalent

Tools Required:

Name	Part number	Remarks
Simple MC tool	J-6400-850-A	Adjustable ROM (supplied)
Servo Gain adjustment tool	J-6400-890-A	
Magnetic head gap adjustment disc	J-6405-010-A	
Head position adjustment tool (NTSC)	J-6405-020-A	CCD camera, Lens, Camera adaptor, Camera cable, Camera holder (supplied)
Head position adjustment tool (PAL)	J-6405-350-A	CCD camera, Lens, Camera adaptor, Camera cable, Camera holder (supplied)
Head position adjustment cartridge	J-6405-320-A	
Eccentricity driver (2-4)	3-702-390-01	
Test disc	J-6401-060-A	
Low pass filter tool	J-6401-070-A	
Block error rate checker	J-6400-880-A	
AAIP error rate checker	J-6400-840-A	
EX-396 Extension board	J-6400-860-A	
EX-397 Extension board	J-6400-870-A	

## Using for Simple MC Tool

### Simple MC Tool



#### Switch

CPU RESET switch:

Simple MC tool CPU reset

7 SEGMENT indicator select switch:

7 SEGMENT LED indicator select (①,② as follows)

- ① AAIP address on the disc
- ② 10-key indicator on the disc

#### Key switch

**Note:** Valid for installing the disc.

When keys are ON, the key LEDs light up.

- TEST** key : Set to TEST mode.  
Used when magnetic head position adjustment.
- EJECT** key : Eject to disc.
- REC** key : Set to REC mode.  
Set up to REC mode Valid for the PLAY mode (**PLAY** key: ON) only.
- PLAY** key : Set to PLAY mode.  
The disc become the continuous PLAY mode.
- STOP** key : Set to STOP mode.  
Stop the disc revolving. Laser OFF.
- GAP** key : Select to GAP TRIM ON/OFF.
- TRK** key : Select to TRK ON/OFF.
- LD** key : Select to LD ON/OFF.

**Note:** **GAP**, **TRK**, **LD** keys are self operating respectively. But press the **STOP** key, they return the initial conditions (All OFF).

- FWD JMP** key : Controls the absolute address jump for the address input via the 10-key.  
Valid for the PLAY mode only.

#### Connector (Rear Panel)

D-sub, 14 Pin: Connect the connecting cord supplied.

#### Accessory

- Connecting cord : 1
- Adjustable ROM : 1
- Power cord : 1

#### Connection/Using

**Note:** Make sure the power to the PCM-9000 and the simple MC tool is OFF when making connections.

- (1) Open the SV-144 board.
- (2) Disconnect the PCM-9000 harness from the CN103/SV144 board connector.
- (3) Connect the simple MC tool connecting cord (26 Pin connector) to CN103/SV144 board.
- (4) Replace the ROM (IC814)/SV-144 board with the adjustable ROM (Supplied with simple MC tool).
- (5) Turn on the power to the simple MC tools and then to the PCM-9000.
- (6) Load the disc. Then **EJECT**, **PLAY**, **STOP**, **GAP**, **TRK**, **TEST**, **LD** keys are valid. **REC** key is valid for PLAY mode only.
- (7) Perform the adjustment items in each order.

#### Key and Switch Initial Settings

7 SEGMENT indicator select switch: Right side  
**REC**, **PLAY**, **STOP**, **GAP**, **TRK**,  
**LD**, **FWD JMP**, **TEST**, **EJECT** key: OFF (LED turn off)

**Note:** The every adjustment items describes the simple MC tool key and switch settings at only case of modifying the initial setting.

#### 4-4-1. SV-144 Board Adjustment (SERVO Adjustment)

##### Equipment required

- Oscilloscope
- DC voltage meter
- 2-channel Level meter
- Frequency counter

##### Tools

- Simple MC tool
- Adjustable ROM (Supplied with simple MC tool)
- Servo gain adjustment tool
- Test disc (Thermal erase / random)
- Magnetic head gap adjustment disc
- Low pass filter tool
- Block error rate checker

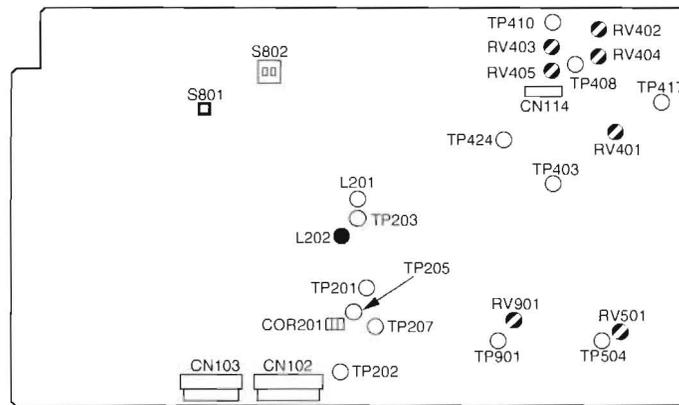
##### Preparation

- (1) Connect the simple MC tool to the CN103/SV-144 board. (For the connection, see 4-16 page, "Connection/Using" of simple MC tool.)
- (2) Replace the ROM (IC814)/SV-144 board with the adjustable ROM (Supplied with simple MC tool).
- (3) Insert a normal disc or a test disc when necessary.

##### Switch setting (SV-144 board)

- S802-1 : OFF
- S802-2 : OFF

##### Adjustment location

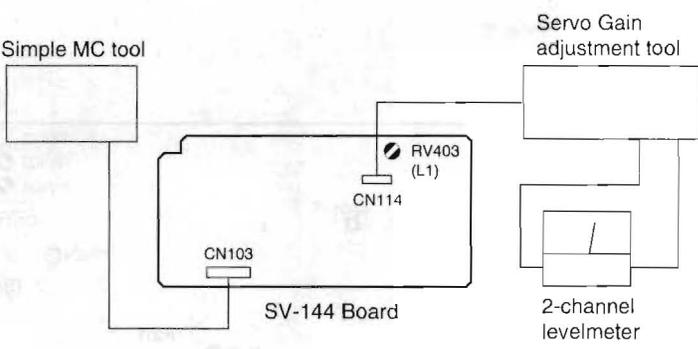


SV-144 BOARD (A SIDE)

##### 1. Pull-in offset adjustment

Adjustment conditions	Procedure/Specifications	Adjustment point	Disc
1. Simple MC tool setting • STOP mode (Press the <b>STOP</b> key)  • Connect the DC voltmeter to the TP417/SV-144 board via the low pass filter tool.	TP417/SV-144 board (N2) level  $0 \pm 2$ mV	RV401/SV-144 board (M3)	Not specified
	<b>Connection</b>  		

## 2. Focus gain adjustment

Adjustment conditions	Procedure/Specifications	Adjustment point	Disc
<p>1. Simple MC tool setting</p> <ul style="list-style-type: none"> <li>Set the STOP mode by pressing the <b>STOP</b> key.</li> <li>Connect the servo gain adjusting tool to the CN114/SV-144 board. (Make sure that the servo gain adjusting tool is turned off.)</li> <li>Connect the 2-channel level meter to the servo gain adjusting tool.</li> <li>After connecting, turn Power of the servo adjusting tool ON.</li> </ul> <p>2. Set the TRACKING/FOCUS select switch of the servo gain adjusting tool to FOCUS mode.</p> <p>3. Operation of simple MC tool</p> <ol style="list-style-type: none"> <li>Set the display selector switch (toggle switch) to the left side (input data display mode).</li> <li>Set the following specified address on the test disc by pressing the numeric keys. Specified address 1: 90: 00</li> <li>Locate to the specified address on the test disc by pressing the <b>PLAY</b> and <b>JUMP FWD</b> keys.</li> <li>Set the display selector switch (toggle switch) to the right side, and select the PLAY mode by pressing the <b>PLAY</b> key.</li> </ol>	<ul style="list-style-type: none"> <li>Adjust <math>\text{RV403}</math> so that the 2-channel level meter indicator level difference of CH1 and CH2 is within the specification mentioned below.</li> </ul> <p>Specification: <math>-2 \pm 0.1</math> dB</p> <p><b>Connection</b></p> 	<p><math>\text{RV403/SV-144}</math> board (L1)</p>	<p>Specified position on test disc Address 1: 90: 00</p>

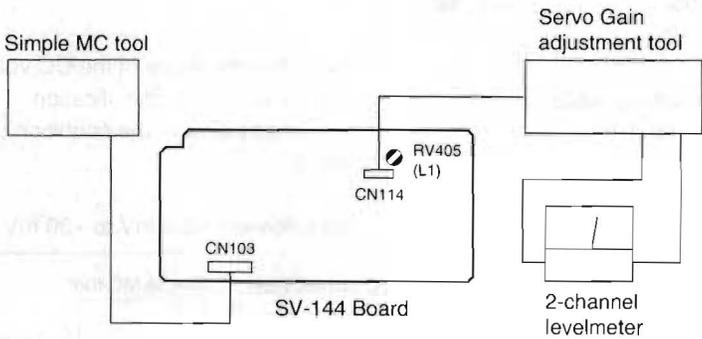
### 3. Focus offset adjustment

Adjustment conditions	Procedure/Specifications	Adjustment point	Disc
<p>Step 1</p> <ul style="list-style-type: none"> <li>Connect the DC voltmeter to the TP403/SV-144 board via the low pass filter tool.</li> <li>Connect the oscilloscope (CH2) to the TP408 and E7 (GND)/SV-144 board.</li> <li>Operation of the simple MC tool set the tracing mode to OFF by pressing the <b>TRK</b> key after selecting the PLAY mode (press the <b>PLAY</b> key).</li> </ul>	<ul style="list-style-type: none"> <li>Adjust the <math>\text{RV402}</math> until the waveform (amplitude) of oscilloscope becomes the maximum. At this time, note down the value of the DC voltmeter as <math>F_{p0}</math> mV.</li> <li>Adjust <math>\text{RV402}</math> so that the value (<math>F_p</math>) of the DC voltmeter satisfies the specification below.</li> </ul> <p>Specification: <math>F_p = (F_{p0} + 20) \pm 20</math> mV</p>	$\text{RV402/SV-144 board (L1)}$	Not specified
<p>Step 2</p> <ul style="list-style-type: none"> <li>Set the tracking mode to ON by pressing the <b>TRK</b> key.</li> </ul>	<ul style="list-style-type: none"> <li>Check that the value of the DC voltmeter is within the specification mentioned below in the condition of Step 2.</li> </ul> <p>Specification: <math>-5.5</math> mV to <math>+30</math> mV</p>		
<p><b>Connection</b></p>			

### 4. Spindle phase adjustment

Adjustment conditions	Procedure/Specifications	Adjustment point	Disc
<ul style="list-style-type: none"> <li>Connect the oscilloscope to the TP504/SV-144 board.</li> <li>Operation of simple MC tool Set the tracking function to OFF by pressing the <b>TRK</b> key after selecting the PLAY mode (press the <b>PLAY</b> key).</li> </ul>	<ul style="list-style-type: none"> <li>TP504/SV-144 board (M7) output waveform duty.</li> </ul>	$\text{RV501/SV-144 board (M7)}$	Not specified
<p><b>Connection</b></p>			

5. Tracking gain adjustment

Adjustment conditions	Procedure/Specifications	Adjustment point	Disc
<p>1. Simple MC tool setting.</p> <ul style="list-style-type: none"> <li>Set the STOP mode. (Press the <b>STOP</b> key.)</li> <li>Connect the servo gain adjusting tool to the CN114/SV-144 board. (Make sure that the servo gain adjusting tool is turned off.)</li> <li>Connect the 2-channel level meter to the servo gain adjusting tool.</li> <li>After connecting, turn power of the servo gain adjusting tool on.</li> </ul>	<ul style="list-style-type: none"> <li>Adjust <math>\text{RV405}</math> so that ch1 and ch2 indication level of the 2-channel level meter is within the specification mentioned below. (ch1 and ch2 indication level become equally level.)</li> </ul> <p>Specification: <math>0 \pm 0.1</math> dB</p>	<p><math>\text{RV405/SV-144}</math> board (L1)</p>	<p>Specified position on test disc. Address 1: 90: 00</p>
<p>2. Set the TRACKING/FOCUS selector switch of the servo gain adjusting tool to TRACKING.</p> <p>3. Operation of simple MC tool</p> <ol style="list-style-type: none"> <li>Set the display selector switch (toggle switch) to the left side (input data display mode).</li> <li>Set the following specified address on the test disc by pressing the numeric keys. Specified address 1: 90: 00</li> <li>Locate to the specified address on the test disc by pressing the <b>PLAY</b> and <b>JUMP FWD</b> keys. Set the display selector switch (toggle switch) to the right side.</li> <li>Select the tracking function to ON by pressing the <b>TRK</b> key.</li> </ol>	<p><b>Connection</b></p> 		

## 6. Tracking offset adjustmet

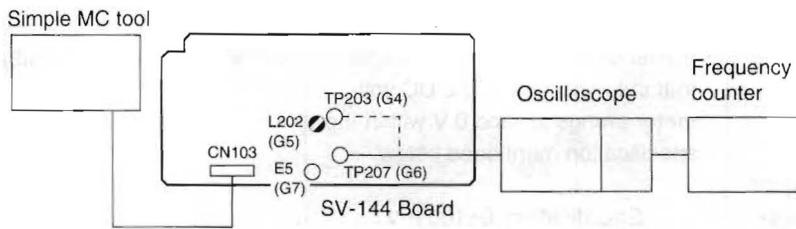
Adjustment conditions	Procedure/Specifications	Adjustment point	Disc
<p>Step 1</p> <ul style="list-style-type: none"> <li>Connect the DC voltmeter to the TP404/SV-144 board via the low pass filter tool.</li> <li>Operation of simple MC tool set the tracking function to OFF by pressing the <b>TRK</b> key after selecting the PLAY mode (press the <b>PLAY</b> key)</li> </ul>	<ul style="list-style-type: none"> <li>Adjust <math>\text{RV405/SV-144}</math> board so that the indication of the DC voltmeter swings around 0 V within the specification mentioned below.</li> </ul> <p>Specification: <math>0 \pm 100</math> mV</p>	$\text{RV404/SV-144}$ board (M2)	Not specified
<p>Step 2</p> <ul style="list-style-type: none"> <li>Set the tracking function to ON by pressing the <b>TRK</b> key.</li> </ul>	<ul style="list-style-type: none"> <li>Check that the indication of the DC voltmeter is within the specification mentioned below.</li> </ul> <p>Specification: within <math>-25</math> to <math>+25</math> mV</p>	—	
<p><b>Connection</b></p>			

## 7. PLL offset adjustment

Adjustment conditions	Procedure/Specifications	Adjustment point	Disc
<ol style="list-style-type: none"> <li>Connect the DC voltmeter to the TP203/SV-144 board.</li> <li>Load a test disc.</li> <li>Operation of simple MC tool. <ol style="list-style-type: none"> <li>Set the display selector switch (toggle switch) to the left side. (input data display mode)</li> <li>Set the following specified address on the test disc by pressing the numeric keys. Specified address 10: 00</li> <li>Locate to the specified address on the test disc by pressing the <b>PLAY</b> and <b>JMP FWD</b> keys.</li> <li>Set the display selector switch (toggle switch) to the right side, and select the PLAY mode by pressing the <b>PLAY</b> key.</li> </ol> </li> </ol>	<ul style="list-style-type: none"> <li>Adjust <math>\text{RV201}</math> so that the indicator of DC voltmeter is within the specification mentioned below.</li> </ul> <p>Specification: <math>0 \pm 50</math> mV</p>	$\text{RV}$ (Added) on the IC203/SV-144 board (G5) (board No. 1-647-007-11) $\text{RV201/SV-144}$ board (G5) (board No. 1-647-007-12 and higher)	Specified position on test disc. Address 10: 00
<p><b>Connection</b></p>			

## 8. PLL adjustment

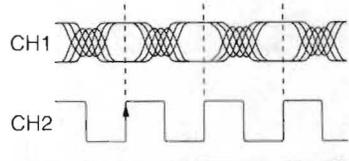
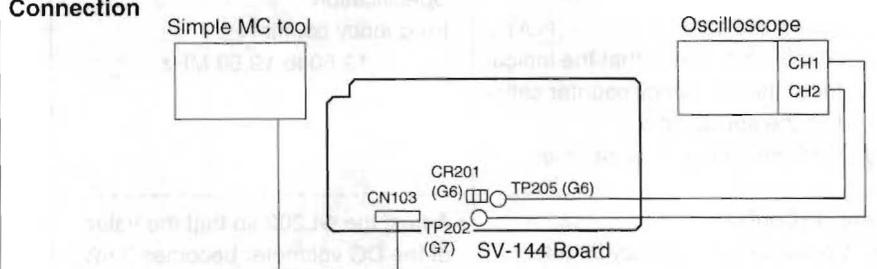
### Connection



Adjustment conditions	Procedure/Specifications	Adjustment point	Disc
<p>Step 1</p> <ol style="list-style-type: none"> <li>1. Connect the frequency counter to the TP207/SV-144 board via the oscilloscope (CH2).</li> <li>2. Load the test disc.</li> <li>3. Operation of simple MC tool.               <ol style="list-style-type: none"> <li>① Set the display selector switch (toggle switch) to the left side (input data display mode).</li> <li>② Set the following specified address on the test disc by pressing the numeric keys. Specified address 10: 00</li> <li>③ Locate to the specified address on the test disc by pressing the <b>PLAY</b> and <b>JMP FWD</b> keys.</li> <li>④ Set the display selector switch (toggle switch) to the right side, and select the PLAY mode by pressing the <b>PLAY</b> key.</li> </ol> </li> </ol>	<ul style="list-style-type: none"> <li>• Adjust <math>\text{L202}</math> so that the indicator of the frequency counter is within the specification mentioned below.</li> </ul> <p>Specification: 19.60 to 19.69 MHz</p>	$\text{L202/SV-144 board (G5)}$	<p>Specified position on test disc: Thermally erased position Address 10: 00</p>
<p>Step 2 (Confirmation)</p> <ol style="list-style-type: none"> <li>1. Connect the frequency counter and DC voltmeter to the TP203 and GND/SV-144 board via the low pass filter tool.</li> <li>2. Load the test disc.</li> <li>3. Operation of simple MC tool.               <ol style="list-style-type: none"> <li>① Locate to the specified address on the test disc as in the case of Step 1. Specified address 10: 00</li> <li>② Press the <b>STOP</b> and <b>PLAY</b> keys in the order <b>STOP</b> → <b>PLAY</b>. At this time, check that the indicator of the frequency counter satisfies the specification.</li> <li>③ Perform above ② three times.</li> </ol> </li> </ol>	<ul style="list-style-type: none"> <li>• Read the indicator of the DC voltmeter when pressing the <b>STOP</b> key (STOP mode). Write down the value of the DC voltmeter at this time. This value will be called [i mV].</li> <li>• Adjust the <math>\text{L202}</math> so that the value of the DC voltmeter becomes [i+200 mV]</li> </ul> <p>Specification: Frequency counter= 19.60 to 19.69 MHz</p>	$\text{L202/SV-144 board (G5)}$	<p>Specified position on test disc: Random signals recorded position Address 10: 00</p>

