

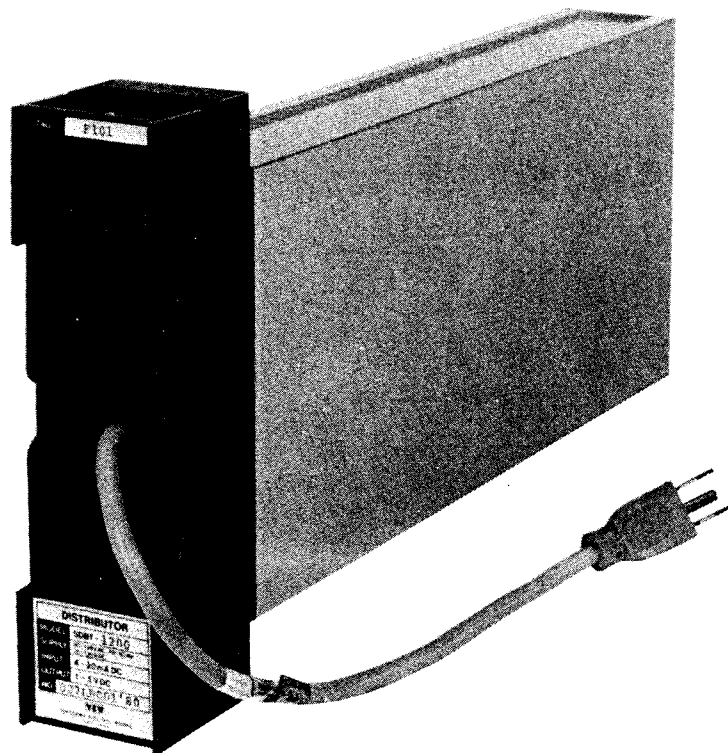
# Instruction Manual

# YEW SERIES 80

## Models SDBT and SDBS

### POWER DISTRIBUTORS

**FOR REFERENCE ONLY**



# CONTENTS

<i>Section</i>	<i>Title</i>	<i>Page</i>
<b>1.</b>	<b>INTRODUCTION</b>	<b>1</b>
1-1.	Inspection	1
1-2.	Instruction Manual Contents	1
<b>2.</b>	<b>GENERAL</b>	<b>2</b>
2-1.	Standard Specifications	3
2-2.	Model and Suffix Codes	4
2-3.	Accessory	4
<b>3.</b>	<b>INSTALLATION</b>	<b>5</b>
3-1.	External Wiring	5
<b>4.</b>	<b>PRINCIPLE OF OPERATION</b>	<b>6</b>
4-1.	Loop Isolation Type SDBT	6
4-2.	Field Isolation Type SDBT	6
4-3.	SDBS Distributor	7
<b>5.</b>	<b>OPERATION</b>	<b>8</b>
5-1.	Names of Components	8
5-2.	Pre-Operational Checks	9
<b>6.</b>	<b>MAINTENANCE</b>	<b>10</b>
6-1.	Test Equipment	10
6-2.	Calibration	10
6-3.	Replacing the Fuse	11
6-4.	Replacing Power Supply Unit	11
<b>7.</b>	<b>TROUBLESHOOTING</b>	<b>12</b>
7-1.	Troubleshooting Flowchart (SDBT Distributor)	12
7-2.	Troubleshooting Flowchart (SDBS Distributor)	13
7-3.	Zero and Span Adjustments (SDBT-21□)	13
7-3-1.	Preparation	13
7-3-2.	Main Card Zero and Span Adjustments	14
7-3-3.	Zero adjustment in the SQRT card (SDBT-□□1)	14
7-4.	Parts Replacement	15
7-4-1.	Disassembly procedure	15
7-4-2.	Disassembling SQRT Card	15
7-4-3.	Disassembling Power Unit	15
7-4-4.	Disassembling Main Card	15

● **PARTS LIST** ..... PL 1B4T1-02, PL 1B4T2-01

**POWER SUPPLY TERMINALS for RACK-MOUNTED INSTRUMENTS (for / TB)**

**IM 1B4F2-11E**

**PL 1B4F2-11**

## 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 suffix codes shown on the shipping documents and also on the nameplate on the terminal cover of the instrument are the same as the order sheet.
- 3) Confirm that all accessories (see section 2-3) are present.

If you have any questions about this instrument please contact either your nearest Yokogawa Sales/Service Office or Yokogawa Electric Corporation (YOKOGAWA), Tokyo, Japan.

### 1-2. Instruction Manual Contents.

This instruction manual deals with operation, external wiring and routine maintenance procedures for the SDBT and SDBS distributors. For installation details and wiring cautions, refer to instruction manual IM 1B4F2-01E "Installation of Rack-Mounting Instruments."

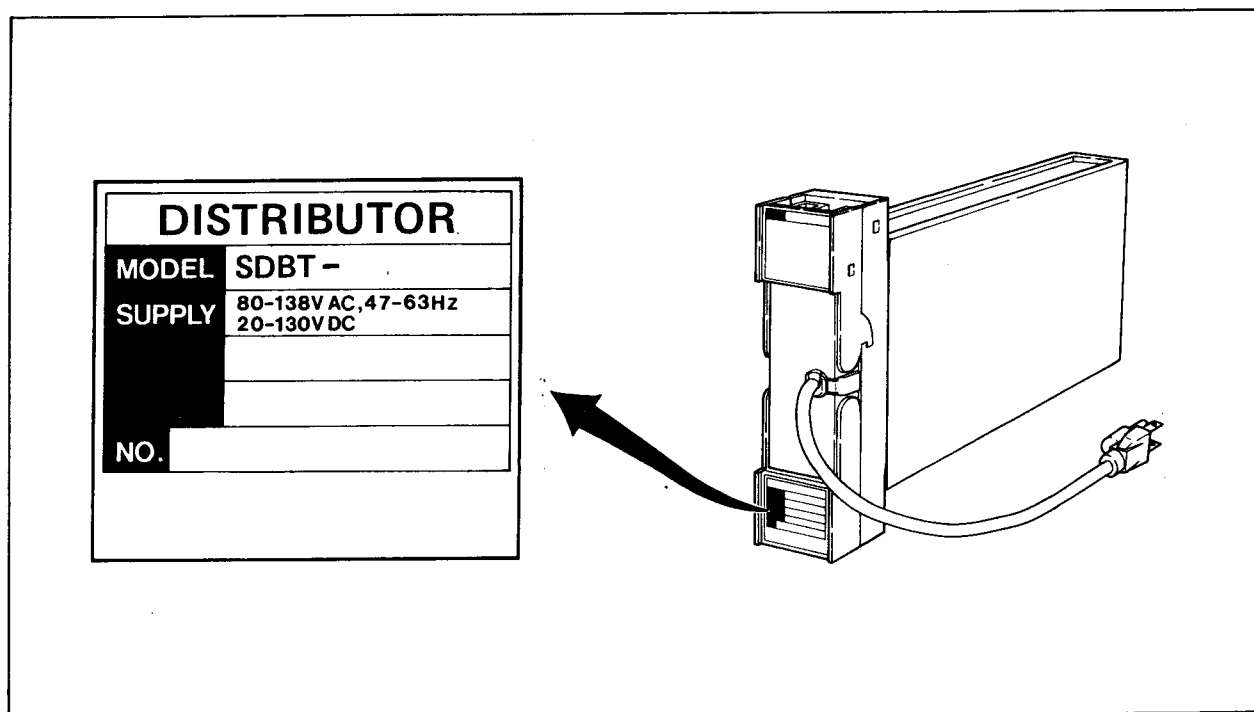


Figure 1-1. Nameplate.

## 2. GENERAL.

SDBT and SDBS distributors are both designed to supply operating power to two-wire type transmitters and convert 4 to 20 mA DC current signal from these transmitters into output signals.

SDBT distributor is designed for one input and available in a loop isolation type SDBT-1 and a field isolation type SDBT-2. SDBT-1 prepares two 1 to 5 V DC output signals. SDBT-2 prepares two 1 to 5 V DC and one 4 to 20 mA DC output signals.

SDBS distributor is designed for four inputs and is available in a loop isolation type.

Both SDBT and SDBS distributors have built-in current limiters allowing normal operation even when a short-circuit occurs on the transmitter side.

