Cat. No. W158-E1-5

SYSMAC
S3200-NSB11-E
SYSMAC NET Support Board

OPERATION MANUAL

OMRON

S3200-NSB11-E
SYSMAC NET Support Board

Operation Manual

Revised June 1995

Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to the product.

⚠ **DANGER!** Indicates information that, if not heeded, is likely to result in loss of life or serious injury.

⚠ **WARNING** Indicates information that, if not heeded, could possibly result in loss of life or serious injury.

⚠ **Caution** Indicates information that, if not heeded, could result in relatively serious or minor injury, damage to the product, or faulty operation.

OMRON Product References

All OMRON products are capitalized in this manual. The word "Unit" is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation "Ch," which appears in some displays and on some OMRON products, often means "word" and is abbreviated "Wd" in documentation in this sense.

The abbreviation "PC" means Programmable Controller and is not used as an abbreviation for anything else.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

1, 2, 3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

In this manual, operating procedures are described with corresponding display screens as shown below.

```
C:\>copy c c:\
        1 file(s) copied

C:\>
```

Input a character string using the keyboard, and then press the Enter Key.

TABLE OF CONTENTS

TABLE OF CONTENTS

About this Manual:

This manual describes the installation and operation of the S3200-NSB11-E SYSMAC NET Support Board for IBM PC/AT or compatible computers and includes the sections described below.

Please read this manual carefully and be sure you understand the information provided before attempting to install and operate the SYSMAC NET Support Board.

PART 1: SETUP The first part provides a summary of parts, a description of the SYSMAC NET, and other information, such as hardware settings, software installation, and communications tests.

Section 1 summarizes the parts of the Support Board and outlines restrictions and precautions related to the SYSMAC NET Support Board and Support Software.

Section 2 provides information on the SYSMAC NET, FINS communications, and software.

Section 3 explains setup procedures such as board settings, mounting, software installation, and operating tests.

PART 2: UTILITIES The second part describes utilities that can be used when a problem occurs during operation checks following installation or during normal operation of the SYSMAC NET System.

Section 4 explains routing tables and the procedure for operating the routing table setting utility. Be sure to read this section if the system consists of multiple networks.

Section 5 describes the Diagnostic Utility, which is used to check operation when the SYSMAC NET System is installed and to troubleshoot the system when errors occur.

Section 6 describes the procedure for executing loop tests. Refer to this section when executing a communications test, such as those performed after setting up SYSMAC NET communications on an IBM PC/AT or compatible computer.

Section 7 describes the Node Configuration Utility, which performs various settings related to NSUs (Network Service Units) and local bridges mounted in SYSMAC NET Systems. Make sure that NSUs and local bridges are set correctly by referring to this section while setting the devices.

Section 8 describes procedures for operating the version display utility, the status display utility, and the packet partitioning utility.

Section 9 describes a program used to test communications with other nodes using the SYSMAC NET datagram service.

PART 3: PROGRAMMING The second part describes program development using FINS communications and datagram communications, including protocols and interfaces. Sample programs are provided.

Section 10 describes the datagram service. Use the datagram service when communicating with nodes that do not support the FINS protocol, such as C-series PCs.

> ⚠**WARNING** Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

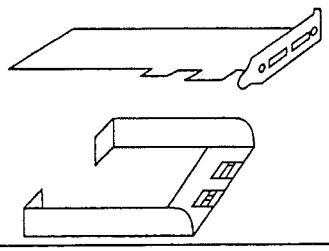
SECTION 1
Parts Check and General Precautions

This section provides a list of parts and also lists restrictions and precautions related to the SYSMAC NET Support Board and Support Software. Make sure that you have all listed parts before you get started, and read this section carefully prior to using the Board and software.

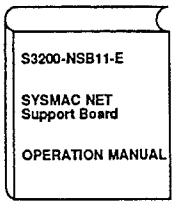
1-1 Parts Check

Thank you for purchasing this OMRON product. Make sure that you have the correct product and that all parts have been included. In the rare event that you find that a part is missing, be sure to contact the dealer from whom you purchased this product.