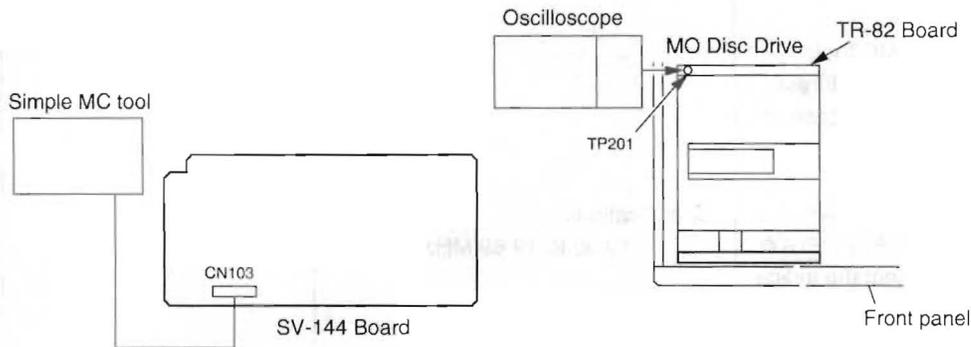
<p>Step 3 (Confirmation)</p> <ol style="list-style-type: none"> <li>1. Connect the frequency counter and DC voltmeter to the TP203 and GND/SV-144 board via the low pass filter tool.</li> <li>2. Load the test disc.</li> <li>3. Operation of simple MC tool. <ol style="list-style-type: none"> <li>① Locate to the specified address on the test disc as in the case of Step 1. Specified address 10: 00</li> <li>② Press the <b>STOP</b> and <b>PLAY</b> keys in the order <b>STOP</b> → <b>PLAY</b>. At this time, check that the indicator of the frequency counter satisfies the specification.</li> <li>③ Perform above ② three times.</li> </ol> </li> </ol>	<ul style="list-style-type: none"> <li>• Adjust the <math>\text{L202}</math> so that the value of the DC voltmeter becomes [i-200 mV]</li> </ul> <p>Specification: Frequency counter= 19.60 to 19.69 MHz</p>	<p><math>\text{L202/SV-144}</math> board (G5)</p>	<p>Specified position on test disc: Random signals recorded position Address 10: 00</p>
<p>Step 4 (Confirmation)</p> <ol style="list-style-type: none"> <li>1. Connect the frequency counter and DC voltmeter to the TP203 and GND/SV-144 board via the low pass filter tool.</li> <li>2. Load the test disc.</li> <li>3. Operation of simple MC tool. <ol style="list-style-type: none"> <li>① Locate to the specified address on the test disc as in the case of Step 1. Specified address 10: 00</li> <li>② Press the <b>STOP</b> and <b>PLAY</b> keys in the order <b>STOP</b> → <b>PLAY</b>. At this time, check that the indicator of the frequency counter satisfies the specification.</li> <li>③ Perform above ② three times.</li> </ol> </li> </ol>	<ul style="list-style-type: none"> <li>• Adjust the <math>\text{L202}</math> so that the value of the DC voltmeter becomes [i mV]</li> </ul> <p>Specification= 19.60 to 19.69 MHz</p>	<p><math>\text{L202/SV-144}</math> board (G5)</p>	<p>Specified position on test disc: Random signals recorded position Address 10: 00</p>

9. Data sampling delay adjustment

Adjustment Conditions	Checking method	Adjustment point	Disc
<ul style="list-style-type: none"> <li>Simple MC tool setting Same as setting of "8. PLL adjustment" step 1.</li> <li>Connect the oscilloscope CH-1: TP202/SV-144 board (G7) GND/SV-144 board CH-2: TP205/SV-144 board (G6) GND/SV-144 board (Trigger) Range: 20 ns/div</li> </ul>	<p>The leading edge of CH-2 signal (sampling clock) becomes in the middle of the CH-1 signal (data).</p> 	<p>Insert the jumper pin to either COR201/SV-144 board (G6).</p>	<p>Position on test disc where random signals are recorded</p>
<p><b>Connection</b></p> 			

10. RF level confirmation

Connection



Adjustment Conditions	Checking method	Adjustment point	Disc
<ol style="list-style-type: none"> <li>Connect the oscilloscope to the TP201/TR-82 board.</li> <li>Load a test disc.</li> <li>Operation of simple MC tool.                             <ol style="list-style-type: none"> <li>Set the display selector switch (toggle switch) to the left side (input data display).</li> <li>Set the following specified address on the test disc by pressing the numeric keys. Specified address 10: 00</li> <li>Locate to the specified address on the test disc by pressing the <b>PLAY</b> and <b>JUM FWD</b> keys.</li> <li>Set the display selector switch (toggle switch) to the right side.</li> </ol> </li> </ol>	<ul style="list-style-type: none"> <li>Check that the RF level (TP201/TR-82 board) satisfies the specification.</li> </ul> <p>Specification: RF level <math>\geq 2.8</math> Vp-p (2.8 Vp-p or more)</p>	<p>—</p>	<p>Specified position on test disc: Random signals recorded position Address 10: 00</p>

11. Tracking offset confirmation (Checking thread kick)

Adjustment Conditions	Checking method	Adjustment point	Disc
<ul style="list-style-type: none"> <li>Remove the simple MC tool.</li> <li>Replace the adjustable ROM with the original ROM.</li> <li>Make the following sample.</li> <li>File on the disc, and play back the file.</li> </ul> <p>Sample:            Create a file in which the following Track 1 and Track 2 are repeated (registered) two or three times.            Track 1 Begin point 1: 00                      End point  1: 10            Track 2 Begin point 1: 00: 00                      End point  1: 00: 00</p>	<ul style="list-style-type: none"> <li>Play back the sample file. Check that the playback is performed according to the sample file.</li> </ul>	_____	Not specified. Making sample file

12. Focus offset confirmation (Measuring block error rate (B.E.R) )

Adjustment Conditions	Checking method	Adjustment point	Disc
<p>Step 1</p> <ul style="list-style-type: none"> <li>Remove the simple MC tool.</li> <li>Replace the adjustable ROM with the original ROM.</li> <li>Connect the harness of the PCM-9000 back where they were.</li> <li>Connect the block error rate checker to the CN3/ED-37 board.</li> </ul>	_____	_____	
<p>Step 2</p> <ul style="list-style-type: none"> <li>Load a disc, record and reproduce in the Monitor Rec mode.</li> <li>Measure the block error rate near the inner circumference (00 H : 05 M : 00 s), the middle (00 H : 40 M : 00 s), and the outer circumference (01 H : 15 M : 00 s).</li> </ul>	<ul style="list-style-type: none"> <li>Check that the B.E.R. meets the specifications at all the measured positions.            Specification : Less than or equal 100/10000</li> </ul>	_____	Normal undamaged disc without dust.

**4-4-2. Magnetic head gap adjustment (GPM-11 board/OWH Ass'y)**

**Equipment required**

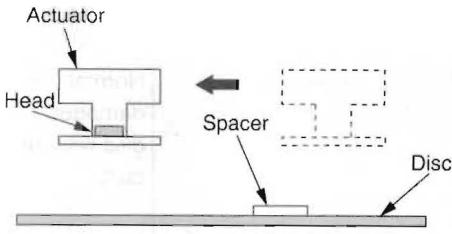
Oscilloscope

**Tools**

- Simple MC tool
- Adjustable ROM (Supplied with simple MC tool)
- Magnetic head gap adjustment disc
- Adjustable driver

**Preparation**

1. Open the SV-144 board, then connect the simple MC tool to CN103/SV-144 board.  
(For the connection, see 4-16 page, "Connection/Using" of simple MC tool.)
2. Replace the ROM (IC814)/SV-144 board with the adjustable ROM (Supplied with simple MC tool).
3. Load the magnetic head gap adjustment disc.

Adjustment conditions	Procedure/Specifications	Adjustment point
<p>Step 1</p> <ul style="list-style-type: none"> <li>• Connect the TP-901/SV-144 board to the oscilloscope.</li> <li>• Turn the RV901/SV-144 board in a counterclockwise direction.</li> <li>• Move the sled by hand to the outer side of the magnetic head gap adjustment disc. (Make the simple MC tool setting to STOP mode.)</li> </ul> <p><b>Standard OWH Ass'y positioning</b> Move the OWH Ass'y by hand to position at least 20 mm away from center.</p>  <ul style="list-style-type: none"> <li>• Simple MC tool settings               <ol style="list-style-type: none"> <li>① STOP mode</li> <li>② Press the <b>GAP</b> key to enter GAP ON mode. (Magnetic head gap adjustment mode)</li> </ol> </li> </ul>	<p>TP901/SV-144 board output (oscilloscope):</p> <p style="text-align: center;"><math>0 \pm 10</math> mV</p>	<p>RV901/SV-144 board (K6)</p>

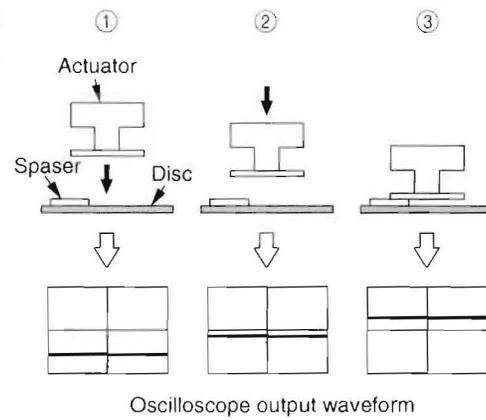
Step 2

- Move the sled by hand to the center of the magnetic head gap adjustment disc.
- Connect the oscilloscope and DC voltmeter to the TP901/SV-144 board and the GND/SV-144 board.
- Turn the  $\text{RV901/SV-144}$  board in a counterclockwise direction.

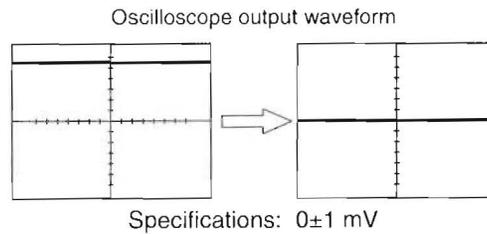
• Simple MC tool settings

- ① STOP mode
- ② Press the **GAP** key to enter GAP ON mode.  
(Magnetic head gap adjustment mode)

1. While watching the oscilloscope output wave form, slowly turn the  $\text{RV901/SV-144}$  board in a clockwise direction. This will cause the actuator to slowly touch the spacer and come to a halt (Fig. 3). When this happens, the oscilloscope wave form values will gradually move from minus to positive. At 3. of Fig. 3, the rise will suddenly cease.



2. Slowly turn the  $\text{RV901/SV-144}$  board until the point where the oscilloscope output wave form stops moving.
3. Tune the  $\text{CV1/GPM-11}$  board so that the indicator of DC voltmeter becomes to 0 V.



4. Press the **GAP** key on the simple MC tool to cancel the adjustment mode.  
(GAP OFF mode)
5. Press the **EJECT** key on the simple MC tool and remove the disc.
6. After adjustment, press the **EJECT** key of the simple MC tool and remove the magnetic head gap adjustment disk.

$\text{RV901/SV-144}$  board (K6)

$\text{CV1/GPM-11}$  board (B2)

#### 4-4-3. Magnetic Head Position Adjustment

##### Equipments Required

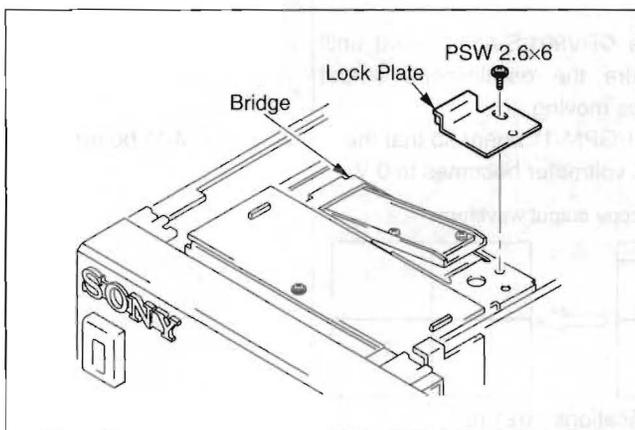
Video monitor  
BNC cable

##### Tools

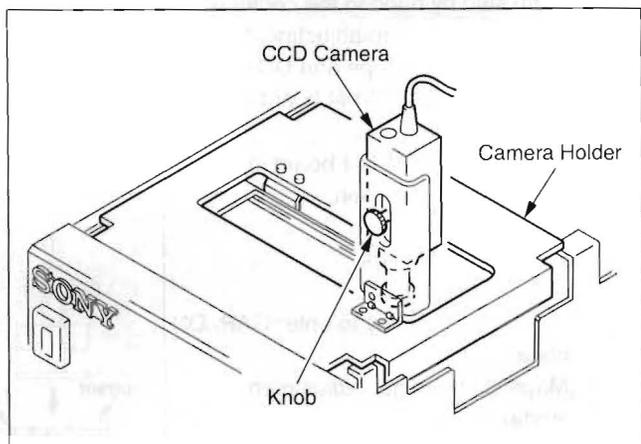
Simple MC tool  
Adjustable ROM (Supplied with simple MC tool)  
Head position adjustment tool (Supplied with CCD camera, Lens, Camera adaptor, Camera cable, Camera holder)  
Eccentricity driver (2-4)  
Head position adjustment cartridge

##### 1. Preparation

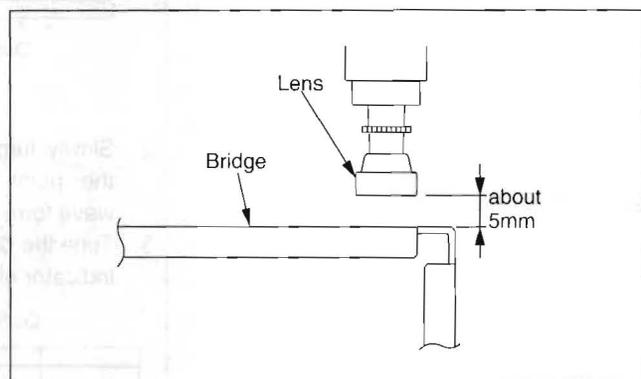
- (1) Connect the simple MC tool to CN103/SV-144 board. Replace the ROM (IC814/SV-144 board) with the adjustable ROM.
- (2) Remove the screw (PSW 2.6×6) which secure the lock plate, then remove the lock plate from the bridge.
- (3) Turn the POWER switch of the PCM-9000 and the simple MC tool on. Insert and load the head position adjustment cartridge.



- (4) Install the supplied CCD camera the head position adjustment tool in the camera holder and mount it above the PCM-9000 frame, as illustrated.



- (5) Sight the gap between the CCD camera lens and bridge and set to about 5 mm by turning the knob on the camera holder to adjust the camera height.



- (6) Connect the CCD camera to the camera adaptor, and the camera adaptor to the video monitor and turn on the power.
- (7) Press the **TEST** key (TEST mode ON) of the simple MC tool.
- (8) Press the **1** key of the simple MC tool, and check the video monitor screen.

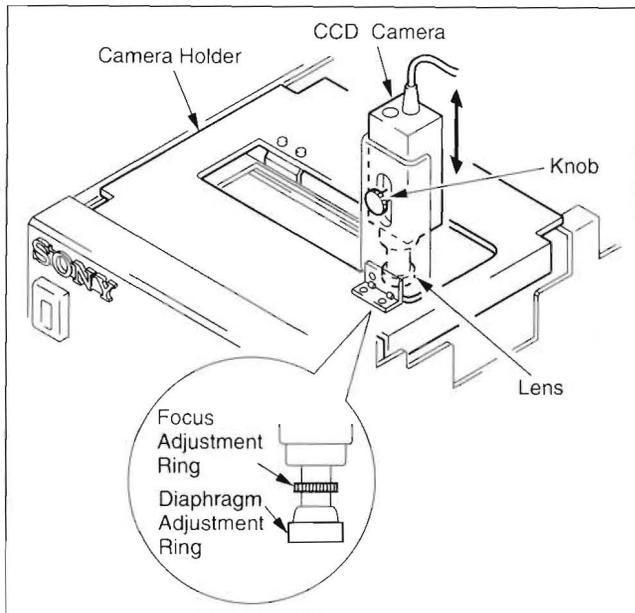
- (8) If the laser spot and magnetic head core are hard to see on the monitor, adjust either focus or diaphragm.

• **Focus adjustment:**

Loosen the knob on the camera holder and move the CCD camera up or down. If the focus is still poor, then loosen the focus adjustment ring and raise or lower the camera lens.

• **Diaphragm adjustment:**

Rotate the diaphragm adjustment ring at the end of the lens.

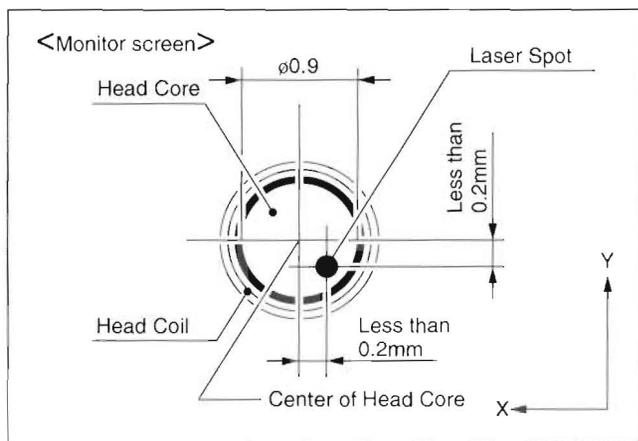


**2. Magnetic Head Adjustment**

While watching the video monitor screen, make adjustments in the following order until the laser spot is properly aligned in the center of the magnetic head core.

**Specification:**

No greater than 0.2 mm at the laser spot between the center of the head core. (Judging from what the diameter of the head core is 0.9 mm.)



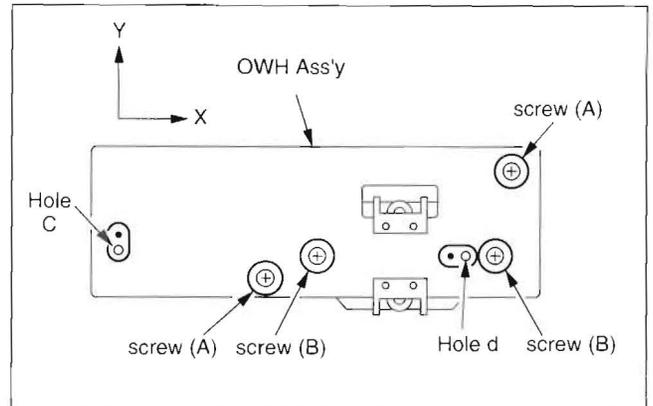
- (1) Loosen the two screws (A) on the OWH Ass'y. Then insert the tilt core screwdriver into slot C, as illustrated, and adjust the X-axis.
- (2) Tighten the two screws (A).
- (3) Loosen the two screws (B). Then insert the eccentricity driver into slot d, as illustrated, and adjust the Y-axis.
- (4) Tighten the two screws (B).
- (5) After tightening the screws, check that the camera is properly aligned. If necessary, carry out the adjustment again.

**When out of adjustment in the X-axis:**

Perform the step (1) and (2)

**When out of adjustment in the Y-axis:**

Perform the step (3) and (4)



**3. Operation After the Adjustment**

- (1) Press the **TEST** key of the simple MC tool so as to cancel the test mode.
  - (2) Remove the CCD camera and camera holder.
  - (3) Press the **EJECT** switch of the simple MC tool and take out the head position adjustment cartridge.
- Note:** Never load or unload the adjusting cartridge while the CCD camera or the camera holder is attached.
- (4) Turn the POWER switch of the PCM-9000 and simple MC tool off.
  - (5) Install the lock plate with the screw (PSW 2.6x6) to the bridge.
  - (6) Disconnect the simple MC tool from CN103/SV-144 board, then put the harness of the PCM-9000 back where they were.
  - (7) Replace the adjustable ROM with the original ROM of IC814/SV-144 board.

