User's
Manual

YEWSERIES 80

# Model SDND (Style C)
# Power Supply Unit

IM 1B4T4-01E

YOKOGAWA ◆
Yokogawa Electric Corporation

IM 1B4T4-01E
9th 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.

(4) Reverse engineering such as the disassembly or decompilation of software is strictly prohibited.

(5) No portion of the software supplied by Yokogawa may be transferred, exchanged, leased or sublet for use by any third party without the prior permission of Yokogawa.

## ■ Force Majeure

(1) Yokogawa does not make any warranties regarding the product except those mentioned in the WARRANTY that is provided separately.

(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.

# CONTENTS

# 1. INTRODUCTION.

## 1-1. Inspection.

This unit has been thoroughly inspected at the factory before shipment. However, when you receive this unit:

(1) Inspect for visible damage.
(2) Confirm that the model and suffix codes shown on the shipping document and also on the nameplate at the rear of the unit are the same as your order sheet.
(3) Confirm that all accessories are present.

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

## 1-2. Scope of This Manual.

This instruction manual covers handling, external wiring, and simple maintenance procedures for the SDND Power Supply Unit.

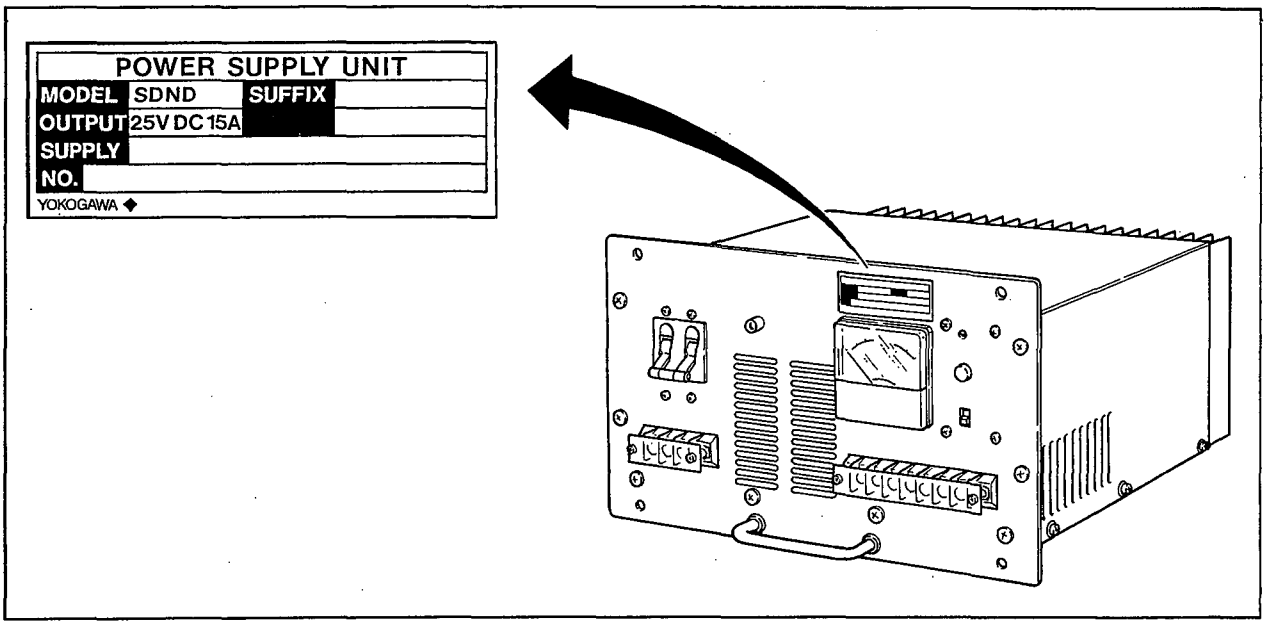



**Figure 1-1. Nameplate.**

# 2. GENERAL.

The SDND power supply unit is designed to supply a regulated 25 V DC power. When a battery back-up power supply system is configured, this unit serves as a battery charger. Major features of this unit are listed below:

- Compact/lightweight.
- Units may be connected in parallel.
- Can be mounted in a rack together with other rack-mount instruments.

## 2-1. Standard Specifications.

**Input Power Supply:** 80 to 138 V or 160 to 264 V AC, 47 to 63 Hz.

**Normal Output Voltage:** 25 V DC/27.3 V DC (Switched from the front panel)

**Rated Output Variable Range:**

When the switch position is 25 V DC;
23 to 26 V DC (for instrument drive)

When the switch position is 27.3 V DC;
Fixed to 27.3 V DC
(for instrument drive or battery charge)

**Rated Output Current:** 15 A.

**Overcurrent Protection:** Foldback circuit operates to limit the current at 17 A ±1 A.

**Alarm Output:** Single-pole double-throw (SPDT). Output relay is deenergized when output voltage drops (22 V ±1 V) or rises (30 V ±2 V), circuit breaker opens.

Alarm Contact Rating:
115 V AC, 1 A (resistive load).
30 V DC, 1 A (resistive load).

**Wiring:** Wires for power supply, ground, DC output, and alarm output are connected to terminal board, secured with ISO M4 (4 mm) terminal screws.

**Weight:** 12 kg.

**Max. Power Consumption:** 900 VA. (80 to 138 V AC)
1200 VA (160 to 264 V AC)

**Rush Current:** Maximum of approximately 5 times input.

## 2-2. Model and Suffix Codes.

| Model | Suffix Codes | | Description |
|---|---|---|---|
| SDND | . . . . . | | Power Supply Unit |
| | -0 . . . . . | | Always 0 |
| Power Supply | 3 . . . . . | | 160 to 264 V AC, 47 to 63 Hz |
| | 5 . . . . . | | 80 to 138 V AC, 47 to 63 Hz |
| | | 0 . . . | Always 0 |
| Style Code | | *C | Style C |

# 3. INSTALLATION AND WIRING.

## 3-1. Installation Conditions.

Select an area which:

(1) has a temperature between 0 and 50°C, but preferably below 40°C.
(2) has relative humidity between 5 and 90% R.H.
(3) is altitude below 1000 m.
(4) is not subject to direct sunlight.
(5) is free from mechanical vibration and corrosive gases.
(6) is sufficiently ventilated.

## 3-2. Installation.

This unit is mounted in a rack suitable for YEW-SERIES 80 rack instruments. Figure 3-1 shows the mounting method and rack construction, Figure 3-2 shows the mounting position.