SYSMAC NET Support Board and Support Software

Name	Appearance	Remarks
SYSMAC NET Support Board		The SYSMAC NET Support Board is used for IBM PC/AT or compatible computers. It includes one bracket as an accessory.
SYSMAC NET Support Software		The SYSMAC NET Support Software is provided on one 3.5-inch 2HD floppy disk. Make sure that you have read and understood the user agreement before opening the software package.

Manual and User Agreement

Name	Form	Remarks
S3200-NSB11-E SYSMAC NET Support Board Operation Manual		Includes information from Support Board settings to program development, including the following parts: Setup Utilities Programming

1-2 Restrictions

The following restrictions are given for the SYSMAC NET Support Software and manual. Make sure that you read and understand these restrictions to avoid any infringement of rights.

- The software and manual are sold solely for individual use by the purchaser on one and only one purchaser system. Copying the software and manual for other than the purchaser's usage is strictly prohibited.
- The software was produced solely for the application described in this manual. We bear no responsibility for damage resulting from using the software with equipment and parameters not specified in this manual.
- The software and manual may change without notification to improve their quality.

Prohibited Items Related to the Software

- Single copy use is always a condition when purchasing software. Corporate and other purchasers are free to make software backup copies for the system when the customer has systems consisting of multiple terminals. The purchaser is, however, prohibited from making copies for use on other systems.
- Any software that is developed with the purchased software may be sold without restriction. However, the software that is sold may not contain all or any part of any software owned by others.
- Free software upgrades will not be provided when the purchaser changes to a higher-grade system. The purchaser's must buy new software in this case.

User Agreement and User Registration Card for the Software

A user agreement and user registration cards for the software have been included. This is to ensure that the purchaser will constantly be kept abreast of the most recent version of the application software that the purchaser is using. Therefore, please take the time to read through the user agreement and then fill out and return the user registration cards for the software before using the software for the first time.
Failure to return the registration cards may delay responses to purchaser inquiries, and may cause purchasers to miss out on software upgrades. Do not break the seal on the floppy disk case for the software until you have filled out the user registration cards. Please fill out user registration cards for each software product.

1-3 Precautions

Be sure to take the following precautions when operating a SYSMAC NET Support Board.

Using Multiple Boards

Only one SYSMAC NET Support Board can be mounted in an IBM PC/AT or compatible computer. However, one SYSMAC LINK Support Board can also be mounted at the same time.

Suppling Power to the Central Power Supply

The Central Power Supply uses an interruptible system, so power to the SYSMAC NET Support Board will shut off when AC power to the Central Power Supply is shut off. The power supply to the Central Power Supply thus must not be linked to the power supply to the IBM PC/AT or compatible computer.

Power Start/Stop Procedures

When power is supplied both from a Central Power Supply and from the IBM PC/AT or compatible computer, the power from the Central Power Supply takes priority. The network may temporarily shut down, therefore, if the Central Power Supply is turned off during network operation. Power from the Central Power Supply must be started before the network is started. By the same token, be sure to turn off power from the Central Power Supply first before shutting down the network. Do not insert or remove a Support Board with the power turned on.

Power Lines

Although optical fiber cables are used for transmission paths, power lines can be affected by noise, static electricity, and other electrical disturbances. Take proper precautions when wiring the Central Power Supply.

Serial Ports

If data is received on simultaneously via the serial port of an IBM PC/AT or compatible computer and the SYSMAC NET interface, the data at the serial port may be corrupted. Reduce the baud rate of the serial port if this happens.

SECTION 2
General Description

This section provides information on the SYSMAC NET, FINS communications, and Support Software. The section *2-3 Network Configuration* will serve as reference in configuring networks.

2-1 Features

Communications at 2M bps
The SYSMAC NET System is a token ring LAN designed for factory automation that communicates at 2M bps.

Data Transfers up to 2 KB
A maximum of 2K bytes of data can be transferred at one time.

