# User's Manual

YEWSERIES 80

# SCIU
# Communication Interface Unit

IM 1B4V2-01E

YOKOGAWA
Yokogawa Electric Corporation

IM 1B4V2-01E
5th 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.

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

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# CONTENTS



FD No.10002-S

# 1. SAFEGUARDS ON HANDLING

This instrument was thoroughly tested at the factory before shipment. When this instrument is delivered, visually check its appearance and confirm that there is no damage. Also check that a spare fuse is attached as a standard accessory.

This chapter describes the safeguards necessary for handling the instrument.

## 1.1 Checking Model and Suffix Codes

The model and suffix codes are marked on the name plate affixed to the front of the instrument. Confirm that this product is as specified in the purchase order by comparing the model and suffix codes on the name plate with those described in section 2.4 and the purchase order.

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

## 1.2 Contents of the Instruction Manual

This instruction manual covers operation, external wiring, simple maintenance procedures and others. For the installation procedures and wiring safeguards, see instruction manual, IM 1B4F2 - 01E, "Installation of Rack - Mounted Instruments."

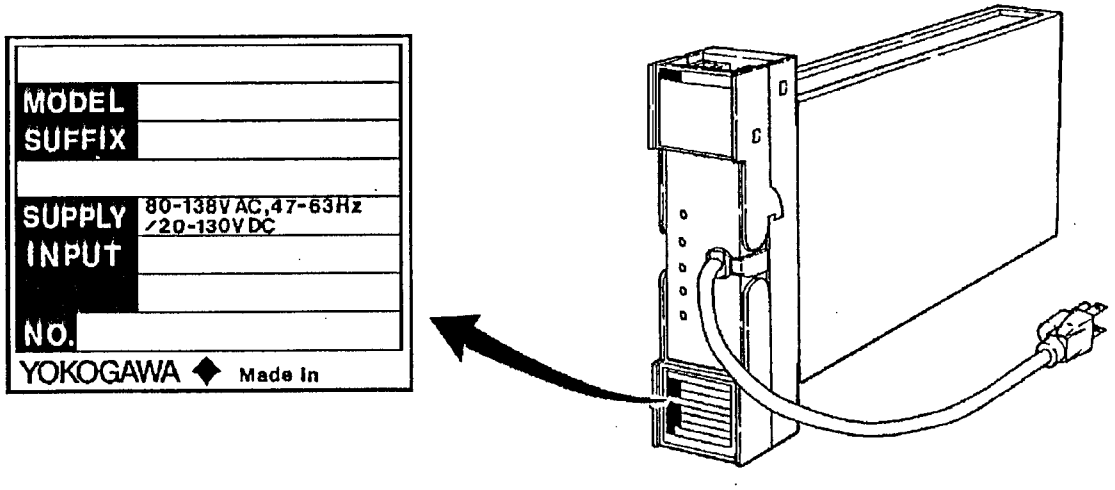



**Figure 1.1 Name Plate**

# 2. OUTLINE

Model SCIU is a communication interface unit which enables a personal computer to carry out a concentrated monitoring of YewSeries 80 instruments. The YewSeries 80 instruments (with communication functions in supervisory systems) can communicate with a personal computer via an RS-485 or RS-232-C interface.

A personal computer can acquire from or set data to YewSeries 80 instruments using simple messages as, for example, DG: Data Get (which means data acquisition).

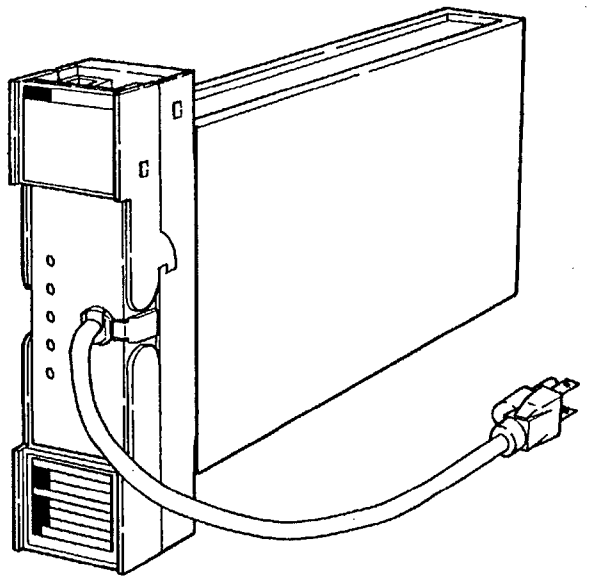


**Figure 2.1 External View**

# 2.1 Standard Specifications

## Communication Specifications

**Communication Interface:**
RS-485 or RS-232-C (specified in the Model and Suffix Codes)
**Transmission Control Procedure:**
TTY procecure
**Connection** : Point to point
**Synchronization** : Asynchronous operation
**Transmission Speed (Baud Rate):**
300, 600, 1200, 2400, 4800, or 9600 bps
**Communication System:**
Half-duplex
**Communication Code:**
ASCII 7 bit code or 8 bit code
**Text Structure:** Single block
**Maximum Number of characters:**
350 bytes (including CR and LF)
**Stop Bit:** 1 or 2 bits
**Error Detection:** Vertical Parity (even or odd)
**Bit-Transmission Sequence:**
Lower-order leading bit first
**Distance between SCIU and a Personal Computer:**
1200 m or less with an RS-485 interface
15 m or less with an RS-232-C interface

## Communication Functions

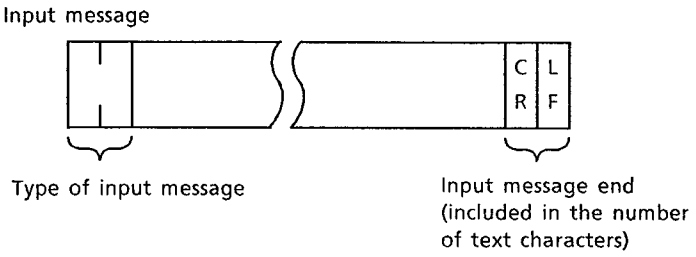
(1) **Communication Commands**
Data acquisition and data setting commands, and SCIU status - communication commands (the WDT time setting message, specifications for communications with a supervisory system, instruction to return data compression, and return timing adjustment message)

(2) **Data Acquisition / Setting Objectives**
Data from YewSeries 80 instruments (communicable data in the instruments with communication functions such as setpoints, process variables, manipulated variables, PID parameters, output limit values, loop status, etc.)
Refer to 3.5 Communication Data List.

## General Functions

The SCIU converts the "data set" and "data get" commands from the computer to a YewSeries format. The computer may set and read YewSeries instrument modes, process data, and SCIU status information.

### Communication Message Format




### Installation

**Installation:** Mounted on a rack installed indoors

**Signal Connection:**
Terminal connections with ISO M4 (4mm) screws

**Power Connection:**
Grounded three - prong plug or terminal connection with ISO M4 (4mm) screws

**External Dimensions:**
(Height x width x depth from the mounting face) 180 x 48 x 300 (mm)

**Weight:** About 1.8 kg (including the rack case)

## 2.2 Basic Performance

**Power Consumption:**
17 VA for 100 V AC
22 VA for 220 V AC

**Max. Operating Current:**
240 mA for 24 V DC

**Insulation Resistance:**
100 M Ω / 500 V DC between communication line, power supply and ground

## 2.3 Normal Operating Conditions

**Ambient Temperature:** 0 to 50°C

**Ambient Humidity:** 5 to 90% R.H. (above the dew point)

**Supply Voltage:** Either DC or AC voltages can be supplied.

- 100 V specifications
  DC drive: 20 to 130 V, no polarity
  AC drive: 80 to 138 V, 47 to 63 Hz
- 200 V specifications
  DC drive: 120 to 340 V, no polarity
  AC drive: 138 to 264 V, 47 to 63 Hz

# 2.4 Model and Suffix Codes

| Model | Suffix code | Style code | Optional codes | Description |
|---|---|---|---|---|
| SCIU | | | | Communication Interface Unit |
| Supervisory communication | -1<br>-2 | | | RS-485<br>RS-232C (terminal connection) |
| | 0 | | | Always 0 |
| | 0 | | | Always 0 |
| Style code | | *E | | Style E |
| Optional specifications | | | /A2ER<br>/TB<br>/NHR | 220 V system power supply (Plug connection)<br>Power terminal model<br>Rack case ordered separately |

# 2.5 Optional Specifications

/A2ER: 220 V system power supply

/NHR: Rack case in a separate order where the case is ordered separately and thus, only the internal assembly is procured.

