User's
Manual

YEWSERIES 80

Model SMLD
Manual Station

IM 1B4D1-01E

YOKOGAWA ◆
Yokogawa Electric Corporation

IM 1B4D1-01E
7th Edition

Notices

■ Regarding This User's Manual

(1) This manual should be passed on the end user. Keep at least one extra copy of the manual in a safe place.

(2) Read this manual carefully and fully understand how to operate this product before you start operation.

(3) This manual is intended to describe the functions of this product. Yokogawa Electric Corporation (hereinafter simply referred to as Yokogawa) does not guarantee that the functions will suit a particular purpose of the user.

(4) Under absolutely no circumstances may the contents of this manual in part or in whole be transcribed or copied without permission.

(5) The contents of this manual are subject to change without prior notice.

(6) Every effort has been made to ensure accuracy in the preparation of this manual. Should any error or omissions come to your attention however, please contact your nearest Yokogawa representative or our sales office.

■ Regarding Protection, Safety, and Prohibition against Unauthorized Modification

(1) In order to protect the product and the system controlled by it against damage and ensure its safe use, make certain that all of the instructions and precautions relating to safety contained in this manual are strictly adhered to. Yokogawa does not guarantee safety if products are not handled according to these instructions.

(2) Be sure to use the spare parts approved by Yokogawa when replacing parts or consumables.

(3) Modification of the product is strictly prohibited.

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(2) Yokogawa assumes no liability to any party for any loss or damage, direct or indirect, caused by the user or any unpredictable defect of the product.

2004.05.01-00

CONTENTS

1. INTRODUCTION.

1-1. Inspection.

This instrument was thoroughly tested at the factory before shipment. However, when you receive this instrument:

1) Inspect for visible damage.
2) Confirm that the model and suffic codes shown on the shipping documents, and also on the name-plate at the top of the instrument, are the same as on your order sheet.
3) Confirm that all accessories (see section 2-4) are present.

If you have any questions about this instrument, please contact either your nearest Yokogawa Sales & Service Office or Yokogawa Electric Coproration, Tokyo, Japan.

2. GENERAL.

The SMLD Manual Station provides outputs continually adjustable between 4 to 20 mA DC and 1 to 5 V DC by means of a front panel manual setting wheel. The output can be used to remotely adjust the setpoint of a controller or to operate a final control element (e.g. control valve). An indicator with a 100-mm long scale displays the setpoint with a high degree of accuracy. A process variable input may also be displayed on the meter.

2-1. Standard Specifications.

Input Signals: 1 to 5 V DC; input resistance 1 MΩ.
Output Signals: 4 to 20 mA DC and 1 to 5 V DC.
Load Resistances:
0 to 750 Ω (4 to 20 mA DC output).
At least 2 kΩ (1 to 5 V DC output).
Output and Process Variable Indicators: Moving-coil type dual pointer meter.
Pointer Colors:
Output: Blue.
Process Variable: Red.
Indication Range: 0 to 100%.
Scale: 100 mm long.
Scale Marking: Single scale with units marking.
Setpoint Adjustment Accuracies: Setpoint wheel on front panel.
Process Variable Indicator: ±0.5% of span.
Current Output: ±1.0% of span.
Voltage Output: ±0.5% of span.
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	100 V	220 V
DC (polarity reversible)	20 to 130 V	120 to 340 V
AC (47 to 63 Hz)	80 to 138 V	138 to 264 V

Ambient Temperature and Humidity: 0 to 50°C, 5 to 90% relative humidity (non-condensing).
Mounting: Flush panel mounting. Instruments are in housings, and may be mounted individually or side by side. Rear of instrument may be up to 75°C below front (indicator zero may need re-adjustment.)
Wiring
Signal Wiring to/from Field: ISO M4 size (4 mm) screws on terminal board.
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.

Nameplate: Cream semi-gloss finish, with lettering in black.
Weight: 2.5 kg.

2-2. Model and Suffix Codes.

Model	Suffix Codes		Description
SMLD	. . . . .		Manual Station
	-1		Process variable indicator
	00		Always 00
Style Code	*A		Style A
Options		/A2ER	220 V power supply
		/MTS	With mounting kit
		/SCF-G□M	Bezel color change
		/NHS	Without housing
		/NPE	Nameplate engraving

2-3. Options.

Option Code	Description
/A2ER	For "220V version" power supply
/MTS	Instrument supplied with kit for individual mounting. For mounting in groups, see GS 1B4F1-E.
/SCF-G□M	Mounting kit bezel color change from standard color (black). Choose color from set of optional colors (see GS 22D1F1-E). Specify color code in space □.
/NHS	No housing, plug-in instrument module only. See GS 1B4F1-E to order housing separately.
/NPE	Letters engraved on front panel nameplate.

2-4. Accessory.

Fuse (1 A): 1 piece.
Note: The fuse (S9510VK) is the dedicated fuse, Do not use it for other products.

3. INSTALLATION AND WIRING.

3-1. Installation.

For general information about installation and wiring of this instrument, refer to Installation of Panel-Mounted instruments IM 1B4F1-01E.

3-2. Wiring.

Connect external cables to the terminal board with M4 (4 mm) screws at the rear of the housing, by referring to the terminal connections given in Table 3-1.

Figure 3-1 shows the terminal layout.

Table 3-1. Terminal Wiring.

Terminal Designations	Description	Terminal Designations	Description
1	+ Process variable input	17	
2	− 1 to 5V DC	18	
3		19	
4		20	
5		21	
6		A	+ Manipulated output
7		B	− (4 to 20mA DC)
8		C	+ Manipulated output
9		D	− (1 to 5V DC)
10		F	
11		H	
12		J	
13		K	
14		L	
15		M	
16		N	

If no current output is issued, connect terminals A and B with the jumper from terminals 6 and 8. Removing the jumper from terminals 6 and 8 should cause no functional changes in this instrument.

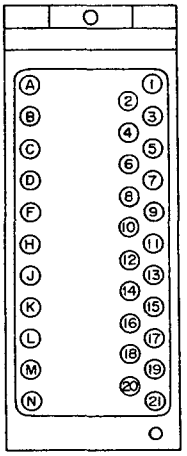


Figure 3-1. Terminal Layout.

(1) When connecting external wires, furnish the cable ends with solderless crimp-on lugs (for 4 mm screws). See Figure 3-2.

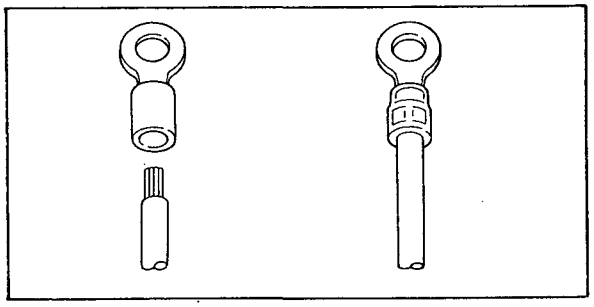


Figure 3-2. Solderless Crimp-on Lugs.

(2) After completing wiring, mount the terminal cover. See Figure 3-3.

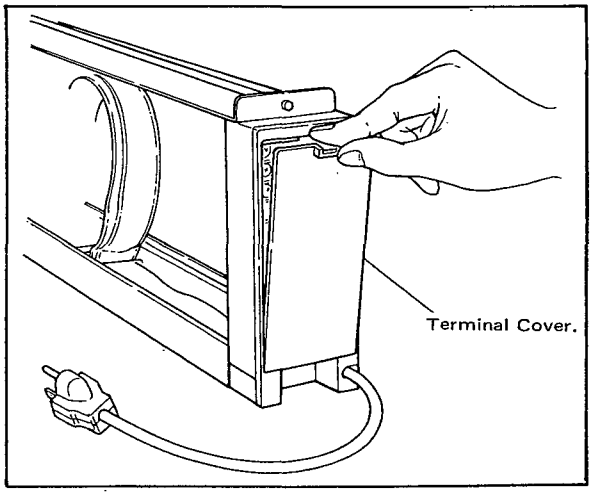


Figure 3-3. Removing and Remounting the Terminal Cover.

