RD−180T／200T
PCM DATA RECORDER
INSTRUCTION MANUAL

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PRECAUTIONS

1. Model and Standard Accessory Check

Check to see that the unit is the one you ordered. See item 12-7 in this manual for the list of standard accessories.

2. Setting Environment

When using the RD-180T/RD-200T, consider environmental conditions such as temperature, humidity, dust, vibration, barometric pressure, magnetic fields, and atmosphere. Please note the following:

2-1) When moving the data recorder or tape from a place of low temperature to a place of high temperature, condensation may form around the unit or tape. Wait at least 30 minutes after turning on the power or after checking that there is no dew condensation around the unit and tape before inserting a tape. If a tape with condensation is inserted, the tape may become tangled around the rotary head. Condensation may form if the temperature varies 15°C (59°F) or more per hour irrespective of the humidity being within the specified range.

Note: If the condensation sensor operates, all tape operation LEDs light and tape operation is disabled.

2-2) Remove the tape from the data recorder before turning off the power. Turning off the power with a tape inserted may cause the tape to become tangled around the rotary head, if there is any condensation before the power is turned on again.
If the tape becomes tangled around the rotary head, take the appropriate action in section 11 of this manual.

3. Input/Output Terminal

The I/O terminal of the data recorder is unbalanced. When the BNC connector cable supplied as an accessory is connected to the I/O terminal of the unit, the outer side of the connector is connected to the frame of the unit. The input impedance is 100 kΩ, the output impedance is 75 Ω, and the maximum output current is ±10 mA under the load of 20 Ω.
When a signal is input to the output terminal, the output amplifier may be damaged.

4. Power Supply

The data recorder operates from ac input of 90 to 250 volts or from dc input of 11 to 30 volts. If a power cable which is not supplied as an accessory is used, use one with a small resistance. Since the power supply unit of the RD-180T/RD-200T uses a switching method, excessive current flows at power-on time. Therefore, use the power suitable for this current.

5. Cassette Tape

5-1) Designated Tape

We designate DM120 or DM60 manufactured by Hitachi Maxell Co. Ltd. for the RD Series data recorders. Tapes other than those designated may fail to record or reproduce. At worst they may cause unexpected trouble to the unit.

If the designated tapes are not available, contact us.

5-2) Tape Insertion

When inserting a tape cassette in the cassette compartment, before closing the compartment, always make sure that the tape cassette is pushed in all way. Also, after ejecting a tape cassette, which may cause the tape cassette to be pushed back a little, before closing the cassette compartment, push in the tape cassette all the way.

5-3) Avoiding BOT (Beginning of Tape) and EOT (End of Tape)

Avoid tape parts near BOT or EOT to ensure recording. That's because near BOT or EOT the connection between the tape and the reel imprints the tape causing dropouts. Especially avoid the last two minutes of the tape where imprints may be severe.

When storing tapes, rewind them to BOT in order not to form imprints near BOT.

6. Mounting optional Accessories

Mount the optional accessories after checking the data recorder.

Refer to each specification manual for mounting the MB-400 memory board and ER-42 remote control unit.

1. OVERVIEW

The RD-180T/RD-200T is a state-of-the-art data recorder using DAT technology, similar to the RD-100 series already released.

The RD-180T/RD-200T analog-digital converter converts the data before recording it on the magnetic tape. During reproduction, the data on the magnetic tape is reproduced and converted from digital to analog before being output. This enables quality recording and reproduction featuring a signal-to-noise ratio over 70 dB as well as a distortion factor and a phase difference between channels that are negligible compared with those of conventional products.

I/O setting ranges from 2 channels (20-kHz band) up to 8 channels (5-kHz band) for the RD-180T and up to 16 channels (2.5-kHz band) for the RD-200T, providing for a wide variety of applications. Various ID codes can be recorded, facilitating data search and filing.

The RD-180T/RD-200T uses a large EL display to provide interactive operation and to display the input monitoring bar meter, the waveform monitor, various parameters, and error messages.

Use of the optional GP-IB interface board enables the RD-180T/RD-200T to be controlled by an external computer. Also, the optional memory board can be mounted to output digital data.

Use of the optional 12-hour mode enables continuous recording for up to 12 hours. (A memory board is required).

2. FEATURES

1) High-quality data

Use of multiplex PCM recording provides a signal-to-noise ratio of 70 dB, a distortion factor of 0.05%, and a phase difference between channels of 5° (within the same frequency band), substantially better than conventional analog data recorders.

2) Multi-channels and wide band

The number of channels can be selected from 2 to 8 for the RD-180T and from 2 to 16 for the RD-200T. The frequency band is dc to 20 kHz for 2 channels, dc to 5 kHz for 8 channels, or dc to 2.5 kHz for 16 channels.

3) Multiband

Different frequency bands can be recorded or reproduced simultaneously. This permits signals of different bands, e.g., vibration and noise, to be recorded or reproduced at the same time, effectively utilizing the channels.

4) Compact and light-weight

The RD-180T/RD-200T is approximately 440 mm wide x 150 mm high x 270 mm deep (17 5/16" x 5 7/8" x 10 5/8"). The RD-180T weighs about 12.5 kg (27.6 lbs.), the RD-200T about 13 kg (28.7 lbs), allowing convenient use in the field.

5) Dual ac/dc power supply

A dual power supply is supplied as standard, providing either 90 to 250 Vac or 11 to 30 Vdc.

6) Large EL display

The large, easy-to-read EL display indicates the all-channel bar graph with the peak-hold function, the waveform of any two channels, and the ID data recorded on the tape. Interactive operation enables effective use of a variety of functions.

7) High-speed search

ID numbers or the counter can be searched at a speed of up to 200 times the record/reproduction speed.

8) Storing of on-recording setup conditions

The time code of the calendar clock, the input range, a title of up to 10 characters, and a memo of up to 50 characters can be recorded/reproduced on a channel other than the data channels. This allows the on-recording setup conditions to be stored on the tape and checked on reproduction as required.

9) Recording of data numbers (ID numbers)

A channel is dedicated to ID number recording/reproduction. An ID number is automatically recorded to identify data recorded. It is incremented by one each time recording starts or whenever the EVENT key is pressed. The ID number starts at 01 and is sequentially updated to 99 followed by 00.

10) End search

The end-search function rapidly locates the end of the previous recording, thus simplifying use of the remaining tape.

11) GP-IB interface and memory

The GP-IB interface, AR-509, equipped as standard, allows automatic measurement by computer. Moreover, use of the optional 6M-byte memory board, MB-400, enables data recorded on the tape to be fetched into the memory and passed to the computer via the GP-IB for processing.

12) Remote control

The optional remote control unit, ER-42, controls the tape operations, EVENT operations, ID number display, and counter display.

13) Tape compatibility with the RD-100 series

Data recorded on the RD-100 series can be reproduced on the RD-180T/ RD-200T.
Data recorded on the RD-180T/RD-200T in the 2- or 4-channel mode can be reproduced on the RD-101T (RD-100T). Data recorded on the RD-180T/RD-200T in the 8-channel mode can be reproduced on the RD-111T (RD-110T). Some functions cannot operate when the GP-300 is used.
However, no compatibility is provided with digital audio tape recorders.

14) 12-hour mode

Optional 12-hour mode (LP-200) requires memory board MB-400 to be installed. Use of this mode enables 12-hour continuous recording. There are following three different modes in this mode: 3H, 6H, and 12H. Time axis conversion is possible up to 1:4.

2-1 Notes on Recording

1 Recording should start at BOT (beginning of tape) and involve no unrecorded portions. (See Figure 1.)

a) The A counter indicates the time elapsed after recording started at BOT. If unrecorded section is encountered, the counter display is not displayed.

b) The amount of tape remaining is displayed only when the A counter is on. If unrecorded section is encountered, the remaining tape is not displayed.

c) After several seconds of lead-in following BOT, ID NO starts with 01 and increases sequentially. ID NO is reset to 01 if unrecorded section is encountered.

BOT

Lead-in	ID NO $\boxed{01}$	ID NO $\boxed{02}$	No recording	ID NO $\boxed{01}$	ID NO $\boxed{02}$	
	Counter operational ————➤			◀———— Counter not operational		

<Figure 1>
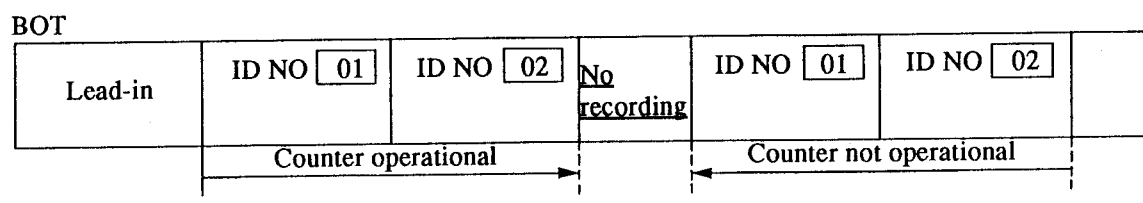
Note: 12-hour mode must be used when the A counter is on.
      See Section 10-3 for details.

2 To record data starting at BOT with no unrecorded portions (See Figure 2.)

a) To record data on a tape that has been partially recorded, use the END search function to locate the end of the previous recording to ensure that there are no unrecorded portions. (One to two seconds of the end of the previous recording and of the beginning of the current recording will overlap.)

b) After data is recorded on the tape, eject and set the tape to start recording data. When recording data is started, put the RD-180T/RD-200T in the recording pause mode so that data can be recorded with no unrecorded portions. Then, the tape automatically returns to the end of previously recorded data, and the RD-180T/RD-200T is ready for recording data.

BOT

| Lead-in | ID NO [01] | ID NO [02] | No recording |

↑
END search point

<Figure 2>
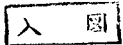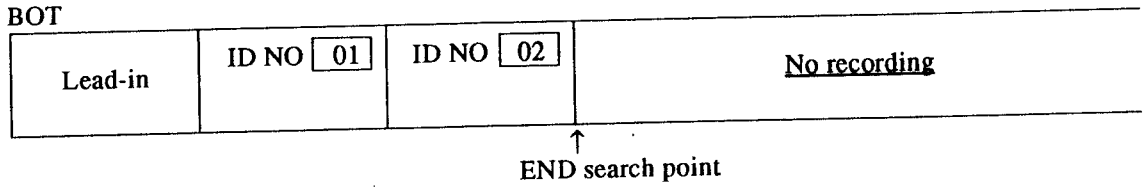
3 To record data over a recorded tape (See Figure 3.)

a) Follow the instructions above when data is recorded starting at BOT. Record E MARK (END ID) at the end of the new recording if it is shorter than the old recording. The END search function will locate the E MARK for subsequent recordings.
As a new recording starts at E MARK, E MARK is erased by the new recording.

BOT

| Lead-in | ID NO [01] (New recording) | E MARK | (Old recording) |

↑
END search point

<Figure 3>
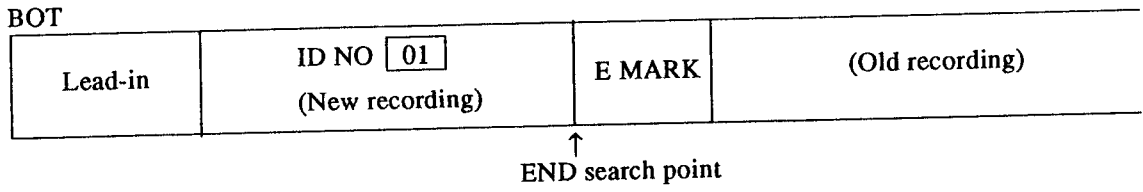
4 ID NO (See Figure 4.)

a) After several seconds of lead-in following BOT, ID NO is incremented from 01. If unrecorded tape is encountered, ID NO is reset to 01.

b) In addition to numbers, ID NO may display the following:

BB: Lead-in
AA: Data break
EE: E MARK

c) ID NO cannot be updated after there is no recording for nine seconds or more. ID NO is incremented by one when recording starts or when the EVENT key is pressed while recording. When recording is stopped within nine seconds after recording starts then recording is restarted, however, ID NO updating is disabled and pressing the EVENT key is ignored.
ID NO will not be incremented if recording restarts within 9 seconds after the previous recording is suspended.

BOT

| Lead-in | ID NO [01] | ID NO [02] |

|← 9 seconds →| |← 9 seconds →|

ID NO is not incremented

<Figure 4>
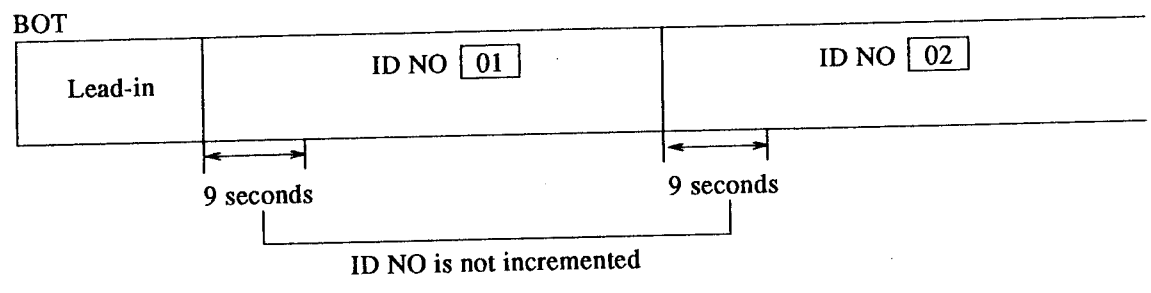
Note: In 12-hour mode, the operation of ID NO is different from the above.
See Section 10-7 for details.