Optical Fiber Cables
Transmit paths feature optical fiber cables, which are not susceptible electrical disturbances, such as noise and static electricity. (Proper precautions must be taken with power lines when a Central Power Supply is used, however, to prevent possible electrical disturbances.)

N:N Communications with up to 126 Units
N:N communications are possible for up to of 126 nodes mounted in a single network.

Powerful RAS Functions
Errors occurring in the network are detected and the network is protected by RAS functions, such as automatic loopbacks and node bypasses.

FINS Message Communications
The FINS (Factory Intelligent Network Service) protocol enables command/response data communications between PCs, FA computers, and other computers.

C and BASIC Libraries
C language and BASIC libraries are supported for FINS message communications program development. (C language: Microsoft C V6.0; BASIC:IBM compiler/2 V1.0, Microsoft QuickBASIC V4.5)

Datagram Service
A datagram service is supported to allow communications with nodes that do not support FINS communications.

Useful Utilities
A number of utilities required for network control, such as node diagnosis, routing table settings, loop tests, node configurations, are provided as standard equipment.

2-2 Specifications

Communications Specifications

Item	Specification
Communications system	N:N token ring
Network configuration	2-core optical fiber loop
Transmission system	Manchester code, base band
Baud rate	2M bps
Transmission paths	2-core plastic-clad optical fiber 2-conductor composite power lines (0.75 mm^2)
Number of nodes	126 maximum (per network, not including 1 Line Server)
Node separation	1 km maximum (3 km with repeaters)
Communication services	Datagram and RAS services as well as FINS message communications
Message length	2K bytes maximum
Communication buffer capacity	Transmission buffers: 1 message Reception buffer : 2K bytes, 15 messages
RAS functions	Automatic loopback Node bypass by Central Power Supply
Power supply	1.1 A at 5 V±5% (With Central Power Supply: 0.8 A)
Environment	Operating ranges (In an IBM PC/AT or compatible) Temperature: 5 to 45 °C Humidity: 8% to 80% (With no condensation) Storage ranges (In an IBM PC/AT or compatible) Temperature: –20 to 65 °C Humidity: 8% to 85% (With no condensation)

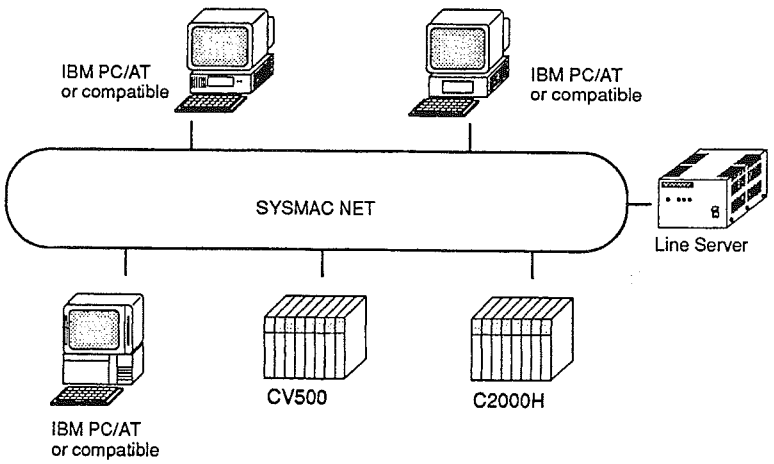
2-3 Network Configuration

The SYSMAC NET System is supported in single-level and multiple-level configurations and is fully compatible with the SYSMAC NET Link Units on SYSMAC C-series and CV-series PCs.

FINS message communications are normally used to communicate with SYSMAC CV-series PCs, while the datagram service is used to communicate with the SYSMAC C-series PC and other nodes that do not support FINS communications.