4. PRINCIPLE OF OPERATION.

Figure 4-1 shows the functional block diagram of this instrument. A process variable input is applied to the dual-pointer indicator via high impedance resistor R_{IN}, filter RC and buffer amplifier U_1.

The red pointer on the indicator reads the value of the process variable input signal. A setpoint voltage signal can be generated by means of a manual setting wheel.

The setpoint voltage signal is converted into a 4 to 20 mA DC current output signal by amplifiers U_3, U_4 and transistors A_1, A_2.

A 1 to 5 V DC signal is obtained via buffer amplifier (U_5).

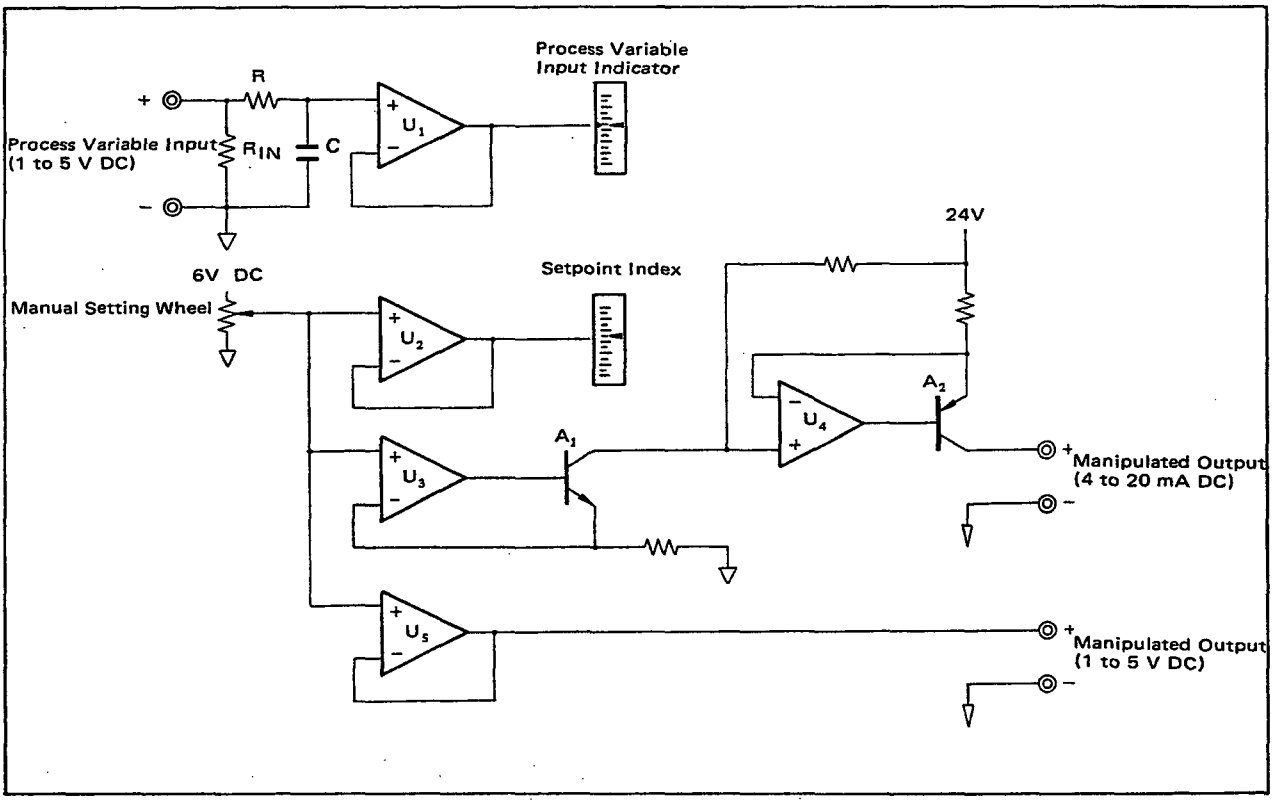


Figure 4-1. Functional Block Diagram.

5. OPERATION.

5-1. Names of Components.

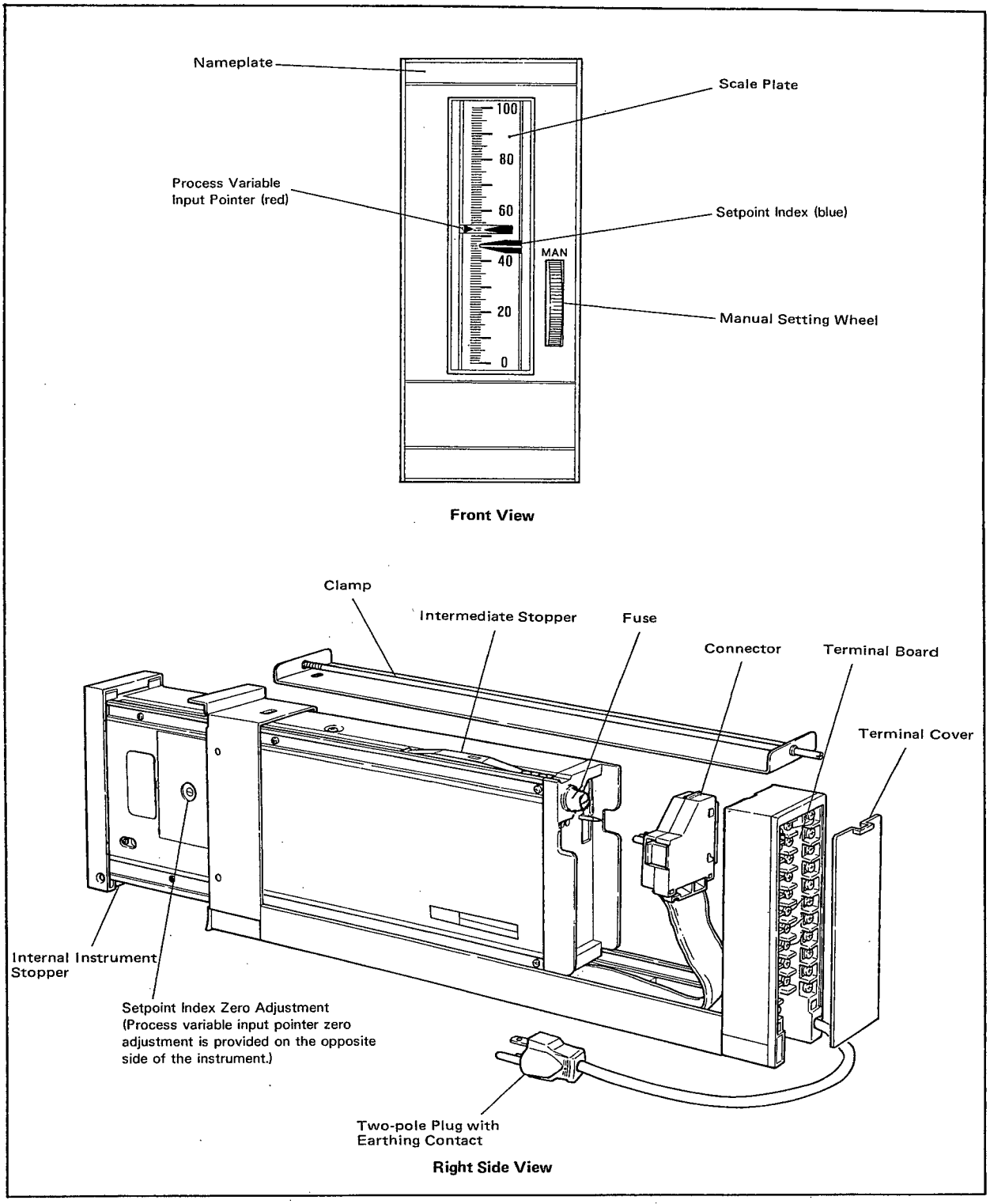


Figure 5-1. Names of Components.

