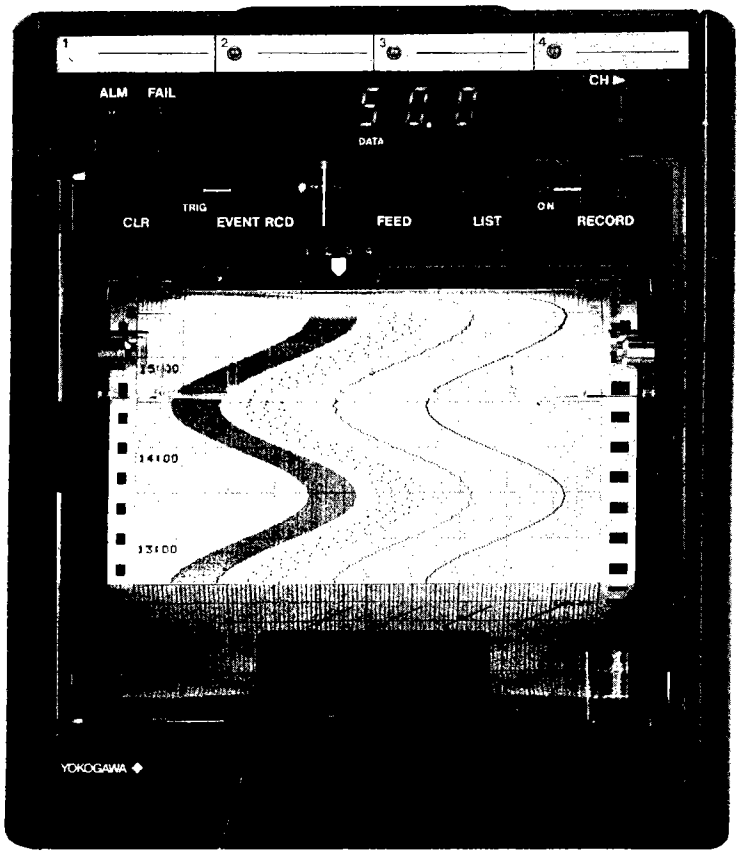
Instruction Manual

Model SRHD (Style E) Intelligent Recorder

YEWSERIES 80

FOR REFERENCE ONLY



YOKOGAWA
Yokogawa Electric Corporation

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3rd Edition

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1. HANDLING CAUTIONS.

The Model SRHD is throughly tested at the factory before shipment. When this instrument is delivered, perform a visual check to confirm that no damage occurred during shipment.

If you have any problems or questions, contact your nearest YOKOGAWA service center or sales representative.

(1) Models and Specifications.

Please check the model and specification.

The model and suffix code are indicated on the data plate attached to the instrument side panel.

Please verify that they are the same as those specified in the original order.

(2) Accessories

Please check that all accessories are present. (Refer to the accessory list of clause 2–3.)

(3) Pen Carriage Stopper

Take off the pen carriage stopper which prevents pen carriage damage during shipment.

Before reshipment of the recorder, be sure to replace the stopper.

NOTE

Please read this manual thoroughly (Chapter 2 to Chapter 5) before operating the recorder.

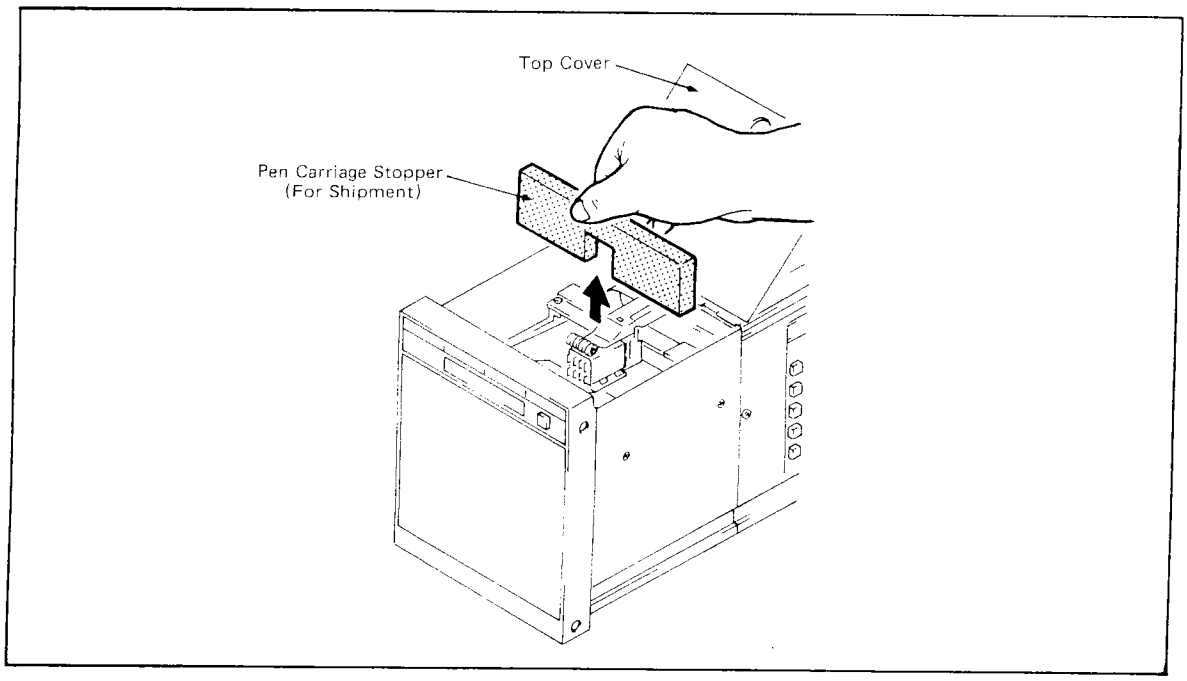


Figure 1-1. Pen Carriage Stopper.

2. GENERAL.

The Model SRHD Intelligent Recorder is a microprocessor based multi-channel dot printing analog recorder.

The recorder has four 1 to 5 V DC or 0 to 10 V DC input channels. In addition to ordinary continuous recording functions*, the recorder is provided with event recording functions.

For ordinary recording, there are five recording modes – dot printing of instantaneous, average, max. or min. values, and trace recording of max/min. values.

For the event recording function, a status input (contact, or voltage level) is used as a trigger signal. When the trigger occurs, a preset number of pre-trigger instantaneous value data are held in memory. After the trigger occurs, a preset number of post-trigger instantaneous value data are added to memory. The total number of pre-trigger and post-trigger data may be up to 700. The stored analog event data can be printed automatically or manually, and can be recorded on the chart with time axis expanded, so considerable detail is visible. (Event Recording).

Please refer to Chapter 6 for details of the event recording function.

Note*: The Model SHRD also has event recording functions, so hereafter, continuous recording will be called "ordinary recording".

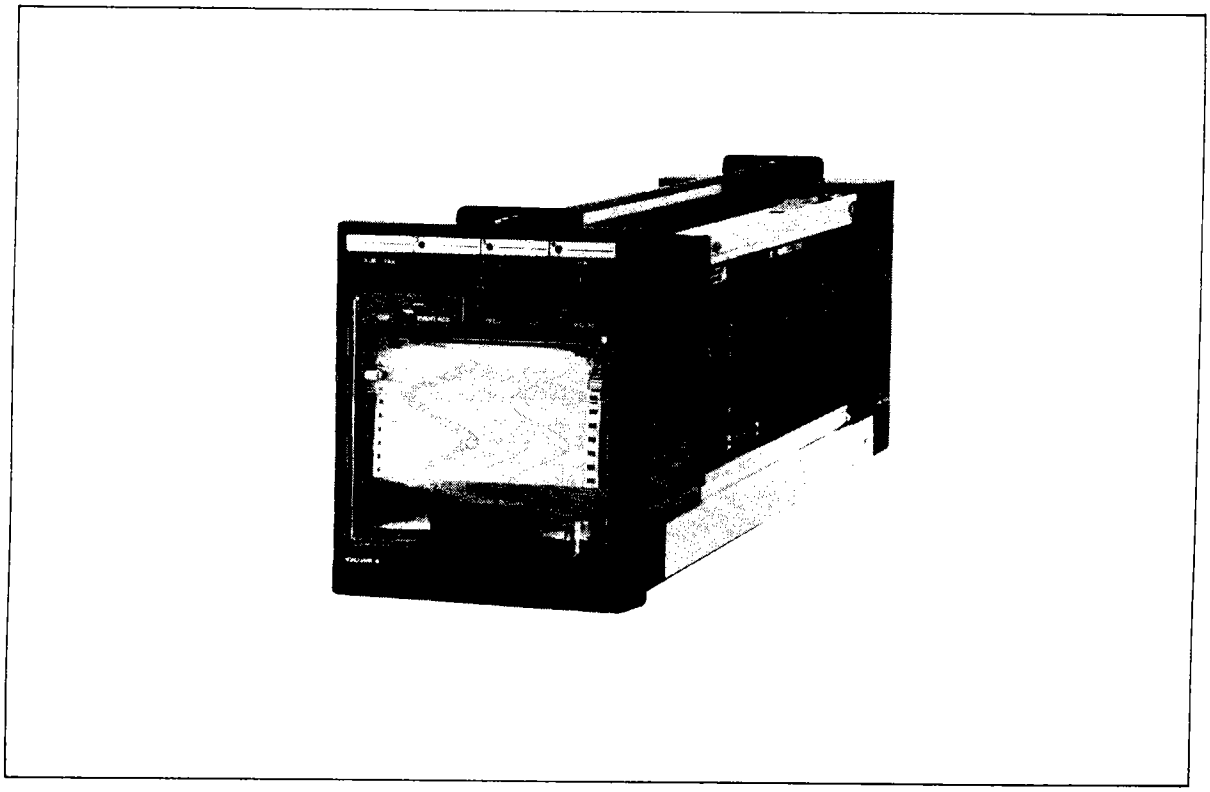


Figure 2-1. External View.

2-1. Standard Specifications.

Input and Output Signals

Analog Input: 4 points

Model	Input Signals	Input Resistance
SRHD-100	1 to 5 V DC	1 MΩ or greater
SRHD-200	1 to 5 V DC	1 MΩ or greater
SRHD-300	0 to 10 V DC	500 kΩ or greater

Trigger Input: One point. (use any as Event-recording or External Record Start/Stop Switching or External Chart Speed Selector).

Input \ Trigger Input Status		ON	OFF
Mechanical Contact or Voltage Level	Mechanical Contact*	Open (Signal source resistance — 100kΩ or greater)	Closed (Signal source resistance — 200Ω or less)
	Voltage Level	HIGH (Input voltage 4.5 to 25V)	LOW (Input voltage −1 to +1V)

* Signal source rating: 5V DC, 20mA or greater.

External Record Start/Stop Switching: RECORD OFF state when remote contact opens.

External Chart Speed Selector: Chart Speed 20 mm/min when remote contact shuts.

Alarm Output: Four points, transistor contact (isolated type).

Fail Output: One point, transistor contact (isolated type).

Input Processing Functions

Input Data Scan Period: 0.25 sec.

Signal Computation: Square-root extraction, zero bias correction.

Recording Mode: The following modes can be selected for each channel.

Instantaneous value dot printing, average value dot printing, maximum and minimum value dot printings, maximum/minimum value trace printings (for chart feed speed 10mm/h, 20mm/h and 1mm/min only).

Recording System

Dot printing and trace recording by 4-color pen heads located in-line on a common axis.

Pen Head: Cartridge type pen.

Ink Color: Red, green, blue and black.

Recording Width: 100 mm.

Chart Feed Speed: 10 mm/h, 20 mm/h or 1 to 20 mm/min. (Uses the side tuning panel keys).

External Selector and Front-panel Selector in Chart Speed: 2 speeds; setting chart speed and 20 mm/min.

Chart: Folded chart, total length 16 m (sufficient for about 1 month use at a chart speed of 20 mm/h).

Recording Period: Automatically determined by chart feed speed setting as described below.

Chart Feed Speed	Recording Period
10mm/h	90sec.
20mm/h	45sec.
1 to 10mm/min	15 to 1.5sec.
11 to 20mm/min	1.5sec.

Process Variable Indicator: Process Variable Pointer on the pen carriage—selected using the front panel data display selector switch—can be indicated while waiting for printing (for chart feed speed 10 mm/h and 20 mm/h only).

Internal Lighting: Fluorescent lamp can be continually lighting.

Process Variable Display: Process variable display can be selected using the front panel data display selector switch.

Displayed Data: Sign plus 4-digits in engineering units.

Printing Functions

List Printing (list/data set internally): Dot-printing system.

Print Start: Uses the front panel push-button switch.

Printed Items: Year, month, day, time, recorder number, chart-feed speed, tag number, recording mode, input filter time constant, unit, range, input bias, square-root extraction, alarm setpoint, event recording parameters (including scan period, number of predata, number or post-data, trigger source).

Hourly Printing: Time and date (only when the chart feed speed is set to 10 mm/h or 20 mm/h).

Scale Printing: Scale (0, 100% scale value), engineering unit, channel no.

Scale items can be printed in order for each 120 mm (for chart feed speed 10 mm/h and 20 mm/h only).

Alarm Printing: Alarm occurrence/release time, mark, channel no., alarm kinds (for chart feed speed 10 mm/h and 20 mm/h only).

Event Recording Functions

Data—instantaneous data—for all channels can be collected.

Event Trigger: Remote contact input or internal alarm.

Retained Data: 700 process data for each channel.

700 process data (predata plus post-data)—in effect just before and after the occurrence of a particular event—can be selected.

Scan Period: 0.25 to 10 sec. (in increments of 0.25 sec.).

Collection Period: 128 to 7000 sec.

Rerecording Time: Approx. 18 min. (for recording 700 process data).

Number of Recording Data: 40 data/10 mm.

Rerecording Start: Automatic start after completion of data collection or manual start after event trigger occurs using the front panel push-button switch (AUTO/MAN can be set using side tuning panel keys).

Alarm Functions

Setting Point: Independent high/low-limit and velocity limit settings for each input.

Output Points: Four NC (normally closed) or NO (normally open) contacts. Logical OR connections can be made between individual setting points.

Velocity Limit Alarm Setting Range: 0.0 to 100.0 (nondiscriminative alarm).

Velocity Limit Alarm Setting Time: 0 to 9999s.

Mounting:

Flush panel mounting. Instruments are in housings, and may be mounted individually or side-by-side. For inclined mounting, instruments may be inclined up to 75° from vertical (rear of instrument lower than front).

Wiring:

Signal Wiring to/from the Field: ISO M4 size (4 mm) screws on terminal block.

Power and Ground Wiring:

100 V version: JIS C 8303 two-pin plug with earthing contact. (IEC A5-15, UL498).

220 V version: CEE 7 VII (CENELEC standard)plug.

Cable Length: 300 mm.

External Dimensions: 182.5 (H) × 157 (W) × 480 ((D): depth behind panel surface) (mm).

Weight:

Recorder: 5 kg (excluding housing).

Housing: 2.5 kg (excluding mounting kit).

Normal Operating conditions

Ambient Temperature: 0 to 50°C.

Ambient Humidity: 5 to 85% relative humidity (without comdensation).

Power Supply: Two versions, for "100 V" (standard) or "220 V" (option/A2ER). Both versions may use AC or DC, without change to the instrument:

Version	100V	220V
DC (polarity reversible)	20 to 130V	120 to 340V
AC (47 to 63Hz)	80 to 138V	138 to 264V

2-2. Options.

/A2ER: For "220 V version" power supply.

/MTS: Recorder supplied with kit for individual mounting. For group mounting, see GS 1B4F1-E.

/SCF-G□M: Mounting kit bezel color change form standard color (black). Choose color form set of optional colors (see GS 22D1F1-E). Specify color code in space.

/NHSD: Instrument without housing. See GS 1B4F1-E to order housing separately.

/NP: Lettering on front panel nameplate (see GS 22D1C4-E).

/NPE: Letters engraved on front panel nameplate (see GS 22D1C4-E).

2-3. Accessories.

Parts Name	Quantity	Description
Chart paper 0 to 1000 (U)	6 boxes	One box contains one sheave of strip charts (chart no. E9721NB) good for about 1 month at a chart feed speed of 20mm/h per sheaf
Cartridge type pen (red)	3 pens	Part No. E9721PF
Cartridge type pen (green)	3 pens	Part No. E9721PH
Cartridge type pen (blue)	3 pens	Part No. E9721PG
Cartridge type pen (black)	3 pens	Part No. E9721PE
Fuse	1 fuse	1 A
Applicator	20 pieces	
Brush	2 pieces	
Sheet	1 piece	
Channel color seal	4 seals	Red, green, blue and black seals

2-4. Model and Suffix Codes.

Model	Suffix Code		Description
SRHD			Intelligent Recorder
	-1		Without input isolation (for use with YS80)*1
	-2		With input isolation
	-3		With differential input
	00		Always 00
Style Code	***E**		Style E
		/A2ER	220V power supply *2
		/MTS	With mounting kit
		/SCF-G□M	Bezel color change
		/NHSD	Without housing
		/NP	Nameplate lettering
		/NPE	Nameplate engraving

Note:

•1: Each input terminal (−) is used as a common terminal.

•2: When ordering housing separately, specify /A2/NHSD.

3. INSTALLATION AND WIRING.

3-1. Installation.

Please refer to the Instruction Manual "Panel Instrument Mounting" (IM 1B4F1-01E) for general mounting/installation information.

■ **Installation**

Figure 3-1 shows the side view of model SRHD.

Securely connect the connector inside the housing to the internal unit. Push the internal unit into the housing gently. The internal unit has an intermediate stopper spring. While pressing down on this spring, push the unit into the housing until it stops.

When the unit is completely installed in the housing, it's locked by the internal unit stopper located on the bottom of the front panel.

■ **Removal.**

Push up the stopper located on the front panel bottom and pull the internal unit towards you.

The unit is stopped by an intermediate stopper spring. Data setting may be carried out at this point.

To remove the internal unit from the housing, push down the intermediate stopper spring while pulling the unit out of the housing.

3-2. Wiring.

Connect external wires (such as wires to be connected to the instrument measuring input terminals) to the terminal board (with ISO 4 mm screw terminals).

The terminal board appears when the terminal cover is taken off. After wiring, please be sure to fit the terminal cover (see Figure 3-2).

Wiring should be performed according to Table 3-1.

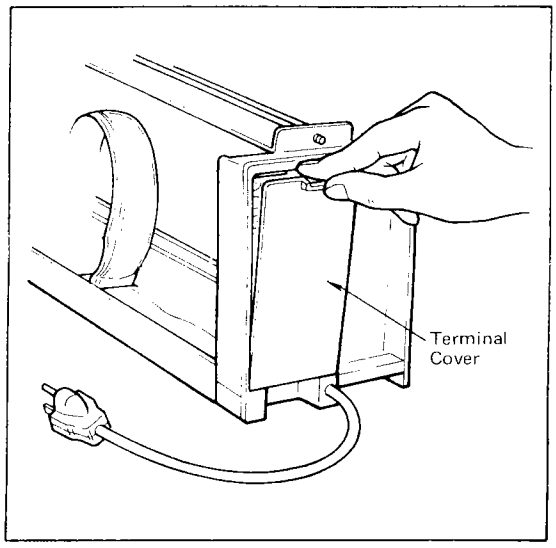


Figure 3-2. Removing the Terminal Cover.

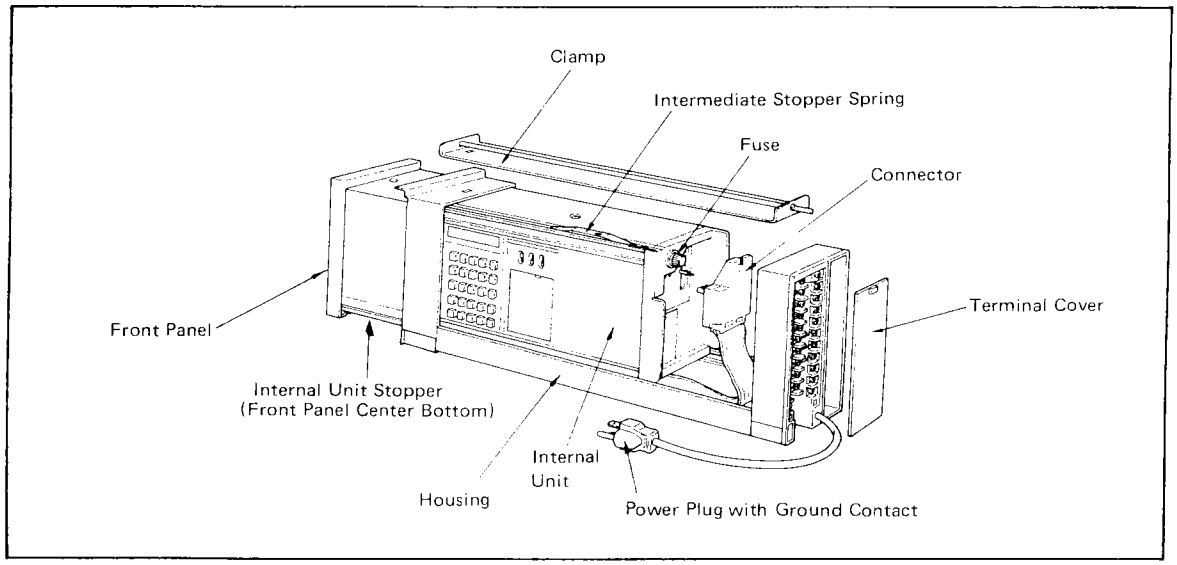
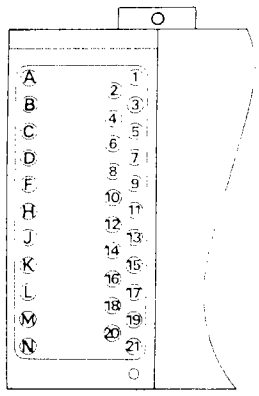


Figure 3-1. Side View of Model SRHD.

Table 3-1. Terminal Connections.



Terminal Designation	Description
1	+ > Input Signal 1
2	– > Input Signal 1
3	+ > Input Signal 2
4	– > Input Signal 2
5	+ > Input Signal 3
6	– > Input Signal 3
7	
8	
9	+ > Input Signal 4
10	– > Input Signal 4
11	+ > Event Trigger Input or Record Start/Stop Trigger Input or Chart Speed Change Trigger Input
12	– > Event Trigger Input or Record Start/Stop Trigger Input or Chart Speed Change Trigger Input
13	
14	
15	+ > Alarm Output 4
16	– > Alarm Output 4
17	
18	
19	+ > Alarm Output 3
20	– > Alarm Output 3
21	– — FAIL Output (– terminal)
A	
B	
C	
D	
F	
H	
J	+ > Alarm output 1
K	– > Alarm output 1
L	+ > Alarm output 2
M	– > Alarm output 2
N	+ — FAIL Output (+ terminal)

3-3. Wiring Precautions.

(1) Furnish all cable ends with solderless crimp-on lugs (ISO M4 Screw Type).

(2) Isolated type transistor switch contacts are used for fail and alarm contact outputs. Alarm contact outputs are designated either NC (normal-closed) or NO (Normal-open) on the tuning panel.
Fail contact outputs are opened if failure occurs. When driving remote equipments using these outputs, wire in accordance with the following instructions.
- Do not connect any load exceeding the contact rating of 30 V DC 200 mA.
- Connect a protection diode (surge absorber) in parallel with inductive loads such as relays to protect the transistor switch from transients when energizing or deenergizing external circuits. (See Figures 3-3, 3-4.)
- Match the power polarity to the terminal markings when connecting the power supply used to drive the external equipment (See Table 3-1).
- An AC load cannot be switched directly using a transistor contact. In this case, provide a repeating relay or equivalent. (See Figure 3-4).

(3) Prepare no-voltage contact or voltage level* for event trigger, record start/stop trigger or chart speed change trigger input signals.
Wiring should be performed according to Figures 3-5 and 3-6.
When the event occurs (ON), the contact needs to stay over 500 ms in the open (HIGH) state.
In record start/stop mode, when the contact is opened (HIGH), recording stops, and when the contact is closed (LOW), recording starts.
In chart feed speed change mode, when the contact is opened (HIGH), chart speed is the setting speed and when the contact is closed (LOW), chart speed is 20mm/min.

Note: * See GS 1B4B2-01E in the rear of this Instruction Manual for contact/voltage specifications.

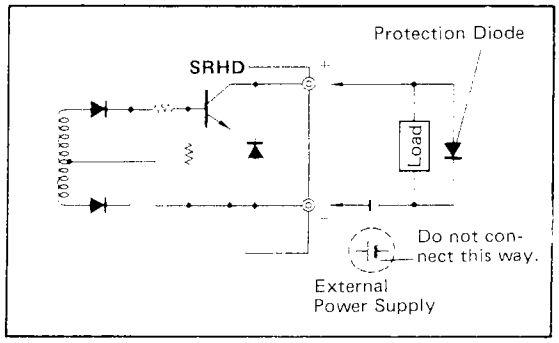


Figure 3-3. Contact Output Connection to External Load.

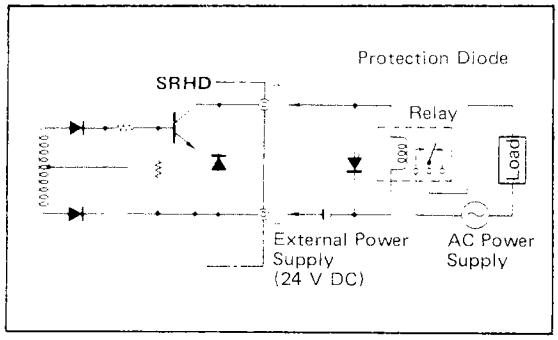


Figure 3-4. Connections for Switching an Alternating Current (AC) Load.

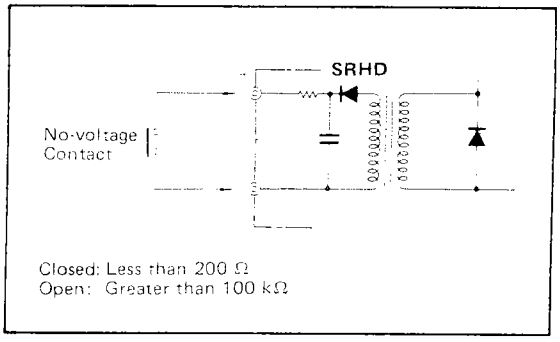


Figure 3-5. Trigger Input Signal Connection Using (No-Voltage) Contact.

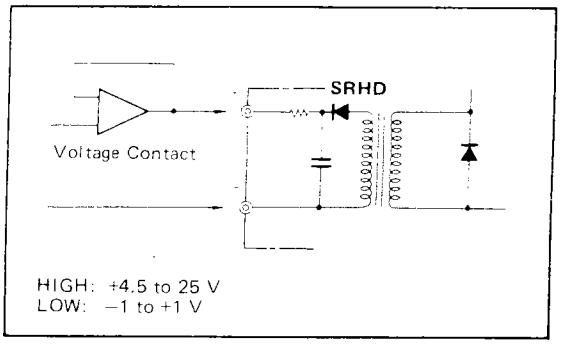


Figure 3-6. Trigger Input Signal Connection Using Voltage (Contact) Signal.

4. CONSTRUCTION AND INPUT/OUTPUT CIRCUIT.

The construction of the model SRHD is shown in Figure 4-1. The recorder module on the front panel contains chart drive and pen servo mechanisms.

The tuning panel, isolator card, interface card, CPU card etc. are installed in the rear of the unit. The input/output signals and power supply are connected to the housing via a connector located on the instrument rear panel.

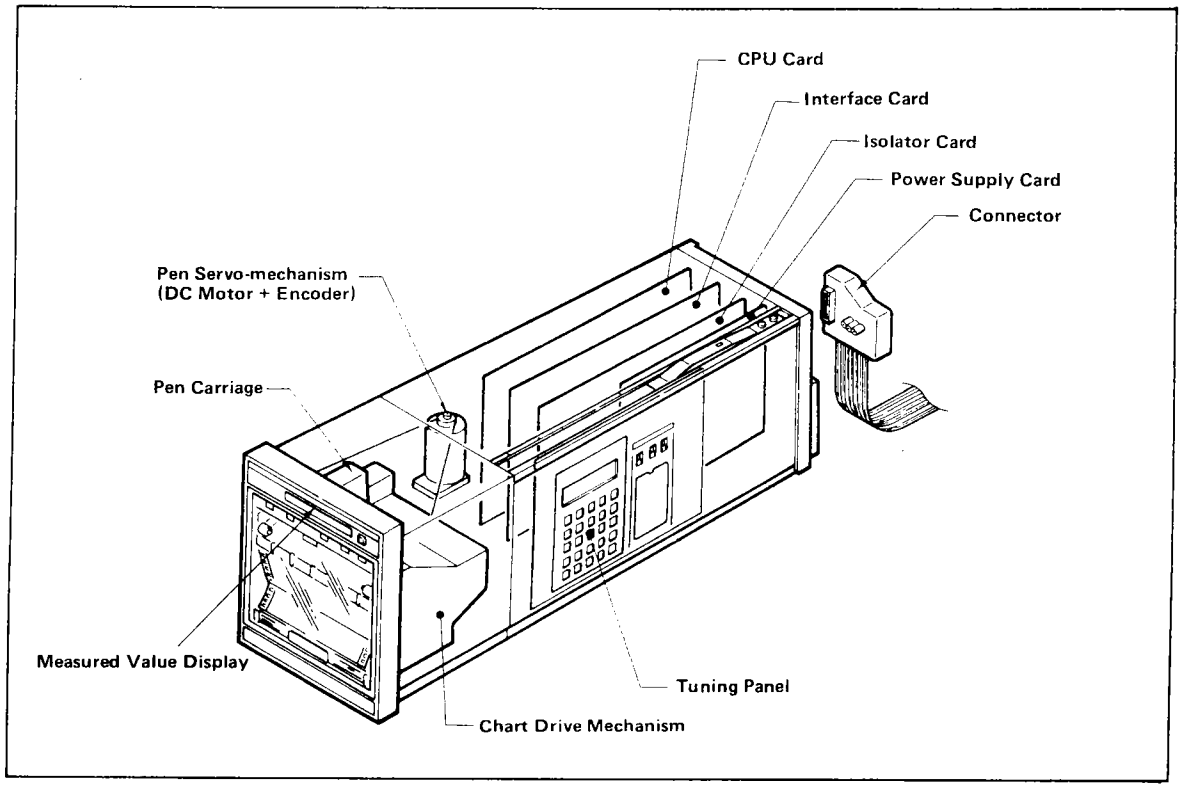


Figure 4-1. Construction of Model SRHD.