## SECTION 5 ELECTRICAL ALIGNMENT

This section explains the electrical adjustments required when following board is repaired or maintained.  
CK-41 Board  
ADA-28 Board

### 5-1. PREPARATION

#### Equipment Required

Name	Specifications (minimum)	Model
Audio analyzer	<ul style="list-style-type: none"> <li>• Oscillator</li> <li>• Distortion meter</li> <li>• Level meter</li> <li>• Balance input/output type</li> </ul>	TEKTRONIX SG505, SG5010, AA501, AA5001 or equivalent
Oscilloscope	<ul style="list-style-type: none"> <li>• Frequency range; DC to 100 MHz</li> <li>• 2 develop</li> <li>• Sensitivity; 5 mV/div</li> </ul>	TEKTRONIX 475, 465 or equivalent
Video signal generator	_____	TEKTRONIX 1410 or equivalent
Frequency counter	<ul style="list-style-type: none"> <li>• Effective digits: more than 8 digits</li> </ul>	ADVANTEST TR5822 or equivalent

#### Tool

Name	Part number	Remarks
Extension board EX-396	J-6400-860-A	For main boards
Extension board EX-397	J-6400-870-A	For option boards

#### Switch and Control initial Settings

Following except switch to option.

#### Control panel

SAMPLING FREQ : 48 kHz  
WORD LENGTH : 20 BIT  
SYNC CLOCK : INT

#### Connector panel

REFERENCE VIDEO INPUT 75 Ω : ON  
WORD SYNC INPUT 75 Ω : ON

#### MC-41 board

SW1-1 to SW1-8 switch : All " I "  
SW2-1 to SW2-8 switch : All " I "  
SW3 switch : " 0 "  
SW4 switch : OFF

#### SV-144 board

S801 switch : OFF

#### DIO-27 board

S1-1 to S1-8 switch : All OFF

### 5-2. CK-41 BOARD ADJUSTMENT

This adjustment is performed when replacing CK-41 board.

#### Equipment and Tools Required

- Oscilloscope
- Frequency counter
- Video Signal generator
- Extension board EX-396

#### Preparation

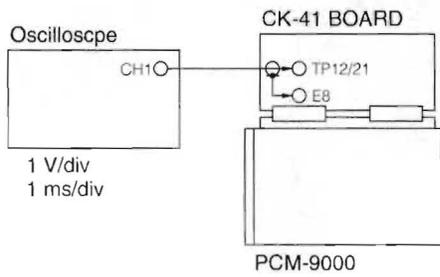
Extend the CK-41 board with the extension board EX-396.

#### 5-2-1. VARI PITCH ADJUSTMENT

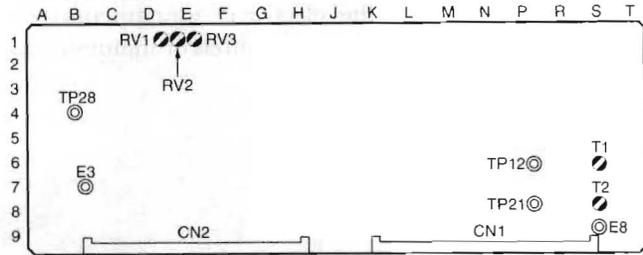
##### Switch and Control settings

Settings other than those listed below are as per Section Switch and Control initial Settings.  
SAMPLING FREQ : 48 KHZ

Connection:



#### Adjustment Location:



CK-41 BOARD (A SIDE)

#### Adjustment procedures:

Adjustment conditions	Specification	Adjustment location
<ul style="list-style-type: none"> <li>• Connect the Oscilloscope to TP12/CK-41 (P6), E8/CK-41 (GND) (S9).</li> </ul>	$TP12/CK-41 = +4.0 \pm 0.1 V$	⚙ T1/CK-41 (S6)
<ul style="list-style-type: none"> <li>• Connect the Oscilloscope to TP21/CK-41 (P8), E8/CK-41 (GND) (S9).</li> </ul>	$TP21/CK-41 = +2.0 \pm 0.1 V$	⚙ T2/CK-41 (S8)

### 5-2-2. VIDEO PLL FREE-RUN ADJUSTMENT

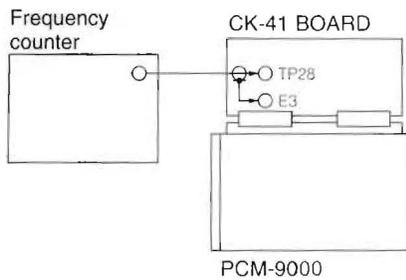
#### Switch settings:

Settings other than those listed below are as per Section Switch and Control initial Settings.

Control panel

SYNC CLOCK : VIDEO

#### Connection:

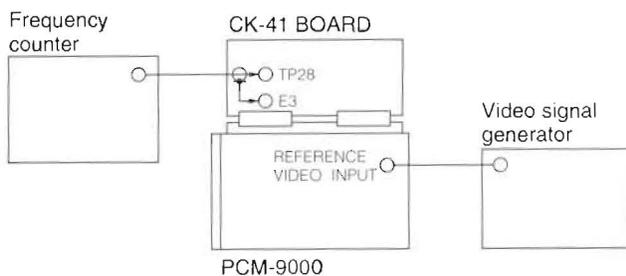


#### Adjustment:

- (1) Connect the frequency counter to TP28/CK-41 (B4) and E3/CK-41 (GND) (B7).
- (2) Set the sampling frequency 48, 44.1 and 44.056 kHz, and adjust RV3/ RV2/ RV1 on the CK-41 board respectively so that the TP28 frequency meets the specification given in the table below.

SAMPLING FREQ.	Specification	Adjustment location
48 kHz	4.800000 MHz ±10Hz	RV3/CK-41 (E1)
44.1 kHz	4.410000 MHz ±10Hz	RV2/CK-41 (E1)
44.056 kHz	4.405600 MHz ±10Hz	RV1/CK-41 (E1)

- (3) Input a video signal from the VIDEO signal generator to the REFERENCE VIDEO INPUT connector. Check that locking occurs at each sampling frequency.



PCM-9000

### 5-3. ADA-28 BOARD (DABK-9001) ADJUSTMENT

This adjustment is performed when replacing ADA-28 board (DABK-9001).

Adjustments are made to a PCM-9000 containing an ADA-28 board (DABK-9001) that has been extended with an extension board EX-397.

#### Equipment and Tools Required

- Audio analyzer
- Oscilloscope
- Extension board EX-397

#### Preparation

Extend the ADA-28 board with the extension board EX-397.

#### Switch and Control Settings

Settings other than those listed below are as per Section Switch and Control initial Settings.

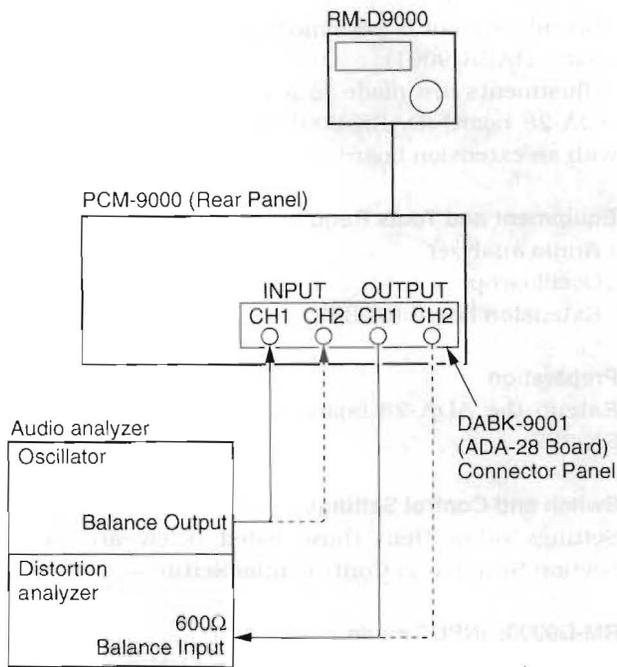
#### RM-D9000: INPUT mode

Press the INPUT key, the CH-1/CH-2 indicator will light up.

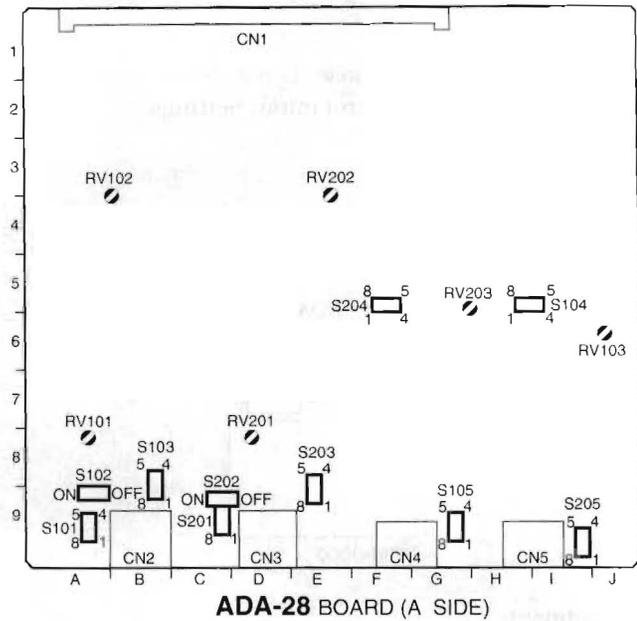
#### ADA-28 board

- S101/201/105/205 switches: bit-1, 2: ON  
bit-3, 4: OFF  
or  
bit-1, 2: OFF  
bit-3, 4: ON
- S102/202 switches: OFF
- S103/104/203/204 switches: bit-1, 2, 3: OFF  
bit-4: ON
- RV101/201: any position  
(for CMR adjustment)
- RV102/202: any position  
(for AD off set adjustment)
- RV103/203: any position  
(for DA line output amp BAL adjustment)

**Connection:**

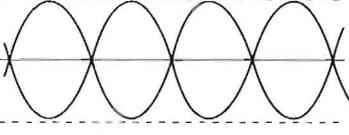
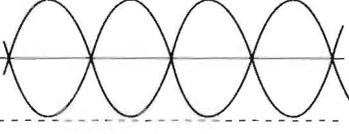


**Adjustment Location:**



**Adjustment Procedures :**

Step	Adjustment conditions	Specification	Adjustment location
1	<ul style="list-style-type: none"> <li>LINE INPUT CH1, CH2 connector: Open (No input signal)</li> <li>RM-D9000 CH-1/CH-2: INPUT</li> </ul>	RM-D9000 at level meter CH-1/ CH-2: $-\infty$ light only  CH1 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> CH2 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	CH-1: RV102/ADA-28 (B3)  CH-2: RV202/ADA-28 (E3)
2	<ul style="list-style-type: none"> <li>Input a 1 kHz, +24dBs signal to the LINE INPUT CH-1 connector. Input the signal between GROUND and the connector's HOT, COLD (parallel inputs to pin 2 and pin 3).</li> <li>Connect the distortion analyzer to LINE OUTPUT CH-1 connector.</li> </ul>	LINE OUTPUT CH-1 output level = minimum	RV101/ADA-28 (A8)
3	<ul style="list-style-type: none"> <li>Input a 1 kHz, +24dBs signal to the LINE INPUT CH-2 connector. Input the signal between GROUND and the connector's HOT, COLD (parallel inputs to pin 2 and pin 3).</li> <li>Connect the distortion analyzer to LINE OUTPUT CH-2 connector.</li> </ul>	LINE OUTPUT CH-2 output level = minimum	RV201/ADA-28 (D8)

Step	Adjustment conditions	Specification	Adjustment location
4	<ul style="list-style-type: none"> <li>Input a 1 kHz, +20dBs signal to the LINE INPUT CH-1 connector.</li> <li>Connect the oscilloscope to LINE OUTPUT CH-1 connector's HOT, COLD (pin 2-pin 1, pin 3-pin 1)</li> </ul>	Adjustment amplitude of LINE OUTPUT CH-1's HOT and COLD output signals so that they are identical. 	RV103/ADA-28 (J6)
5	<ul style="list-style-type: none"> <li>Input a 1 kHz, +20dBs signal to the LINE INPUT CH-2 connector.</li> <li>Connect the oscilloscope to LINE OUTPUT CH-2 connector's HOT, COLD (pin 2-pin 1, pin 3-pin 1)</li> </ul>	Adjustment amplitude of LINE OUTPUT CH-2's HOT and COLD output signals so that they are identical. 	RV203/ADA-28 (H6)

**Reference:** The ADA-28 board has dip switches (S103, 104, 203, 204) which allow changes to be made in the board's performance. These switches can be set, together with the ANALOG LEVEL ADJUST volume on the front panel of a PCM-9000 (fitted with an ADA-28 board), to give a maximum input/output level of +14 to +26 dBs. The dip switches are arranged in 3.0 dBs steps and the front panel volume can be varied over a range exceeding  $\pm 2$  dBs. The maximum ranges in input/output volume levels made by altering the settings of the AD adjustment dip switches (S103, 203) and the DA adjustment dip switches (S104, 204) are listed below.

Switch settings (S102/103/203/204)	Volume center standard	Volume adjustable range
bit-4 switch only: ON	+24 dBs	+22~+26 dBs
bit-3 switch only: ON	+21 dBs	+19~+23 dBs
bit-2 switch only: ON	+18 dBs	+16~+20 dBs
bit-1 switch only: ON	+15 dBs	+13~+17 dBs

## SECTION 6 BLOCK DIAGRAMS AND FRAME WIRINGS

### 6-1. BLOCK DIAGRAMS

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**CK-41 Board****Outline**

The CK-41 board generates a series of clock and sync signals that are distributed to respective board to be used as the reference of PCM-9000 operation.

Selection of the sampling frequency, the word length and the sync clock are executed by the data set which is supplied from the MC-41 board.

**1. INTERNAL SYNC MODE (INTERNAL)**

The master clock and various sync signals are generated depending upon the sampling frequency (either 48 kHz, 44.1 kHz or 44.056 kHz) that is selected.

The master clock and the sync signals can be generated within the variable pitch range of  $\pm 12.5\%$  for respective sampling frequency. The internal sync signals are output to the external equipment enabling synchronous operation with external equipment.

The standard speed and the double speed operations are possible. During the double speed operation, each FS and sync signal are doubled of the frequency. But the 256FS is not doubled.

**2. EXTERNAL SYNC MODE (EXTERNAL)**

The operation of the unit can be locked to either video sync signal or to the word sync (EXT word, DI (AES/EBU), DI sync) signal. The synchronous operation is within the range of  $\pm 50$  ppm in the video sync lock operation and, the range from  $-12.5\%$  of FS 44.056 kHz to  $+12.5\%$  of FS 48 kHz in the word sync lock operation.

This system has the NARROW and WIDE selection. The word sync system operates only on WIDE mode and the video sync system operates only on the NARROW mode.

**3. DOUBLE SPEED MODE**

PCM-9000 has the function of double-speed dubbing. In this mode, the clock signals must operate in the two times the normal frequency.

The 768FS is frequency divided (1/2) by the gate array built-in divider in the normal speed mode, and its output is sent to the clock and sync generator circuit. In the double speed mode, the frequency division (1/2) circuit is not used so that the 768FS is directly sent to the clock and sync generator circuit. It means that the 192FS, 64FS, Wck and WSync signals have the doubled frequency. However, the 256FS is not doubled to 512FS but is sent to output as 256FS.

**4. QUICK START**

Disc is played back using the BSYNC signal as the reference.

When the mode of operation is changed from STOP to PLAY, the BSYNC ENB signal is supplied from ED board to CK-41 board where the BSYNC signal is generated. The BSYNC signal is output one word later.

**DIO-27 Board****Outline**

The DIO-27 board consists of the interface block, input select block, timecode block and headphone monitor block. The interface block is the AES/EBU format 2-channel D IN/D OUT interface of PCM-9000.

**Description****1. D OUT BLOCK**

The serial audio data that is supplied from the ED-37 board is sent to the TX LSI (ICL1). But during the double speed mode, the data which is frequency divided by 1/2 is input to the TX LSI.

The validity signal and the channel status signal are added to the input data. Format of the added data is converted to the AES/EBU digital audio signal. The CRC code, parity and preamble data of the channel status information is automatically generated inside the IC and are added to the output signal. The output signal is converted to the balanced type output and sent to the external equipment.

**2. D IN BLOCK**

The balanced type input signal is converted to the unbalanced type signal and sent to the RX LSI (ICM1). As the AES/EBU signal is the self-sync data, the clock is extracted using PLL. The extracted clock signal is sent to the CK-41 board.

Format of the input data is converted inside the LSI using the clock that is supplied from CK-41 board, so that the serial data is output. The channel status data (FSID, EMPHASIS FLAG) which are extracted from the input data, are read by the MC data bus.

**3. INPUT SELECT BLOCK**

The input digital audio signal that is sent to the ED-37 board is selected from the ADA output, DI (AES/EBU) SDIF signal and SCSI signal.

**4. TIME CODE BLOCK**

The data that is supplied from the MC-41 board, and the BSYNC signal that is supplied from the CK-41 board are input to the frequency counter block of ICL1. This counter is used as the down-counter. The SYNC output is obtained at any desired position by changing the setting value of the counter. The generated sync and clock signals are sent to the MC board and timecode board.

Here, the phase difference between the external TC and internal TC is measured. Measurement is based upon the internal TC that is used as the reference. Phase error of the external TC is measured with reference to the internal TC. The result of measurement is read by the MC data bus.



## ED-37 Board

## Description

**1. MC I/F BLOCK (IC11, 12, 64 to 67, 69, 70, 73, 74)**

The MC I/F (main CPU interface) block consists of three blocks (1) the address decoder generating the chip select signal enabling the main CPU to access the respective circuit block of ED-37 board, (2) the board ID generator enabling the main CPU to identify the existence of ED-37 board, and (3) the port enabling the main CPU to control the hardware of ED-37 board.

**2. ENCODER BLOCK (IC49, 75, 76, 78)**

The encoder block generates the recording signals by interleaving the audio data and TC signal, adding the ECC (Error Correction Code), and (2, 7) modulating them so that the signals is ready to be recorded on disc.

**3. DECODER BLOCK (IC15, 51, 80, 82 to 85, 87, 135)**

The Decoder block receives the disc playback signal which is supplied from SV-144 board, and decodes the disc playback signal into the audio data and TC signal by (2, 7) demodulating, error corrections and de-interleaving processing.

**4. DEC FLAG BLOCK (IC2, 6, 7, 9, 50, 71, 101, 126, 132, 134)**

The DEC FLAG block receives the flag and other information from the DECODER block and generates the timing control signals that are required in the SUB DSP block. It also interfaces these flags with the SUB DSP block.

**5. DECODER I/F BLOCK (IC17 to 33)**

The decoder interface block receives the playback serial data from the DECODER block and converts it from serial-to-parallel data with the specified word length. It interfaces the parallel data with the SUB DSP.

**6. AUX I/F BLOCK (IC16, 52, 109 to 121, 127 to 131)**

The AUX interface block receives the parallel Aux data from the SUB DSP, converts the signal from parallel-to-serial data and generates the playback TC signal. It also switches the monitor output of the Aux data, and enables the REC READY control.