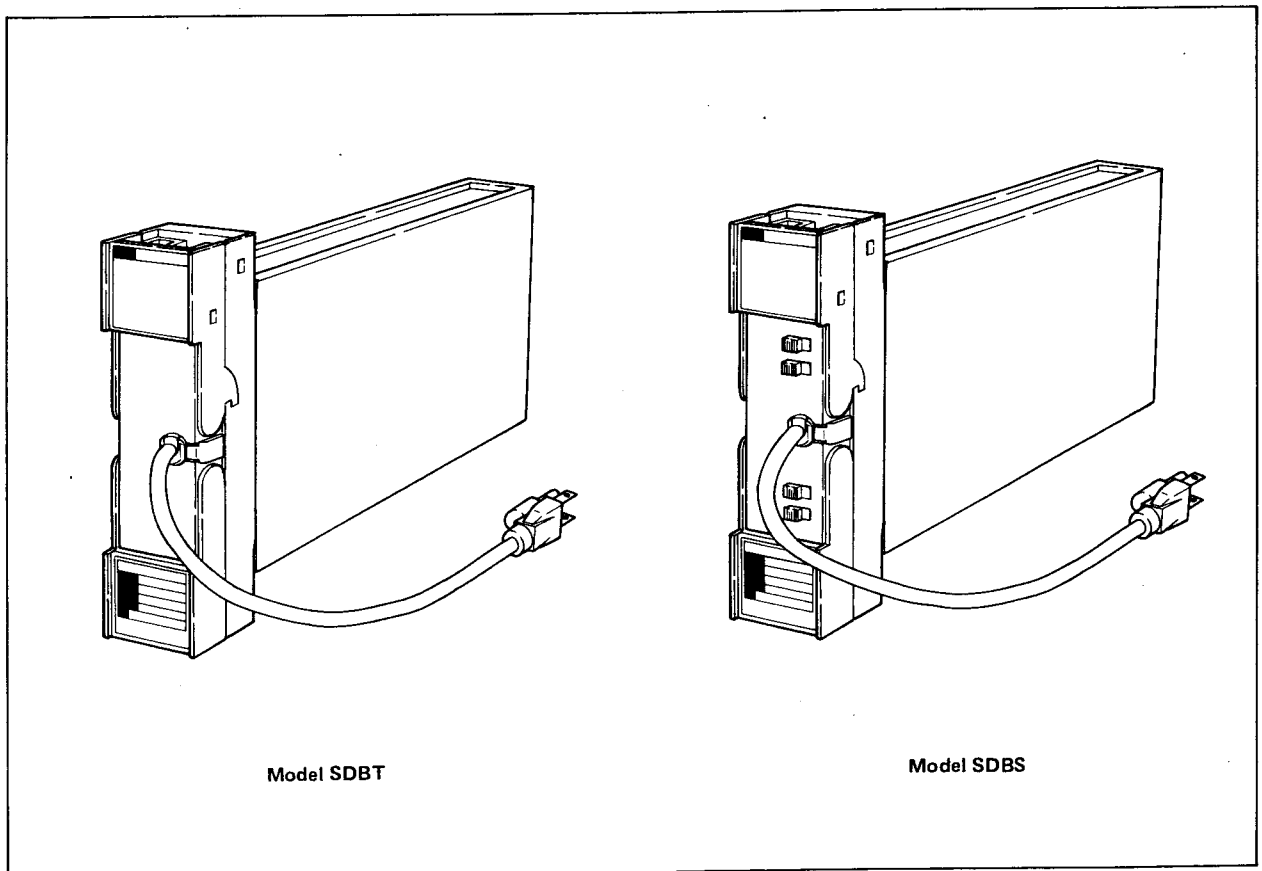


Figure 2-1. External View.

**2-1. Standard Specifications.**

Item	SDBT Distributor	SDBS Distributor																				
Transmitter Used	Operates on 24 V DC, outputs 4 to 20 mA DC signal, 2-wire transmitter.																					
Number of Unit	1	4																				
Output Signal	<ul style="list-style-type: none"><li>1 to 5 V DC (2 points), resistive load: at least 2 kΩ</li><li>4 to 20 mA DC (1 point) is perattached for Type SDBT-2 only, resistive load: 0 to 750 Ω</li></ul>	1 to 5 V DC, resistive load: at least 2 kΩ																				
Leadwire resistance between transmitters	<p>Calculate from the following equation.</p> $\text{Leadwire Resistance } (\Omega) \leq \frac{(20^{*1} - 4.5^{*2} - \text{Transmitter maximum on-load voltage drop}^{*3})V}{0.02A}$ <p>*1 Minimum supply voltage (25 V) – Maximum on-load voltage drop (5 V) *2 Subtraction when safety barrier is connected (maximum on-load voltage drop 4.5 V), not applicable to SDBS *3 UNI Δ, YEWFO: 12 V DC E10 Series: 15 V DC</p>																					
Type of Isolation	<p>(1) Loop isolation type</p> <ul style="list-style-type: none"><li>Input not isolated from output.</li><li>Input and output isolated from distributor power source, i.e. inter-loop isolation.</li></ul> <p>(2) Field isolation type</p> <ul style="list-style-type: none"><li>Input isolated from output.</li><li>Input and output isolated from distributor power source, inter-loop isolation.</li></ul>	<p>Loop isolation type</p> <ul style="list-style-type: none"><li>Input not isolated from output.</li><li>Input and output isolated from distributor power source.</li><li>Loop isolated from other loops.</li></ul>																				
Accuracy	<p>(1) ±0.2% of span</p> <p>(2) ±0.5% of span for the version with square root computation.</p>	±0.2% of span																				
Transmitter Supply Voltage	26.5 ± 1.5 V DC																					
Supply Voltage	Power Supply: AC or DC (No change to instrument). DC Supply (polarity reversible): 20 to 130 V (100 V version), 120 to 340 V (220 V version). AC Supply (47 to 63 Hz): 80 to 138 V (100 V version), 138 to 264 V (220 V version).																					
Maximum power consumption	<table><tr><th>Model</th><th>24 V DC (mA)</th><th>100 V AC (VA)</th><th>220 V AC (VA)</th></tr><tr><td>SDBT-110</td><td>60</td><td>5.4</td><td>8.4</td></tr><tr><td>SDBT-111</td><td>100</td><td>7.3</td><td>10.2</td></tr><tr><td>SDBT-210</td><td>155</td><td>9.5</td><td>12.4</td></tr><tr><td>SDBT-211</td><td>195</td><td>11.1</td><td>13.9</td></tr></table>	Model	24 V DC (mA)	100 V AC (VA)	220 V AC (VA)	SDBT-110	60	5.4	8.4	SDBT-111	100	7.3	10.2	SDBT-210	155	9.5	12.4	SDBT-211	195	11.1	13.9	24 V DC: 210 mA 100 V AC: 11.6 VA 220 V AC: 14.6 VA
Model	24 V DC (mA)	100 V AC (VA)	220 V AC (VA)																			
SDBT-110	60	5.4	8.4																			
SDBT-111	100	7.3	10.2																			
SDBT-210	155	9.5	12.4																			
SDBT-211	195	11.1	13.9																			
Ambient temperature and humidity	0 to 50°C, 5 to 90% RH (non-condensing)																					
Mounting	Rack mounting																					
Weight	1.7 kg																					

**2-2. Model and Suffix Codes.**

## ● SDBT Distributor

Model	Suffix Codes	Description
SDBT	.....	Distributor
Isolation	-11 ..... -21 .....	Loop isolation only Field (plus loop) isolation
Square Root Function	0 ..... 1 .....	Not provided Provided
Style Code	*B .....	Style B
Option	/A2ER /NHR	220 V power supply Without case

Note: Square root extract computation.

$$\text{Equation: } E_0 = 2 \sqrt{E_1 - 1} + 1$$

$E_0$ : Output signal

$E_1$ : Input signal

Low input cutoff: Output is proportional  
to the input below 1%  
of its value.

## ● SDBS Distributor

Model	Suffix Codes	Description
SDBS	.....	Distributor
Isolation, Inputs	-14 .....	Loop isolation only, four inputs
	0 .....	Always 0
Style Code	*A .....	Style A
Option	/A2ER /NHR	220 V power supply Without case

**2-3. Accessory.**

Fuse 1 A: One

### 3. INSTALLATION

For general information about installation and wiring, refer to instruction manual IM 1B4F2-01E "Installation of Rack-Mounting Instruments."

#### 3-1. External Wiring.

- (1) When wiring the terminals, install round solderless crimp-on lugs on the ends of each wire.
- (2) When the internal unit is housed in the rack case, tilt the terminal cover forward in order to do the wiring.
- (3) The wiring to each terminal should be done while referring to Table 3-1.
- (4) After completing the wiring, replace the terminal cover.

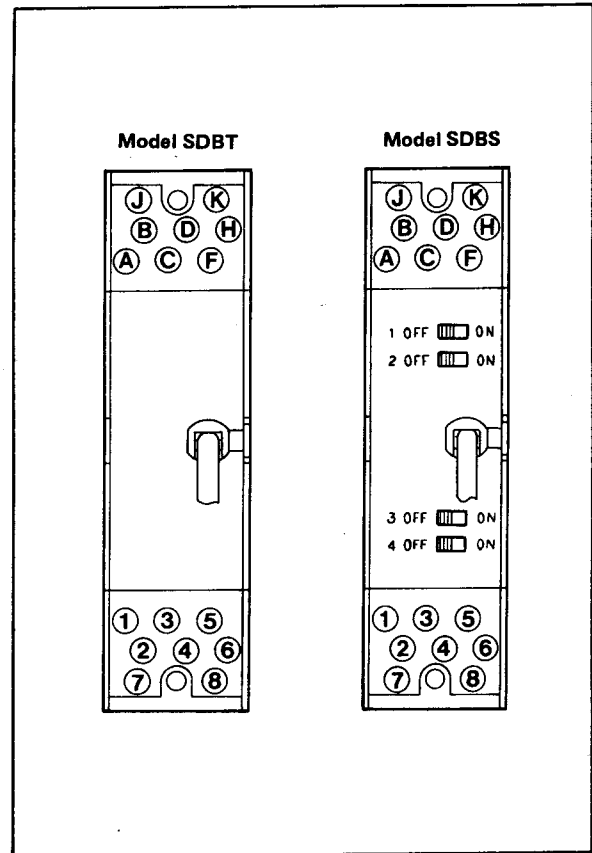


Figure 3-1. Terminal Layout.

Table 3-1. Terminal Wiring.

SDBT		SDBS	
Terminal Designation	Description	Terminal Designation	Description
1	+ — To Transmitter — — Barrier COM*	1	+ — To Transmitter 1
2		2	+ — To Transmitter 3
3		3	+ — To Transmitter 2
4		4	+ — To Transmitter 4
5		5	+ — To Transmitter 1
6		6	+ — To Transmitter 3
7	+ — Output signal 1 (1 to 5 V DC) — — + — Output signal 3*2 (4 to 20 mA DC) — — + — Output signal 2 (1 to 5 V DC) — —	7	+ — Output signal 1
8		8	+ — Output signal 3
A		A	+ — Output signal 2
B		B	+ — Output signal 4
C		C	
D		D	
F		F	
H		H	
J		J	
K		K	

**Note:**

- \*1: Use where barrier connections are required.
- \*2: When the output signal is not used, terminal C to D remains opened.

#### 4. PRINCIPLE OF OPERATION.

##### 4-1. Loop Isolation Type SDBT.

The SDBT supplies power to a two-wire type transmitter through current limiter CL and converts 4 to 20 mA output current signals from this transmitter into 1 to 5 V DC signals. CL prevents excessive current if a short-circuit should occur in the field wiring.

It is also possible to incorporate a square-root-extraction circuit (additional specification) in the area indicated by the dotted line.