4-1. Chart Drive Mechanism.

Figure 4-2 shows the chart drive mechanism. Model SRHD has an automatic chart loading mechanism. When the chart stock (with chart) is put into the chart stock fixing position, the optical sensor detects the chart and the feed roller rotates. The chart is fed by this feed roller through the chart feed slot to the slide roller. The optical sensor on the chart feed slot detects the perforations at the chart edge, and controls chart feed rate according to the timer in the recorder and the chart time axis marking.

The recorder can't be operated unless the chart is loaded correctly.

The optical sensor for chart detection, besides being used in chart loading as mentioned above, detects chart end and lights an ALM LED.

4-2. Pen Servomechanism.

The model SRHD has a digital pen servo-mechanism, driven by a DC motor directly coupled to a rotary encoder. The pen carriage with four dot pens is linked to the DC motor by wire, and when the designated pen reaches its balance point, it prints by solenoid impact method. When all channel recording is completed, the chart is fed for the recording period to prepare for the next recording and the above sequence repeats.

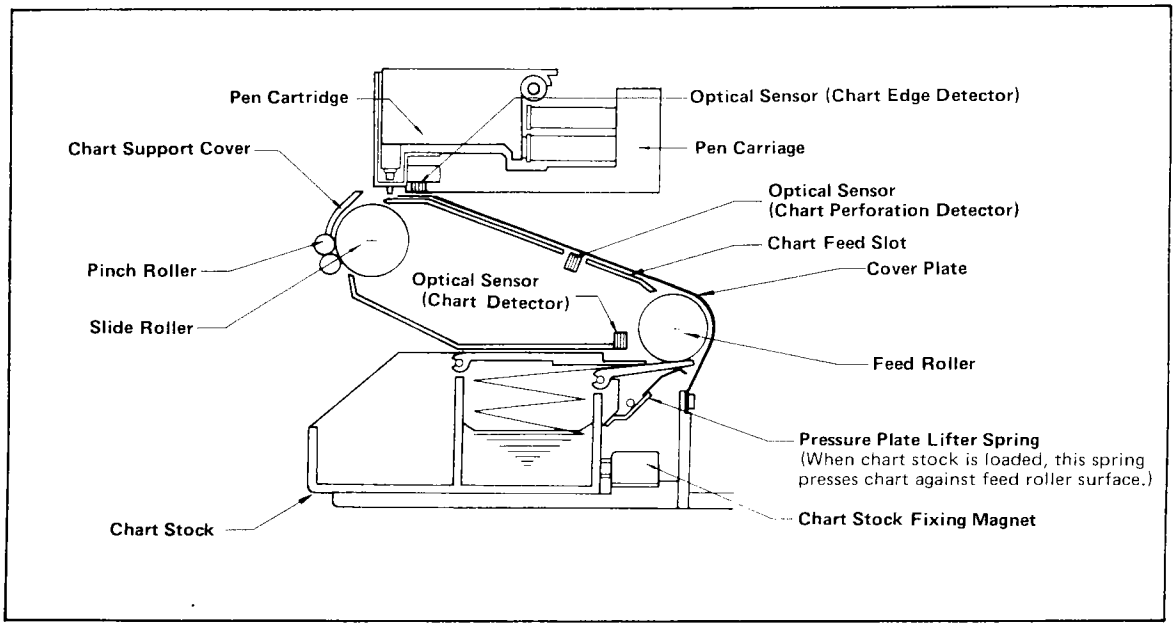


Figure 4-2. Chart Drive Mechanism (Side View).

4-3. I/O Signal Circuit.

Figure 4-3 shows the block diagram of I/O signal circuit.

Analog input signals (1 to 5 V DC or 0 to 10 V DC) enter the isolator card. For the non-isolated type recorder the isolation amplifier is not equipped and input signals are connected to the multiplexer through jumper wires (J11 to 14, J21 to 24). In this case, the (–) input line is the common line.

Digital outputs are transformer-isolated, and are output to the field as open-collector contact signals.

For 0 to 10 V DC input, a differential input amplifying circuit (Figure 4-4) is used as an isolator card.

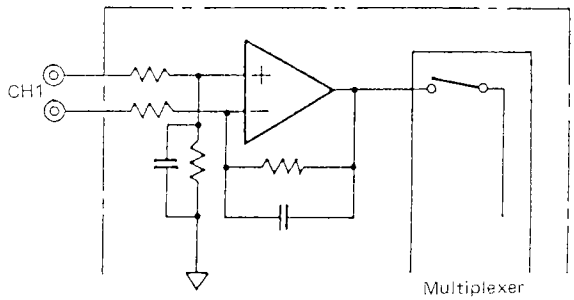


Figure 4-4. Differential Input Circuit.

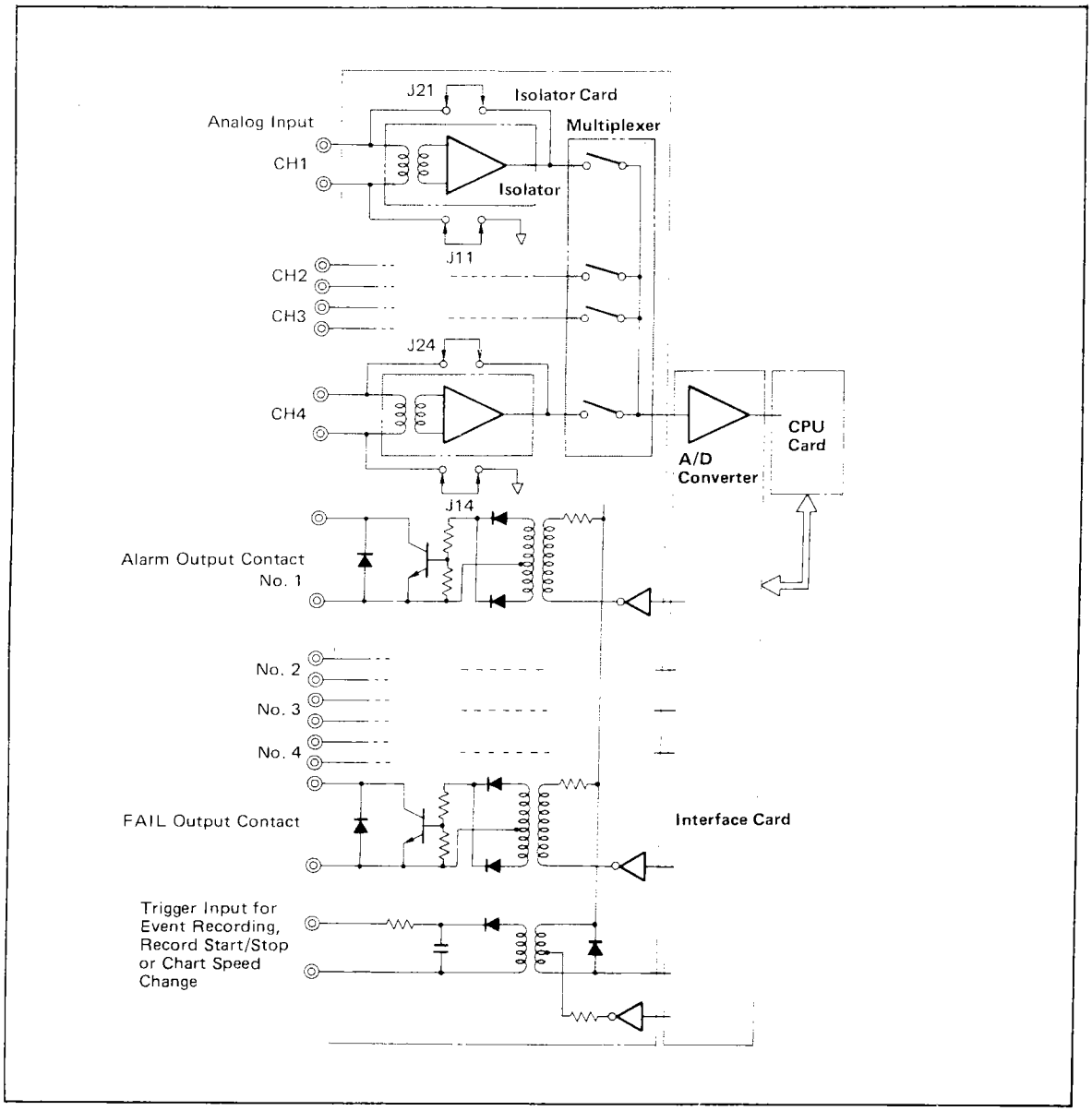


Figure 4-3. I/O Signal Circuit.

5. OPERATION.

The names of items on the model SRHD front panel are shown in Figure 5-1. In this chapter, the recorder mainframe is called the "internal unit".

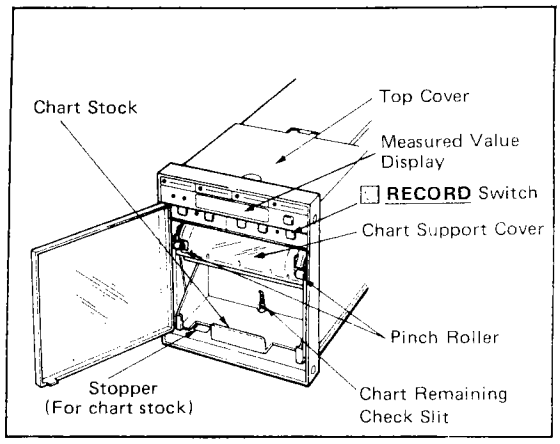


Figure 5-1. Recorder Front View.

5-1. Preparation for Operation.

The housing should be fixed to the instrument panel. When installing or removing the internal unit, please turn off the power.

5-1-1. Action to be Taken When Power is Turned ON.

For date and time, the built-in battery backs up the recorder clock in power-OFF status. When the clock is abnormal, if power is turned ON, the **ALM LED** lights (ALM contents can be confirmed with the message "TIME ERR" by pressing the ALM key on the side tuning panel. See Chapter 8). Set date and time (see 5-2. Data Setting).

5-1-2. Removing or Inserting Pen Cartridge.

Before removing or inserting the pen cartridge, be sure to turn the RECORD switch "OFF" (please refer to Clause 5-3.).

Push up the internal unit stopper (Figure 3-1) and pull the internal unit towards you, open the top cover, and you can see the pen cartridge.

The cartridge pens, viewed from the front and from left to right, correspond to channels 1, 2, 3, 4 respectively. Normally the cartridge pens are set from left to right in order, red, green, blue and black, but settings are user-selectable. For an indication of cartridge pen colors corresponding to channels, it is useful to stick the supplied channel color seals on each channel part of the nameplate.

Hold the cartridge pen (see Figure 5-2), lightly slide it downward into the pen carriage guide slit, and press on the clamp to secure it. When the cartridge pen is set in the pen carriage and clamped, the cartridge pen insertion is completed.

After setting the cartridge pen, please confirm that it springs back when pressed down lightly (Figure 5-3).

For cartridge pen removal, first lift the clamp part, then pull the pen upwards.

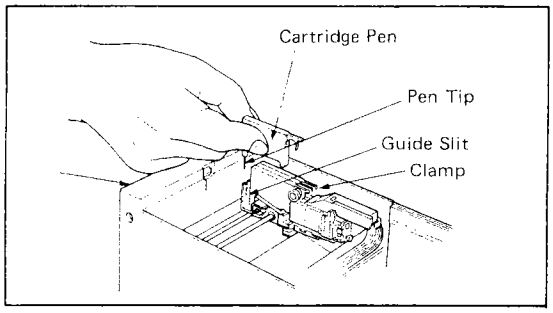


Figure 5-2. Cartridge Pen Replacement.

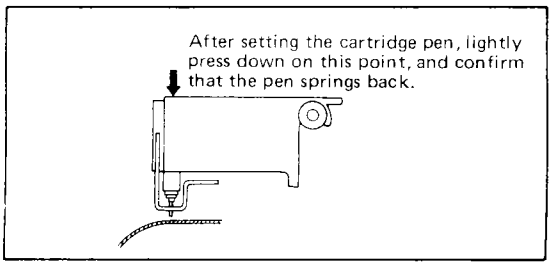


Figure 5-3. Confirmation of Cartridge Pen Setting.

NOTE

Cut open (don't tear open) the cartridge pen pack, and take care not to bent the cartridge pen clamp.

If the clamp part is slightly bend, pleade fix it with your hand.

5-1-3. Chart Loading.

The Model SHRD has an automatic chart loading mechanism. When the chart stock is pushed into the chart stock position in the recorder, the chart is loaded automatically by a command from the optical chart sensor.

NOTE

Please do not pull the chart stock during recording. If the chart stock is pulled, take out the chart and reset again. (refer to Section 5-1-4.)

(1) "Fan" the chart paper sufficiently prior to loading it in the chart stock (see Figure 5-4) and confirm that there is no punch-confetti in the square holes at the chart edge.

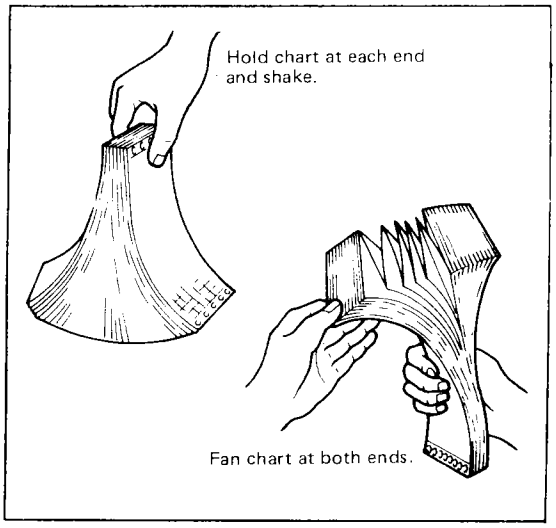


Figure 5-4. Fanning Chart.

(2) Confirm that the chart end is correctly cut off at a perforated line and is not warped or twisted. (see Figure 5-5).

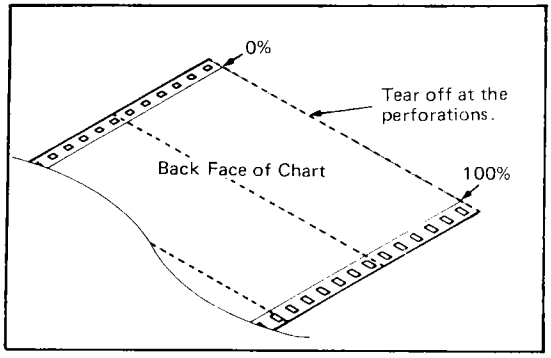


Figure 5-5. Chart End.

(3) Open the front door (see Figure 5-6) press down the stopper and pull the chart stock (tray) out of the internal unit.

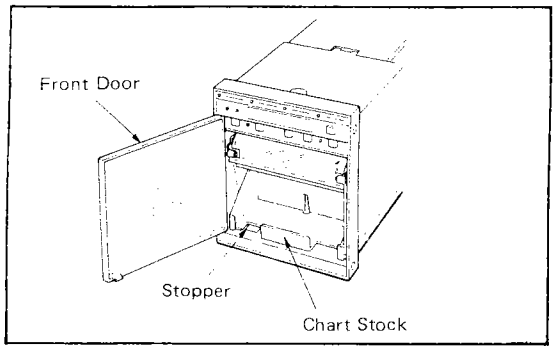


Figure 5-6. Pulling Out the Chart Stock.

(4) Observe the chart scale marks (0% and 100%), and note that the chart should be loaded so that its back faces upwards (Figure 5-8).

(5) While holding the stock as shown in Figure 5-7, and guiding the chart with your fingertips, push the chart into the stock so that the chart bottom completely contacts the chart stock bottom.

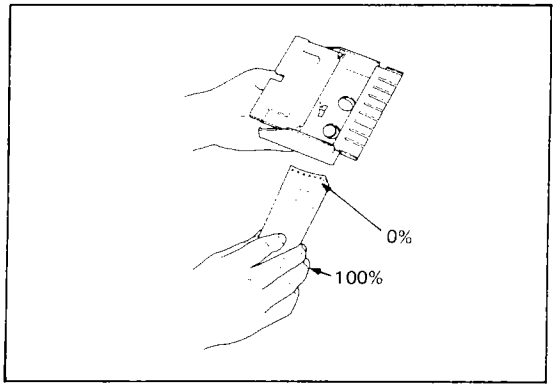


Figure 5-7. Holding Chart and Chart Stock.

(6) The inside of the stock is slightly narrower than the chart (width between two perforated lines), so the chart must be pushed into the stock so that it is under the duplicate feeding prevention claw as shown in Figure 5-8.

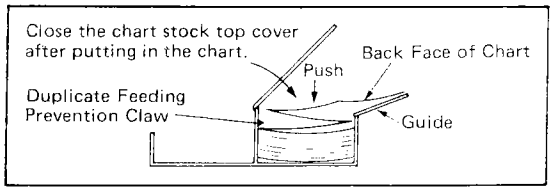


Figure 5-8. Loading Chart in the Stock.

(7) Load the chart with its back face upward.

(8) Chart end (tear off at perforation) should be aligned with the guide end.

(9) When the chart stock top cover is closed, the chart condition must be as shown in Figure 5-9.

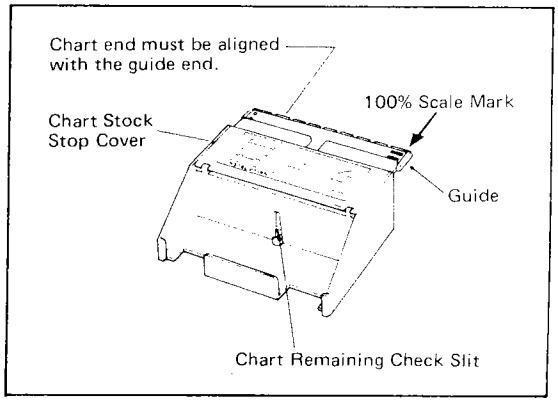


Figure 5-9. Chart Stock.

(10) Confirm that the power is correctly supplied to the recorder.

(11) While lightly pressing the chart stock top cover, gently install the stock in the recorder.

(12) When the stock is pushed into the recorder until it is locked by the stopper, the slide roller starts revolving and the chart is automatically loaded (see Figure 5-10).

(13) The chart stops after being fed approximately 150 mm from slide roller.

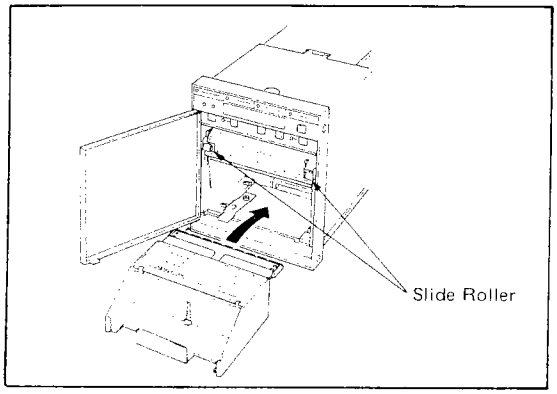


Figure 5-10. Chart Stock Insertion.

5-1-4. Chart Removal (Chart Miss Loading).

The chart is loaded automatically, however, if the chart jams, **ALM LED** lights and a message is displayed on the measured value display. (Please refer to Chapter 8.)

Message	Description
C.L.Er	: Chart loading failure
C.F.Er	: Chart feed error during normal recording (Duplicate feeding etc.)

Chart removal is described below.

NOTE

If the chart does not load properly, please do not press the feed switch, instead take the following steps.

(1) Tear off the recorded chart at perforation (see Figure 5-11).

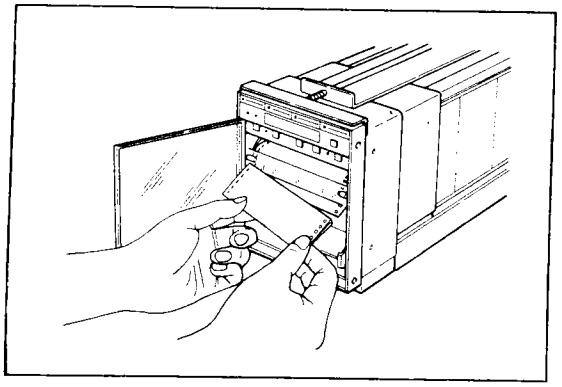


Figure 5-11. Chart Cutting.

(2) Push the chart support cover (clear acryllic plate) to the left, rotate it towards you and take it off gently.

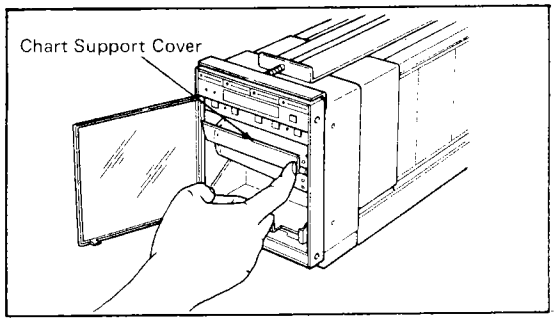


Figure 5-12. Chart Support Cover Removal.

(3) Remove the chart from the pinch roller. (see Figure 5-13).

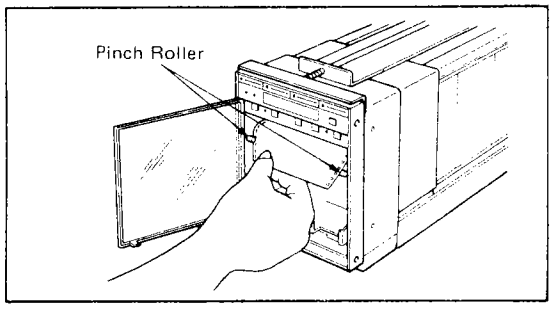


Figure 5-13. Pinch Roller.

(4) Push down the stopper and pull the chart stock out of the unit.

(5) Set the chart switch (CHART) on the tuning panel to the "RETURN" position.

(6) Pull the chart gently from under the feeding roller at the same speed as the roller rotation to completely remove the chart.

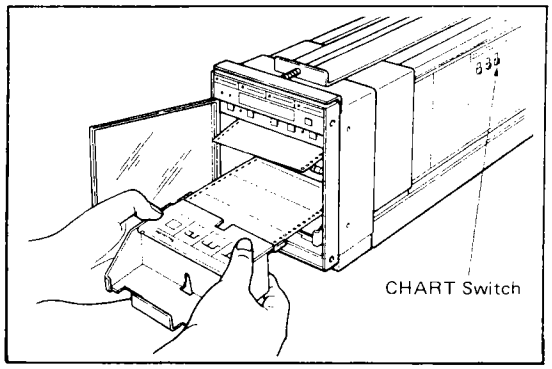


Figure 5-14. Chart Removal.

(7) After pulling out the chart completely, reset the chart switch (CHART) to the "NORMAL" position.

(8) Replace the chart support cover (reverse of step (2)).

(9) If any paper strips remain in the chart feed slot, use a pair of tweezers to remove whole paper strips through the chart feed slot that can be seen when the top cover is open (see Figure 5-15).

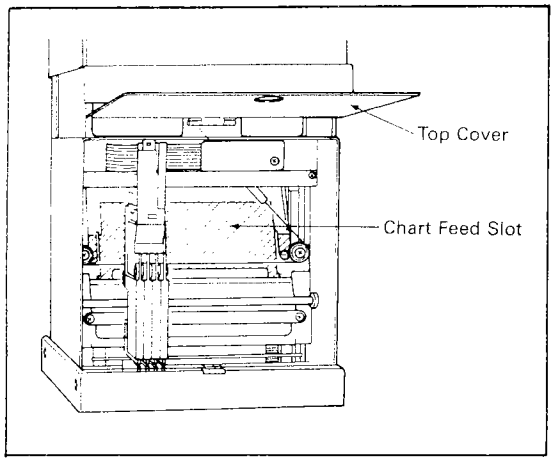


Figure 5-15. Chart Feed Slot.

(10) Reload the chart according to the procedure described above (clause 5-1-3).

NOTE

(1) Chart rewind switch (CHART) should not be set to "RETURN" except during the above procedure.
(2) To disassemble the chart feed slot cover plate, follow the disassembly procedure (refer to clause 10-2).

5-2. Names of Parts on the Front Panel.

Figure 5-16 identifies the parts on the front panel.

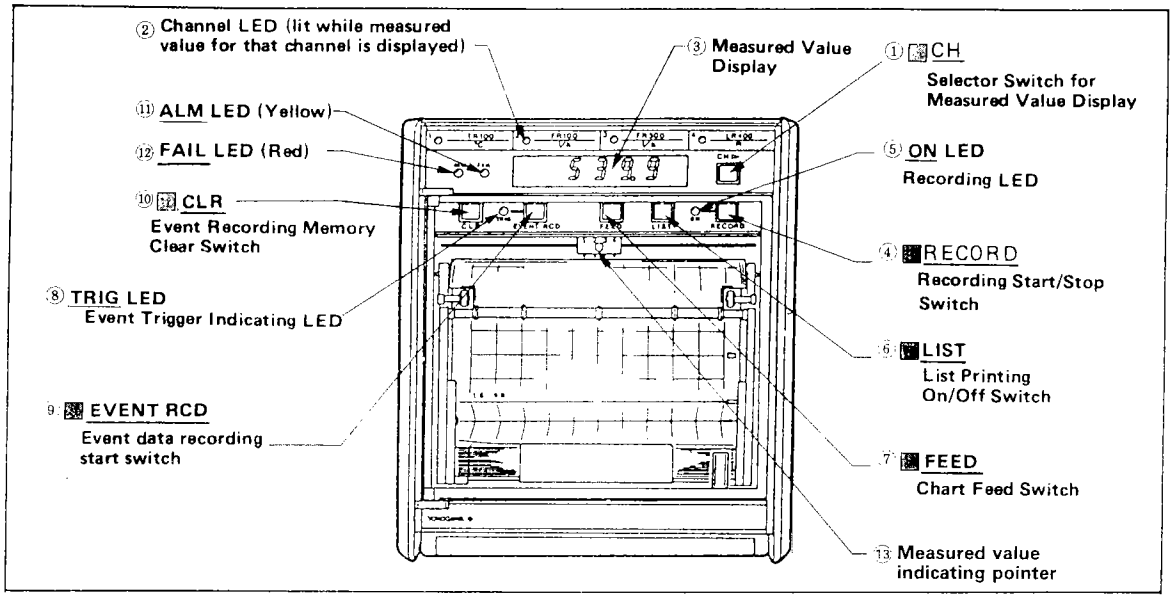


Figure 5-16. Switches and LED Indicator Lamps on Model SRHD Front Face.

(1) Measured Value Selection

Each time the □CH ① switch is pressed, channel of measured value displayed on ③ Measured Value Display is selected.

The selected channel LED indicator lampe ② lights.

When the chart speed is set to 10 or 20 mm/h, the indicating pointer ⑬ indicates the measured value in the channel selected with □CH ① for the waiting interval of recording.

(2) Recording Start/Stop

(a) Switching from front panel

When □RECORD ④ is pressed, ON LED ⑤ is lit and recording starts. To stop recording, press the □RECORD ④ again.

(b) Switching by remote contact

Set the trigger mode in the common data items to RCD ON/OFF from the tuning panel (5-3-4 (5)).

When the □RECORD switch is ON (ON LED lit), and when the remote contact is closed (TRIG LED off), recording starts. To stop the recording, open the remote contact (TRIG LED lit).

When the chart speed is set to 10 or 20 mm/h and time printing set ON, pressing the record switch causes the recorder clock to be automatically synchronized with the chart time axis marks.

(3) List Printout Start

List printout is started by pressing the □LIST ⑥ key. To stop the printout, press the □LIST key again.

Program listing can be performed while ordinary recording is occurring. Press the □LIST ⑥ key and the record LED will remain lit. After the list is printed, ordinary recording restarts automatically.

(4) Manual Chart Feeding

To feed the chart manually, press the □FEED key ⑦.

If low chart speeds 10, or 20 mm/h are set, and the time printout is designated by start command (ON), after feeding manually, the chart time printout is automatically set to the correct time.

For time printout OFF command, or at high chart speeds 1 to 20 mm/min, time setting is disabled.

(5) Event Recording

For event recording (TRIG LED ⑧, □EVENT RCD ⑨, □CLR ⑩), please refer to chapter 6.

(6) Chart Speed Switching

(a) Front-Panel Chart Speed Selector

Set the trigger mode in the common data items to 20 MM/M MAN from the tuning panel (5-3-4 (5)). When □RECORD is ON (ON LED lit) and □EVENT RCD is pressed, TRIG LED lights and ordinary recording is carried out at 20 mm/min. When □EVENT RCD is pressed again, TRIG LED is turned ON and recording is carried out at the tuning panel chart speed.

(b) External Chart Speed Selector

Set the trigger mode in the common data items to 20 MM/M AUT from the tuning panel (5-3-4 (5)). When the □RECORD switch is "ON" (ON LED lit), and when the contact is closed (TRIG LED lit), ordinary recording is carried out at 20 mm/min; when the contact is open (TRIG LED off), ordinary recording is carried out at the tuning panel chart speed.

5-3. Data Setting.

Input signals pass through a multiplexor, are A/D converted, arithmetic processing may be applied, and the result is recorded on the chart of the Model SRHD.

Figure 5-17 shows the recorder input processing functions. Data setting or function selection (as necessary for each function block) is carried out by the tuning switches on the tuning panel (side face).

This part explains the operation of the tuning panel.