/TB: Power terminal model

# 2.6 Accessory

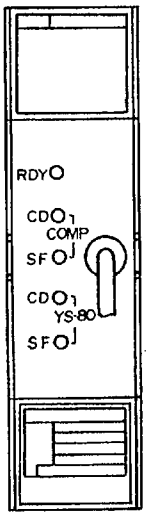
One 1 A fuse

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

# 3. FUNCTIONS

## 3.1 Components

Figure 3.1 shows the components:




Front View

| Lamp name | Significance when lit |
|---|---|
| RDY | The SCIU is in a state where normal operation is permitted. |
| COMP CD | Receiving signals from a personal computer |
| COMP SF | Transmitting signals to a personal computer |
| YS-80 CD | Receiving signals from a YewSeries 80 instrument |
| YS-80 SF | Transmitting signals to a YewSeries 80 instrument |

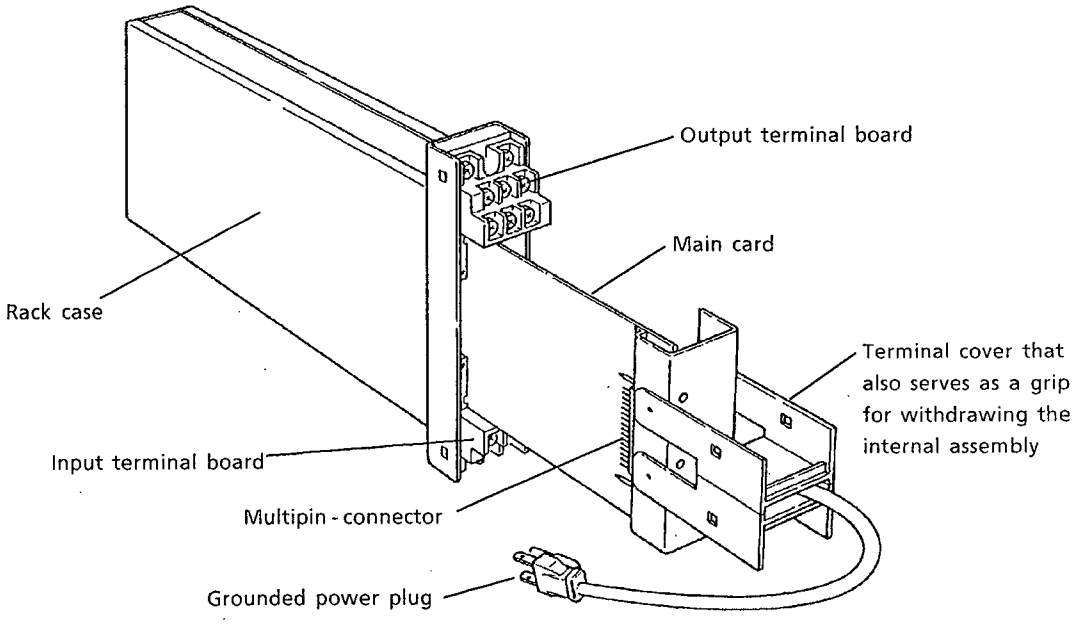



**Figure 3.1 Components**

# 3.2 Communication System Configuration

Up to 16 SCIUs for an RS - 485 interface or one SCIU for an RS - 232 - C interface can be connected to a personal computer. Each SCIU can connect up to four YewSeries 80 instruments.

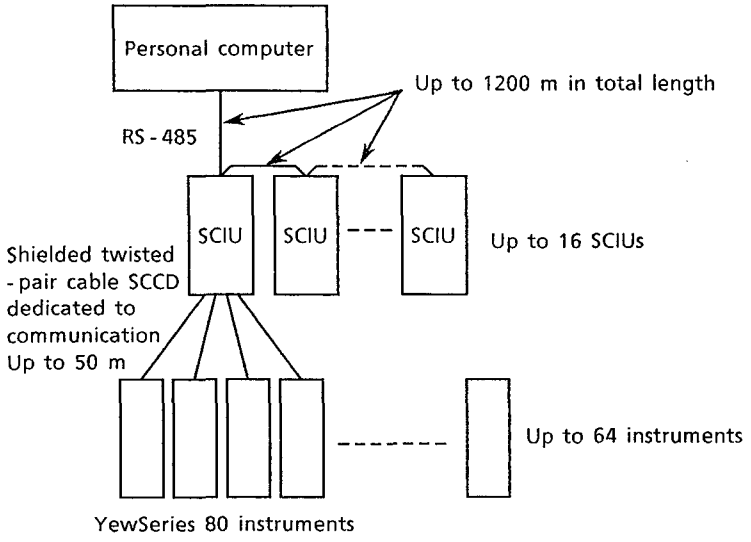



**Figure 3.2 Communication System Configuration (RS - 485)**

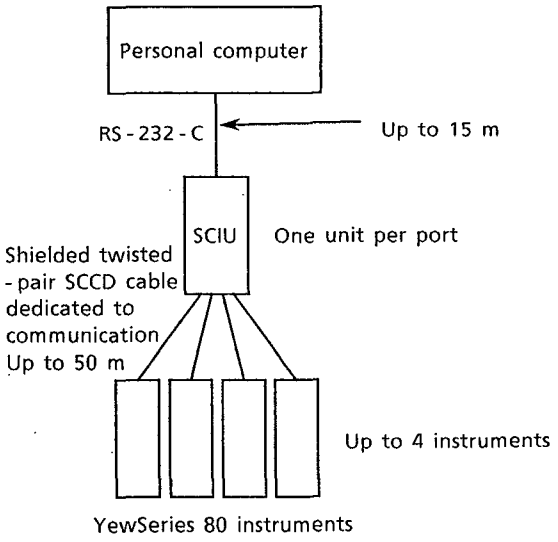
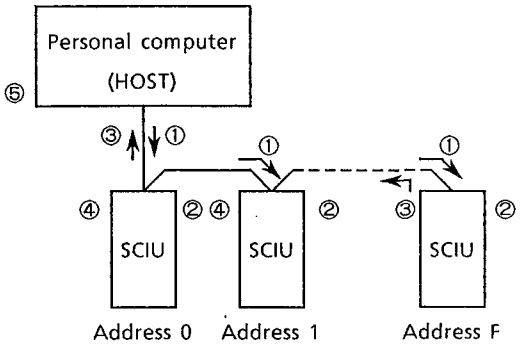



**Figure 3.3 Communication System Configuration (RS - 232 - C)**

# 3.3 Transmission Control Procedure

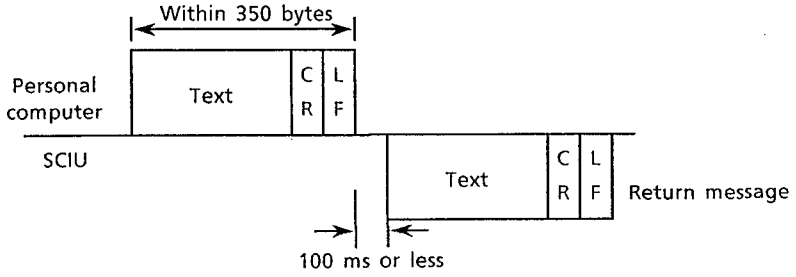
① A HOST (personal computer) sends a TEXT $C_RL_F$ to all the SCIUs.
② An SCIU collates the address contained in the TEXT with its own address.
③ If they agree, the SCIU transmits the TEXT $C_RL_F$ to the HOST.
④ If they do not agree, nothing happens. The SCIU continues receiving text.
⑤ The HOST receives the TEXT from the SCIU whose address agrees with the address in the TEXT and the communication is completed.



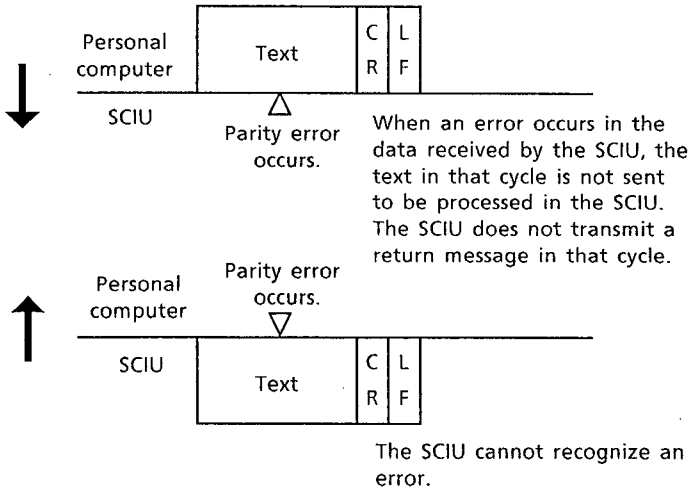

Example of TEXT :
DG F 1 YS01MV70.5$C_RL_F$
↳ Designates the address F.
Note : For an RS-232-C interface, transmission is controlled as address = 0

**Figure 3.4 Transmission Control Procedure**

- Normal Transmission



- Transmission on Error Occurrence




Notice : Text data that are sent must be configured with characters with a period of time required to send the text – 0.1 seconds between characters. If text data which are configured with characters having more than that period of time are sent, a communication error occurs and the SCIU does not send any response signal.
On a personal computer, observe the period of time required to send text data and recover hung-up communications back to normal.

# 3.4 Communication Messages

The following are the communication messages (TEXT) used in the personal computer:

**(1) Data Get (Data acquisition) / Data Put (Data setting)**

When the YewSeries instrument (SLCD, SLPC, etc.) with communication functions is connected, send the following message to acquire data such as the process variable (PV), set value (SV), manipulated output value (MV), ect. For the types of data that can be acquired, see Section 3.5.

Host message DG␣n1␣n2␣YSn3PV␣.....␣YSn3LS$C_R$$L_F$

Data acquisition command: DG; Requested data 1: YSn3PV; Requested data n2: YSn3LS

Return message DG␣ n1␣ n2␣␣␣␣␣␣50.0.....␣AUTO␣␣␣␣␣␣$C_R$$L_F$

PV data: 50.0; LS data: AUTO

The set value (SV) and operation mode of a YewSeries80 instrument (SMST, SMRT. etc.) with communication functions can be set and changed from the personal computer.

Host message DP␣n1␣n2␣YSn3MV␣70.5$C_R$$L_F$

Data setting command: DP; Entry data: 70.5

Return message DP␣n1␣n2␣␣␣␣␣␣70.5$C_R$$L_F$

Entry data: 70.5

n1 : SCIU unit address (0 to F) (address number fixed at 0 for an RS - 232 - C interface)
n2 : Number of data to be acquired (DG : 1 to 32; DP : 1 to 24)
n3 : YewSeries 80 instrument channel number (01 to 04)
PV, SV, MV, CS : Data type to be acquired (or set) for YewSeries 80 instruments.
LS : YewSeries 80 instrument loop status that is required.
$C_R$ : Carriage Return (ASCII function character)
$L_F$ : Line Feed (ASCII function character)
␣ : Space
— : Shows a block of messages or data.