3. MEMO

4. APPEARANCE AND FUNCTIONS

4-1 Appearance
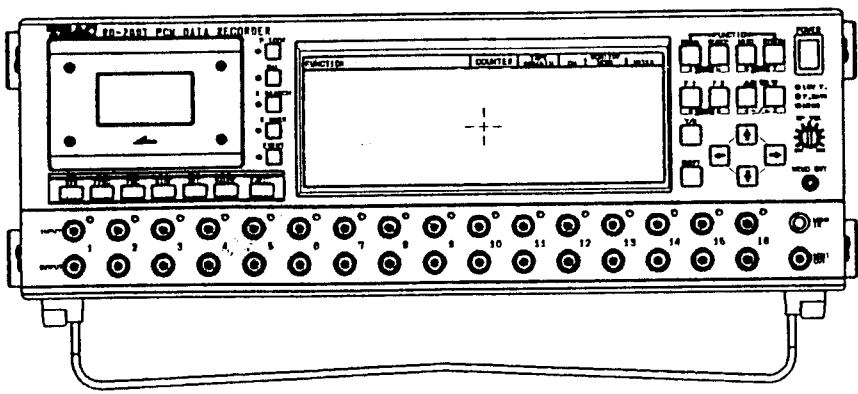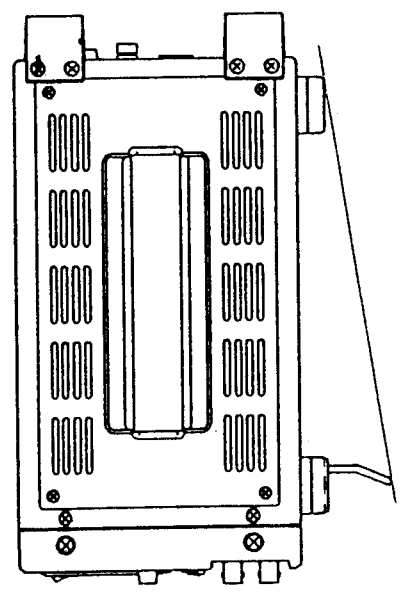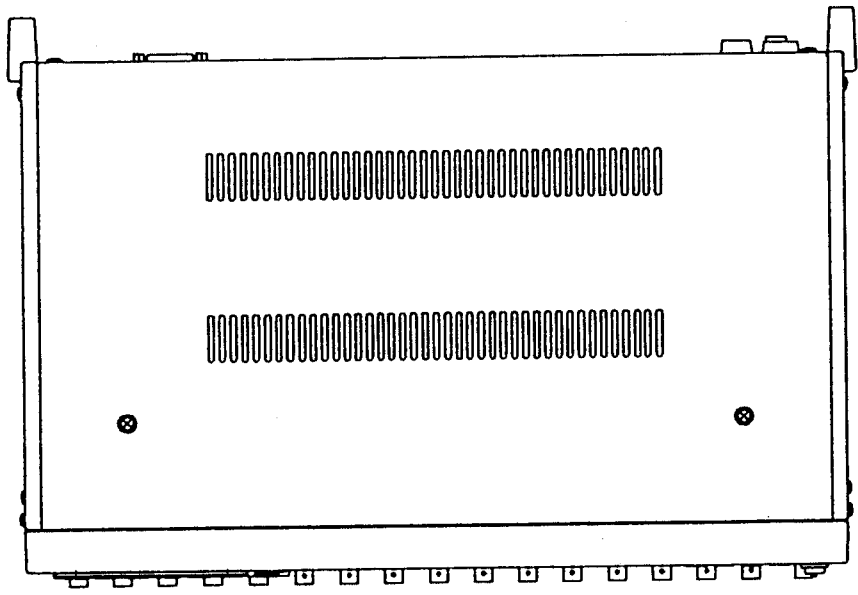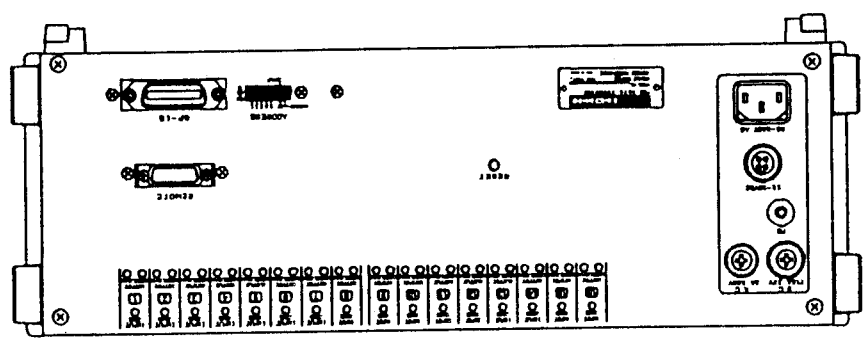
Note: Only channels up to 8 are available in the RD-180T.

90176261
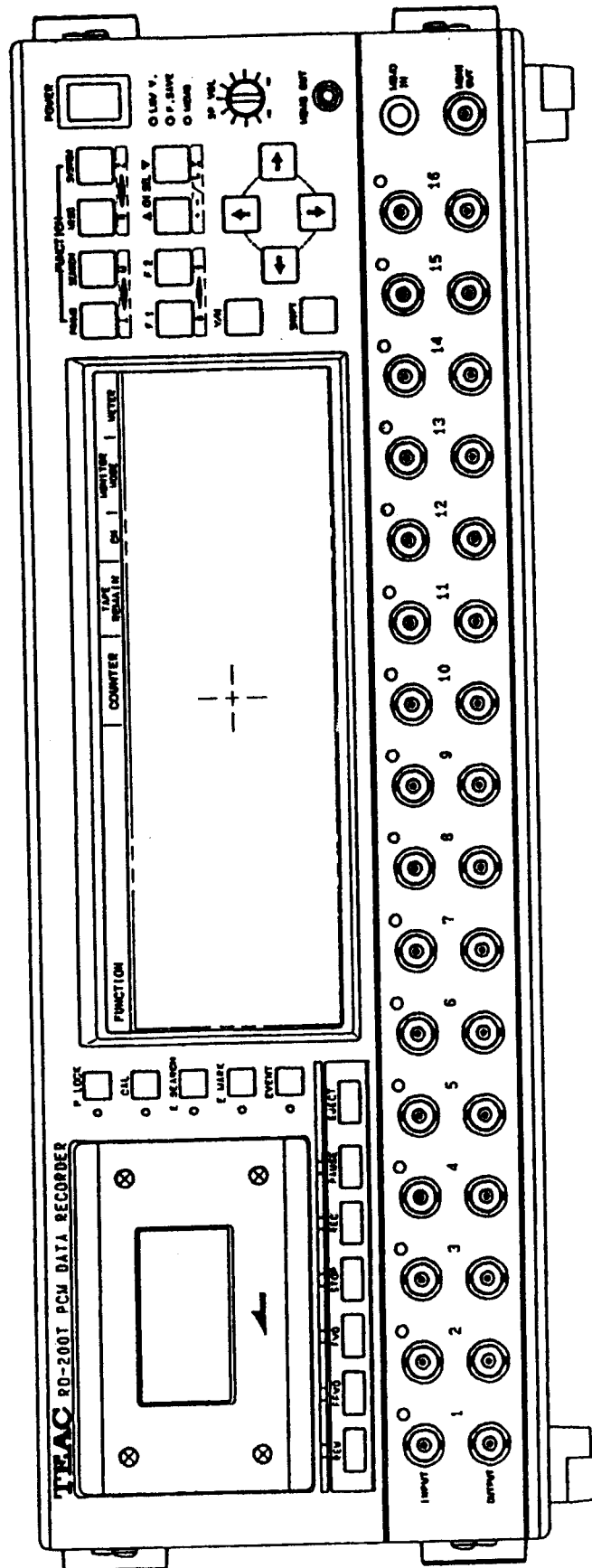
Note: Only channels up to 8 are available in the RD-180T.

4-2-1　Tape transport (TTP) control key group
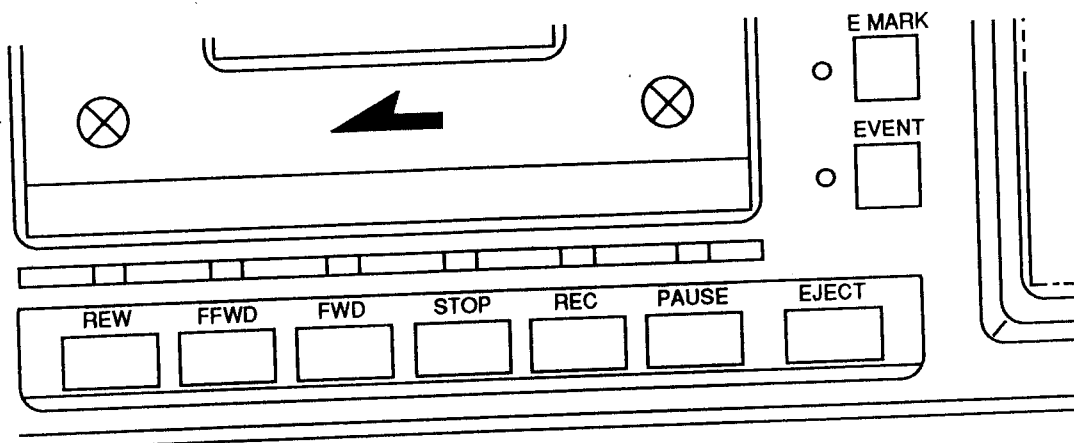
REW (rewind):　　　Pressing the REW key rewinds the tape. This key is not valid in the REC FWD or REC PAUSE mode. It is necessary for the unit to first be placed in the STOP mode.

FFWD (fast-forward):　Pressing the FFWD key fast-forwards the tape. This key is not valid in the REC FWD or REC PAUSE mode. It is necessary for the unit to first be placed in STOP mode.

FWD (reproduction):　Pressing the FWD key runs the tape forward, reproducing the recorded data. Pressing the FWD key in the REC PAUSE mode changes the mode to REC FWD, and the unit starts recording.

STOP (stop):　　　Pressing the STOP key in the REC, REC FWD, REW, or FFWD mode releases the mode and stops the tape.

REC (recording):　　Pressing the REC key in the STOP mode lights the REC and PAUSE indicators to indicate the unit is ready for recording. Subsequently pressing the FWD key starts recording.

PAUSE (pause):　　Pressing the PAUSE key in the REC or FWD mode pauses recording or reproduction. Pressing the FWD key again resumes recording or reproduction.

EJECT (open cassette compartment):
　　　　　　　Pressing the EJECT key in a mode other than the REC FWD and REC PAUSE modes opens the cassette compartment, enabling the tape to be loaded or removed.

Note:　In 12-hour mode, the operations of keys FWD, STOP, REC, and PAUSE are different from the above.
　　　See Sections 10-4 and 10-5 for details.

4-2-2 Execution key group

The execution keys can be used to execute part of the functions of the RD-180T/RD-200T or to execute the functions set on the SYSTEM screen (described later).

RD-200T PCM DATA RECORDER

P LOCK
CAL
E SEARCH
E MARK
EVENT
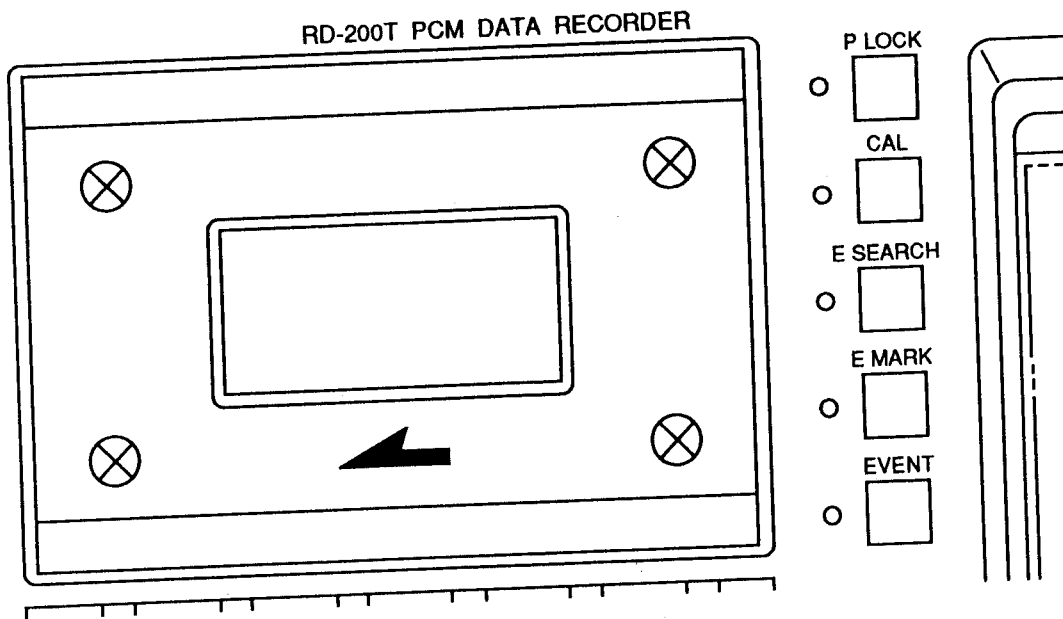
P LOCK (panel lock)

This key locks the functions of operation buttons to ensure the setup conditions will not be accidentally altered. Pressing this key locks all keys other than the power switch and the P LOCK key itself. Pressing the P LOCK key for three seconds causes the P LOCK LED to blink. The LED lights when locking is completed. To release, press the key for three seconds. The LED blinks, and goes out when releasing is completed.

CAL (calibration)

Pressing this key generates a CAL signal. Load a recordable tape and check the bar meter or graph in the REC PAUSE or REC FWD mode. The setting is made on the SYSTEM screen (described later). Either AC, +, -, 0, or AUTO can be selected. Selecting AUTO outputs all four signals of AC50% (1 kHz), DC+50%, DC-50%, and 0 V continuously for approximately one second each. The CAL signals can be used as dummy signals.

Note: The frequency of AC CAL is 1 kHz. Pressing the CAL key in 12-hour mode below 1 kHz band cannot output the signal normally.

E SEARCH (end search)

Pressing this key winds the tape rapidly in the REW direction. After reaching BOT, the tape advances rapidly until the end of the previous recording or the nearest E MARK is found. Placing the unit in the REC FWD mode here causes recording to start at the beginning of E MARK, if any. In this case, E MARK is erased by the new recording. If no E MARK exists, new data will be recorded from approximately one second before the end of the previous recording. This ensures that there are no unrecorded portions on the tape.

E MARK (end mark)

The E MARK key can be used to search for the end of a new record overwritten on recorded tape. Read page 4 for details. Pressing this key writes an E MARK on the tape, indicating the end of recording. Since the E MARK is written on the portion other than recorded portions of tape, the E MARK does not affect any data after it. Pressing the E MARK key in the REC PAUSE mode enables E MARK to be written.
However, an E MARK cannot be written on a nonrecorded portion of tape or a portion of tape for which the EVENT LED is on (from a point where the ID has changed to a 9-second point on the tape).

EVENT (event)

Pressing this key increments the ID number recorded during data recording by 1 and continues data recording. One ID recording requires nine seconds. During this period, the ID NO display blinks and the EVENT LED lights up. Pressing the EVENT key is ignored while the ID NO display blinks.

Note: Approximately a one-minute interval is required between high-speed searches using ID NO.
In 12-hour mode, the operation of the EVENT key is slightly different from the above.
See Sections 10-7 for details.

4-2-3 FUNCTION key group
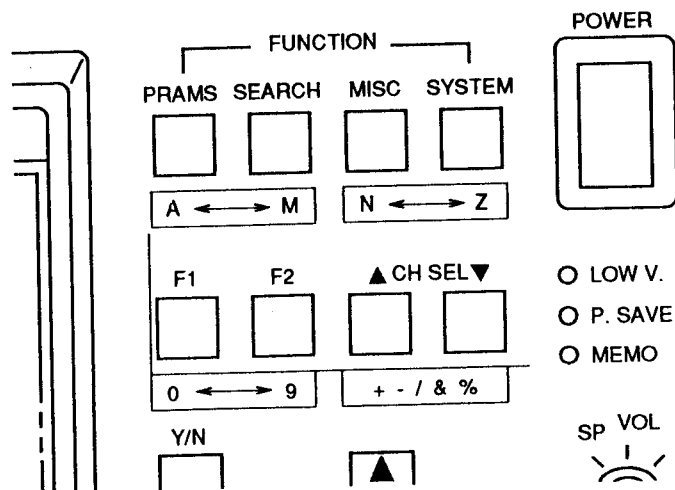
PRAMS (parameter setting)

Pressing this key displays the PRAMS screen where the character I/O range, TITLE, and MEMO parameters can be set. A title of up to 10 characters and a memo of up to 50 characters can be entered and recorded on the tape. During reproduction, the I/O range, the title, and the memo are displayed.