**7. SUB DSP BLOCK (IC38, 79, 81, 86, 91, 94, 125, 133, 136)**

The sub DSP block consists of the DSP56001 and external data memory (8k words). It corrects errors of the disc playback audio signal that could not be corrected by the DECODER block. The error corrections are AVERAGE, HOLD and MUTE. It also applies TBC (Time Base Correction). It then interface the corrected playback signal with the main DSP block.

**8. MAIN DSP BLOCK (IC92, 93, 122 to 124)**

The main DSP block consists of the DSP56001 and external Program memory (8k words). This block receives the PB data from the SUB DSP block, the DI data from the DI I/F block, and the JE data from the MEM-58 board, and applies various audio data processing in the order of MC command. It sends the output audio data to the DO I/F block to be supplied to the monitor or to the ENCODER block.

**9. DI I/F BLOCK (IC34 to 37, 39 to 41, 72, 88)**

This block receives the DI data from the DIO-27 board, and the JE data from the MEM-58 board. It converts them from serial-to-parallel and interfaces them with the main DSP.

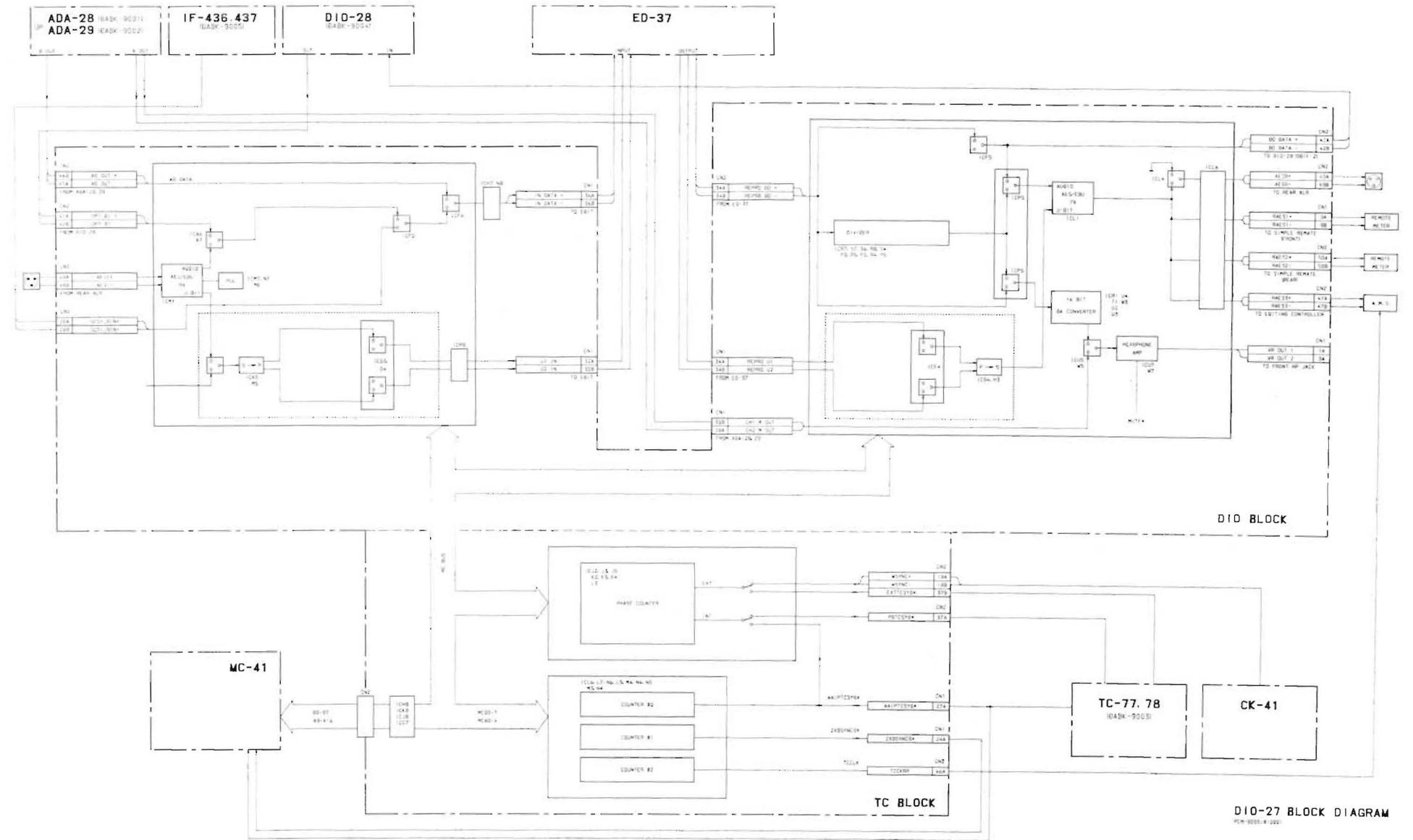
**10. DO I/F BLOCK (IC4, 8, 42 to 48)**

This block receives the audio data from the main DSP and converts them from parallel-to-serial. It generates the serial data to be sent to the monitor, the ENCODER, and also generates the block sync pause signal used in quick start function.

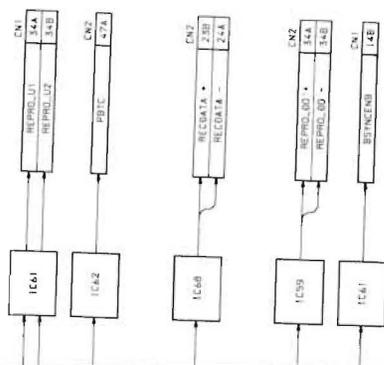
**11. TOC BUFFER BLOCK (IC5, 14, 95 to 97, 99, 100, 102 to 108)**

The TOC buffer block consists of the 64k\*8bit buffer memory and the address counter. The 64k\*8bit buffer memory is used for Edit data save and load, enabling read and write data from either MC (main CPU) and main DSP. The address counter sets the order of access so that the TOC buffer block is accessed in the specified order.

DIO-27 Board



DIO-27 BLOCK DIAGRAM  
PCM-9000-1-000



**MC-41** BLOCK DIAGRAM

## MC-41 Board

### Outline

The MC-41 board consists of the main CPU and its peripheral circuit. The main CPU has the function as the main controller of PCM-9000.

### Description

#### 1. CPU BLOCK (IC3 to 6, 8, 9, and X1)

The CPU block consists of the CPU (TMP68301), clock generator (12.288 MHz) and reset circuit. The reset circuit watches the +5V power line. The CPU has the function to control the various devices of MC-41 board, the main boards and option boards.

#### 2. ADD. DEC. BLOCK (IC10 to 14, 36, 37, 87)

Addresses are decoded to generate the select signal so that the CPU accesses the devices of MC-41 board, the main boards and the option boards. It also generates the DTACK signal depending upon the number of wait of each board and device. The DTACK\* signal is returned to the CPU.

#### 3. ROM/RAM BLOCK (IC15 to 29, Q12)

The ROM/RAM block consists of the EP-ROM (128 kbyte: max. 4 pieces) for the main CPU software, and the SRAM (total: 1M byte) for the work area. The SRAM has the power backup circuit.

#### 4. INTERRUPT BLOCK (IC7, 10, 30 to 35, 37 to 42, 51, 88)

The interrupt block consists of the interrupt controller TMP82C59A and the read/write signal generator circuit. It accepts the interrupt requests from the devices of MC-41 board, the main boards and the option boards in accordance with the priority of interrupt request.

#### 5. FRONT PANEL BLOCK (IC7, 33, 37, 72 to 76, 78 to 81, and Q3 to 21)

The front panel block consists of the key input/display interface (TMP82C79 and the read/write signal generator circuit. It has the function of the key data processing and LED display. When any new key data is input, an interrupt request requiring the front panel data processing is generated.

As receiving the interrupt request, the CPU executes the key input processing and the front panel LED display processing.

#### 6. SC I/F BLOCK (IC51 to 72)

This is the interface block to establish communication with the servo CPU. The 8-byte serial data is sent/received per each communication.

#### 7. REMOTE I/F BLOCK (IC43)

The front and rear remote controllers are interfaced with this block that has the Ballance/Unballance conversion function. This block is connected to the serial controller which is built-in in the main CPU enabling the serial data transmission and reception with the CPU of the remote controllers.

#### 8. AD/DA PORT BLOCK (IC13, 82, 83)

This is the port enabling setting of emphasis on/off, muting etc., of the AD/DA board.

#### 9. SWITCH BLOCK (IC84 to 86, S2 to 4)

The switch block consists of the two pieces of DIP switch and the rotary switch. The setting status of various modes are acknowledged when the CPU reads the switch data.

#### 10. BUFFER BLOCK (IC45 to 50)

This is the buffer block enabling input and output of the address bus, data bus and control signals with the main boards and the option boards.

## SV-144 Board

### Outline

The SV-144 board has various servo control functions of the M/O disc drive.

### Description

#### 1. PLL BLOCK (IC201 to 209)

The RF data is supplied from TR-82 to the PLL block where approximately 19.6MHz CLK is extracted and sent to the PB RAM control block.

#### 2. PB RAM BLOCK (IC601 to 604, IC607 to 612, IC701 to 724)

The PB RAM block consists of the PB FIFO RAM and the RAM control circuit. The playback RF data is written into the PB FIFO RAM using PLL CLK and is read from it using DEC CLK which is supplied from the DEC circuit (ED-37 board). The address control on disc is executed by the CPU. The playback RF data is picked up from the disc in several block units (monitor REC mode) starting from a specified address. The playback RF data is transferred from the TR-82 board to the PB FIFO RAM. This operation is synchronized with the AAIP block sync signal.

#### 3. REC RAM BLOCK (IC601 to 606, IC609 to 612, IC701 to 724)

The REC RAM block consists of the REC FIFO RAM and the RAM control circuit. The (2, 7) modulated data which is supplied from ENC circuit (ED-37 board) is written into the REC FIFO RAM. The data that is read out from the REC FIFO RAM is transferred to the MGDR control block. The data write and read are accomplished using approximately 19.6MHz master clock. The address control on disc is executed by the CPU. This data is recorded on the disc in several block units (monitor REC mode) starting from a specified address. The record data is transferred from the REC FIFO RAM to the MGDR control block and then recorded on the disc. This operation is synchronized with the AAIP block sync signal.

#### 4. MGDR CONTROL BLOCK (IC403, IC901 to 908)

The MGDR control block receives the record data from the REC RAM block and converts the data format suited for magnetic field modulation to be recorded on disc.

#### 5. GAP SERVO BLOCK (IC403, IC901 to 908)

The gap servo circuit has the function to maintain a constant distance (about 200  $\mu\text{m}$ ) between the disc and coil during recording. The gap sensor generates the error signal which controls the gap servo that drives the head actuator.

#### 6. LASER CTRL BLOCK (IC301 to 306)

This block has the function of maintaining the laser output power constant during PB and REC modes as it receives the laser power monitor output. The laser output power is temperature characteristics compensated during record mode so that the power is decreased during high ambient temperature and increased during low temperature.

#### 7. AAIP BLOCK (IC417, IC801 to 810)

This block reads the absolute address (which is called AAIP, the abbreviation of Absolute Address In Pre Groove) that have been pre-striped on disc beforehand. The address information has already been FM-modulated and inscribed after wobbling on the track of disc. The wobble signal is extracted from the disc, FM-demodulated to extract the address information which is sent to the CPU.

#### 8. SPINDL SERVO BLOCK (IC501 to 509, IC511)

The spindle servo controls the disc rotation so that the constant linear velocity (CLV) is established. The spindle rotation is controlled so that the frequency and phase of the wobble signal from the disc and those of reference CLK agree. The FG servo is also employed at the same time to enable the quick lock-in time.

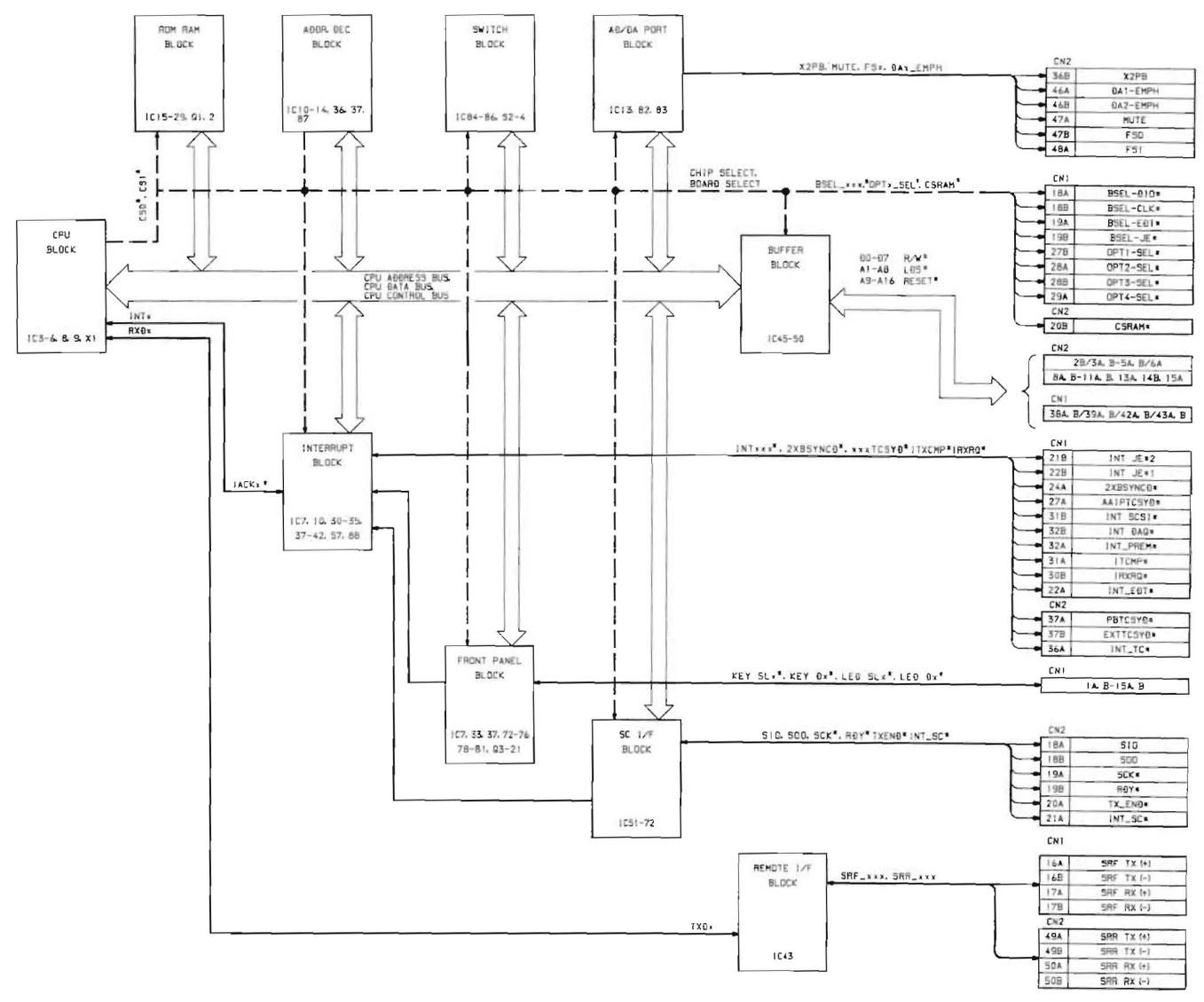
#### 9. DUAL-AXIS SERVO AND SLED SERVO BLOCK (IC401 to 427)

This block consists of the focus servo which focuses the laser beam spot on the disc, the tracking servo which enables tracking of the beam and the sled servo which controls the sled motor to move the optical block in radial direction of the disc so that the dual-axis servo has the widest operating range.

#### 10. CPU BLOCK (IC811 to 817)

This block controls operation of all the above described blocks. It locks the focus servo, rotates the spindle motor, establishes the tracking servo, reads the disc address, controls the laser power, enables the gap servo, controls the MGDR, and controls the PB RAM block and record RAM block. It also drives the disc loading, transfers command and status between the main CPU, and performs the abnormality detection and processing by monitoring these above conditions.

MC-41 Board



MC-41 BLOCK DIAGRAM  
PCM-9000-110001-

**GPM-11 Board (OWH ASSY)****Structure**

The GPM-11 board consists of the followings.

1. **Gap detector**
2. **Head coil current, actuator coil current bypass**

**Description****1. GAP DETECTOR BLOCK**

The gap detector block consists of the crystal (X2) and the peripheral circuit (IC1, R1, CV1, etc.). An output of the crystal oscillator is sent to the gap sensor via C1. The oscillating frequency of the oscillator is determined by the capacitance of the gap sensor. At the same time, a separate oscillator consisting of the crystal (X1) is prepared. These two oscillators form a PLL circuit using one oscillator as the reference which is connected to the gap sensor. The output of the PLL circuit is passed through a low-pass filter (feedback signal) and then sent to the external circuit as the GAP ERROR signal. (The low-pass filter output of the PLL circuit has 2.5V offset when the gap is 0.3mm. The offset is canceled by IC8 (2/2) so that the 0V output is supplied when the gap is 0.3mm.) IC7 and TH1 form a temperature characteristics compensation circuit.

**2. HEAD COIL CURRENT, ACTUATOR COIL CURRENT BYPASS BLOCK**

The head coil current is generated by the MD-87 board and is supplied to this block. The actuator coil current is generated by the SV-144 board and supplied to this block via the MD-87 board. Both of these signals pass through the GPM-11 board and sent to the head actuator coil via the flexible cable (FR-62) that is attached to the GPM-11 with adhesive agent.

**MD-87 Board****Structure**

The MD-87 board consists of the followings.

1. **Over write head coil current driver**
2. **Gap servo signal bypass block**

**Description****1. OVER WRITE HEAD COIL CURRENT DRIVER BLOCK**

This block consists of the main switch (Q1 to Q6) and the buffer amplifier (Q7 to Q16). The main switch is driven by the control signal which is supplied from the SV-144 board.

As the main switch (Q1 to Q6) is switched ON/OFF by the control signal, the current to flow through the overwrite head is generated. The output current is sent to the GPM-11 board via CN1.

**2. GAP SERVO SIGNAL BYPASS BLOCK**

The gap signal that is supplied from the SV-144 board to be sent to the GPM-11 board is bypassed by this block.

**TR-82 Board****Structure**

The TR-82 board consists of the following blocks.

1. **Voltage regulator block**
2. **RF equalizer amplifier and comparator block**
3. **Signal bypass block**

**Description****1. VOLTAGE REGULATOR BLOCK**

The TR-82 board receives +12V, GND, -15V, +5V, GND and -5V from the PS-345 board. It generates +7V from +12V supply, and -5V from -15V supply using three terminal regulator device. These powers are sent to the RF equalizer amplifier block and the optical pickup as analog power supplies.