Example 1

Host message DG ␣ 1 ␣ 5 ␣ YS03PV ␣ YS03SV ␣ YS03MV ␣ YS03LS ␣ YS03CS $C_R$ $L_F$

Requested data contents

Assume that an SLPC programmable controller is connected to a channel 3 terminal connected to an SCIU address 1.

Return the process variable (PV), set value (SV), and manipulated output value (MV) operating mode as well as data that are set with SLPC internal parameter "P02 (CS)".

Return message DG␣1␣5␣␣␣␣␣␣74.8␣␣␣␣␣␣75.0␣␣␣␣␣␣67.8␣
PV data SV data MV data
CAS␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣1.112 $C_R$ $L_F$
Operating mode P02 data

The channel number of the SCIU is 3. A measured value of 74.8%, a set value of 75.0%, and a manipulated output value of 67.8% are required for this SLPC. Furthermore, the SLPC is operating in the cascade mode. SLPC computational parameter P02 is set to 1.112. Nine-digit data are right-justified and returned. Loop statuses such as the operating mode and alarm status are left-justified and returned.

(Example 2)

Host message DG␣1␣2␣YS01SV␣YSPVMV $C_R$ $L_F$

Return message @005 $C_R$ $L_F$

Protocol errors involving that "PV" are set for channel numbers 01 to 04 for the YewSeries 80 instruments. If this error occurs, error code @005 will be returned. After the SCIU power is applied, if the YewSeries 80 instruments send a response signal, error code @005 will be canceled. For more information on protocol errors, see Schedule 1 at the end of this manual.

(Example 3)

Host message DG␣1␣2␣YS01PV␣YS04PV $C_R$ $L_F$

Return message DG␣1␣2␣␣␣␣␣␣24.8␣−99999999 $C_R$ $L_F$

Electrical connections for YewSeries 80 instrument channel 04 are disconnected or else the YewSeries 80 instrument fails. Error code −99999999 will be returned.
After the SCIU power is applied, the YewSeries 80 instrument first sends a response signal, and then if no more response signals are sent from it, error code −99999999 is returned.

(Example 4)

Host message

DP␣1␣4␣YS01SV␣60␣YS02MV␣30␣YS03LS␣AUT␣
Entry 1 Entry 2 Entry 3
YS04SV␣1 $C_R$ $L_F$
Entry 4

Data setting contents
Set a 60% set value in channel number 01. Set the manipulated output in channel number 02 to 30% output when the YewSeries 80 instrument operating mode in channel number 02 is in manual (MAN). Set the YewSeries 80 instrument (in channel number 03) operating mode to AUT (automatic). Assume that a YewSeries 80 instrument (in channel number 04) is connected to the SLBC batch controller. So, set the SLBC batch controller status to "1" (reset status).
For more information, see the SLBC data sheet.

Return message

DP␣1␣4␣␣␣␣␣60.0␣␣␣␣␣␣30.0␣AUT␣␣␣␣␣␣
Entry result data 1 Entry result data 2 Entry result data 3
␣␣␣␣␣␣␣␣␣1 $C_R$ $L_F$
Entry result data 4

Nine-digit data are right-justified and returned. Loop statuses such as the operating mode and alarm status are left-justified and returned.

(Example 5)

Host message

DP␣1␣2␣YS03BS␣1.050␣YS04BSET␣65000 $C_R$ $L_F$
Entry 1 Entry 2

Data setting contents
Assume that the SLPC is connected to channel number 03. Set the SLPC BS (computational parameter P01) to 1.050. Assume that the SLBC BSET (batch setting amount) connected to channel number 04 (in Example 4 above) is 65000.

Return message

DP␣1␣2␣␣␣␣␣1.050␣␣␣␣␣65000 $C_R$ $L_F$
Entry result data 1 Entry result data 2

(Example 6)

Host message DP ␣ 1 ␣ 3 ␣ YS01PV ␣ 50 ␣ YS02SV ␣ 150 ␣ YS03 LS ␣ CAS $C_R$ $L_F$
Entry 1 Entry 2 Entry 3

Return message DP ␣ 1 ␣ 3 ␣ ␣␣␣␣␣ 70.3 ␣ ␣␣␣␣␣ 70.2 ␣
Entry result data 1 Entry result data 2

MAN␣␣␣␣␣␣ $C_R$ $L_F$
Entry result data 3

The process variables (PV) that cannot be set in entry 1 above are set. So, the current PV value is sent. In entry 2 above, data that exceed a setting range are set. So, data setting is omitted, and the current set value is returned. In entry 3 above, the YewSeries 80 instrument in channel number 03 is in the manual mode (MAN), but the data entry is omitted and the current mode is returned because a transfer from the MAN to cascade mode (CAS) is attempted.

(Example 7)

Host message DP ␣ 1 ␣ 1 ␣ YS02SV ␣ 75 $C_R$ $L_F$
Entry 1

Return message DP ␣ 1 ␣ 1 ␣ −99999999 $C_R$ $L_F$

If no YewSeries 80 instrument is connected to channel number 02, an error message is transmitted which means a disconnected transmission line between the SCIU and YewSeries 80 instrument or a YewSeries 80 instrument failure.

(2) * **Instruction to Return Data Compression**

9 - digit data, which contain spaces for other than significant figures, are used for "Data Get" and "Data Put." These spaces can be compressed to shorten the "return" transmission time. Use an asterisk (*) instead of spaces after DG and DP (see the Example below).

Normal data transmission DG␣1␣1␣YS01PV $C_RL_F$

Requested data

Normal data return DG␣1␣1␣␣␣␣␣␣50.0$C_RL_F$

Returned data

Transmission of instruction for return data compression

DG*1␣1␣YS01PV $C_RL_F$

Requested data

Compressed return data DG*1␣1␣50.0$C_RL_F$

Returned data

When the return message in Example 1 is compressed, the foloowing message will apply:

DG*1␣5␣74.8␣75.0␣67.8␣CAS␣1.112 $C_RL_F$

When the return message in Example 4 is compressed, the following message will apply:

DP*1␣4␣60.0␣30.0␣AUT␣1 $C_RL_F$

Hereinafter, the instruction to return data compression will be applied to descriptions for communication messages.

### (3) WDT (Watch Dog Timer Time Setting Message)

It is supposed that there are three purposes for connecting YS - 80 instruments to a host computer.

① A host computer acquires YS - 80 instrument data to carry out centralized supervision. In this case, data acquisition is a main purpose for connection to a host computer, while YS - 80 instruments carrying out settings and operations related to control actions. (Even in this case, a host computer can set data. If data setting by a host computer is desired to be inhibited, put YS - 80 instruments in the setting inhibit mode for communication).

② YS - 80 instruments are controlled by a host computer and setpoints of controllers are given from the host computer. In this case, set YS - 80 instruments in the CMP mode (for setting procedure, see YS - 80 instruments Instruction Manuals).

③ Operating signals for YS - 80 instruments are set on the basis of control computation results in a host computer. In other words, the system is used as a DDC system. In this case, YS - 80 instruments are provided for the purpose of back - up instruments in the host computer failure.

In the case of above ② or ③, unless the host computer gives the next CM message, the YS instruments decide the host computer failed, and cannot transfer to CMP or DDC mode.

As described in the above ② or ③, if YS - 80 instruments are controlled by a host computer, YS - 80 instruments are designed so that the backup mode (BM : backup manual, BA : backup auto) can be selected. Backup mode for each instrument is set with a setting switch or a key switch on each instrument side face. Refer to Instruction manuals for each instrument.

A means for a YS - 80 instrument to know the above computer failure is to receive the following CM message. When the host computer WDT message is not received again within the WDT time set in the CM message, WDT time is over and the YS - 80 instrument decides that the host computer fails and moves to the backup mode.

Host message $\quad CM\_n1\_50C_RL_F$
Return message $\quad CM\_n1\_50C_RL_F$

where CM : WDT time setting message. The setting time is selectable within 0 to 9999 seconds.
n1 : SCIU unit address (o to F)
$C_R$ : Carriage Return (ASCII function character)
$L_F$ : Line Feed (ASCII function character)

In the above example, WDT time is set to 50 seconds, If the host computer does not send another CM message within 50 seconds, YS - 80 instruments decides that the host computer fails and moves to the preset backup mode.

(4) **SS (Status Sense)**

SCIU communication specifications are set with switches on the main card. Design models of YewSeries 80 instruments connected to an SCIU card are stored in memory on the SCIU card. If these statuses are confirmed by the host computer, use the following messages:

Host message : SS␣$n_1$␣C $\underline{C_R}$ $\underline{L_F}$
Return message : SS␣$n_1$␣C␣TTY␣BAUD-RATE:9600␣PARITY:ENABLE, EVEN␣
CHARACTER-LENGTH:7␣STOP-BIT:1 $\underline{C_R}$ $\underline{L_F}$

where SS ··· C : Message for setting status data acquisition (Status Sense)
n1 : SCIU unit address (0 to F)
$C_R$ : Carriage Return (ASCII function character)
$L_F$ : Line Feed (ASCII function character)

The contents of the return message vary with the switch positions on the SCIU card.