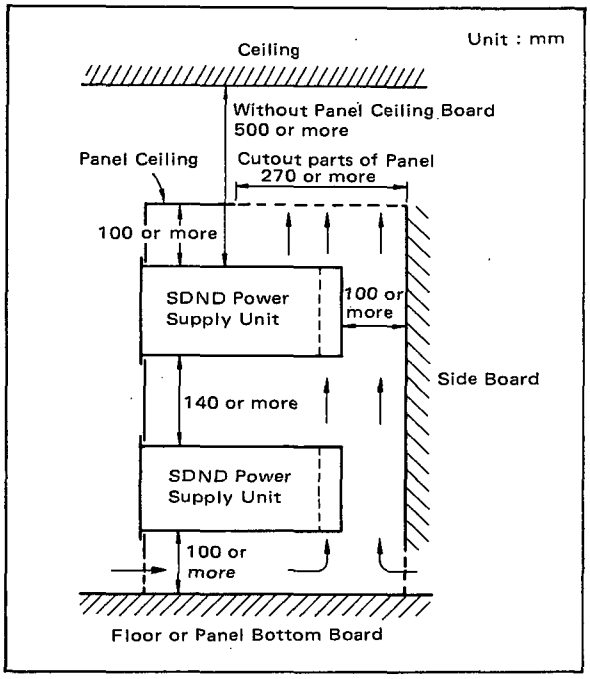



**Figure 3-2. SDND Mounting Position.**

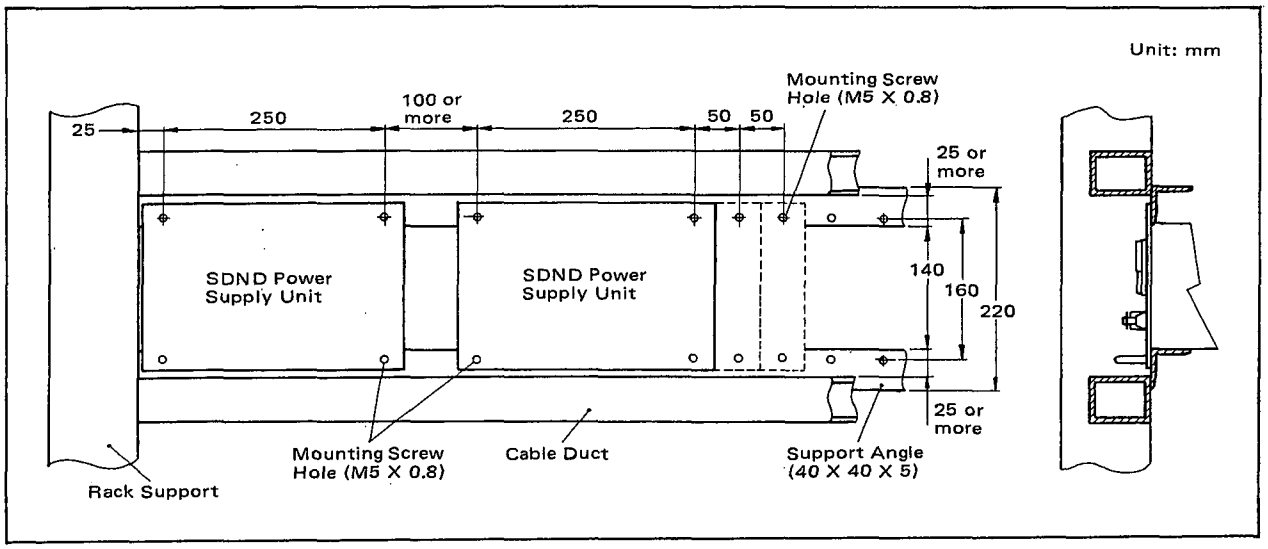



**Figure 3-1. SDND Mounting Dimensions and Rack Construction.**

## 3-3. Wiring.

**(1) Wiring Cautions.**

- Furnish all cable ends with crimp-on type solderless lugs (for 4 mm screws).
- It is recommended that cables with sufficient current carrying capacity such as those listed below be used.
  1. Power supply circuit: IV or KIV with a conductor cross-sectional area of 1.25 $mm^2$ or larger (yellow).
  2. Ground circuit: IV, KIV or VSF with a conductor cross-sectional area of 2.0 $mm^2$ or larger (green).
  3. Alarm circuit: IV, KIV or VSF with a conductor cross-sectional area of 0.5 $mm^2$ or larger.

  IV: 600 V vinyl insulated cable (JIS C3307)
  KIV: Vinyl insulated cable for electrical equipment (JIS C3316)
  VSF: Vinyl cable for devices (JIS C3306)

**Table 3-1. Terminal Connections.**

| Terminal Designation | Description |
|---|---|
| A, B | +, − : DC output (Note) |
| J, K, M | NO, C, NC : Abnormal, power failure / Normal operation; Closed, Closed : Alarm output |
| L1, L2 | AC power supply |
| ⏚ | Ground |

Note: Two each of DC output terminals A and B are provided.

**(2) DC Output Wiring.**

In order to avoid voltage drop due to leadwire resistance between the SDND and busbar, use dual cables as shown in Figure 3-3.

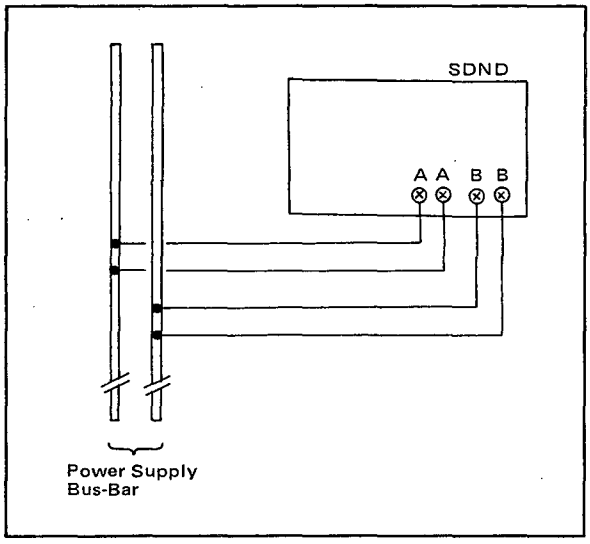



**Figure 3-3. DC Output Terminal Wiring.**

**(3) Ground Wiring (see Figure 3-4).**

1. To drive YS instruments:
   Connect the SDND to ground independently (JIS Class 3, ground resistance 100 Ω or less).
2. To drive ℐ Series instruments:
   - Connect the SDND ground terminal to the DC current output terminal B (system is grounded via SDND ground terminal).
   - For parallel operation, connect one ground terminal on either of the two units and the minus line of the DC power supply bus-bar to ground.