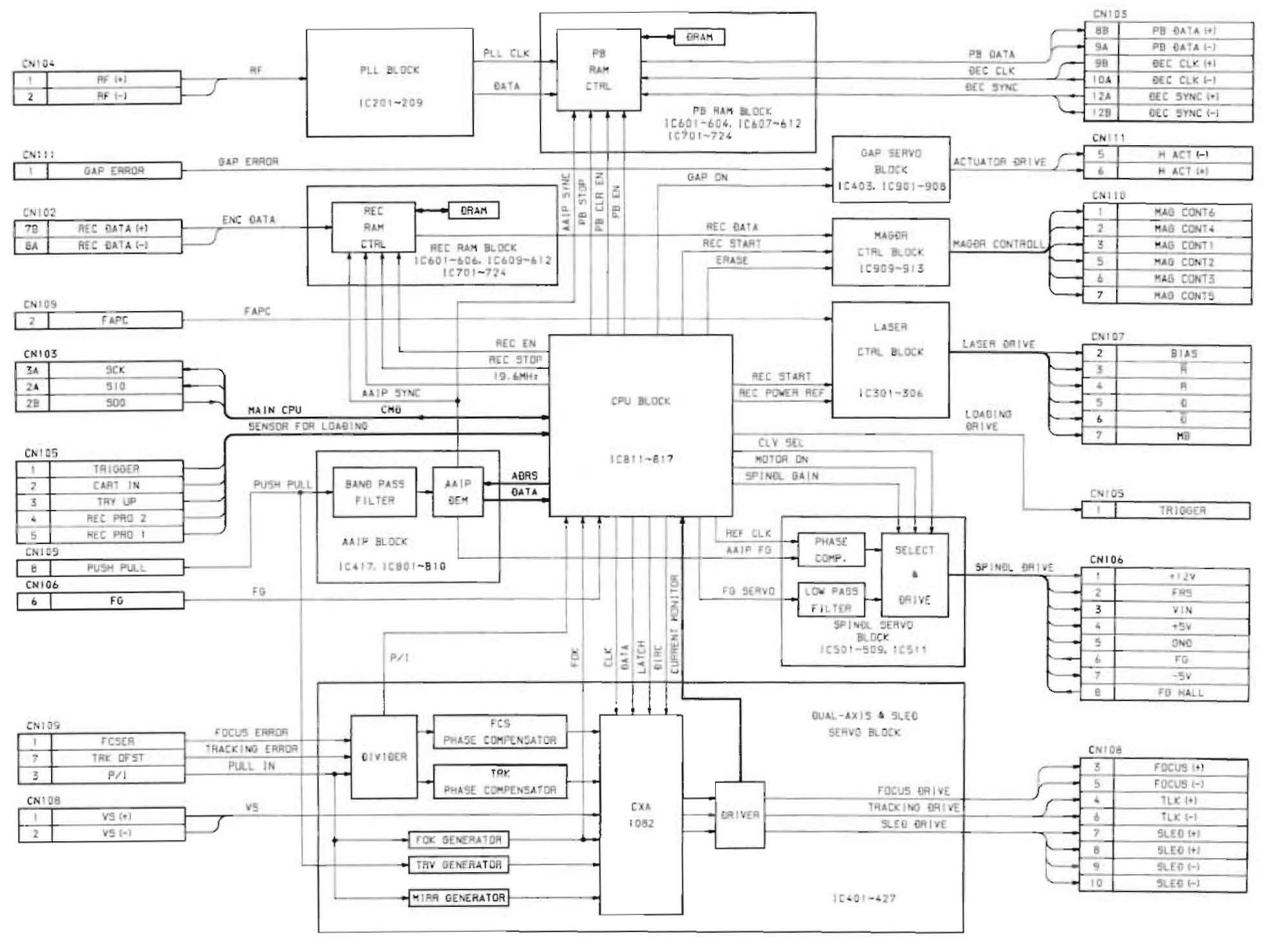
**2. RF EQUALIZER AMPLIFIER AND COMPARATOR BLOCK**

The RFD signal is supplied from the optical pickup which is amplified by the front end amplifier IC201 (1/2) and sent to the subsequent equalizer circuit. Output of the equalizer circuit is converted to the "0 to 5V" signal by the comparator (IC205), and is further converted to the unbalanced-type signal by IC204. The output signal is sent to the SV-144 board.

**3. SIGNAL BYPASS BLOCK**

The geared motor related signal, the loading related signals, the sled motor signal, the spindle motor signal and focus/tracking signals are supplied from the optical pickup. They bypass the TR-82 board active circuit and are sent to the SV-144 board.

SV-144 Board



SV-144 BLOCK DIAGRAM  
PCM-9000 #10001-

**RM-D9000**

The remote control unit RM-D9000 consists of the followings.

1. **KC-32 Board**
2. **DP-195 Board**
3. **KY-267 Board**
4. **KY-269 Board**
5. **LE-120 Board**
6. **CN-883 Board**

**Descriptions**

**1. KC-32 Board**

• **RESET BLOCK (IC F6,F8)**

It generates the reset signal when power is turned on.

• **CPU BLOCK (IC C4)**

This is the one-chip CPU having the core equivalent to Z80 CPU core, with the built-in serial and parallel I/O interface.

• **ROM/RAM BLOCK (IC E2,E6)**

32k byte ROM (IC E2) for storing program, and 8k byte RAM (IC E6).

• **ADDRESS DECODER BLOCK (IC B1,C3)**

The address decoder enabling CPU to access the peripheral circuit.

• **SERIAL I/O BLOCK (IC B2)**

The buffer for serial communication with PCM-9000 unit.

• **METER I/F BLOCK (IC B2,C2,C5,C6,D5,D6,E5,E6,F4)**

The meter drive signal is supplied from PCM-9000 unit in the AES/EBU format. This block detects the peak data and the bit-mode data. The detected data are read by the CPU.

• **PULSE COUNTER BLOCK (IC B3,B6,F6)**

It counts the pulse output of the JOG dial rotation. The CPU reads the counter output.

• **DC/DC CONVERTER BLOCK (IC C8, C9, Q101-105)**

It receives the supply voltages from PCM-9000 or from the external power supply, and generates the exclusive supply voltages required in the RM-D9000.

**2. DP-195 Board**

• **I/O EXPANDER BLOCK (IC B2, B3)**

The I/O expander to send the fluorescent tube display data from the CPU.

• **FL DRIVER BLOCK (Q201 to 280)**

It converts the I/O expander output to the signal voltages that can drive the fluorescent tube.

• **FL HEATER DRIVER BLOCK (IC C2, Q281 to 284)**

The current driver supplying the fluorescent tube display data. This data is originally supplied from the CPU.

**3. KY-267 Board**

• **I/O EXPANDER BLOCK (IC A1)**

The I/O expander enabling input and output of the LED drive data and the key scan signal.

• **LED DRIVER BLOCK (Q301 to 319)**

The current driver for the display LED.

• **KEY & LED DISPLAY BLOCK (S301 to 332, S401 to 406)**

The matrix for the display LED and operation key.

**4. KY-269 Board (S501 to 507)**

The operation key and display LED board.

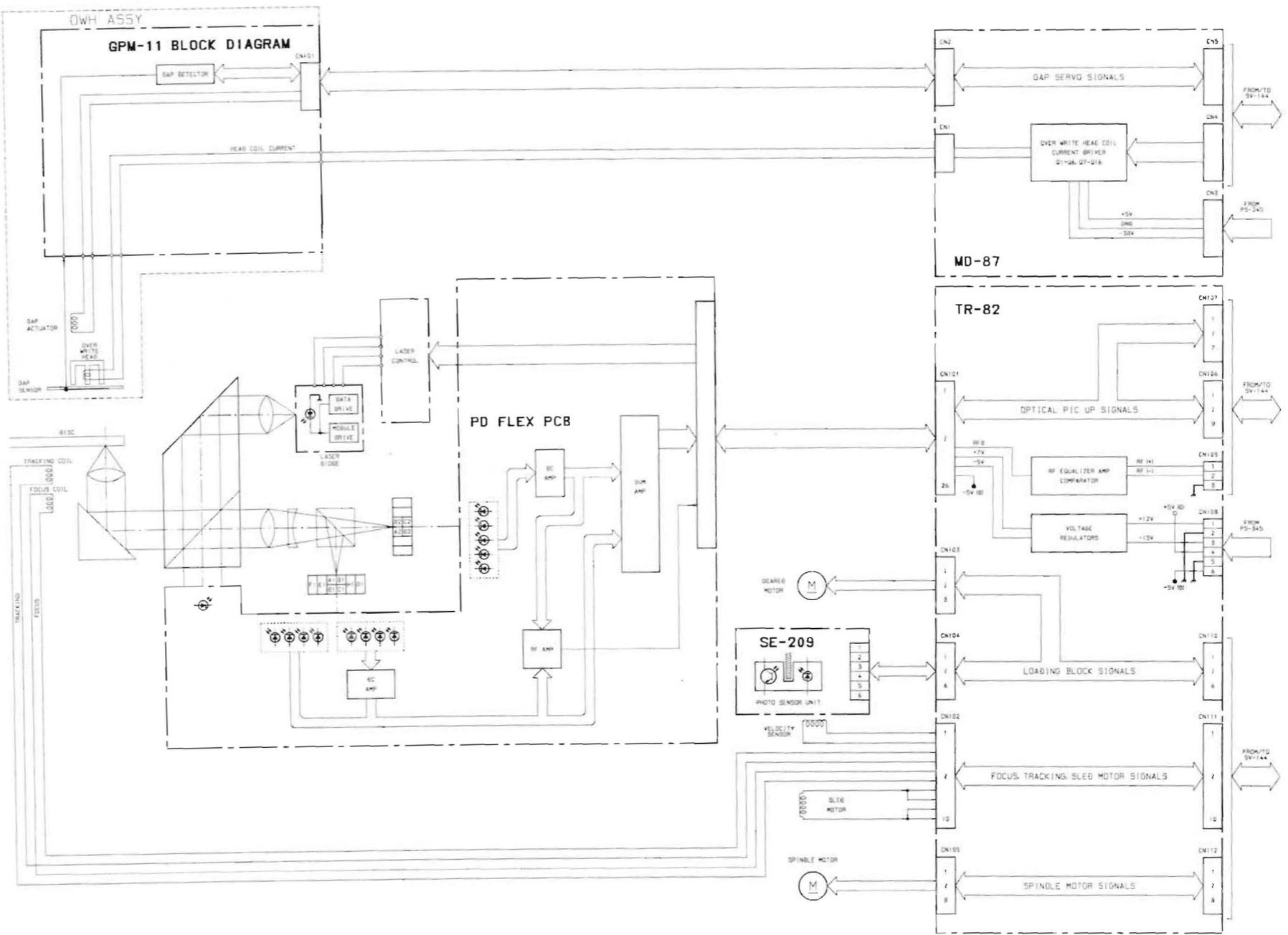
**5. LE-120 Board (D601 to 603)**

The LED board for displaying the JOG dial rotating direction.

**6. CN-883 Board (RE701)**

The rotary encoder board for the JOG dial.

GPM-11 Board  
MD-87 Board  
TR-82 Board



GPM-11/MD-87/TR-82 BLOCK DIAGRAM  
PCM-9000-81001-

**RM-D9000**

The remote controll unit RM-D9000 consists of the followings.

1. **KC-32 Board**
2. **DP-195 Board**
3. **KY-267 Board**
4. **KY-269 Board**
5. **LE-120 Board**
6. **CN-883 Board**

**Descriptions**

**1. KC-32 Board**

• **RESET BLOCK (IC F6,F8)**

It generates the reset signal when power is turned on.

• **CPU BLOCK (IC C4)**

This is the one-chip CPU having the core equivalent to Z80 CPU core, with the built-in serial and parallel I/O interface.

• **ROM/RAM BLOCK (IC E2,E6)**

32k byte ROM (IC E2) for storing program, and 8k byte RAM (IC E6).

• **ADDRESS DECODER BLOCK (IC B1,C3)**

The address decoder enabling CPU to access the peripheral circuit.

• **SERIAL I/O BLOCK (IC B2)**

The buffer for serial communication with PCM-9000 unit.

• **METER I/F BLOCK (IC B2,C2,C5,C6,D5,D6,E5,E6,F4)**

The meter drive signal is supplied from PCM-9000 unit in the AES/EBU format. This block detects the peak data and the bit-mode data. The detected data are read by the CPU.

• **PULSE COUNTER BLOCK (IC B3,B6,F6)**

It counts the pulse output of the JOG dial rotation. The CPU reads the counter output.

• **DC/DC CONVERTER BLOCK (IC C8, C9, Q101-105)**

It receives the supply voltages from PCM-9000 or from the external power supply, and generates the exclusive supply voltages required in the RM-D9000.

**2. DP-195 Board**

• **I/O EXPANDER BLOCK (IC B2, B3)**

The I/O expander to send the fluorescent tube display data from the CPU.

• **FL DRIVER BLOCK (Q201 to 280)**

It converts the I/O expander output to the signal voltages that can drive the fluorescent tube.

• **FL HEATER DRIVER BLOCK (IC C2, Q281 to 284)**

The current driver supplying the fluorescent tube display data. This data is originally supplied from the CPU.

**3. KY-267 Board**

• **I/O EXPANDER BLOCK (IC A1)**

The I/O expander enabling input and output of the LED drive data and the key scan signal.

• **LED DRIVER BLOCK (Q301 to 319)**

The current driver for the display LED.

• **KEY & LED DISPLAY BLOCK (S301 to 332, S401 to 406)**

The matrix for the display LED and operation key.

**4. KY-269 Board (S501 to 507)**

The operation key and display LED board.

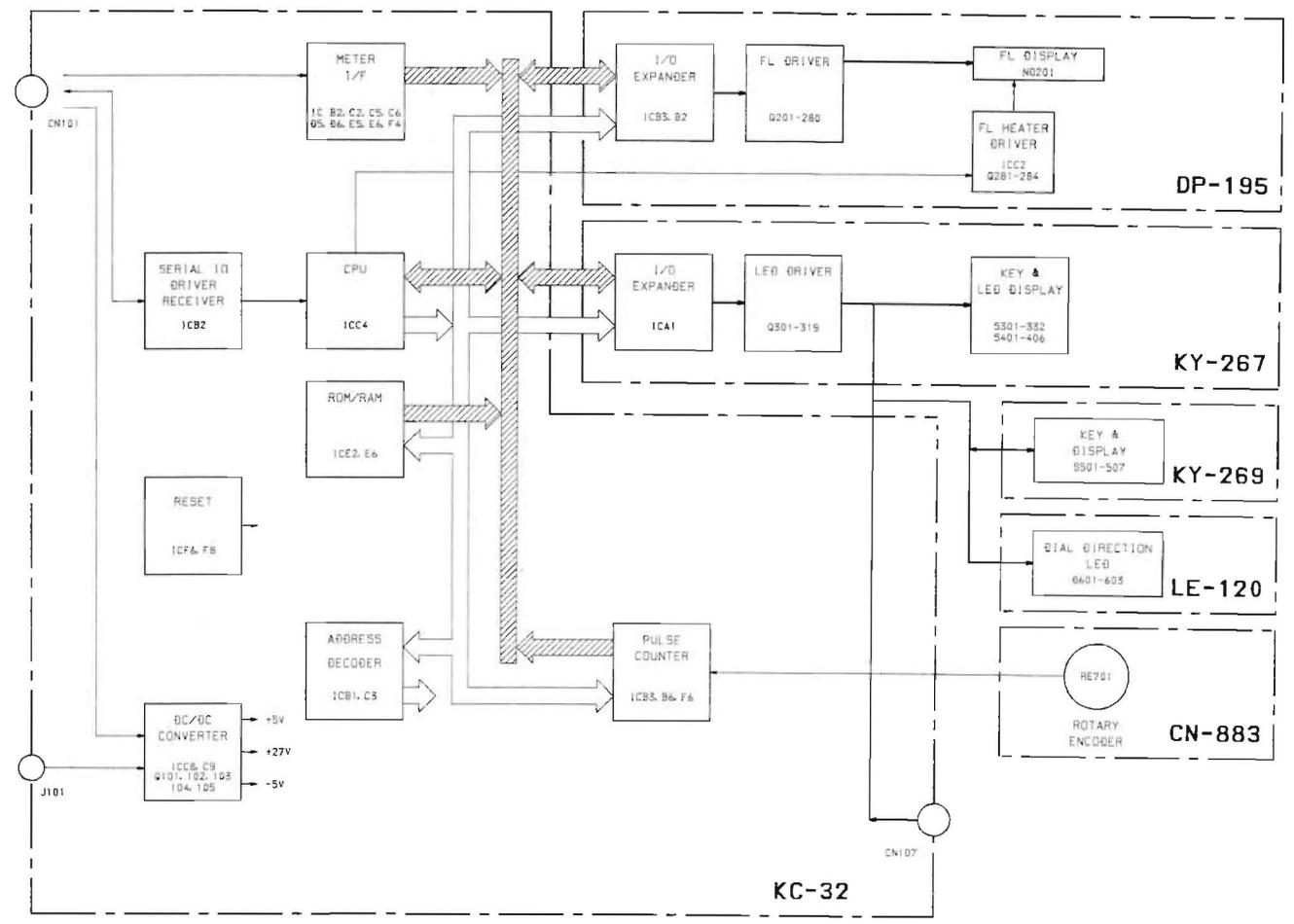
**5. LE-120 Board (D601 to 603)**

The LED board for displaying the JOG dial rotating direction.

**6. CN-883 Board (RE701)**

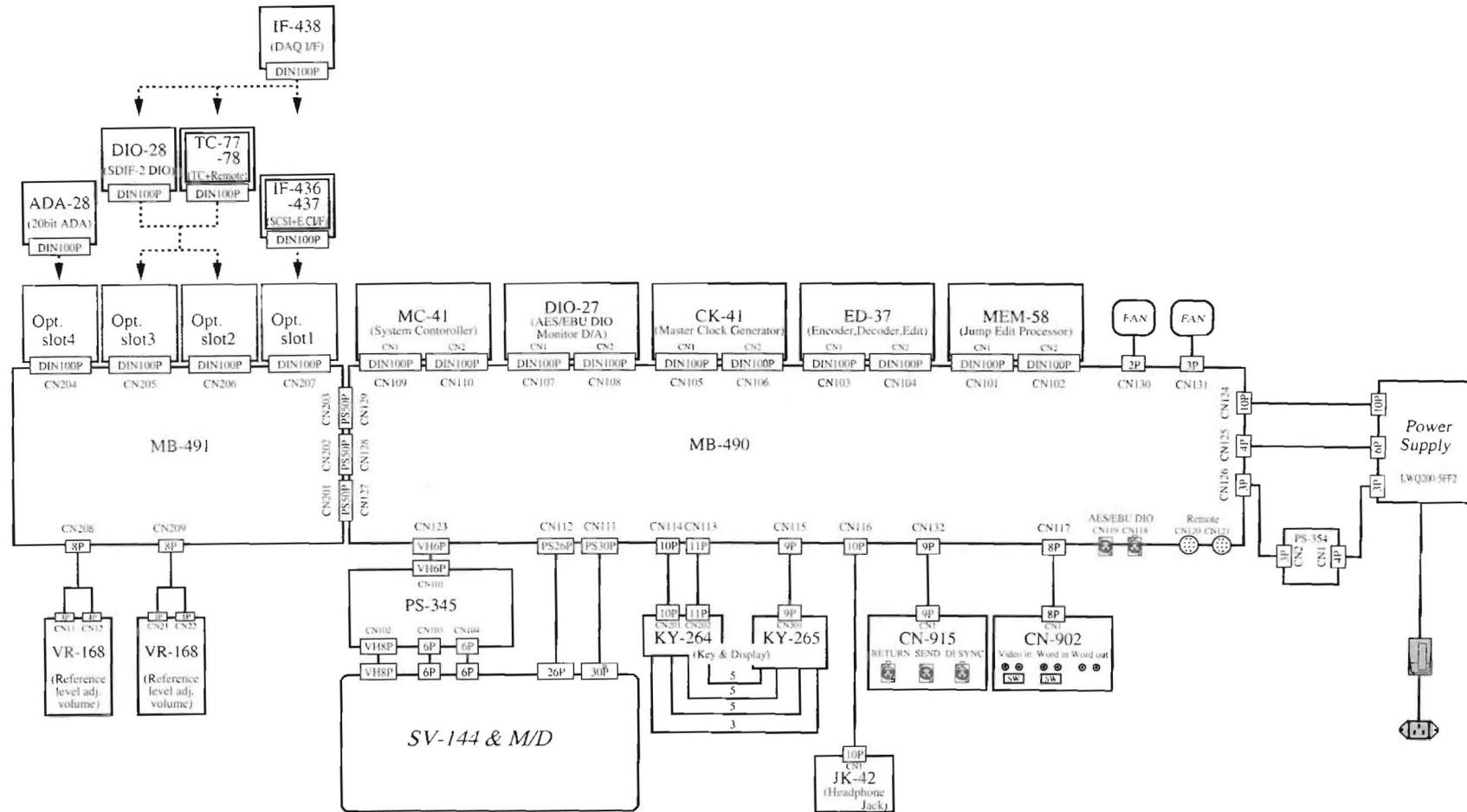
The rotary encoder board for the JOG dial.