SEARCH (search)

Pressing this key displays the SEARCH screen where parameters including the search item recorded on the tape can be set.

MISC (miscellaneous functions)

Pressing this key displays the MISC screen where the SELF TEST, CLOCK SET (time setting), and P SAVE MODE (power save mode) functions can be set.
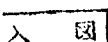
SYSTEM (system functions)

Pressing this key displays the SYSTEM screen where desired operations can be selected from MPX MODE, CAL MODE, REC PAUSE TIME, SP MONITOR, and LONG PLAY MODE. See the operation method in this instructional manual for details.

4-2-4 Entry key group
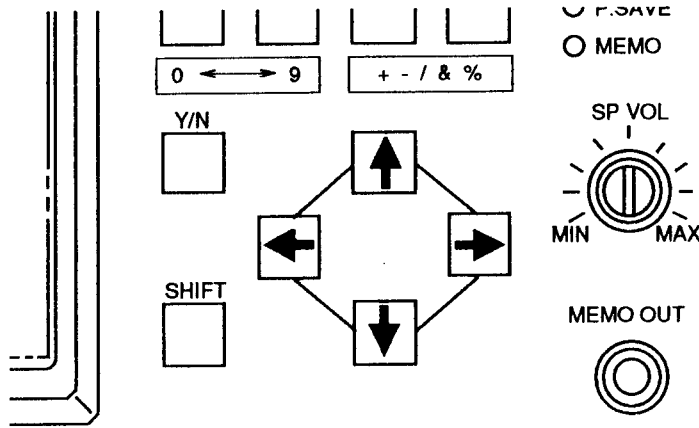
The ↑, ↓, →, and ← keys can be used to move the cursor upward, downward, to the right, and to the left, respectively. Pressing the ↑ or ↓ key while holding down the SHIFT key increases or decreases the numerical value. The SHIFT and Y/N keys are assigned the meanings defined on each screen.

4-2-5 CH SEL (monitor channel select) and F1 & F2 keys
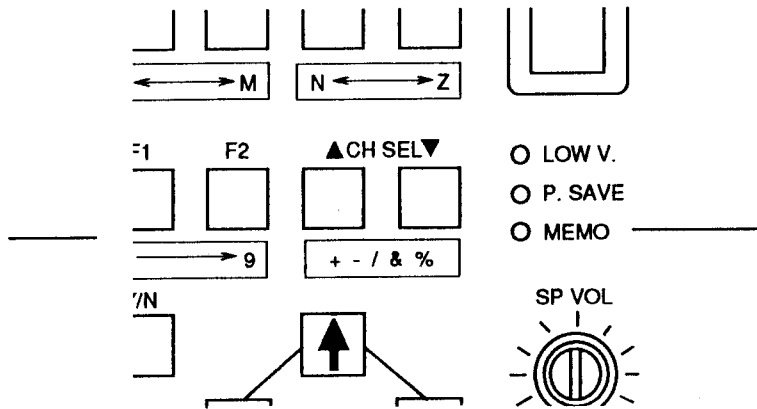
The key ▼ increases the channel order and the ▲ key decreases the channel order. The F1 and F2 keys are defined on each screen.
Pressing the SHIFT key enables characters to be entered for a title of up to 10 characters or a memo of up to 50 characters.

INPUT ZERO: Turning this trimmer with INPUT ZERO set to ON on the PRAMS screen enables the input signal to be shifted within the range of ±100%.

- 11 -
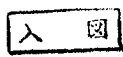
OUTPUT ZERO:	Turning this trimmer enables the output signal to be shifted within the range of ±10 mV.
OUTPUT LEVEL:	This trimmer enables the output signal to be varied between 0.5 and 5 V with TRIM specified for OUTPUT on the PRAMS screen.
RESET:	Use of the reset button is not required during normal operation. Press the reset button only when the factory-set conditions are desired or when the firmware is hung up

Factory setting	
MPX mode:	16CH
Input/Output range:	2 V
Input/Output zero shift:	OFF
Clock:	The current time
TITLE:	None
Other modes:	OFF

Note: Channels 9 to 13 in the figure on the preceding page are not available in the RD-180T.

4-3 Display

FUNCTION	L/PMODE TAPE/SYSTEM	COUNTER	TAPE REMAIN	MONITOR CH | MODE | METER		
PRAMS:		000'17"	02:00'	2	TAPE	+48%

```
          -100%      +100% INPUT  ZERO  BAND    OUT       ID SET IDNO 02 P000'01"
 CH 1  :                    2   V  OFF  2.5  KH  2 V
 CH 2 ←:                    2   V  OFF  2.5  KH  2 V      CLOCK : 90.01.01  13:38'54"
 CH 3  :                    2   V  OFF  2.5  KH  2 V      TITLE : TEST 1
 CH 4  :                    2   V  OFF  2.5  KH  2 V      MEMO  :
 CH 5  :                    2   V  OFF  2.5  KH  2 V
 CH 6  :                    2   V  OFF  2.5  KH  2 V
 CH 7  :                    2   V  OFF  2.5  KH  2 V
 CH 8  :                    2   V  OFF  2.5  KH  2 V
 CH 9  :                    2   V  OFF  2.5  KH  2 V
 CH 10 :                    2   V  OFF  2.5  KH  2 V
 CH 11 :                    2   V  OFF  2.5  KH  2 V
 CH 12 :                    2   V  OFF  2.5  KH  2 V
 CH 13 :                    2   V  OFF  2.5  KH  2 V      SYSTEM LIST
 CH 14 :                    2   V  OFF  2.5  KH  2 V
 CH 15 :                    2   V  OFF  2.5  KH  2 V      MPX 2/CAL AC/PAUSE ON
 CH 16 :                    2   V  OFF  2.5  KH  2 V
 PK HOLD [YN]/GRAPH [SHIFT] [YN]/DUP [SHIFT] [▶]                          ED 000
```

Note: Channels 9 to 16 are not displayed on the screen in the RD-180T. See section 6-1-4 for details.

The parameters on this multi display are described below.

FUNCTION:	Selecting a function using a FUNCTION key displays the associated screen and the selected FUNCTION name.
L/P MODE:	When the optional 12-hour mode function is specified, selecting L/P MODE displays the setting of the system and the contents of the reproduced tape.
COUNTER:	If recording started at BOT and has been made continuously, the amount of tape remaining is displayed using three digits for the minutes and two digits for the seconds (000'00").
TAPE REMAIN:	If recording started at BOT and has been made continuously, the amount of tape remaining is displayed using three digits for the hours and two digits for the minutes (00:00').
MONITOR:	Displays the number of the channel (CH) being monitored, and the mode determined by recording or reproduction (SOURCE in the REC PAUSE or REC FWD mode and TAPE in the other modes). Channels can be selected by the channel select key. For the channel being monitored, the number at the left of the associated bar is indicated by an arrow.

ID SET:　　　　　If the PRAMS mode is specified for FUNCTION:
In the REC or REC PAUSE mode, or in the STOP mode after the REC or REC PAUSE mode, displays the ID number (ID NO) for the current recording and the time elapsed after the recording started (P TIME).
In other cases, ID NO and P TIME reproduced from the tape are displayed.
This information is read from the tape and cannot be set.
Read page 4 for details of the ID NO. If tape is not loaded, no ID NO may be displayed, and AA may blink.

Note: In 12-hour mode, P TIME is not displayed. See Section 10-7 for details of the operations of keys such as ID NO in 12-hour mode.

Others

CLOCK:　　　　　The time set on the unit is displayed during recording and the time on the tape is displayed during reproduction. This display is held until the REC key is pressed.

TITLE and MEMO:　A common title such as an experiment name can be recorded on the tape. During reproduction, the recorded title of up to 10 characters is automatically displayed. MEMO allows a memo of up to 50 characters such as the experiment conditions to be recorded on the tape. During reproduction, the memo recorded on the tape is automatically displayed and, once the REC key is pressed, the setting on the unit is displayed.
Desired characters can be entered by moving the cursor to the TITLE or MEMO location and pressing the FUNCTION, F1, F2, or CH SEL key while holding down the SHIFT key. Alphabetic characters, numerics, the symbols +, −, /, &, and %, and spaces can be entered. See Section 6-1-3, Setting TITLE and MEMO.

SYSTEM LIST:　　This column is always displayed at the right bottom of the screen so that the setup conditions of the unit can be checked at any time. In the bottom line of the screen from left to right, the entry key definition, the error code (ERR000), and the error data (the number of errors resulting from ECC in a second (ED 000)) are displayed. For error codes, see Section 7, ERROR LIST.

5. BASIC OPERATION

5-1 Basic Operation

Perform the following operations and checks according to the steps below:

Note: See section 10 for the operation of the 12-hour mode.

1) Connect the power cable.

Be sure to check that the input power conforms to the specified voltage.

2) Turn the POWER switch on.

Display of the unit (for P SAVE OFF)

COUNTER: 000'00"
ID: 00
CLOCK: Current time display (year, month, day, hour, minute and second)
LOW V: Increase the d.c. power-supply voltage if blinking.

3) Press the EJECT key.

The cassette compartment opens.

4) Insert a cassette tape.

Carefully insert the cassette tape all the way with the opening downward and the transparent window to the front.
Use a new cassette tape or cassette tape containing unrecorded portions that starts at the beginning of the tape.
Note: Refer to "Cassette Tape" on page iv.

5) Close the cassette compartment.

Press down the cassette compartment firmly until it locks. If not completely closed, the cassette tape is unloaded, and the cassette compartment will automatically open. in this case, press the cassette compartment again.

6) Automatic tape loading

After the tape is loaded automatically, it touches the head and runs a slightly.

COUNTER: 000'00"
ID: 00
CLOCK: Current year, month, day, hour, minute and second display

7) Press the REC key.

The REC and PAUSE indicators light to indicate the unit is ready for recording.

ID: BB (blinking)

The REC and PAUSE indicators blink for approximately eight seconds.

8) Press the FWD key.

Recording starts the moment the REC and FWD indicators light.

COUNTER: Recording elapsed time display
ID: 01
CLOCK: Current year, month, day, hours, minutes, and seconds display

9) Press the CAL key.

While this key is pressed, the 1 kHz 50% signal is recorded and the input signal from BNC is not recorded. Releasing the key stops the 1 kHz 50% signal, and the input signal is recorded.

10) Press the PAUSE key.

REC FWD temporarily stops the moment the REC and PAUSE indicators light.

COUNTER: Stops with the last value maintained.
ID: Stays at 01
CLOCK: Current year, month, day, hours, minutes, and seconds display

11) Press the FWD key.

Recording restarts the moment the REC and FWD indicators light.

COUNTER: Displays continuously.
ID: 02
CLOCK: Current year, month, day, hours, minutes, and seconds display

Approximately 60 seconds elapse.

12) Press the PAUSE key.

After returning to step 11), the ID number is incremented by 1 until it reaches 99, then it starts again from 00.

13) Press the STOP key.

COUNTER: Stops with the last number maintained.
ID: Stops with the last number maintained.
CLOCK: Current year, month, day, hours, minutes, and seconds display

14) Press the REW key.

The unit rewinds the tape to the beginning and stops automatically.

Operation during tape rewind:

COUNTER: Displays the counter value recorded on the tape.
ID: Displays the ID value recorded on the tape.
CLOCK: Current year, month, day, hours, minutes, and seconds display

15) Press the FWD key.

The unit reproduces the contents recorded from the beginning of the tape.

COUNTER: Continuous minute and second display from the beginning of the tape, 000'00", to the end of tape, XXX'XX".
ID: Displays 00 to XX.
CLOCK: Displays the year, month, day, hours, minutes, and seconds of the recording.

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Bar meter: Displays the signal level of each data channel. (Displays the CAL signal while the signal is recorded.)

Speaker: If the microphone was used, the sound produced when the press-to-talk switch was pressed is output.
             Selection of SP MONITOR ON on the SYSTEM screen causes the data channel signal specified by the monitor to be output from the speaker.

Note: The message "ERR110" displayed on the EL display during recording or reproduction means that the error rate is worse than a certain level. The "ED" count updates every second when an uncorrectable error (e.g. due to dropouts) occurs. The probable causes of the errors are scratches on the tape or improper tape selection. Change the tape or check to see that the tape is the one designated.
A contaminated tape path may cause dropouts or scratches on tapes resulting in worsened error rates. Clean the tape path with the supplied cleaning tape. For details of the cleaning, refer to section 11 "Maintenance" on page 41.

5-2   Connection of the Input Signal

The input terminal of this unit is unbalanced. The outside of the BNC cable is connected to the frame of the unit. The nominal input impedance is 100 kΩ and the absolute maximum input voltage is ±100 V. The MPX modes can be selected from the range between 2 channels/20 kHz and 16 channels/2.5 kHz by the SYSTEM function. The settings are indicated on the display and stored on the tape during recording.

Note: In 12-hour mode, the band becomes narrower.

5-3   Connection of the Output Signal

The output terminal of this unit is unbalanced. The outside of the BNC cable is connected to the frame of the unit. The nominal output impedance is 75 Ω and the maximum output current is 10 mA. Note that input to the output terminal may damage the unit. In the CH mode, the output channel is determined according to the tape to be reproduced, and the LED upper right of the input BNC terminal lights. The CH mode set on the unit is temporarily saved until the REC key of the TTP operation mode key group is pressed.

5-4   Memo (Announcement) Recording or Reproduction

The RD-200T provides a memo voice channel in addition to data channels. Recording is enabled in the REC FWD mode. Memo sound is recorded by pressing the press-to-talk switch with the optional microphone connected.
AGC is equipped to ensure recording at an adequate level. The microphone volume is indicated by the blinking MEMO LED.
When reproduced, the sound is output from the speaker. The volume can be adjusted by the control.
If the SP MONITOR mode, in which data channel signals are output from the speaker, is set to ON on the SYSTEM screen, no memo announcement is heard. Use of an earphone also disables output from the speaker.

Note: The sound is less fidelity in the 6H and 12H modes of 12-hour mode.

6. OPERATION METHOD

6-1 Setting on the PRAMS Screen

Pressing the PRAMS key in the FUNCTION key group displays the PRAMS screen. Settings are displayed in the STOP mode and the contents recorded on the tape are displayed in the reproduction mode. Pressing the REC key displays the current settings on the unit.

Pressing the STOP key after the PAUSE or REC PAUSE key can change settings. However, pressing the STOP key after the FWD key cannot change settings because the settings are already recorded on the tape

6-1-1 Input range

The input range can be selected from the six steps, ±0.5, ±1, ±2, ±5, ±10, and ±20 Vp, according to the level of the input signal. Set the input range by referring to the bar meter, so as to prevent overscaling. If overscaling occurs, the recorded signals are saturated.