##### 4-2. Field Isolation Type SDBT.

The 1 to 5 V signal obtained in a manner similar to the loop isolation type. The input signal (4 to 20 mA DC) is isolated from the output signal by a photo-isolation circuit consisting of the voltage-pulse converter, a photocoupler and a pulse-voltage converter. It is then output 1 to 5 V DC and 4 to 20 mA DC signals via an output amplifier.

A square-root-extraction circuit (additional specification) can be inserted into the area indicated by dotted lines.

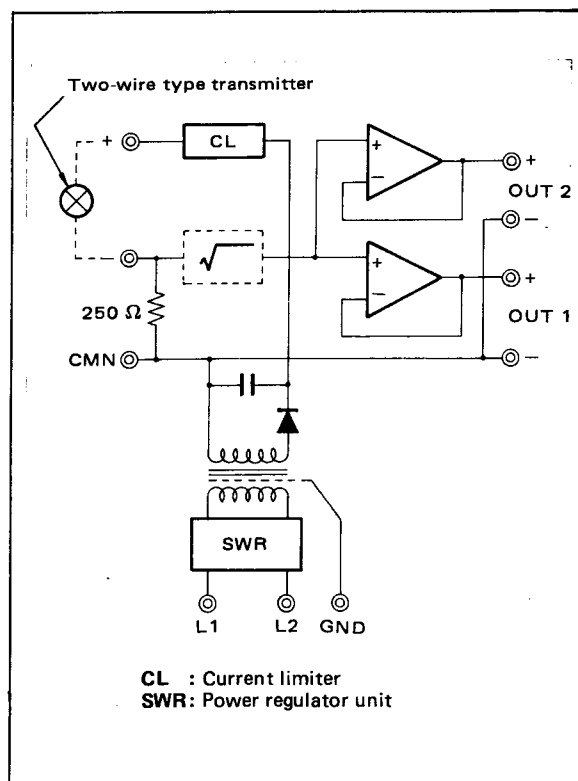


Figure 4-1. Functional Block Diagram for Loop Isolator Type SDBT.

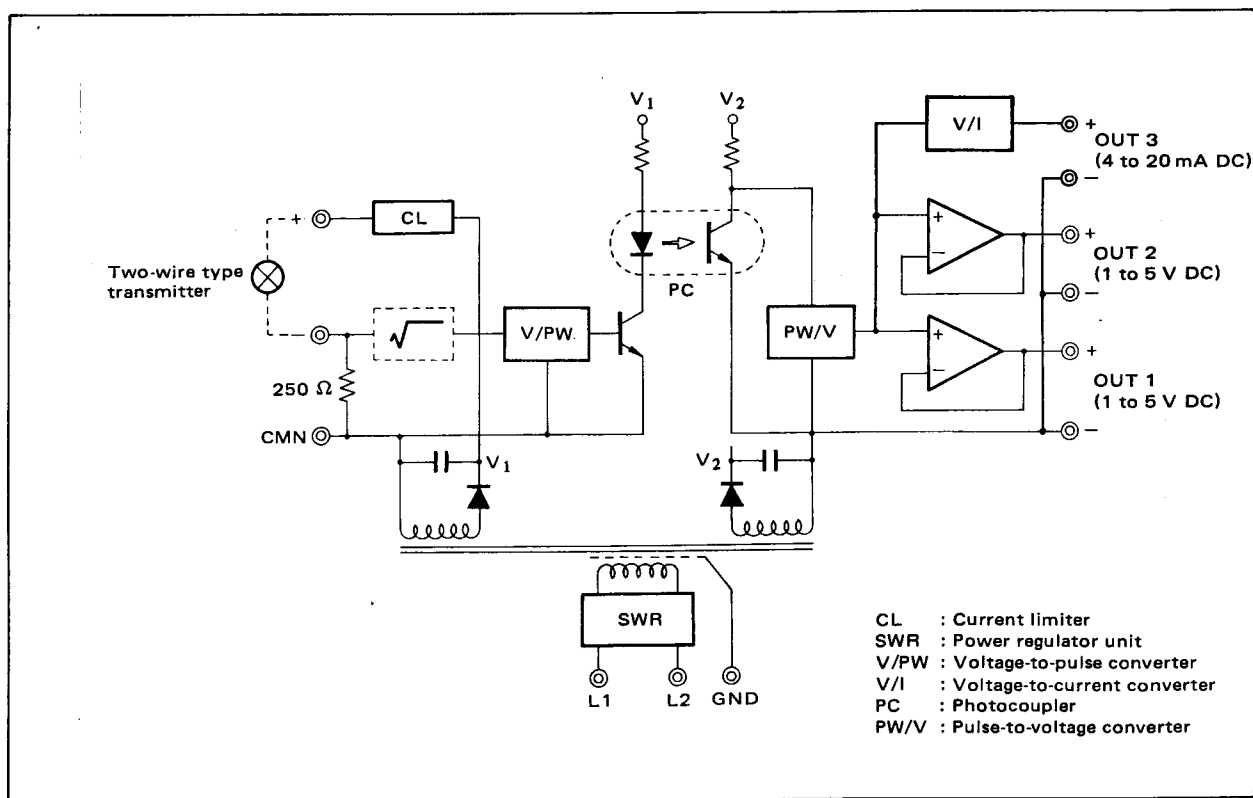


Figure 4-2. Functional Block Diagram for Field Isolator Type SDBT.



### 4-3. SDBS Distributor.

The SDBS supplies power to a two-wire type transmitter through the current limiter CL and converts a 4 to 20 mA output current signal from the transmitter into a 1 to 5 V DC signal. CL prevents excessive current if a short-circuit occurs in the field wiring.

Each of the four isolated loop distributor circuits in SDBS is provided with an ON/OFF switch for the transmitter.

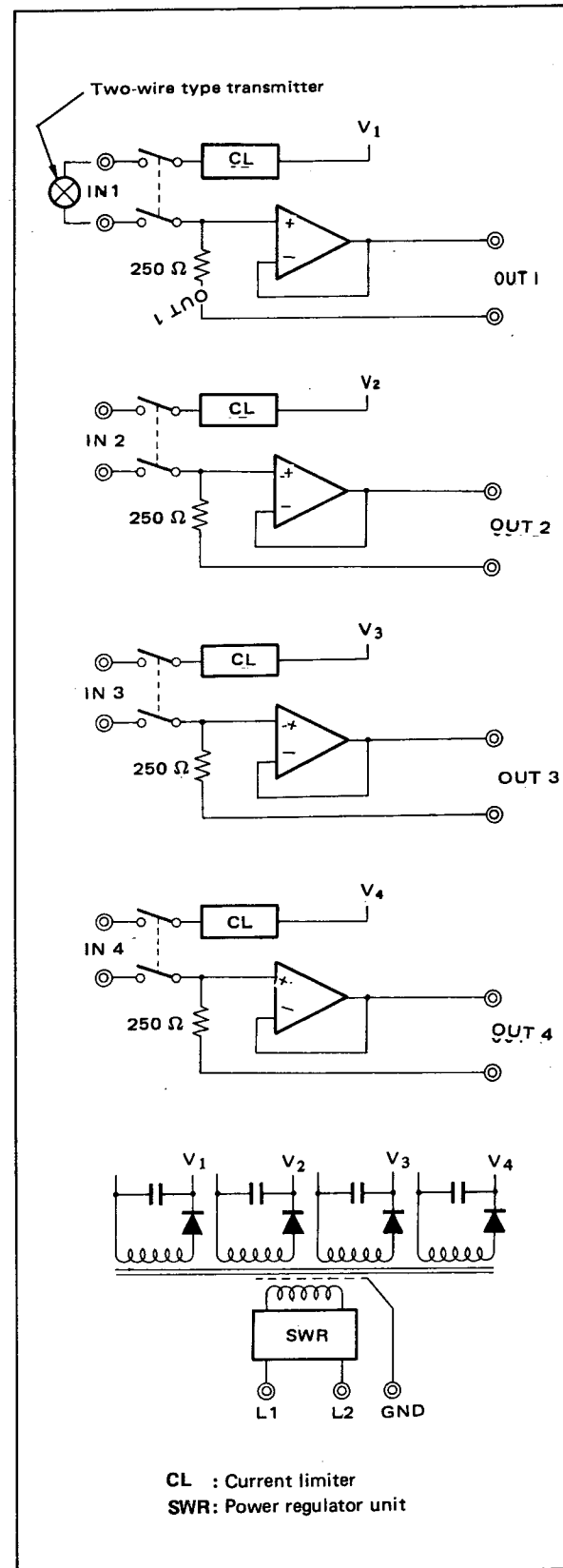


Figure 4-3. Functional Block Diagram for the SDBS Distributor.

## 5. OPERATION.

Once the installation and wiring are completed, this distributor can be placed in operation by simply turning on the power switch. This distributor does not require any adjustments, but the inspection and checks described in Section 5-2 should be made before the unit is placed in operation.