Host message SS␣$n_1$␣G $\underline{C_R}$ $\underline{L_F}$
Return message SS␣$n_1$␣G␣YS01:SLCD␣YS02:SLPC␣YS03:SMRT␣YS04:SMST-121$\underline{C_R}$ $\underline{L_F}$

where SS ··· G: Message for YewSeries 80 instruments interconnection data acquisition.

Design models of YewSeries 80 instruments connected to an SCIU card are automatically stored in the SCIU card memory when communications between the SCIU card and YewSeries 80 instruments start. From then on, these stored models are used for communications with the host computer.

In the above return message, YewSeries instruments connected to channels are:
(1) the SLCD Indicating Controller to channel 01;
(2) the SLPC Programmable Indicating Controller to channel 02;
(3) the SMRT Ratio Set Station to channel 03; and,
(4) the SMST-121 Auto/Manual Station to channel 04.

**(5) HT (Hold Time)**

The SCIU accepts and processes dat transmitted from the host computer in turn, and sends them back to the computer. However, some computers may gather data in error from the SCIU because its response time is too rapid. When the SCIU is used in combination with one such computer, the message "HT" (Hold Time) is used to delay the SCIU response time. Send the HT message once before data are transmitted (see below for the HT entry format).

Host message HT␣$n_1$␣N $\underline{C_R}$ $\underline{L_F}$
Return message HT␣$n_1$␣N $\underline{C_R}$ $\underline{L_F}$

where HT : Return timing adjustment message
n1 : SCIU unit address (0 to F)
N : Time adjustment factor for return message timing (intger.Nmax=100. Approximately a 1-ms delay when N=1.)
$C_R$ : Carriage Return (ASCII character)
$L_F$ : Line Feed (ASCII character)

When a return message the same as the host message (when the initial value N=0) is obtained, the HT message need not be used. For example, when N=1 and the related return message is not received, increase N in number to 2, 3, 4, or more until the host and return messages are completely equal,, Then, give the desired value of N as a communication command for the SCIU.

# 3.5 Communication Data List

Communication data used in YewSeries 80 controllers, BCS instruments and rack-mounted instruments are shown in Tables 3.1, 3.2, and 3.3, respectively.

**Table 3.1 Communication Data Used in Controllers (1/2)**

| Model / Data type | YewSeries 80 Controllers | | | | | |
|---|---|---|---|---|---|---|
| | SLCD | SLPC | SLMC | SMST-111 | SMST-121 | SMRT |
| PV | Process Variable (%) | | | | | |
| SV | Setpoint (%) | | | | | Ratio setpoint (Z1) |
| MV | Manipulated variable (%) | | | | Manipulated variable (%) | |
| DL | | | | | | Ramp constant (Z1) |
| MH | Manipulated variable upper-limit setpoint (%) | | | | Manipulated variable upper-limit setpoint (%) | |
| ML | Manipulated variable lower-limit setpoint (%) | | | | Manipulated variable lower-limit setpoint (%) | |
| P | Proportional band (%1) | | | | | |
| I | Integral time (S) | | | | | |
| D | Derivative time (S1) | | | | | |

(Definition of symbols)

* : Engineering unit data
*1 : Integer data (Display is the same as *)
% : 0 to 100% data
%1 : 6.3 to 999.9% data
Z1 : 0.000 to 8.000 or ratio
S : Seconds (1 to 9999)
S1 : Seconds (0 to 9999)

Nomally, entry is disabled.

**Table 3.1 Communication Data Used in Controllers (2/2)**

| Model / Data type | YEWSERIES 80 Controllers | | | | | |
|---|---|---|---|---|---|---|
| | SLCD | SLPC | SLMC | SMST -111 | SMST -121 | SMRT |
| BS | | Computation parameter1 (Y) | | | | |
| CS | | Computation parameter2 (Y) | | | | |
| AUX1 | | Auxiliary input1 (%) | | | | |
| AUX2 | | Auxiliary input2 (%) | | | | |
| AUX3 | | Auxiliary input3 (%) | | | | |
| EB | | | | | | External bias (%) |
| P1 | | | | | | Computation parameter1 (Z2) |
| P2 | | | | | | Computation parameter2 (Z2) |
| P3 | | | | | | Computation parameter3 (Z2) |
| P4 | | | | | | Computation parameter4 (Y) |
| CALC | | | | | | Ratio computation value(%) |
| LS (Note 1) | ○ | ○ | ○ | ○ | ○ | ○ |
| ALM (Note 2) | | | | | | |

(Definition of symbols)
- % : 0 to 100% data
- Y : −8.000to 8.000
- Z2 : −800.0to 800.0
- (Note 1) : Refer to Table 3.4
- (Note 2) : Refer to Table 3.5

○ : Loop status (LS) or Alarm status (ALM) provided.
▒ : Nomally, entry is disabled.

**Table 3.2 Communication Data Used in BCS Instruments**

| Model / Data type | YewSeries 80 BCS instruments | | | |
|---|---|---|---|---|
| | SBSD | SLBC | SLCC | STLD |
| PV | Instantaneous flow (%) | | | |
| SV | Batch status (X) | | Ratio (%3) | |
| MV | Output demand (%) | Manipulated variable (%) | | |
| DV | | | Totalizer value deviation *1 | |
| SUM | Totalizer value * (Note 1) | | | |
| PH | Upper flow limit setpoint (%) | | | |
| PL | Lower flow limit setpoint (%) | | | |
| VL | Initial totalizer flow limit value (Note2) | | | |
| BSET | Batch setpoint *1 | | | |
| CC1 | Instrument-error compensation coefficient$\alpha$ ($\triangle$) | | | |
| CC2 | First-order compensation coefficient$\beta$ ($\triangle$) | | | |
| CC3 | Second-order compensation coefficient$\gamma$ ($\triangle$) | | | |
| CC4 | Specific gravity$\rho$ ($\triangle$2) | | | |
| RAW | Raw data (%) | | | |
| LS (Note 3) | ○ | ○ | ○ | ○ |
| ALM (Note 4) | ○ | ○ | ○ | |

(Definition of symbols)

* : Engineering units data
*1 : Integer data (Display is the same as *)
% : 0 to 100% data
%3 : Ratio
X : Integer data
$\triangle$ : −1.0000 to 1.0000
$\triangle$2 : 0.5000 to 1.2000

○ : Loop status (LS) or Alarm status (ALM) is provided.
Normally, entry is disabled.

Note 1 : 0 to 99999999 for the STLD
0 to 999999 for other instruments
Note 2 : 0 to 9999 and DP depending on the DP and the same engineering unit as for SUM.
Note 3 : Refer to Table 3.4
Note 4 : Refer to Table 3.5

Table 3.3 Communication Data Used in Rack-Mounted Instruments

| Model / Data type | YewSeries 80 rack-mounted instruments |
|---|---|
| | SDAU |
| A1 | P1(Input 1) −6.3 to106.3% |
| A2 | P2(Input 2) −6.3 to106.3% |
| A5 | 1H −9999 to 9999 |
| A6 | 1L −9999 to 9999 |
| A7 | 2H −9999 to 9999 |
| A8 | 2L −9999 to 9999 |
| A9 | 3H −9999 to 9999 |
| A10 | 3L −9999 to 9999 |
| D1 | ALM1 ON, OFF |
| D2 | ALM2 ON, OFF |

(Definition of symbols)
▒▒ Normally, entry is disabled.

Table 3.4 Communication Message in YS-80 Instruments Operation Mode (Loop Status)

| Communication message | | Operation mode (loop status) |
|---|---|---|
| MAN | | Manual control |
| AUT | | Automatic operation |
| CAS | | Cascade operation |
| CMP | *1 | Conputer-controlled status (SPC) |
| DDC | *2 | Computer-controlled status (DDC) |
| BM | *3 | Back up manual |
| BA | *3 | back up auto |
| OOP | | Output circuit open status |

Note :

*1 : Set the YewSeries 80 instrument operation mode to CMP.