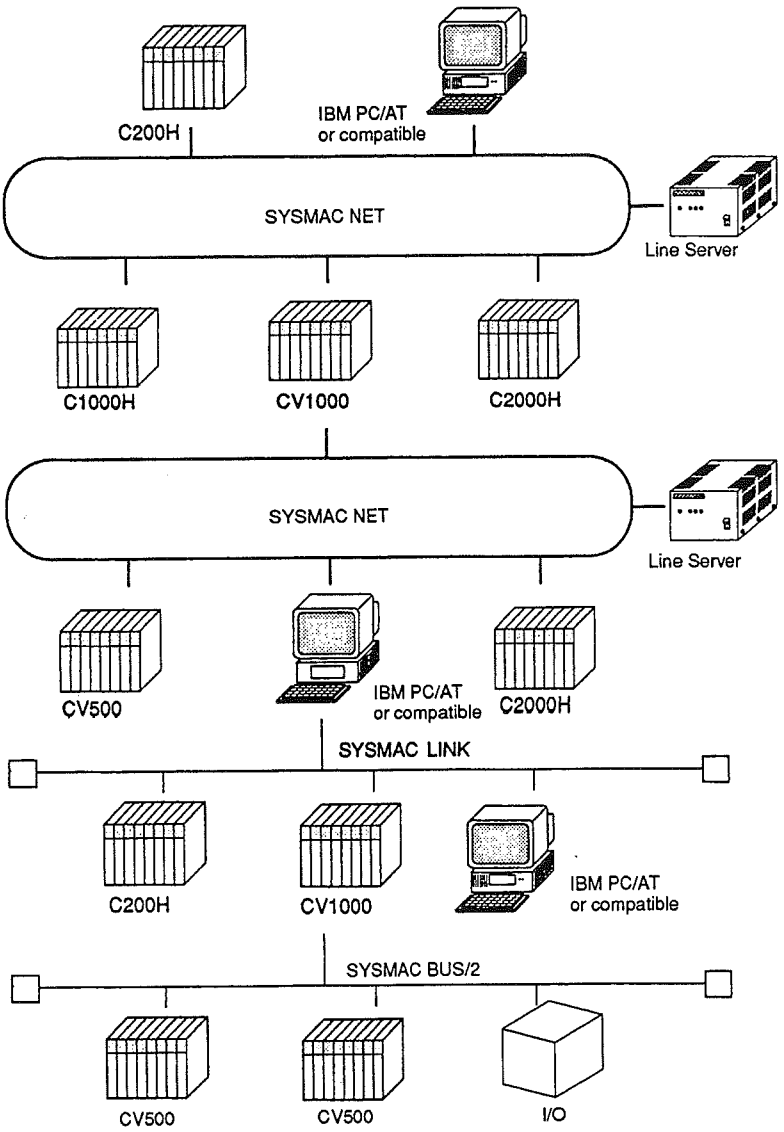
Examples of network configurations are given below.

2-3-1 Single-level Networks



Note When configuring a network, be sure to include a Line Server.

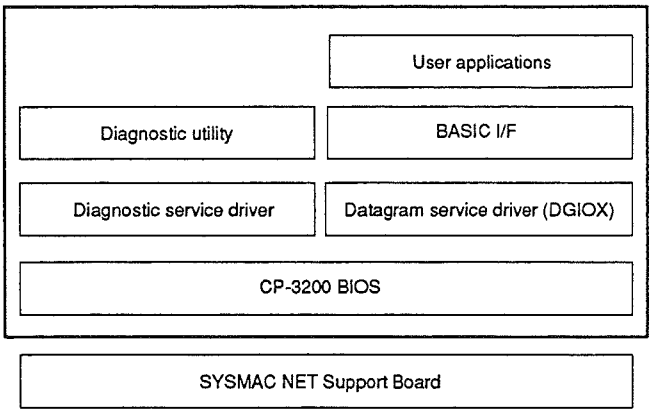
2-3-2 Multiple Level Networks



If FINS communications are used, communications are possible across up to 3 network levels, including both SYSMAC NET and SYSMAC LINK Systems.

2-4 Software Configurations

The following illustration shows the SYSMAC NET software configuration for IBM PC/AT or compatible computers. (I/F = interface)



CP_3200 BIOS

The CP_3200.SYS (BIOS) I/O module supports send and receive functions for the SYSMAC NET Support Board. The minimum memory capacity required here is about 12K bytes.