### 5-1. Names of Components.

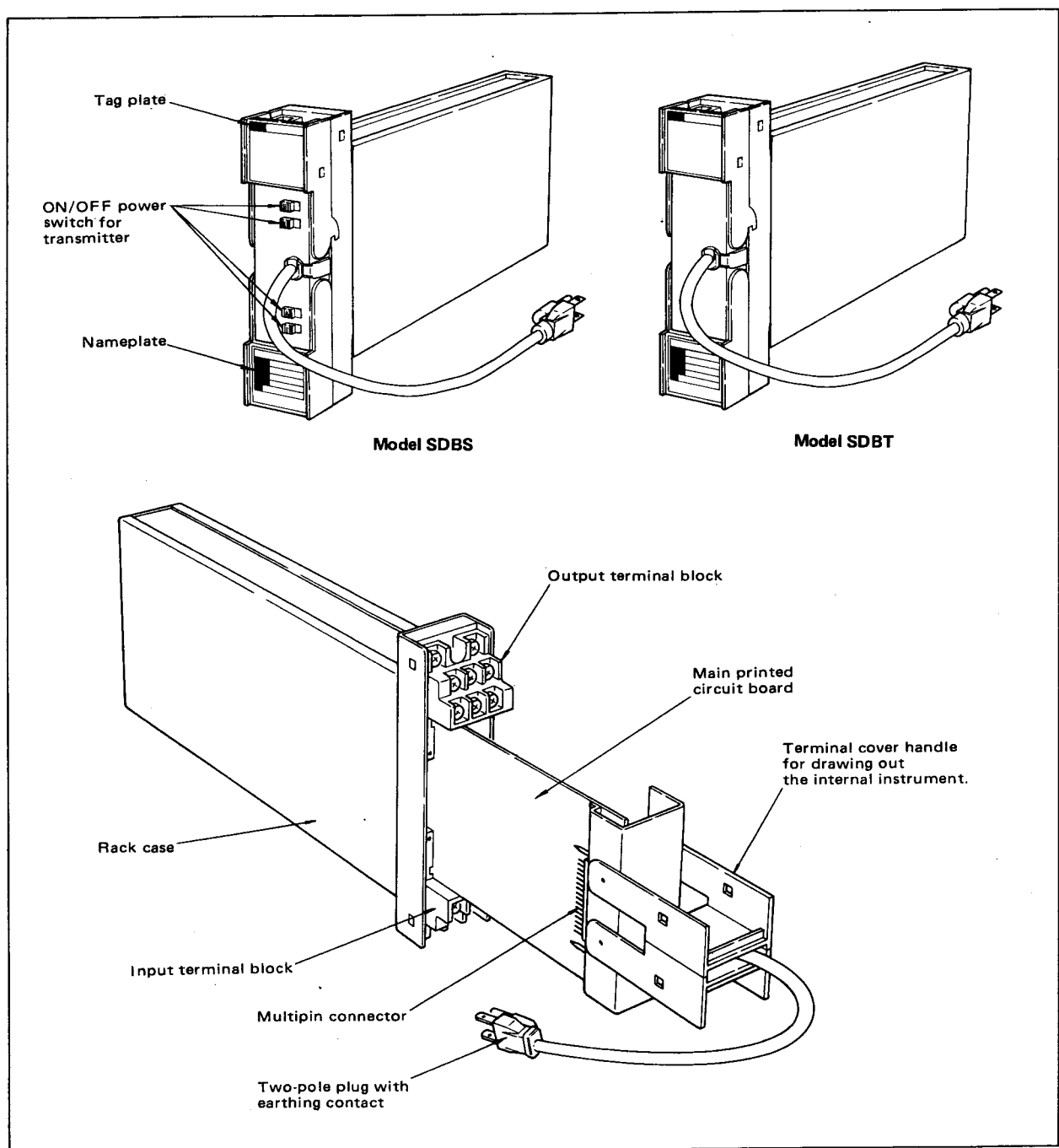


Figure 5-1. Names of Various Components.

## 5-2. Pre-operational Checks.

Inspect and check the following points before entering the unit into normal operation.

- (1) Draw the internal unit out from the rack case and insure that the specified fuse is installed in the fuse holder at the back of the internal unit.
- (2) Before sliding the internal unit back into the rack case, check that the rack case connector is securely connected to the internal unit.
- (3) Check that the wires are securely connected to the correct terminals on the terminal block.
- (4) Check that the power plug is securely connected in a power outlet with a grounding contact.
- (5) For SDBS, set the switch at the front of the distributor to the ON position. If any distributor circuit is not used, set the corresponding switch to the OFF position.

## 6. MAINTENANCE.

This chapter deals with simple maintenance procedures and parts replacements.

### 6-1. Test Equipment.

For efficient maintenance of this distributor, the user is advised to have the following test equipment manufactured by Yokogawa or its equivalents before the need for maintenance arises.

- Voltage/current standard Type 2554 ..... 1 set
- Digital voltmeter Type 2502 ..... 1 set
- Calibration booster Type E9712SK:  
include Model SSKD Service Kit ..... 1 set

### 6-2. Calibration.

- (1) Connect the instruments as illustrated in Figure 6-1 or 6-2 and turn on the power switch. Allow the instruments to warm up for about 5 minutes.

- (2) Apply inputs corresponding to 0, 25, 50, 75 and 100% of the input range and confirm that the input/output relationships shown in Table 6-1 are satisfied by reading the output at each of these points with a digital voltmeter. In the case of 4 to 20 mA DC output test, put a parallel resistance ( $250\ \Omega \pm 0.05\%$ ) into terminal C – D and read in voltage number.
- (3) Since the SDBS distributor has four built-in distributor circuits, calibrate each of these circuits by using the procedure described in (2) above.

Table 6-1. Input/Output Characteristics.

%	Input	Output	
		SDBS and SDBT without square-root-extraction function	SDBT with square-root-extraction function
0	4 mA	$1 \pm 0.008\text{ V}$	$1.000 \pm 0.02\text{ V}$
25	8 mA	$2 \pm 0.008\text{ V}$	$3.000 \pm 0.02\text{ V}$
50	12 mA	$3 \pm 0.008\text{ V}$	$3.828 \pm 0.02\text{ V}$
75	16 mA	$4 \pm 0.008\text{ V}$	$4.464 \pm 0.02\text{ V}$
100	20 mA	$5 \pm 0.008\text{ V}$	$5.000 \pm 0.02\text{ V}$

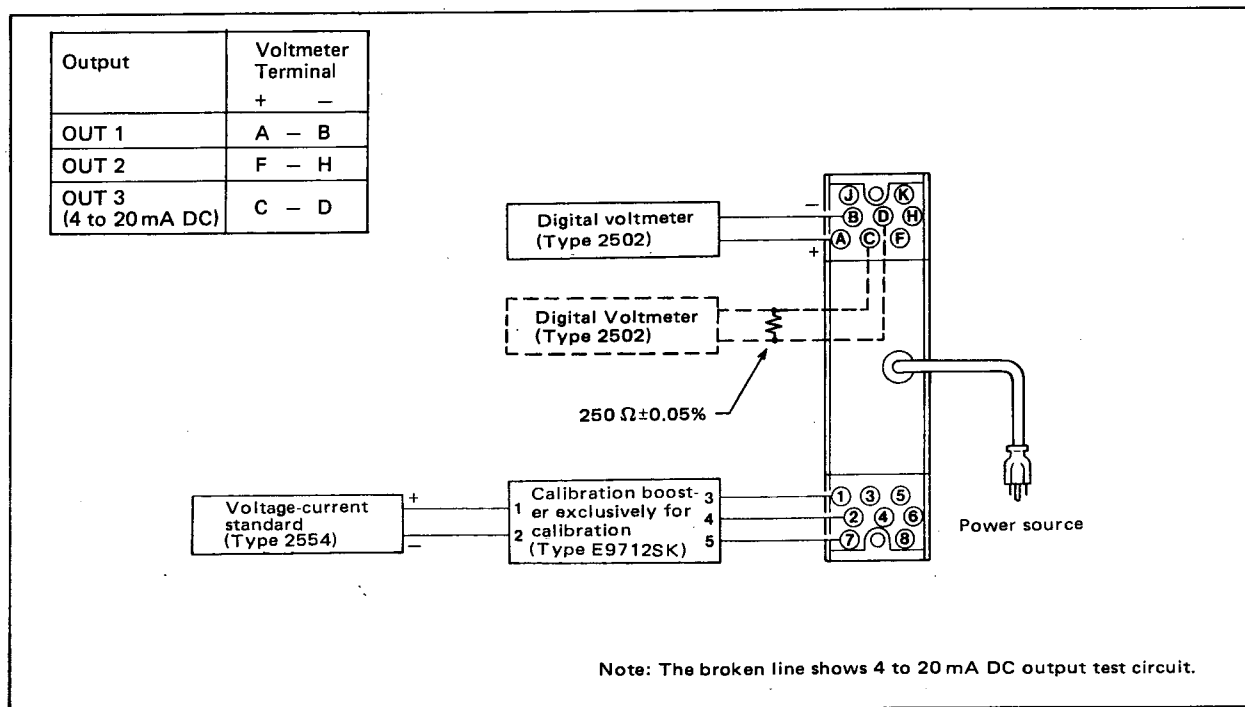


Figure 6-1. SDBT Calibration.

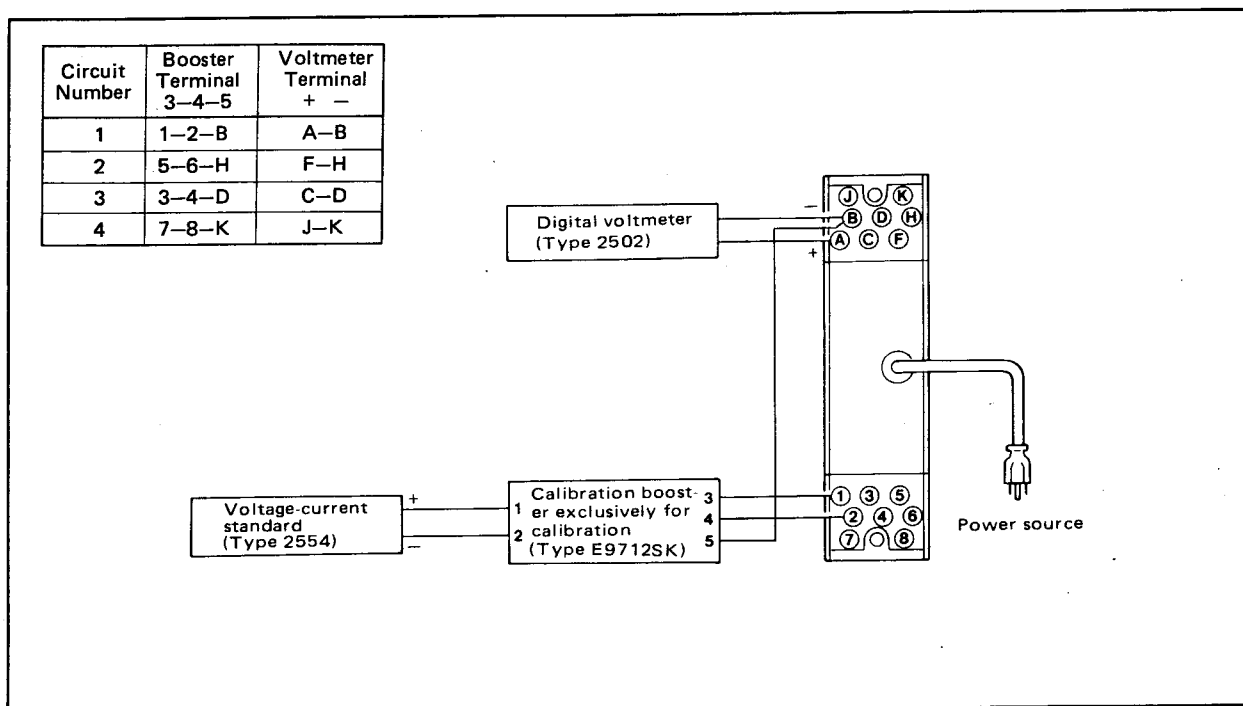


Figure 6-2. SDBS Calibration.