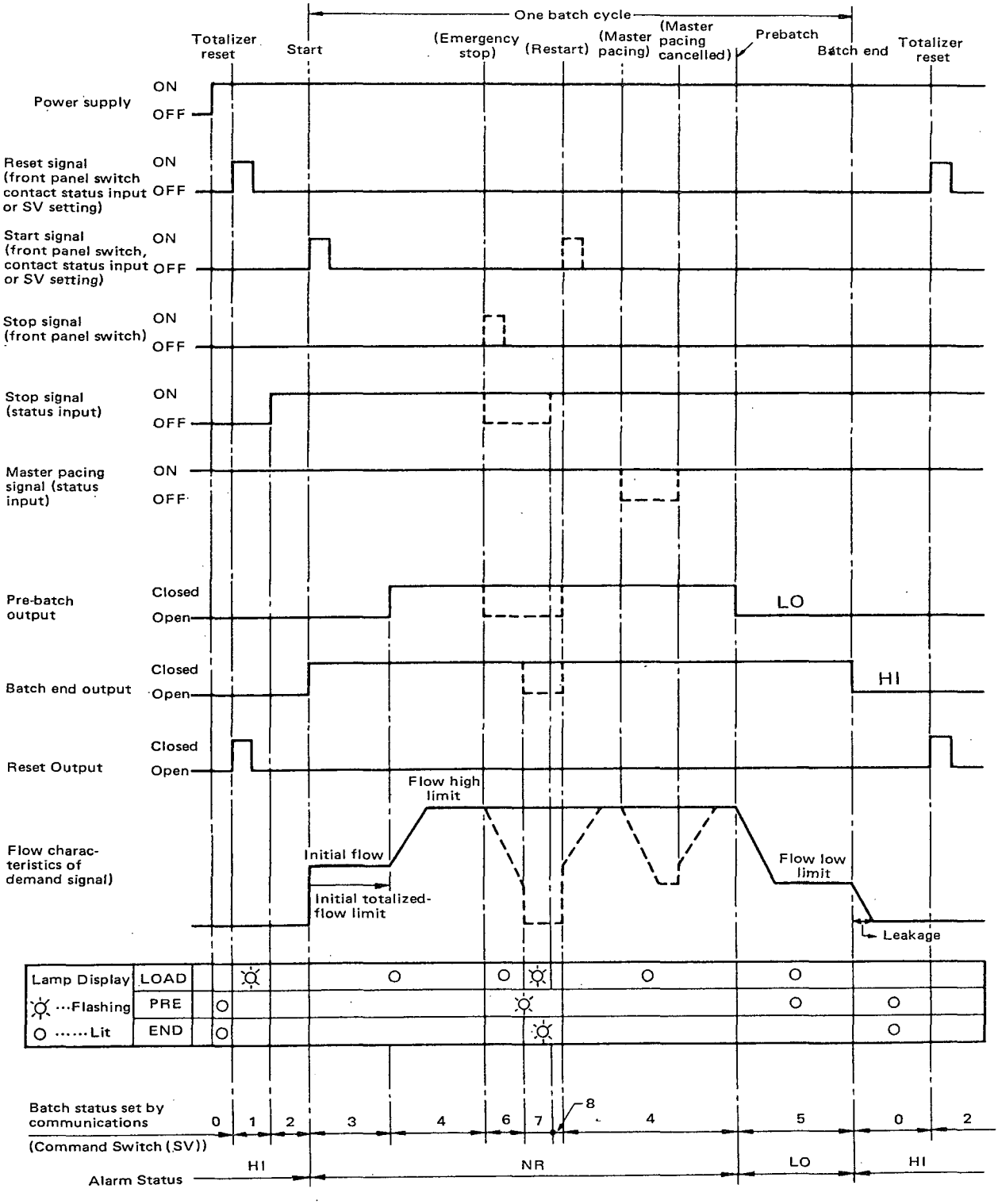
*2 : Set the YewSeries 80 instrument to the CMP mode and send the message "DG ␣ YSn3LS $C_RL_F$", for example. For this message, when the message "DG ␣ CMP" is returned, transfer the YewSeries 80 instrument mode from CMP to DDC with the message "DP ␣ YSn3LS ␣ DDC $C_RL_F$." To transfer the YewSeries 80 instrument mode from DDC to CMP, confirm that the instrument is in the DDC mode, then send the message "DP ␣ YSn3LS DDC $C_RL_F$.

*3 : When the YewSeries 80 instrument is in the automatic backup or manual backup state, the instrument is computer-controlled. If the SCIU or host computer fails, transfer automatic backup (BA) or manual backup (BM) automatically. BM and BA can be set by a YewSeries 80 instrument when it is in the computer-controlled mode.

Table 3.5 Communication Messages for YS-BCS Sequence (Alarm Status)

| Communication message | YS-BCS sequence (Alarm status) | |
|---|---|---|
| | SBSD | SLCC |
| LO | Pre-batch | |
| HI | Batch end | |
| +DV | Leakage failure occurerence | Totalized deviation alarm (1st stage) |
| −DV | | Totalized deviation alarm (2nd stage) |
| NR | Normal | |

## Operation of sequence command switch (SV) of SBSD and SLBC




Note: 1) If RESET is entered during status "7" (stop status input OFF), status SV reverts to "1".
If RESET is entered during status "8" (stop status input ON), status SV reverts to "2".

2) The command switch operations which can be performed by host computer.

$0 \rightarrow 1$, $7 \rightarrow 1$, $8 \rightarrow 1$ } RESET

$2 \rightarrow 3$, $8 \rightarrow 3$ } START

$3 \rightarrow 6$, $4 \rightarrow 6$, $5 \rightarrow 6$ } STOP

$3 \rightarrow 4$ Continue from the initial totalized-flow limit

# 4. INSTALLATION

For the installation procedure and wiring safeguards, see instruction manual IM 1B4F2 - 01E, "Installation of Rack - Mounted Instruments."

## 4.1 External Wiring

(1) When wiring the terminals, use round crimping terminal lugs at the end of cable conductors.
(2) If an internal assembly is accommodated in a rack case, pull the terminal cover forward to do the wiring.
(3) For wiring to each terminal, connect the cable conductors referring to Table 4.1 (Figure 4.1 shows the terminal arrangement).
(4) After wiring, be sure to put the terminal cover back on. The terminal cover also serves as a lock to prevent the internal assembly from falling off. Confirm that the internal assembly is securely inserted into the case.

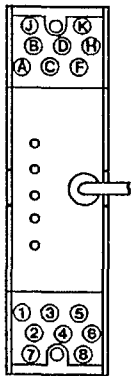



**Figure 4.1 Terminal Arrangement**

**Table 4.1 Wiring to Terminals**

| Terminal symbols | Codes | | | Terminal symbols | Codes | |
|---|---|---|---|---|---|---|
| | RS-485 common send/receive | RS-485 independent send/receive | RS-232-C | | | |
| 1 | SD/RD (A) | SD (A) | SD | A | (P) | YewSeries 80 communication CH2 |
| 2 | SD/RD (B) | SD (B) | RD | B | (N) | |
| 7 | SG | SG | SG | J | (S) | |
| 3 | SD/RD (A) | RD (A) | DTR | F | (P) | YewSeries 80 communication CH3 |
| 4 | SD/RD (B) | RD (B) | — | H | (N) | |
| 5 | (P) | YewSeries 80 communication CH1 | | K | (S) | |
| 6 | (N) | | | C | (P) | YewSeries 80 communication CH4 |
| 8 | (S) | | | D | (N) | |

(Note)SD : Send data
RD : Receive data
SG : Signal ground
DTR: Data terminal ready (This output terminal goes "HIGH" when the power to the SCIU is turned on.)
Definition of terminal names A and B:
As specified in EIA, if the terminal voltages are assumed to be $V_A$ and $V_B$,
$V_A < V_B$ when the signal is "mark", and thus the terminal condition is OFF or 1.
$V_A > V_B$ when the signal is "space", and thus the terminal condition is ON or 0.

# 4.2 Connection via an RS - 485 Interface

There are two methods in connecting a personal computer via an RS - 485 interface : common or independent send / receive. Normally, an RS - 485 is connected for a common send / receive. When an RTS (request to send) cannot be controlled at the personal computer side and thus the driver is left open, an RS - 485 can be connected for an independent send / receive.