Press the cursor keys to move the cursor to the input range of the desired channel. Pressing the ↑ key with the SHIFT key pressed increases the range value by one step. Continuously pressing the key increases the value until it reaches 20 V. Pressing the ↓ key with the SHIFT key pressed decreases the range value by one step. Continuously pressing the key decreases the value until it reaches 0.5 V. A greater number channel than the desired channel can be set in the same input range by following DUP SHIFT → displayed lower left on the screen and pressing the key → with the SHIFT key pressed.

With REC or INPUT ZERO set to ON on the screen, the zero point of the input signal can be changed within a range of ±100% using the INPUT ZERO trimmer on the rear panel.

6-1-2 Output range

The output range can be selected from three steps, ±1, ±2, and ±5 Vp according to the objective of the output signal. Press the cursor keys to move the cursor to the output range of the desired channel. Pressing the ↑ key with the SHIFT key pressed increases the range value until it reaches 5 V. Pressing the ↓ key with the SHIFT key pressed decreases the range value until it reaches 1 V. A greater number channel than the desired channel can be set in the same output range by following DUP SHIFT → displayed lower left on the screen and pressing the → key with the SHIFT key pressed.

ZERO and LEVEL of the output signals can be altered using the trimmer on the rear panel. The variable ranges are ±10 mV for ZERO and ±0.5 to ±5 V for LEVEL.

6-1-3 Setting TITLE and MEMO

A common title (up to 10 characters) and a common memo (up to 50 characters) can be recorded together with data on the tape. The title and memo can be changed during recording. The changed title and memo become valid the moment they are changed. Desired characters can be entered using the FUNCTION, F1, F2, and CH SEL keys.

Alphabetic characters, numerics, the symbols +, −, /, &, %, and spaces can be entered.

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FUNCTION				COUNTER	TAPE REMAIN	MONITOR CH | MODE | METER	

| | | | | | 000'17" | 02:00' | 2 TAPE +48% |

PRAMS:

	-100%	+100%	INPUT	ZERO	BAND	OUT
CH 1			2 V	OFF	2.5 KH	2 V
CH 2 ←			2 V	OFF	2.5 KH	2 V
CH 3			2 V	OFF	2.5 KH	2 V
CH 4			2 V	OFF	2.5 KH	2 V
CH 5			2 V	OFF	2.5 KH	2 V
CH 6			2 V	OFF	2.5 KH	2 V
CH 7			2 V	OFF	2.5 KH	2 V
CH 8			2 V	OFF	2.5 KH	2 V
CH 9			2 V	OFF	2.5 KH	2 V
CH 10			2 V	OFF	2.5 KH	2 V
CH 11			2 V	OFF	2.5 KH	2 V
CH 12			2 V	OFF	2.5 KH	2 V
CH 13			2 V	OFF	2.5 KH	2 V
CH 14			2 V	OFF	2.5 KH	2 V
CH 15			2 V	OFF	2.5 KH	2 V
CH 16			2 V	OFF	2.5 KH	2 V

ID SET IDNO 02 P000'01"

CLOCK : 90.01.01 13:38'54"
TITLE : TEST 1
MEMO :

SYSTEM LIST

MPX 2/CAL AC/PAUSE ON

ED 000

PK HOLD [YN] /GRAPH [SHIFT] [YN] /DUP [SHIFT] [▶]

Note: Channels 9 to 16 are not displayed on the screen in the RD-180T. See Sectrion 6-1-4 for details.

```
        ┌──── FUNCTION ────┐         POWER
        PRAMS  SEARCH   MISC  SYSTEM
         □      □        □      □       □

        A ◄──► M      N ◄──► Z

         F1     F2    ▲ CH SEL ▼      ○ LOW V.
         □      □      □      □        ○ P. SAVE
                                       ○ MEMO
```

Use the cursor keys to move the cursor to the TITLE column. Pressing the A key once with the SHIFT key pressed displays the letter 'A' and pressing it twice displays the letter 'B'. The letters from 'A' to 'M' can be entered in this manner. Pressing the M key with the SHIFT key pressed can select a letter to be entered from the letter 'M' toward 'A'.

The operation is the same for other letters. After the desired characters are entered, release the SHIFT key, move the cursor to the next location, and perform the same operation. MEMO can be entered in the same manner. To delete the characters written in the unit memory, enter a space. Setting can be altered in the REC PAUSE mode or in the STOP mode after the REC PAUSE mode. In the STOP mode after the FWD mode, however, setting cannot be altered because the information is read from the tape. Insertion and deletion functions are not provided.

入 図
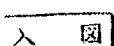
6-1-4 Waveform and bar graph

BAR METER: The bar meter is displayed on the PARAMETER screen.

PRAMS:				000'17" 02:00'	2	TAPE +48%

	-100%	+100%	INPUT	ZERO	BAND	OUT
CH 1			2 V	OFF	2.5 KH	2 V
CH 2 ←			2 V	OFF	2.5 KH	2 V
CH 3			2 V	OFF	2.5 KH	2 V
CH 4			2 V	OFF	2.5 KH	2 V
CH 5			2 V	OFF	2.5 KH	2 V
CH 6			2 V	OFF	2.5 KH	2 V
CH 7			2 V	OFF	2.5 KH	2 V
CH 8			2 V	OFF	2.5 KH	2 V
CH 9			2 V	OFF	2.5 KH	2 V
CH 10			2 V	OFF	2.5 KH	2 V
CH 11			2 V	OFF	2.5 KH	2 V
CH 12			2 V	OFF	2.5 KH	2 V
CH 13			2 V	OFF	2.5 KH	2 V
CH 14			2 V	OFF	2.5 KH	2 V
CH 15			2 V	OFF	2.5 KH	2 V
CH 16			2 V	OFF	2.5 KH	2 V

ID SET IDNO 02 P000'01"

CLOCK : 89.12.06 13:38'54"
TITLE : TEAC RD200
MEMO :

SYSTEM LIST

MPX 2/CAL AC/PAUSE ON

ED 000

PK HOLD [Y/N]/GRAPH[SHIFT] [Y/N]/DUP[SHIFT][▶]

Note: Channels 9 to 16 are not displayed on the screen in the RD-180T. They are displayed only when a tape recorded in the MPX modes 9 to 16 on the RD-200T is reproduced. In this case, signals to the output BNC terminal cannot be output normally.

The seventh dot displayed indicates the full scale. To hold the peak, follow the PK HOLD Y/N indication and press the Y/N key. To release the peak, follow the RELEASE Y/N indication and press the Y/N key. Holding or releasing is performed for all channels and cannot be performed for independent channel.
In the FWD mode, data from the tape is displayed and, in the REC or REC PAUSE mode, input data is displayed. No display is provided in the other modes.

GRAPH: Follow the GRAPH SHIFT Y/N indication on the PRAMS screen and press the Y/N key with the SHIFT key pressed. To return to BAR, follow the BAR SHIFT Y/N indication on the screen and press the Y/N key with the SHIFT key pressed.

TIME: The time axis can be selected from nine steps, 1 to 9 and 0.25 to 512 ms/division according to the record/reproduction frequency band. Some of the 9 steps may not be selected depending on the specified number of channels. Move the cursor to the TIME column and press the ↑ or ↓ key with the SHIFT key pressed. The displayed waveform cannot be moved or zoomed.

Note: In 12-hour mode, the values of the time axis is larger than the above.

AMPLE (AMPLITUDE): The displayed amplitude can be selected. The full scale is 100% with X1 and 50% with X2. Move the cursor to the AMPLE column and press the ↑ or ↓ key with the SHIFT key pressed.

TRIG (TRIGGER): The trigger mode and parameters can be set. The LIVE or UP/DOWN mode can be selected. In the UP/DOWN mode, -75%, -50%, -25%, 0%, 25%, 50% or 75% can be set. Move the cursor to the TRIG column and press the ↑ or ↓ key with the SHIFT key pressed to select the mode and to move the cursor to the desired value for selection.

MODE: SINGLE for 1 phenomenon or DUAL for 2 phenomena can be selected. Move the cursor to the MODE column and press the ↑ or ↓ key with the SHIFT key pressed to select the mode.
In the second channel, CHB, any of channels 1 to 8 for the RD-180T and to 16 for the RD-200T can be specified for the waveform display channel in the DUAL mode. With the recording OFF channel specified, no waveform is generated. The waveform display can be held or released.
In the FWD mode, data from the tape is displayed and, in the REC or REC PAUSE mode, the input data is displayed. No display is provided in the other modes.

PRAMS: 000'12" 02:00' 2 SOURCE - 0%

+100%

+50%

0

-50%

-100%

0.25 ms/D

TIME
AMPLE 1ST
X 1
TRIG
LIVE
0%
MODE
SINGLE
CH B
1CH

ID SET IDNO 01 P000'12"

CLOCK : 89.12.26 13:43'03"
TITLE : TEAC RD200
MEMO :

SYSTEM LIST
MPX 16/CAL AC/PAUSE ON

ED 000

RELEASE YN /BAR SHIFT YN
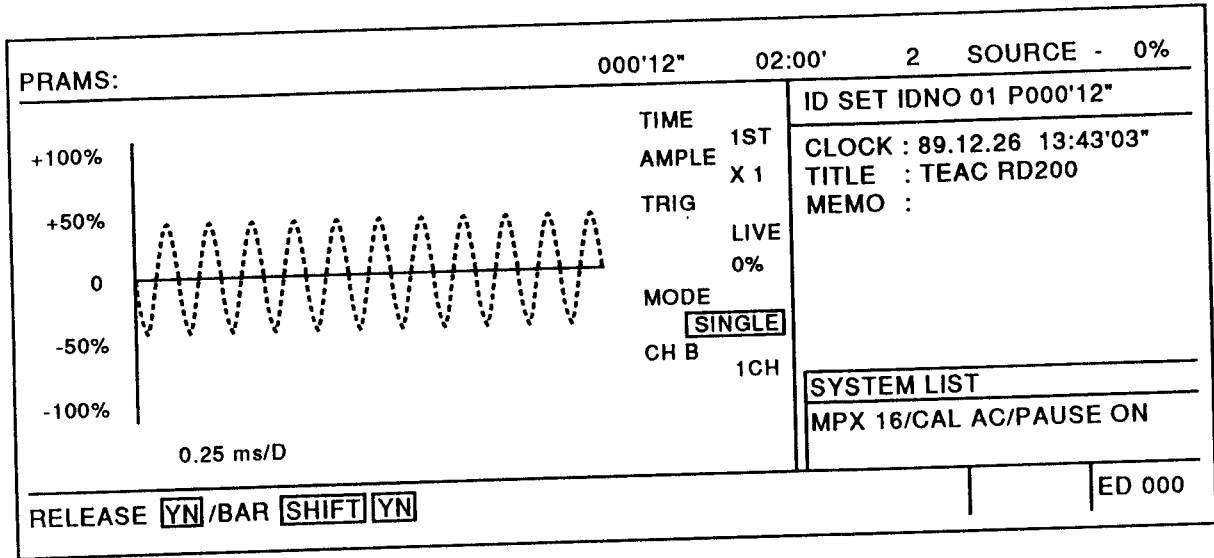
6-2 SEARCH

Search can be performed using the following factors (SEARCH SOURCE). Search using the ID number is enabled if the number is recorded for at least 60 seconds, and is disabled if the number is recorded for less than 60 seconds. The search point (TARGET POINT) needs to be specified . To reproduce the tape after search is completed, select PLAY AFT TP in the PLAY MODE. To stop at the searched point, select PAUSE AT TP. To suspend the search operation, follow the STOP Y/N display and press the Y/N key. PRESENT always displays the ID number and the P counter (ID NO P 000'00") to indicate the point being searched.

Note: See Section 10-6 for the search operation in 12-hour mode.

6-2-1 A counter

Set three digits for minutes and two digits for seconds when the A counter is selected. Follow the START Y/N display and press the Y/N key. High-speed search will start and the SEARCH display will blink to indicate that a search is being performed. When the specified TP (TARGET POINT) is located, the unit will operate as specified in the PLAY MODE. To suspend the search operation, follow the STOP Y/N display and press the Y/N key or press the STOP key in the TTP operation mode key group.

6-2-2 ID NO

Specify two digits for the ID number, and follow the START Y/N display to press the Y/N key. High-speed search will start and the SEARCH display will blink to indicate that a search is being performed. When the specified TP (TARGET POINT) is located, the unit will operate as specified in the PLAY MODE. To suspend the search operation, follow the STOP Y/N display and press the Y/N key or press the STOP key in the TTP operation mode key group.

6-2-3 ID NO + counter

Set the ID number and the P counter value (00P000'00") when ID NO + counter is selected. Follow the START Y/N display and press the Y/N key. High-speed search will start and the SEARCH display will blink to indicate that a search is being performed. When the specified ID number is found, the unit enters the reproduction mode. After TP is located, the unit will operate as specified in the PLAY MODE. To suspend the search operation, follow the STOP Y/N display and press the Y/N key or press the STOP key in the TTP operation mode key group.

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6-2-4 ID NO + clock

Set the ID number and the year, month, day, hours, minutes, and seconds using two digits for each (00 00 00 00 00:00'00"). Follow the START Y/N display and press the Y/N key. High-speed search will start and the SEARCH display will blink to indicate that a search is being performed. When the specified ID number is found, the unit enters the reproduction mode. After TP is located, the unit will operate as specified in the PLAY MODE. To suspend the search operation, follow the STOP Y/N display and press the Y/N key or press the STOP key in the TTP operation mode key group.

```
SEARCH:                        2H/2H      000'05"  02:00'   2    TAPE     +0%

SEARCH SOURCE :      ID NO/A COUNTER/ID NO + P COUNTER/ID NO + CLOCK
TARGET POINT    :    000'00"
PLAY MODE       :    PLAY AFT TP/PAUSE AT TP

PRESENT      ID NO 01    P 000'05"
             CLOCK: 89.12.06  11:32'29"
             TITLE :
             MEMO :

                                              SYSTEM LIST
                                              MPX 2/CAL AC/PAUSE ON

                                                              ED 000
SEARCH START  YH
```

Note: To alter the year, month, day, hours, minutes, and seconds, start with the lower digit.