### 6-3. Replacing the Fuse.

When the fuse blows, first check the cause and then change it as described below. When the fuse itself is responsible for the problem, check the inside of the fuse holder for any contamination that might cause poor contact.

Recommended replacement interval: About 3 years.

- (1) Remove the fuse holder cap by turning it counter-clockwise in the direction of the arrow.
- (2) When installing a new fuse, always check that its rating is correct.

Replace the fuse holder cap securely.

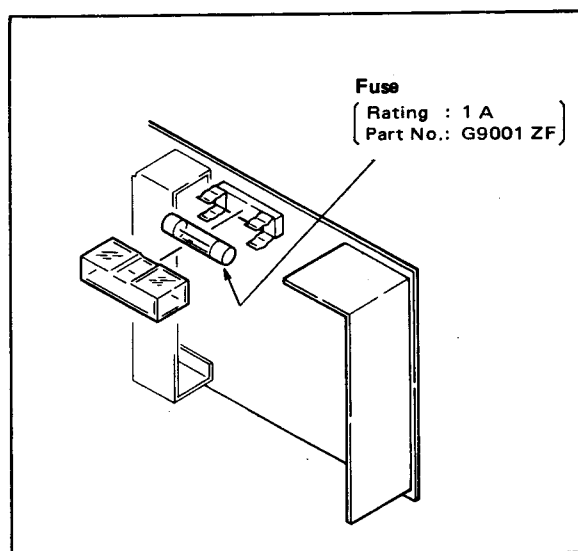


Figure 6-3. Changing the Fuse.

### 6-4. Replacing Power Supply Unit.

Degradation of the  $\text{Al}$  electrolytic capacitor in the power supply unit depends on working temperature conditions.

Recommended replacement interval: 5 to 10 years

Replace the power supply unit as instructed in Section 7-4.

## 7. TROUBLESHOOTING.

If any fault occurs in the instrument, note the symptoms. To find the fault, first wire the instruments according to Figure 6-1, apply an input signal, and follow the section 7-1 Troubleshooting flowchart.

If the fault is difficult to find, contact your nearest YOKOGAWA service center.

### 7-1. Troubleshooting Flowchart (SDBT Distributor).

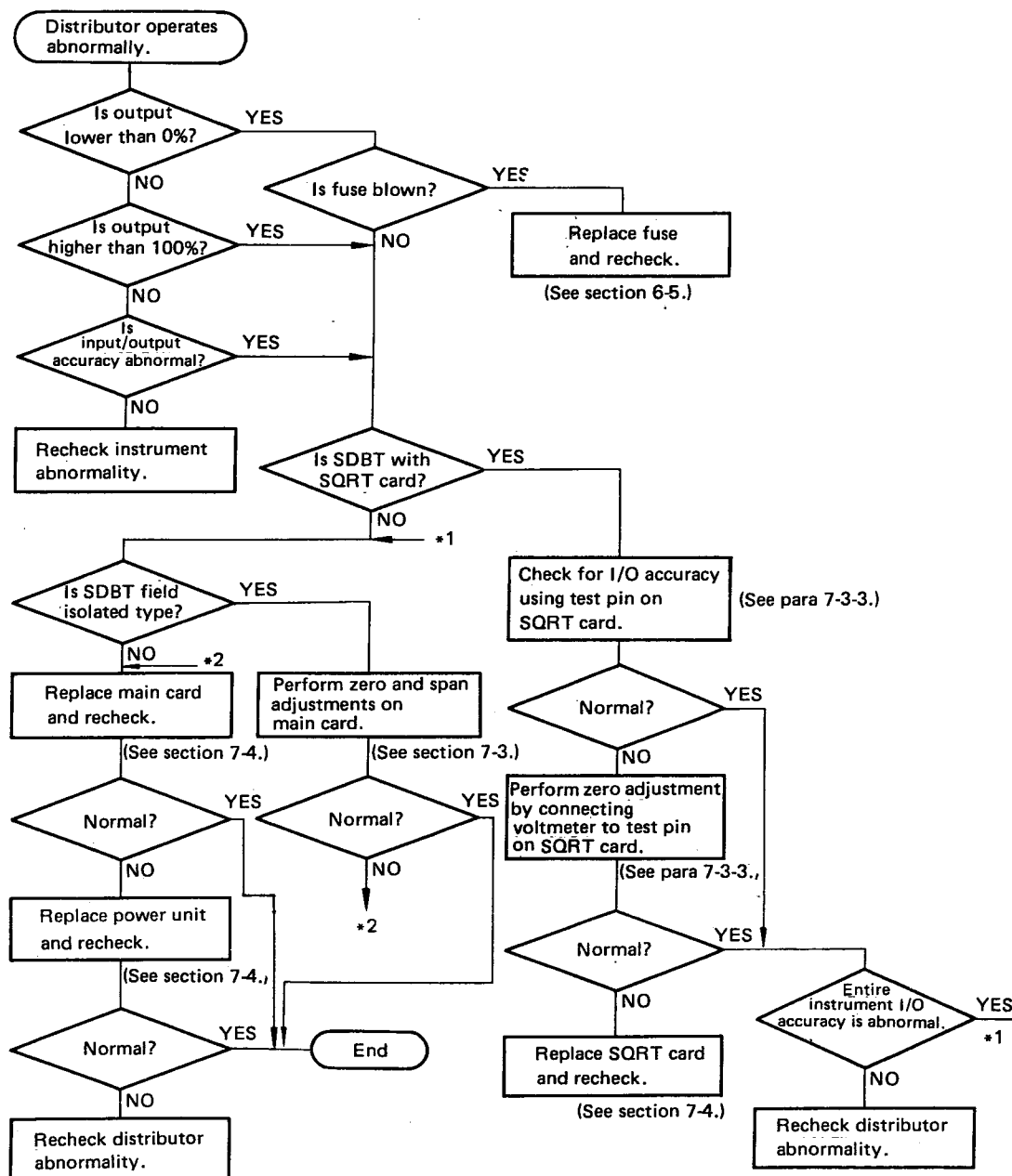
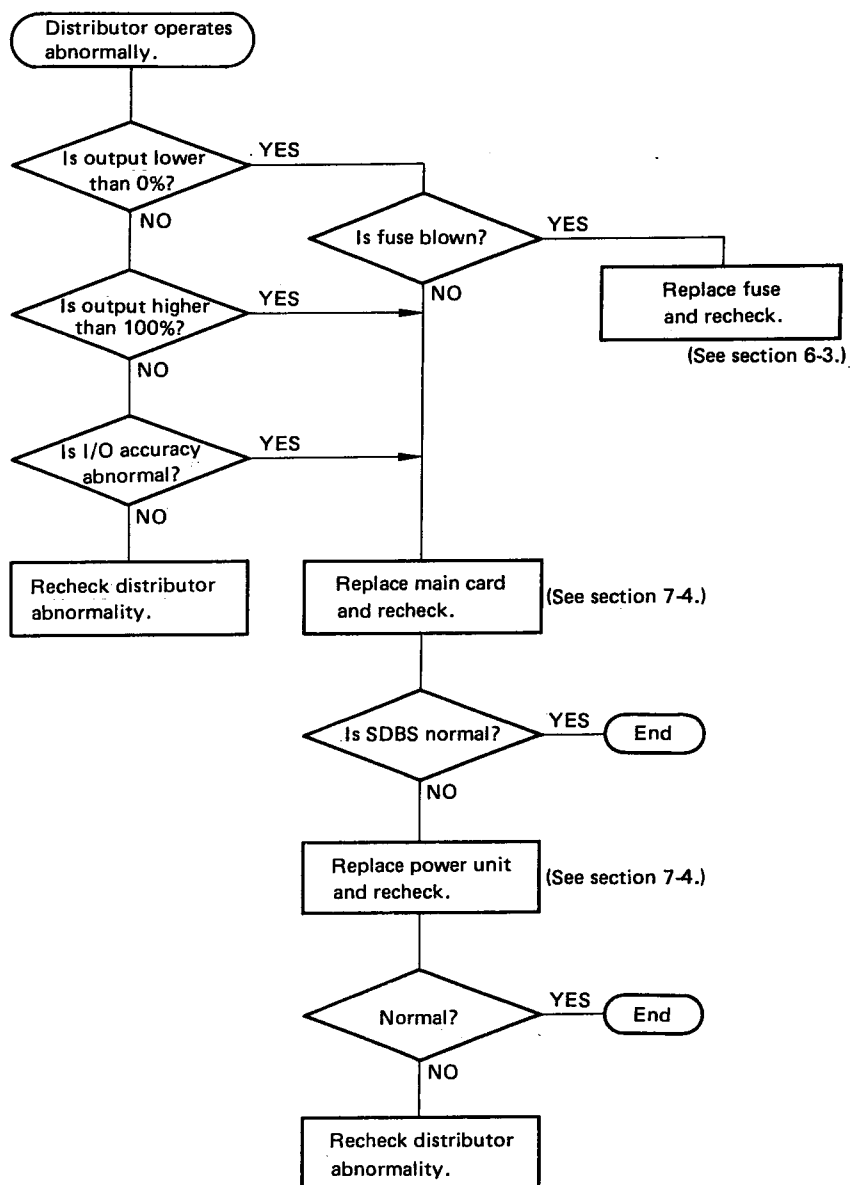


Figure 7-1. Troubleshooting Flowchart for SDBT Distributor.