### (1) Common Send / Receive

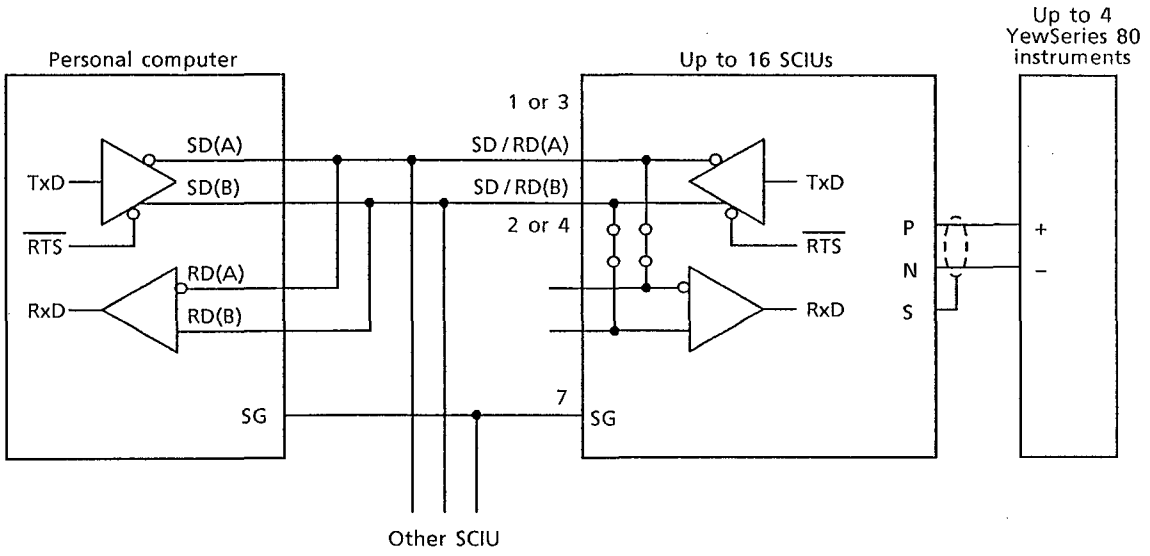



**Figure 4.2 Connection for a Common Send / Receive**

### (2) Independent Send / Receive

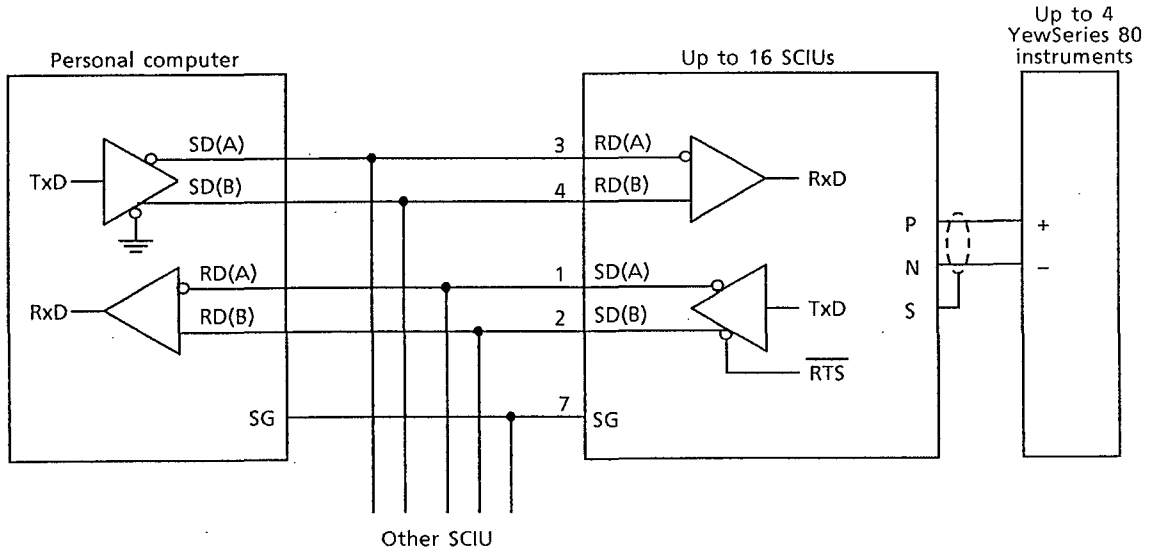
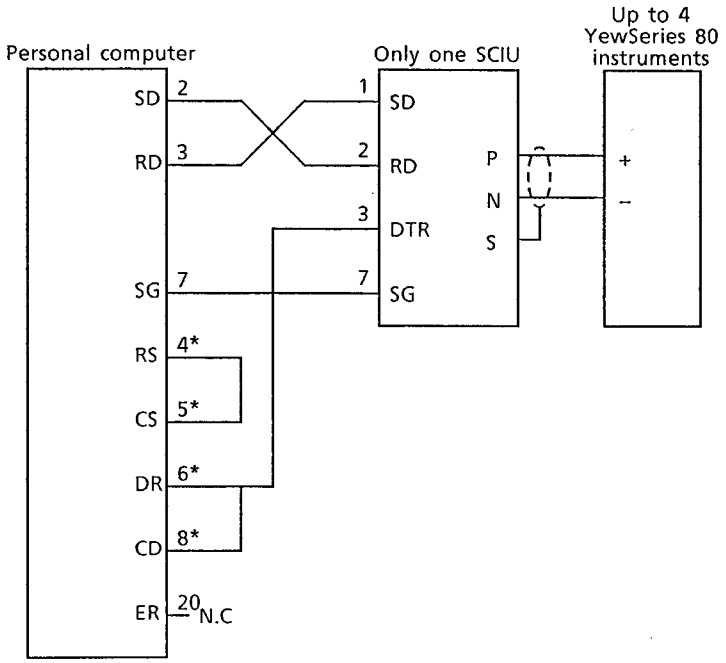



**Figure 4.3 Connection for an Independent Send / Receive**

# 4.3 Connection via an RS - 232 - C Interface

Make the connection as shown below:




Note 1: Signal connections marked with an asterisk vary with personal computers. The connection in this figure is just an example. Thus, those signal connections should be made in accordance with the instruction manual of the personal computer used.

Note 2: The DTR (No. 3 terminal) of the SCIU is an output terminal that becomes a HIGH level terminal (control ON) when power is turned on.

**Figure 4.4 Connection via an RS - 232 - C Interface**

# 5. SETTING

## 5.1 Mode Setting

Pull out the main card of the SCIU from the rack case. Set the mode setting switch (SW1) on the main card referring to Figure 5.1.

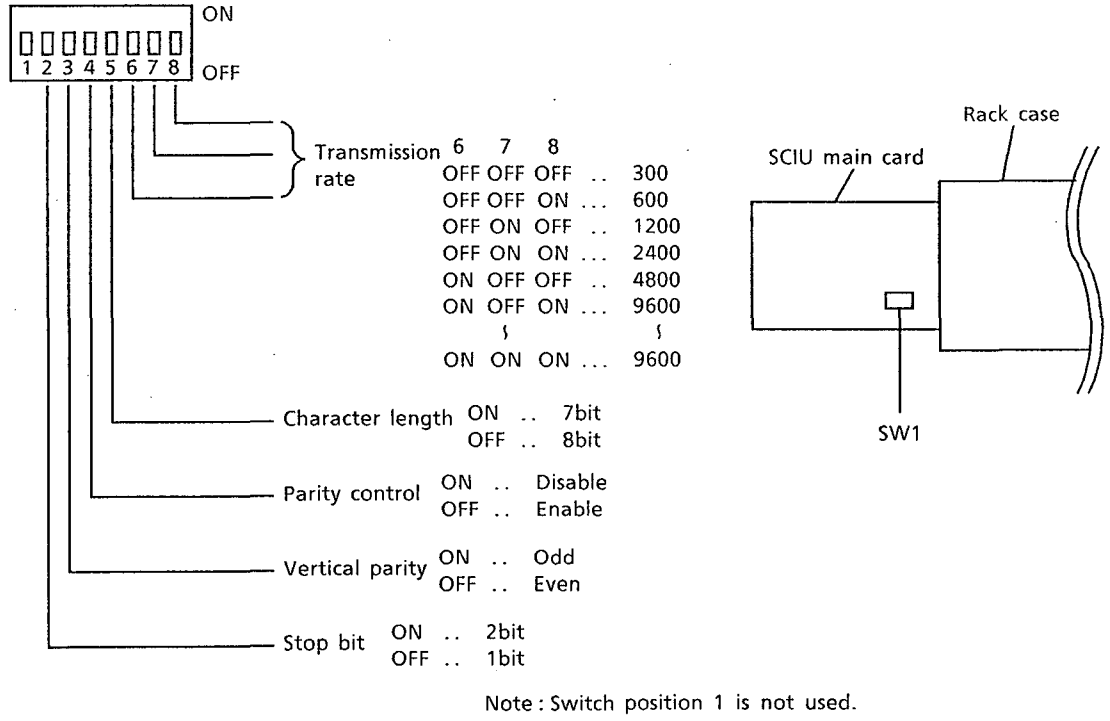
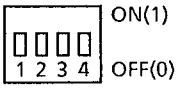



**Figure 5.1 Setting of SW1 Mode Setting Switch**

# 5.2 Address Setting

Pull out the main card of the SCIU from the rack case. Set the mode address switch (SW2) on the main card referring to Figure 5.2. However, if the SCIU is specified for an RS-232-C interface, the SW2 is not attached. Make control as address 0.




Set addresses represented by hexadecimal digits (0 to F) in binary notation.

| Address (hexadecimal) | Address (binary) | Switch setting |
|---|---|---|
| 0 | 0000 | |
| 1 | 0001 | |
| 2 | 0010 | |
| 3 | 0011 | |
| 4 | 0100 | |
| 5 | 0101 | |
| 6 | 0110 | |
| 7 | 0111 | |
| 8 | 1000 | |
| 9 | 1001 | |
| A | 1010 | |
| B | 1011 | |
| C | 1100 | |
| D | 1101 | |
| E | 1110 | |
| F | 1111 | |

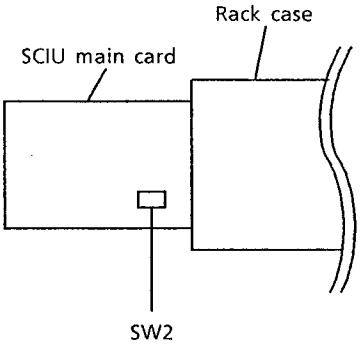
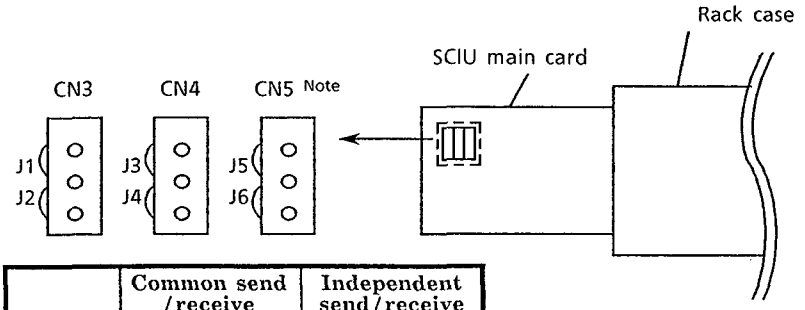



**Figure 5.2 Setting of SW2 Address-Setting Switch**

# 5.3 Setting for Common or Independent Send / Receive (RS - 485)

Normally, connection for a common send / receive is used. When an RTS (request to send) cannot be controlled at the personal computer side and thus the driver is left open, an RS - 485 can be connected for independent send / receive.

The setting of these connections is implemented by pulling the main card of the SCIU out of the rack case and shorting out the pins of the CN3 and CN4 connectors with shorting bars as shown in Figure 5.3.




| | Common send /receive | Independent send / receive |
|---|---|---|
| CN3 | J1 | J2 |
| CN4 | J3 | J4 |

Note : Connector CN5 is used for setting the terminating resistor described in section 5.4.

**Figure 5.3 Shorting Bar Setting for CN3 and CN4 Connector Pins**

# 5.4 Setting Terminating Resistance (RS - 485)

Terminating resistors must be connected at both ends of an RS - 485 cable (twisted - pair). In the case of an SCIU connection for a common send / receive and on the receiving side of an SCIU connection for an independent send / receive, the terminating resistor can be connected by shorting out the CN5 connector with a jumper (shorting bar) [see Figure 5.3]. When termination is necessary, short out J5 with the shorting bar and when termination is not necessary, short out J6 with the shorting bar.