6-3 MISC (MISCELLANEOUS) Functions

The following functions are provided. Select the MISC (MISCELLANEOUS) key in the FUNCTION key group to display the MISC screen.

```
MISC:                               000'17"  02:00'   2   SOURCE   +10%

1.  SELF TEST
2.  CLOCK SET
3.  SAVE MODE

                                 SYSTEM REVISION : A900101
                                 GP-IB ADDRESS    : 00

                                              SYSTEM LIST
                                              MPX 16/CAL AC/PAUSE ON

                                                              ED 000
SELECT YN /START  SHIFT  YN
```

6-3-1 SELF TEST

The RD-180T/RD-200T is equipped with a self test function to check the tape transport (TTP), the amplifier (AMP), and the memories (ROM and RAM).
Load a recordable tape—SELF TEST can be executed only when a tape is loaded.
Move the cursor to the SELF TEST column using the cursor keys and press the Y/N key.

```
┌─────────────────────────────────────────────────────────────────────────┐
│ MISC:SELF TEST                    000'28"  02:00'    2    SOURCE    +10%   │
│ ──────────────────────────────────────────────────────────────────────   │
│ 1. TTP                                                                     │
│ 2. AMP                                                                     │
│ 3. ROM RAM                                                                 │
│                                                                            │
│                                              ┌──────────────────────────┐ │
│                                              │ SYSTEM LIST              │ │
│                                              │ ──────────────────────── │ │
│                                              │ MPX 16/CAL AC/PAUSE ON   │ │
│                                              │                          │ │
│ ───────────────────────────────────────────────────────┬─────────┬──────┤ │
│ START [YN]/RETURN [SHIFT][YN]                           │ ERRIIO  │ED 000│ │
└─────────────────────────────────────────────────────────────────────────┘
```

Follow the START Y/N display and press the Y/N key. The self test will then start. The three tests will be completed in approximately 40 seconds. 'OK' is displayed for good results and 'BAD' is displayed for failures. Use of the optional memory board, MB-400, displays MEMORY as the fourth diagnostic item and extends the testing for about 30 seconds duration. To suspend testing, follow the STOP Y/N display and press the Y/N key. To return to the previous screen, follow the RETURN SHIFT Y/N display and press the Y/N key with the SHIFT key pressed.
When 'BAD' is displayed for the TTP, run the cleaning tape and perform the test again. If 'BAD' is still displayed, change the tape and repeat the test.
When 'BAD' is displayed for the AMP, ROM or RAM, press the RESET switch on the rear panel and perform the test again. Note that pressing the RESET switch initializes the settings.

6-3-2 CLOCK SET

The RD-180T/RD-200T automatically records the time on the tape during recording. To set the time of the clock function, move the cursor to the CLOCK SET column on the MISC screen and press the Y/N key. The CLOCK SET screen will then be displayed.

```
┌─────────────────────────────────────────────────────────────────────────┐
│ MISC:CLOCK SET                    008'16"  02:00'    2    SOURCE    +10%   │
│ ──────────────────────────────────────────────────────────────────────   │
│ 1. CURRENT TIME      90.01.01  13:39'42"                                   │
│ 2. SETTING TIME      90.01.01  13:39'00"                                   │
│                                                                            │
│                                              ┌──────────────────────────┐ │
│                                              │ SYSTEM LIST              │ │
│                                              │ ──────────────────────── │ │
│                                              │ MPX 16/CAL AC/PAUSE ON   │ │
│                                              │                          │ │
│ ──────────────────────────────────────────────────────────────────┬──────┤ │
│ RETURN [SHIFT][YN]/SET [F1]                                        │ED 000│ │
└─────────────────────────────────────────────────────────────────────────┘
```

The current time and set time are displayed on the screen. Move the cursor to the desired location of the set time. Press the ↑ or ↓key with the SHIFT key pressed to enter the desired number. Move the cursor to the right and repeat the same procedure, i.e., press the ↑ or ↓key with the SHIFT key pressed to enter the desired number. To set the entered time, follow the SET F1 display and press the F1 key. The clock starts operating with the newly set time effective the moment the F1 key is pressed.

Note: Start changing with the lower digit for the year, month, day, hour, minute and second.

6-3-3 P SAVE MODE

The RD-180T/RD-200T provides the function to delete the display to save power.
Move the cursor to the SAVE MODE on the MISC screen and select using the Y/N key.

```
┌─────────────────────────────────────────────────────────────────┐
│ MISC:SAVE MODE              000'16"  02:00'   2    SOURCE    +0%   │
│ ─────────────────────────────────────────────────────────────── │
│ 1. SAVE MODE       [OFF]/ON                                       │
│ 2. OFF TIMER       0SEC/30SEC                                     │
│                                                                   │
│                                                                   │
│                                                                   │
│                                            ┌────────────────────  │
│                                            │ SYSTEM LIST          │
│                                            │ ──────────────────── │
│                                            │ MPX 16/CAL AC/PAUSE ON│
│                                            │                      │
│ ──────────────────────────────────────────┴──────────┬─────────  │
│ SET [SHIFT] [YN]                                      │ ED 000    │
└─────────────────────────────────────────────────────────────────┘
```

Move the cursor to SAVE MODE ON or OFF. The time elapsed until the display disappears after the operator stops operating the complete keyboard, the OFF TIMER, can be selected between 0SEC and 30SEC by moving the cursor to the desired item and pressing the Y/N key according to the SET Y/N display. Selecting of 0SEC, OFF TIMER causes the display to disappear immediately after the operator stops operating the keyboard. The FUNCTION, F, channel select, or entry, key can be pressed for the display to appear again.
Selecting 30SEC, OFF TIMER causes the display to disappear in 30 seconds after the operator stops operating the keyboard.
The P SAVE LED blinks while counting the 30 seconds and lights when the display disappears.
This mode can reduce the required current by approximately 0.6 A at 12 Vdc.

6-4 SYSTEM

The RD-180T/RD-200T enables the following SYSTEM settings according to the user's needs. Press the SYSTEM key in the FUNCTION key group. The SYSTEM key is valid only in the STOP mode.
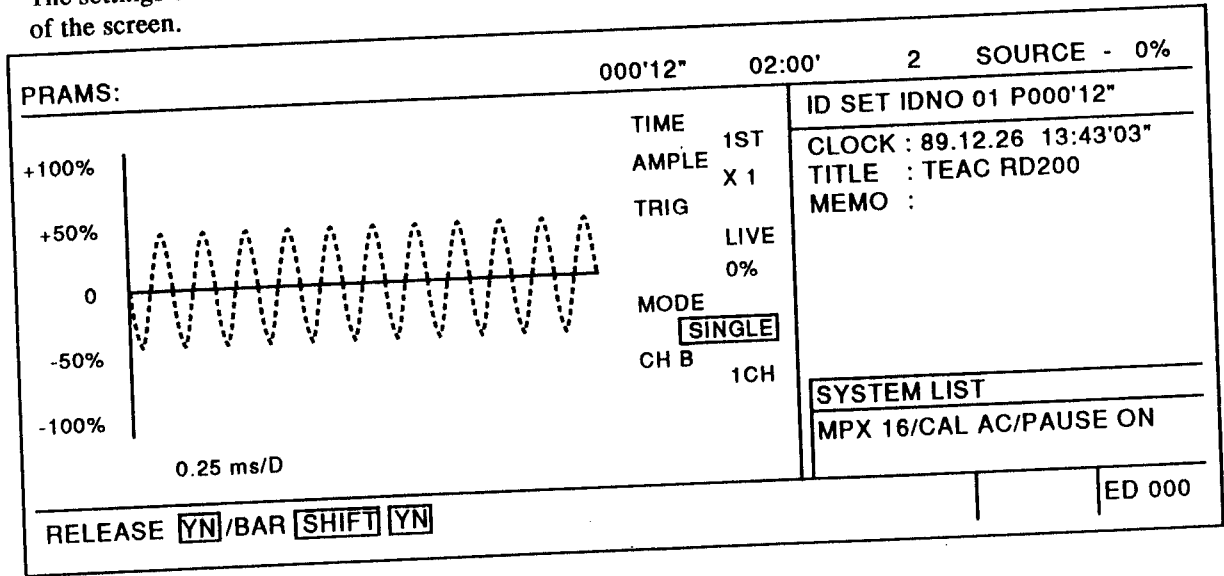
Note: See Section 10-2 for the SYSTEM setting in 12-hour mode.

```
┌─────────────────────────────────────────────────────────────────┐
│ SYSTEM SET:                 000'16"  02:00'   2    SOURCE    +10%  │
│ ─────────────────────────────────────────────────────────────── │
│ 1. MAX MODE        2/3/4/5/6/8/9/10/12/[16]                       │
│ 2. CAL MODE        AC/ + / - /0/AUTO                              │
│ 3. REC/PAUSE TIME  5MIN/NO LIMIT                                  │
│ 4. SP MONITOR      OFF/ON                                         │
│                                                                   │
│                                                                   │
│                                            ┌────────────────────  │
│                                            │ SYSTEM LIST          │
│                                            │ ──────────────────── │
│                                            │ MPX 16/CAL AC/PAUSE ON│
│                                            │                      │
│ ──────────────────────────────────────────┴──────────┬─────────  │
│ SET [YN]                                              │ ED 000    │
└─────────────────────────────────────────────────────────────────┘
```

Note: Only MPX modes 2 to 8 are available in the RD-180T.
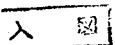
The settings on the unit are always displayed by abbreviations in SYSTEM LIST at the lower right corner of the screen.


```
                                     000'12"    02:00'    2    SOURCE -  0%
PRAMS:                                              ID SET IDNO 01 P000'12"
                                     TIME
                                              1ST    CLOCK : 89.12.26  13:43'03"
   +100%                             AMPLE    X 1    TITLE  : TEAC RD200
                                     TRIG            MEMO  :
    +50%                                      LIVE
                                              0%
      0                              MODE
                                     SINGLE
    -50%                             CH B
                                              1CH    SYSTEM LIST
   -100%                                             MPX 16/CAL AC/PAUSE ON
        0.25 ms/D
                                                                    ED 000
   RELEASE YN/BAR SHIFT YN
```

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6-4-1 MPX MODE

The frequency bands for the RD-180T/RD-200T is 40 kHz. The number of channels can be selected from 2CH (20 kHz) to 8CH (5 kHz) for the RD-180T and to 16CH (2.5 kHz) to the RD-200T as specified.
Note: In 12-hour mode, the band becomes narrower.
Select the desired frequency band or the number or channels. Follow the SET SHIFT Y/N display and press the Y/N key with the SHIFT key pressed. The upper right LED of BNC will light to display the recordable channel positions. The number of channels is specified in the MPX column in the lower right SYSTEM display. Each frequency band for the recordable channels is displayed on the PRAMS screen. When reproducing the tape, however, the CH MODE in which the tape was recorded is displayed. To check the setting on the unit, press the REC key in the TTP operation mode key group.

6-4-2 CAL MODE

Pressing this key generates a CAL signal. Load a recordable tape and check the bar meter or graph in the REC PAUSE or REC FWD mode. The setting is made on the SYSTEM screen. One of AC, +,-, 0, and AUTO can be selected. Selecting AUTO outputs all four signals of AC50% (1 kHz), DC+50%, DC-50%, and 0 V continuously for approximately one second each. The CAL signals can be used as dummy signals.

6-4-3 REC PAUSE TIMER

After five minutes elapse in the REC/PAUSE mode, the tape is usually unloaded automatically. The REC and PAUSE LEDs blink. Pressing the FWD key loads the tape and places the unit in the REC FWD mode.
If the loading time is not adequate for recording startup, move the cursor to NO LIMIT in REC PAUSE TIME and set according to the SET Y/N display. This disables automatic unloading in the REC/PAUSE mode.

Note: Continuing the REC/PAUSE operation for a long time while loading may scratch a tape or make the head dirty. When NO LIMIT is set, release the REC/PAUSE operation for about an hour. Always fix the limit time to 5 min. in 12-hour mode.

6-4-4 SP MONITOR

The RD-180T/RD-200T enables data channel signals to be heard as sound from the monitor speaker. Move the cursor to the SP MONITOR column and select ON/OFF. Follow the SET Y/N display and press the Y/N key. With the SP MONITOR ON setting, memo announcement is not audible.

6-5 Execution Key Group

The execution keys can be used to execute the functions of the RD-180T/RD-200T or to execute the functions set on the SYSTEM screen.

6-5-1 P LOCK (panel lock)

This key locks the panel to ensure the setup conditions will not be accidentally altered. Pressing this key locks all keys other than the power switch and the P LOCK key itself. Pressing the P LOCK key for three seconds causes the P LOCK LED to blink. The LED lights when locking is completed. To release the panel, press the key for three seconds. The LED blinks, and goes out when releasing is completed.

6-5-2 CAL (calibration)

Pressing this key generates the CAL signal set on the SYSTEM screen.
One of AC, +, −, 0, and AUTO can be selected as a reference or dummy signal. AUTO outputs four or combination of AC50% (1 kHz), DC+50%, DC-50%, and 0 V signals continuously for approximately one second each.
Load a recordable tape and check the bar meter or graph in the REC PAUSE or REC mode by generating the signal with the CAL execution key.

Note: The frequency of AC CAL is 1 kHz. Pressing the CAL key in 12-hour mode below 1 kHz band cannot output the signal normally.

6-5-3 E MARK

Pressing this key writes E MARK on the tape, indicating the end of a recording. This key should be used when recording on an already recorded tape. With a new tape or a tape with no data recorded, no E MARK is required.
E MARK does not affect any data after it. Pressing the E MARK key in the REC PAUSE mode enables E MARK to be written.
However, an E MARK cannot be written on a nonrecorded portion of tape or a portion of tape for which the EVENT LED is on (from a point where the ID has changed to a 9-second point on the tape).

6-5-4 E SEARCH

Pressing this key winds the tape rapidly in the REW direction. After reaching BOT, the tape runs fast in the FWD direction until the end of the previous recording or the nearest E MARK is found. Placing the unit in the REC mode here causes recording to start at the beginning of E MARK, if any. E MARK is erased by the beginning of the new data. If no E MARK exists, the new data will be recorded starting at the point approximately one second before the end of the previous recording. This ensures that there are no unrecorded portions on the tape.

6-5-5 EVENT

Pressing this key in REC mode increments the currently recorded ID number by 1. The ID number being recorded is displayed. Recording one ID number requires 9 seconds. For the time, the display of the ID number blinks, and the EVENT LED is on. While the ID number display blinks, the function of the EVENT key is ignored when it is pressed.

Note: If the ID number is used for high-speed search, data must be recorded continuously for about one minutes.
In 12-hour mode, the operation of the EVENT key is different from the above. See Section 10-7.

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6-6 Erasure

The R-DAT cassette tape used for the RD-180T/RD-200T is designed so that the data previously recorded on the tape is erased by or replaced with the newly recorded data. For the tape portions not subjected to re-recording, the previous data, memo, ID, COUNTER, and CLOCK can be reproduced. If the previous data is not desired, all data on the cassette tape can be erased by the bulk tape eraser.

The R-DAT tape is extremely difficult to erase magnetically. Use a powerful bulk tape eraser such as TEAC CH-M5A (210 to 250V a.c.) or TEAC CH-M5C (108 to 132 V a.c.) and 5 or 6 times for both sides of the tape. Insufficient erasure may cause meaningless characters to be displayed in COUNTER, ID, or CLOCK.

7. ERROR LIST

7-1 Probable causes of the errors below are misoperations.

010	The key disabled for a certain setting was pressed.
020	The REC key was pressed when a REC protected tape was loaded.
030	A key for advancing the tape was pressed when the tape was at EOT.
040	A key for reversing the tape was pressed when the tape was at BOT.
050	The REC key was pressed on E MARK.
060	The REC key was pressed at a point distant from the end of the previous recording on the tape.
070	The REC PAUSE mode was activated within nine seconds after the ID number being updated.
080	The EVENT key was pressed within nine seconds after the ID number being updated.
090	Moisture condensation
110	The tape error rate has deteriorated in the REC FWD or FWD mode.
130	A key was pressed to operate a tape when no tape is mounted.
200	The tape reached EOT or BOT during search.
210	The tape reached EOT during SELF TEST.
240	The E MARK key was pressed when an E MARK cannot be written.
300	A tape recorded in normal-mode was reproduced in 12-hour mode.
310	One of keys REC, FWD and PAUSE was pressed in 12-hour mode when the A counter was off.
320	12-hour mode was specified when no memory board was mounted.
330	The modes (normal/12-hour) of the system and the tape was not same when a search operation was executed.
340	The EVENT key was pressed in 12-hour mode.
350	The display of the A counter disappeared during the reproduction of a tape in 12-hour mode.
360	12-hour mode cannot be specified.
510	SELF TEST started when a REC protected tape was loaded.