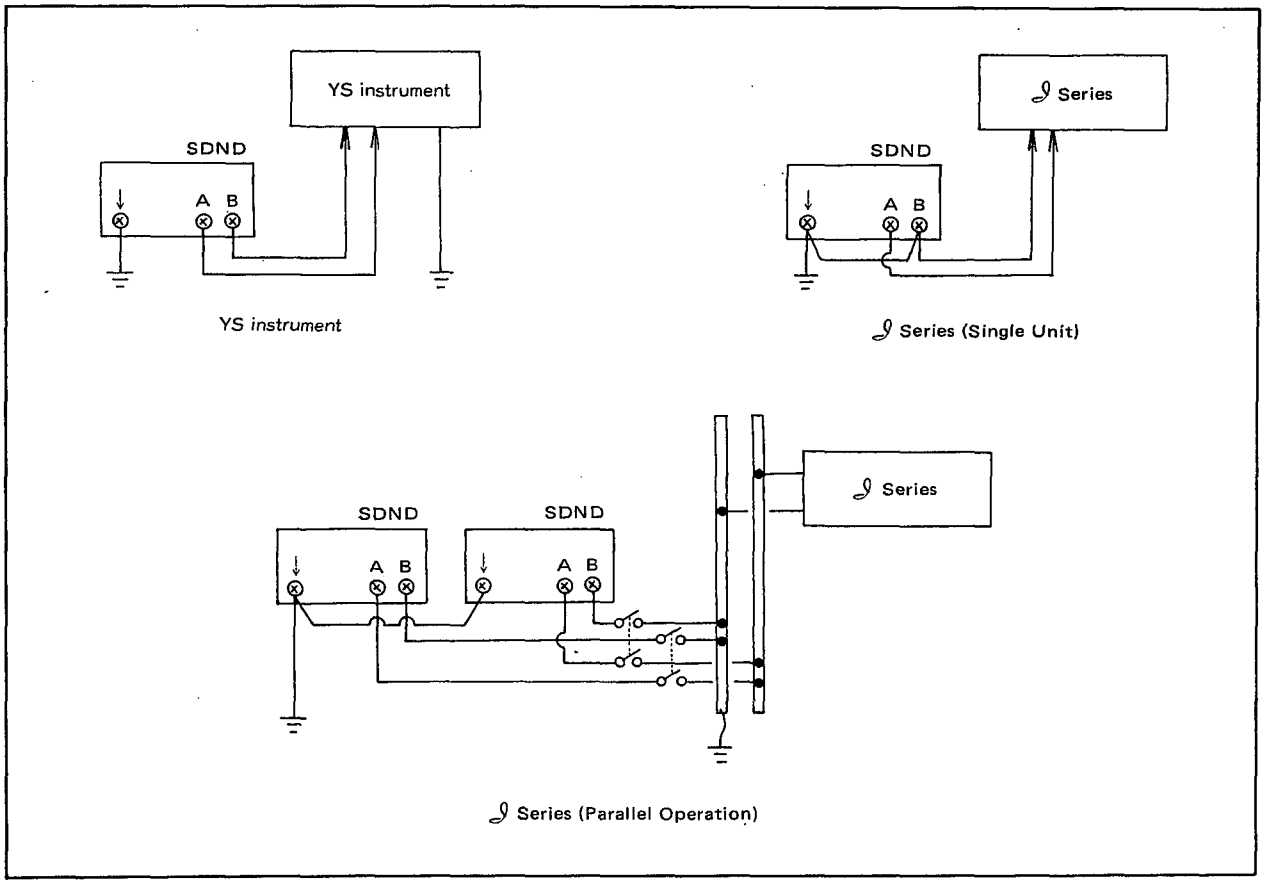



**Figure 3-4. Grounding the SDND and Control System.**

# 4. PRINCIPLES OF OPERATION.

The SDND Power Supply Unit receives a single phase 100 V or 200 V AC 50 or 60 Hz input and converts it to a DC power with a rectifier circuit. A high frequency switching circuit in this unit, then re-converts the DC to an AC voltage. Finally, a switching regulator converts this AC voltage to a regulated DC voltage.

The SDND provides a low voltage alarm circuit, overvoltage protection, and NFB trips alarms. Figure 4-1 shows the functional block diagram for this unit.