If a personal computer has a terminating resistor when termination is necessary at the computer terminal (Figure 5.4, upper figure), use it as the cable terminating resistor ; if the personal computer does not have a terminating resistor, one is required by calculating the resistance value. On the contrary, if a computer has a terminating resistor when termination is not necessary at the computer terminal (Figure 5.4, lower figure), remove it for cable connection.

**(1) Common Send / Receive**

Set the terminating resistors at each terminal of the hatched areas in the figures to the right (Figure 5.4). The same applies to the case when the SCIUs connected with broken lines are removed.

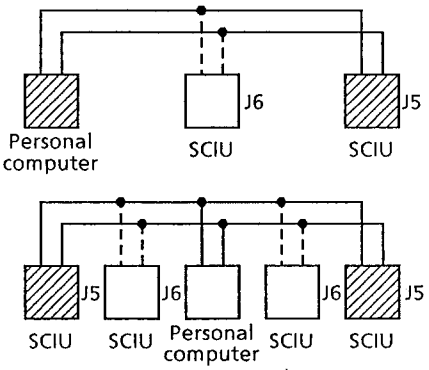



**Figure 5.4**

**(2) Independent Send / Receive**

Set the terminating resistors at each terminal of the hatched areas in the figures to the right (Figure 5.5). The same applies to the case when the SCIUs connected with broken lines are removed.

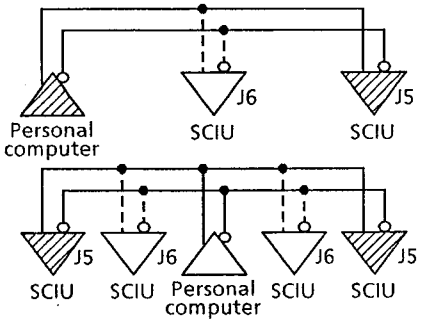
Since an SCIU has no terminating resistor on the sending side, provide the following resistor and connect it across terminals 1 and 2 when required :

120 ohms, accuracy 1%, 1 / 2 W, 100 ppm / °C

△ ····· Sending side

▽ ····· Receiving side

• SCIU Receiving Line




• SCIU Sending Line

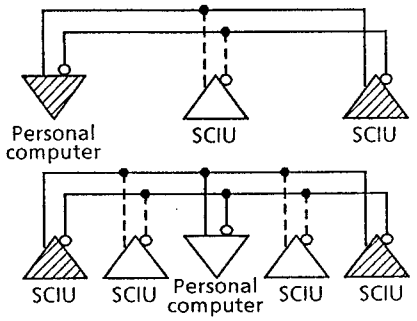



**Figure 5.5**

# 6. CONNECTION OF SCIU TO COMPUTER

(1) **Example of Connection Program to HP Model 9845 Computer.**

```
10   DIM A$[200],B$[200]
20   SET TIMEOUT 10;200
30   ON INT #10 GOTO 100
40   A$="DG 1 1 YS01PV"
50   OUTPUT 10 USING "K";A$
60   ENTER 10;B$
70   PRINT "A$=";A$
80   PRINT "B$=";B$
90   END
100  RESET 10
110  GOTO 70

result of normal communication end
A$=DG 1 1 YS01PV
B$=DG 1 1      35.5

result of abnormal communication end
A$=DG 1 1 YS01PV
B$
```

At the step 40 of the above program, acquisition of PV data in loop No. 1 of YS-80 instruments is commanded.

(2) Example of Connection Program to NEC PC-9800 Computer.

```
10  DIM A$[200],B$[200]
20  K=0
30  OPEN "COM1:" AS #1
40  ON COM GOSUB 180
50  COM ON
60  A$="DG 1 1 YS01PV"
70  PRINT #1,A$
80  I=1
90  IF K=1 THEN GOTO 130
100  IF I=30 THEN GOTO 130
110  I=I+1
120  GOTO 90
130  PRINT "A$=";A$
140  IF  K=0 THEN GOTO 160
150  PRINT "B$=";B$
160  CLOSE #1
170  END
180  COM OFF
190  INPUT #1,B$
200  K=1
210  RETURN

result of normal communication end
A$=DG 1 1 YS01PV
B$=DG 1 1      35.5

result of abnormal communication end
A$=DG 1 1 YS01PV
```

At the step 60 of the above program, PV data in loop No. 1 of YS-80 instruments is acquired by a DG (Data Get) message.

(3) Example of Connection Program to IBM PC.

```
10  PRINT "YS LOOP NO.=";
20  INPUT N$
30  PRINT "SELECT  1:READ OR 2:SET";
40  INPUT M
50  PRINT "    "
60  OPEN "COM1:4800,E,7,,DS,CS4000"AS#1
70  ON M GOSUB 200,300
80  CLOSE#1
90  PRINT "    "
100  PRINT "    "
110  GOTO 10
120  END
200  D$="DG 1 3 YS"+N$+"PV YS"+N$+"SV YS"+N$+"MV"
210  PRINT #1,D$
220  PRINT #1,CHR$(10)
230  LINE INPUT #1,B$
240  PRINT "READ DATA:       PV       SV       MV"
250  PRINT "B$=";B$
260  RTURN
300  PRINT "1:SV OR 2:MV";
310  INPUT P
320  ON  P  GOSUB 400,450
330  PRINT#1,C$
340  PRINT#1,CHR$(10)
350  WRITE #1,C$
360  RETURN
400  PRINT"SV=";
410  INPUT O$
420  C$="DP 1 1 YS"+N$+"SV "+O$
430  RETURN
450  PRINT"MV=";
460  INPUT Q$
470  C$="DP 1 1 YS"+N$+"MV "+Q$
480  RETURN
11620  END
```

# 7. MAINTENANCE

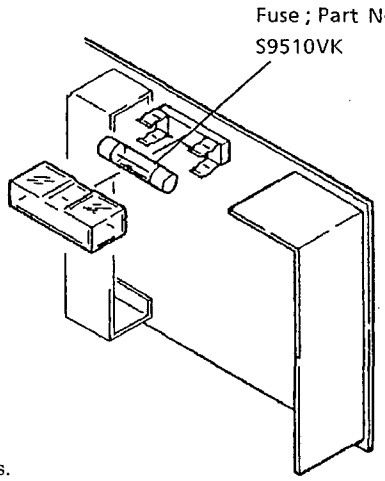
Relatively simple part replacement is described.

## 7.1 Fuse Replacement

If a fuse is blown, replace it in the following manner after examining it for the cause of the trouble. If the failure is caused by the fuse, check it for a dirty fuse holder and poor contact.

Recommended replacement period : About 3 years.

(1) Remove the fuse by pulling it in the direction as shown in Figure 6.1.
(2) Attach a new fuse after confirming its rating.




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

**Figure 6.1 Fuse Replacement**

## 7.2 Power Unit Replacement

Deterioration of the aluminum electrolytic capacitor used in the power unit varies with the operating conditions.

Recommended replacement period : 5 to 10 years.

## Schedule 1. List of Error Dispositions

| Type of Error | Actual Error Causes and Status on Occurrence | Example of Error | Error Disposition |
|---|---|---|---|
| Communication Error | Over-characters | | No return message. |
| | Framing error | | |
| | Overrun error | | |
| | Parity error | | |
| | CR LF cannot be found | | |
| Protocol Error | Protocols othre than DG, DP, CM, HT, and SS are issued. | DD␣1␣1␣YS01PVCR LF<br>↑ Protocol "DD" does not exist. | Retuen message @001CR LF |
| | Mistaken unit No. | DG␣10␣1␣YS01PVCR LF<br>↑ Numbers other than 0 to F. | No return message |
| | Difference between number of data and number of requested data.<br>Data > 32 for DG, data > 24 for DP. | DG␣1␣n␣YS01PV␣·····␣YS05SV<br>First data m-th data<br>n ≠ m | Retuen message @003CR LF |
| | DG or DP attempted to access messages other than YS | DG␣1␣1␣YC01PVCR LF<br>↑ Type YC does not exist. | Retuen message @004CR LF |
| | Channel No. is not numeral (01 to 24)<br><br>Channel No. is not connected to SL** | DG␣1␣1␣YS05PVCR LF<br>↑ This is not a numeral from 01 to 04<br>DG␣1␣1␣YS04PVCR LF<br>SL** is not connected to channel No. 04 | Retuen message @005CR LF |
| | Mistaken data type.<br>Access of data type which does not exist in SL** model connected.<br>No space. | DG␣1␣1␣YS01BS CR LF<br>Data type BS is not admitted for SLCD in channel No.01.<br>DG␣1␣2␣YS01PVYS01SV CR LF<br>There is no data type PVYS01SV | Retuen message @006CR LF |
| | In data put, entry data does not take the specified form.<br>Number of entry data is different. | DP␣1␣1␣YS01LS␣AUT␣YS01SV␣50CR LF<br>Two data for one data specification<br>DP␣1␣1␣YS01SV␣50.0␣CR LF<br>Entry data ends with a space. | Retuen message @009CR LF |
| | Data is not a decimal number within 0 to 9999 in CM command. | CM␣1␣50001 CR LF<br>Not within 0 to 9999. | Retuen message @012CR LF |
| | Data is not a numeral within 0 to 100 in HT command | HT␣1␣205 CR LF<br>Not within 0 to 100 | Retuen message @013CR LF |
| | Status data other than C orG is to be accessed in SS command. | SS␣1␣R CR LF<br>Status data other than C and G is to be accessed. | Retuen message @014CR LF |
| Entry Impossible | Attempt of entry into where entry is inhibited. | DP␣1␣1␣YS01PV␣50CR LF<br>PV is inhibited to enter. | Writing is ignored.<br>Current status is read and returned. |
| | Error in loop change check.<br>Change is impossible. | DP␣1␣1␣YS01LS␣CASCR LF<br>Change of current MAN to CAS mode is not allowed. | |
| | Setpoint is in excess of the limit. | DP␣1␣1␣YS01SV␣150CR LF<br>150% cannot be entered. | |
| | Change is impossible because of SL** status. | DP␣1␣1␣YS01MV␣70.5CR LF<br>Changeable because YS01 is in MAN mode.<br>DP␣1␣1␣YS02MV␣75CR LF<br>Not changeable because YS02 is in AUT mode. | |
| Failures* | For message DG␣1␣1␣YS01PVCR LF | | Return DG␣1␣1␣−99999999CR LF |
| | For message DP␣1␣1␣YS01MV␣70CR LF | | Return DP␣1␣1␣−99999999CR LF |

* YS-80 instruments failure, and Communication failure between SCIU and YS-80 instruments.