7-2 Probable causes of the errors below are hardware troubles. Contact us if they occurred.

100	The power supply is over heated.
120	Recording did not start after three seconds elapsed in the REC FWD mode.
140	Clock time indicates an abnormal time. (The clock is set to 00:00:00:00:00:00.)

8. OPTIONAL REMOTE CONTROL UNIT, ER-42

The optional remote control unit, ER-42, is designed for use with the RD-180T/RD-200T. It provides a remote control function and a relay control terminal.

8-1 Connection

Turn off the RD-180T/RD-200T power. Firmly fasten the connector to REMOTE with the two screws. On turning on the power, the LEDs of the ER-42 light to indicate the contents displayed on the RD-180T/RD-200T.

8-2 General Description of the ER-42

8-2-1 Key assembly

MODE: Switches the COUNTER display. Pressing this key switches in the order of A TIME, P TIME, and REMAIN.

EVENT: Pressing this key during recording updates the currently displayed ID NO. It is not valid while the EVENT LED is on.

REW: Rewinds the tape. With the FWD key pressed simultaneously, REVIEW for triple-speed rewinding is activated.

   *1) Not activated in the REC/PAUSE, REC, or FWD modes.

FFWD: Fast forwards the tape. With the FWD key pressed simultaneously, CUE for triple-speed forwarding is activated.

FWD: Advances the tape. Reproducing is activated. Pressing this key in the REC/PAUSE mode activates recording.

STOP: Stops the current operation or releases the PAUSE mode.

REC: Activates the REC/PAUSE mode. This key is valid in the STOP and PAUSE modes only. Simultaneously pressing the FWD key activates the REC/FWD mode.

PAUSE: Activates the PAUSE mode. This key is valid in the FWD and STOP modes only.

P SAVE: Turns ON or OFF the RD-180T/RD-200T display. Pressing this key switches between ON and OFF.

8-2-2 Display assembly

ID: Displays the ID NO read from the tape. It is the same as on the unit.

COUNTER: Displays A TIME, P TIME, or REMAIN selected by the MODE key and read from the tape.

8-2-3 Slide SW

MIC LOCK: Displays ON when the microphone is used regardless whether the press-to-talk switch is ON or OFF.
Displays OFF when press-to-talk switch ON or OFF is valid.

8-2-4 LED assembly

A TIME/P TIME/REMAIN:
The MODE selected by the MODE key lights up.

BOT: Lights when the tape is at BOT.

EOT: Lights when the tape is at EOT.

LOW V: Blinks when the d.c. supply voltage falls below 10.9 ±0.1 V.

MIC LOCK: Lights when the microphone is inserted and the press-to-talk switch is on. Always lights when the MIC LOCK SW is ON regardless whether the press-to-talk switch is on or off.

EVENT: Lights for nine seconds after recording starts or when PAUSE or reproduction is activated during the nine seconds.

REW: Lights during REW operation.

FFWD: Lights during FFWD operation.

FWD: Lights during FWD or REC FWD operation.

STOP: Lights when the unit is in the STOP mode.

REC: Lights during REC/PAUSE or REC operation.

PAUSE: Lights during PAUSE or REC/PAUSE operation.

P SAVE: Lights when the RD-180T/RD-200T is in the POWER SAVE (P SAVE) mode and the displays are off.

Note: In 12-hour mode, the operations of keys EVENT, FWD, STOP, REC, and PAUSE are different from the above. See Sections 10-4 and 10-5.
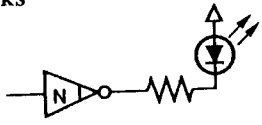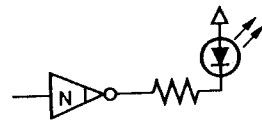
8-2-5 Side panel

CONTROL I/O: A CN terminal that enables transport control by means of a make contact and allows operation condition output
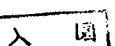
MIC jack: The input jack where the microphone is inserted for memo voice recording

8-2-6 CONTROL I/O (CN pin No., signal name, and I/O mode)

CN name Daiichi Electronics Engineering Co., Ltd. DALC-J15SAF-10L6

PIN NO	Signal name	I/O mode	Remarks
1	EOT output	—[N]>o— Sink current:15 mA or less	—[N]>o—WV—LED
2	REW output	—[N]>o— Sink current:15 mA or less	
3	FFWD output	—[N]>o— Sink current:15 mA or less	
4	PAUSE output	—[N]>o— Sink current:15 mA or less	
5	FFWD SW	(switch symbol)	
6	STOP SW	(switch symbol)	
7	REC SW	(switch symbol)	
8	PAUSE SW	(switch symbol)	
9	BOT output	—[N]>o— Sink current:15 mA or less	—[N]>o—WV—LED
10	REC output	—[N]>o— Sink current:15 mA or less	
11	FWD output	—[N]>o— Sink current:15 mA or less	
12	REW SW	(switch symbol)	
13	FWD SW"	(switch symbol)	
14	+5 V		

8-2-7 External view
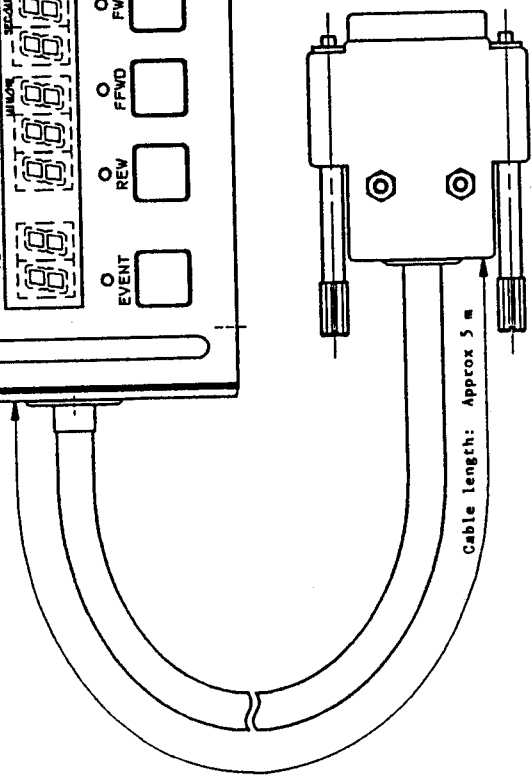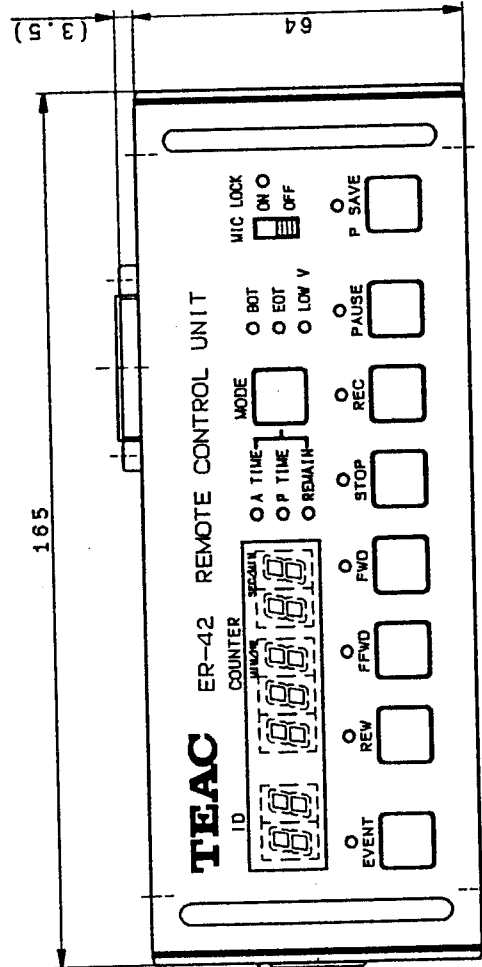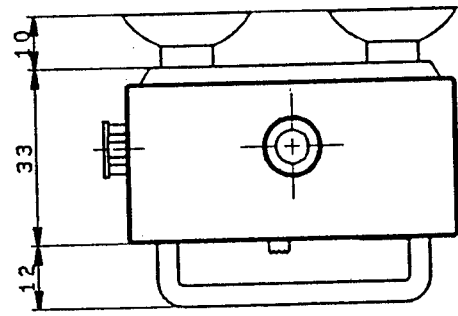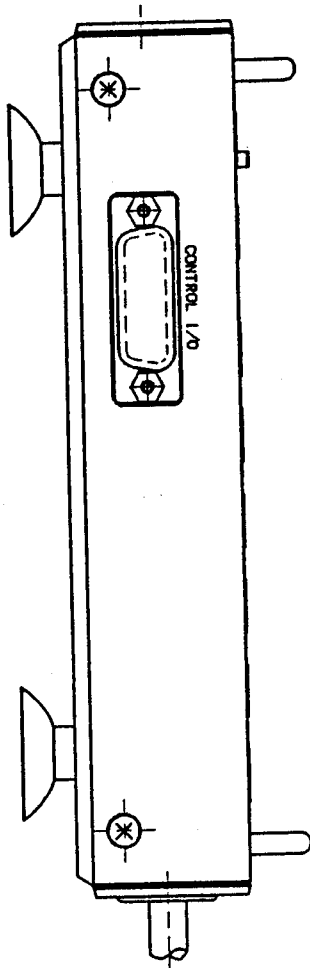
9. GP-IB

9-1 Outline

The AR-509 GP-IB board is an interface board that connects between the RD-180T/RD-200T data recorder and the IEEE standard 488 measuring bus (GP-IB: General Purpose Interface Bus). Functions of the RD-180T/RD-200T can be controlled through the GP-IB system by the AR-509. Not only the operating mode, but also recording/reproduction conditions and ID information can be set. The GP-IB has the functions indispensable to the automatic measuring system such as setting modes and reading reproduced ID information.

If an optional memory board (MB-400) is incorporated into the GP-IB, digital data recorded on the tape can be saved in the 6M-byte memory and transmitted to the host computer through the GP-IB.

Refer to "AR-509" Programming Manual" for programming in case of connection of the AR-509 with the GP-IB system.

9-2 Configuration

Since the AR-509 is built into the RD-180T/RD-200T, the GP-IB connector is installed in the rear panel of the RD-180T/RD-200T.

9-3 Setting Device Address, Terminator, and Header

The following device address, terminator, and header are already factory-set.

Device address: 15
Terminator: CR + LF
Header: Set

If the above settings must be changed because of the use of the GB-IB together with other measuring instruments or programming, use the setting switches at the rear panel.
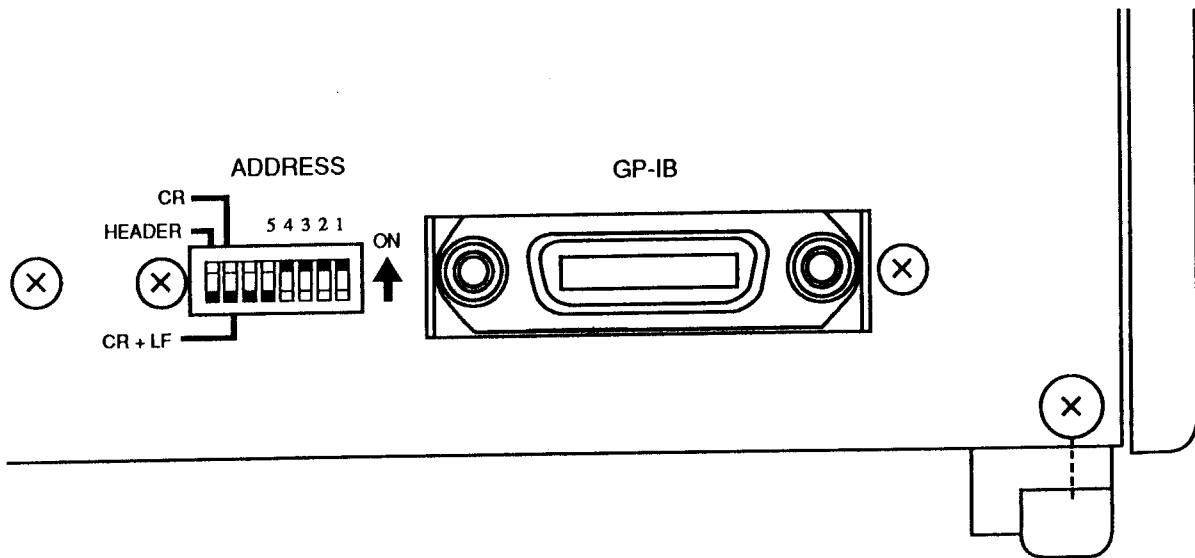
(1) Device address

The device address is specified with setting switches, ADDRESS 1 to ADDRESS 5.

	Factory-set
ADDRESS 1 = 2^0	On
ADDRESS 2 = 2^1	On
ADDRESS 3 = 2^2	On
ADDRESS 4 = 2^3	On
ADDRESS 5 = 2^4	Off

(2) Terminator

The terminator for commands and transfer data is specified with the second switch from the left in setting switches. Commands and transfer data are set simultaneously.

CR: On
CR + LF: Off (factory-set)

(3) Header

Data to be transferred by the AR-509 when it receives the specification of the talker has the header indicating the contents of the data. The header is specified with the leftmost switch of the setting switches.

No header (SPACE): On
Header: Off (factory-set)

Note: Before changing the settings with setting switches, be sure to turn off power to the RD-180T/RD-200T.

(4) Screen of the RD-180T/RD-200T

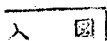While the GP-IB operates, the screen of the RD-180T/RD-200T is fixed to the PRAMS (parameter setting) screen.

10. 12-HOUR MODE

10-1 Overview

- 12-hour mode can be used through the optional function LP-200 and by mounting memory board MB-400.

- 12-hour mode and the conventional (normal) mode are switched by pressing the SYSTEM key in the FUNCTION key group. Both mode can be used.

- Because of the requirements of tape format, 12-hour mode can be used only where the A counter, which counts the time from BOT continuously, is on.

- Filters for input and output in the conventional mode is also used in 12-hour mode. For the band below 2.5 kHz (RD-180T) or 1.25 kHz (RD-200T), prepare external filters if necessary.

- There are three operating modes in 12-hour mode: 3H, 6H, and 12H. The table below shows the features of each mode. A tape recorded in the 12-hour mode can be reproduced in any of these modes. When the tape recorded in 12H mode is reproduced in 3H mode, the reproduction speed is reduced to 1/4.

Mode	Recording time	Recording/reproduction band
Normal mode	Approx. 2 h.	See Specifications
12-hour mode 3H	Approx. 3 h. and 15 min.	1/2 of normal mode
12-hour mode 6H	Approx. 6 h. and 30 min.	1/4 of normal mode
12-hour mode 12H	Approx. 13 h.	1/8 of normal mode

Note: The recording time indicates the time when tape DM120 is used.