5-2. Preparation for Operation.

Check the following points before starting operation.

(1) Disconnect the power plug from the outlet.

(2) Pull the internal instrument out of the housing and ensure that the specified power fuse is securely mounted to the fuseholder at the rear part of the internal instrument.
(For instructions on drawing out the internal instrument, see Figure 5-2.)

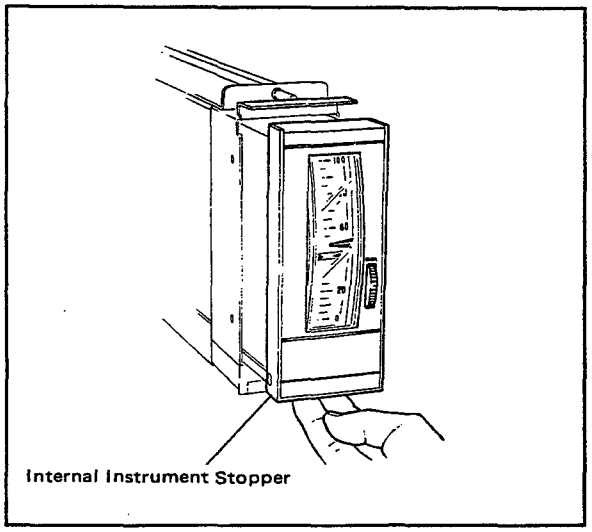


Figure 5-2. Pulling Out the Internal Instrument.

(3) As the internal instrument is drawn out of the housing, it locks about halfway out. If it is necessary to draw the internal instrument further, press down manually on the intermediate stopper at the top of the internal instrument. (See Figure 5-3.)

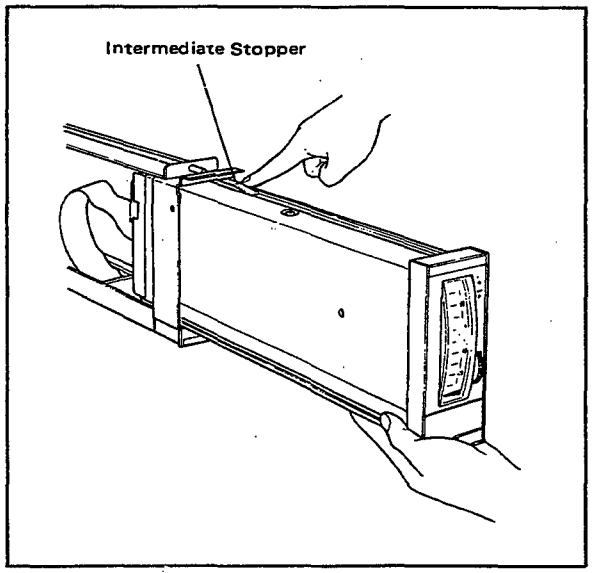


Figure 5-3. Pulling Out the Internal Instrument.

(4) Check that the housing connector is securely connected to the housing and internal instrument. (See Figure 5-4).

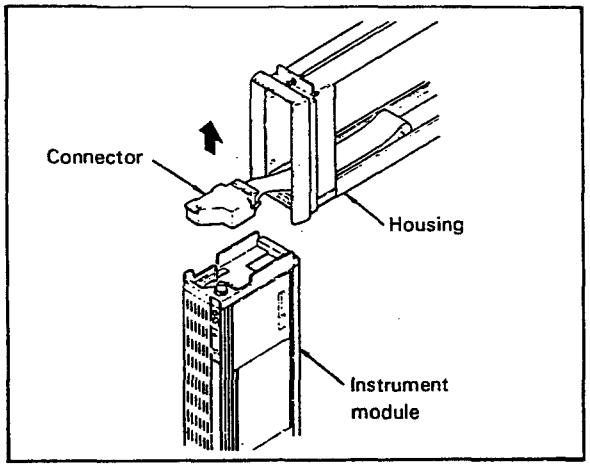


Figure 5-4. Connection between Internal Instrument and Housing.

5-3. Operation (Manual Operation).

Perform manual output operation with the manual setting wheel on the front of the instrument. (See Figure 5-5.)

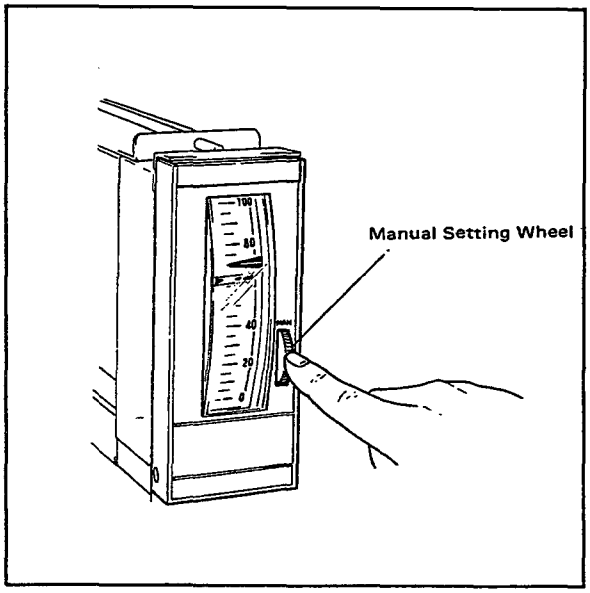


Figure 5-5. Manual Operation with Setting Wheel.

6. MAINTENANCE.

6-1. Testing Devices.

(1) DC Voltage/Current Standard:
YOKOGAWA Model 2554 or equivalent 1
(2) Digital voltmeter:
YOKOGAWA Model 2502 or equivalent 1
(3) Precision resistor: 250Ω ±0.1% 1

6-2. Checking the Measuring Input Indicator Accuracy.

Connect testing devices and the instrument to be tested in accordance with Figure 6-1, and warm them up for at least 5 minutes after turning on the power.

(1) Apply input signals of 1V, 2V, 3V, 4V, and 5V DC using a DC voltage/current standard.
(2) Ensure that the process variable input pointer (red) reads 0%, 25%, 50%, 75%, and 100% points respectively within ±0.5% accuracy.
(3) If the indicator accuracy does not fall within ±0.5% of span, adjust the zero point according to the following procedure.
Check the pointer at the position where line of sight and the pointer are horizontal.
(4) Apply an input signal of 3V DC.
(5) Adjust the zero point until the measurement pointer reads 50% (See Figure 6-2).
(6) Repeat steps (1) and (2) and then steps (3) to (6) until the indicator reads within the specified accuracy.

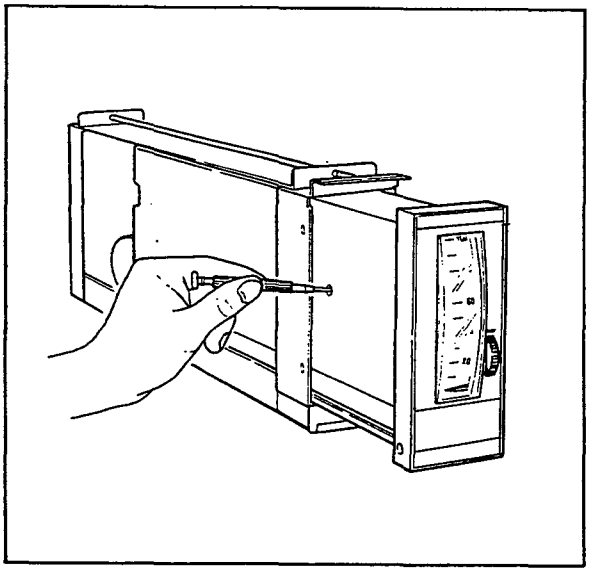


Figure 6-2. Measurement Input Indicator Zero Adjustment.