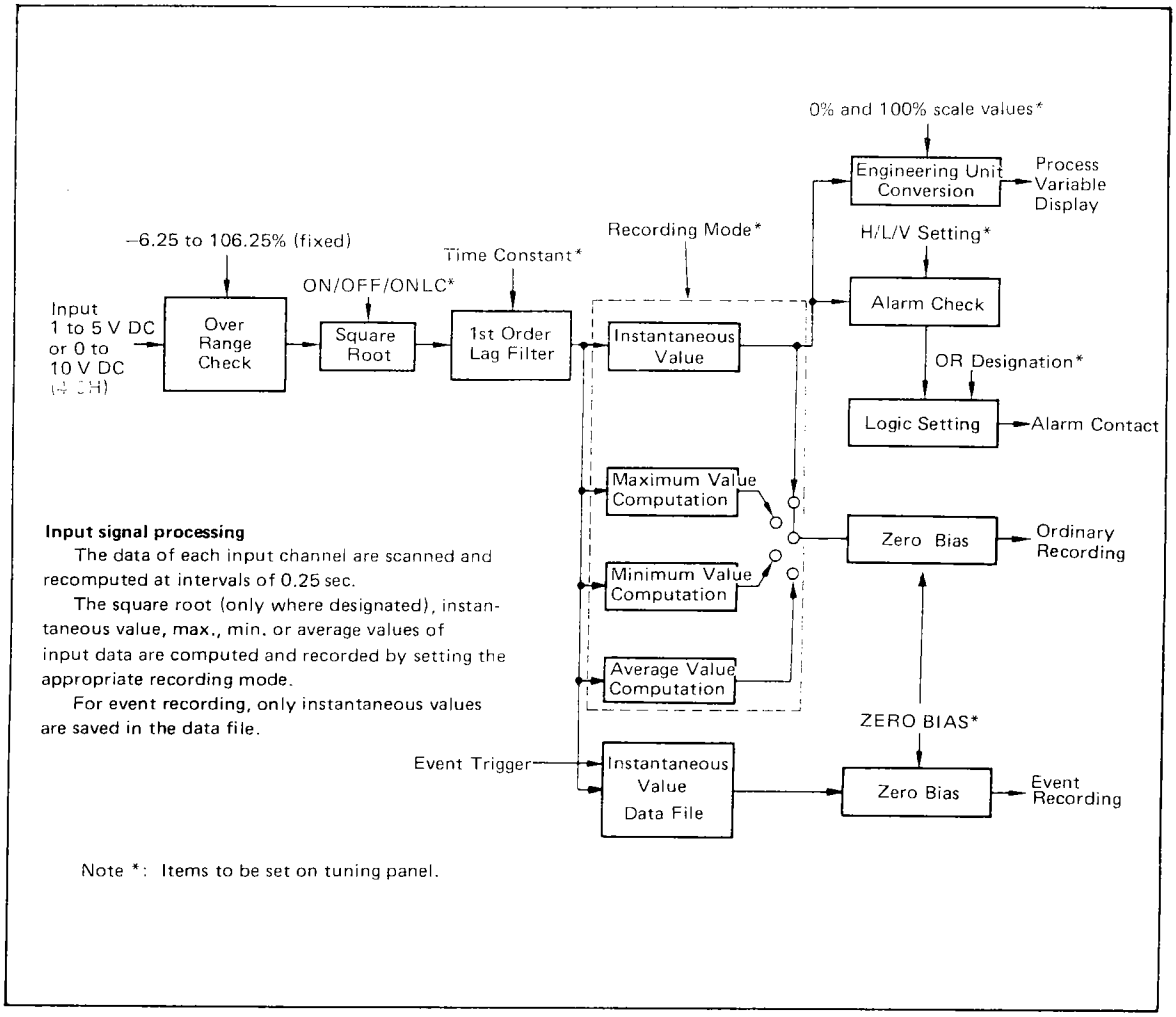


Figure 5-17. Model SRHD Functions.

5-3-1. Names and Functions of Items on Tuning Panel.

The recording parameters are set on the tuning panel (on the side face of the unit).

This panel has a 16-digit LCD display and three slide switches (on the top right of the panel).

Displayed messages and data are erased if no key operation occurs for 60 min.

Figure 5-18 shows the "tuning panel", and the key switch function list is shown in Table 5-1.

The slide switches are, from left to right, **TUNING, CAL (CALIBRATION), CHART.**

The functions of these switches are as follows.

①**TUNING:** Locking switch to set or change the data on the tuning panel. It has two positions, **ENABLE** and **INHIBIT.** For normal display-only operation, the switch is set to **INHIBIT.** Set it to **ENABLE** only when changing data settings.

②**CAL:** This switch is used during maintenance and service. It's usually turned off (refer to chapter 9.)

③**CHART:** When the chart is incorrectly loaded, this switch is used to rewind **(RETURN)** the chart. Do not use this switch except if a chart loading error or chart feed error occurs.

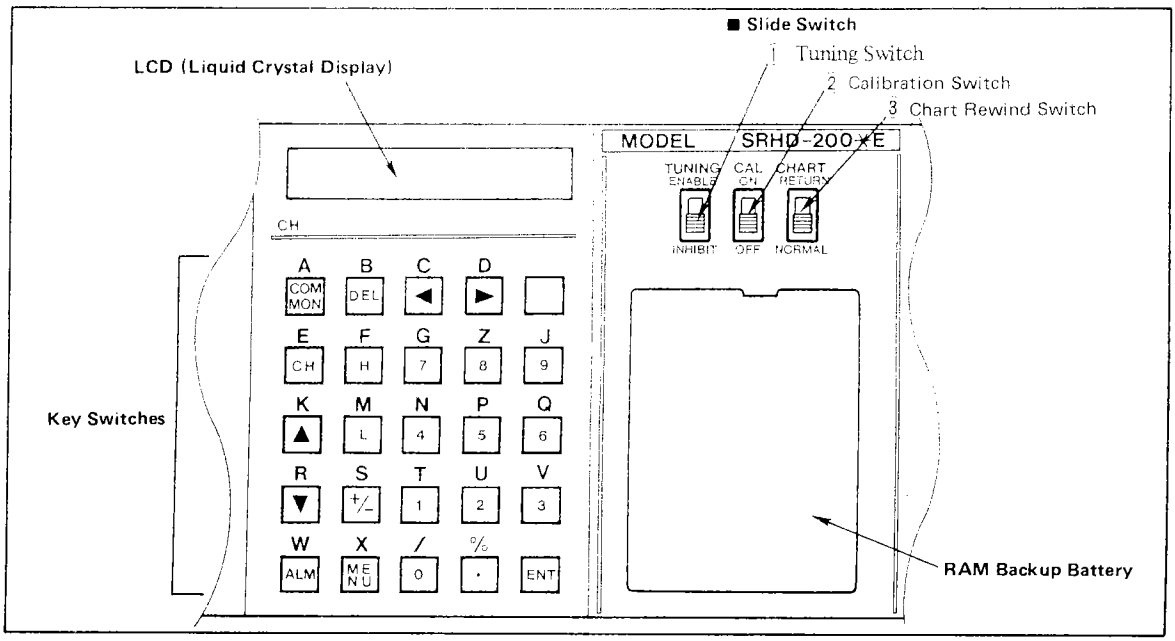


Figure 5-18. Tuning Panel.

Table 5-1. Key Switch Functions/Uses of Tuning Panel.

Key Plate	Name	Function/Uses
COMMON	**Common data**	Common data call instruction
CH	**Channel data**	Channel data call instruction
▼ , ▲		Data Item number increment/decrement
◀ , ▶		Move cursor to the right/left
MENU	**Mode menu**	When setting data are mnemonic data, setting mode is selected by this "MENU" key. Every time the key is pushed, the registered mode changes step by step.
DEL	**DELETE**	Deletes setting data
ENT	**ENTER**	Setting data entry
ALM	**Alarm**	Message displayed when alarm LED lights
A, B, C . . . x, /, %	**Character keys**	Character keys for tag number, unit, etc.
1, 2, 3 . . . 0, +/–	**Numeric keys**	Data setting, positive/negative sign changing keys
(SHIFT) Blue key with no marking	**Shift**	Used for key shift to set symbols and alphabetic characters. "s" mark is displayed on the display right side.

5-3-2. Data Set Items.

Data is classified as "Common Data" or "Channel Data". "Common Data" is data like chart speed that is common to every channel and "Channel Data" such as alarm setting data is set for each channel. Common Data is shown in Table 5-2 (21 items) and Channel Data is shown in Table 5-3 (13 items).

Table 5-2. Common Data Items.

1	Recorder No.
2	Date
3	Time
4	Chart Speed
5	No. 1 alarm output connecting operation & output OR connecting designation
6	No. 2 alarm output connecting operation & output OR connecting designation
7	No. 3 alarm output connecting operation & output OR connecting designation
8	No. 4 alarm output connecting operation & output OR connecting designation
9	Trigger mode
10	Trigger source and event trigger ORed connection designation
11	Event data scan cycle
12	Number of pre event data
13	Number of post event data
14	Time printing designation
15	Scale printing designation
16	Alarm printing designation
17	Chart list printing designation
18	Tag number list printing designation
19	Record list printing designation
20	Alarm list printing designation
21	Event list printing designation

Table 5-3. Channel Data Items.

1	Tag No.
2	Recording mode
3	Square root extraction
4	Input filter time constant
5	Engineering unit
6	100% scale value
7	0% scale value
8	Zero bias
9	High-limit set point H
10	Low-limit set point L
11	Velocity alarm (deviation value)
12	Velocity alarm (time)
13	Event data output (to the chart) designation (ON/OFF)

5-3-3. Common Steps and Notes on Data Setting.

The initial instrument data is already set at the factory as shown in 5-3-4 and 5-3-5; please change data only if necessary.

(1) Set the tuning switch **(TUNING)** to the "**ENABLE**" position. (In the "**INHIBIT**" position, data can only be displayed, but data setting and changing cannot be performed.)
By pressing the [COM MON] [▼] or [▲] keys, common data items are displayed, and by pressing the [CH] [▼] or [▲] keys, channel data items are displayed. The displayed data are the latest values set.
For numeric or alphabetic data entry, the cursor is displayed in the required data entry area. Move the cursor to the required figures using the [►] or [◄] keys and input the data. After data input, press the [ENT] key to complete the entry. For mnemonic data, press the [MENU] key one or more times to select required data contents, and then press the [ENT] key to complete entry.

(2) When you finish all the data entry, turn the tuning switch to "**INHIBIT**" position.

5-3-4. Common Data Setting.

(1) Recorder No.

Recorder No. is printed as data on list printout.

Common Data Item	Data Format	Setting Data	Initial Data
Recorder No.	RCDER NO. = R101	Four alphanumeric characters	Blank

■ Example of Setting Operation (Setting: R101)

Press the [COM MON] key, and then press the [▼] or [▲] keys to select "RCDER NO." display.

Display: R C D E R N O . = _

↓ (SHIFT) R

Key Entry: [ ] [▼] [1] [0] [1] [ENT]

↓

Display: R C D E R N O . = R 1 0 1

(2) Date and Time.

Common Data Item	Data Format	Setting Data	Initial Data
Date	DATE = 88/02/24	Use the Christian Era	Current date
Time	TIME = 15 : 15	Use 24hr system	Current time

■ Example of Setting Operation (Setting: Feb. 24, '88)

Press the [COM MON] key, and then press the [▼] or [▲] keys to select "DATE" display.

Display: D A T E = 0 0 / 0 / 0

↓

Key Entry: [8] [8] [0] or [▶] [2] [2] [4] [ENT]

↓

Display: D A T E = 8 8 / 2 / 2 4

■ For time setting, the procedure is the same as above.

(3) Chart Speed

Common Data Item	Data Format	Setting Data	Initial Data
Chart Speed	CHART SPD = 20MM/H	10, 20 mm/h, within range of 1 to 20 mm/min. H : Hr, M : Min.	20MM/H

■ Numeric data is input by numeric keys and H M is selected by [MENU] key.

■ Example of Setting Operation (Setting: 5 mm/min.)

Press the [DISP/RSET] key, and then press the [▼] or [▲] keys to select "CHART SPD" display.

Display : C H A R T S P D = 2 0 M M /H

↓

Key Entry: [0] or [DEL] [5] [MENU] [ENT]

↓

Display: C H A R T S P D = _ 5 M M /M

<Description>

- Chart Speed and Recording Period.

  The dot printing period depends on the chart speed. The chart is fed a certain length every recording period by the feed roller driven by the pulse motor.

Chart Speed	Rec. Cycle
10 mm/h	90 sec.
20 mm/h	45 sec.
1 to 10 mm/min.	15 to 1.5 sec.
11 to 20 mm/min.	1.5 sec.

- Chart Speed Changing.

  When the time printout designation is ON, and the chart speed is changed as shown below, the chart is automatically fed to synchronize the time axis, and there is a momentary discontinuity in the recording.

  When { Changing from 10 mm/h to 20 mm/h. / Changing from 20 mm/h to 10 mm/h. / Changing from 1 to 20 mm/min., to 10 or 20 mm/h. } there is a momentary discontinuity in the recording.

(4) Alarm Output Contact Action and ORed Output Connection Designation.

Common Data Item	Data Format	Setting Data	Initial Data
No. 1 Alarm output contact action and output OR connection designation	ALARM OUT 1 = NC 1H2H3V	[Output contact action] OFF: No Output ↓ NC: Normally closed ↓ NO: Normally open } Select by the [ME NU] key. [Output OR Connection] • ORed output connection. After designating ALARM out □=□□, press the [↑] key and —using the alphanumeric keys—enter any combination of 1H~4H, 1L~4L, 1V~4V on the next line. (Example) 1H: Channel 1 High-limit alarm 4L: Channel 4 Low-limit alarm 3V: Channel 3 Velocity alarm • Up to eight alarm points can be OR-connected to each output contact. Example for ALARM OUT 1 shows OR connection of upper alarm for Channels 1 to 4.	OFF
No. 2 Alarm output contact action and output OR connection designation	ALARM OUT 2 = NO 2L3L1V		OFF
No. 3 Alarm output contact action and output OR connection designation	ALARM OUT 3 = OFF		OFF
No. 4 Alarm output contact action and output OR connection designation	ALARM OUT 4 = NC 2H2V		OFF

■ Example of Setting Operation
(Setting: No. 1 Output—NO. High-limit alarm of CH1, 2 and velocity alarm of CH3: OR connection)

Press the [SCAN ADJ] key, and then press the [▼] or [▲] keys to select "ALARM OUT 1" display.

Display: A L A R M O U T 1 = O F F

↓

Key Entry: [ME NU] [ME NU] [ENT]

↓

Display: A L A R M O U T 1 = N O

↓

Key Operation: [▼]

↓

Display: _

↓

Key Entry: [1] [H] [2] [H] [3] [(SHIFT) V] [3] [ENT]

↓

Display: 1 H 2 H 3 V

■ Exercise: Set No.2 ~ No.4 alarm outputs in the same way as described above.

<Description> Alarm Function

Each one alarm set points (High-limite, Low-limit and velocity alarms) for each channel input, a total of 12 points, can be set.

These alarm setpoints can be OR connected, up to eight per alarm output, to each alarm output (No. 1 to 4).

The alarm action can be selected as NC or NO for each point.

Alram setting data are set as channel data, output contact action and OR connections are set as common data.

For data setting and function description of velocity alarm, those will be described in clause 5-3-5 (9).

(5) Mode and Event Recording Parameter Setting.

The setting operations described in this section are required only when you want to use event recording functions, external record start/stop switching functions, front-panel chart speed switching functions and external chart speed switching functions.

If these are not required, leave settings as they were on delivery from the YOKOGAWA factory.

When you need the event recording functions, please read Chapter 6 first, then set parameters as described below.

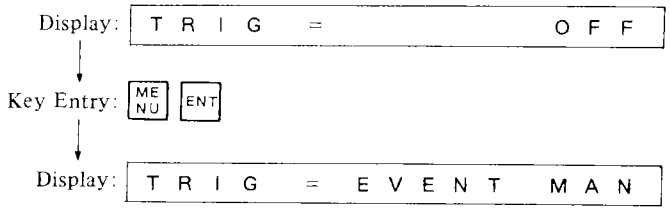
Common Data Item	Data Format	Setting Data	Initial Data
Trigger mode	TRIG = EVENT MAN	OFF : Without trigger EVENT MAN : Event data replay recording manual start EVENT AUT : Event data replay recording automatic start RCD ON/OFF : External recording start/stop 20MM/M MAN : Front panel chart speed selector 20MM/M AUT : External chart speed selector Select by the key.	OFF
Trigger source and event trigger ORed connection designation	TRIG SOURCE = INT ALM OUT 1/2/3/4	[Trigger source] EXT: Event trigger external contact INT: Event trigger internal alarm Select with key. [Event trigger OR connection designation] For "Event trigger OR connection designation", set an arbitrary output after designating TRIG SOURCE = INT and feeding one line with ▼ key.	EXT
Event data scan cycle	EV SCN TIM = 3.00	0.25 to 10.00 sec. Unit: 0.25 sec.	0.25
Number of pre event data	PRE-EV DATA = 200	Set the number of data (before and after the event trigger occurence) However, the sum of PRE-EV DATA and PST-EV DATA must not exceed 700.	0
Number of post event data	PST-EV DATA = 500		0

- If you don't need to use this event recording function, you don't need to set the trigger source and event trigger ORed connection designation or event data scan cycle or number of pre and post event data.

- TRIG SOURCE = INT is valid only for Setting Data TRIG = EVENT MAN or TRIG = EVENT AUT in trigger mode.

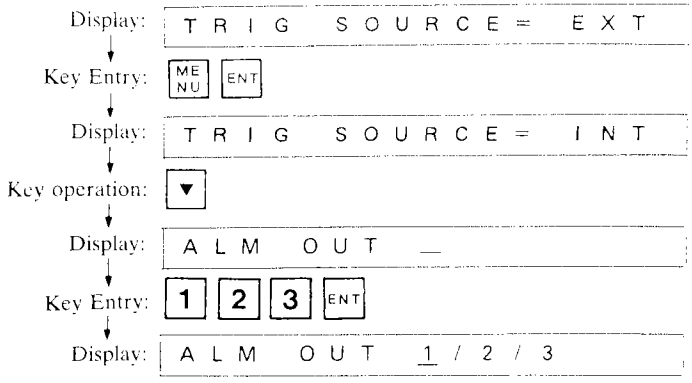
- Event trigger OR connection is valid only for TRIG SOURCE = INT.

- Example of Setting Operation – 1
  (Trigger Mode: EVENT MAN)
  Push the COM MON key, and then press the ▼ or ▲ key to select "TRIG" display.



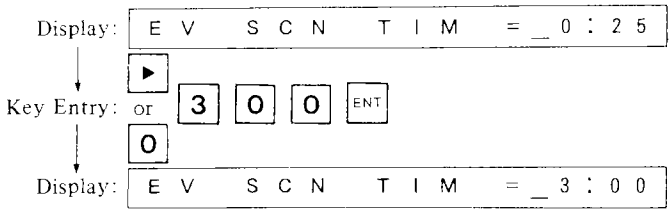
■ Example of Setting Operation—2

Set trigger source to INT and make OR-connection of alarm outputs 1, 2, and 3 as the event (triggers.)
After pressing [COM MON] key, call TRIG SOURCE by pressing [▼] or [▲] key.



■ Example of Setting Operation – 3

(Event data scan cycle: 3 sec)
Push the [COM MON] key, and then press the [▼] or [▲] key to select EV SCN TIM.



■ The number of pre-event data and post-event data should be set in the same way as described above.

< Description >

- External Recording Start/Stop Function.
  When the □**RECORD** switch is "ON" (**ON LED** lit), and when the external contact is open, ordinary recording stops; when the contact is closed, ordinary recording starts.
  After the contact closes, at the start of ordinary recording, the start point is marked with a line (by No 1 pen, normally red) on the right side of the chart.
  When the chart speed is set to low (10, 20 mm/h) and time printing turned ON, the chart time axis is automatically synchronized with the recorder clock when the contact closes.

- Front-Panel Chart Speed Selector Function.
  Pressing the □**EVENT RCD** key switch, lights or turns off the **TRIG LED**, and the chart speed is switched between 20 mm/min and the tuning panel speed setting.
  When the **TRIG** LED is off, ordinary recording is carried out at the tuning panel chart speed setting, and when the **TRIG LED** is lit, ordinary recording is carried out at 20 mm/min.
  Each time □**EVENT RCD** is pressed to switch chart speed between 20 mm/min and the tuning panel speed setting, the changeover point is marked with a line (by No 1 pen, normally red) on the right side of the chart.
  When the tuning panel chart speed setting is low (10, 20 mm/h) and time printing is set to ON, the chart time axis is automatically synchronized with the recorder clock after the **TRIG LED** turns off.

- External Chart Speed Selector Function.
  When the contact is open, ordinary recording is carried out at the tuning panel chart speed setting, and when the contact is closed, ordinary recording is carried out at 20 mm/min.
  Each time the contact is switched to select chart speed between 20 mm/min and the tuning panel speed setting, the changeover point is marked with a line (by No 1 pen, normally red) on the right side of the chart.
  When the chart speed is set to low (10, 20 mm/h) and time printing is set to ON, the chart time axis is automatically synchronized with the recorder clock after the contact opens.

- Trigger Source.
  As the event trigger, the following two procedures may be selected.
  (1) EXT — Procedure to use the external contact input.
  (2) INT — Procedure to make "soft-wiring" after freely combining built-in alarm output contacts internally.
  In "soft-wiring", up to four alarm output contacts can be made OR connection.

(6) Time Printout.

Common Data Item	Data Format	Setting Data	Initial Data
Time Printout	TIME PRINT = **ON**	**OFF**: No print out **ON**: Print out } Select by the [MENU] key.	ON

■ Example of setting operation (Setting: OFF)
Press the [COMMON] key, and then press the [▼] or [▲] keys to select the "TIME PRINT" display.

Display : T I M E P R I N T = O N
↓
Key Entry: [MENU] [ENT]
↓
Display: T I M E P R I N T = O F F

<Description>

- Time, Date Printout Function
  When the chart speed is low (10 mm/h or 20 mm/h), time is printed out on the main scale marks of the chart time axis. The time is printed out every two hours for the chart speed 10 mm/h, and every hour for 20 mm/h; the date is printed out at 0h 00 min.
  However, date and time are not printed out when the chart speed is 1 mm/min or faster.
  The printout format is as follows:
  - Time: XX: 00 (XX: 01 to 23 blue numeric characters)
  - Date: XX/YY (XX month YY day)
  - Pen: No. 3 Pen (normally blue)

- Date Printout when Recording Stopped.
  When the trigger mode is set to EVENT AUT and the RECORD switch LED **(ON LED)** on SRHD front panel is "OFF", or when the trigger mode is set to (external) RCD ON/OFF and the **ON LED** is "lit", if event recording or the ordinary recording is not carried out from 0:00 a.m to 24:00 p.m, the date is printed out at 0:00 a.m the next day to prevent the recording pen from drying or clogging.
  The date is printed out by each pen in the order of pen number (No 1 pen → No 2 pen → No 3 pen → No 4 pen) from left to right on the chart.
  For event recording or ordinary recording with date printout, the date printout is suspended.

(7) Scale Printout

Common Data Item	Data Format	Setting Data		Initial Data
Scale Print-out	SCALE PRINT = OFF	OFF: Without printout ON: Printout	Select by the MENU key	OFF

Example of Setting Operation (Setting: Scale printout ON)
After pressing COMMON key, call SCALE PRINT by pressing ▼ or ▼ key.

Display: S C A L E P R I N T = O F F
↓
Key Entry: MENU ENT
↓
Display: S C A L E P R I N T = O N

<Description> **Scale Printout Function**

When the chart speed is low, printing is made on the chart graduations for one channel in every 120 mm feed, thus four channels in 480 mm feed in the order of channel No. The printing items are : Channel No., engineering unit, 100% scale value, and 0% scale value, set in Channel Data Item.
The channel No. is printed with each channel No. pen and other items are printed with No.4 pen (normally black).
A channel whose recording mode is set to OFF is skipped and printing is not made. Scale printing is also not made during other printing is executed.
Figure 5-19 shows an example of scale printout.

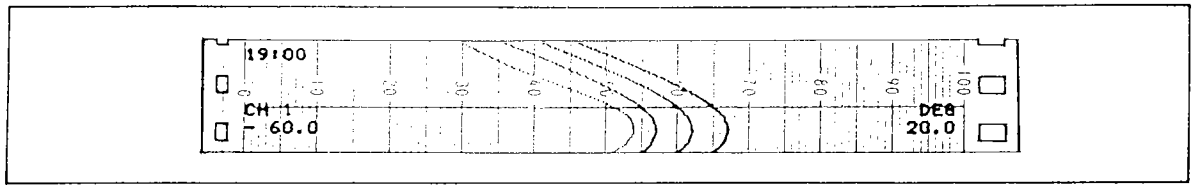


Figure 5-19. Example of Scale Printout.

(8) Alarm Printout

Common Data Item	Data Format	Setting Data		Initial Data
Alarm Print-out	ALARM PRINT = ON	OFF: Without printout ON: Printout	Select by the MENU key	OFF

Example of Setting Operation (Setting: Alarm printout ON)
After pressing COMMON key, call ALARM PRINT by pressing ▼ or ▲ key.

Display: A L A R M P R I N T = O F F
↓
Key Entry: MENU ENT
↓
Display: A L A R M P R I N T = O N

<Description> **Scale Printout Function**

When the chart speed is low, alarms (upper alrm, lower alarm, and velocity alarm) generation and release in each channel set in the Channel Data Item are printed out for marks, time, channel No, and type of alarms.

The marks, type of alarms and the channel No. are printed with each channel No. pen and time is printed with No.4 pen (normally black). (The generation mark: 6 mm width, the release mark: 4 mm width).

The alarm generation/release mark is not printed during the event trigger generation mark is recorded. If an alarm generation and an alarm release occur in the same period, only an alarm generation is printed (the highest priority is the order of 1H, 1L, 1V, 2H, ... 4V).

In addition, during alarm generation/release time is printed or during scale printout, alarm generation/release time, channel No., and type of alarm are not printed out. Figure 5-20 shows an example of alarm printout.

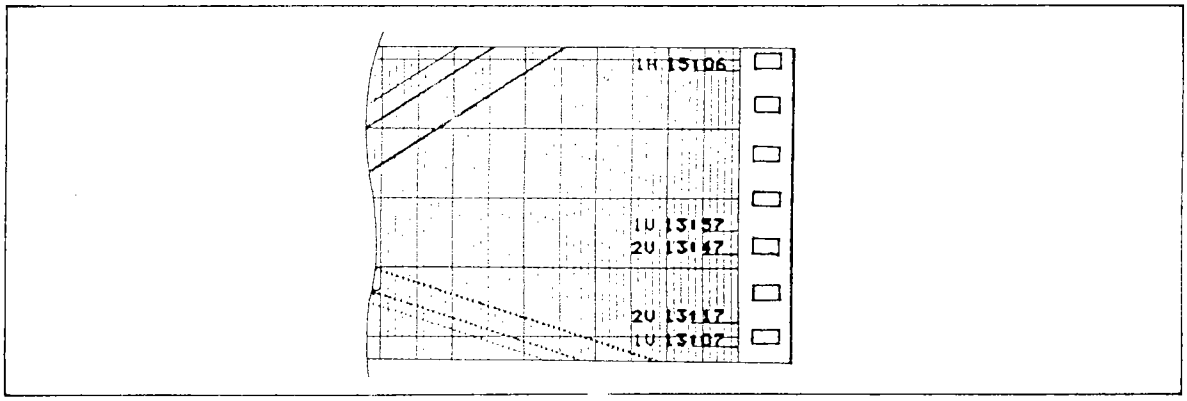


Figure 5-20. Example of Alarm Printout.

(9) List Pritout Items

Common Data Item	Data Format	Setting Data	Initial Data
Chart list printout	CHART LIST = ON	OFF: Without printout ON: Printout } Select by the MENU key.	ON
Tag number list printout	TAG NO. LIST = OFF		OFF
Record list printout	RECORD LIST = OFF	The items with ON designation are printed out by list printout start instruction.	OFF
Alarm list printout	ALARM LIST = OFF		OFF
Event list printout	EVENT LIST = OFF		OFF

■ Example of setting operation (Setting: alarm list printing ON)
Press the COMMON key, and then press the ▼ or ▲ keys to select "ALARM LIST" display.

Display: A L M L I S T = O F F

↓

Key Entry: ME NU ENT

↓

Display: A L M L I S T = O N

■ Set other items in the same way as described above.

<Description> **List Printout Function**

This function lists the recording and input signal processing parameters.
Printing this listing before data recording facilitates analysis of recorded data .
The list is divided in five sections as shown in the Table below, and any necessary items can be selected and printed. Printout is carried out by No. 4 pen (normally black).
A printout example including all five items as list items is shown in Figure 5-21. All setting items and contents are the data set on the tuning panel.

List Sections	Printout Contents
Chart List	Date, Time, recorder number, chart speed.
Tag List	Tag number
Record List	Printout setting data for each channel. Setting data are as follows. Recording mode, filter time constant, engineering unit, range scale (0, 100 % scale value) bias Q'ty, square root extraction.
Alarm List	Process variable High- and low-limit set points, velocity alarm deviation set value, detecting time set value, alarm output operation Alarm output allocation table (OR wiring table)
Event List	Event recording channel allocation table, trigger mode, trigger source alarm connection, scan period, number of pre-data, number of post data, number of post data

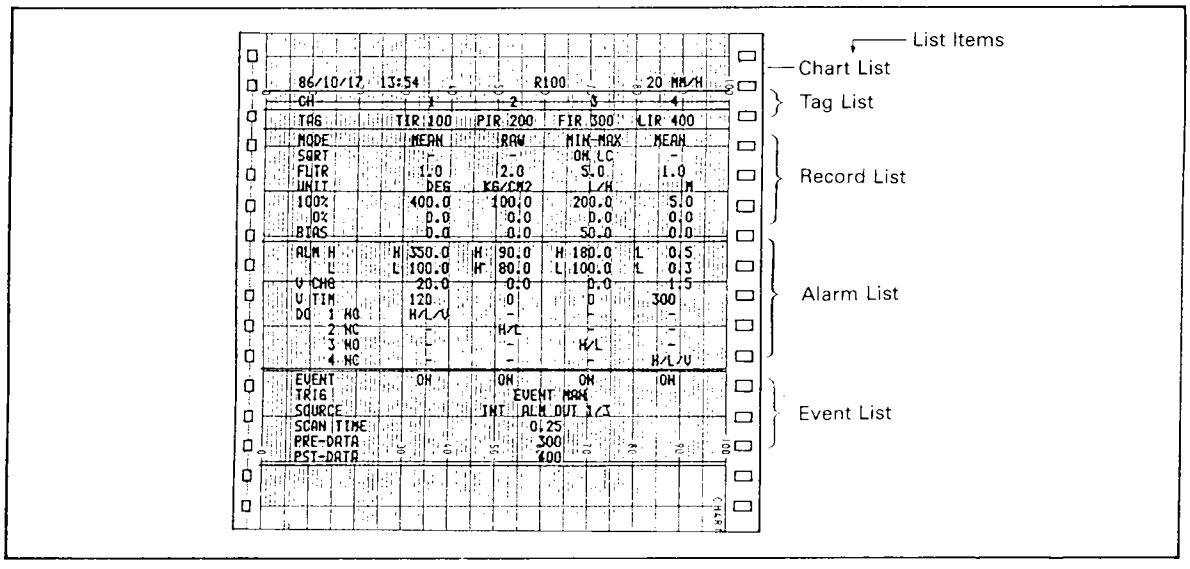


Figure 5-21. Example List Printout.