10-2 Setting the 12-hour Mode

To set 12-hour mode, press the SYSTEM key in the FUNCTION key group, then specify one of the following options for LONG PLAY MODE on the screen: 3H, 6H, 12H.
Specify 2H for normal mode. The specified mode is displayed on the SYSTEM field of L/P MODE on the top line of the display. The recording mode of the reproduced tape is displayed on the TAPE field of L/P MODE.
The mode specified by SYSTEM is valid for reproduction as well as for recording of a tape. That is, any reproduction is performed according to the specification by the SYSTEM key regardless of the recording mode of the tape.
The following diagram shows the relationships between the conditions for recording and reproduction.

Recording   Reproduction   ———— Reproduction is possible.

2 H ⟶ 2 H

3 H   3 H   - - - - - Intermittent reproduction

6 H   6 H   The reproduction signal is discontinuous
                    because the no-signal sections between
12H   12H   data blocks are also reproduced.
                    MEMO sound is not output.
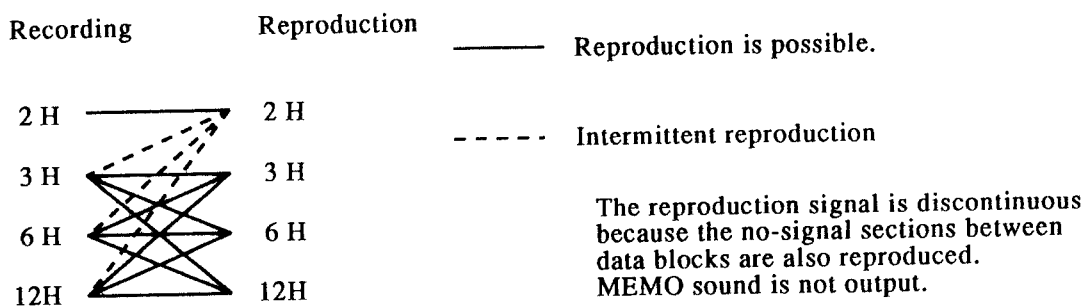
Use of the intermittent reproduction function in 2H mode above is convenient to check the recording status.

See Section 6-4 for details of the other items of the SYSTEM key.
This setting can be specified only in STOP status.

FUNCTION	L/PMODE TAPE/SYSTEM	COUNTER	TAPE REMAIN	CH	MONITOR MODE METER		
SYSTEM SET:	12H/12H	000'16"	'02:00'	2	SOURCE	+0%	

1. MPX MODE   2/3/4/5/6/8/9/10/12/ 16
2. CAL MODE   AC/ + / - /0/AUTO
3. REC/PAUSE   5MIN/NO LIMIT
4. SP MONITOR   OFF/ON
5. LONG PLAY MODE   2H/3H/6H/12H

SYSTEM LIST

MPX 16/CAL AC/PAUSE ON

SET YN   ED 000

Note: Only 2 to 8 can be specified for MPX MODE in the RD-180T.

10-3 Tape Format

In 12-hour mode, unlike in normal mode, data is stored in the memory and recorded on the tape block by block intermittently.
Since the data blocks are managed by the A counter, which counts the time from BOT continuously, the recording needs to be performed in the area where no disconnection of record occurs from BOT.
Take the following steps.

① Record data from BOT.
② Re-record (overwrite) the area where the record of the A counter exists.
③ Perform E SEARCH (blank search), then record new data immediately after the previous record. (See Sections 2-1 and 4-2-2.)

Each block is recorded on the areas of 01 to 17 sec., 21 to 37 sec., and 41 to 57 sec. of the A counter as shown below.
On other areas, zero data is recorded.

01 sec.		17 sec.	21 sec.		37 sec.	41 sec.		57 sec.	
			Data			Data		Data	
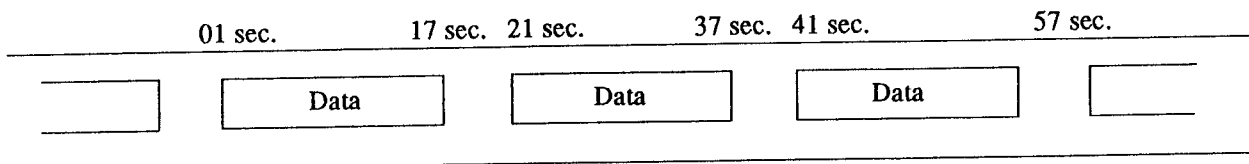
12-hour mode recording and normal mode recording can be performed within one tape.
Data in both recording modes can be reproduced if reproduction mode is switched by the SYSTEM key.

Cautions 1. Maintain tapes carefully and use tapes free from any scratches and dirt because if a drop-out is found on tape, data of one block (equivalent to approx. 2 minutes in 12H mode) can be lost.
2. Since a drop-out is likely to occur around the BOT, it is recommended that recording be performed without data input one minute or more after the BOT. This can also be done in 2H mode. The time is measured by the counter.

10-4 Recording

The key operation in 12-hour mode is basically same as in normal mode, but tape operation is different as described below.

(1) Preparation for recording

Press the REC key at the area where the count of the A counter record is continuous. The system turns into REC/PAUSE mode, causing the LEDs for the REC and PAUSE blinking. Then the tape recording is performed until the tape reaches immediately before a block. At this point, the LEDs for the REC and PAUSE light, indicating that the preparation for recording is complete.

Note: Even in the REC/PAUSE mode, the recording operation continues in the area immediately before a block so that the tape is erased.

(2) Starting recording

Then press the FWD key. The system turns into REC/FWD mode causing the LEDs for REC and FWD blinking, and starts storing the A/D converted data into the memory. On completion of the storing, the data begins to be recorded on the tape.
After that, the tape operation is performed intermittently.
If the FWD key is pressed while the LEDs for the REC and PAUSE is blinking, the LEDs for REC and FWD go blinking, indicating that the preparation for recording is being performed. On completion of the preparation, the system automatically turns into REC/FWD mode, causing the LEDs for REC and FWD light.

(3) Temporary stop of recording

If the PAUSE key is pressed in the REC/FWD operation, the system turns into REC/PAUSE mode, causing the LEDs for REC and PAUSE light and stops the storing data into the memory. Pressing the FWD key again resumes the REC/FWD mode, causing the system to restart the storing the data on the memory from the suspended point and start the recording again. If the EVENT LED has not been lighting when the system turns into the REC/PAUSE mode, ID NO is incremented when the REC/FWD mode is resumed.

(4) Termination of recording

Pressing the STOP key during the REC/FWD operation turns the system into STOP mode, causing the STOP LED blinking. The storing of the data is stopped, then the LED of STOP goes on after recording from memory to tape is completed. While the STOP LED is blinking, no key can be entered.

Note: The system can be operated from the remote control unit just as same as from the recorder unit.

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10-5 Reproduction

The key operation in 12-hour mode is basically same as in normal mode, but tape operation is different as described below.

(1) Preparation for reproduction

Press the PAUSE key in the STOP status. The system turns into PAUSE mode, causing PAUSE LED blinking. The tape is forwarded and the data on the tape is stored in the memory. On completion of the storing, the PAUSE LED goes on, indicating that the preparation for reproduction is complete.

(2) Reproduction

Then press the FWD key. The system turns into FWD mode causing the data to be output from the memory. After that, the tape operates intermittently continuing the reproduction operation. Pressing the FWD key in the STOP status causes the FWD LED blinking, forwarding the tape, then starts the reproduction operation.

(3) Temporary stop of reproduction

If the PAUSE key is pressed in the FWD operation (with the FWD LED lighting), the data output from the memory is temporarily suspended. Pressing the FWD key resumes the output from the memory.

(4) Termination of reproduction

Pressing the STOP key during FWD operation causes the STOP LED go lighting and forces the tape operation to be stopped if it was in operation. The data output from the memory is stopped. Pressing the FWD key again causes the system to reproduce data from the next data block.

Note: The reproduction mode is the mode which is specified by the SYSTEM key. For example, when a tape recorded in 12H mode is reproduced while the SYSTEM key is specified as 3H, the tape is reproduced in 3H mode.
The system can be operated from the remote control unit just as same as from the recorder unit.

10-6 SEARCH

In 12-hour mode, there are two modes of search operation.
The search mode is selected from the SEARCH SOURCE items after pressing the SEARCH key in the FUNCTION key group.

(1) ID NO

Set the ID NO to be searched in two digits in the TARGET POINT field, then press the Y/N key. The system starts high-speed searching with the characters 'SEARCH' blinking indicating that the search operation is being performed. When the specified TARGET POINT is found, the system stores two data blocks of data in the memory starting from that point. Then the search operation is completed causing the blinking of 'SEARCH' to be stopped. The system turns into FWD or PAUSE mode according to the specification of the PLAY MODE. To cancel the search during its operation, press Y/N or STOP key according to the STOP YN indication on the screen.

(2) ID NO + CLOCK

Set the ID NO and the year, month, day, hour, minute, and second (00.00.00:00'00') in two digits for each, then press the Y/N key according to the STOP YN indication. The system starts high-speed searching, and operates as same as the (1) above.

Note: When specifying the year, month, day, hour, minute, and second, specify them from lower digit.

```
┌─────────────────────────────────────────────────────────────────┐
│ SEARCH:           3H/3H        000'05"  02:00'   2   SOURCE  +0%  │
├─────────────────────────────────────────────────────────────────┤
│ SEARCH SOURCE : ID NO/ID NO + CLOCK                               │
│ TARGET POINT   : 00                                               │
│ PLAY MODE      : PLAY AFT TP/PAUSE AT TP                          │
│                                                                   │
│ PRESENT  ID NO 01                                                 │
│          CLOCK: 90.12.06  11:32'29"                               │
│          TITLE :                                                  │
│          MEMO :                                                   │
│                                    ┌──────────────────────────┐   │
│                                    │ SYSTEM LIST              │   │
│                                    ├──────────────────────────┤   │
│                                    │ MPX 2/CAL AC/PAUSE ON    │   │
│                                    │                   ┌──────┤   │
│ SEARCH START [Y N]                 │                   │ED 000│   │
└─────────────────────────────────────────────────────────────────┘
```

Notes 1: The TARGET POINT which is in the last block of the recording section of the tape or in the block immediately before EOT cannot be searched.

2: When the SYSTEM is specified as normal mode (2H), the tape recorded in the 12-hour mode (3H, 6H, and 12H) cannot be searched.

3: When the SYSTEM is specified as 12-hour mode (3H, 6H, and 12H), the tape recorded in normal mode cannot be searched.

10-7 ID NO, EVENT, and Counter

(1) ID NO and EVENT

In 12-hour mode, the operations on ID NO is almost same as in normal mode. The ID NO is incremented at the start of REC/FWD and each time the EVENT key is pressed during REC/FWD operation. The difference of this mode and normal mode is the lighting time of the EVENT LED which goes on when ID NO is incremented. (ID NO cannot be incremented if EVENT LED is on.) In normal mode, the lighting time of the EVENT LED is approx. 9 sec. after ID NO is changed, while in 12-hour mode it is as shown below:

3H mode	6H mode	12H mode
41 sec. max	73 sec. max	137 sec. max

These features are resulted from the restriction in the high-speed search in which ID NO must not be changed more than once in a selfsame data block.

(2) Counter

The counter operates in accordance with the intermittent operation of the tape. By reason of this, tape positioning in reproduction time using the counter as in normal mode is meaningless. In 12-hour mode, search operation does not use the counter. Search is performed by using ID NO or ID NO + CLOCK. The display of the A counter is continued but P TIME is not displayed.

10-8 Filter

In 12-hour mode, there is no internal analog filter at the band of 2.5 kHz or less for the RD-180T, or at the band of 1.25 kHz or less for the RD-200T, respectively. Prepare external filters as shown below if necessary.

(1) Input filter

The external filter with almost equivalent characteristics with the internal analog filter is a 48-dB/OCT low-pass filter (maximum flatness) with the cut-off frequency as shown in the table below.
The use of the 1/2 decimation digital filter for A/D conversion, however, enables almost three times high antialiasing effect of the band even without a analog filter. This reduces the necessity of the external input filter.

(2) Output filter

The external filter with almost equivalent characteristics with the internal analog filter is a 24-dB/OCT low-pass filter (maximum flatness) with the cut-off frequency as shown in the table below.
The use of the four-times over-sampling digital filter for D/A conversion, however, enables a rather formidable filter effect for the band of 1.25 kHz, with approx. 0.5% of distortion.

Setting of external filter cut-off

Band	1.25 kHz	625 kHz	313 kHz
Cut-off of external filter	2 kHz or less	1 kHz or less	500 Hz or less

10-9 CAL Signal

There are four CAL signals: AC CAL (1 kHz), DC+50%, DC-50%, and 0 V. In the 625-Hz band, the CAL signal is almost 0 V. In AUTO mode where four CAL signals are continuously output, CAL signals are almost 0 V when AC CAL is output in the 625- or 313-Hz band.

Note: In the 1.25-Hz band at AC CAL output, the bar-graph display shows considerable dispersion between channels because of samplings.

10-10 Specification (for 12-hour mode)

Tape speed: 8.15 mm/sec. (intermittent recording/reproduction)
Recording/reproduction time: Approx. 3 hr. and 15 min. (3H mode) always DM120 60 m tape
Approx. 6 hr. and 30 min. (6H mode) at continuous recording
Approx. 13 hr. (12H mode)

Input filter:
At the band of 2.5 kHz or more: (RD-200T)
At the band of 5 kHz or more: (RD-180T) } 1/2 decimation digital filter and analog filter are used.

At the band of 1.25 kHz or more: (RD-200T) 1/2 decimation digital filter and 2.5 kHz analog filter are used.
At the band of 2.5 kHz or more: (RD-180T) 1/2 decimation digital filter and 5 kHz analog filter are used.

Output filter:
At the band of 2.5 kHz or more: four-times over-sampling digital filter and analog filter are used.
At the band of 1.25 kHz or more: four-times over-sampling digital filter and 2.5 kHz analog filter are used.

Number of data channels and recording/reproduction frequency

Mode / Band (Hz) / Number of channels	3H				6H				12H			
	10 K	5 K	2.5 K	1.25 K	5 K	2.5 K	1.25 K	625	2.5 K	1.25 K	625	313
2	2				2				2			
3	1	2			1	2			1	2		
4		4				4				4		
5	1		4		1		4		1		4	
6		2	4			2	4			2	4	
8			8				8				8	
9	1			8	1			8	1			8
10		2		8		2		8		2		8
12			4	8			4	8			4	8
16				16				16				16

Note: The number of channels are 2 to 8 only for the RD-180T. The bands are shown only from DC.

Distortion: 0.05% (at the band of more than 2.5 kHz, at 1/2 of the frequency band)
0.5% (at the band of 1.25 kHz, at 1/2 of the frequency band)
Staircase (at the band of 625 Hz and 313 Hz)
Search: Search using ID number or ID number + clock

Memo announce: Recording/reproduction band: 3H mode (400 Hz to 2600 Hz)
6H mode (400 Hz to 1300 Hz)
12H mode (400 Hz to 650 Hz)

Calibration Signal: One of AC50% (1 kHz), DC+50%, DC-50%, and 0 V, or output all 4 continuously by selecting AUTO. Recording and reproduction of AC50% cannot be performed at the bands of 625 Hz and 313 Hz.