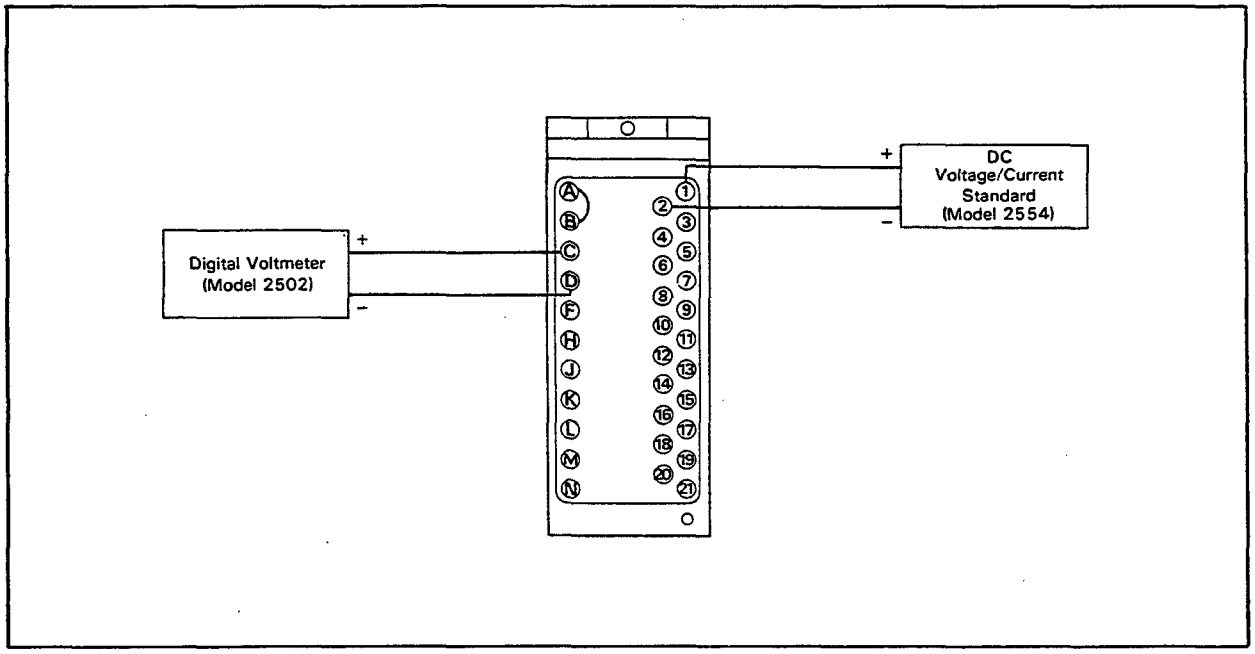


Figure 6-1. Wiring Diagram.

6-3. Checking the Setpoint Accuracy.

Connect the digital voltmeter and the instrument to be tested in according to Figure 6-1, and warm them up for about 5 minutes after turning on the power.

(1) Turn the manual setting wheel until the digital voltmeter reads 1V, 2V, 3V, 4V, and 5V DC.
(2) Ensure that the manipulated output pointer (blue) indicates the 0%, 25%, 50%, 75%, and 100% points respectively within ±0.5% accuracy.
(3) If the indicated value does not agree with the specified accuracy, adjust the setpoint index zero in accordance with the following procedure.
(4) Turn the manual setting wheel until the digital voltmeter reads 3V DC.
(5) Adjust the setpoint index zero until the setpoint index reads 50% (see Figure 6-3).
(6) Repeat steps (1) and (2) and then steps (3) to (6) until the indicator reads within the specified accuracy.

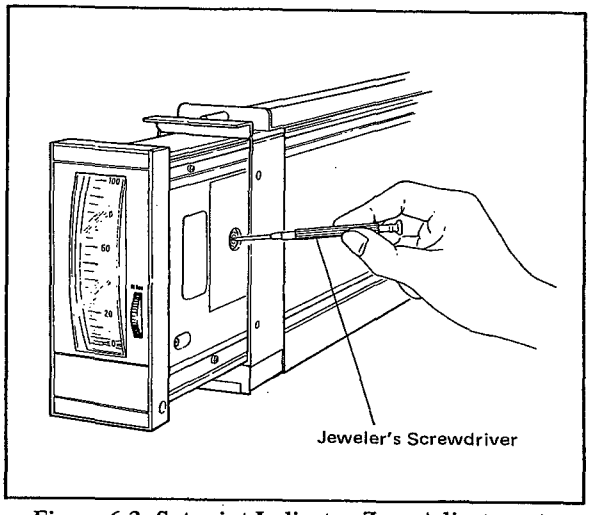


Figure 6-3. Setpoint Indicator Zero Adjustment.

6-4. Current Output Check.

Connect a precision resistor (250Ω) across current output terminals A(+) – B(–). Connect the digital voltmeter across this resistor. See Figure 6-4.

Turn the power supply on and warm up the digital voltmeter and the manual station to be tested for at least 5 minutes.

(1) Turn the manual setting wheel until the digital voltmeter reads 1V, 2V, 3V, 4V and 5V DC.
(2) Ensure that the manipulated output pointer (blue) indicates 0%, 25%, 50%, 75% and 100% points respectively within ±1.0% accuracy while the digital voltmeter reads 1V, 2V, 3V, 4V, and 5V DC.
(3) If the indicator does not fall within the specified accuracy, adjust the setpoint index zero according to the following procedure.
(4) Turn the manual setting wheel until the digital voltmeter reads 3V DC.
(5) Adjust the setpoint index zero until the setpoint index reads 50%. See Figure 6-3.
(6) Repeat steps (1) and (2) and then steps (3) to (6) until the indicator reads with the specified accuracy.

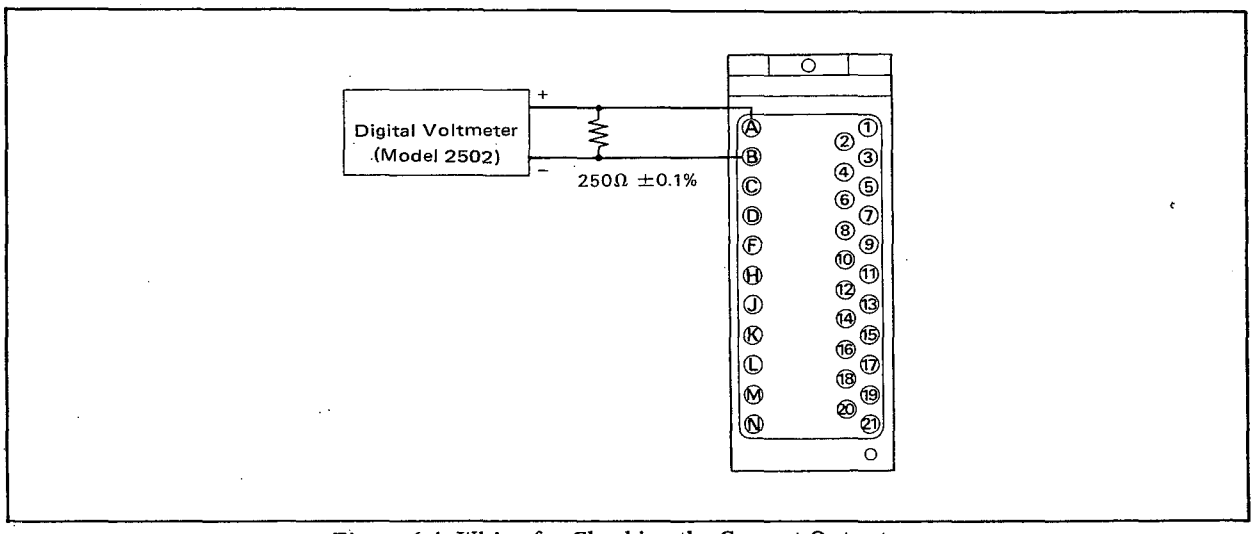


Figure 6-4. Wiring for Checking the Current Output.