5-3-5. Channel Data Setting.

Set the following data for each channel.

(1) Tag No.

This item is printed out as data on the list printout.

Channel Data Item	Data Format	Setting Data	Initial Data
Tag No.	Channel No. display TAG = = T I C 1 0 0 6 A	Eight alphanumeric characters	Blank

■ Example of Setting Operation (Setting: TR006A)

Select the channel by pressing the [CH] key and select "TAG" by the [▼] or [▲] keys

Display: n T A G = _

↓

Key Entry: (SHIFT) T (SHIFT) R [1] [▼] [0] [0] [6] (SHIFT) A [COMMON] [ENT]

↓

Display: n T A G = T R 0 0 6 A

(2) Recording Mode

Channel Data Item	Data Format	Setting Data	Initial Data
Recording Mode	Channel No. display MODE = RAW	RAW: Instantaneous value ↓ MEAN: Mean value ↓ MIN-MAX: min/max. value ↓ MAX: max. value ↓ MIN: Min. value ↓ OFF: Recording stop (Select by the [MENU] key.)	MIN-MAX

■ Please be sure to set "OFF" any unused channels.

■ Example of setting operation (setting: MAX)

Select the channel by pressing the [CH] key and select "MODE" by the [▼] or [▲] keys

Display: n M O D E = M I N - M A X

↓

Key Entry: [MENU] [ENT]

↓

Display: n M O D E = M A X

<Description> **Recording Mode**

For each input channel, you can select any of the recording modes shown below, so please select whichever suit your application.

- Instantaneous value (RAW): Record the sampled data "as is".
- Minimum Value (Min.): Record the minimum data value within each recording period.
- Maximum Value (Max.): Record the maximum data value within each recording period.
- Mean Value (Mean): Record the mean data value within each recording period (obtained by dividing totalized value of scan data by number of scans during recording period)
- Mininum/Maxim (Min./Max.): Record the range between minimum and maximum data values, within the recording period. However, this is possible only when chart speed is 10, 20 mm/h or 1 mm/min (recording period is 90, 45 or 15s). If chart speed is set to 2 mm/min or faster, instantaneous data recording is carried out even if min/max trace mode is set.

(3) Square Roots Extraction

Channel Data Item	Data Format	Setting Data	Initial Data
Square root extraction	Channel No. display SQR ROOT = OFF	OFF : Not executed ON : Square root extraction ON LC : Square root extraction with low cut (1% or less) Select by the MENU key	OFF

■ Example of setting operation (Setting: ON)

Select the channel by pressing the CH key and select "SQR ROOT" by the ▼ or ▲ keys.

Display: n SQR ROOT = OFF

↓ Key Entry: MENU ENT

↓

Display: n SQR ROOT = ON

(4) Input Filter

Channel Data Item	Data Format	Setting Data	Initial Data
Input filter time constant	Channel No. display FILTER = 5.0	0 to 99.9 sec. Unit: 0.1 sec.	3.0

■ Example of setting operation (Setting: 0.5 sec.)

Select the channel by pressing the CH key and select "FILTER" by the ▼ or ▲ keys.

Display: n FILTER = 3.0

↓ Key Entry: ▶ or 0 → 5 → (0) → ENT ( ): This part may be omitted.

↓

Display: n FILTER = 5.0

(5) Engineering Unit

This item is printed out as data on list printout.

Channel Data Item	Data Format	Setting Data	Initial Setting
Engineering unit	Channel No. display UNIT = KG/CM2	Eight alphanumeric characters	Blank

■ Example of setting operation (Setting: kg/cm^2)

Select the channel by pressing the CH keys and select "UNIT" by the ▼ or ▲ keys.

Display: n UNIT =

↓ Key Entry: (SHIFT) K (SHIFT) G (SHIFT) / (SHIFT) C (SHIFT) M → ▲ → 7 → 0 → ◀ → L → 2 → ENT

↓

Display: n UNIT = KG/CM2

(6) 100% and 0% Scale Values

Channel Data Item	Data Format	Setting Data	Initial Data
100% scale value	Channel No. display 100% VAL = 70.00	Engineering Unit: sign + 4 numeric digits + decimal point Decimal point of 0% is set to same as that of 100%.	100.0
0% scale value	0% VAL = –30.00		0.0

■ To change between positive and negative sign, press the [+/–] key before or after data entry.

■ Example of setting operation

(Setting: 100%: 70.00, 0%: –30.00)

Select the channel by pressing the [↵] key and set "100% VAL" by the [▼] or [▲] keys.

Display: n 100% VAL = 100.0

↓

Key Entry: [7] [0] [•] [0] ([0]) [ENT] ( ): This part may be omitted.

↓

Display: n 100% VAL = 70.00

↓

Press the [▼] key, and select "0% VAL" display.

↓

Display: n 0% VAL = 0.00

↓

Key Entry: [+/–] [3] ([0] [0] [0]) [ENT] ( ): This part may be omitted.

↓

Display: 0% VAL = –30.00

(7) Zero/Bias

When several traces are overlaid on the chart, to move the zero point of the recording.

Channel Data Item	Data Format	Setting Data	Initial Data
Zero bias	Channel No. display ZR BIAS = 0.0	% Data of –107.0 to 107.0%.	0.0

■ To change between positive and negative sign, press the [+/–] key before or after data entry.

■ Example of setting operation (Setting: 20.0%)

Select the channel by pressing the [↵] key and set "ZR BIAS" by the [▼] or [▲] keys.

Display: n ZR BIAS = 0.0

↓

Key Entry: [▶] or [0] [2] ([0] [0]) [ENT] ( ): This part may be omitted.

↓

Display : n ZR BIAS = 20.0

(8) Alarm Set Point

High- and low-limit set points are provided, which can be set in the following three ways.

(a) Set the high-limit set point as a high-limit alarm and the low-limit set point as a low-limit alarm.

(b) Duplex high alarm: Set the low-limit set point as the 1st high-limit alarm and the high-limit set point as the 2nd high-limit alarm.

(c) Duplex low alarm: Set the high-limit set point as the 1st low-limit alarm and the low-limit set point as the 2nd low-limit alarm.

In (b) and (c), the high limit alarm or the low-limit alarm is duplicated.

Channel Data Item	Data Format	Setting Data	Initial Data
High-limit setpoint	Enter channel No. □ ALM H>= 60.00	>= : High-limit alarms <= : Low-limit alarms } Select with [MENU] key. Values corresponding to the range between 0 and 100% scale values, −6.25 to 106.25% in engineering unit. Decimal point position is the same as that of 100% scale value.	>= 106.3
Low-limit setpoint	□ ALM L<= −20.00	<=: High-limit alarms >=: Low-limit alarms } Select with [MENU] key. Values corresponding to the range between 0 and 100% scale values, −6.25 to 106.25% in engineering unit. Decimal point position is the same as that of 100% scale value.	=< −6.2

■ To change between positive and negative sign, press the [+/−] key before or after data entry.

■ Example of setting operation-(a) (Setting: High-limit to 60.0)

Select the channel by pressing [CH] key,

and select "ALM H" with the [▼] or [▲] key.

Display: n ALM H>= 106.3

↓

Key Entry: [DEL] [6] [0] [0] [ENT]

↓

Display: n ALM H>= 60.0

■ For low-limit alarm setting value: Set in same manner as above.

Example of Setting Operation-(b) (Setting: For High-limit setpoint, 100.0 as 2nd high-limit alarm, and for low-limit setpoint, 85.5 as 1st high-limit alarm.)

Select the channel by pressing [CH] key,

and call ALM H with [▼] or [▼] key.

Display: n ALM H>= 106.3

↓

Key Entry: [▶] or [1] [0] [0] [0] [ENT]

↓

Display: n ALM H>= 100.0

↓

Key Entry: [▼]

↓

Display: n ALM L=< − 6.2

↓

Key Entry: [MENU] [+/−] [0] [8] [5] [5] [ENT]

↓

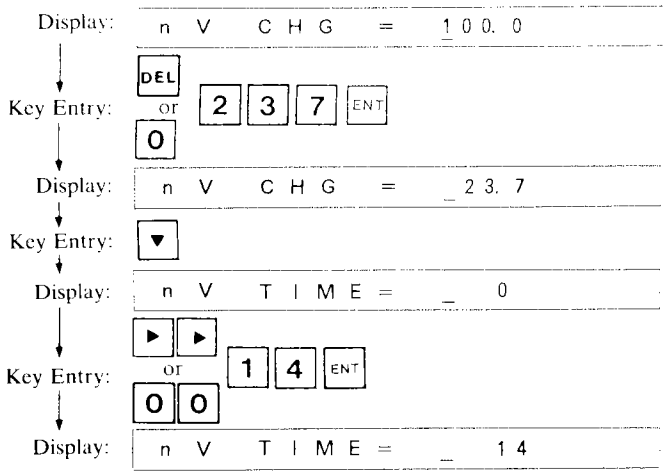
Display: n ALM L>= 85.5

(9) Velocity Alarm Designation

Channel data Item	Data Format	Setting Data	Initial Data
Velocity alarm deviation set value	Enter channel No. → □ V CHG = 23.7	Value corresponding to 0.0 to 100.0% in engineering unit. (Sign cannot be identified.)	100.0
Velocity alarm detecting time set value	□ V TIME = 14	0 to 9999 seconds Designate in 1 second step.	0

■ If the velocity alarm is not executed, set the detecting time to 0.

■ Example of Setting Operation (Set 23.7 to the deviation and 14 seconds to the detecting time.)
Select the channel by pressing [CH] key,
and call V CHG with [▼] or [▲] key.



<Description> **Velocity Alarm Function.**

For velocity alarm, the preceding measured value (process variable, PV) $PV_{(t-VT)}$ preceding by the velocity alarm time duration VT to the current PV is subtracted from the current PV, PV_t, and if this difference (variation) exceeds the setpoint V, the alarm is issued.

Velocity alarm: $|PV_t - PV_{(t-VT)}| \geqq V$

Generally, more precise variations can be checked by setting a smaller VT. The alarm output lasts at least for the time VT (see Figure 5-22).

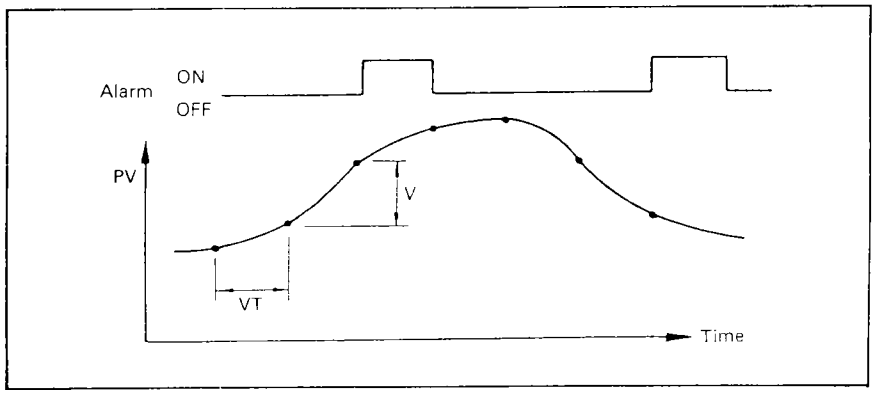


Figure 5-22. Operating Principle of Velocity Alarm.

(10) Event Data Output

This designates whether or not the data, gathered by the event recording function, is to be recorded on the chart. When the event recording function is not used, keep it set "OFF" (initial data).

Channel Data Item	Data Format	Setting Data	Initial Data
Event data output to the chart	Channel No. display EV RCD OUT = OFF	OFF: No printout ON: Printout } Select by the MENU key.	OFF

■ Please be sure to set "OFF" channels not in use.

■ Example of setting operation (setting: ON)
Select the channel by pressing the CH key,
and select "EV RCD OUT" by pressing the ▼ or ▲ keys.

Display: n EV RCD OUT = OFF

↓

Key Entry: MENU ENT

↓

Display: n EV RCD OUT = ON

6. EVENT RECORDING FUNCTION.

When an event occurs in the process being recorded, (a contact signal or internal alarm input is used as event trigger), the input data before and after the event are stored in RAM, and can be "replayed" and recorded on the chart with time axis expanded.

Even high speed data too fast to be recorded on an ordinary recorder can be captured and recorded.

Figure 6-1 shows the principles of the event recording function.

The event recording is effective for ordinary recording at low chart speeds* of 10, 20 mm/h (recording period 90, 45s).

Note*: When the chart speed is high (1 to 20 mm/min), there is no distinction between ordinary recording and event recording on the chart, so event recording at fast chart speeds is meaningless.

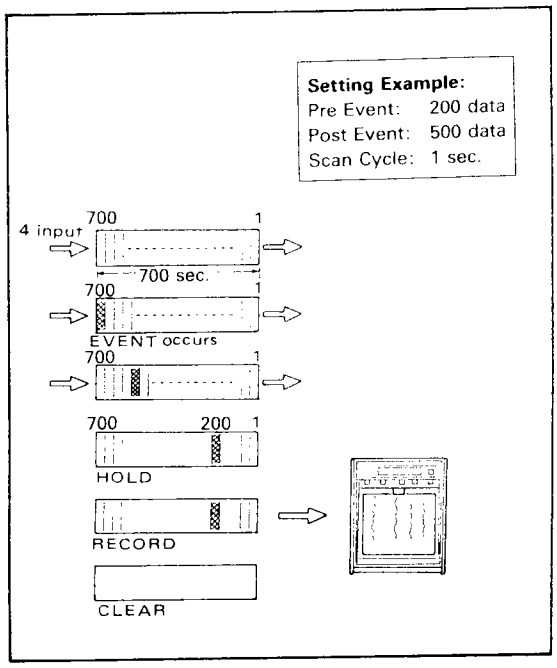


Figure 6-1. Event Recording Principle.

6-1. Function Descriptions.

■ Recording Points

Event recording can be specified for any or all of the four input channels (set using the tuning panel).

■ Number of Data Samples Captured.

Instantaneous values, 700 data samples/channel.

The number of data before and after event trigger, the pre-data and post-data, can be set separately and the sum of them cannot exceed 700.

The number of pre- and post- data can be set from the tuning panel as common data items.

■ Scan Period

The scan period can be set in the range 0.25 to 10 sec. (in 0.25 sec. increments).

The scan period is a common data item (event-data-scan-period) set from the tuning panel.

■ Event Trigger

Event recording is started by external contact input or internal alarm (designate Trigger source or Event trigger OR connection).

■ Event Data Replay Recording Start Mode

The captured event data can be replayed and recorded in "AUT" (auto) or "MAN" (manual) modes. The operation of each mode is described in section 6-2.

The mode is a common item (Trigger mode) set from the tuning panel.

6-2. Operation for Event Recording.

The state of event trigger is displayed on TRIG LED (See Figure 5-16). The meaning is as follows.

TRIG lamp flashes	During data acquisition, after trigger occurs.
TRIG lamp lights	After data acquisition completed.
TRIG lamp goes out	In standby status

(1) Operation of "AUT" Replay Recording Mode.

In AUTO mode, the recorder starts to collect event data when the trigger occurs, and after event data acquisition, ordinary recording stops and event data replay recording starts.

When the event data replay recording is completed, the stored event data in RAM are erased, and the recorder reverts to ordinary recording mode.

(2) Operation of "MAN" Replay Recording Mode.

In MAN mode, the recorder starts to collect event data when the trigger occurs. After event data acquisition, at an arbitrary time, the operator can replay and record the event data by pressing the EVENT RCD key on the front panel. (See Figure 5-16). Then the ordinary recording stops and event data replay recording begins.

After event recording is completed, the recorder reverts to ordinary recording mode, and by pressing the CLR key (see Figure 5-16) the event data is cleared. If the CLR key is not pressed, the event data is kept and can be recorded again, but the next event trigger cannot be accepted.

The operator can stop the event recordig by pressing the EVENT RCD key again when the event data replay recording is being carried out. And the operator can replay the event data replay recording by pressing the EVENT RCD key when the TRIG LED is being lit.

In "AUT" or "MAN" modes, the ordinary recording data are stored in RAM while the event data is being recorded, and when ordinary recording restarts, the recording begins with the stored data, so ordinary recording data is not lost.

CAUTION

(1) In MAN mode, if replay recording of event data is started before data acquisition ends (TRIG LED flashing), ordinary recording is interrupted (and data is lost).
(2) In event trigger status (TRIG LED lit or flashing), please do not change the event recording settings.

6-3. Example of Event Recording Chart.

An example of an event recording is shown in Figure 6-2. The event trigger occurrence is marked with a line (by No. 1 Pen, normally red) on the right side of the chart and at the same time TRIG LED lamp flashes to indicate acquisition of event data.

In this chart example, the recording start mode is MAN and the recorded point is channel 1.

- The event recording is executed by interrupting the ordinary recording. The ordinary recording suspended range (stop – restart) is indicated with the line marks on right of chart.
- In the event recording, three points – trigger occurrence time, data acquisition start and ending times – are indicated using line marks and time printouts.
- Immediately event recording is completed, the ordinary recording restarts.
  The time axis of the chart is automatically corrected.

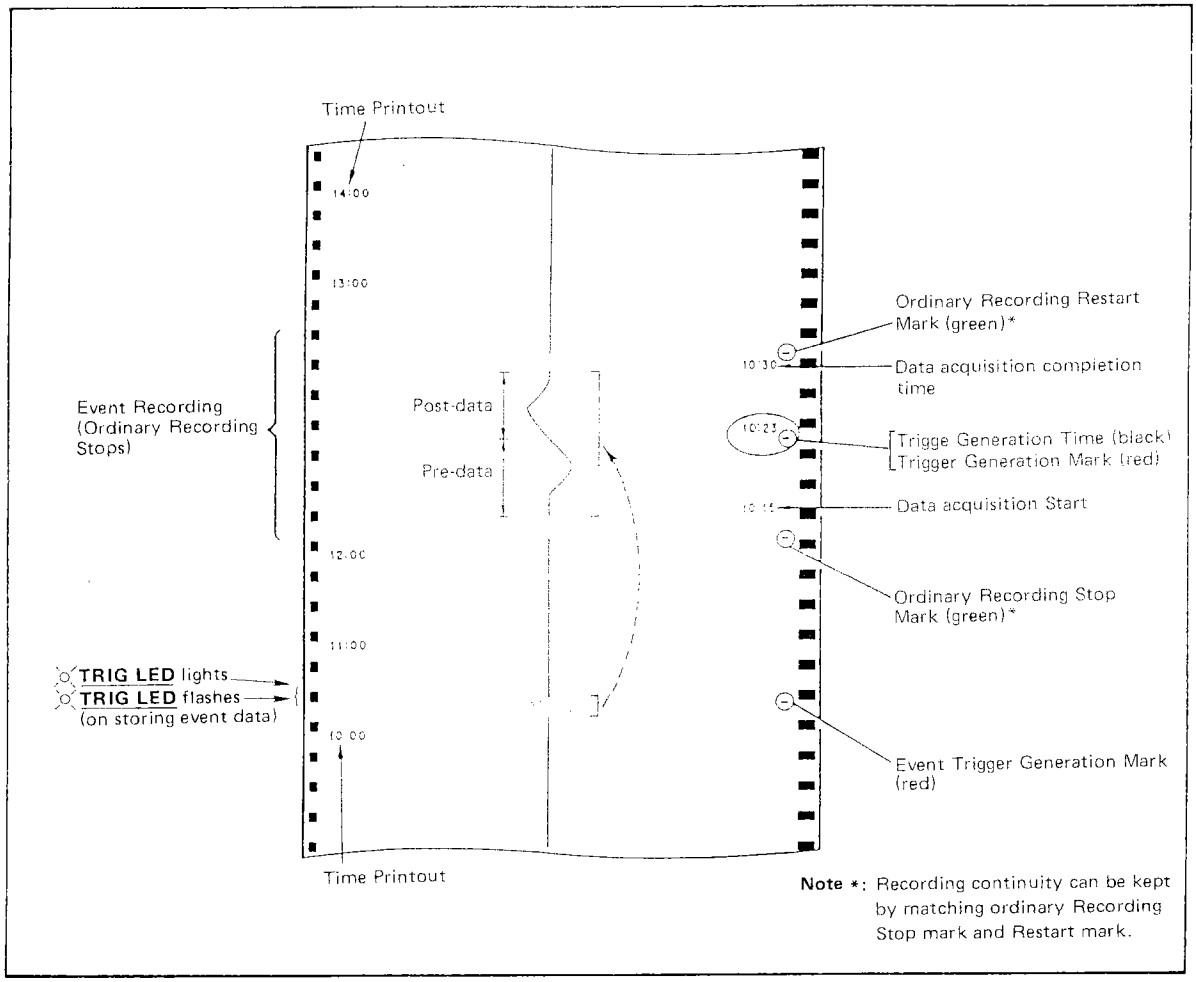


Figure 6-2. Example of Event Recording Chart.

7. MAINTENANCE.

This chapter describes parts replacement and maintenance for the Model SRHD recorder.

7-1. Replacing Chart.

A chart for this recorder has the length for one month's feed at a chart speed of 20 mm/h. The amount of chart remaining can be visually checked by looking at the slit in the chart stock. Chart replacement time may be calculated given the chart speed.

The "RENEW CHART" band mark is printed at 400 mm before chart end.

The model SRHD has self-diagnostic functions – these functions detect "out of chart" status, and **ALM LED** is lit and "C. End" is displayed on measured value display.

The recorder stops the recording operation automatically when the chart is fed approximately 10 mm past the chart end ALM indicating position.

7-2. Replacing Pen Cartridge.

The life of the cartridge pen depends on such conditions as recording mode, period and list printing, etc. but normally cartridge pen replacement period is approximately one month for dot-printing at a chart speed of 20 mm/h.

Observe the clarity of printed out points to decide when to replace the pens.

Before replacing the pen, always stop the recording. If the pen cartridge will not be used for a long time, remove the cartridge, wipe the pen tip clean, and replace the rubber pen cap to prevent gradual ink dryout. Keep the pen-cartridge in a cool place.

The pen cartridge has been altered from the ceramic pen to the plastic pen. In SRHDs delivered before the end of March 1986, use it by replacing the pen guide and employ the plastic pen. For the pen guide bracket for replacement, contact one of our sales offices.

Replenishing ink directly into the pen cartridge cannot be applied to the plastic pen. Thus, do not use the ink for replenishment of 30 cc (ml) for the plastic pen because it is provided with the ceramic pen.

7-3. Checking the Pen Guide Bezel.

When the chart or pen-cartridge is replaced, please wipe paper dust and ink from the pen guide bezel using the supplied brush wetted with a little water (see Figure 7-1).

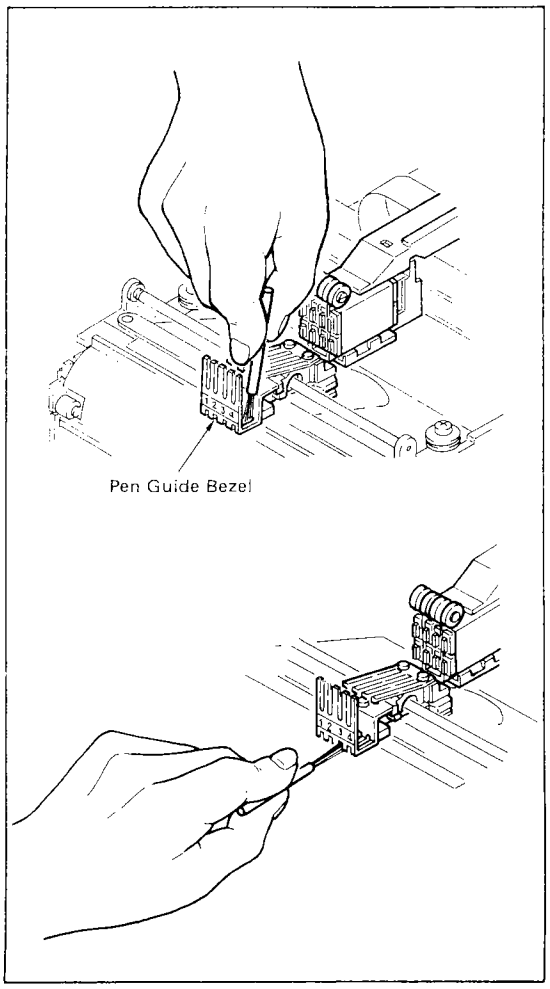


Figure 7-1. Pen Guide Bezel Cleaning.

7-4. Checking Sensors Mounted on Chart Feed Mechanism.

The optical sensors for detecting square hole at the chart edge and detecting the chart end should be kept clean. When the chart or pen-cartridge is replaced, please clean parts A and B in Figure 7-2, where the chart passes chart edge detectors.

The optical sensor mounting locations are shown in Figure 7-2. If any dust adheres to the sensor, wipe it off using the supplied cotton swab.

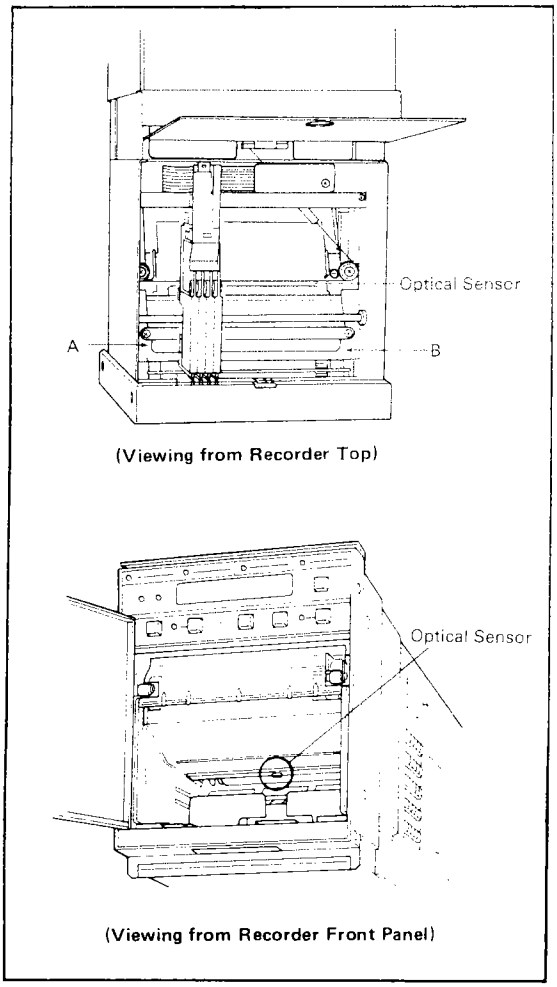


Figure 7-2. Optical Sensor Mounting Locations.

7-5. Replacing Fuse.

If it seems that the fuse may be faulty, check the inside of the fuse holder for contamination or poor contact with fuse.

Recommended replacement period: 3 years

(1) To remove the fuse, unscrew the fuseholder cap by turning it in the direction of the arrow marked on the cap – counterclockwise. Then the fuse is exposed.

(2) Mount a new fuse after confirming that its current rating is correct. Tighten the cap firmly.

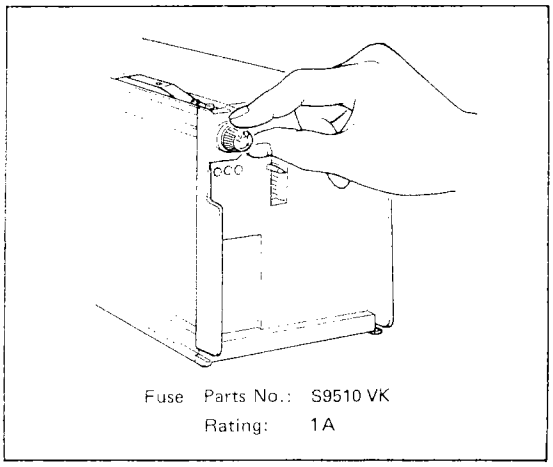


Figure 7-3. Fuse Replacement.

7-6. Replacing Data Memory Backup Battery.

If the ALM lamp on the recorder front panel begins flashing, replace the battery without delay.

("LOW BTRY VOLT" is displayed by ALM check operation, please refer to Chapter 8).

NOTE

Leave power applied to the recorder while replacing the battery. If the battery is removed during power failure, data settings may disappear.

(1) Pull the internal unit a little out of the housing. Remove the protecting cover, battery cover and battery (see Figure 7-4).

(2) Mount a new battery and fit the battery cover and protecting cover securely.

(3) Make sure that the ALM lamp on the front panel has stopped flashing.

Battery Life: Over 5 years (Environmental temp. under 45°C, Power applied condition)
Over 1 year (Environmental temp. under 45°C, Non power applied condition).

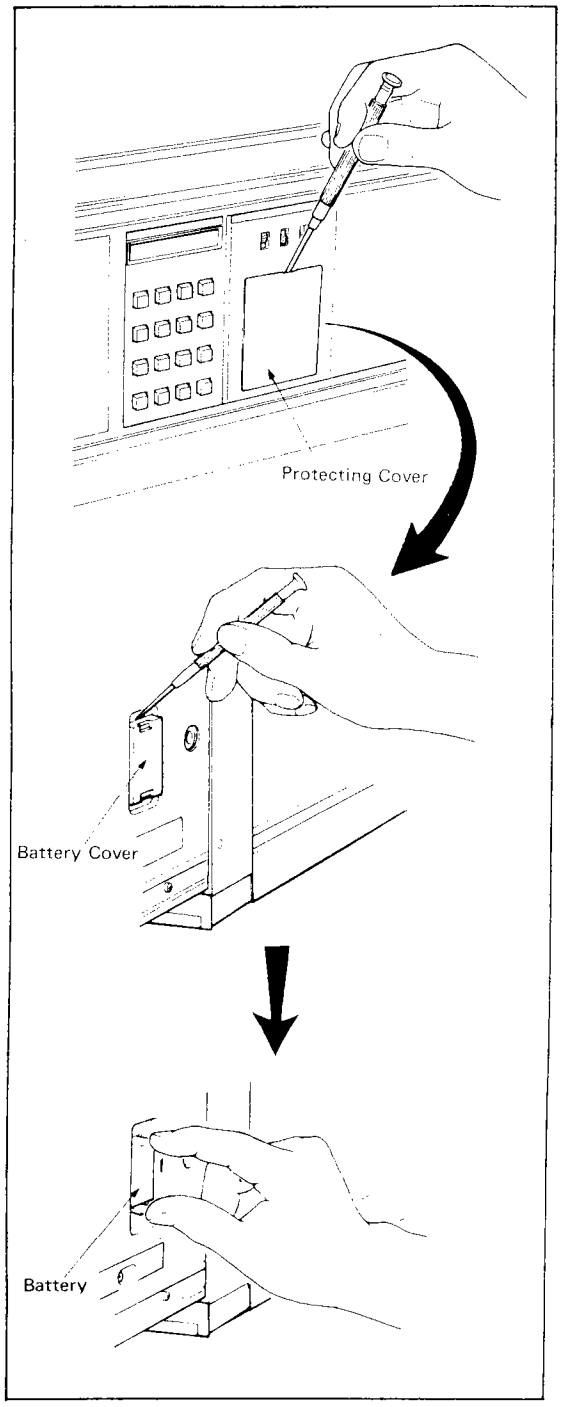


Figure 7-4. Data Backup Battery Replacement.