**7-2. Troubleshooting Flowchart (SDBS Distributor).****Figure 7-2. Troubleshooting Flowchart for SDBS Distributor.****7-3. Zero and Span Adjustments (SDBT-21□).**

Zero and span adjustments are performed only for the field isolation type distributors, and these adjustments are not required for the loop isolation type SDBT distributors (SDBT-11□) and SDBS distributors.

**7-3-1. Preparation.**

- (1) Withdraw the internal assembly from the case and connect the extension card (in Model SSKD YewSeries service kit) between the internal assembly and the case. (See Figure 7-3.)

- (2) Connect the instruments as illustrated in Figure 6-1. Turn the power ON and allow the instruments to warm up for at least 5 minutes.

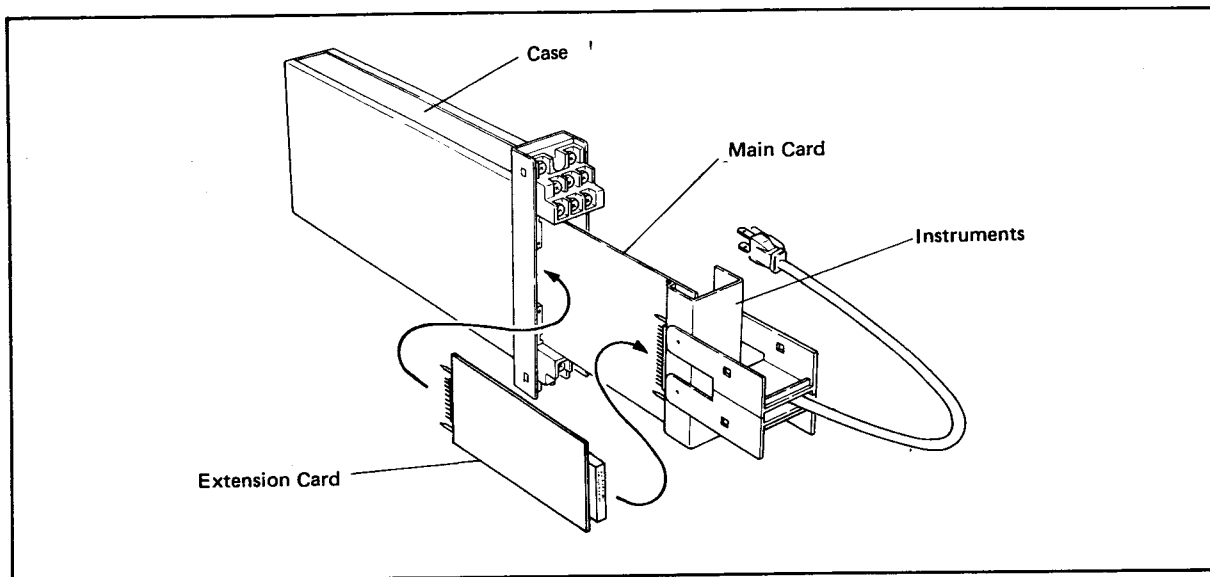


Figure 7-3. Connection of Extension Card

### 7-3-2. Main Card Zero and Span Adjustments.

After completing warm up, apply a 4 to 20 mA DC input and check that the input/output agrees with the value in Table 7-1 below.

Table 7-1. Input/Output Characteristics.

Input		Output (V)	
%	mA	Version without SQRT card	Version with SQRT card
0	4	$1 \pm 0.008$	$1.000 \pm 0.02$
25	8	$2 \pm 0.008$	$3.000 \pm 0.02$
50	12	$3 \pm 0.008$	$3.828 \pm 0.02$
75	16	$4 \pm 0.008$	$4.464 \pm 0.02$
100	20	$5 \pm 0.008$	$5.000 \pm 0.02$

### 7-3-3. Zero Adjustment in the SQRT Card (SDBT-□□1).

For the distributor with square root extraction function, perform zero adjustment in the SQRT card prior to zero and span adjustments (except for SDBT-111) in paragraph 7-3-2.

- (1) Wire the instrument as per Figure 7-4, and turn the power ON. Allow the instruments to warm up for at least 5 minutes.
- (2) When 1.04 V DC is applied from the voltage/current standard, confirm that the voltmeter indicates  $1.4 \pm 0.02$  V.
- (3) If the voltmeter does not indicate this value, adjust the ZERO ADJ until it reads correct value.

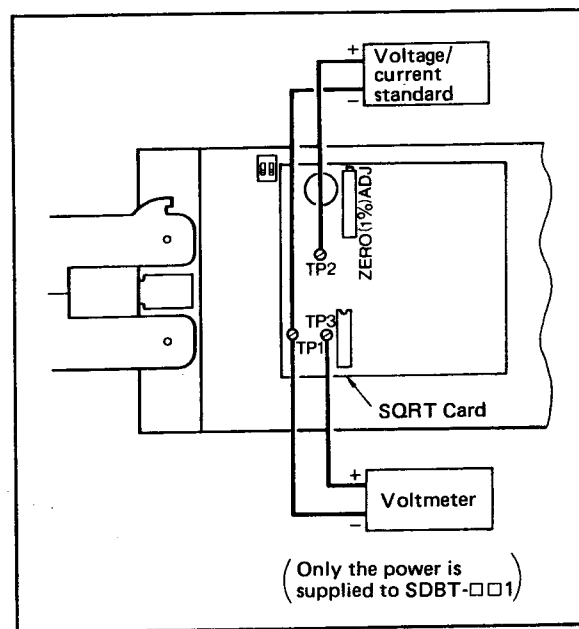


Figure 7-4. Zero Adjustment on SQRT Card.



## 7-4. Parts Replacement.

The disassembly procedures for replacing parts as follows:

Be careful to remove or disassemble only those parts which need to be removed or disassembled in order to replace faulty parts.

Reassemble the unit, after parts replacement, in the reverse order of the disassembly procedure (described below). The SDBT distributor parts replacement procedure is basically the same as those for the SDBS distributor.

### 7-4-1. Disassembly Procedure (see Figure 7-5).

- (1) Disassembling SQRD Card (STBT with square root extract functions).
- (2) Disassembling V/I Unit Card.
- (3) Disassembling Power Unit.
- (4) Disassembling Main Card.

### 7-4-2. Disassembling SQRD Card ( ⑥ in Figure 7-5).

- (1) Remove three screws ⑦.
- (2) Remove SQRD card ⑥ from main card ⑤. A connector is used to connect main card ⑤ and SQRD card ⑥.

### 7-4-3. Disassembling Power Unit ( ② in Figure 7-5).

- (1) Unplug connector ① from board ②.
- (2) Remove two screws ③ to separate board ② from bracket ⑧.

### 7-4-4. Disassembling Main Card ( ⑤ in Figure 7-5).

Carry out this procedure after the range card, V/I unit card and power unit are disassembled.

- (1) Remove four screws ④ to separate main board ⑤ from the bracket.