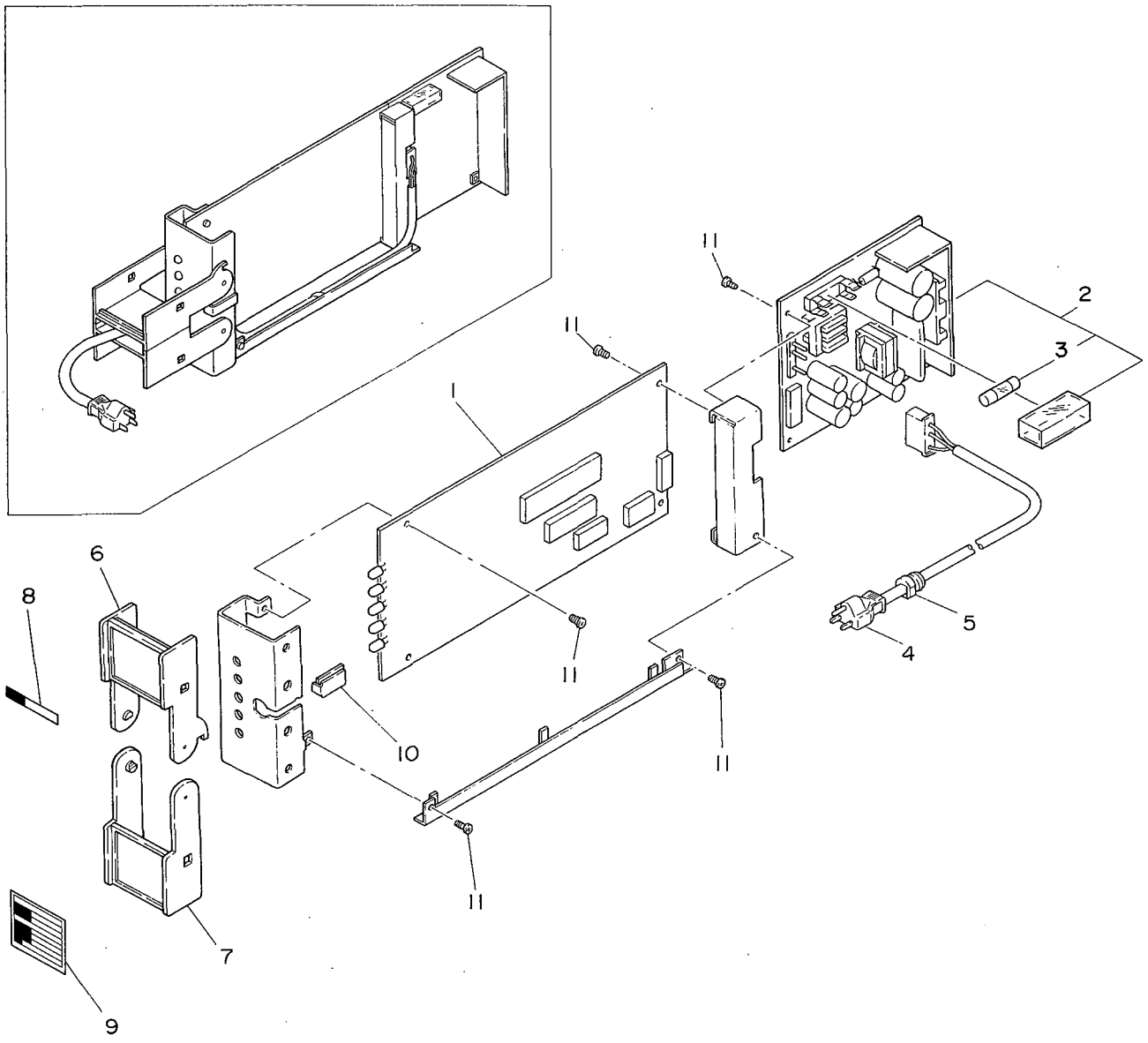
## Schedule 2. List of Communication Message

| Function | | Message | Remarks |
|---|---|---|---|
| Data Acquisition | Host Message | DG␣n1␣n2␣YS␣␣␣$^{n_3}$␣␣␣YS␣␣␣$^{n_3}$␣␣␣␣···· <br> Data get command / Address No. / Number of requested data / Requested data 1 (Instrument, Data type) / Requested data 2 (Instrument, Data type) <br> ···␣YS␣␣␣$^{n_4}$␣␣␣␣CR LF <br> Requested data $n_2$ (Instrument, Data type) / End of message | Requested instrument <br> YS␣␣$^{n_3}$ : YEWSERIES instrument <br> YS␣␣$^{n_4}$ : YEWSERIES instrument |
| | Return Message | DG␣n1␣n2␣␣␣␣␣␣72.5␣␣␣␣␣32600···· <br> Data get response / Address No. / Number of requested data / Return data 1 / Return data 2 <br> ···␣AUT␣␣␣␣␣␣CR LF <br> Return data $n_2$ / End of message | n1 : SCIU address (0 to F) <br> (RS-232-C interface : always 0) <br> n2 : Number of data acquisiting (DG), 1 to 32 <br> Number of data set (DP), 1 to 24 <br> $n_3$,$n_4$ : YS instrument Channel No. 01 to 4 |
| Data Set | Host Message | DP␣n1␣n2␣YS␣␣␣$^{n_3}$ S V 4 0 0 ␣␣␣YS␣␣␣$^{n_4}$ L S A U T ···· <br> Data get command / Address No. / Number of set data / Set data 1 (Instrument, Data type, set data) / Set data 2 (Instrument, Data type, set data) <br> ···␣YS␣␣␣$^{n_3}$␣␣␣␣␣CR LF <br> Set data $n_2$ (Instrument, Data type, set data) / End of message | |
| | Return Message | DP␣n1␣n2␣␣␣␣␣400.0␣AUT␣␣␣␣␣␣···· <br> Data get response / Address No. / Number of set data / Set result data 1 / Set result data 2 <br> ···␣␣␣␣␣␣␣␣␣␣␣␣CR LF <br> Set result data $n_2$ / End of message | |
| WDT Communication | Host Message | CM␣n1␣$^{t_1}$␣␣␣CR LF <br> WDT time set command / Address No. / WDT set time | t1 : WDT setting time 0 to 9999 (sec) |
| | Return Message | CM␣n1␣$^{t_1}$␣␣␣CR LF <br> WDT time set response / Address No. / WDT set time | |
| Data Acquisition of SCIU Setting | Host Message | SS␣n1␣C CR LF <br> Set status get command / Address No. / Communication spec set | |
| | Return Message | SS␣n1␣C␣TTY␣BAUD-RATE:␣␣␣␣␣PARITY:···· <br> Set status get response / Address No. / Communication spec set <br> ···␣STOP-BIT:␣ CR LF | |
| Data Acquisition of Instrument Connecting Status | Host Message | SS␣n1␣G CR LF <br> Set status get command / Address No. / Instrument connection status | |
| | Return Message | SS␣n1␣G␣YS01 : SLCD ···␣YS04 : SLPC CR LF <br> Set status get response / Address No. / Instrument connection status | |
| Instruction to Return Data Compression | | DG*n1␣n2␣···· CR LF <br> Return Data compression command <br> DP*n1␣n2␣···· CR LF <br> Return Data compression command | |
| Return Timing Adjusting Message | Host Message | HT␣n1␣$^{N}$␣␣␣CR LF <br> Timing adjusting command / Adjusting time | N : Adjusting time 0 to 100 (m sec) |
| | Return Message | HT␣n1␣$^{N}$␣␣␣CR LF <br> Timing adjusting response / Adjusting time | |

# Customer Maintenance Parts List

Model SCIU
Communication Interface Unit

YEWSERIES 80



| Item | Part No. | Model / Qty SCIU-100 | Model / Qty SCIU-200 | Description |
|---|---|---|---|---|
| 1 | E9715GA | 1 | | Main Board Assembly |
| | E9715GB | | 1 | Main Board Assembly |
| 2 | E9715YG | 1 | 1 | Power Unit Assembly (for 80 to 132V AC 47–63 Hz and 20 to 130V power supplies) |
| 3 | S9510VK | 1 | 1 | Fuse (1A) |
| 4 | E9713EG | 1 | 1 | Cable Assembly |
| 5 | S9079PB | 1 | 1 | Bushing |
| 6 | E9713CK | 1 | 1 | Cover |
| 7 | E9713CA | 1 | 1 | Cover |
| 8 | Y9422NP | 1 | 1 | Tag No. Label (blank) |
| 9 | E9713HZ | 1 | 1 | Nameplate |
| 10 | E9713CE | 1 | 1 | Cover |
| 11 | Y9306JB | 8 | 8 | Pan H. Screw, M3 x 6 |

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