KC-32 Board  
 DP-195 Board  
 KY-267 Board  
 KY-269 Board  
 LE-120 Board  
 CN-883 Board



BLOCK DIAGRAM  
 RM-D9000:110001-

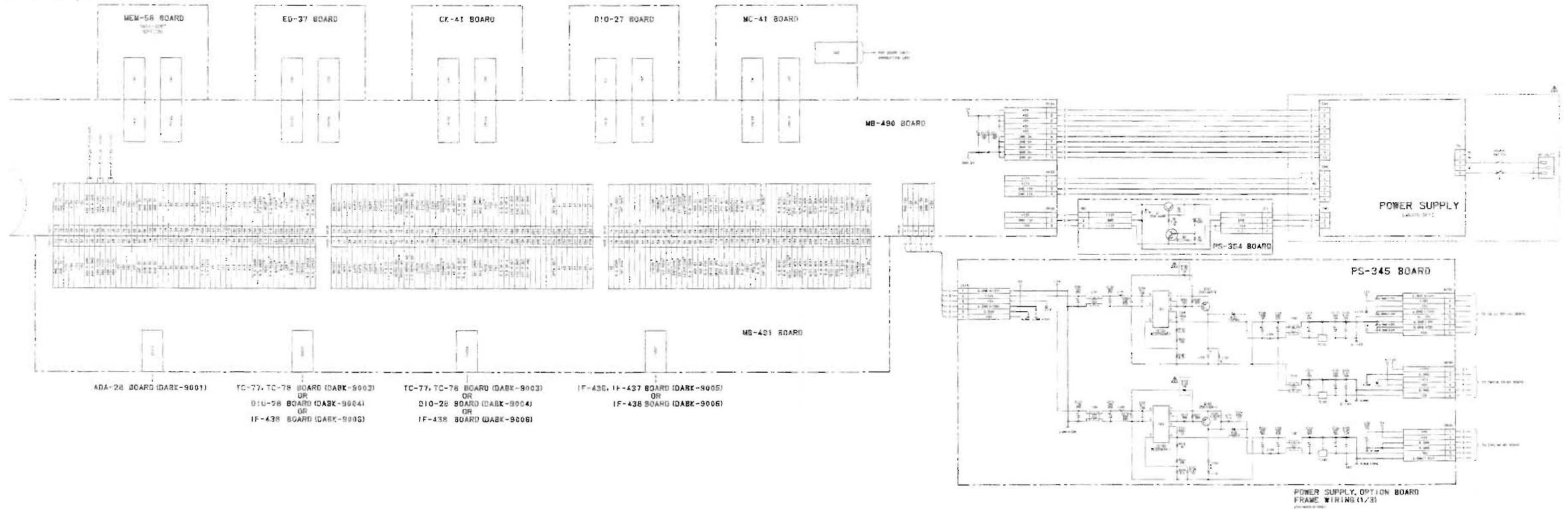
6-2. FRAME WIRINGS  
OVERALL



FRAME WIRING OVERALL

PCM-9000: #10001-

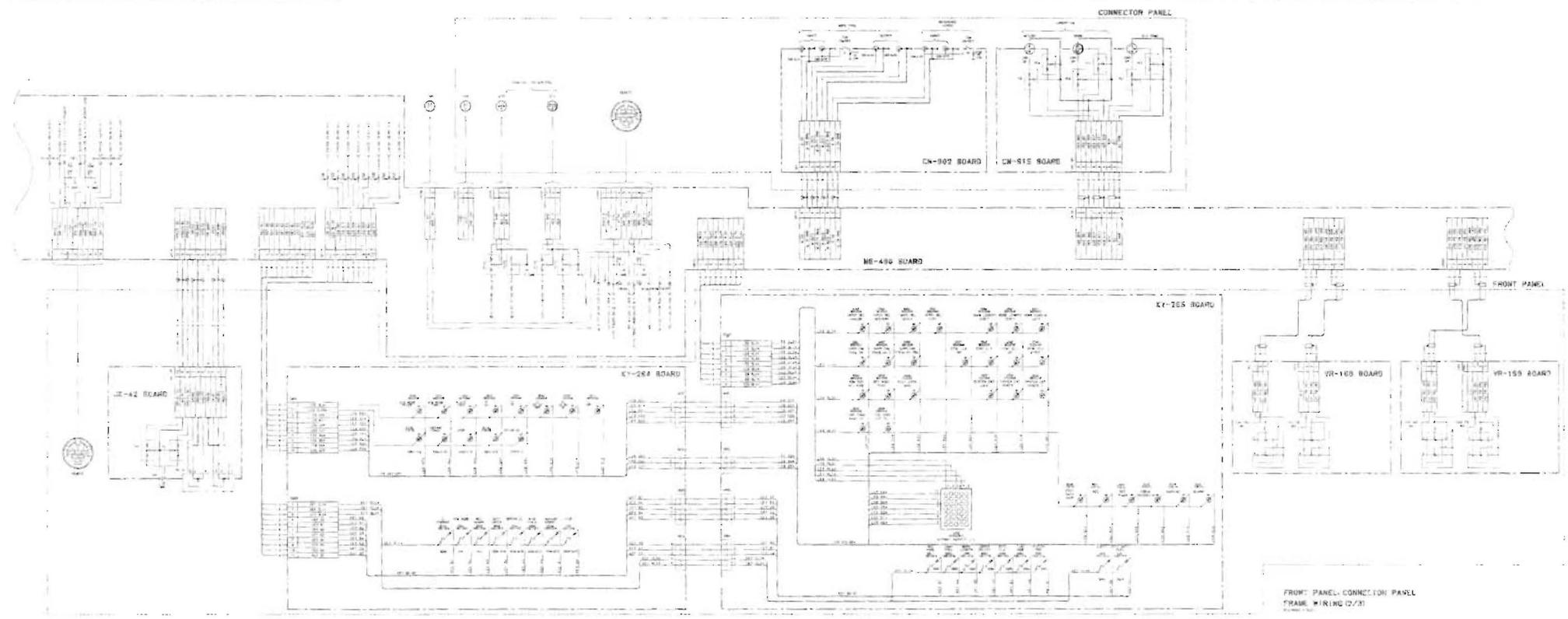
FRAME WIRING (1/3)  
 PS-345 Board : D/C Converter Board  
 PS-354 Board : Switching Board



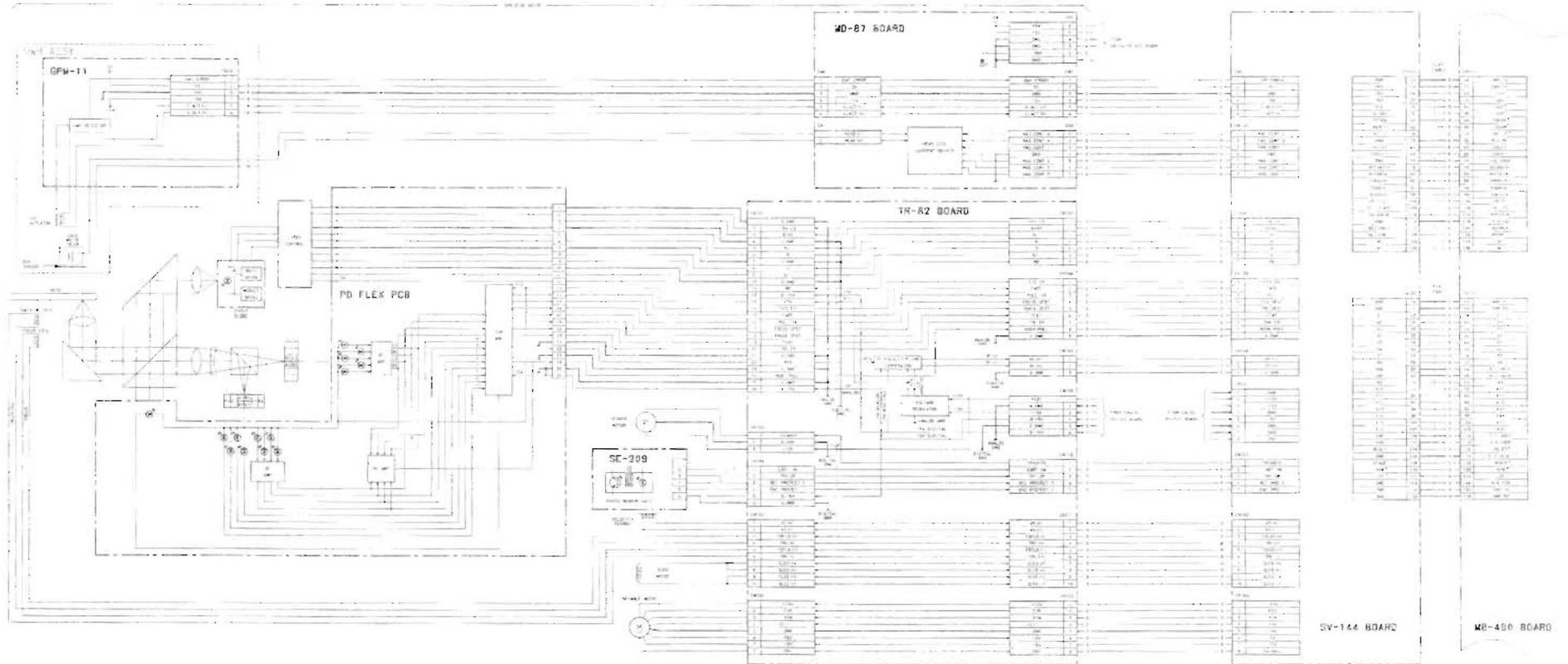
CN-902, CN-915, JK-42, KY-264, VR-168, VR-169  
 FRAME WIRING (2/3) FRAME WIRING (2/3) CN-902, CN-915, JK-42, KY-264, VR-168, VR-169

CN-902, CN-915, JK-42, KY-264, VR-168, VR-169  
 FRAME WIRING (2/3) FRAME WIRING (2/3) CN-902, CN-915, JK-42, KY-264, VR-168, VR-169

- FRAME WIRING (2/3)  
 CN-902 Board : Connector Board  
 CN-915 Board : Connector Board  
 JK-42 Board : Headphone Board  
 KY-264 Board : Key Switch Board  
 KY-265 Board : Key Switch Board  
 VR-168 Board : VR Board  
 VR-169 Board : VR Board



FRAME WIRING (3/3)  
 GPM-11 Board : GAP Sensor Board  
 SE-209 Board : Sensor Board

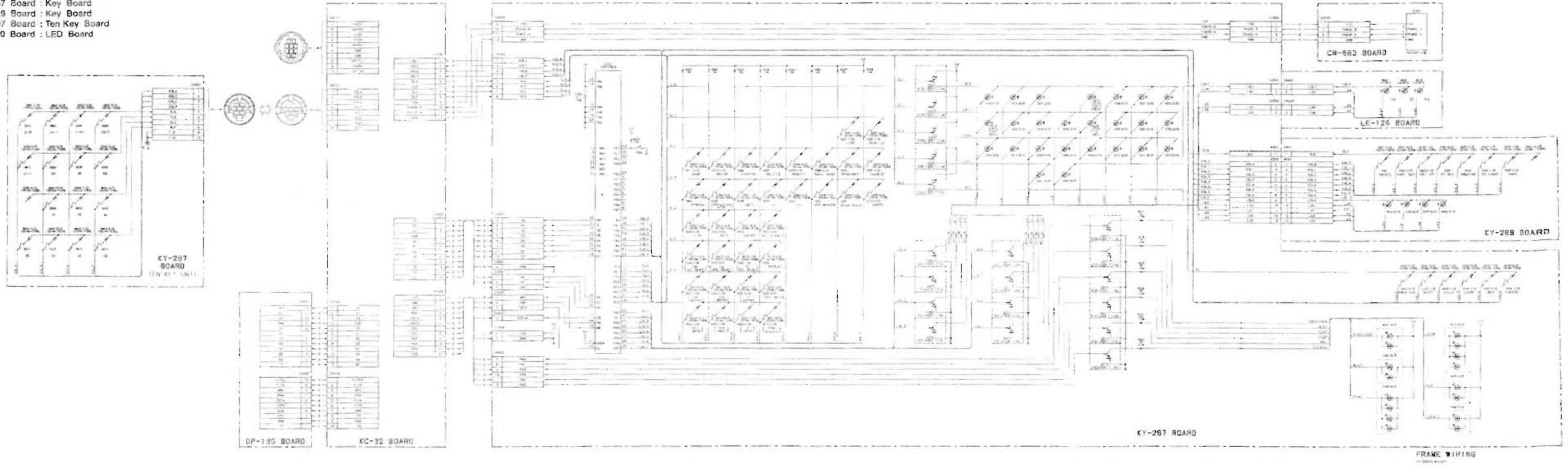


M/O DISC DRIVE, SERVO  
 FRAME WIRING (3/3)

**FRAME WIRING**  
 CN-883 Board : Connector Board  
 KY-267 Board : Key Board  
 KY-269 Board : Ten Key Board  
 KY-297 Board : Ten Key Board  
 LE-120 Board : LED Board

CN-883 KY-267  
 KY-269 KY-297 LE-120 **FRAME WIRING** **FRAME WIRING**  
 REV. 08/60 AM. 08/60

CN-883 KY-267  
 KY-269 KY-297 LE-120 **FRAME WIRING** **FRAME WIRING**  
 REV. 08/60 AM. 08/60



## ADA-28 Board (DABK-9001: Option)

### Description

The ADA-28 board comprises of the DABK-9001 and is inserted into the option slot of PCM-9000 rear panel. It consists of 2-channel 20-bit A/D converter, D/A converter and the timing control circuit. The 2-channel analog input signal is converted by the A/D converter to digital signal which is sent to the DIO-27 board.

The 2-channel digital signal that is supplied from the DIO-27 board is converted by the D/A converter to the analog signal.

### 1. A/D CONVERTER BLOCK

The A/D converter consists of the input polarity selection circuit (S101, S201), LINE IN amplifier (IC101, IC201), 3 dB step attenuator circuit (S103, S203) and A/D converter (IC102, IC103, IC106, IC202, IC203, IC206). The offset compensation circuit (IC104, IC105, IC204, IC205, RV102, RV202) enables the offset adjustment of A/D converter. The input level adjustment is possible within the range of  $\pm 2$  dB using the front panel control VR of PCM-9000. When combined by S103 and S203, the maximum range of input level adjustment is from +14 dBs to +26 dBs.

The A/D converter output digital data is converted from the 20-bit parallel data to the 2-channel serial 20-bit data by IC107, IC108, IC109, IC111, IC207, IC208, IC209. The output data is sent to the DIO-27 board via the line driver IC13.

### 2. D/A CONVERTER BLOCK

The D/A converter consists of the digital filter (IC16), 20-bit D/A converter (IC110, IC210), low-pass filter with amplifier (IC111, IC112, IC113, IC211, IC212, IC213), 3 dB step attenuator (S104, S204) and LINE OUT amplifier (IC115, IC116, Q101-Q108, IC215, IC216, Q201-Q208). As the digital filter generates the 20-bit data of 8 times the sampling frequency, the low-pass filter having a good linear phase characteristics within the audible range is used. The output level adjustment is possible within the range of  $\pm 2$  dB using the front panel control VR of PCM-9000. When combined by S105 and S205, the maximum range of output level (full bit data) adjustment is from +14 dBs to +26 dBs.

### 3. TIMING CONTROL BLOCK (IC4, IC5, IC6, IC7, IC9)

The timing control block receives the various timing clocks from the CK-41 board, and the REPRO DO data from the DIO-27 board. Using these input signals, it generates the various timing signals (256FS, 64FS, FS) that are required for A/D and D/A conversion.

## **DIO-28 Board (DABK-9004: Option)**

### **Description**

#### **1. SDIF OUTPUT BLOCK (IC2)**

DIO-28 board receives the digital output signal (DODATA) at the balanced-type input buffer (IC1) in the form of serial data. This data is sent to the SDIF-2 transmit LSI (IC2) where the data is converted to the SDIF format and sent to the external units via 75 ohm driver (IC9). The emphasis flag for the output data passes through the CPU I/F block so that the emphasis flag is set by the main CPU.

#### **2. SDIF INPUT BLOCK (IC5)**

DIO-28 board receives the SDIF format input signal at the 75 ohm receiver (IC8) where the input signal is converted to the TTL level. The signal then passes through the multiplexer (IC7) where either the SDIF signal or the loop-test signal is selected. The selected signal is sent to the SDIF receive LSI (IC5) where the signal is converted to the 64-bit slot serial signal. The converted signal is sent to the DIO-27 board via the output buffer (IC6).

The emphasis flag of the SDIF input signal and the DIN active signal are latched once by the flag latch block (IC15-17), and passed through the CPU I/F block so that the main CPU reads these signals.

#### **3. TIMING GENERATOR BLOCK (IC4, 10, 11, 12, 13, 14)**

This block generates the timing signals required for internal operation using the clock signal that is supplied from the PCM-9000.