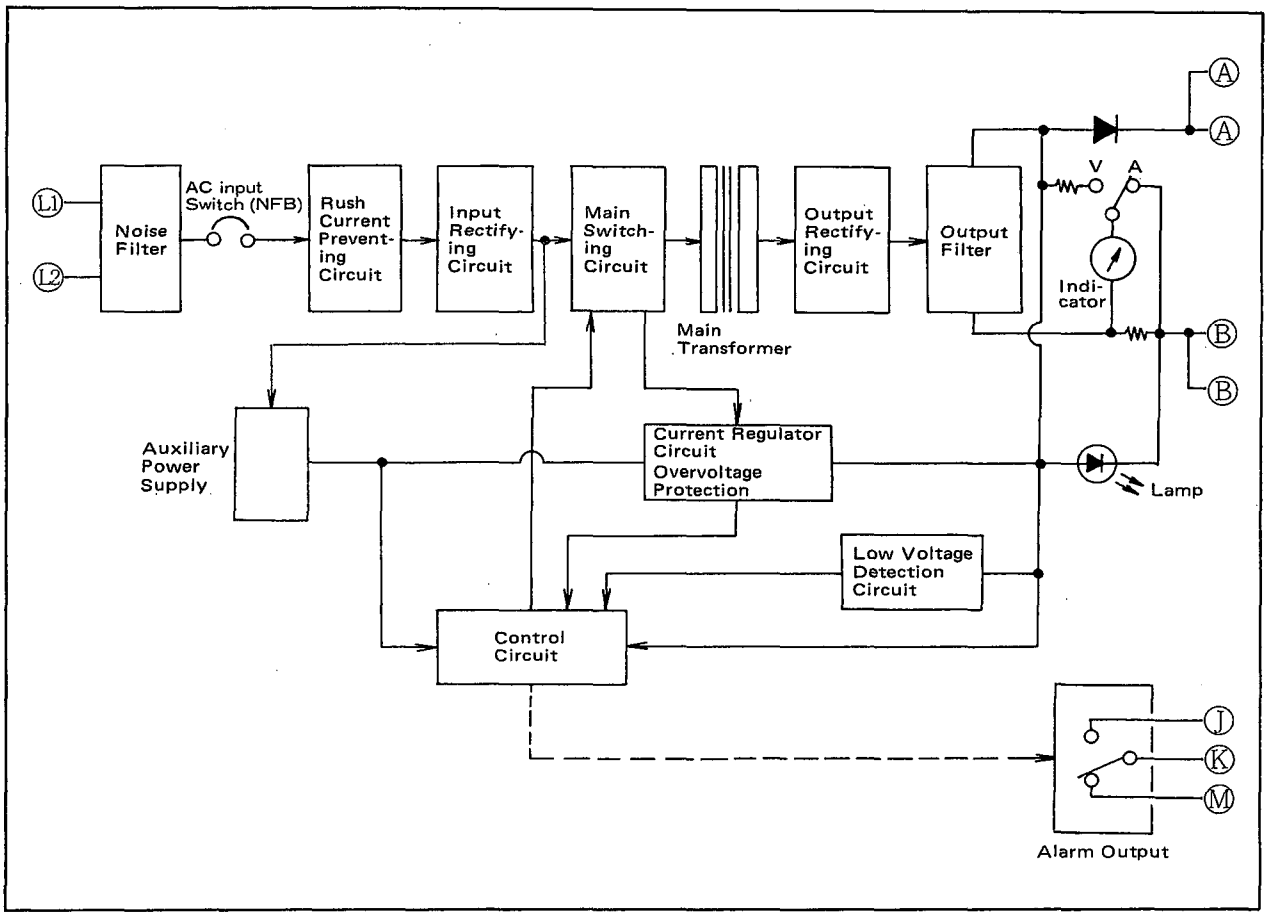



**Figure 4-1. Functional Block Diagram.**

# 5. OPERATION.

## 5-1. Names of Components.

Figure 5-1 shows the names of components.

(1) A green lamp (below DC OUTPUT) lights while SDND outputs a normal DC voltage.

(2) AC input switch (NFB) turns on and off AC input power supplies. The NFB automatically trips (shuts off) and issues an alarm when an AC input abnormally increases due to unit failure.

(3) The indicator with 0 to 20 A/0 to 35 V ranges – on the front panel of the unit – normally reads output current. When the VOLTAGE CHECK button is pressed, the pointer indicates output voltage.

(4) The OUTPUT ADJUST is used to adjust DC output voltages. (This adjustment has been adjusted at the factory before shipment.)

## 5-2. Test Run.

(1) Before operating, confirm that the unit receives an AC input.

(2) Turn all external output switches OFF, so the SDND output is open.

(3) Turn the AC input switch (NFB) ON and DC OUTPUT lamp lights.

(4) Press the VOLTAGE CHECK button located on the front panel to confirm that the indicator pointer reads approximately 25 V.

(5) Turn the AC input switch (NFB)

## 5-3. Operation.

(1) Check for the reception of AC input voltage.

(2) Turn all external output switch ON.

(3) Turn the AC input switch (NFB) ON. (see Note below.)

Note: If the rush current from the instrument is too large, an alarm may be issued as the output drops rapidly.

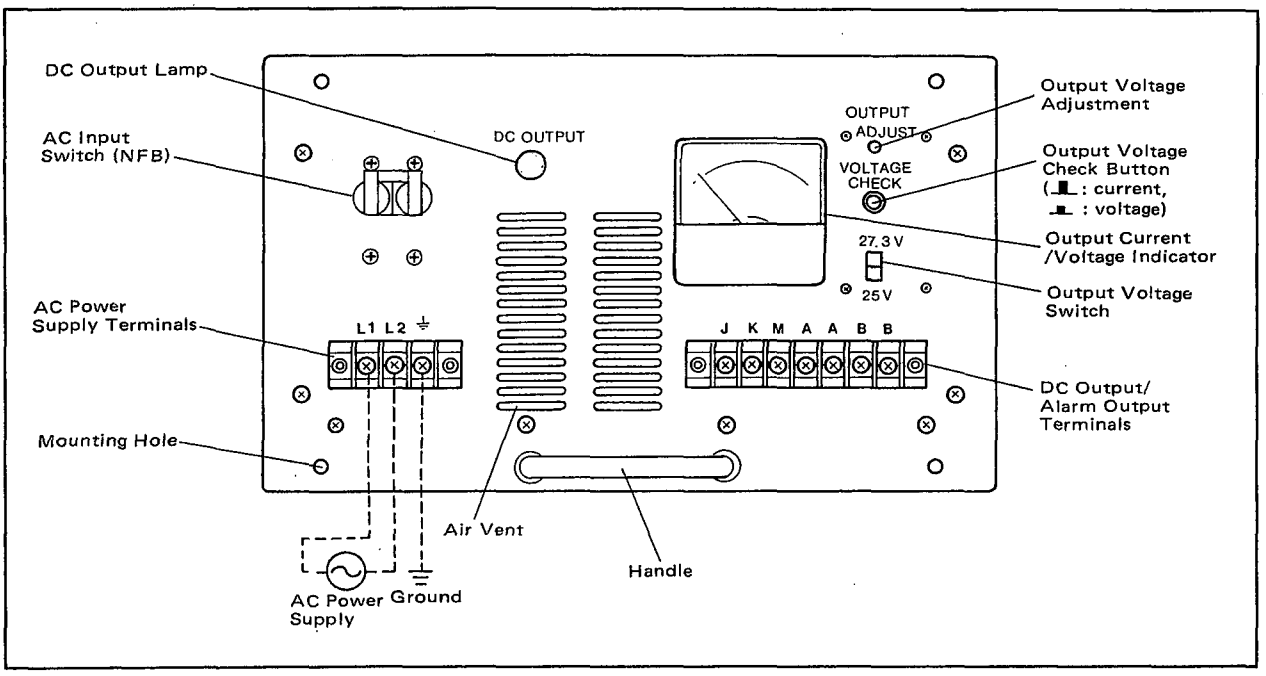



Figure 5-1. Names of Components.

## 5-4. Connecting SDNDs in Parallel.

### 5-4-1. Wiring and Selecting the NFB.

The standard SDND can be connected up to four units in parallel. (Figure 5-2.) Refer to Table 5-2 for the NFB rating (input side) when SDNDs are connected in parallel. Do not use instant-trip type NFB switches for this configuration.

If the output current is not distributed evenly to each unit, adjust the OUTPUT ADJUST until all output currents are approximately equal.

### 5-4-2. Initiating Operation.

(1) Turn all SDND AC input switches (NFB) ON.
(2) Turn all external output switches ON (see Note below.)
(3) Turn NFB (input side) ON.

Note: If rush current from the instrument is too large, perform the procedure given in Paragraph 5-3.

## 5-5. Alarm Check.

The SDND issues alarm contact signals when AC input power fails, AC input switch is OFF, or an abnormality occurs in the SDND unit. Table 5-2 shows alarm contact outputs.

**Table 5-2. Alarm Contact Output.**

| Terminal Designation / SDND Status | J – K | K – M |
|---|---|---|
| AC input power failure | Closed | Open |
| AC input switch OFF (Note) | Closed | Open |
| SDND abnormal (Note) | Closed | Open |
| *Normal operation* | *Open* | *Closed* |

Note: SDND abnormality means the following conditions.
a. Output voltage is too low (22 V ±1 V or below).
b. Output voltage is too high (30 V ±2 V or above).
c. Rush current protecting circuit failure.