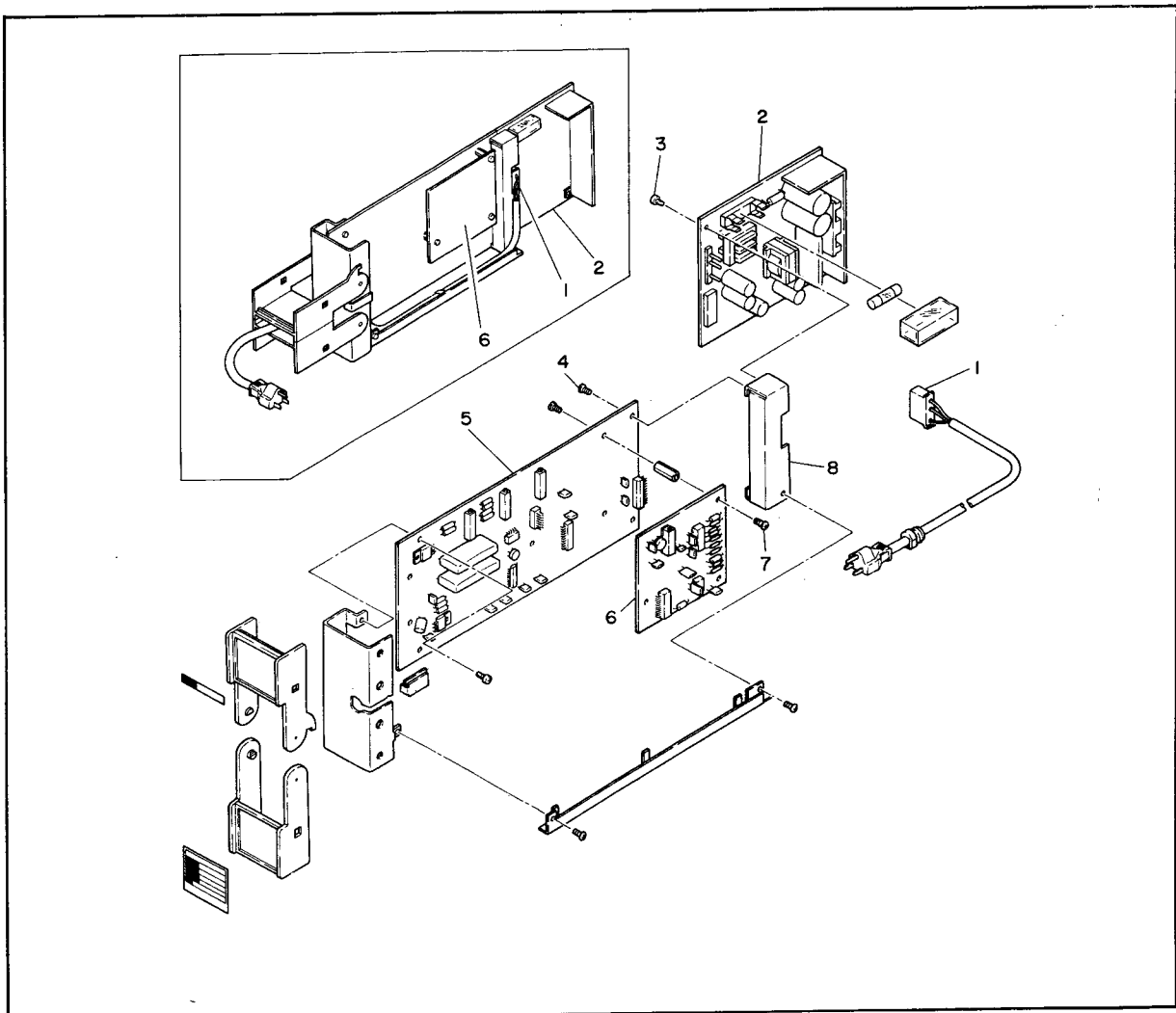
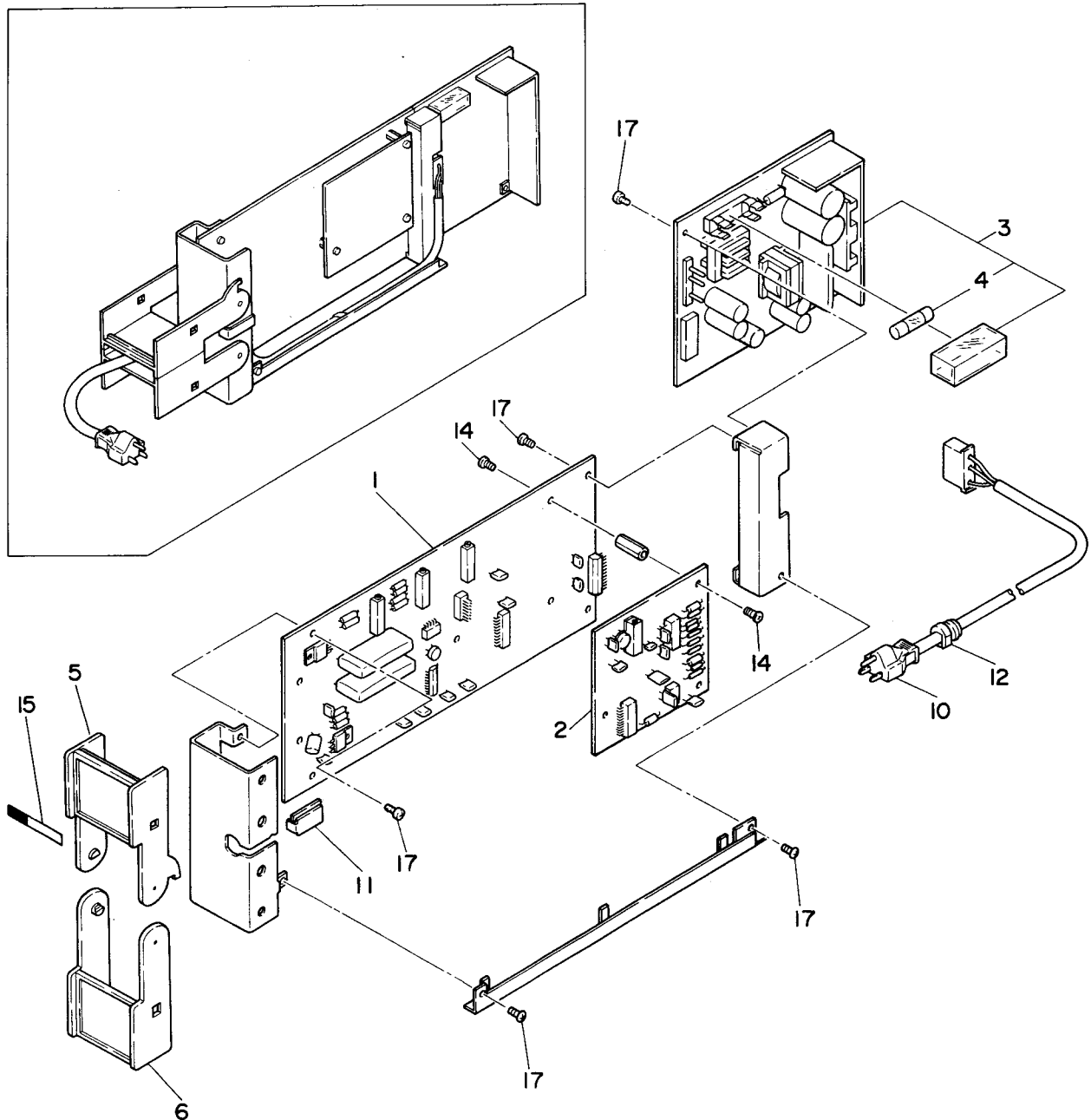


Figure 7-5. Disassembled View (SDBT-□ 11\*A).

# Parts List

YEW SERIES 80

Model SDBT  
POWER DISTRIBUTOR (For 1 Point)  
(Style B)



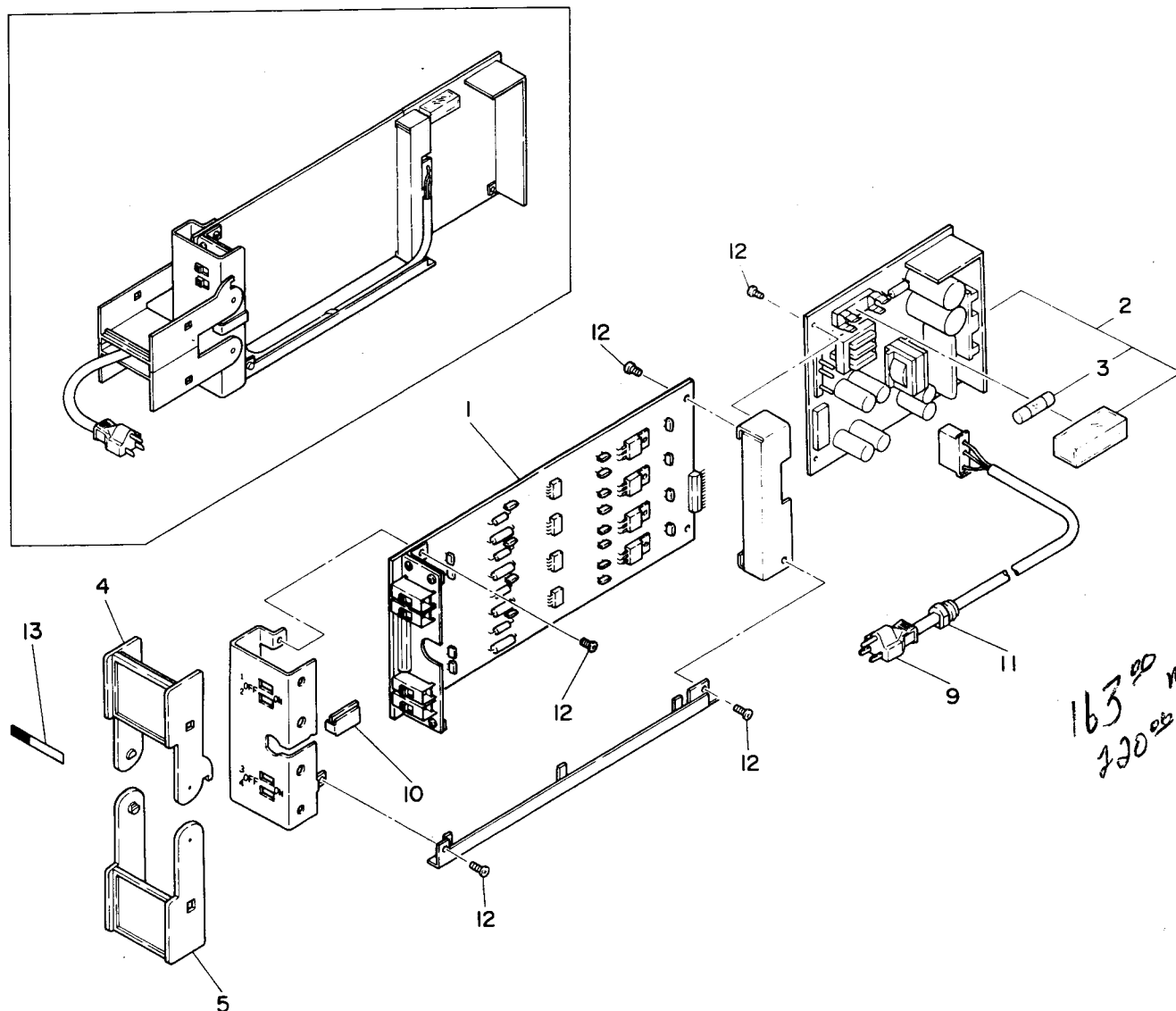
Item	Part No.	Model	Qty				Description
			SDBT-110	SDBT-111	SDBT-210	SDBT-211	
1	E9715AB	1	1				Main Card
	E9715AG			1	1		Main Card
2	E9715AE		1	1			SQRT Card
3	E9715YB	1	1	1	1		Power Supply Unit (for 100V Version)
	E9715YS	1	1	1	1		Power Supply Unit (for 220V Version)
4	S9510VK	1	1	1	1		Fuse — 1A
5	E9713CK	1	1	1	1		Cover
6	E9713CA	1	1	1	1		Cover
10	E9713EG	1	1	1	1		Cable Assembly (for 100V Version)
	E9713FS	1	1	1	1		Cable Assembly (for 220V Version)
11	E9713CE	1	1	1	1		Cover
12	S9079PB	1	1	1	1		Bushing
14	Y9306JB			6	6		Pan H. Screw, M3 x 6
15	Y9422NP	1	1	1	1		Tag No. Label (blank)
17	Y9306JB	8	8	8	8		Pan H. Screw, M3 x 6

# Parts List

YEW SERIES 80

Model SDBS

POWER DISTRIBUTOR (For 4 Points)



Item	Part No.	Qty	Description
1	E9715KA	1	Main Card
2	E9715YC	1	Power Supply Unit (for 100V Version)
	E9715YT	1	Power Supply Unit (for 220V Version)
3	S9510VK	1	Fuse - 1A
4	E9713CK	1	Cover
5	E9713CA	1	Cover
9	E9713EG	1	Cable Assembly (for 100V Version)
	E9713FS	1	Cable Assembly (for 220V Version)
10	E9713CE	1	Cover
11	S9079PB	1	Bushing
12	Y9306JB	8	Pan H. Screw, M3 x 6
13	Y9422NP	1-4	Tag No. Label (blank)