■ **Precautions for storage and handling of data memory backup battery.**

(1) Storage conditions
Ambient temperature: −10 to +60°C (14 to 140°F)
Ambient humidity: 5 to 85% R.H
Location free from corrosive gases.

(2) Replace the complete battery assembly (plastic plug-in package). Do not try to remove the battery only, as there is a danger of the unit being reassembled with wrong polarity.

(3) When measuring the battery voltage, be sure to employ a high input resistance voltmeter. Do not attempt to measure the voltage with a circuit tester or the like.

(4) Cautions in handling batteries.
- Do not charge the battery.
- Do not heat the battery or put it into fire.
- Do not short the positive and negative poles nor mount the battery with its polarity reversed.
- Do not subject the battery to severe shock nor attempt to disassemble it.

7-7. Replacement of Fluorescent Lamp.

Replacement procedure of the fluoresent lamp are described below.

7-7-1. Removing Front Frame.

(1) Remove the recorder from the housing.
(2) Remove one screw ① and lift top cover ② to remove from the internal assembly.

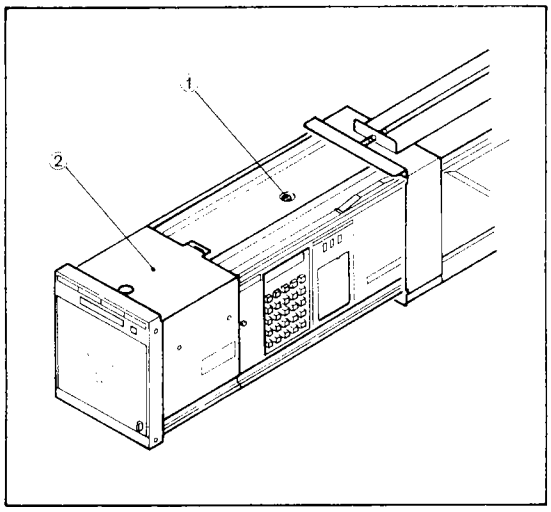


Figure 7-5. Removing Cover.

(3) Remove two connectors ③ and ④ in Figure 7-6. (Do not apply excessive force.)
Remember the direction of connectors connected.

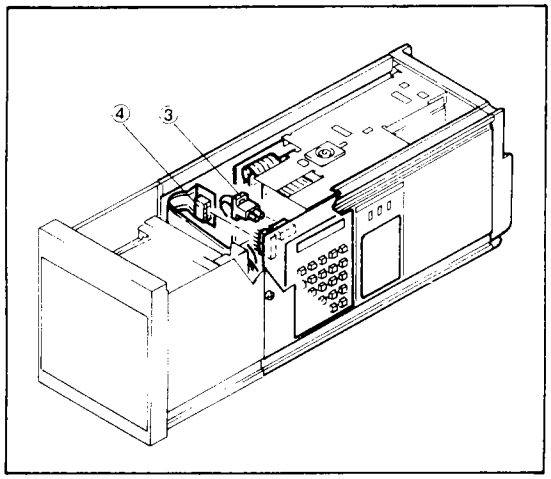


Figure 7-6. Removing Connectors.

(4) Remove four screws ⑤ (two screws at each side).
(5) Pull out the front frame so that the right side panel can be removed.

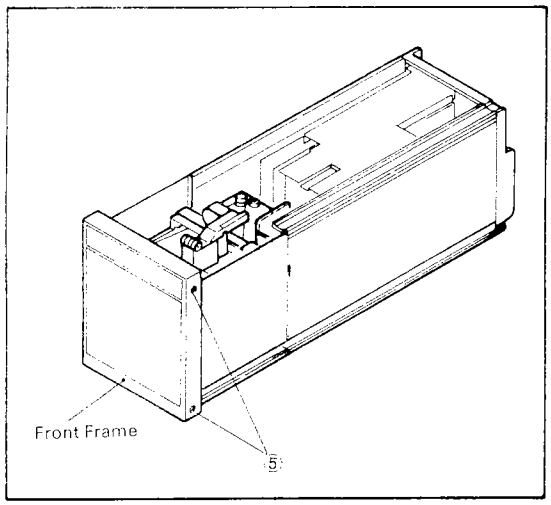


Figure 7-7. Removing Four Screws.

(6) Remove two screws ⑥ (in Figure 7-8) and pull out the right panel.
(Left panel don't have to be pulled out.)

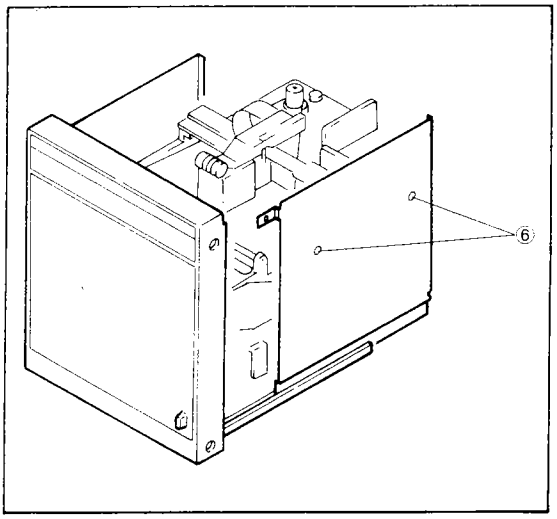


Figure 7-8. Removing Right Side Panel.

(7) The flexible printed board for the front display section is suspended by the mold hook (Figure 7-9). Remove the board from mold hook without damaging it.

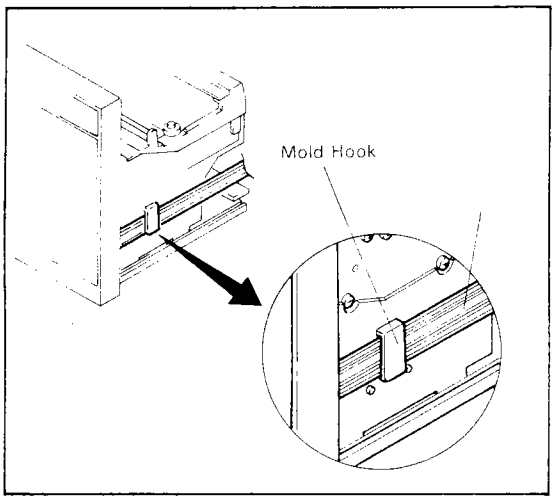


Figure 7-9. Flexible Printed Board.

(8) Put the front frame with the front part down as shown in Figure 6-10. Remove the rear cover at the back of front display section to gain access to the fluorescent lamp. (The rear cover is not held with clamps, so it can be removed easily.)

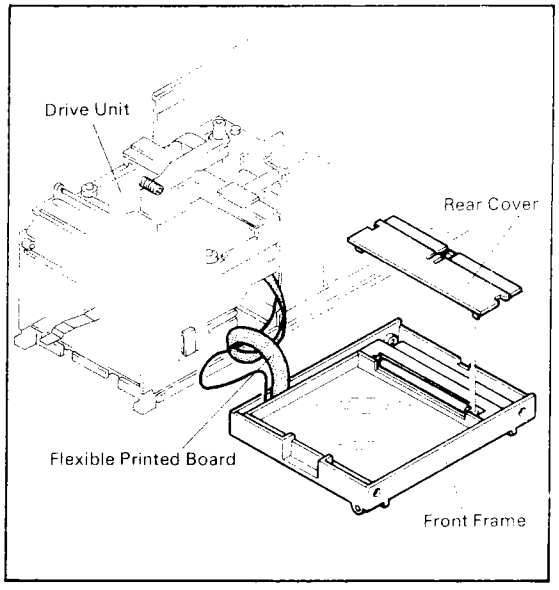


Figure 7-10.

7-7-2. Replacement of Fluorescent Lamp.

(1) Hold leadwire with two pincers (or tweezers) and remove the fluorescent lamp. (Don't hold glass section.)

(2) Install a new fluorescent lamp (do not bend the lead wires). Before installing, confirm that lead wires are not bent.

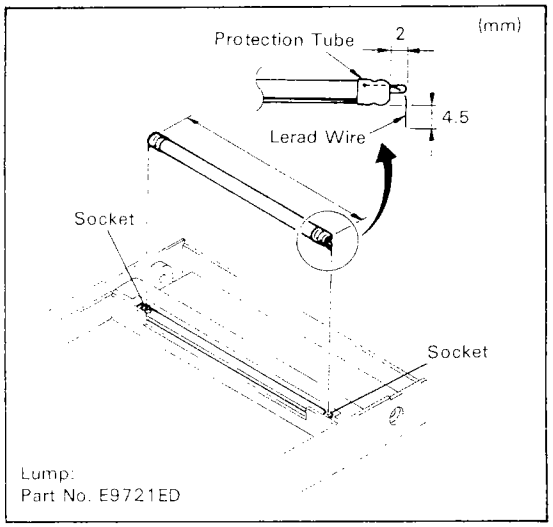


Figure 7-11.

7-7-3. Reassembly.

After replacing the fluorecent lamp, reassemble in the reverse order to the above disassembly procedures (refer to the Section 10-2-3 of the Instruction Manual).

8. SELF-DIAGNOSTIC FUNCTIONS AND DATA DISPLAYED.

Using the recorder self-diagnostic functions, if any abnormalities are detected in the recorder, the **FAIL** (red)* or **ALM** (yellow) indicator LED on the front panel lights, and a message is displayed on the tuning panel display. Some alarms are displayed on the measured value display (Front panel). The data display of the self-diagnostic function is summarized in Table 8-1.

When **FAIL LED, ALAM LED** lights, check the cause of trouble by the message on the display. If you think the cause is a hardware fault, please carry out trouble shooting according to Chapter 10.

8-1. Diagnostic Message Displaying Methods.

When the **FAIL** or **ALM** indicator lamp is lit, pressing the [ALM] key switch on the tuning panel, displays the corresponding recorder failure alarm data message on the recorder display.

Where there are two or more simultaneous faults (alarms) the recorder displays the message for only one, but the number of simultaneous alarms is indicated by "n" (n: 1, 2 . . . .F) at the end of the display message.

(Example) A/D CONV ERR /3
- A/D CONV ERR: message
- /3: indicates that there are three alarms

To check the other alarm messages, press the [ALM] key again and the next message is displayed.

When both FAIL and ALM are off, pressing the [ALM] key switch displays "/0" at the right end of the display.

Table 8-1. Contents of Self-Diagnostic Function.

LED Indication		Message	Failure content	Other Operation During Failure
FAIL lights (red)		———	CPU Failure	FAIL contact open
		A/D CONV ERR	A/D Converter Failure	
ALM (yellow)	Flashes	LOW BTRY VOLT	Backup Battery Failure	
	lights	ROM TEST ERR	ROM TEST Failure	
		RAM TEST ERR	RAM TEST Failure	
		ARITH OVER FLOW	Arithmetic Over Range	Operation continues using limit value
		SERVO ERR	Servo Mechanism Failure	Sr. Er. is displayed on process variable display.
		CHART LOAD ERR	Chart installation Failure	C.L.Er is displayed on the process variable display
		CHART FEED ERR	Chart Feed Failure	Recording stops C.F.Er is displayed on the process variable display
		CHART END	Chart End Detection	Chart is fed 10 mm and recording stops. C. End is displayed on process variable display.
		TIME ERR	Time error	
		RAM DATA LOST	Internal Data Lost	
		CH1 OVER RANGE	CH1 Input Range Over	Operation continues using limit value
		CH2 OVER RANGE	CH2 Input Range Over	
		CH3 OVER RANGE	CH3 Input Range Over	
		CH4 OVER RANGE	CH4 Input Range Over	
		ALM 1 1H1L2H3V*/4 (NOTE)	Alarm No. 1 Output ON	Each contact point open or closed
		ALM 2	Alarm No. 2 Output ON	
		ALM 3	Alarm No. 3 Output ON	
		ALM 4	Alarm No. 4 Output ON	

Note: For the messages of alarm outputs (No. 1 to 4). the * mark shown in the following format example indicates that there are some main causes other than those identified by the current message contents.

(Alarm output format)

ALM 1 1H1L2H3V*/4
- ALM 1 1H1L2H3V: Message
- 4: shows that there are four alarms
- *: When there are faults other than indicated by current message (1H, 1L, 2H, 3V) exist.

8-2. Messages Displayed on Measured Value Display.

For the following alarms, messages are automatically displayed on measured value display.

The messages and their meanings are shown in Table 9-2. If two or more of these alarms occur simultaneously, the one with highest priority is displayed and the others cannot be verified.

To clear the message from the display and change the display back to a measured value display, please refer to the following table (table 8-2) descriptions.

Table 8-2. Messages Displayed on Measured Value Display.

Priority	Message	Content	Message Display Cancel
1	Init	When RAM data is initialized.	Push the CONV key on the tuning panel.
2	C.rEt	Chart rewinding.	Set the chart rewind switch (CHART) on the tuning panel to "NORMAL".
3	Sr.Er	Servo-error	Push the CH switch on the front panel.
4	C.L.Er	Chart loading failure	
5	C.F.Er	Chart feeding failure	
6	C.End	Chart end	
7	Entr	Event recording stand-by *	Push the EVENT RCD switch on the front panel again.
8	LISt	List printing stand-by **	Push the LIST switch on the front panel again.

* During list printing, chart loading or chart feeding, if you press the event data replay recording switch, this message is displayed.

** During event recording or chart loading, if you press the list printing ON/OFF switch, this message is displayed.

9. ADJUSTMENT.

This chapter describes adjustment of the recording mechanism. There are four adjustment items as follows:

- Isolation circuit adjustment (only for the SRHD-200, SRHD-300)
- Optical sensor adjustment.
- Zero/span adjustment (two methods as follows).
  1. Adjustment using internal signal.
  2. Adjustment using external input signal
- Chart time axis fine adjustment.

NOTE

All parts have been adjusted in our factory. So please carry out the adjustments written in this part only during periodic maintenance or if the recorder malfunctions.

If—for some reason—RAM data is lost, it may be necessary to adjust the recorder.

9-1. Preparation for Adjustment.

No special equipment is needed for adjustment. However, when zero/span adjustment is to be carried out using an external input signal, a DC voltage standard (YOKOGAWA TYPE 2554 portable DC voltage. current standard or equivalent) is needed.

For adjustment, use the switches mounted on the tuning panel on the recorder internal unit right side panel or the pushbutton switches on the recorder front panel. Two isolator check switches are provided with the SRHD-200 and SRHD-300 type recorder on the center top of its internal unit.

Special functions are allocated for the switches on the front panel during adjustment.

The function contents are explained together with each adjustment item description.

The locations of the switches to be used for adjustment are shown in Figure 9-1. It is not necessary to disconnect the input signal wiring before adjustment.

9-2. Adjustment Item Selection.

Figure 9-2 shows the adjustment item selection procedure. When the calibration switch (CAL) is set to ON position, the adjustment items are displayed on the display.

When the tuning switch is set to "ENABLE" position, the items can be displayed in order by pushing the [MENU] key. By selecting the adjustment item and pushing the [ENT] key, adjustment is possible.

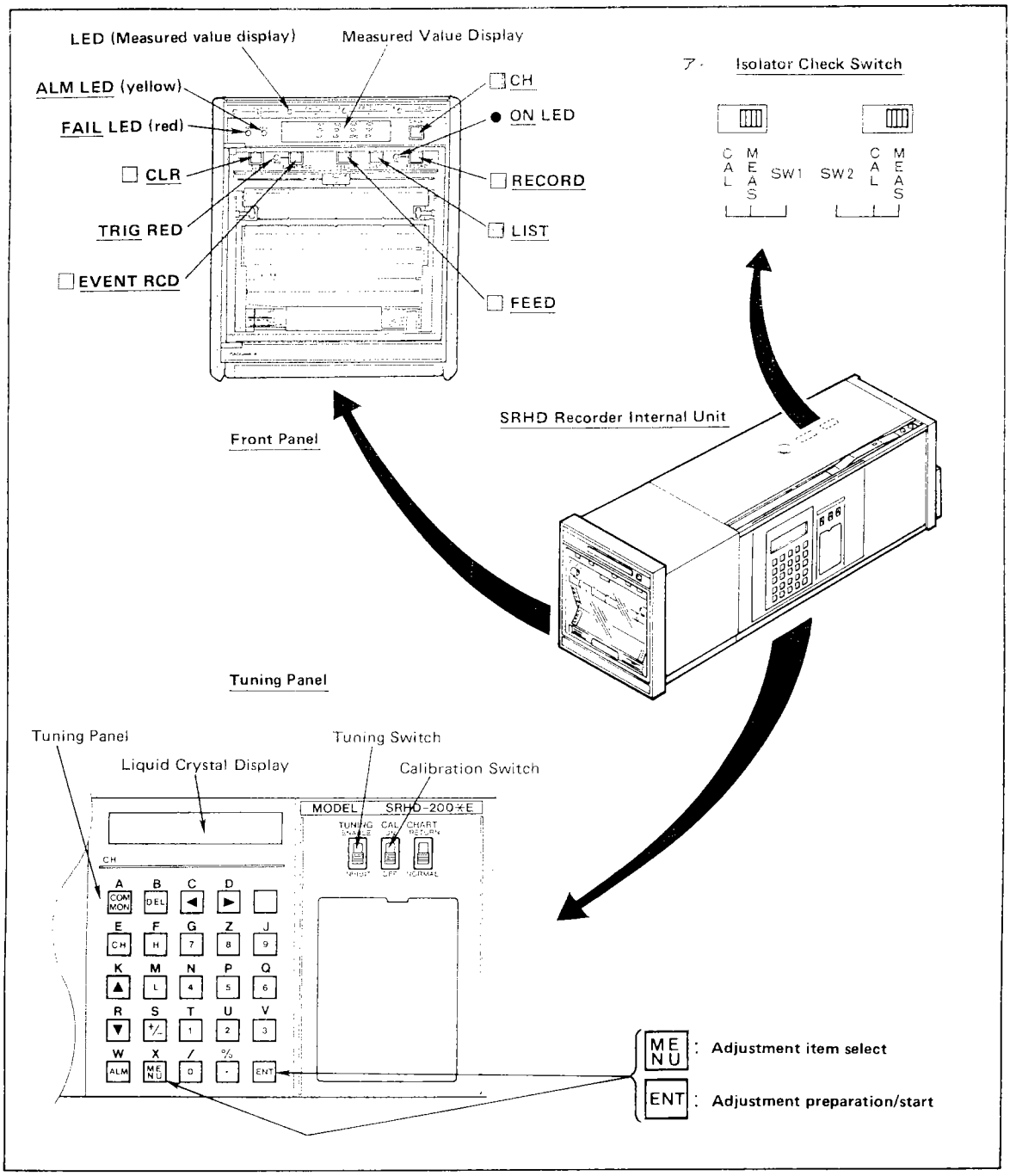


Figure 9-1. Switches for Recording Mechanism Adjustment.

9-3. Adjustment.

The procedure for each adjustment item is shown in the relevant flowchart below.

Figure 9-3. Isolation Circuit Adjustment
Figure 9-4 Optical Sensor Adjustment
Figure 9-5 Zero/Span Adjustment using Internal Signal
Figure 9-6. Zero/Span Adjustment using External Input Signal
Figure 7-7. Chart Time Axis Adjustment.

NOTE

Before carrying out "Zero/Span Adjustment" first carry out "Isolation Circuit Adjustment" (Model SRHD-200, SRHD-300).

Also carry out "Optical Sensor Adjustment" first – the reason is that if there is trouble with the optical sensor, the chart zero span adjustment and time axis adjustment may not be satisfactory.

9-3-1. Isolation Circuit Adjustment.

Follow the Figure 9-3 Flowchart.

Adjust the SRHD-200 (input isolated type) SRHD-300 recorder isolation circuit input/output linearity.

This adjustment is not needed for the SRHD-100 (non-isolated input type) recorder.

Adjust the isolation circuit according to the Figure 9-3 flowchart. Before adjustment, it is necessary to remove the internal unit top cover so that the isolator check switches (SW1, SW2) can be operated.

From the item selection, by pressing the [ENT] switch, start adjustment. During adjustment the message "**I**. CAL" is displayed on the recorder front panel display.

Set the switches SW1 and SW2 to CAL positions and press the [ENT] key to begin automatic adjust-completed the display message "SET SW1, 2 MEAS?" appears. Set the switches SW1 and SW2 to MEAS positions and press the [ENT] key to complete the adjustment.

If there is trouble with an isolation circuit, its channel number is displayed in the message display. After adjusting isolator circuit, replace the top cover of internal unit.

9-3-2. Optical Sensor Adjustment.

Carry out the optical sensor automatic sensitivity adjustment as follows. Adjust the optical sensor according to the Figure 9-4 Flow chart. The four optical sensors – two ℅ axis detecting sensors on the pen carriage, a chart detection sensor and time axis sensor – are adjusted by comparing two conditions (chart unloaded and loaded conditions).

Therefore, according to the message instructions, chart stock must be installed in the unit twice (with the chart unloaded and with the chart loaded).

If there is trouble with a sensor, the sensor number is displayed in a message display.

While adjusting the optical sensors, be sure to close the top cover to keep external light from affecting the sensors.

9-3-3. Zero/Span Adjustment.

■ Notes for Zero/Span Adjustment

The zero/span adjustment can be performed by either of two methods: either using the internal signal (see Figure 9-5) or using an external input signal (see Figure 9-6).

The former method is a self-checking method using the internal 0%, 100% monitor signals, so a signal generator is not required. For the latter method, an external analog signal is applied.

The zero/span adjustment was carried out at the factory before shipment using an external input signal. Following this adjustment, if adjustment using the internal signal is carried out, the adjustment (values) set at the factory before shipment are lost.

So adjustment using the internal signal should be limited only to "Confirmation" – the first half of the description below– and "adjustment" should be carried out only when "Confirmation" indicates that it is necessary.

While adjusting, be careful not to cause pen carriage to hit case side panel.

When carrying out this adjustment, the switches on the recorder front panel have the following functions.

- ☐ **CH** . . . . . .Channels are selected in turn.
- ☐ **LIST** . . . . . .Zero or span adjustment are selected.
- ☐ **RECORD** . . . . . .Commands recording start/stop with designated conditions.
- ☐ **EVENT RCD** . . . .Moves pen head to the right.
- ☐ **CLR** . . . . . .Moves pen head to the left.

(1) Zero/Span Adjustment Using Internal Signal.

- Confirmation (Operation 1).
  The confirmation of the factory-set recorder zero /span data is part of operation 1 in the flowchart. (If operation 2 is executed, zero/span data are set and the previous data are lost, so only do this if adjustment is necessary.)
  Using the switches □ **CH**, □ **LIST** and □ **RECORD**, select and record each channel zero and span to check the recording deviation.
  From the recorded results, if adjustment is needed, adjust as follows:
- Adjustment (Operation 2)
  After all channel zero adjustments, adjust the last channel span.
  That is, carry out CH1, 2, 3 and 4 zero adjustments first and complete CH4 span adjustment.
  For (–) deviation, correct by pushing the □ **EVENT RCD** key and for (+) deviation, correct by pressing the □ **CLR** key.
  The pen head correction amount each time the key is pressed is approx. 0.02 mm.

(2) Zero/Span Adjustment using External Signal.

By pressing the MENU key, the message changes from the adjustment menu using internal signal (INTERNAL INPUT?) to the adjustment menu using external signal (EXTERNAL INPUT?)

In the same manner as confirmation using internal signal, select channel and zero or span and apply the following signal to the corresponding the channel input terminals.

When zero point is selected	1.000 V
	0.00 V (SRHD-300)
When span is selected	5.000 V
	10.00 V (SRHD-300)

Verify each channel recording and – as a result–if adjustment is needed, carry out adjustment in the same manner as (1) described above.

9-3-4. Chart Time Axis Fine Adjustment.

This paragraph describes how to confirm that the chart time axis is being fed in agreement with the time (the chart must be dot printed on the time axis main scale at just 00 min.) and how to adjust it.

Figure 9-7 shows the adjustment procedure.

When carrying out this adjustment, the switches on the recorder front panel have the following functions.

□ **CH** . . . . . Channels are selected in turn.
□ **RECORD** . . . . . Commands recording start/stop on designated channel
□ **EVENT RCD** . . . . . Corrects "fast" recording time.
□ **LIST** . . . . . Initial recording adjustment on the main scale.
□ **CLR** . . . . . Corrects "slow" recording time

- Confirmation (Operation 1.)
  Decide if the chart time axis has shifted.
  From the item selection, by pressing the ENT key, start adjustment. "t. Adj" is displayed on the recorder front panel. At first, Channel 1 is automatically selected and the measured value indicator LED 1 lights simultaneously. When the □ **RECORD** switch is pressed, the No. 1 pen dots at 0, 90, 0.3, 90.3 . . . . 10.00, 100% points furthermore, after chart is fed 20mm, dots again at 0.90 . . . . 100% points.
  During this interval, by pressing the □ **CH** switch and changing channel in turn, confirm the recording conditions. To stop recording, press the □ **RECORD** switch again. If the time axis is correctly adjusted, the test dot printing is just on the time axis main scale.
  When all channel test recordings show the same constant deviations, adjust according to the following operation 2. When only a certain channel deviates, the pen may be incorrectly mounted, so check pen carriage and pen mechanism.
- Time axis fine adjustment (Operation 2)
  While carrying out the test recording described in operation 1 above, press the front panel switches □ **CLR**, □ **EVENT RCD** to correct by printing.
  By pressing the □ **EVENT RCD** switch once, corrects "fast" recording by approximately 0.1 mm.
  For "slow" recording, by pressing the □ **CLR** switch once, the chart is fed 18 mm (the interval between adjacent main scale marks is 20mm). Correct by pressing the □ **EVENT RCD** switch. When all channel dot printing is correctly performed on the time axis, the adjustments are complete.

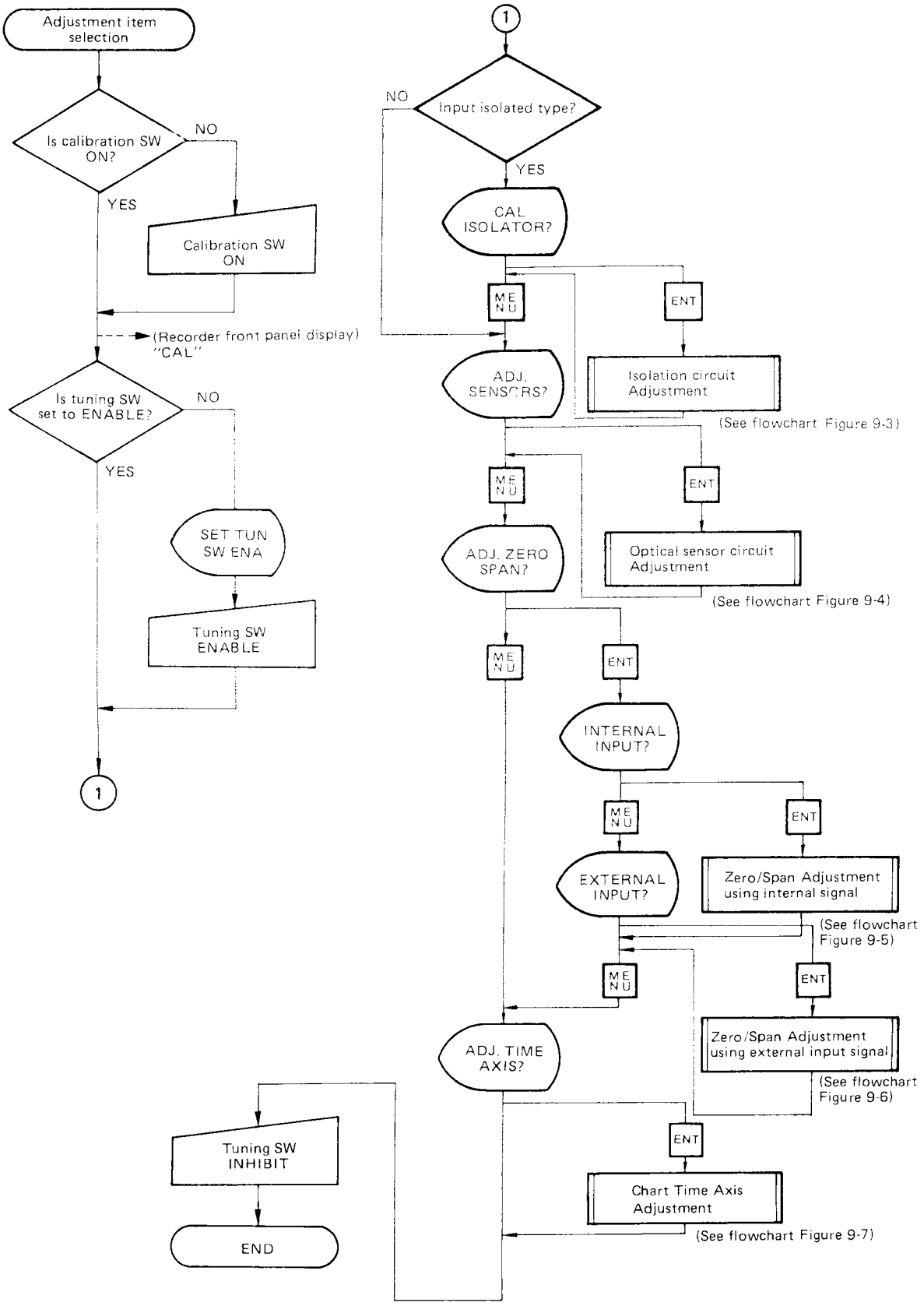


Figure 9-2. Adjustment Item Selection.