DC output voltage is shut down, if one of the abnormalities (b) to (c) above occurs. An alarm is issued after 2 to 5 seconds from occurrence of the abnormality. The AC input switch automatically trips (turns off) when input current increases due to SDND failure.

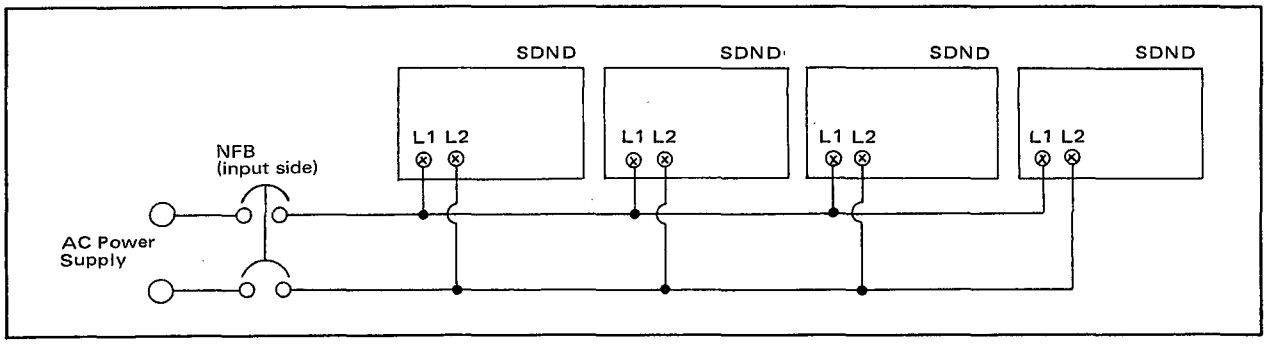



**Figure 5-2. Connecting SDNDs in Parallel.**

**Table 5-1. NBF Rating.**

| Number of Parallel Unit | Single | Dual | Triple | Quadruple |
|---|---|---|---|---|
| NFB rating (input side) | 20 A | 30 A | 50 A | 60 A |

# 6. MAINTENANCE.

## 6-1. Maintenance and Checks.

### 6-1-1. Table of Maintenance Check.

To maintain the SDND in good operating conditions, it is important to perform correct maintenance checks. Table 6-1 shows the recommended maintenance check procedures.

**Table 6-1. Recommended Maintenance Check Procedures.**

| Check Points | Interval of Checks | | | Criteria | Check Method |
|---|---|---|---|---|---|
| | Daily | 3 Months | 12 Months | | |
| Output Voltage Indicator | O | O | O | Should read approx. 25 V against the rated input/output. | Press the VOLTAGE CHECK button to read the pointer. |
| Indicator Lamp | O | O | O | The green DC OUTPUT lamp must light. | Check that the indicator lamp lights. |
| Abnormal Sound & Smell | O | O | O | No abnormal sound and smell must be recognized in the power supply unit during operation. | Check for abnormal sound and burning smell in the unit. |
| Cleaning | | | O | Must be clean. | Clean other components as necessary. |
| Indicator Check | | | O | Output voltage indicator must read any value within tolerance of 0.9 V. | Confirm the indicator value while measuring the voltage between output terminals. |

## 6-2. Output Voltage Adjustment and Selection.

### 6-2-1. Output Voltage (25 V) Adjustment.

If the output voltage is not specified value, connect a voltmeter as shown in Figure 6-2 and adjust it by turning the OUTPUT ADJUST. A Model 2506 digital voltmeter (manufactured by Yokogawa) is recommended for this adjustment.

### 6-2-2. Output Voltage Selection.

When a 27.3 V output is required (e.g. for battery recharge), set the output select switch to 27.3 V.

Note: The OUTPUT ADJUST is used for 25 V output adjustment. 27.3 V output is not adjustable.

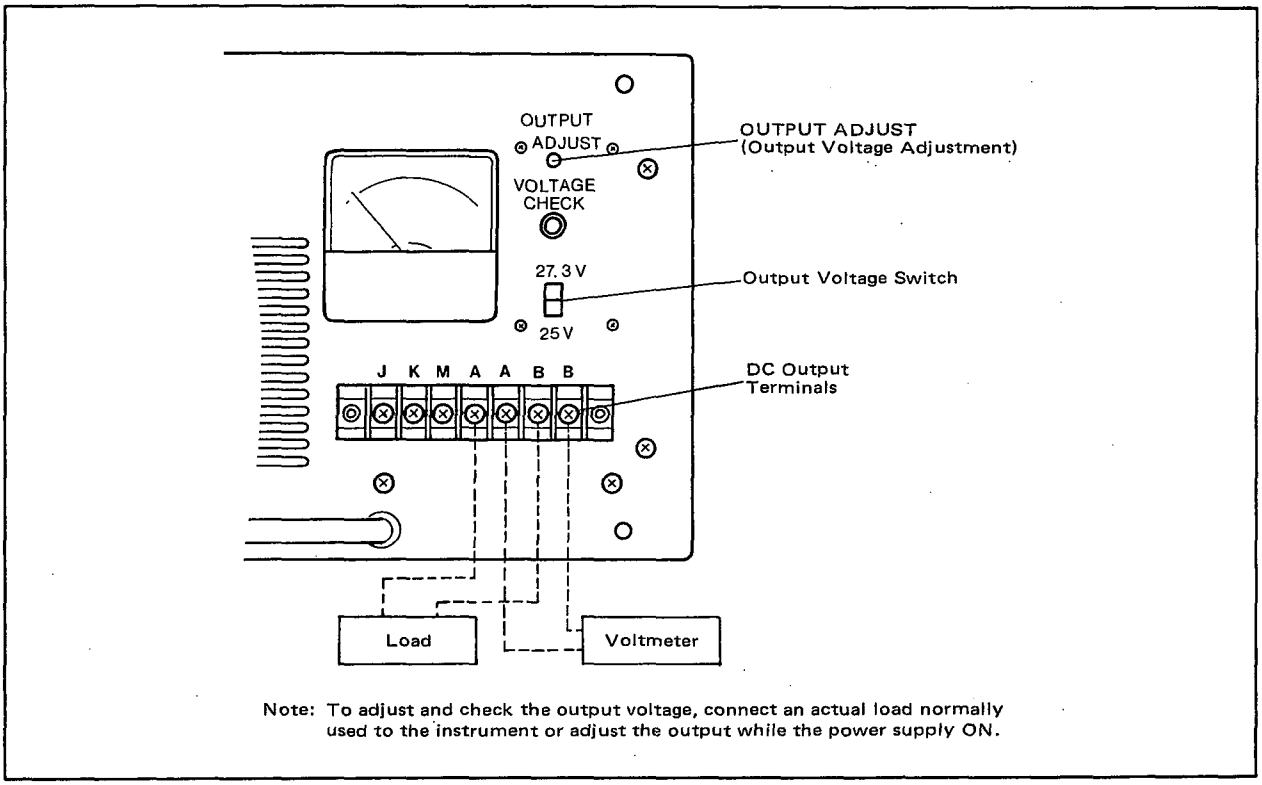



**Figure 6-2. Output Voltage Adjustment.**

## 6-3. Overhaul

Recommended overhaul period:

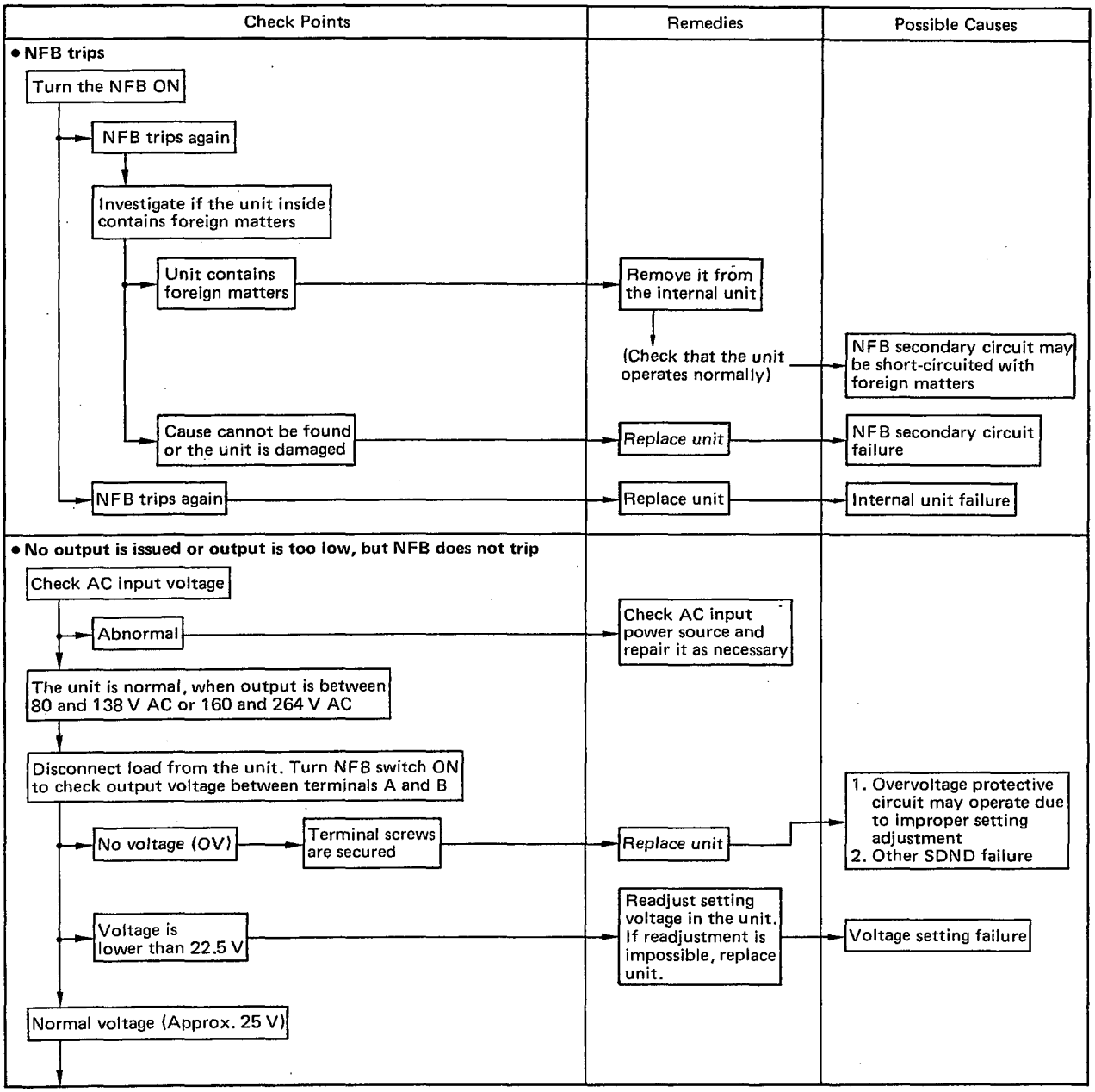
About 8 years

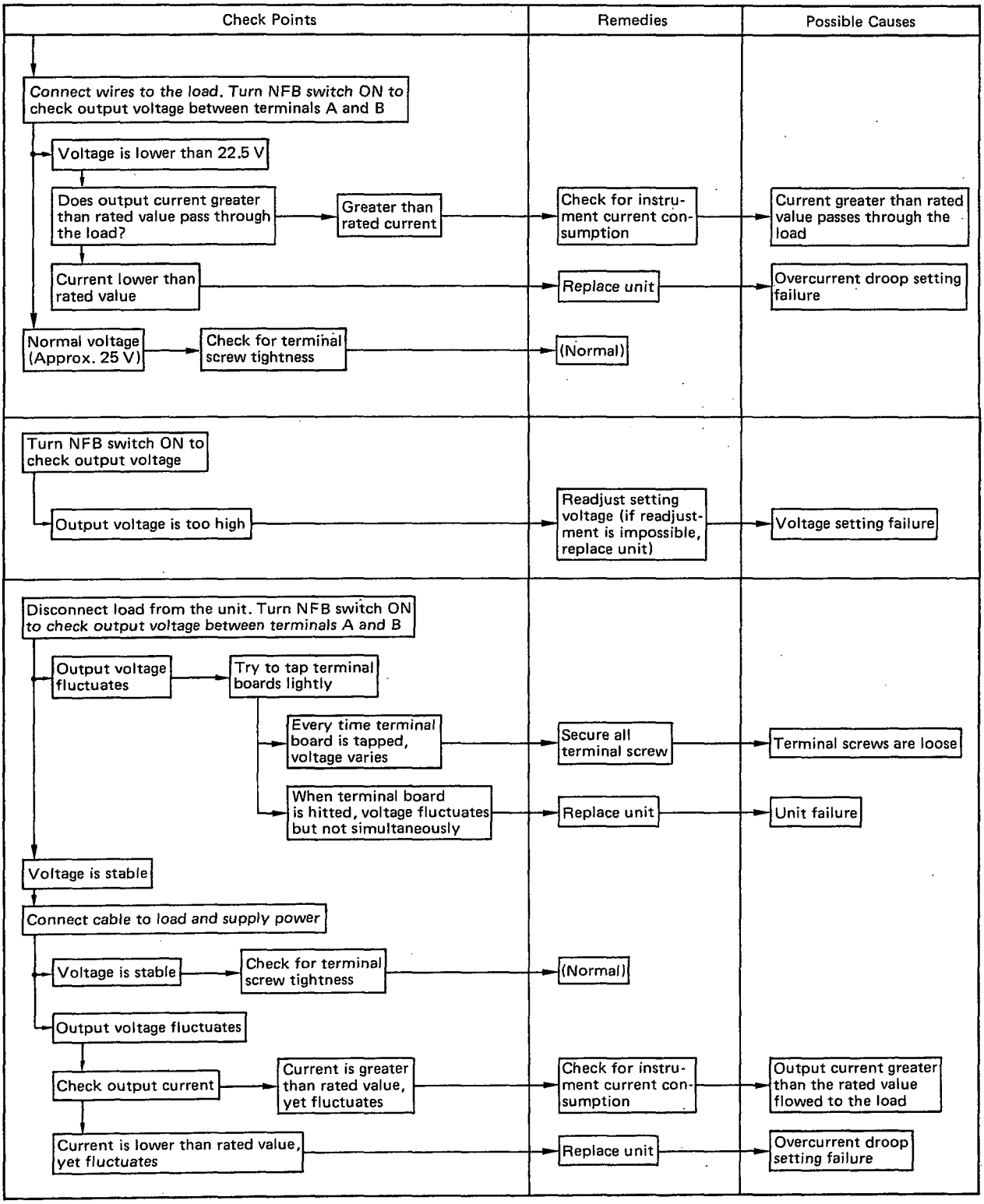
To maintain the SDND in good condition, we recommend periodical overhauls. Please contact your nearest Yokogawa service office for overhaul.