# Instruction Manual

YEW SERIES 80

## /TB POWER SUPPLY TERMINAL CONNECTIONS FOR RACK-MOUNTED INSTRUMENTS (Option)

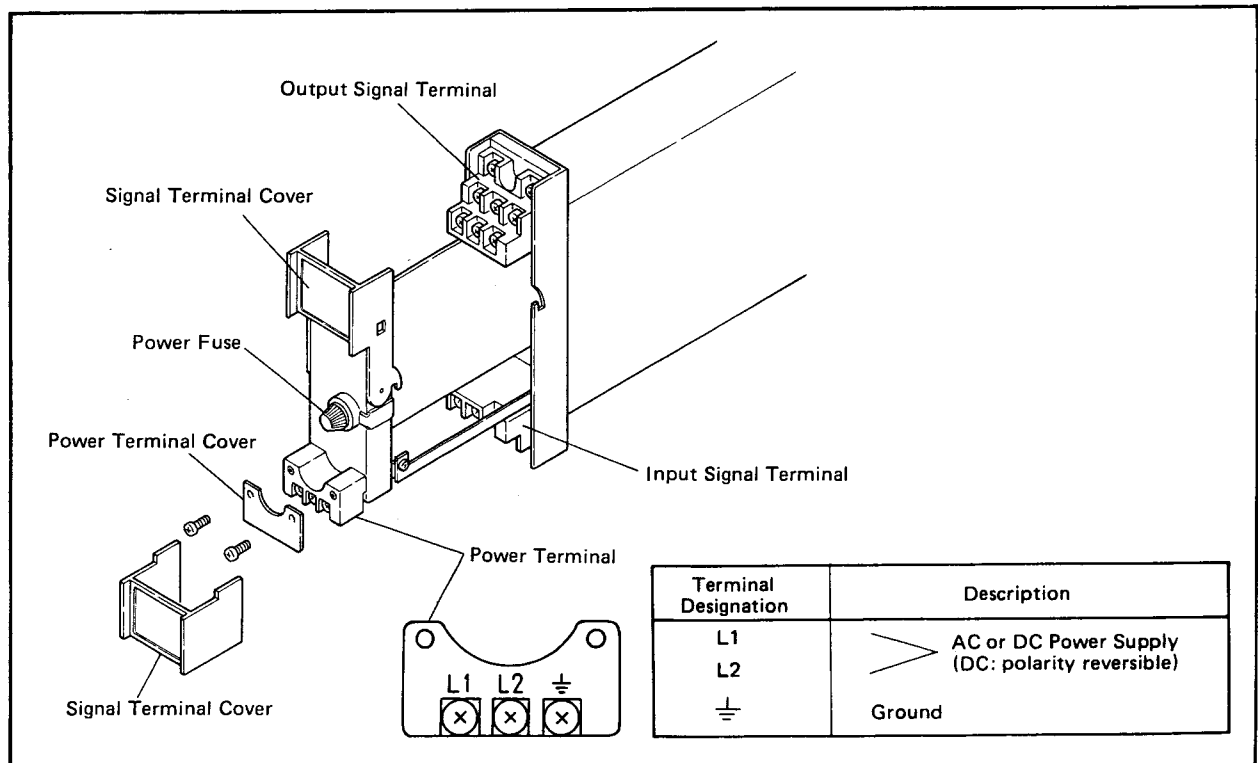
### 1. GENERAL.

If you specify the terminal board to which the power source is directly connected (suffix code /TB), the external wiring to the terminal board is necessary; therefore, drawing out of the inner chassis requires previous turning off of the power source and disconnection of the wiring from the terminal board.

### 2. APPLICABLE INSTRUMENTS.

Model	Description
STED	Emf- and RTS-to-Voltage Converter
SKYD	Alarm Unit
SALD	Emf- and RTS-Input Alarm Unit
SPLR	Programmable Computing Unit
SIND	Integrator
SISD	Isolator
SDBT	Power Distributor
SDBS	Power Distributor
SDBU-21	Power Distributor

### 3. EXTERNAL VIEW AND NAMES OF COMPONENTS.



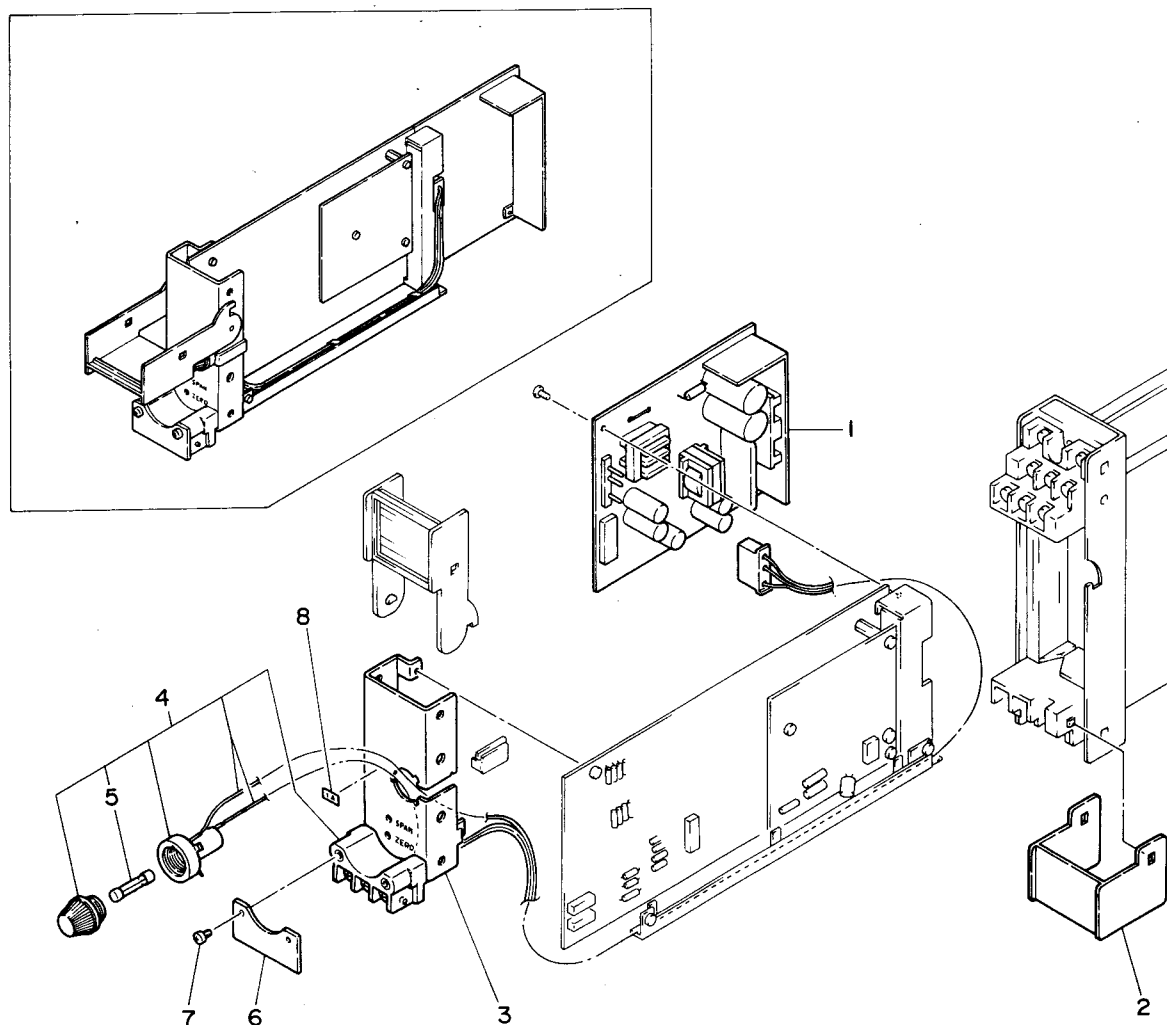
### 4. POWER SUPPLY AND GROUND WIRING.

- (1) All cable ends must be furnished with crimp-on type solderless lugs (for 4 mm screw).
- (2) Examples of applicable cables.  
Cross-sectional area of the cable conductor:  $2.0 \text{ mm}^2$ .  
Applicable cable:  
600 V vinyl insulated cable (IV), conforming to JIS C3307.  
Vinyle sheathed cables for electric appliances (KIV), conforming to JIS C3316.  
Note \*: Power supply cables should be determined from the instrument power consumption – they must have conductors with cross-sectional area of at least  $1.25 \text{ mm}^2$ .
- (3) Wirings to power supply and ground terminals should be made after completion of signal terminal wirings. (To facilitate connecting input signal, pull the internal instrument module approximately half way out of the housing. Do not remove the power terminal block.)
- (4) After completing the power supply and ground wiring, mount the power terminal cover.

# Parts List

## /TB POWER SUPPLY TERMINALS for RACK - MOUNTED INSTRUMENTS (Option)

YEW SERIES 80



Item	Part No.	Qty	Description
1	—	1	Power Supply Unit (see Table 1)
2	E9713CJ	1	Cover
3	—	1	Bracket (see Table 2)
4	E9713ET	1	Terminal Assembly
5	G9001ZF	1	Fuse (1 A)
6	E9713CV	1	Cover
7	Y9306JB	2	Pan H. Screw, M3 x 6
8	G9325EM	1	Label (1 A)

Table 1. Power Supply Unit Part Number.

Applicable Instruments	Power Supply Unit Part No.	
	100 V Version	220 V Version
SPLR, SIND	E9715YH	W9092JM
STED, SKYD, SALD SISD, SDBT	E9715YJ	W9092JN
SDBS	E9715YK	W9092JP
SDBU-21	E9715YK	—

Table 2. Bracket Part Number.

Applicable Instruments	Bracket Part No.
Model	
STED	E9713DS
SKYD, SPLR	E9713DN
SKYD-100	E9713DP
SALD	E9713DT
SDBT, SIND, SISD SDBU-21	E9713DL
SDBS	E9713DR