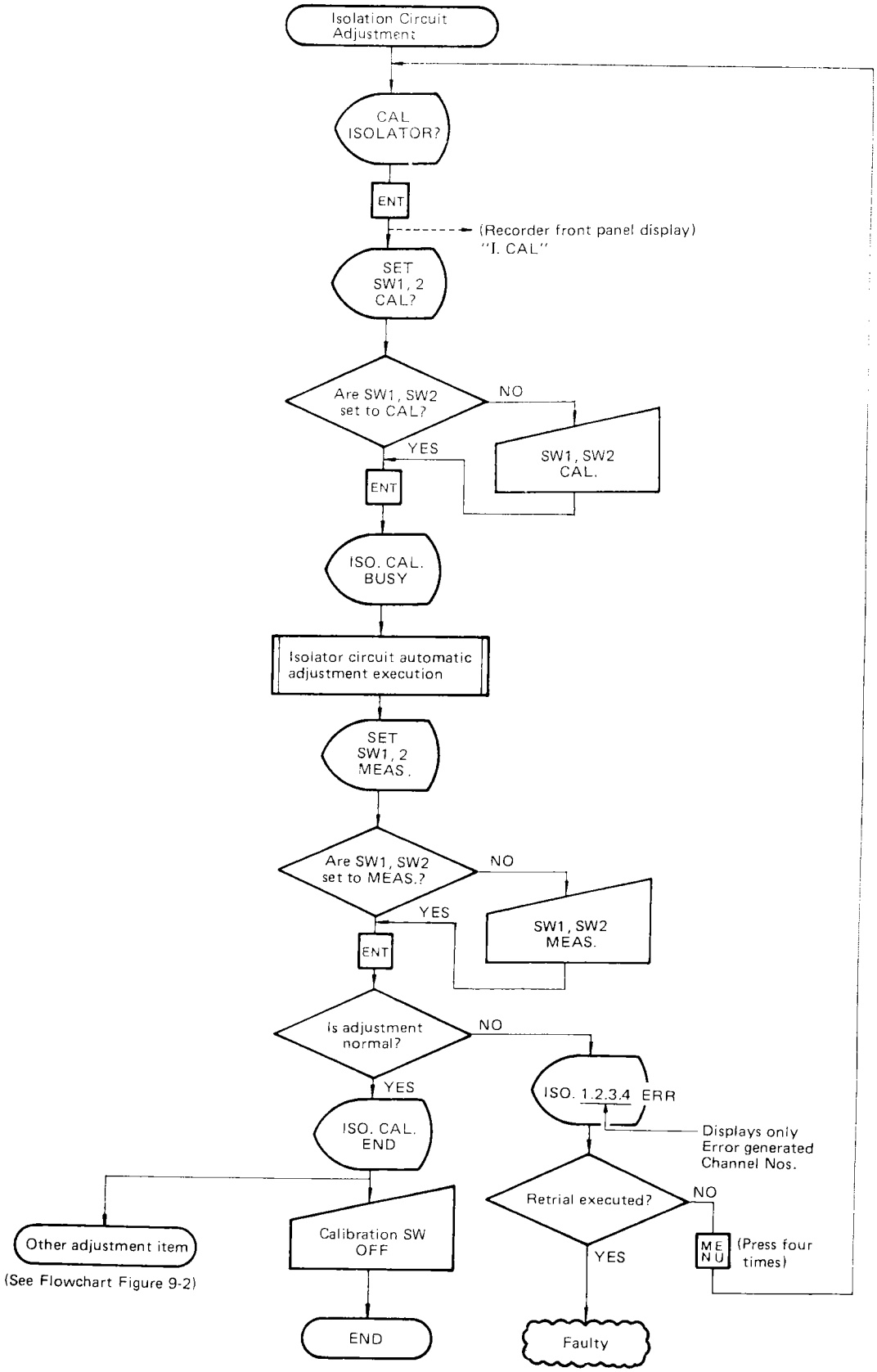


Figure 9-3. Isolator Circuit Adjustment.

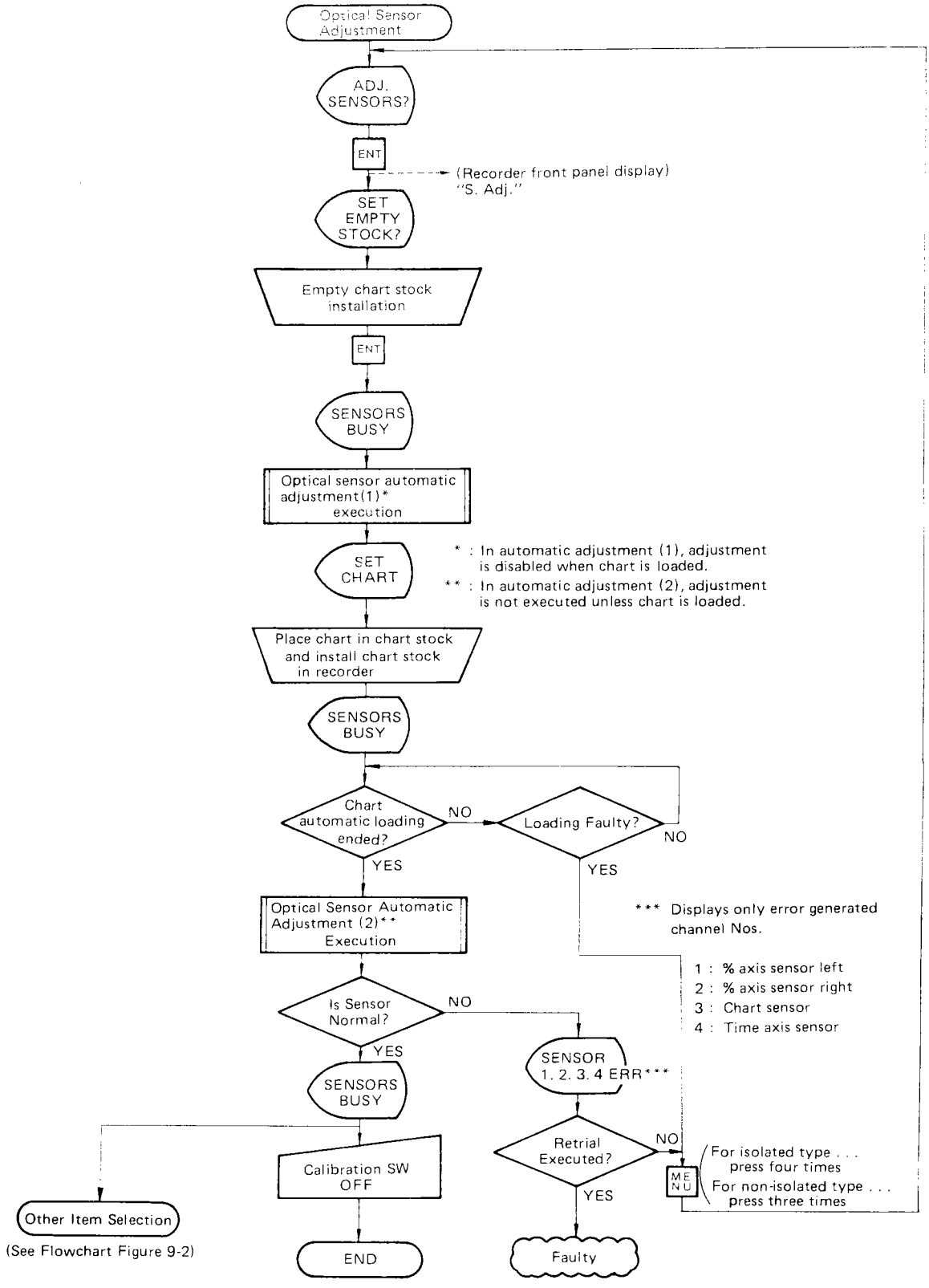


Figure 9-4. Optical Sensor Adjustment.

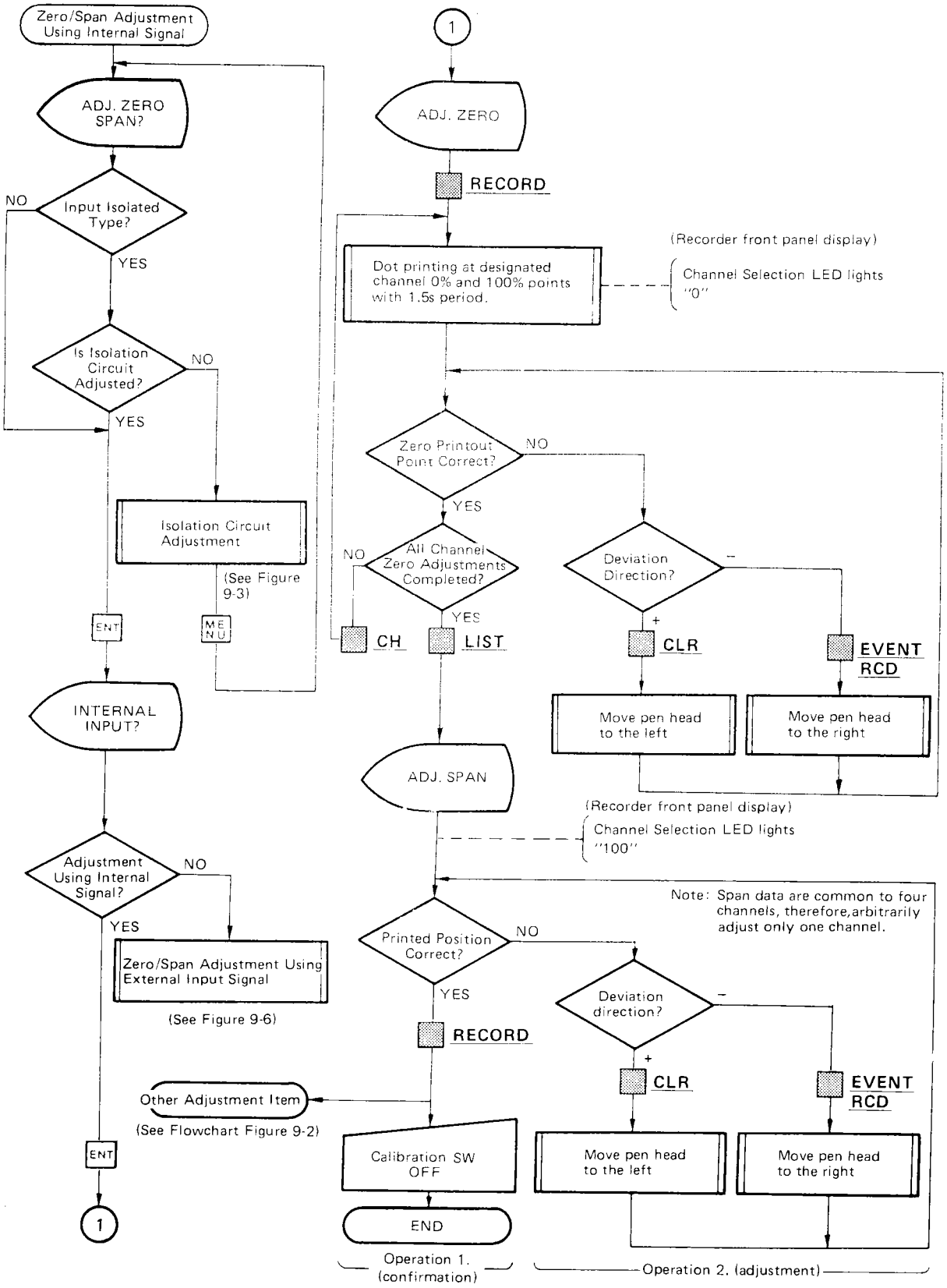


Figure 9-5. Zero/Span Adjustment Using Internal Signal.

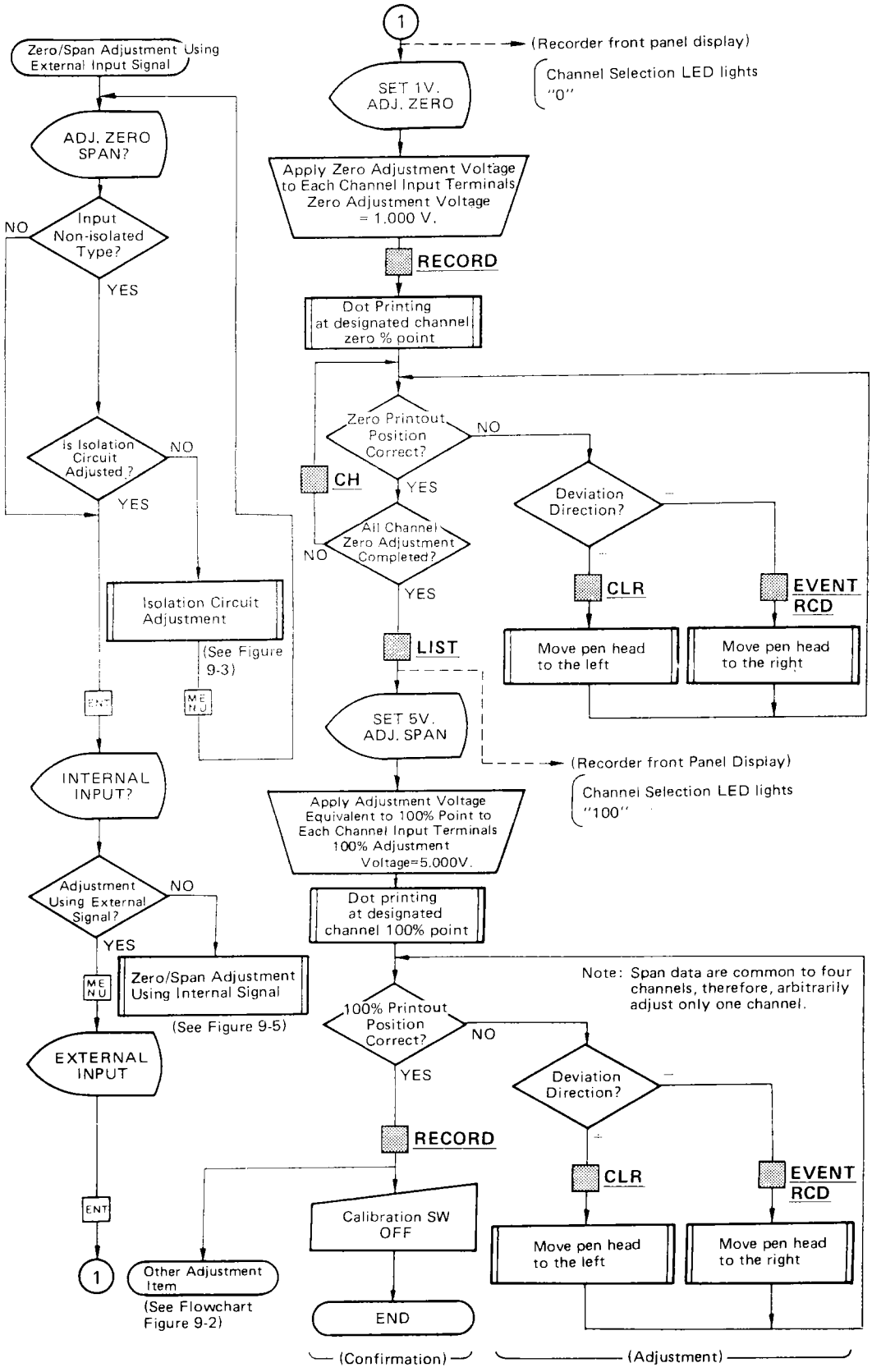


Figure 9-6. Zero/Span Adjustment Using External Input Signal.

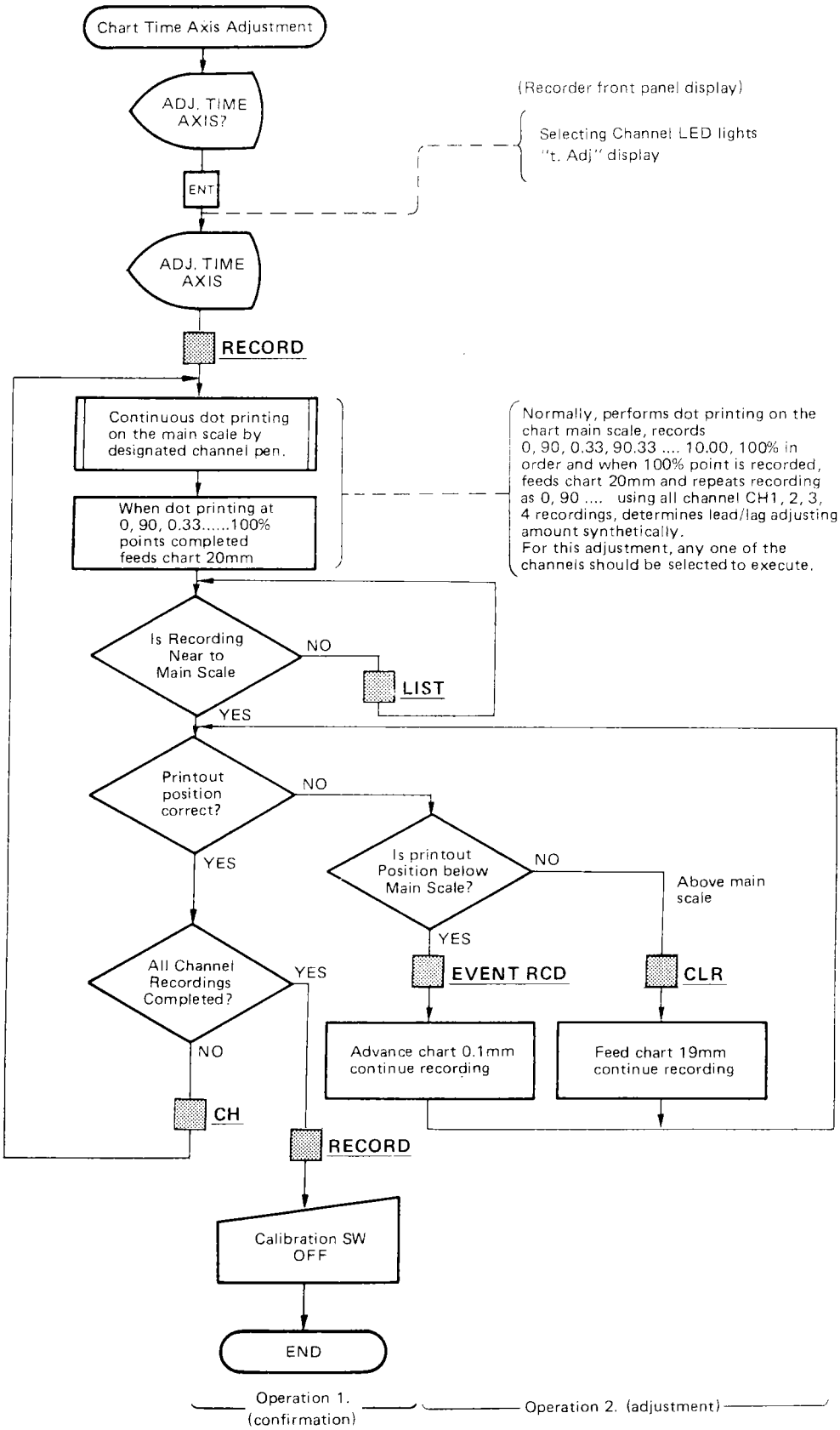


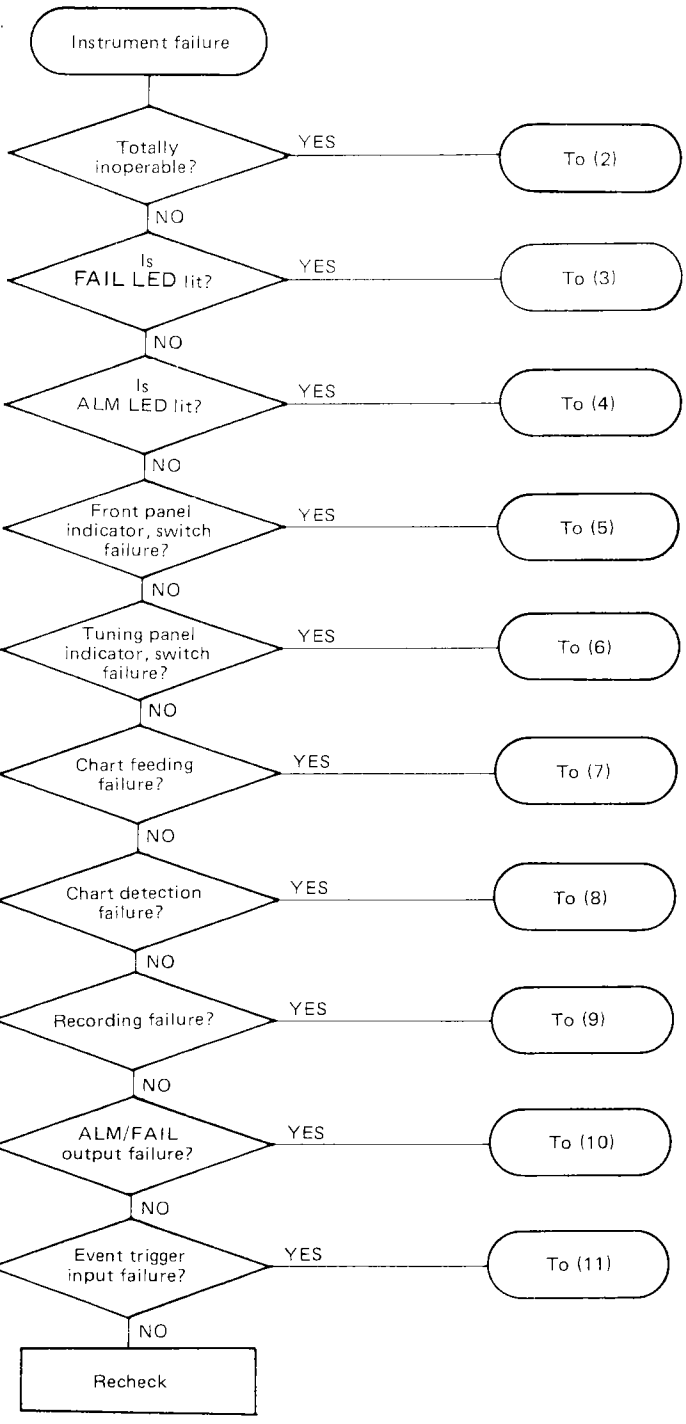
Figure 9-7. Chart Time Axis Adjustment.

10. TROUBLESHOOTING.

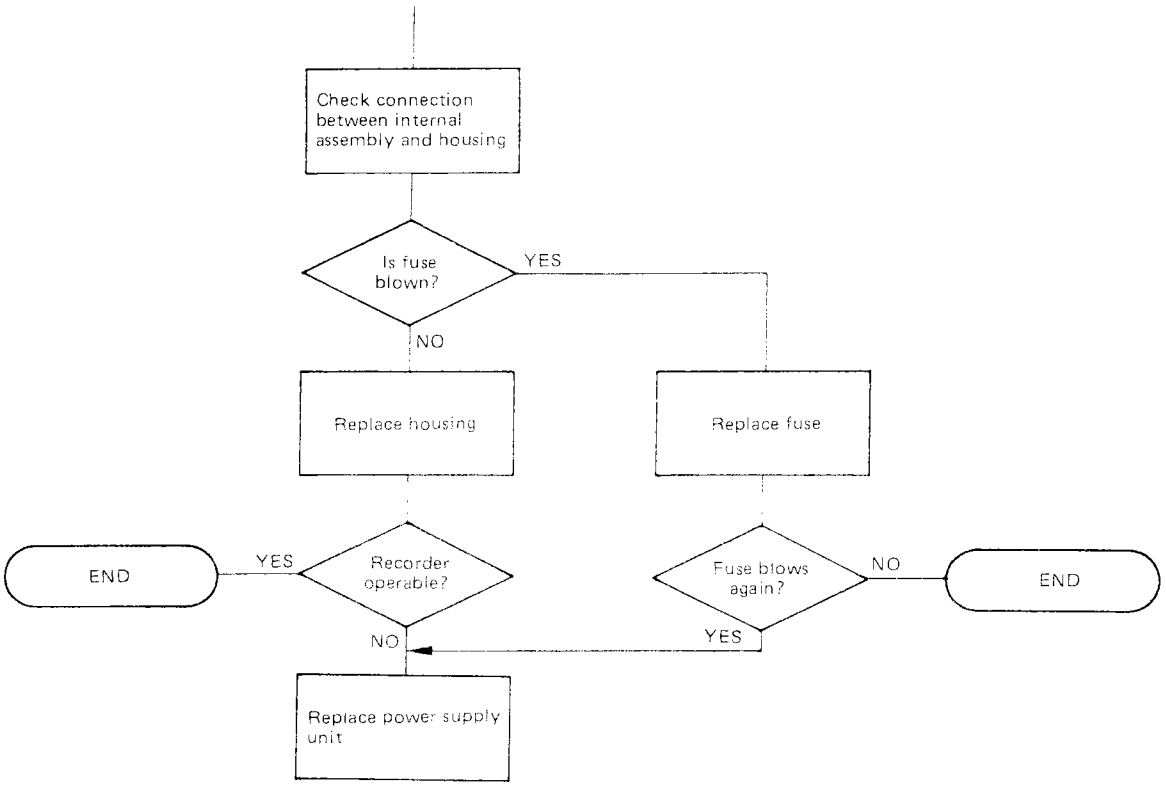
If a problem occurs in the Model SRHD INTELLIGENT RECORDER, identify the problem and resolve it according to the troubleshooting flowcharts written in this part. If the problem is difficult to find, consult your local YEW service station.

10-1. Troubleshooting Flowcharts.

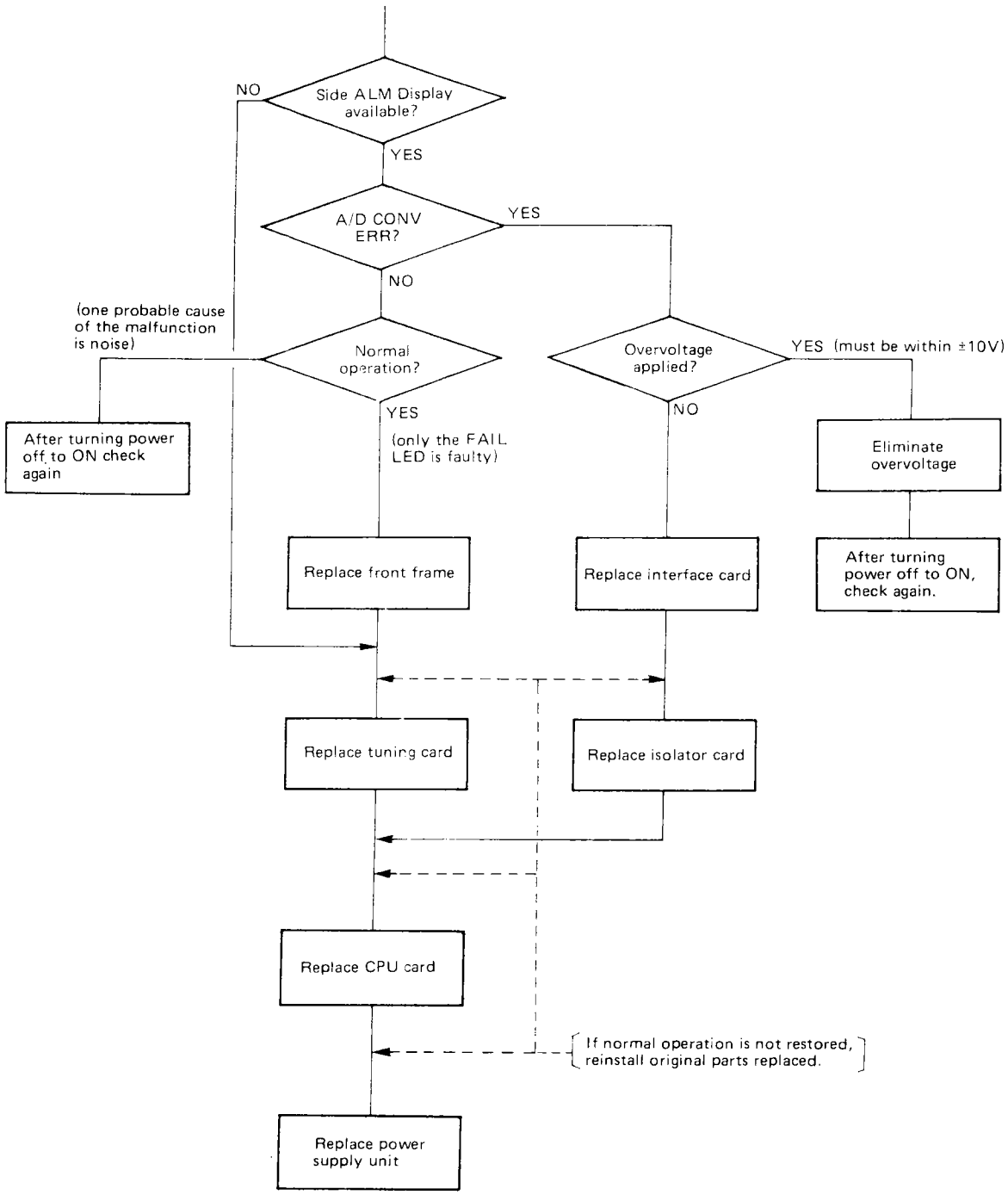
(1) Problem Identification.