# 7. TROUBLESHOOTING.

If an abnormality occurs in the unit, carefully check, isolate, and remedy troubles by referring to the following flowcharts. For SDND units connected in parallel and battery back up systems, disconnect the SDND from the power line.

- **Troubleshooting Flowcharts.**

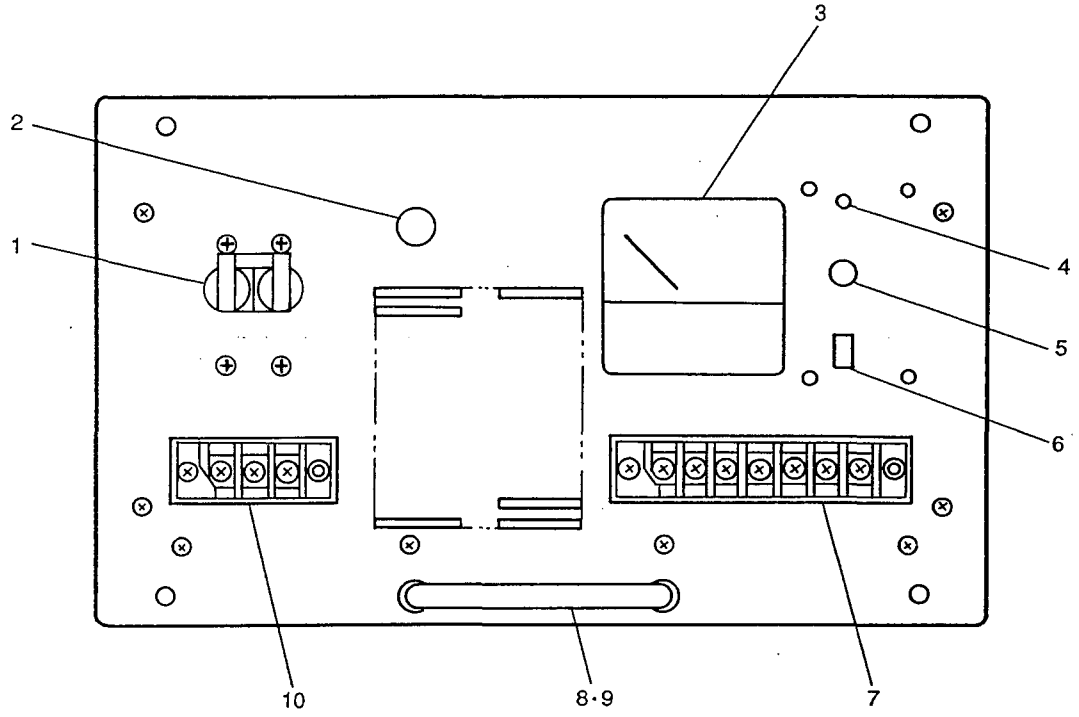



Check Points
Remedies
Possible Causes
Connect wires to the load. Turn NFB switch ON to check output voltage between terminals A and B
Voltage is lower than 22.5 V
Does output current greater than rated value pass through the load?
Greater than rated current
Check for instrument current consumption
Current greater than rated value passes through the load
Current lower than rated value
Replace unit
Overcurrent droop setting failure
Normal voltage (Approx. 25 V)
Check for terminal screw tightness
(Normal)
Turn NFB switch ON to check output voltage
Output voltage is too high
Readjust setting voltage (if readjustment is impossible, replace unit)
Voltage setting failure
Disconnect load from the unit. Turn NFB switch ON to check output voltage between terminals A and B
Output voltage fluctuates
Try to tap terminal boards lightly
Every time terminal board is tapped, voltage varies
Secure all terminal screw
Terminal screws are loose
When terminal board is hitted, voltage fluctuates but not simultaneously
Replace unit
Unit failure
Voltage is stable
Connect cable to load and supply power
Voltage is stable
Check for terminal screw tightness
(Normal)
Output voltage fluctuates
Check output current
Current is greater than rated value, yet fluctuates
Check for instrument current consumption
Output current greater than the rated value flowed to the load
Current is lower than rated value, yet fluctuates
Replace unit
Overcurrent droop setting failure