Datagram Service Driver

The DGIOX.SYS I/O module supports Datagram Service functions for the SYSMAC NET System. The minimum memory capacity required varies with the number and size of the transmission and reception buffers. The BIOS described above is required for DGIOX operation.

BASIC I/F

The BASIC interface is a programming language interface provided to simplify datagram communication via user applications. The BASIC language is supported.

Diagnostic Service Driver

The DIAG32.SYS I/O module supports SYSMAC NET diagnostic service functions. The minimum memory capacity required is about 13K. The BIOS described above is required for diagnostic service driver operation.

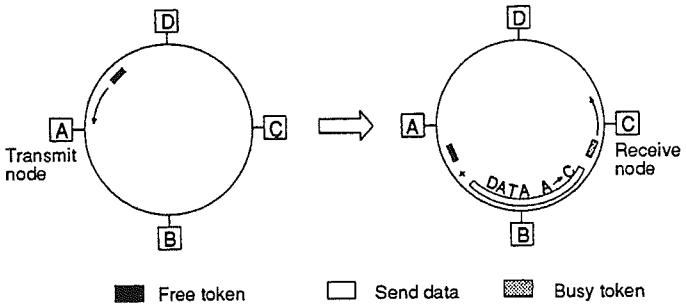
Diagnostic Utility

The diagnostic utility checks the status of nodes mounted in the SYSMAC NET System by performing echo back and other tests to diagnose nodes.

2-5 Communication Features

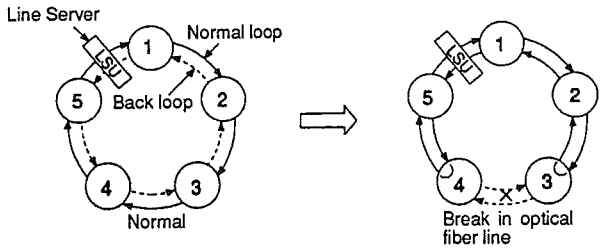
Token Ring

SYSMAC NET System is a token ring LAN. The token ring system is used for communications with nodes connected in the shape of a ring. A token representing the right to transmit moves around the network enabling the node holding the token to transmit. The transmitting node generates a token at the end of transmission, and thus passes the right to transmit to the next node. If the token is passed to a node that doesn't have data to transmit, the token is immediately passed to the node with the next highest address.



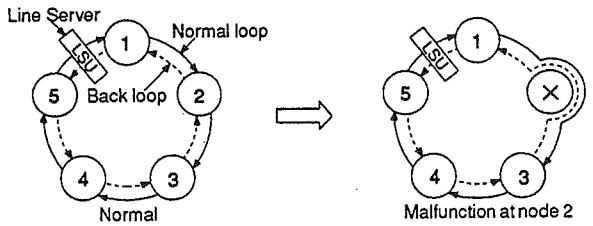
Loopbacks

The SYSMAC NET System supports a loopback function. The loopback function automatically creates a new transmission path on a backloop that is used to prevent the entire network from shutting down in the event of a break in the transmission path along the ring.



Node Bypass Function

The SYSMAC NET System supports a node bypass function. The node bypass function bypasses faulty nodes in order to prevent the entire network from shutting down when a node within the ring is not working. (A Central Power Supply is required to support the node bypass function.)