6-5. Replacing Nameplate, Scale or Fuse.

6-5-1. Nameplate replacement.

After pulling the internal instrument slightly out of the housing, open the front upper cover upward to remove the nameplate removed. Insert new nameplate (see Figure 6-5).

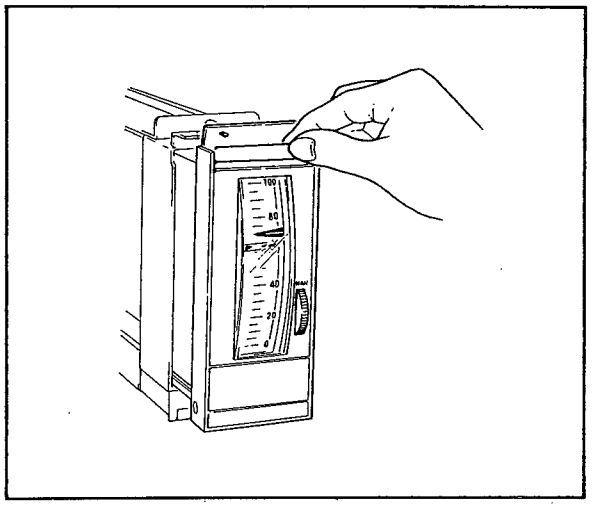


Figure 6-5. Nameplate Replacement.

6-5-2. Scale plate replacement.

(1) Slightly pull the internal instrument out of the housing, and open the front upper cover upward.
(2) After removing the scale plate holder with tweezers, pull out the scale plate. See Figure 6-6.
(3) Insert a new scale plate and mount the scale plate holder.

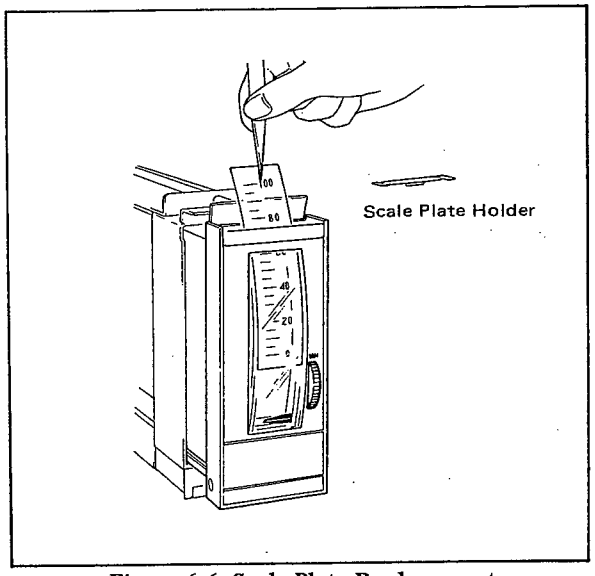


Figure 6-6. Scale Plate Replacement.

6-5-3. Fuse replacement.

After opening the fuseholder mounted at the rear of the internal instrument, replace the cartridge fuse. See Figure 6-7.

Recommended replacement interval: About 3 years.

Fuse rating: 1A

Parts No. : S9510VK

Note: Use the dedicated fuse (S9510VK). Do not use a fuse for other products.

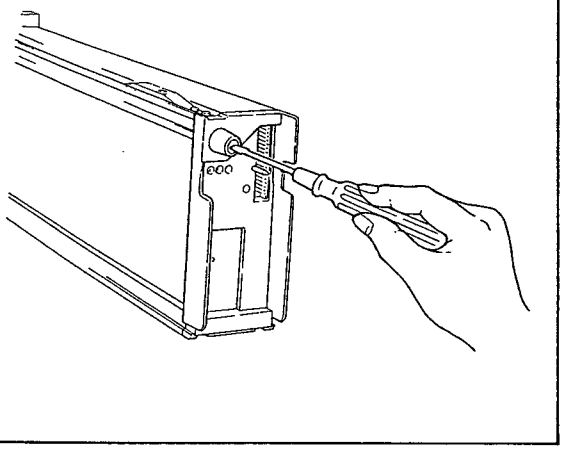


Figure 6-7. Fuse Replacement.

Note: Secure the fuseholder cap.

7. TROUBLESHOOTING.

If operational troubles occur in the Model SMLD Manual Station, identify the problems fully and resolve them according to the troubleshooting flowcharts shown in Section 7-1.

In troubleshooting, feed input signals to the Station in the wiring setup shown in Figure 6-1, and identify the trouble.

When troubleshooting is difficult to achieve, consult the YOKOGAWA service station serving your area.

7-1. Troubleshooting Flowcharts.

7-1-1. Problem Identification.

Identify problems according to the flowchart in Figure 7-1 before biginning to troubleshoot the Model SMLD Manual Station.

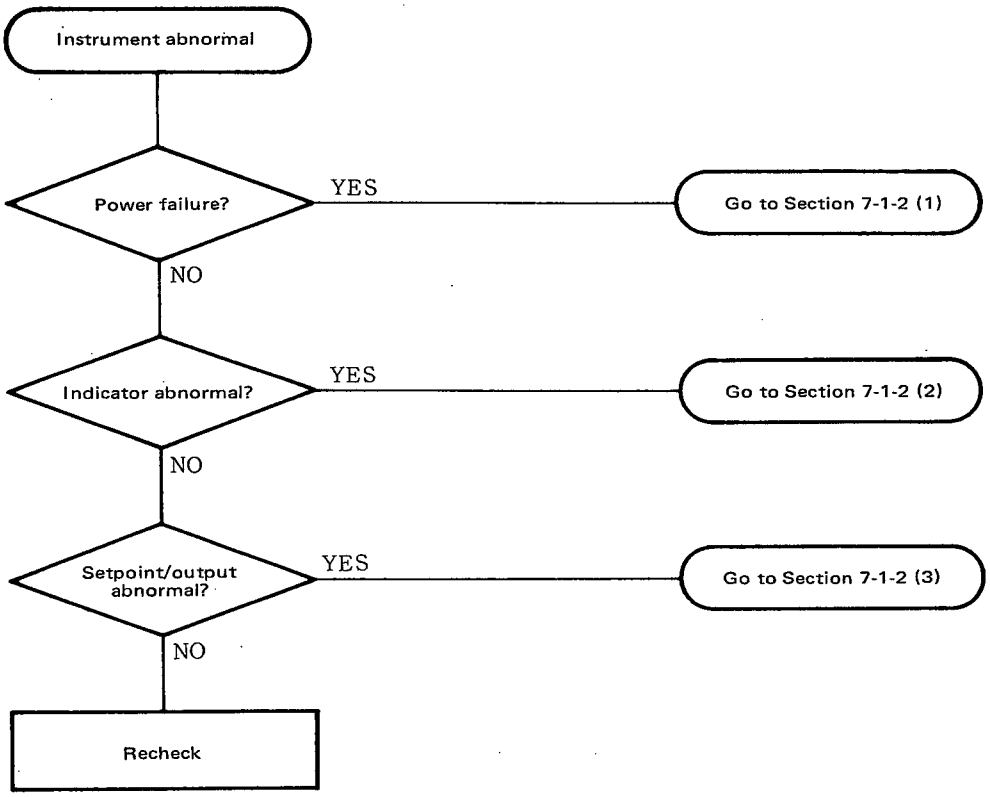
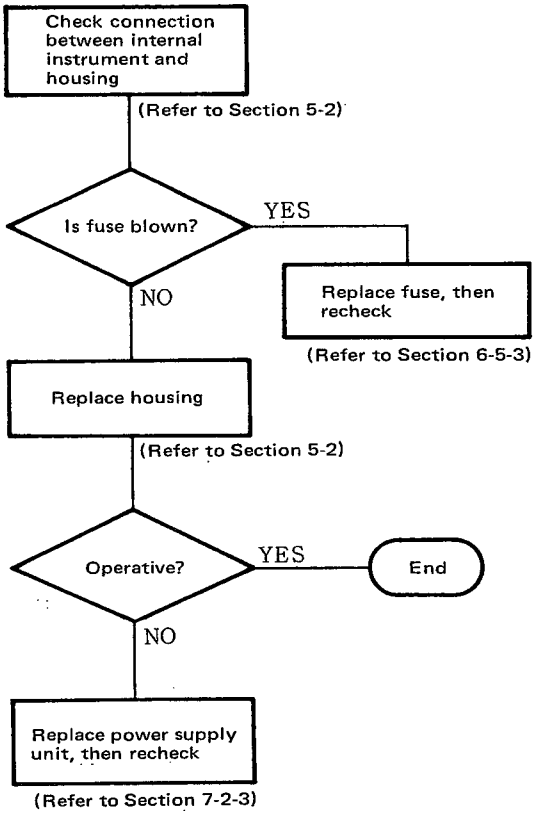