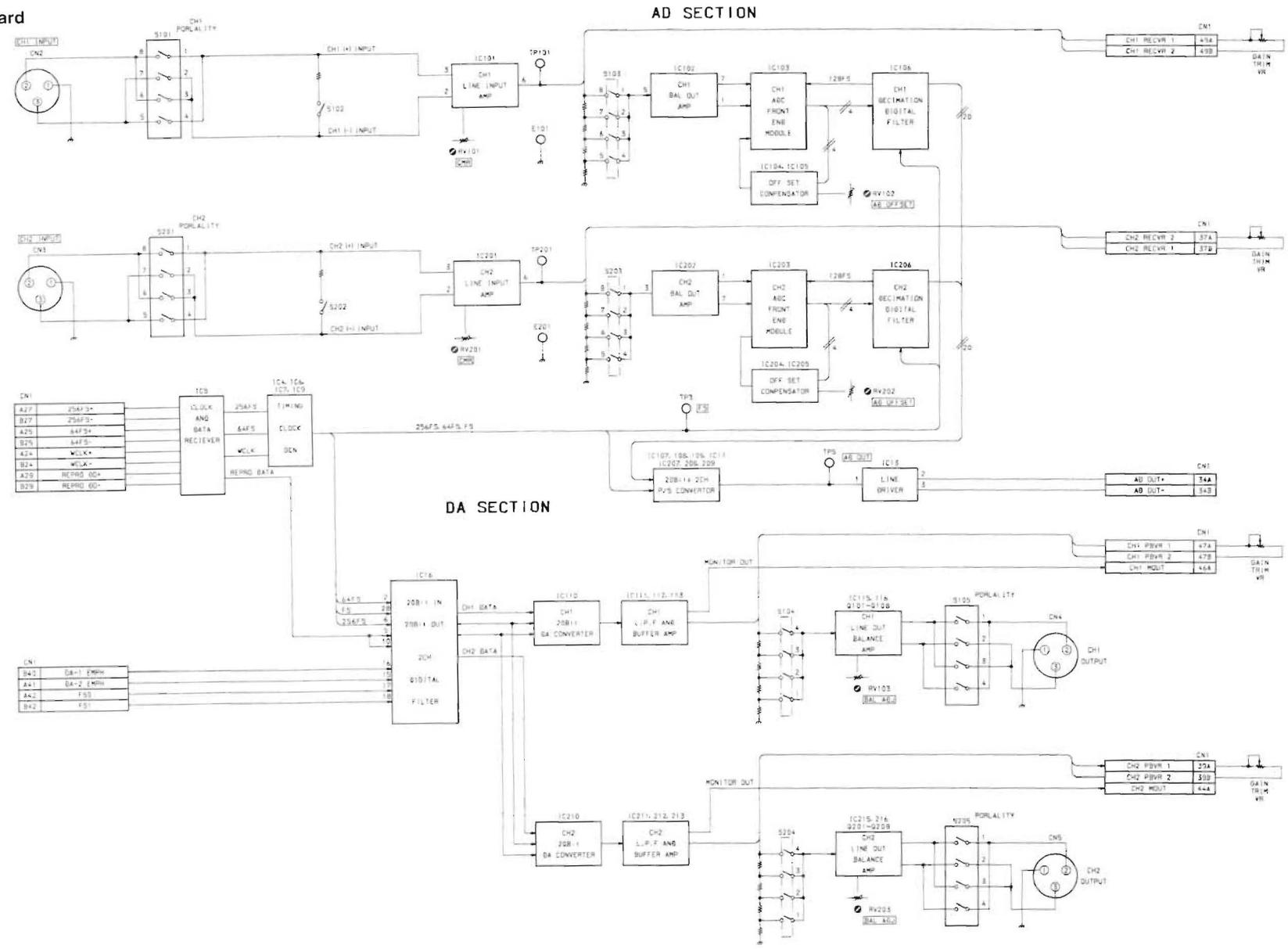
#### **4. POWER ON MUTE BLOCK (IC3, 23, 27)**

It generates the muting signal which inhibits signal output for about five seconds when the power is turned on. It prevents generation of noise in the externally connected equipment.

#### **5. CPU I/F BLOCK (IC18 to 26)**

The CPU I/F consists of the address decoder enabling CPU access, the board ID signal generator, and the latches for writing and reading the flag signal.

DABK-9001  
ADA-28 Board



ADA-28 BLOCK DIAGRAM  
DABK-9001 (R) D001

## MEM-58 Board (DABK-9007: Option)

### Outline

The MEM-58 board mainly exchanges data and control signals between the EDIT board and the MC board.

The MEM-58 board stores the data decoded by the EDIT board in the memory and outputs JOG data, in which X' fade and FADER processing are conducted on the stored data and the data is interpolated with the internally divided value, to the EDIT board.

The input data is once stored in the large capacity DRAM (approximately 10 seconds of stereo signal). The functions of JOG playback, FILE playback, etc. are enabled using this memory and DSPs.

The DIO of AES/EBU format is prepared in the MEM-58 board for insertion which enables the result of playback to be input and output with external equipment directly.

### Description

Main function blocks

MEM-58 board has the following six function blocks.

1. Error data interpolation process block
2. Memory block
3. Memory control block
4. Signal process block
5. AES/EBU format interface block for insertion
6. Main CPU interface block

#### 1. Error data interpolation process block (IC62)

The DEC input data is supplied from ED-37 board. This data can include errors depending upon the playback conditions. The error flags which is supplied together with the input data are checked to activate the interpolation process for the data including errors. Occurrence of strange sound is thus prevented.

#### 2. Memory block (IC153 to IC159, IC183 to IC189)

The DEC input and SCSI input are stored in either memory A or B as the main CPU controls the INPUT SELECTOR (IC120, IC122).

Seven DRAMs of 4-bit×1M words are used in parallel connection. Six DRAMs are used for audio data, and one DRAM is used for timecode data.

#### 3. Memory control block (IC120, IC214, IC122, IC232)

The DECODE input data are stored in either memory A or B as controlled by the main CPU.

The data read and write can be carried out freely as the result of arbitration.

The read is synchronized with the word clock enabling time base correction of the data.

#### 4. Signal process block (IC130)

The data output from the memory receives the signal processes such as level control, JOG interpolation, X'fade, etc., in accordance with the operating mode. All these signal processes are carried out by DSPs. The data after processes are output to ED-37 board as the DATA-A.

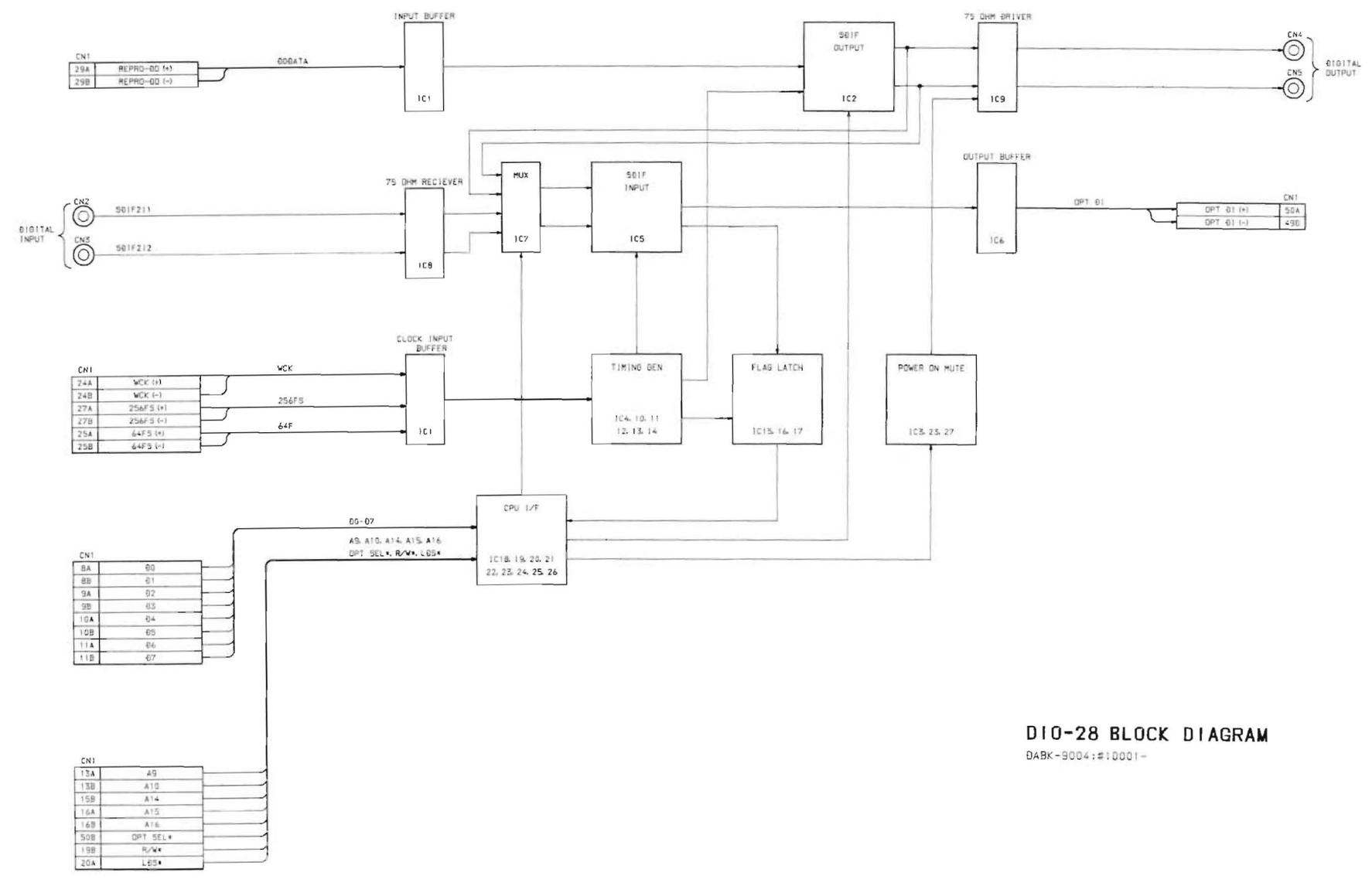
#### 5. AES/EBU format interface block for insertion (IC250, IC257)

The DIO of AES/EBU format is prepared which enables connection of external effector, etc. so that the playback signal can be once output to external equipment. Switching is performed by the INSERTION key on the remote controller.

#### 6. Main CPU interface block (IC22 to IC29)

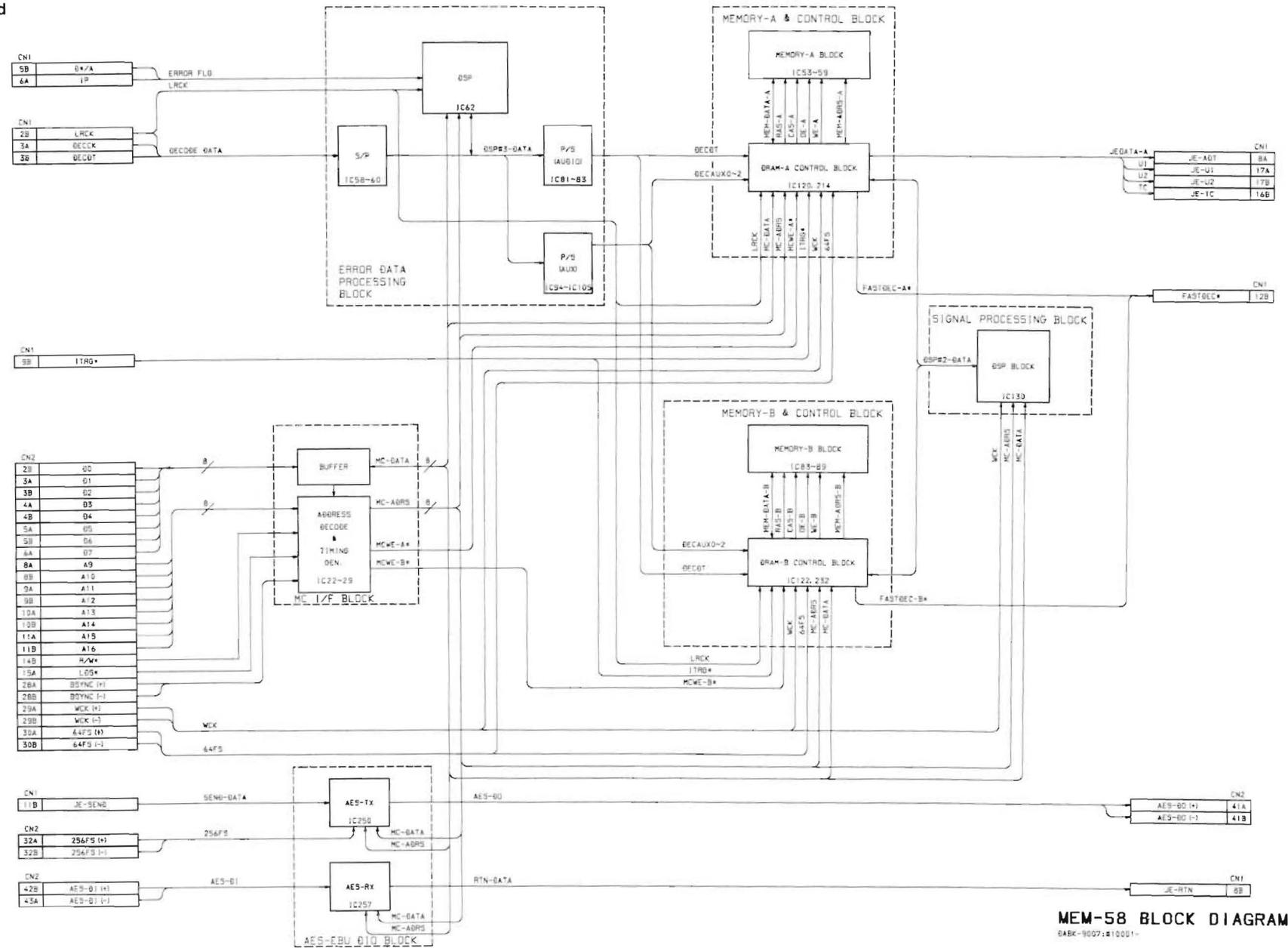
This is the address decoder for the main CPU bus, and generates various timings.

DABK-9004  
DIO-28 Board



DIO-28 BLOCK DIAGRAM  
DABK-9004; #10001-

DABK-9007  
MEM-58 Board



MEM-58 BLOCK DIAGRAM  
DABK-9007:010001-

## SECTION 7 SPARE PARTS

### 7-1. NOTES ON SPARE PARTS

### 補修用部品注意事項

#### (1) Safety Related Components Warning

Components marked with  $\Delta$  on the schematic diagrams, exploded views and electrical spare parts list are critical to safe operation. Replace these components with Sony parts whose part numbers appear in this manual or in service bulletins and service manual supplements published by Sony.

#### (1) 安全重要部品

回路図、分解図、電気部品表中、 $\Delta$ 印の部品は安全性を維持するために重要な部品です。従ってこれらの部品を交換するときには必ず指定の部品と交換して下さい。

#### (2) Standardization of Parts

Repair parts supplied from Sony Parts Center may not be always identical with the parts which actually in use due to "accommodating the improved parts and/or engineering changes" or "standardization of genuine parts".

This manual's exploded views and electrical spare parts list are indicating the part numbers of "the standardized genuine parts at present".

#### (2) 部品の共通化

ソニーから供給される部品セットに実装されているものと異なることがあります。これは部品の共通化、改良等によるものです。

分解図や電気部品表には現時点での共通化された部品が記載されています。

#### (3) Stock of Parts

Parts marked with "o" SP (Supply Code) column of the spare parts list are not normally required for routine service work. Orders for parts marked with "o" will be processed, but allow for additional delivery time.

#### (3) 部品の在庫

部品表のSP (Supply code) 欄にoで示される部品は交換頻度が低い部品ですので在庫していないことがあり、納期が長くなることがあります。

#### (4) Units for Capacitors, Inductors and Resistors

The following units are assumed in schematic diagrams, electrical parts list and exploded views unless otherwise specified.

Capacitors :  $\mu\text{F}$   
Inductors :  $\mu\text{H}$   
Resistors :  $\Omega$

#### (4) コンデンサー、インダクター、抵抗の単位

回路図、分解図、電気部品表中、特に明記したものを除き、下記の単位は省略されています。

コンデンサー :  $\mu\text{F}$   
インダクター :  $\mu\text{H}$   
抵抗 :  $\Omega$

## 7-2. EXPLODED VIEWS

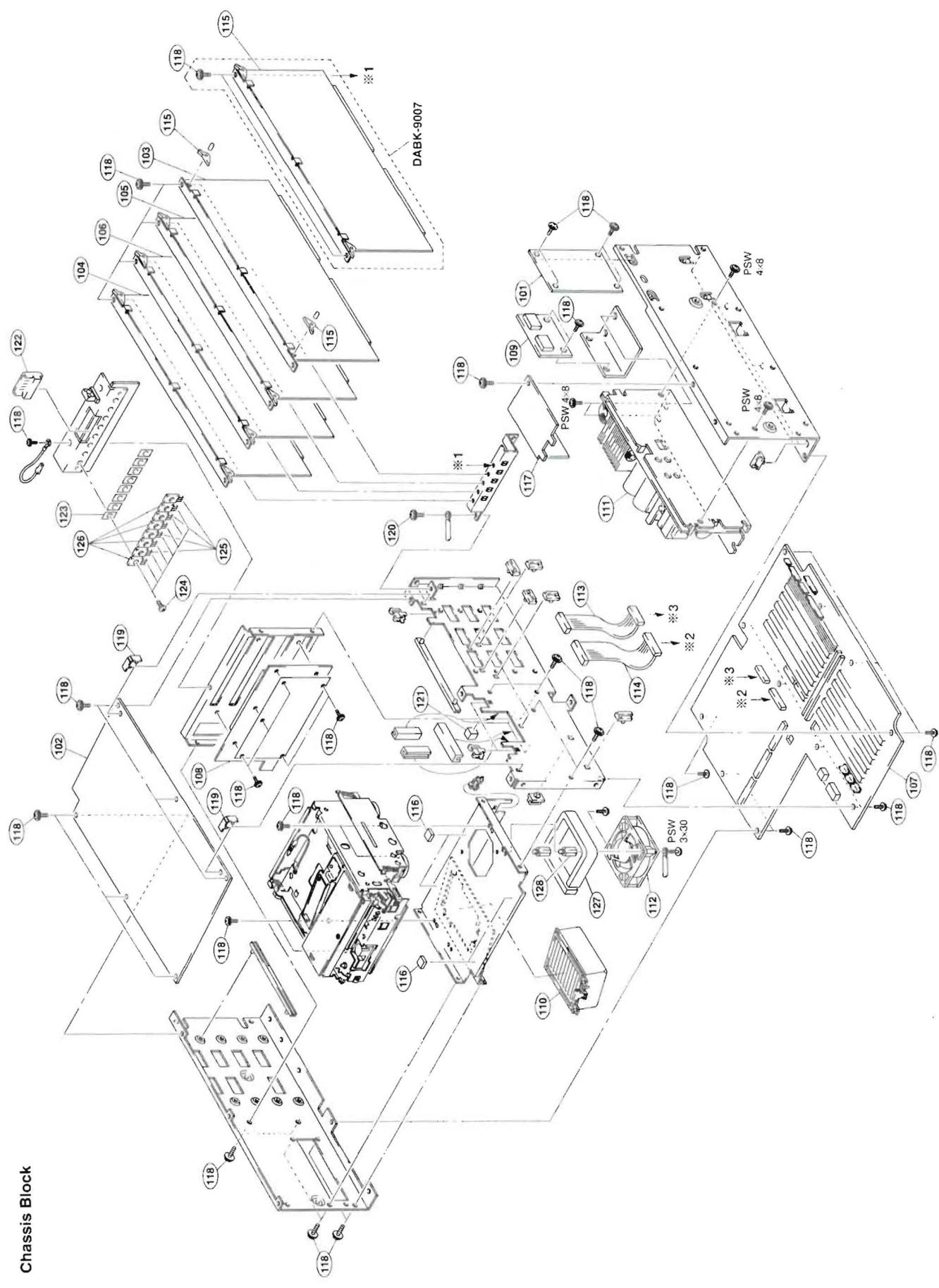
•Exploded views are composed of the following blocks

- (1) Ornamental Block
- (2) Chassis Block
- (3) Disc Drive Block
- (4) Rear Panel Block
- (5) Remote Control Panel RM-D9000 (Option)