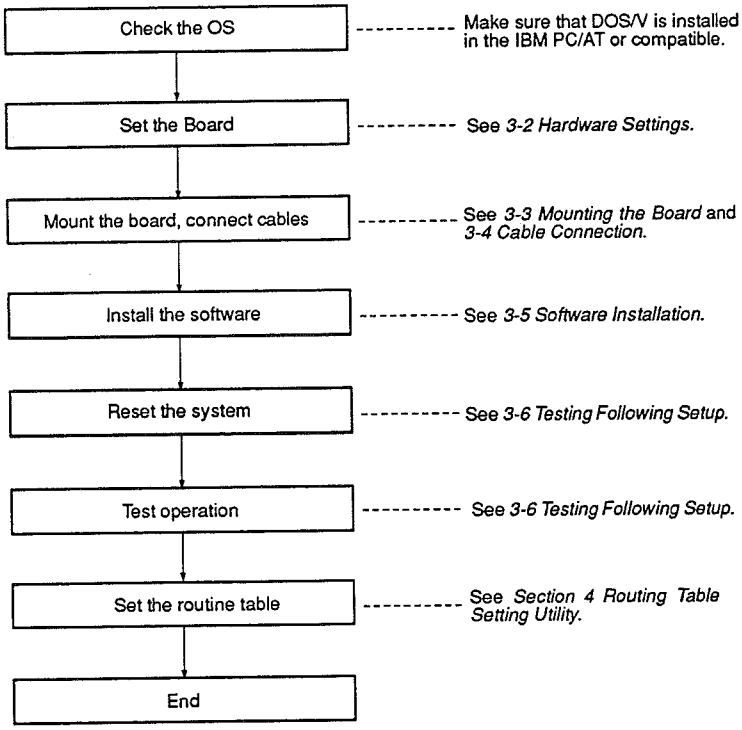
SECTION 3
Setup

This section explains setup procedures such as board settings, mounting, software installation, and operating tests. Perform the setup procedure carefully while referring to this section.

3-1 Setup Procedure

The following procedure describes the setup for communicating through a SYSMAC NET Support Board installed in an IBM PC/AT or compatible computer and connected to a SYSMAC NET network.

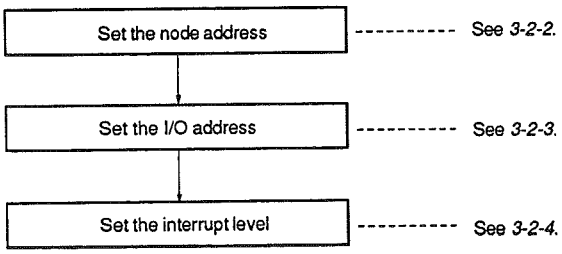
Refer as needed to any or all of the manual sections given below while performing the setup procedure.



Note The routing table setting is not necessary when using a single network.

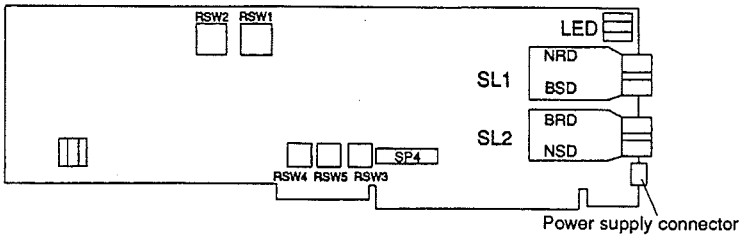
3-2 Hardware Settings

Follow the procedure below to set the hardware. Be sure to refer to *3-2-1 Block Names and Functions* when setting the hardware.



3-2-1 Block Names and Functions

An external view of the Board showing the setting switches, LED indicators, and other components is shown below.



Name	Function
RSW1, 2	Sets the node address.
RSW3, SP4	Sets the interrupt level.
RSW4, 5	Sets the I/O address.
SL1	Upstream optical connector.
SL2	Downstream optical connector.
LED indicators	Displays the power supply and loop status.
Power supply connector	Connects the power supply line.

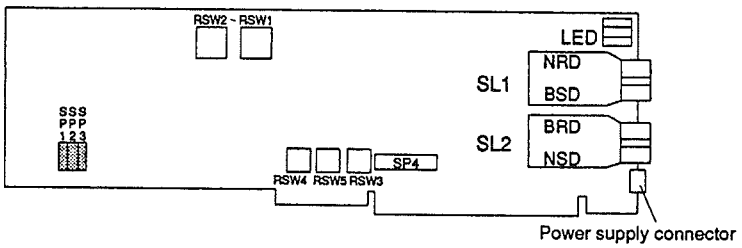
LED Indicators

Indicator		Status	Function
Name	Color		
V2: Power supply	Red	Lit	Lit when power is supplied by the central power supply.
		Not lit	Unlit if no power is supplied by the central power supply.
NCD: Connection	Green	Lit	Lit when connected to a normal loop.
		Not lit	Unlit if not connected to a normal loop.
BCD: Connection	Orange	Lit	Lit when connected to a back loop.
		Not lit	Unlit if not connected to a back loop.