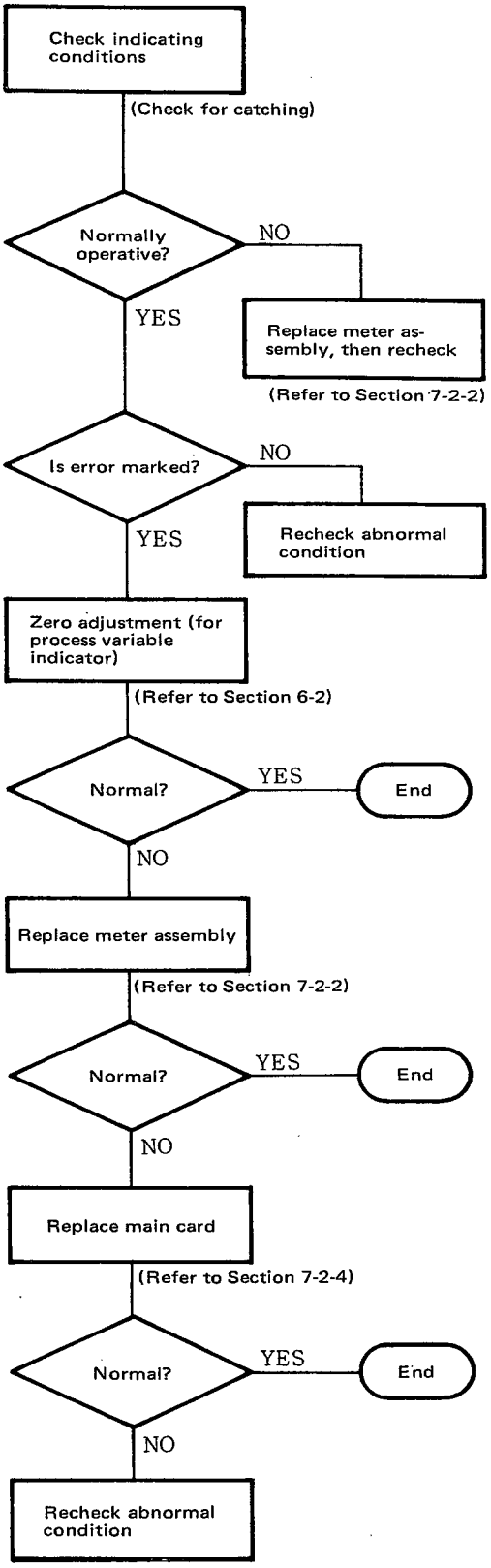
Figure 7-1. Problem Identification.

7-1-2. Troubleshooting Flowcharts by Cause.

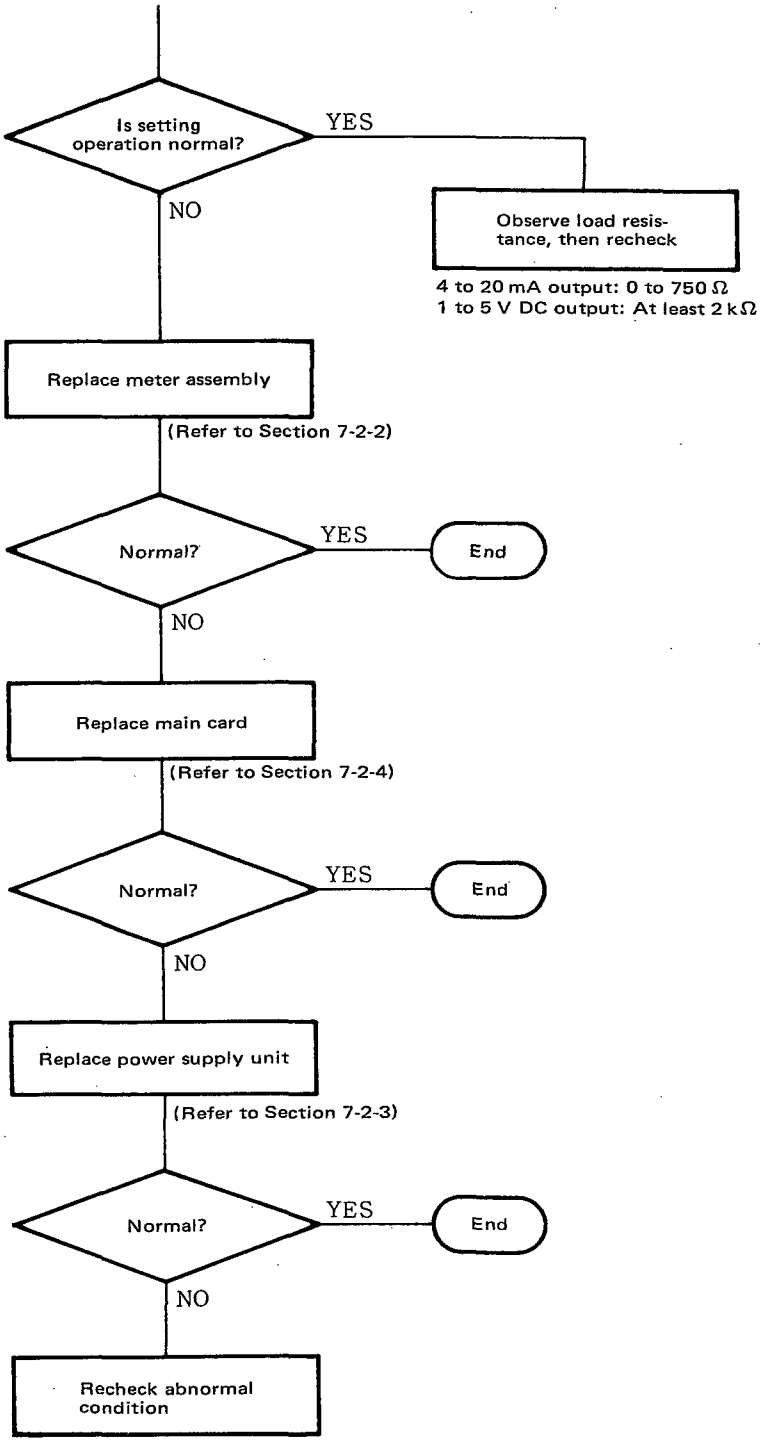
(1) Power Failure.