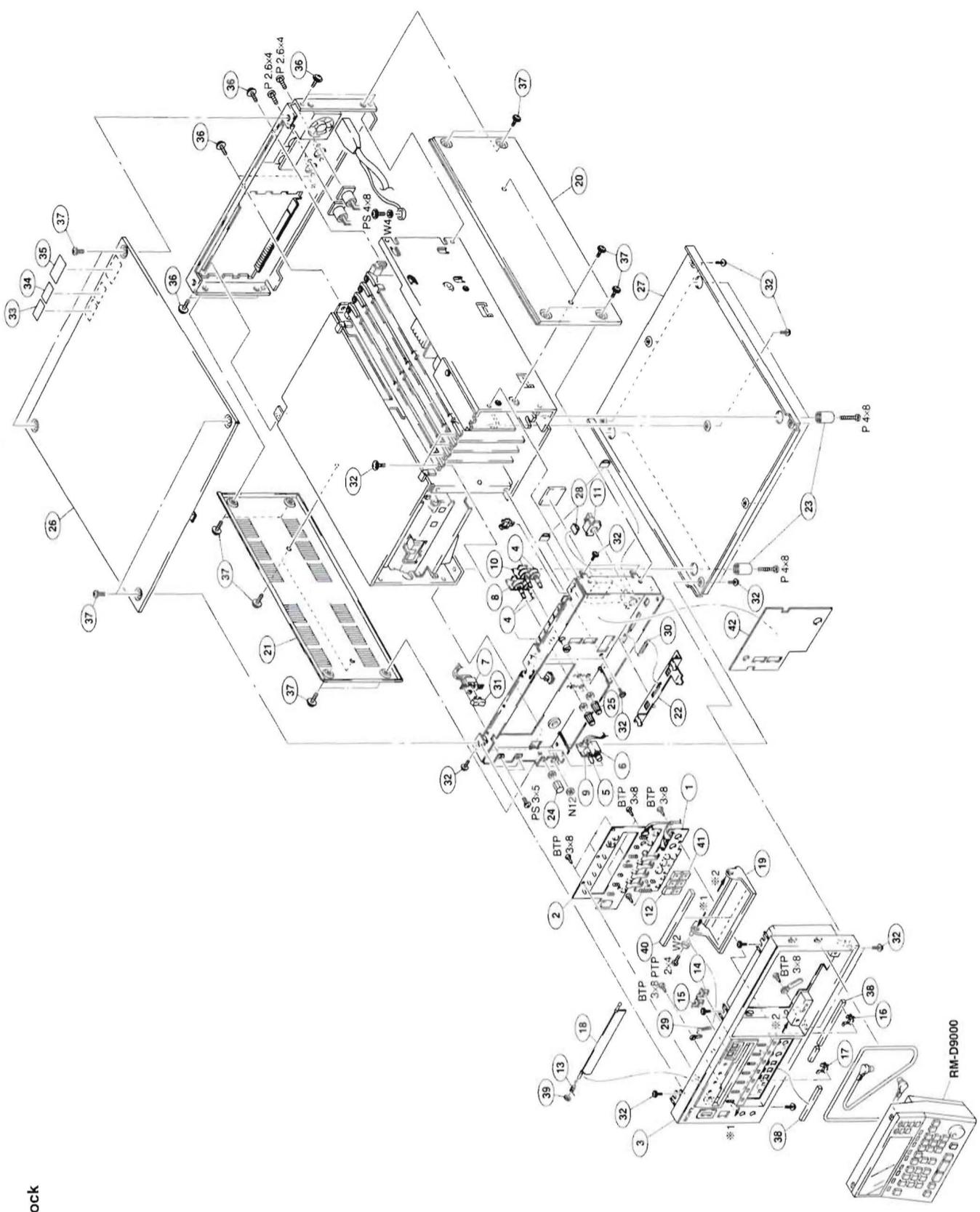
## ORNAMENTAL BLOCK

No.	Parts No.	SP Description
1	A-8276-678-A	o MOUNTED CIRCUIT BOARD, KY-264
2	A-8276-679-A	o MOUNTED CIRCUIT BOARD KY-265
3	X-3167-187-2	o BLOCK ASSY, FRONT PANEL
4	1-223-512-11	s RES, VAR, CARBON 1K/1K
5	1-241-331-11	s RES, VAR, CARBON 10K/10K
6	1-562-881-11	s JACK, LARGE TYPE
7	1-570-117-41	s SWITCH, ROCKER (AC POWER)
8	1-647-015-11	o PRINTED CIRCUIT BOARD, VR-168
9	1-647-022-11	o PRINTED CIRCUIT BOARD, JK-42
10	1-647-127-11	o PRINTED CIRCUIT BOARD, VR-169
11	1-764-253-11	s CONNECTOR, ROUND TYPE 10P
12	2-140-311-06	s KEY TOP
13	3-181-225-01	s SPRING, TORSION
14	3-181-240-01	s KEY TOP (D)
15	3-181-240-11	s KEY TOP (D)
16	3-181-241-01	s KEY TOP (B)
17	3-181-242-01	s KEY TOP (A)
18	3-181-243-01	o WINDOW, DISK
19	3-181-244-02	o DOOR SW
20	3-181-248-03	o PLATE, SIDE (R) ORNAMENTAL
21	3-181-249-03	o PLATE, SIDE (L), ORNAMENTAL
22	3-181-251-01	o HOOK
23	3-182-147-01	o LEG
24	3-182-199-01	o KNOB, HP
25	3-182-200-01	o KNOB, VR
26	3-182-209-01	o PLATE, TOP
27	3-182-513-01	o PLATE, BOTTOM
28	3-182-781-01	o FINGER, STICK
29	3-642-513-00	s SPRING, TENSION
30	3-669-980-00	s SPRING, TENSION
31	3-688-814-11	s CAP, SWITCH
32	3-703-486-01	s SCREW, PTTWH 3x5
33	4-614-487-03	o LABEL, LASER DANGER
34	4-621-544-01	o LABEL, LASER (CLASS 1)
35	4-625-571-01	o LABEL
36	4-886-821-01	s SCREW,M3 CASE
37	4-889-321-31	s SCREW
38	4-908-075-01	o CUSHION
39	4-915-008-02	s COLLAR, ROCK HANDLE
40	4-915-938-01	o CUSHION, D
41	4-928-315-31	s KEY TOP
42	3-182-823-01	o SHEET 2, PANEL

Chassis Block



Ornamental Block



## CHASSIS BLOCK

No.	Parts No.	SP Description
101	A-8275-194-A	o MOUNTED CIRCUIT BOARD, PS-345
102	A-8275-195-A	o MOUNTED CIRCUIT BOARD, SV-144
103	A-8275-196-A	o MOUNTED CIRCUIT BOARD, ED-37
104	A-8275-197-A	o MOUNTED CIRCUIT BOARD, MC-41
105	A-8275-198-A	o MOUNTED CIRCUIT BOARD, CK-41
106	A-8275-199-A	o MOUNTED CIRCUIT BOARD, DIO-27
107	A-8276-680-A	o MOUNTED CIRCUIT BOARD, MB-490
108	A-8276-681-A	o MOUNTED CIRCUIT BOARD, MB-491
109	A-8276-806-A	o MOUNTED CIRCUIT BOARD, PS-354
110	A-8007-311-A	s FILTER ASSY
111	▲1-413-856-11	s SWITCHING REGULATOR
112	1-541-431-41	s FAN, DC
113	1-952-469-11	o HARNASS, SUB (DATA SIGNAL)
114	1-952-470-11	o HARNASS, SUB (CONT SIGNAL)
115	2-251-622-21	s LEVER, PC BOARD
116	2-522-807-01	o RETAINER (B), MICROPHONE
117	3-182-848-02	o COVER, POWER
118	3-703-486-01	s SCREW, PTTWH 3×5
119	3-710-565-01	o HINGE, PC BOARD
120	4-886-821-01	s SCREW, M3 CASE
121	4-930-730-01	o CUSHION (TA)
122	1-506-494-11	o PIN, CONNECTOR 15P
123	3-566-928-01	s SHEET, INSULATING
124	7-621-759-45	s +PSW 2.6×6
125	8-729-177-23	s TRANSISTOR 2SB772-P
126	8-729-188-23	s TRANSISTOR 2SD882-P
127	3-183-863-01	o CUSHION
128	4-886-542-00	o SUPPORT

## DISC DRIVE BLOCK

No.	Parts No.	SP	Discription	No.	Parts No.	SP	Discription
201	A-8267-799-A	s	LOADING ASSY (RP)	252	3-703-486-01	s	SCREW, PTTWH 3×5
202	A-8267-800-A	s	OWH ASSY (RP)	253	3-183-914-01	s	SPACER (0.04)
203	A-8275-192-A	o	MOUNTED CIRCUIT BOARD, MD-87		3-183-914-11	s	SPACER (0.08)
204	A-8275-193-A	o	MOUNTED CIRCUIT BOARD, TR-82		3-183-914-21	s	SPACER (0.16)
205	X-3167-183-1	o	HOLDER ASSY, MECHANICAL	254	3-183-643-02	o	HOLDER, MOTOR
206	1-406-814-11	o	COIL, DRIVE				
207	1-459-864-11	s	COIL (DETECTION)				
208	1-541-793-12	s	MOTOR (GEARED)				
209	1-559-926-11	o	CORD (WITH CONNECTOR)				
210	1-562-884-11	o	CONNECTOR, F. P. C. 4P				
211	1-564-012-11	s	PIN, CONNECTOR 2P				
212	1-564-014-11	s	PIN, CONNECTOR 4P				
213	1-626-774-11	s	PC BOARD, LENEAR MOTOR FLEXIBLE				
214	1-647-010-11	o	PRINTED CIRCUIT BOARD, SE-209				
215	3-181-211-01	s	SPRING				
216	3-181-212-01	o	RETAINER (A), SHAFT				
217	3-181-213-01	o	RETAINER (S), SHAFT				
219	3-181-228-01	o	BRIDGE				
220	3-181-229-01	o	HOLDER, MAG				
221	3-181-230-01	o	HOLDER, DAMPER				
222	3-181-982-01	o	JOINT				
223	3-182-692-01	o	PLATE, LOCK				
224	3-323-258-01	o	SPACER (A)				
225	3-325-697-01	s	WASHER				
226	3-375-501-02	s	DAMPER (CNG)				
227	3-426-500-02	s	SPRING, TENSION				
228	3-437-284-01	o	SPRING, TENSION				
229	3-491-096-11	s	SPRING, TENSION				
230	3-501-040-31	s	DAMPER, CASSETTE LID				
231	3-513-076-11	s	SPRING, TENSION				
232	3-561-105-01	s	SPRING, TENSION				
233	3-621-212-21	s	CLAMP, DKN				
234	3-639-309-01	s	SPACER, SPRING				
235	3-676-387-01	s	POLY-SLIDER (DIA. 1. 6)				
236	3-703-074-01	s	CAP 3, SHAFT				
237	3-703-075-01	s	CAP 2, SHAFT				
238	4-607-434-01	o	SHAFT, CAM, INSERTING PROTECTION				
239	4-614-428-01	s	DAMPER				
240	4-614-429-03	s	SPRING, TENSION				
241	4-614-466-01	o	SHAFT (A), GUIDE				
242	4-614-467-01	o	SHAFT (B), GUIDE				
243	4-614-470-01	s	SPRING				
244	4-614-471-11	o	SHAFT, ARM				
245	4-614-474-01	s	SPRING				
246	4-614-476-01	o	HOLDER, OP FLEXIBLE				
247	4-614-478-01	s	SCREW, (2.6×18)				
248	4-614-481-01	o	HOLDER, DRIVE FLEXIBLE				
249	4-886-542-00	o	SUPPORT				
250	8-835-500-01	s	MOTOR, DC SSM-03E01A				
251	8-848-285-11	s	DEVICE, OPTICAL KMS-160A (RP)				

\*注意: "4-3-3. スピンドルモーターの交換" 及び "4-3-4. 光学ピックアップの交換" 参照。

\*Note: Refer to section "4-3-3. Spindle Motor Replacement" and "4-3-4. Optical Pick-up Replacement".





## REAR PANEL BLOCK

No.	Parts No.	SP Description
301	X-2068-004-1	s TERMINAL ASSY
302	⚠1-251-148-21	s INLET, AC 3P
303	1-568-005-11	s CONNECTOR, XLR TYPE 3P, MALE
304	1-568-006-11	s CONNECTOR, XLR TYPE 3P, FEMALE
305	1-573-582-11	s CONNECTOR, BNC (RECEPTACLE)
306	1-573-593-11	s CONNECTOR, XLR TYPE 3P, MALE
307	1-573-594-11	s CONNECTOR, XLR TYPE 3P, FEMALE
308	1-647-032-11	o PRINTED CIRCUIT BOARD, CN-902
309	1-648-793-11	o PRINTED CIRCUIT BOARD, CN-915
310	1-698-106-11	s MOTOR, DC BLUSHLESS FAN
311	1-764-253-11	s CONNECTOR, ROUND TYPE 10P
312	2-068-008-01	s WASHER
313	2-527-909-01	o HANDLE, PANEL
314	2-990-241-02	s HOLDER (A), PLUG
315	3-181-187-02	o PANEL (4), OPTION (DABK-9001;OPTION)
316	3-181-203-04	o PANEL (3), OPTION (DABK-9003;OPTION)
317	3-181-206-02	o PANEL (5), OPTION (DABK-9004;OPTION)
318	3-181-250-02	o PLATE, BLIND, OPTION
319	3-181-714-01	o FINGER, STICK
320	3-182-781-01	o FINGER
321	3-182-822-01	o PANEL (2), OPTION (DABK-9006;OPTION)
322	3-182-845-01	o LABEL, PC BOARD INDICATION
323	3-675-897-00	o BLACKET, FAN
324	3-701-778-02	o LABEL, CAMERA CERTIFICATION
325	3-703-486-01	s SCREW, PTTWH 3x5
326	4-601-466-11	o COVER, AC INLET
327	4-886-821-01	s SCREW, M3 CASE
328	--PENDING--	o MOUNTED CIRCUIT BOARD, IF-436
329	--PENDING--	o MOUNTED CIRCUIT BOARD, IF-437
330	--PENDING--	o MOUNTED CIRCUIT BOARD, TC-77
331	--PENDING--	o MOUNTED CIRCUIT BOARD, TC-78
332	3-182-824-01	o PANEL, REAR
333	3-185-462-01	o PANEL (1), OPTION (DABK-9005;OPTION)

## REMOTE CONTROL PANEL RM-D9000

### Control Panel

No.	Parts No.	SP Discription
401	A-8275-168-A	o MOUNTED CIRCUIT BOARD, KC-32
402	A-8276-662-A	o MOUNTED CIRCUIT BOARD, KY-267
403	A-8276-666-A	o MOUNTED CIRCUIT BOARD DP-195
404	X-3167-186-4	o PANEL ASSY, REMOTE
405	1-467-350-11	s ENCODER, ROTARY (OPT TYPE)
406	1-565-253-11	o CONNECTOR, ROUND TYPE 8P
407	1-647-026-11	o PRINTED CIRCUIT BOARD. LE-120
408	1-647-029-11	o PRINTED CIRCUIT BOARD. CN-833
409	1-692-752-11	s SWITCH, TACTIL
410	1-692-753-11	s SWITCH, TACTIL
411	1-692-754-11	s SWITCH, TACTIL
412	1-692-755-11	s SWITCH, TACTIL
413	1-692-756-11	s SWITCH, TACTIL
414	1-764-253-11	s CONNECTOR, ROUND TYPE 10P
415	2-140-311-01	s KEY TOP
416	2-140-311-04	s KEY TOP
417	2-270-305-01	s FOOT, RUBBER
418	3-181-242-01	s KEY TOP (A)
419	3-182-004-02	o CASE, REMOTE
420	X-3167-405-1	o DIAL ASSY, JOG
421	7-621-772-20	s SCREW B2x5 (Serial No. 10001 to 10020)
	3-359-365-11	o SCREW B2x10 (Serial No. 10021 and higher)
422	4-908-075-01	o CUSHION
423	4-928-315-01	s KEY TOP
424	4-928-315-11	s KEY TOP
425	4-928-315-31	s KEY TOP
426	1-651-356-11	o PRINTED CIRCUIT BOARD, ROM-16
427	3-701-444-21	s WASHER, 6

### Ten Key Ass'y

501	A-8276-645-A	o MOUNTED CIRCUIT BOARD, KY-297
502	X-3167-098-2	o PLATE, BOTTOM, ASSY, TEN KEY
503	1-751-729-11	o CORD, CONNECTION
504	3-181-161-02	o PANEL, TEN KEY
505	3-181-167-01	s KEY TOP (8.5)
506	3-181-167-02	s KEY TOP (8.5)
507	3-181-167-03	s KEY TOP (8.5)
508	3-181-167-04	s KEY TOP (8.5)
509	3-181-167-05	s KEY TOP (8.5)
510	3-181-167-06	s KEY TOP (8.5)
511	3-181-167-07	s KEY TOP (8.5)
512	3-181-167-08	s KEY TOP (8.5)
513	3-181-167-09	s KEY TOP (8.5)
514	3-181-167-10	s KEY TOP (8.5)
515	3-181-167-11	s KEY TOP (8.5)
516	3-181-167-12	s KEY TOP (8.5)
517	3-181-167-17	s KEY TOP (8.5)
518	3-181-167-18	s KEY TOP (8.5)



OPTIONAL FIXTURES

Part No.	SP Description
3-702-390-01	ECCENTRICITY DRIVER
J-6400-840-A	AAIP ERROR RATE CHECKER
J-6400-850-A	SIMPLE MC TOOL
J-6400-860-A	EXTENSION BOARD, EX-396
J-6400-870-A	EXTENSION BOARD, EX-397
J-6400-880-A	BLOCK ERROR RATE CHECKER
J-6400-890-A	SERVO GAIN ADJUSTMENT TOOL
J-6401-060-A	TEST DISK
J-6401-070-A	LOWPASS FILTER TOOL
J-6401-080-A	SERVO OFFSET TOOL
J-6405-010-A	MAGNETIC HEAD GAP ADJUSTMENT TOOL
J-6405-020-A	HEAD POSITION ADJ TOOL (NTSC)
J-6405-320-A	HEAD POSITION ADJ CARTRIDGE
J-6405-350-A	HEAD POSITION ADJ TOOL(PAL)

7-3. SUPPLIED ACCESSORIES

PCM-9000

Ref. No. or Q'ty	Part No.	SP Description
1pc	A-8310-050-A	o PANEL ASSY, BLANK
1pc	△ 1-551-812-11	s COAD, POWER (for UC)
1pc	△ 1-557-161-11	s COAD, POWER (for J)
1pc	△ 1-590-910-11	s COAD SET, POWER (for EK)
1pc	2-990-242-01	s HOLDER (B), PLUG (for J, UC)
1pc	3-170-078-01	s HOLDER (A), PLUG (for EK)
1pc	7-721-130-52	o WRENCH, BALL POINT L
2pcs	X-3165-162-2	s ANGLE ASSY (4U), RACK
4pcs	2-297-913-01	s WASHER (DIA.5), ORNAMENTAL
4pcs	7-682-378-04	s SCREW +BK 5x16
4pcs	7-682-561-09	s SCREW +B 4x8
4pcs	7-682-565-09	s SCREW +B 4x16

RM-D9000 (OPTION)

Ref. No. or Q'ty	Part No.	SP Description
1pc	1-500-051-11	s BEAD, FERRITE(WITH CASE)
1pc	1-543-827-21	s CLAMP, SLEEVE FERRITE
1pc	1-751-726-11	s COAD, CONNECTION 0.8m
1pc	1-751-728-11	s COAD, CONNECTION 10m

DABK-9007 (OPTION)

Ref. No. or Q'ty	Part No.	SP Description
2pcs	7-682-546-04	s SCREW +B 3x5