Short Pins

Use the factory settings for SP1, SP2, and SP3 as shown below.

Short pin	Factory setting
SP1	Short
SP2	Short
SP3	Open



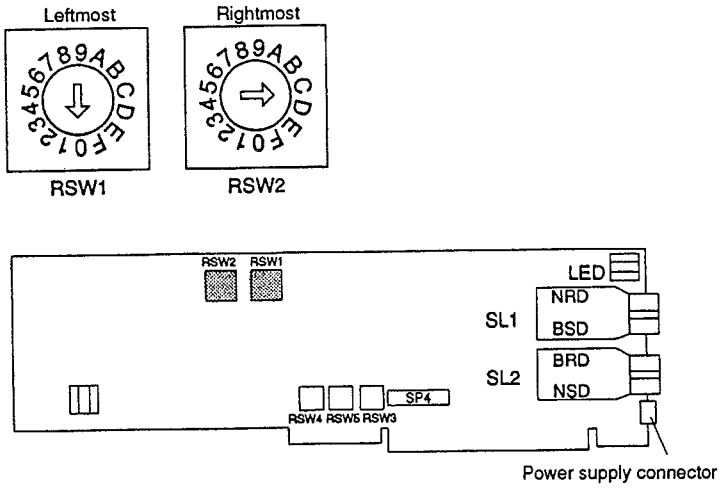
3-2-2 Node Address Settings

The node addresses are used to identify nodes. Do not use the same node address more than one within a single network.

Node addresses are set using 2-digit hexadecimal numbers (01_H to $7E_H$) ranging from 1 to 126 in decimal. Addresses are set on RSW1 and RSW2, and must be set with hexadecimal numbers.

Use a small straight flat-blade screwdriver to carefully set addresses without damaging the switch groove.

The example below shows a setting of 12 ($0C_H$) (factory setting).



Note

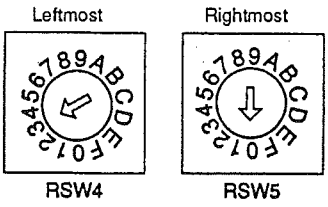
1. The factory setting for the node address is 00_H. Be sure to set the node address for each node.
2. Do not use the same address more than once in a single network.
3. Do not use address 00_H or addresses $7F_H$ and higher for any node.

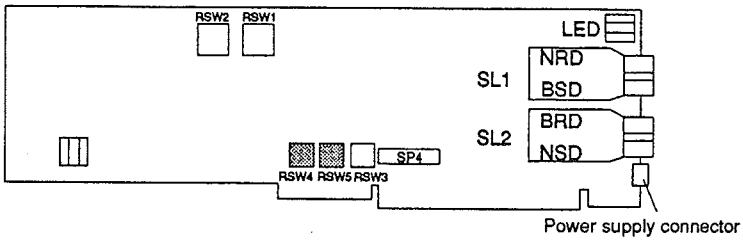
3-2-3 I/O Address Settings

The I/O address used by the Board can be set. The factory setting can be used as long as no other option boards are being used.

The I/O address is set on RSW4 (Leftmost) and RSW5 (Rightmost) within a range from 000_H to $3F0_H$. Use RSW4 and RSW5 to set the leftmost two digits of the I/O address (i.e., the XX part of $XX0_H$).

The example below shows a setting of 300_H (factory setting).





Note
1. Set a unique I/O addresses within a range from 000_H to $3F0_H$ when another option board (e.g., SYSMAC LINK Support Board) is being used.
2. The rightmost digit of the address is fixed at 0, but actually $XX0_H$ to XXF_H are used.