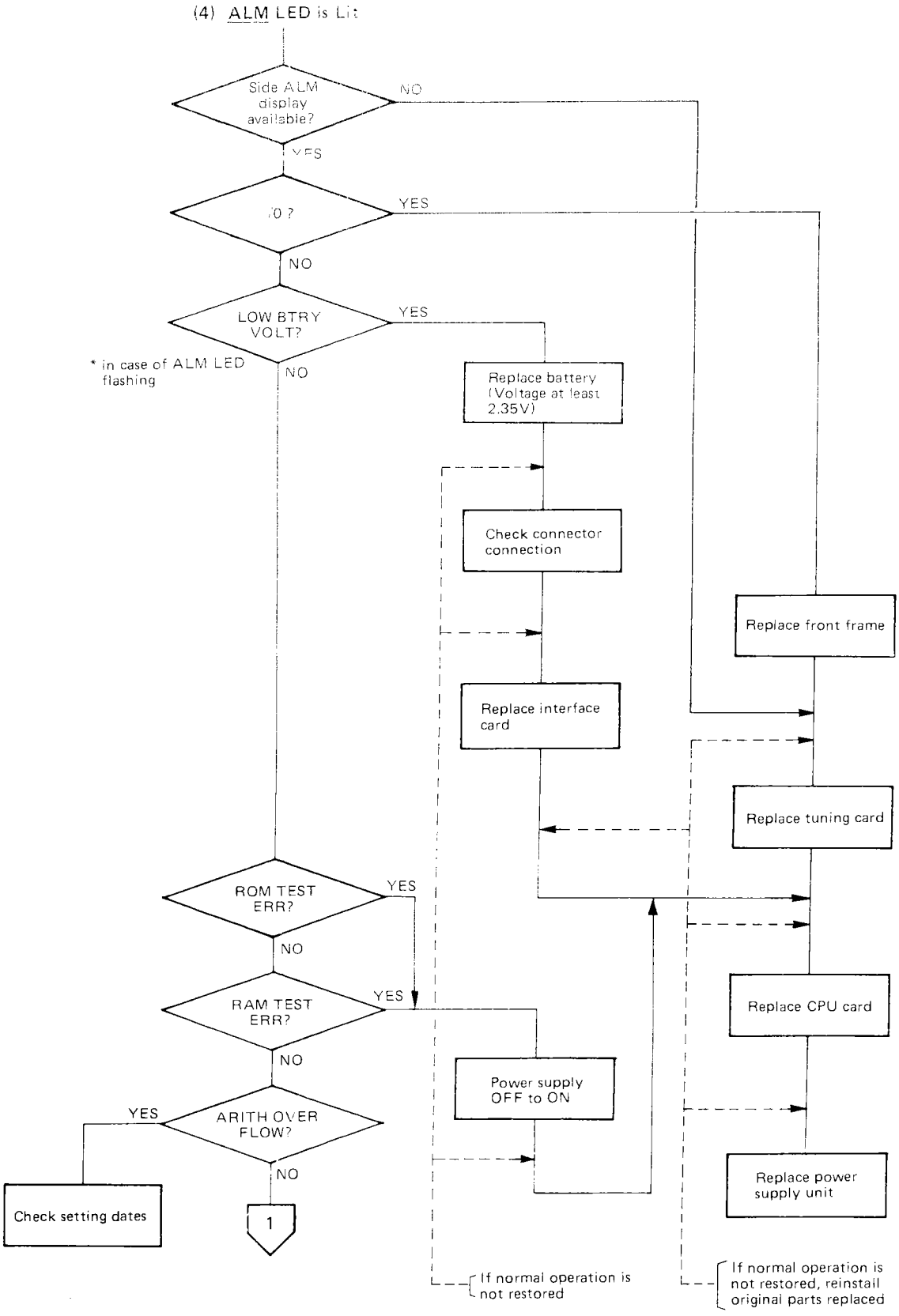


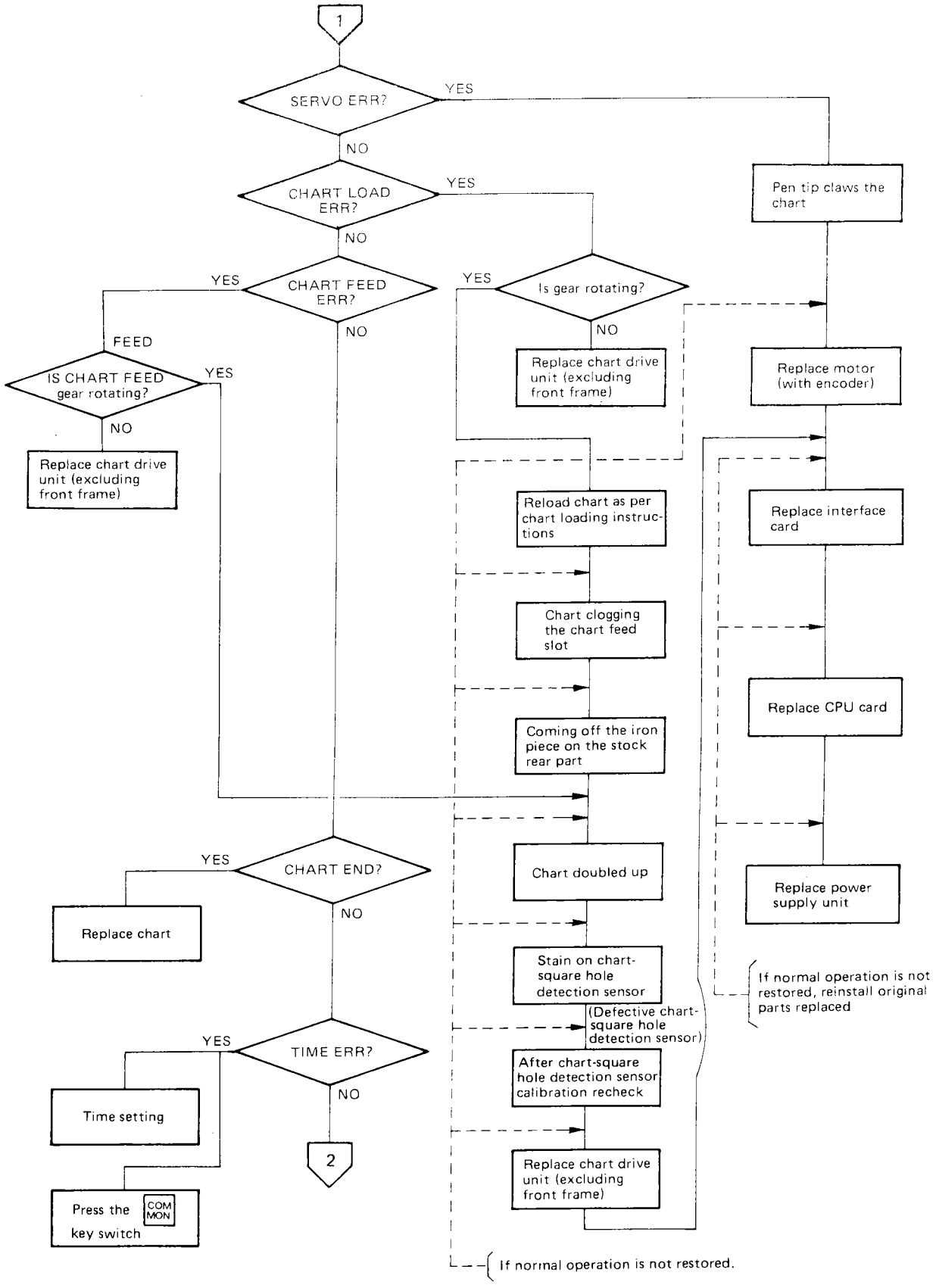
(2) Totally Inoperable

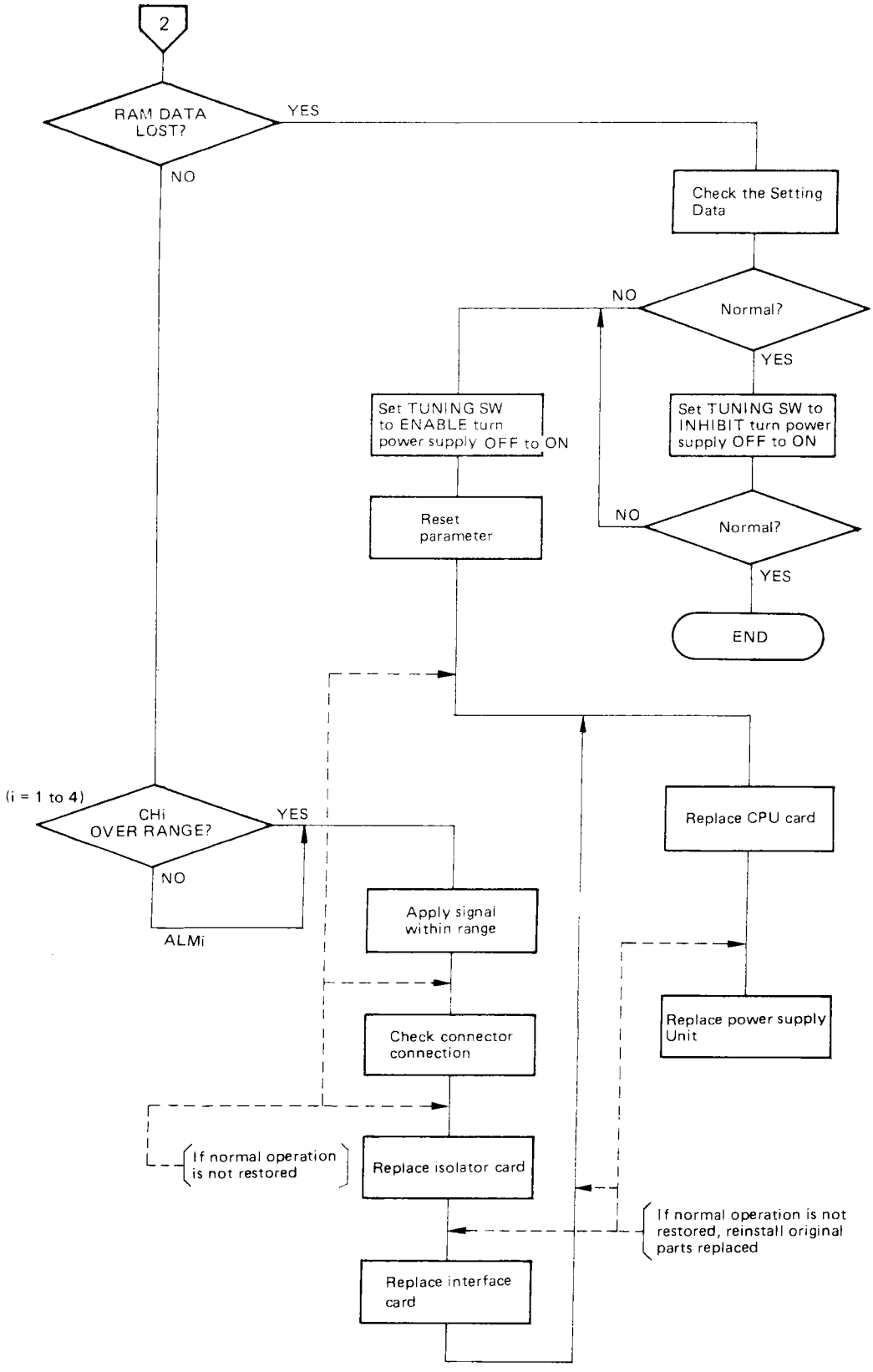


(3) FAIL LED is Lit



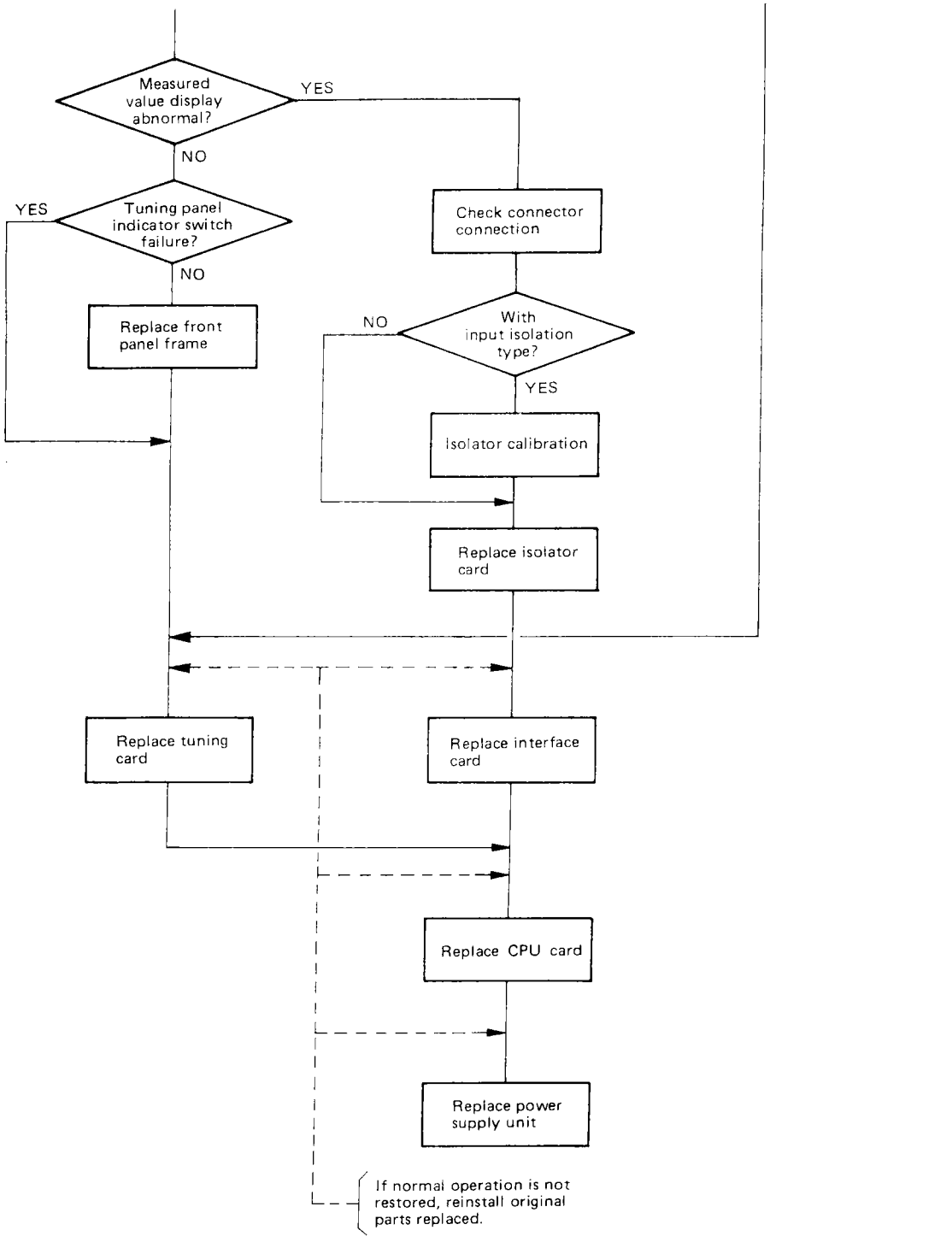

(4) ALM LED is Lit
Side ALM display available?
NO
YES
/0 ?
YES
NO
LOW BTRY VOLT?
YES
NO
* in case of ALM LED flashing
Replace battery (Voltage at least 2.35V)
Check connector connection
Replace front frame
Replace interface card
Replace tuning card
ROM TEST ERR?
YES
NO
RAM TEST ERR?
YES
NO
Replace CPU card
Power supply OFF to ON
ARITH OVER FLOW?
YES
NO
Replace power supply unit
Check setting dates
1
If normal operation is not restored
If normal operation is not restored, reinstall original parts replaced


1
SERVO ERR?
YES
NO
CHART LOAD ERR?
YES
NO
CHART FEED ERR?
YES
NO
FEED
IS CHART FEED gear rotating?
YES
NO
Replace chart drive unit (excluding front frame)
Is gear rotating?
YES
NO
Replace chart drive unit (excluding front frame)
Pen tip claws the chart
Replace motor (with encoder)
Reload chart as per chart loading instructions
Replace interface card
Chart clogging the chart feed slot
Replace CPU card
Coming off the iron piece on the stock rear part
CHART END?
YES
NO
Replace chart
Chart doubled up
Replace power supply unit
Stain on chart-square hole detection sensor
(Defective chart-square hole detection sensor)
If normal operation is not restored, reinstall original parts replaced
TIME ERR?
YES
NO
Time setting
After chart-square hole detection sensor calibration recheck
2
Replace chart drive unit (excluding front frame)
Press the COM MON key switch
If normal operation is not restored.

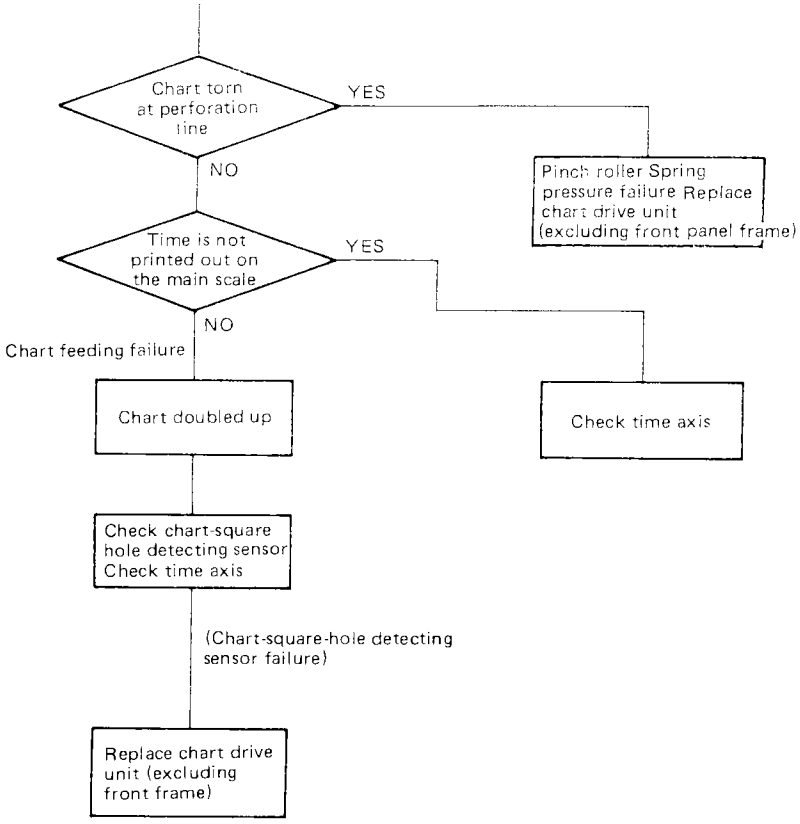

2
RAM DATA LOST?
YES
NO
Check the Setting Data
NO
Normal?
YES
Set TUNING SW to ENABLE turn power supply OFF to ON
Set TUNING SW to INHIBIT turn power supply OFF to ON
Reset parameter
NO
Normal?
YES
END
(i = 1 to 4)
CHi OVER RANGE?
YES
NO
ALMi
Apply signal within range
Check connector connection
If normal operation is not restored
Replace isolator card
Replace interface card
Replace CPU card
Replace power supply Unit
If normal operation is not restored, reinstall original parts replaced

(5) Front panel Indicator Switch Failure

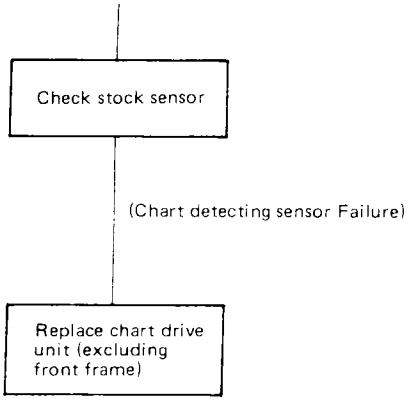
(6) Turning panel Indicator Switch Failure



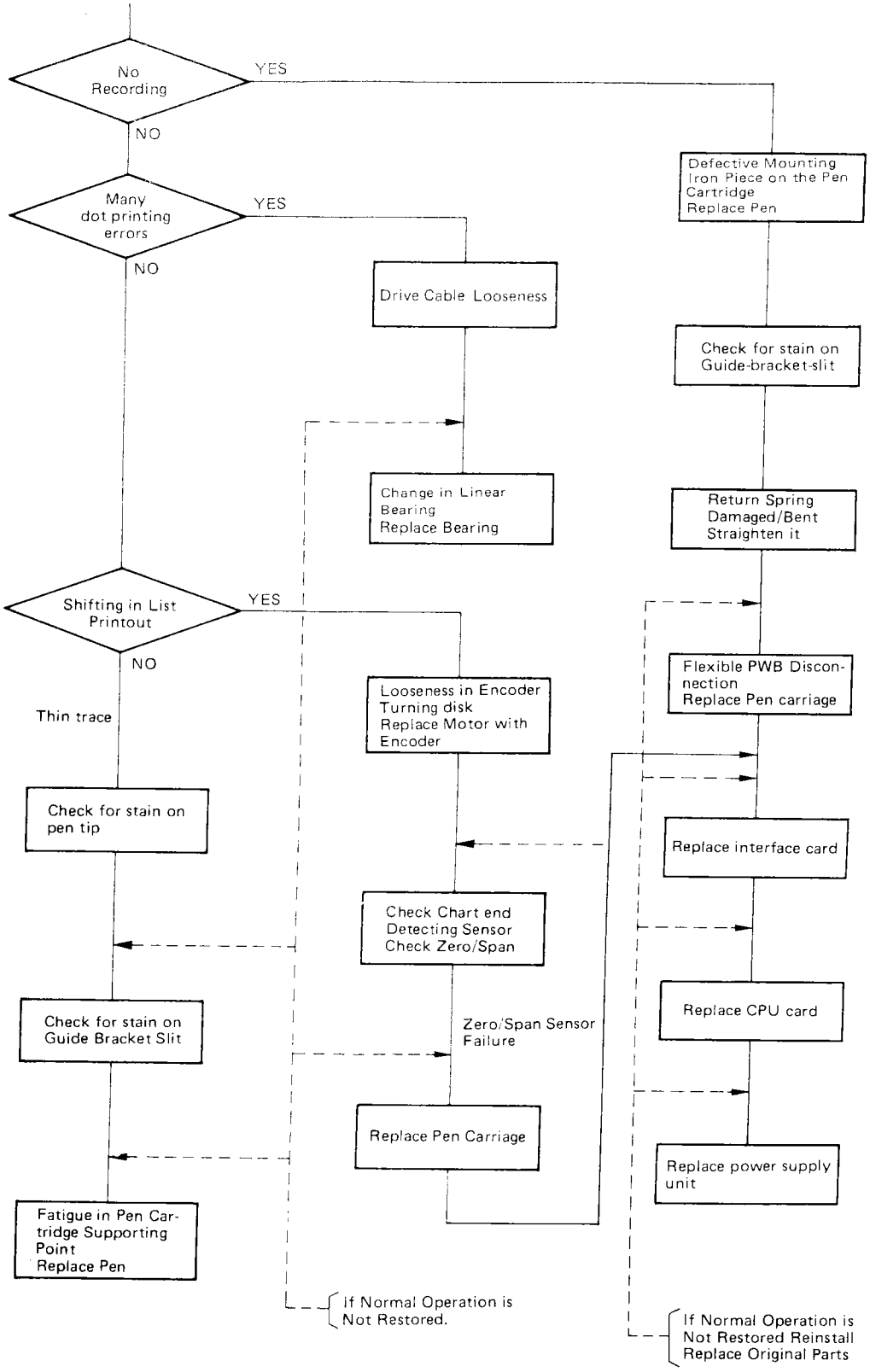
(7) Chart Drive Failure

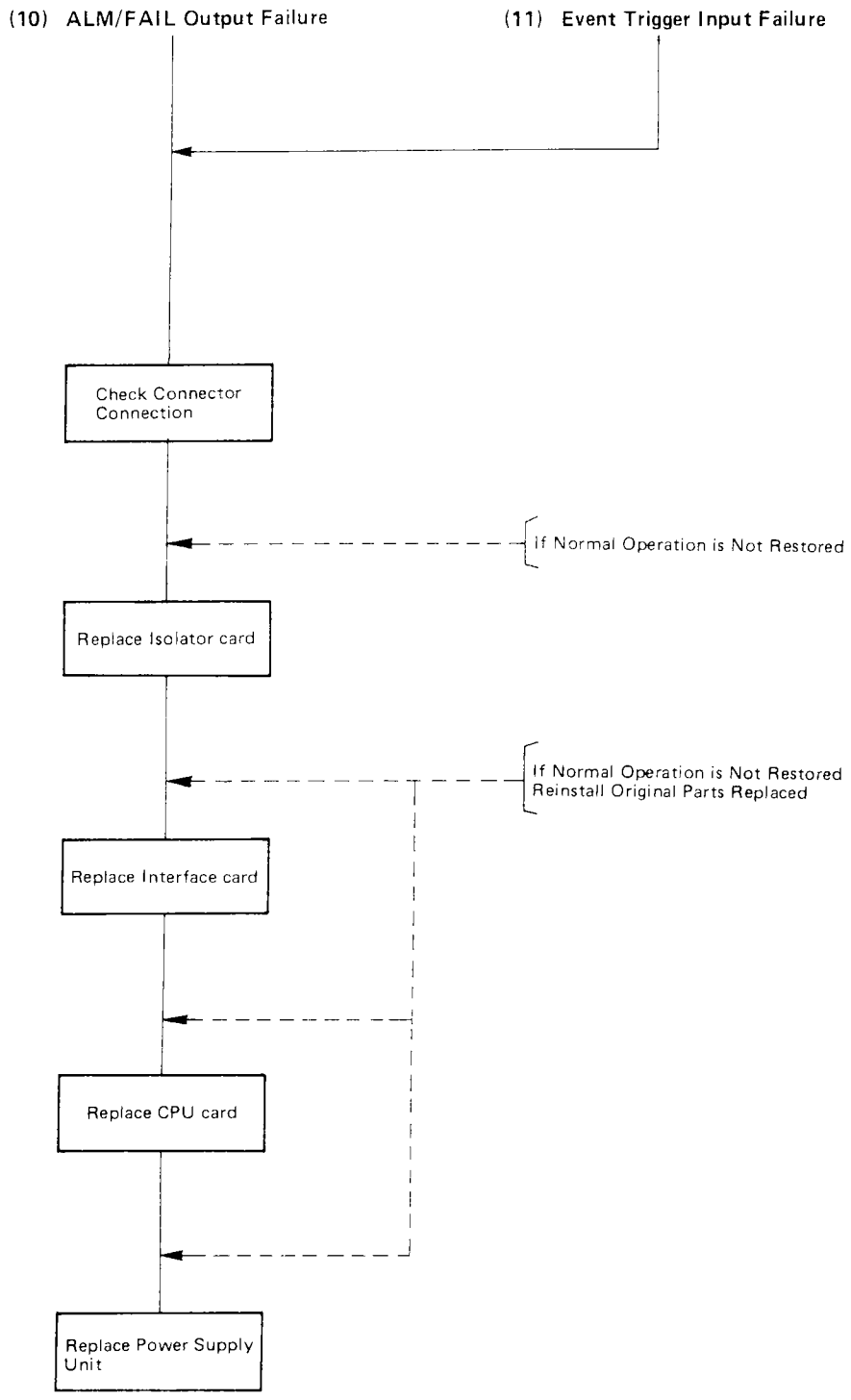


(8) Chart Detection Failure



(9) Recording Failure




(10) ALM/FAIL Output Failure
(11) Event Trigger Input Failure
Check Connector Connection
If Normal Operation is Not Restored
Replace Isolator card
If Normal Operation is Not Restored
Reinstall Original Parts Replaced
Replace Interface card
Replace CPU card
Replace Power Supply Unit

10-2. Disassembly and Reassembly.

Follow the disassembly and reassembly procedures in this section to clear the chart paper feed path, which may be clogged due to improper loading or feeding of chart paper.

10-2-1. Chart Drive Assembly Removal.

(1) Remove the recorder unit from the recorder unit housing.

(2) Remove the screw (number 1) located on the top of the recorder unit, and then remove the recorder top cover (number 2) – (see Figure 10-1).

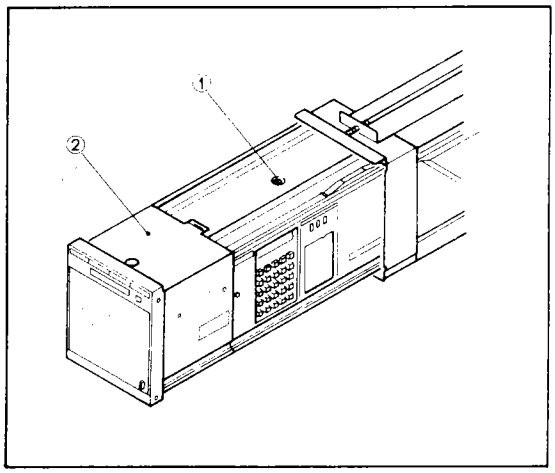


Figure 10-1. Recorder Cover Removal.

(3) Disconnect the female multipin connectors (number 3 and 4) (see Figure 10-2).

(4) Remove two screws (number 5) on both side panels (see Figure 10-2).

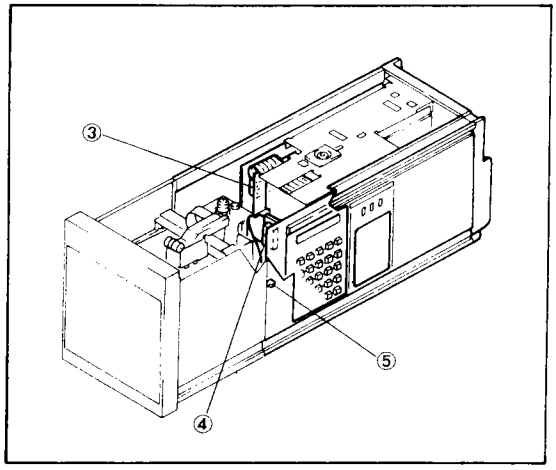


Figure 10-2. Connector Removal.

(5) Position the pen carrier as far left as possible and then lay down the recorder unit with the keyboard facing up (see Figure 10-3). Remove two screws (number 6).

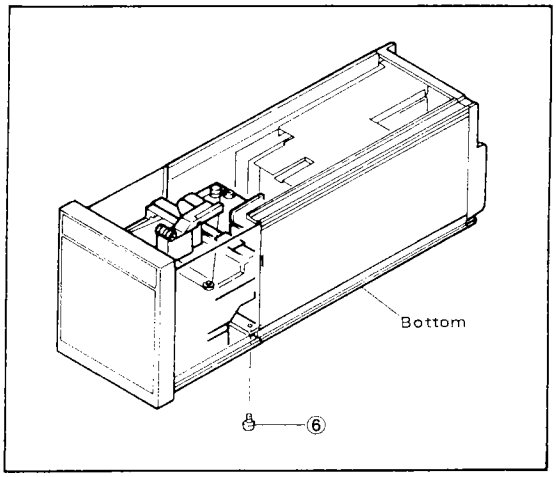


Figure 10-3. Removing Two Screws from the Recorder Bottom.

(6) While lifting up the chart drive unit, gently move it in the direction of the arrow (see Figure 10-4). Do not damage the flexible printed circuit board.

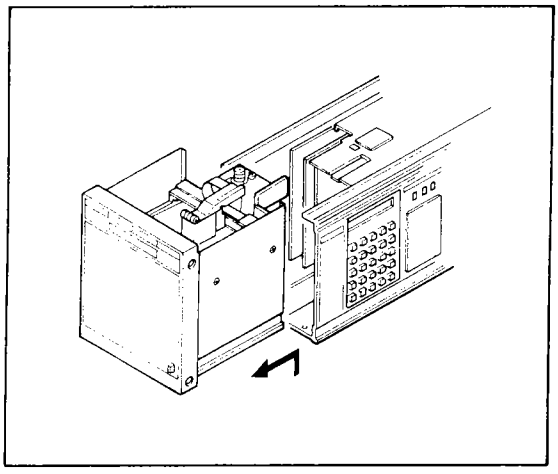


Figure 10-4. Chart Drive Unit Removal.