(2) Indicator Abnormal.



(3) Setpoint/Output Abnormal.



7-2. Parts Replacement.

Given below are the procedures to replace parts. Limit the scope of overhaul to the minimum required; never attempt to overhaul unnecessary parts.

When reinstall parts after replacement, reverse the overhauling procedures.

7-2-1. Replacing Procedures (See Figure 7-2).

Remove the internal instrument from housing as instructed in Section 5-2, then detach the left-side cover by removing screw C1 as shown in Figure 7-2.

Perform overhauling in the following sequence:

(1) Meter assembly.
(2) Power supply unit.
(3) Main card.

7-2-2. Replacing Meter Assembly (9 in Figure 7-2).

(1) Remove five screws 14 from casing 13. Then, disconnect connectors CN1 and CN2 from the main card.
(2) Remove four screws 8 from frame 12.
(3) The meter assembly can be separated from frame 10 by removing three screws 11.

7-2-3. Replacing Power Supply Unit (5 in Figure 7-2).

(1) Pull out the power supply unit rearward by removing four screws 1.
(2) The power supply unit can be separated by disconnecting connector CN3 from the main card.

7-2-4. Replacing Main Card (3 in Figure 7-2).

(1) Detach cover 2 and plate by removing two screws 4.
(2) The main card can be released from bracket 6 by removing two screws 7.

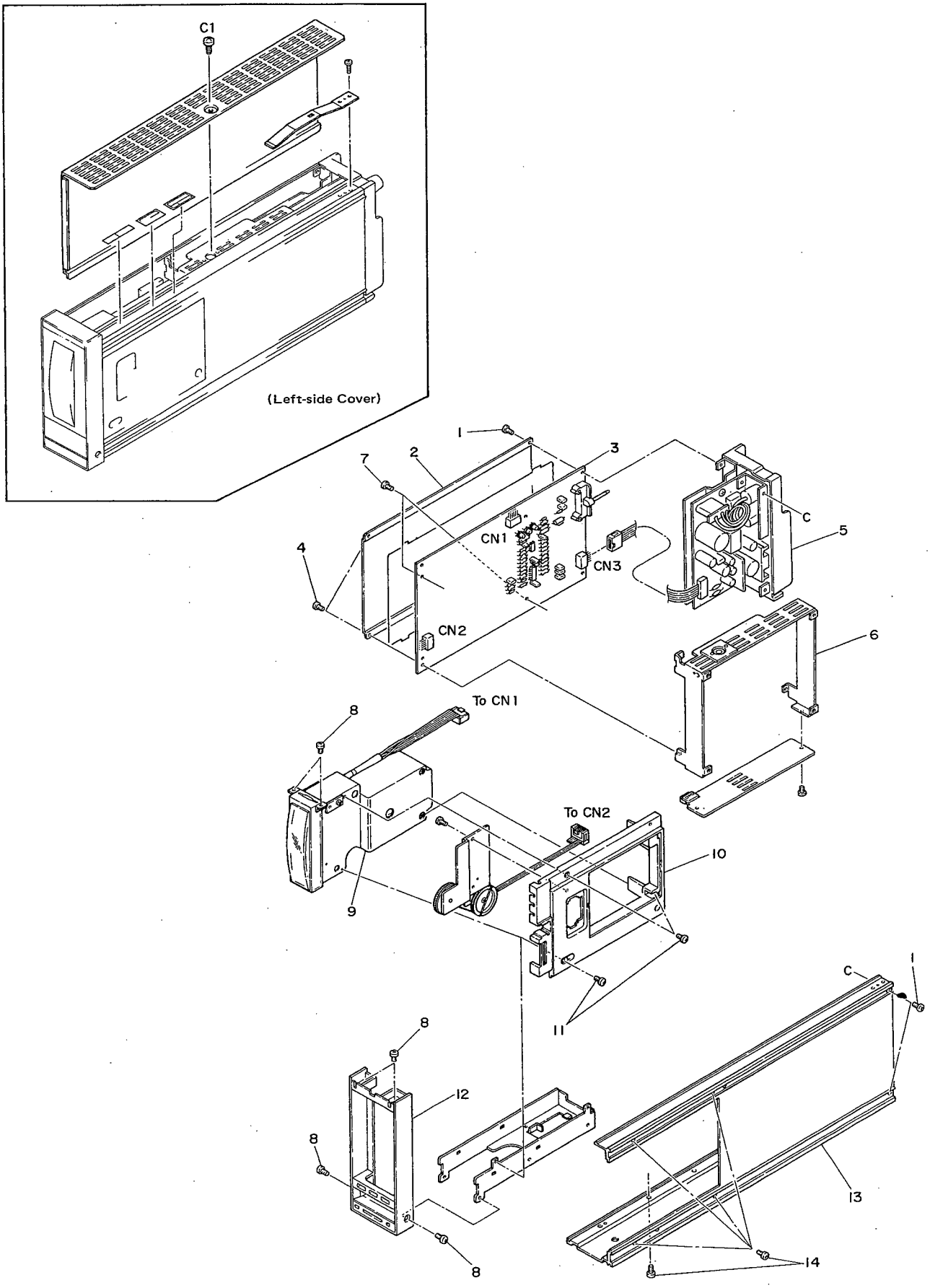
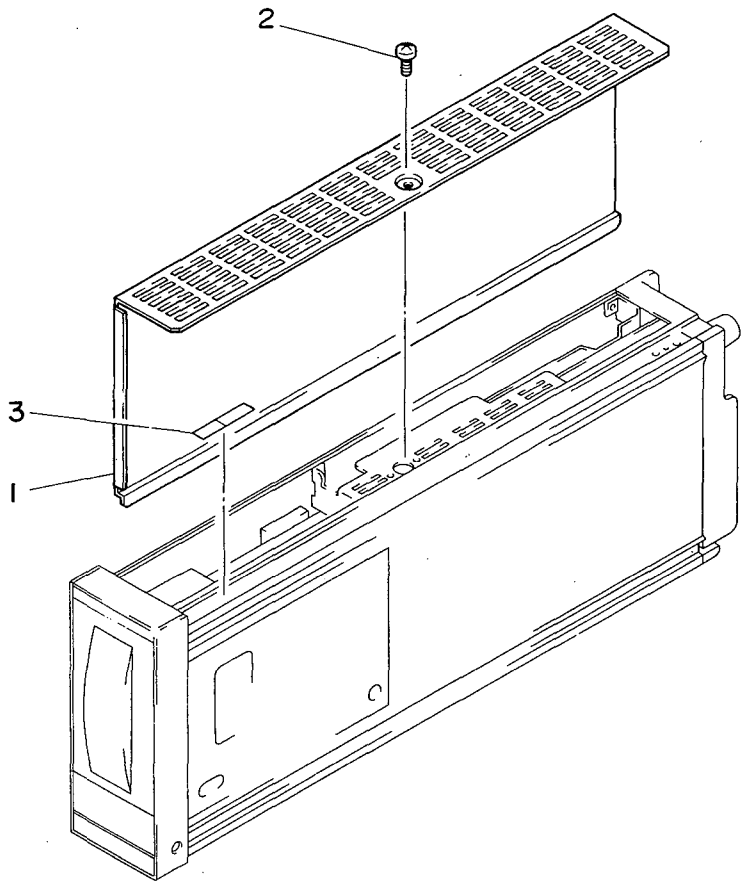


Figure 7-2. Disassembly Drawing.