# Customer Maintenance Parts List

## Model SDND (Style C) Power Supply Unit

YEWSERIES 80

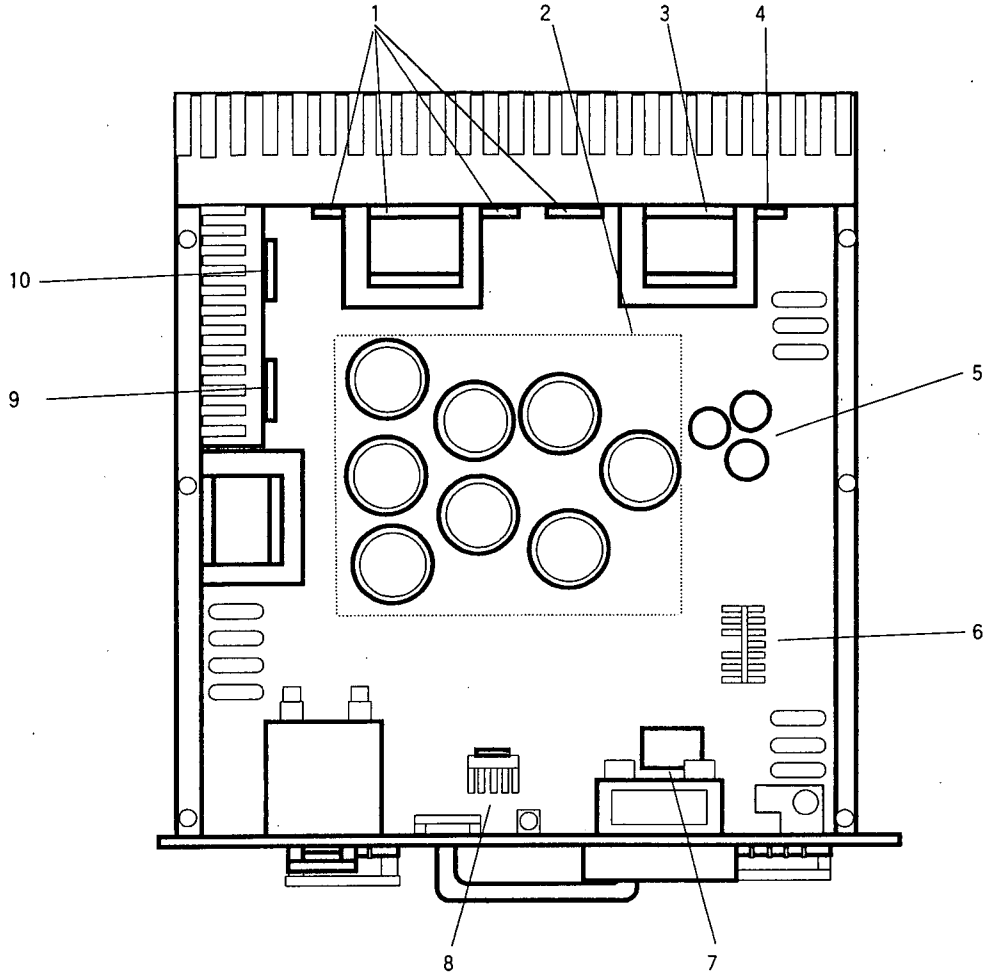



| Item | Part No. | Description |
|---|---|---|
| 1 | BAB2215313 | Switch |
| 2 | GL5EG8T | Indicator |
| 3 | 209310 | Meter |
| 4 | TM065PH10K Ω | Variable Resister |
| 5 | MB-2011H | Push Button Switch |
| 6 | T400040 | Slide Switch |
| 7 | UF2038BP-7P | Terminal Board |
| 8 | 3404A | Handle |
| 9 | 3452 | Washer |
| 10 | UF2038BP-3P | Terminal Board |



YOKOGAWA ◆

CMPL 1B4T4-02E
3rd Edition: May 2004(KP)




| Item | Part No. | Description |
|---|---|---|
| 1 | 2SK2197 | Transistor |
| 2 | KMM250VNSN1500M-35F | Capacitor |
| 3 | D20LC20U | Diode |
| 4 | S20LC40 | Diode |
| 5 | KMF35VB-4700M | Capacitor |
| 6 | S60SC4M | Diode |
| 7 | LZ-12WS-K-UC | Relay |
| 8 | 2SD1410 | Transistor |
| 9 | SM25J51 | Triac |
| 10 | D25XB60 | Diode |

YOKOGAWA ◆

Yokogawa Electric Corporation


**YOKOGAWA ELECTRIC CORPORATION**
**Network Solutions Business Div.**
2-9-32, Nakacho, Musashino-shi, Tokyo, 180-8750 JAPAN
Phone: +81-422-52-7179 Facsimile: +81-422-52-6793
***Sales Branch Offices***
Tokyo, Nagoya, Osaka, Hiroshima, Fukuoka

**YOKOGAWA CORPORATION OF AMERICA**
**Headquaters**
2 Dart Road, Newnan, GA. 30265-1094 U.S.A.
Phone: +1-770-253-7000 Facsimile: +1-770-251-0928
**Sales Branch Offices** / Texas, Chicago, Detroit, San Jose

**YOKOGAWA EUROPE B. V.**
**Headquaters**
Databankweg 20, 3821 AL Amersfoort THE NETHERLANDS
Phone: +31-334-64-1611 Facsimile: +31-334-64-1610
**Sales Branch Offices** / Houten (The Netherlands), Wien (Austria), Zaventem (Belgium), Ratingen (Germany), Madrid (Spain), Bratislava (Slovakia), Runcorn (United Kingdom), Milano (Italy), Velizy villacoublay(France), Johannesburg(Republic of South Africa)

**YOKOGAWA AMERICA DO SUL S.A.**
**Headquarters & Plant**
Praca Acapulco, 31-Santo Amaro, Sao Paulo/SP, BRAZIL CEP-04675-190
Phone: +55-11-5681-2400 Facsimile: +55-11-5681-4434

**YOKOGAWA ENGINEERING ASIA PTE. LTD.**
**Head office**
5 Bedok South Road, Singapore 469270 SINGAPORE
Phone: +65-6241-9933 Facsimile: +65-6241-2606

**YOKOGAWA ELECTRIC KOREA CO., LTD.**
**Seoul Sales office**
395-70, Shindaebang-dong, Dongjak-gu, Seoul,156-010, KOREA
Phone: +82-2-3284-3000 Facsimile: +82-2-3284-3019

**YOKOGAWA TAIWAN CORPORATION**
**Head office**
17F, No.39, Sec. 1, Chung Hwa Road Taipei, 100 TAIWAN
Phone: +886-2-2314-9166 Facsimile: +886-2-2314-9918

**YOKOGAWA AUSTRALIA PTY. LTD.**
**Head office**
Centrecourt D1, 25-27 Paul Street North, North Ryde, N. S. W. 2113, AUSTRALIA
Phone: +61-2-9805-0699 Facsimile: +61-2-9888-1844

**YOKOGAWA INDIA LTD.**
**Head office**
40/4 Lavelle Road, Bangalore, 560 001, INDIA
Phone: +91-80-227-1513 Facsimile: +91-80-227-4270

**LTD. YOKOGAWA ELECTRIC**
Grokholskiy per. 13, Build. 2, 4th Floor, 129010, Moscow, RUSSIA FEDERATION
Phone: +7-095-737-7868 Facsimile: +7-095-737-7869