10-2-2. Disassembling Chart Drive Unit.

(1) Remove four screws (number 7) on both side plates and four screws (number 9) on both sides of the front frame (see Figure 10-5). Remove both side plates (number 8) and the front panel (number 10).

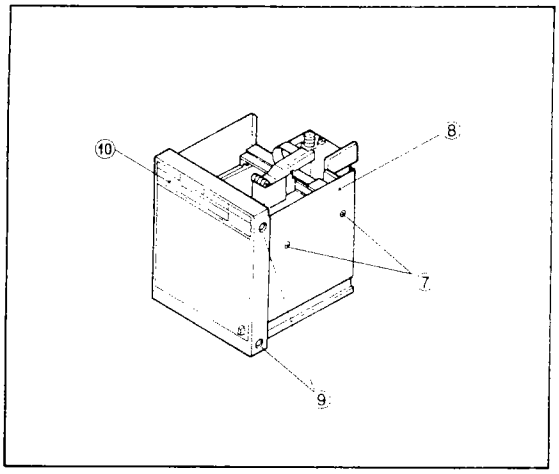


Figure 10-5. Side Plate Removal.

(2) Remove four female multipin connectors (numbers 11, 12, 13, and 14) from the rear of the chart drive unit (see Figure 10-6). Then remove the two screws (number 15) that fasten the printed circuit board.

(3) Remove one screw (number 16) that fastens the roof plate (number 17) (see Figure 10-7).

(4) Remove the "CHART" connector cable (number 12) and "SENS" connector cable (number 13) from the molded guide (number 19) – (see Figure 10-8). Remove the four screws (number 18).

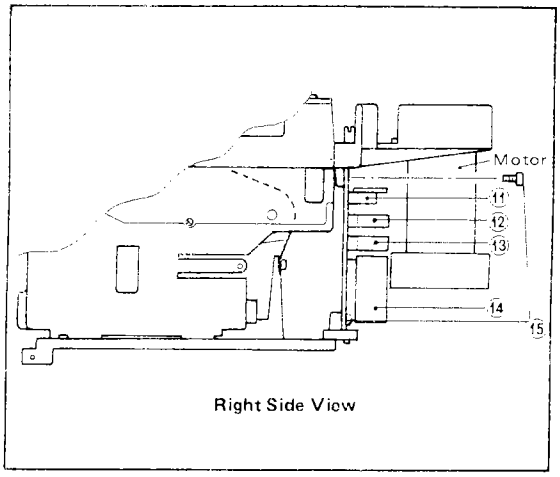


Figure 10-6. Connectors Removal.

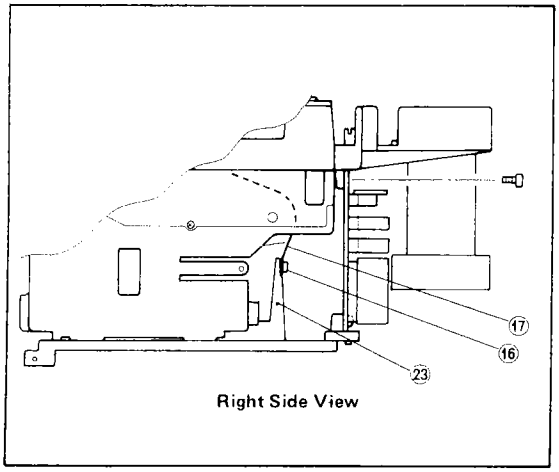


Figure 10-7. Roof Plate Removal.

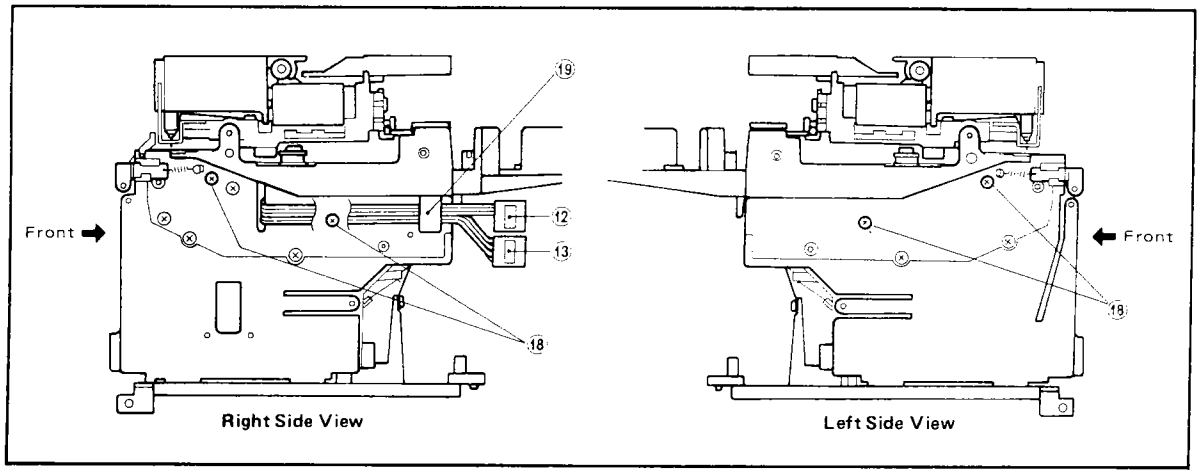


Figure 10-8. Chart Drive Unit Disassembly (1).

(5) Move the upper die casting unit (number 20) in the direction of the arrow for removal from the lower unit (number 22) (see Figure 10-9).

(6) Working in area "A" of the upper die casting unit, insert a mylar sheet, supplied with the recorder, between the roof plate (number 17) and the bottom of the upper die casting unit (number 20), to clear the chart paper feed path (number 21). Do not bend the roof plate (number 17).

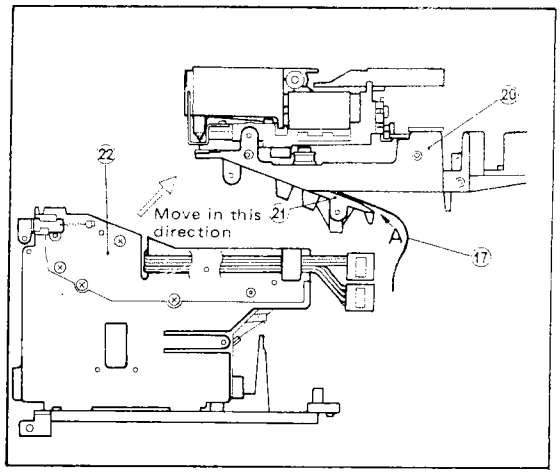


Figure 10-9. Chart Drive Unit Disassembly (2).

10-2-3. Reassembly.

Reassemble the chart drive unit in the reverse order of disassembly.

(1) Install the upper die casting unit (number 20) properly in place – on the lower unit (number 22) so as not to provide a clearance (see Figure 10-10).

(2) Tighten the four screws (number 18). Pass the two connector cables (numbers 12 and 13) under the molded guide (number 19).

(3) Tighten the screw (number 16) – (see Figure 10-11).

(4) Mount the printed circuit board using the two screws (number 15) – (see Figure 10-6).

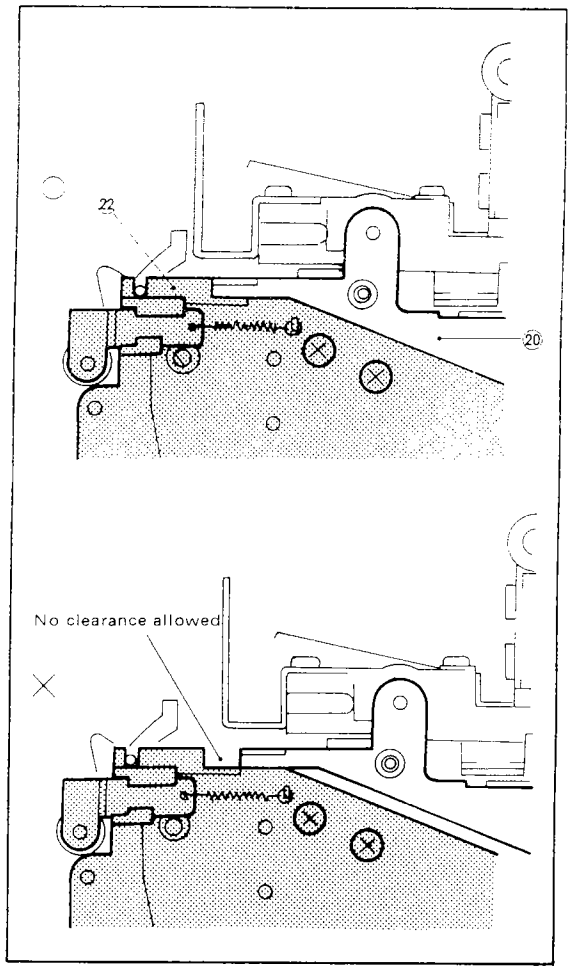


Figure 10-10. Replacing Die Cast Chart Drive Unit Assembly.

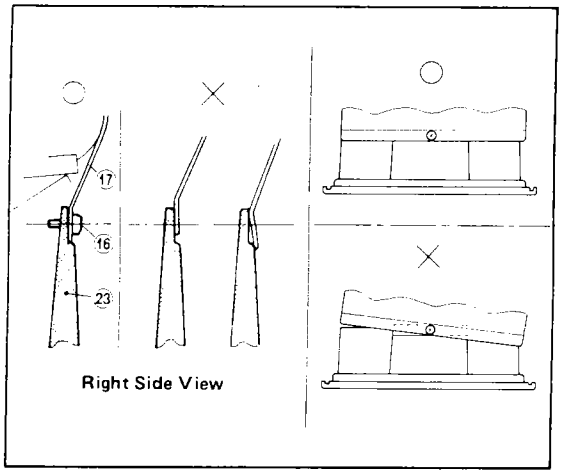


Figure 10-11. Securing the Roof Plate.

(5) Connect the four connectors (numbers 11, 12, 13, and 14) – (see Figure 10-12). Be sure that all connectors are inserted snugly.

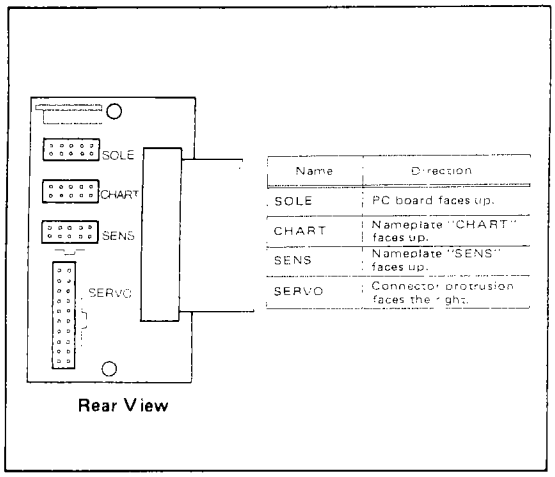


Figure 10-12. Cable Connectors.

(6) Pass the front panel flexible printed circuit cable under the molded guide (see Figure 10-13).

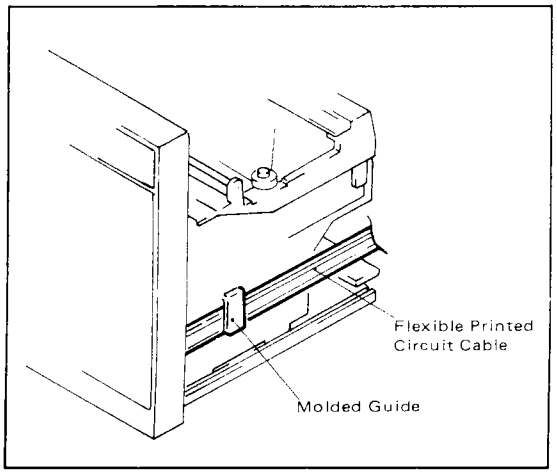


Figure 10-13. Inserting Flexible Printed Circuit Cable.

(7) Insert the bottom protrusions of the front panel into the rectangular holes of the chart drive unit lock lever and install and tighten the two lower front panel mounting screws (number 9) – (see Figure 10-14).

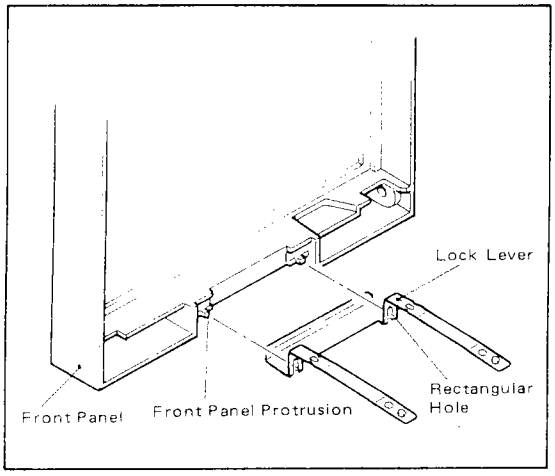


Figure 10-14. Attaching Front Panel.

(8) Insert side plates in the grooves located on the inside bottom of the chart drive unit. Slide the plates forward to the rear of the front panel (see Figure 10-15).
Tighten four flat screws (number 7) and the two screws (number 9) to complete installation of the side plates. Be sure that the front door can be closed and locked.

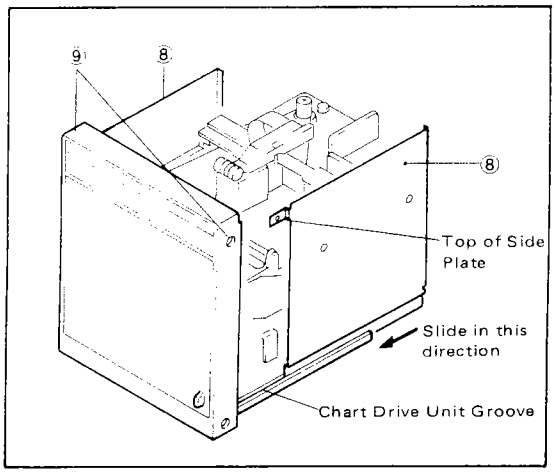


Figure 10-15. Mounting Side Plate.

(9) Insert the mylar sheet into the chart feed slot to ensure that the sheet can be moved to the right and left and front chart outlet (see Figure 10-16).

(10) Install the chart drive unit in the SRHD controller part, and secure the two bottom screws (number 6).

(11) Install and tighten the two screws (number 5) on both side panels (see Figure 10-2).

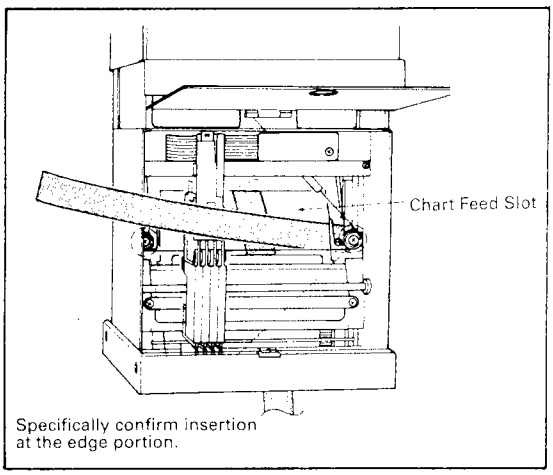


Figure 10-16. Inserting a Mylar Sheet.

(12) Connect the two connectors (numbers 3 and 4) in the manner as detailed in Figure 10-17).

(13) Mount the recorder top cover using one screw (number 1) and store the recorder internal unit in its housing.

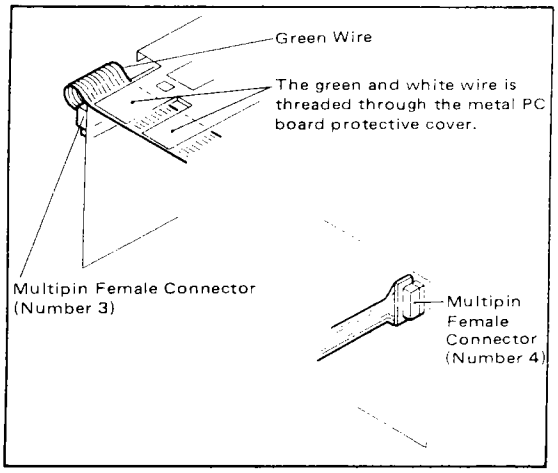


Figure 10-17. Connecting Multipin Female Connectors (3) and (4).

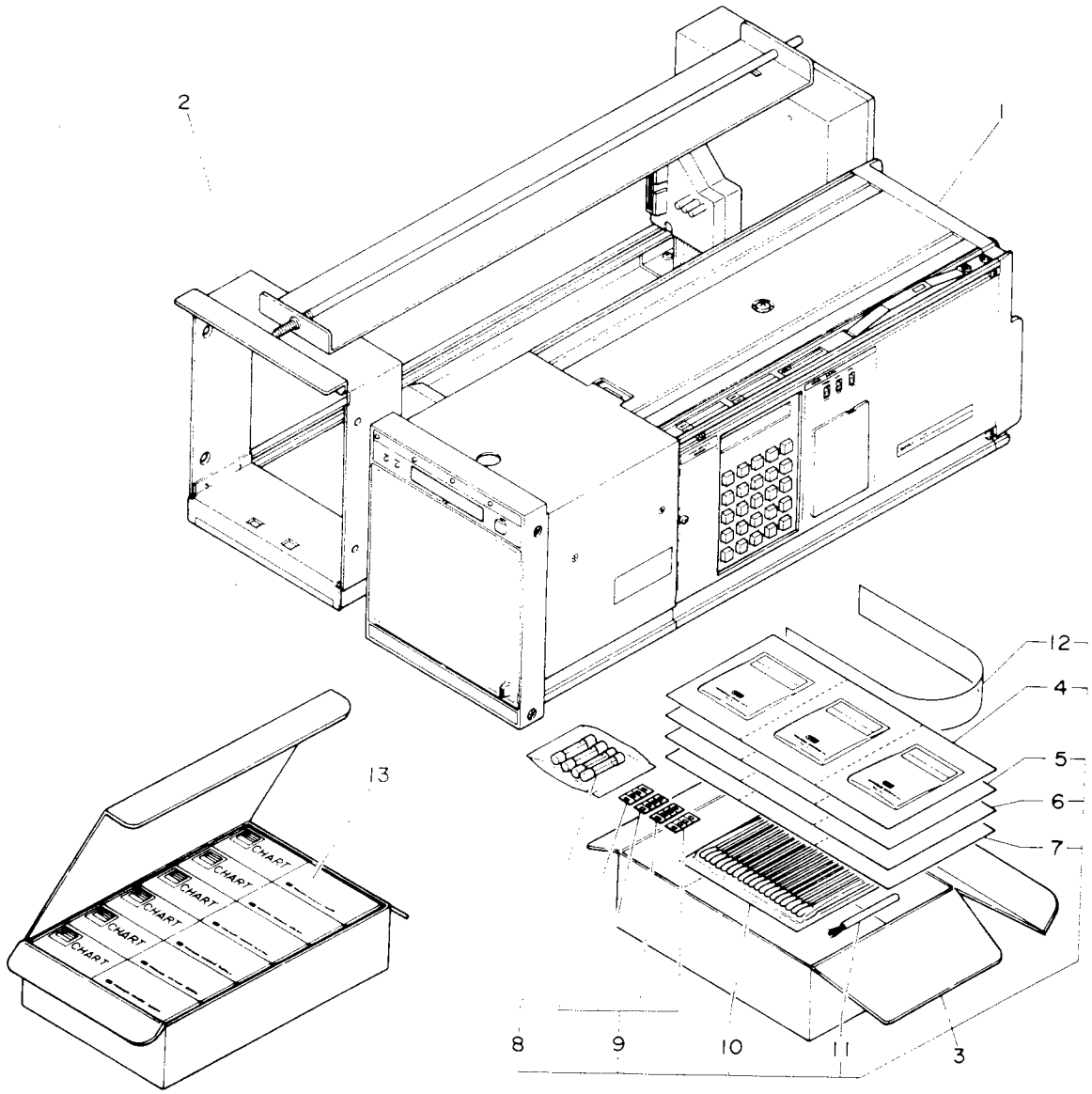
10-2-4. Checking Recorder.

After reassembling the chart drive unit, refer to Section 9 of the instruction manual (IM 1B4B2-01E or -02E) in order to adjust the isolation circuit, photosensor, chart time axis, zero and span settings.

Customer Maintenance Parts List

Model SRHD (Style E)
Intelligent Recorder

YEWSERIES 80



Item	Part No.	Qty	Description
1	–	1	Main Unit Assembly (see page 2 to page 5)
2	–	1	Shelf Assembly (see PL 1B4F1-01)
3	E9721AH	1	Box Assembly
4	E9721PE	3	Pen Assembly (black)
5	E9721PF	3	Pen Assembly (red)
6	E9721PG	3	Pen Assembly (blue)
7	E9721PH	3	Pen Assembly (green)
8	S9510VK	4	Fuse (1A/250 V)
9	E9721QZ	1	Color Seal (red, green, blue, black)
10	E9721DQ	1	Stick
11	E9721QL	2	Brush
12	E9721DX	1	Mylar Sheet
13	E9721NB	6	Chart

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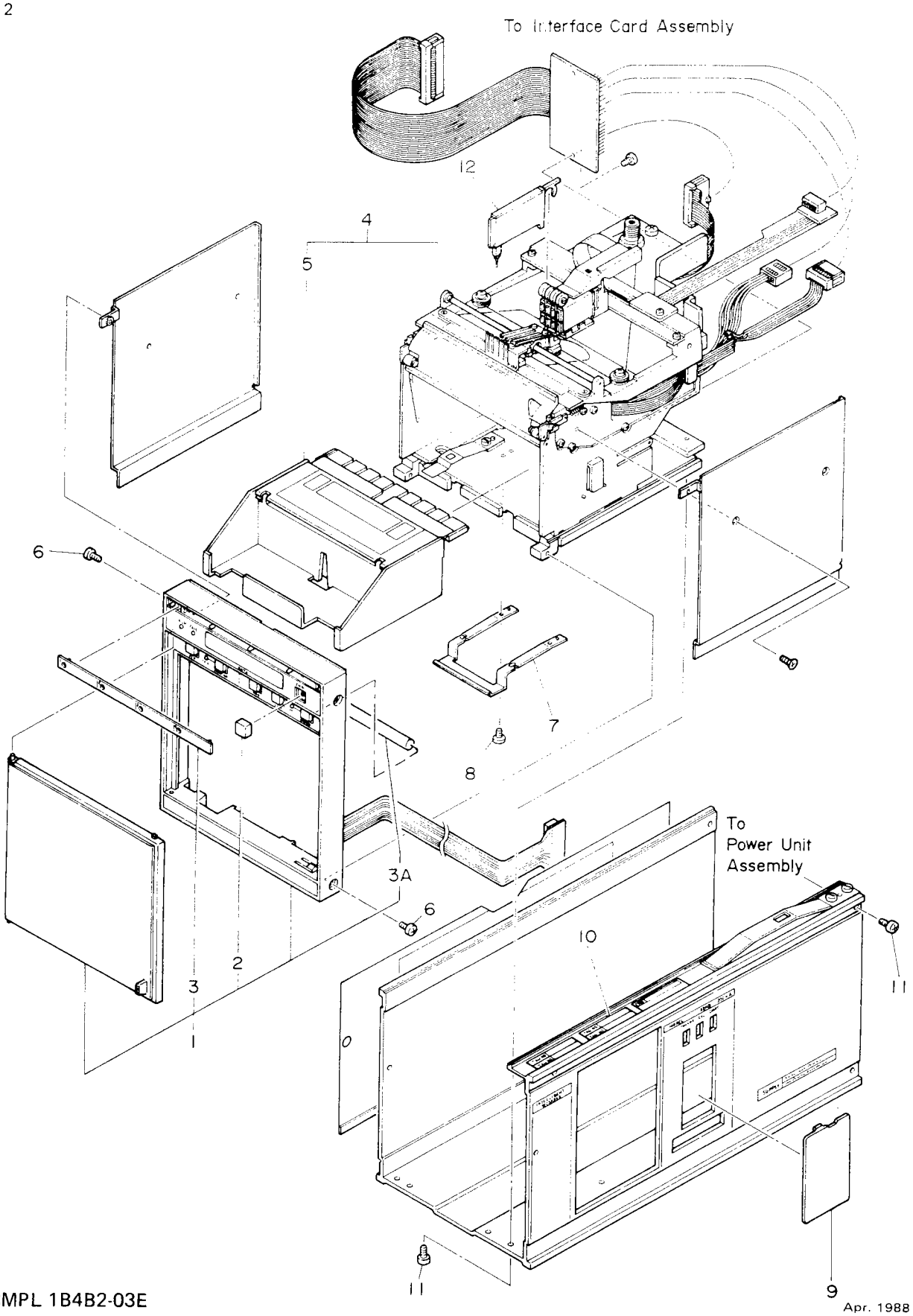
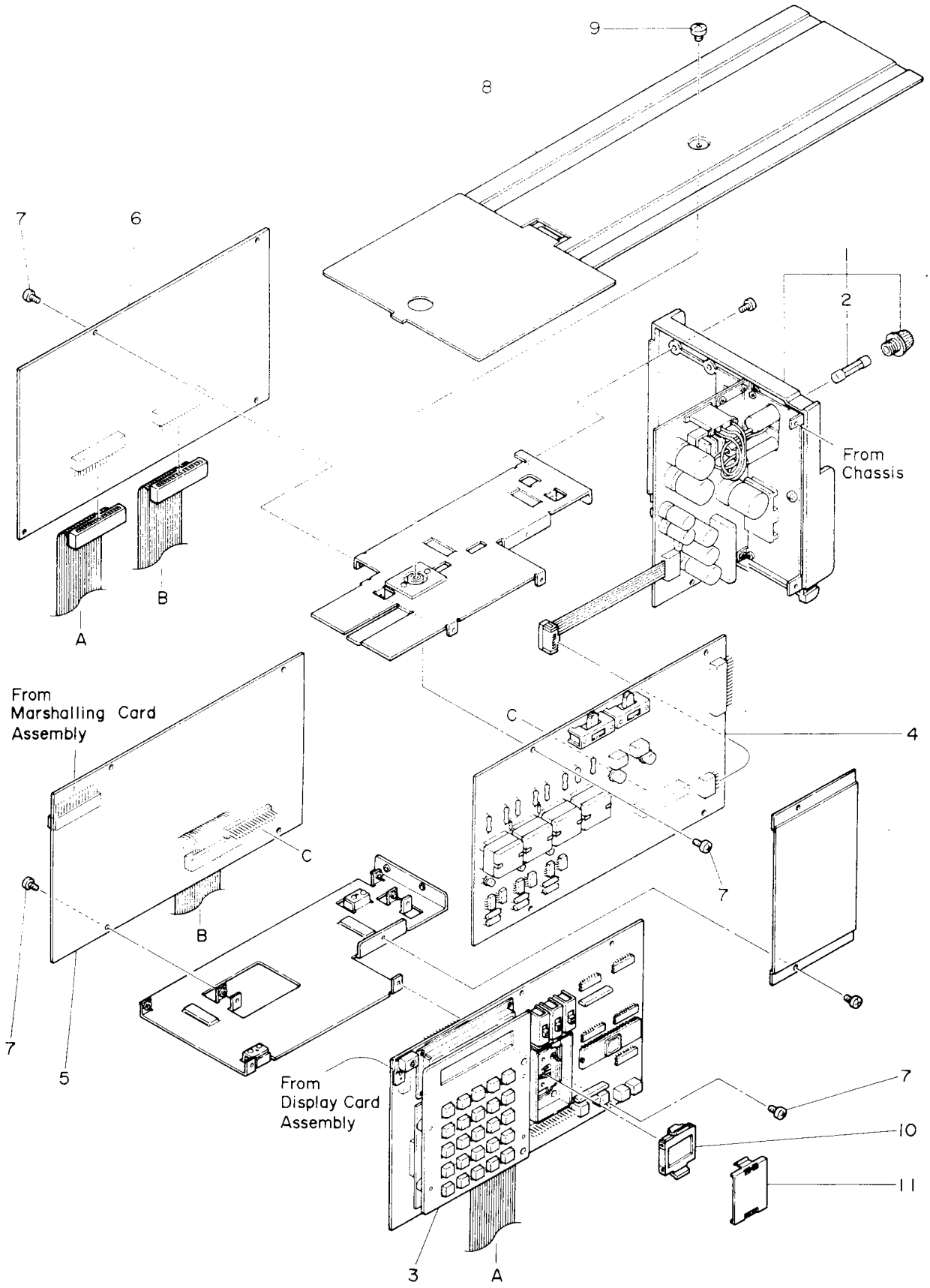

To Interface Card Assembly
12
4
5
6
7
8
3A
6
To
Power Unit
Assembly
10
11
2
3
1
0
11
9

Item	Part No.	Qty	Description
—	—	1	Drive Unit Assembly (items 1 through 13)
1	E9721EL	1	Display Assembly
2	E9712CC	6	Key Top
3	E9721AR	1	Plate
3A	E9721ED	1	Lamp
4	E9721BA	1	Main Unit Assembly
5	E9721DS	1	Chart Stock Assembly
6	Y9306JB	4	Pan H. Screw, M3 x 6
7	E9711TD	1	Stopper
8	Y9306JB	2	Pan H. Screw, M3 x 6
9	E9721QA	1	Cover
10	Y9422NP	—	Tag No. Label
11	Y9306JB	9	Pan H. Screw, M3 x 6
12	—	4	Pan Assembly (see page 1)


9
8
7
6
2
From
Chassis
A
B
From
Marshalling Card
Assembly
C
4
7
5
From
Display Card
Assembly
3
10
11

Item	Part No.	Qty	Description
—	—	1	Control Assembly
1	Below	1	Power Unit Assembly
	E9716YG		For 100 V Version
	E9716YX		For 220 V Version
2	S9510VK	1	Fuse (1A/250 V)
3	E9716RJ	1	Tuning Card Assembly
4	Below	1	Isolator Card Assembly
	E9716PA		For Model SRHD-100*E
	E9716PB		For Model SRHD-200*E
	E9716QA		For Model SRHD-300*E
5	E9716RK	1	Interface Card Assembly
6	E9716PM	1	CPU Card Assembly
7	Y9306JB	20	Pan H. Screw, M3 x 6
8	E9721AX	1	Cover Assembly
9	Y9405LB	1	B. H. Screw, M3 x 6
10	E9711DH	1	Battery Assembly
11	E9711GQ	1	Cover

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