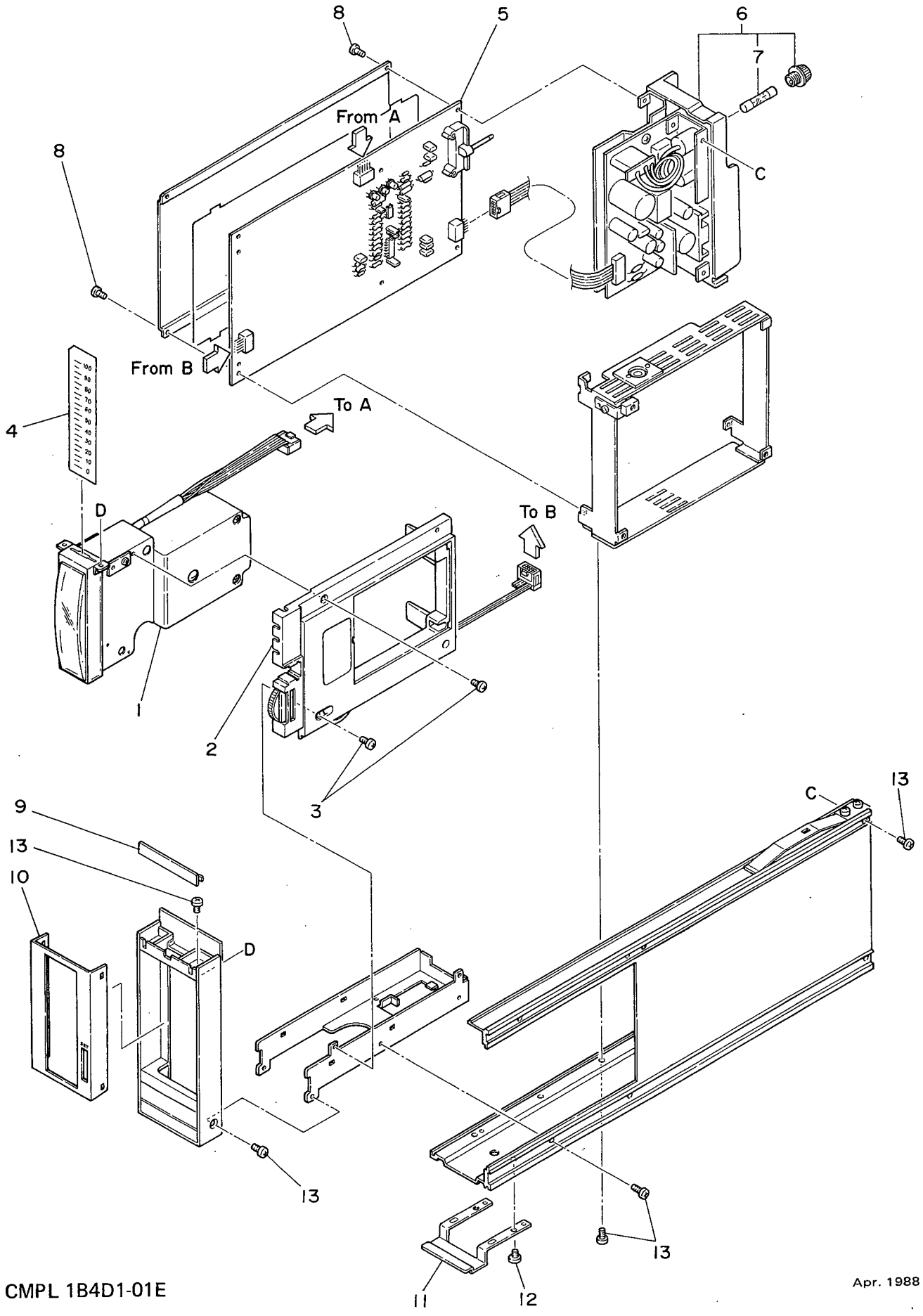
Customer Maintenance Parts List

Model SMLD
Manual Station

YEWSERIES 80



Item	Part No.	Qty	Description
1	E9711TG	1	Cover
2	Y9405LB	1	B.H. Screw, M4 x 5
3	Y9422NP	1	Tag No. Label (blank)



CMPL 1B4D1-01E

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Item	Part No.	Qty	Description
–	E9711AH	1	Meter Assembly
1	E9714AB	1	Meter Assembly
2	E9711DG	1	Frame Assembly
3	Y9306JB	5	Pan H. Screw, M3 x 6
4	–	1	Scale*
–	E9711NT	1	Control Assembly
5	E9716SA	1	Main Card
6	Below	1	Power Supply Unit
	E9716YA		For 100 V Version
	E9716YR		For 220 V Version
7	S9510VK	1	Fuse – "1A/250 V"
8	Y9306JB	6	Pan H. Screw, M3 x 6
9	E9711FG	1	Plate (blank)
10	E9711HJ	1	Bracket
11	E9711TD	1	Stopper
12	E9711TE	2	Screw
13	Y9306JB	14	Pan H. Screw, M3 x 6

*Note: Specify model, range, unit and characteristics.

Apr. 1988
Printed in Japan

Instruction Manual

/ HTB
Power Supply Terminal Connections for Panel - mounted Instruments (Option)

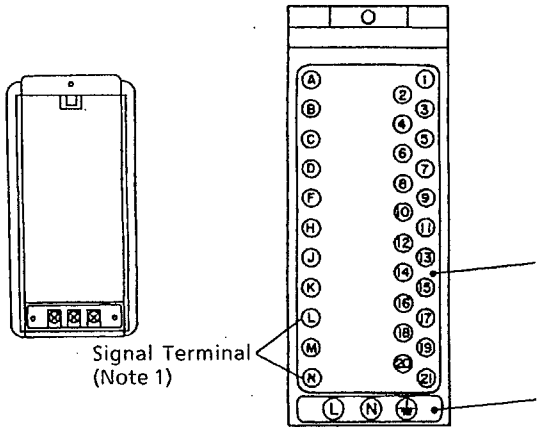
1. GENERAL.

If you specify the terminal board to which the power source is directly connected (suffix code / HTB), the external wiring to the terminal board is necessary.

2. APPLICABLE INSTRUMENTS.

Model	Description
SRVD	Strip Chart Recorder
SIHM	Indicator (With Housing)
SIHF	Bar Graph Indicator (With Alarms)
SIHK	Indicator (With Alarms)
SLCD	Indicating Controller
SLPC	Programmable Indicating Controller
SLMC	Programmable Indicating Controller with Pulse → Width Output
SMLD	Manual Station
SMST	Auto / Manual Station
SMRT	Ratio Set Station
SCMS	Programmable Computing Station
SBSD	Batch Set Station
SLCC	Blending Controller
SLBC	Batch Controller
STLD	Totalizer

3. NAME OF COMPONENTS AND TERMINAL DESIGNATION OF POWER SUPPLY



Terminals Layout

Terminal Designation	Description
L	AC or DC Power Supply (DC : polarity reversible)
N	
⏚	Ground

(Note 1) Be careful for which Signal Terminals have L, N terminals, too.

4. POWER SUPPLY AND GROUND WIRING.

(1) All cable ends must be furnished with crimp - on type solderless lugs (for 4mm screw).

(2) Examples of applicable cables.

Cross - sectional area of the cable conductor : 2.0mm^2.*

Note * : Power supply cables should be determined from the instrument power consumption - they must have conductors with cross - sectional area of at least 1.25mm^2.

Applicable cable : 600V vinyle insulated cable (IV), conforming to JIS C3307.
Vinyle sheathed cables for electric appliances (KIV), conforming to JIS C3316.

(3) After completing the power supply and ground wiring, mount the power terminal cover.

FD No. 10004 - S

YOKOGAWA ◆

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