Counter: Display at the recording/reproduction is possible only in the A counter

ID number: Incremented at start of recording or each time the EVENT key is pressed. Cannot be updated within a block length.
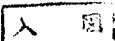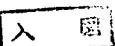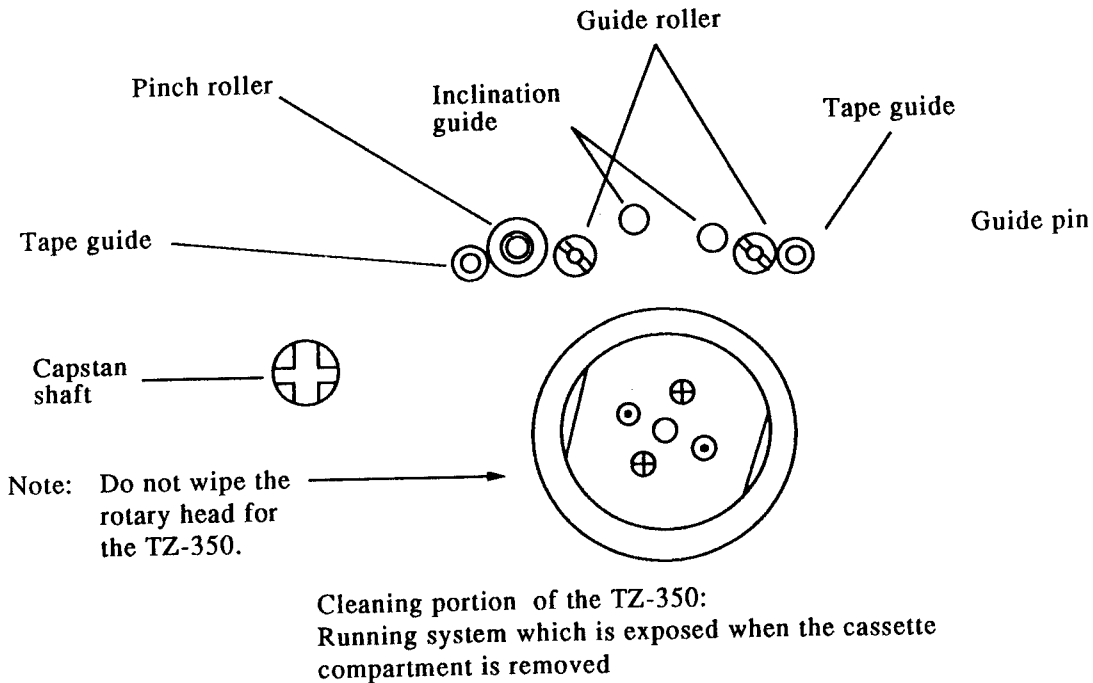
11. MAINTENANCE

As a helical scanning rotary head is used in this unit, the maintenance for this unit is a little different from that for analog data recorders. Read the following explanations and follow the maintenance procedures.

11-1 Head Cleaning before Recording

Clean the rotary head using the accessory cleaning tape either before recording, once a day, or in the event of unusually frequent errors or of missing waveforms. Load the cleaning tape and run it for about 10 seconds, then unload it.

Even in the stop mode, the tape remains loaded and is in contact with the rotary head. Leaving the cleaning tape loaded or running the cleaning tape for a longer period of time than required accelerates head abrasion. Do not rewind the cleaning tape after use. Rewind the tape to the beginning only when it has been used to the end.

The accessory TZ-350 cleaner kit is for cleaning the guides and pinch roller, not for the rotary head. Cleaning the rotary head with this cleaner may help dirt adhere to the head surface or may cause the tape to entangle.

Pinch roller   Inclination guide   Guide roller   Tape guide

Tape guide   Guide pin

Capstan shaft

Note: Do not wipe the rotary head for the TZ-350.

Cleaning portion of the TZ-350:
Running system which is exposed when the cassette compartment is removed

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12. SPECIFICATIONS

12-1 Major Specifications

Recording/Reproduction System:	Multiplex PCM providing analog input and output
Tape:	Conforms to DAT standards
	Maxell tape DM120 is designated. (60 m long, 3.81 mm wide)
	Note: Refer to "Cassette Tape" on page iv.
Recording Format:	Helical scan R-DAT
Quantization:	16 bits
Data Recording Length:	Bit quantization of 14 most significant bits
Recording/Reproduction Heads:	4 (2 heads for recording and 2 heads for reproduction)
	(erasure is done by overwrite.)
Error Correction Method:	Double Reed-Solomon
Tape Speed:	8.15 mm/s (recording/reproduction)
Head Rotation:	2000 rpm (recording/reproduction)
Recording Time:	2 hrs (DM120 60-m tape continuous recording)
Start/Stop Time:	Approx. 2 s
Fast Forward/Rewind Time:	Approx. 60 s (DM120 60-m tape)

12-2 I/O Specifications

Input Voltage:	±0.5, ±1, ±2, ±5, ±10, ±20 Vp
Input Zero Shift:	±100% Set to ON/OFF by trimmer
Input Impedance:	Nominal 100 kΩ unbalanced
Input Filter:	Analog filter and 1/2 decimation digital filter are used.
Output Voltage:	±1, ±2, ±5 Vp, trimmer variable
Output Impedance:	Nominal 75 Ω unbalanced
Output Current:	±10 mA (20 Ω load)
Output Filter:	Analog filter and four-times over-sampling digital filter are used.

Multi-Band Channel and Frequency Combinations

No. of channels	Freq. band			
	DC to 20 kHz	DC to 10 kHz	DC to 5 kHz	DC to 2.5 kHz
2	2	-	-	-
3	1	2	-	-
4	-	4	-	-
5	1	-	4	-
6	-	2	4	-
8	-	-	8	-
9	1	-	-	8
10	-	2	-	8
12	-	-	4	8
16	-	-	-	16

Note: Only channels up to 8 are available in the RD-180T.

Frequency characteristic flat: +0.5 dB. −1 dB

Signal-to-Noise Ration: 72dB (within the bandwidth)

Phase difference between Channels : 5° max.(for recording/reproduction within the same frequency band,
at max. band frequency)
0.69 μ s(20kHz) .
1.39 μ s(10kHz)
2.78 μ s(5kHz)
5.56 μ s(2.5kHz)

Crosstalk: −72dB (within the bandwidth)

Linearity: ±0.2%

Distortion: 0.05%

Drift: ±0.25% or less (after 10 minutes of heat run)

12-3) Environmental Specifications

Operating temperature: 0°C to 40°C (32° F to 104° F)

Operating humidity during: 20% to 80% RH (non-condensing)

Vibration: MIL-STD-810C TABLE 514,2-VI   V   curve

Shock: MIL-STD-810C 30G-11 ms

12-4) Functional Specifications

ID Data: The following recording/reproduction displays
ID number: Incremented at start of recording or each time EVENT
Key is pressed during recording 01 to 99
Clock: Year, month, day: hour, minute, and seconds
Input Range: Input range of all channels
Title: 10 alphanumeric characters (keyed input)
Memo: 50 alphanumeric characters (keyed input)

Search: High-speed search of an ID number

Memo Announce: Frequency response: 400Hz to 2600Hz, recording using
external microphone

Monitors: Bar meter EL display of all channels
Waveform EL display of any two channels
Speaker/earphone (monitor select channel)
Monitor BNC connector (monitor select channel)

Calibration Signal: One of AC50%(1kHz),DC+50%,DC-50%,and 0 V, or output all
4 continuously by selecting AUTO

Panel Lock: Locks all keys

End search: Searches the end of recording or END ID

END ID: Records END ID

Self Test: Tests A/D conversion system and tape drive
Checks the ROM and RAM

Control: F-FWD. REW. FWD. STOP. REC. PAUSE. and EJECT

12-5 Others

|	
Power Supply:	Switching regulator system
Dual AC/DC Supply Voltage:	90 to 250 Vac (50 to 440 Hz)
	11 to 30 Vdc
Power Consumption:	100 Vac: approx. 0.8A (RD-200T)
	approx. 0.7A (RD-180T)
	220 Vac: approx. 0.4A (RD-200T)
	approx. 0.35A (RD-180T)
	12 Vac: approx. 6.3A (RD-200T)
	approx. 5.0A (RD-180T)
Dimensions (W x H x D)	Approx. 440 mm x 150 mm x 270 mm
	(17 5/16" x 5 7/8" x 10 5/8") (excluding protrusions)
Weight:	Approx. 13Kg (28.7 lbs.) (RD-200T)
	Approx. 12.5Kg (27.6 lbs.) (RD-180T)

12-6 External View and Dimensions (RD-200T)

See next page.

12-7 Standard Accessories

Magnetic tape	············	1
BNC cable	···········	33 (RD-200T)
	···········	17 (RD-180T)
AC supply cable	···········	1
DC supply cable	···········	1
Microphone	···········	1
Earphone	···········	1
Cleaning tape	···········	1
Cleaner kit	···········	1
Fuses : AC	···········	1 (Not applied to type CE)
DC	···········	1
Vinyl container for accessories	···········	1
Instruction manual	···········	1
Unit vinyl cover	···········	1
Small screw driver	···········	1
Front angle	···········	1
Power supply unit AD-101	···········	1 (Only applied to type CE)

Separately available accessories		
Memory board (6M bytes)	···········	MB-400
Remote control unit	···········	ER-42
12-hour mode function	···········	LP-200
Others		

External View and Dimensions

90176299

270(10-5/8)

440(17-5/16)

149(5-7/8)

14.5(9/16)
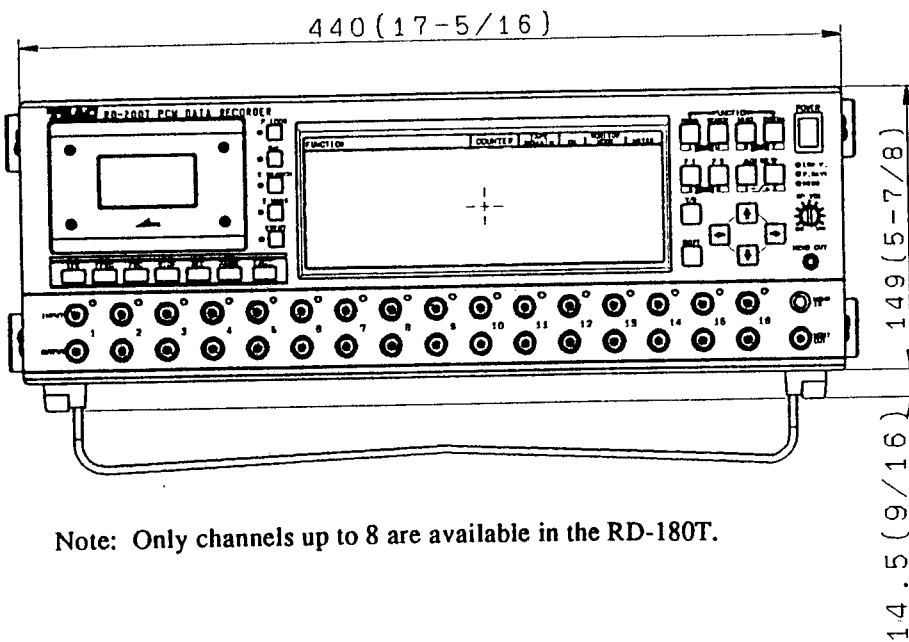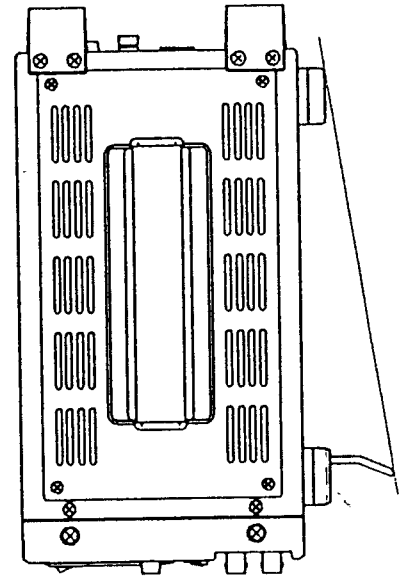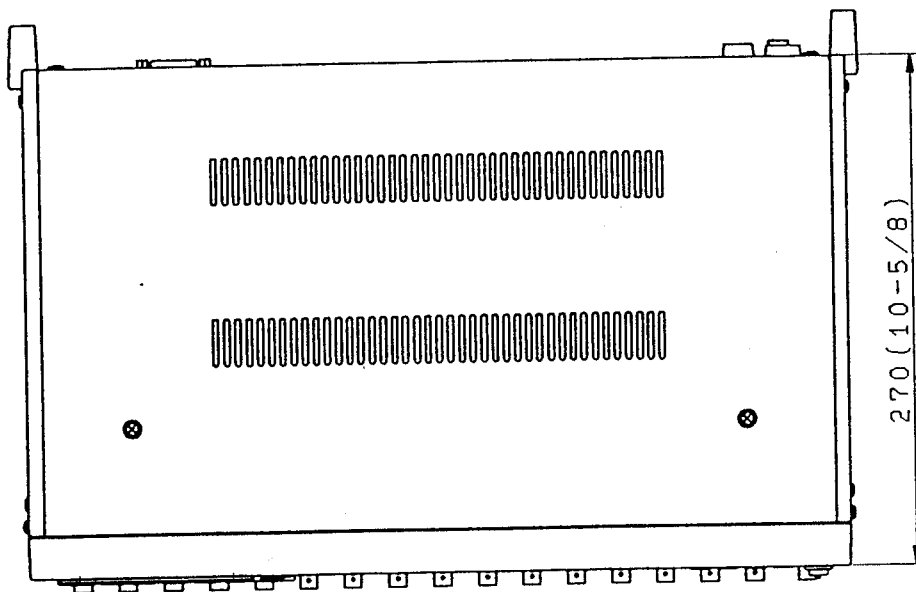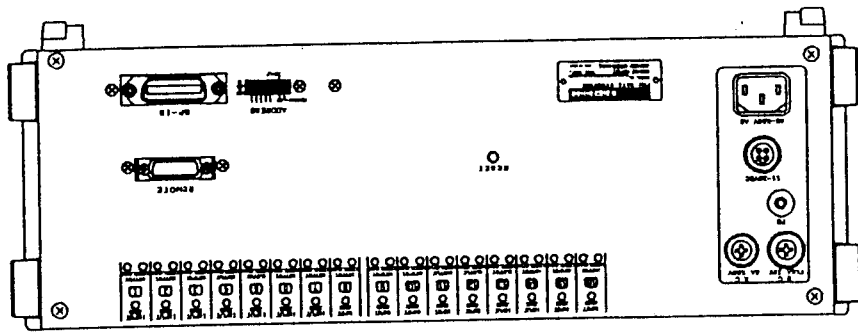
Unit: mm (inches)

Note: Only channels up to 8 are available in the RD-180T.

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