3-2-4 Interrupt Level Settings

The interrupt level used by the Board can be set. The factory settings can be used as long as no other option boards are being used.

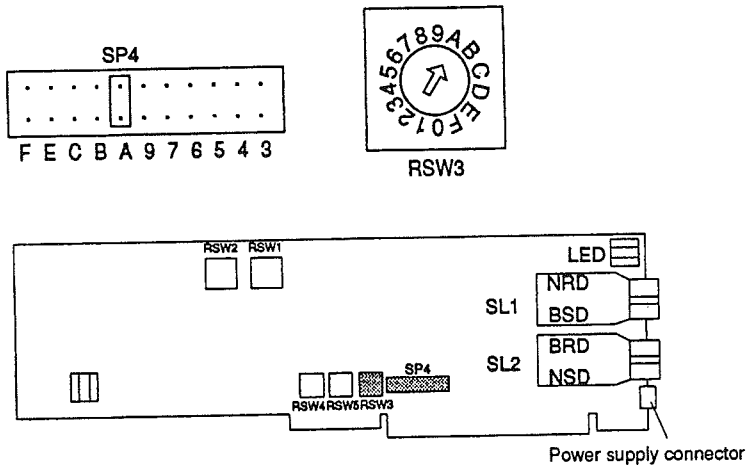
The interrupt level is set on short pin SP4 and rotary switch RSW3. Make sure that both are set to the same level. The only possible settings here are 10, 11 and 15; do not use any other interrupt level.

Do not set the same level for any other option boards.

Short pin SP4 and rotary switch RSW3 settings correspond to the interrupt levels as shown in the following table.

Interrupt level	Short pin SP4 and rotary switch RSW3
10	A
11	B
15	F

The example below shows interrupt level INT10 (factory setting).



Note 1. Make sure that SP4 and RSW3 are set the same.

2. Do not set the same level used for other option boards.

3-2-5 Summary of Factory Settings

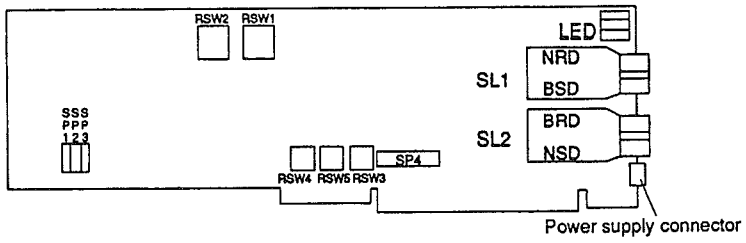
The factory settings for short pins and rotary switches are given below.

Short Pin Settings

Short pin	Factory setting	Meaning
SP1	Shorted	Do not change the settings of SP1 to SP2.
SP2	Shorted	
SP3	Open	
SP4	Only A shorted	Interrupt level INT10

Rotary Switch Settings

Rotary switch	Factory setting	Meaning
RSW1	0	Node address 00_H
RSW2	0	
RSW3	A	Interrupt level INT10
RSW4	3	I/O address 300_H
RSW5	0	



3-3 Mounting the Board

3-3-1 Removing the Cover

1, 2, 3...

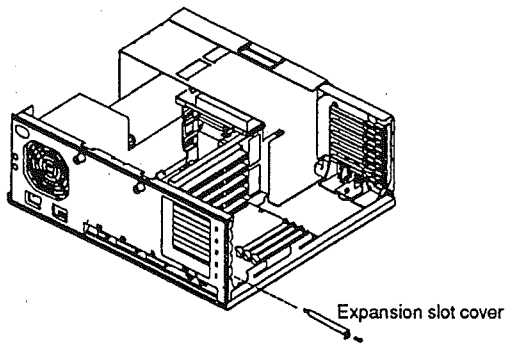
1. Turn off power to the computer as well as any displays or printers connected to the computer.
2. Unplug all power cords from the electrical outlets.
3. Remove the cover from the computer according to directions in the manual that came with it.

3-3-2 Installing the Board

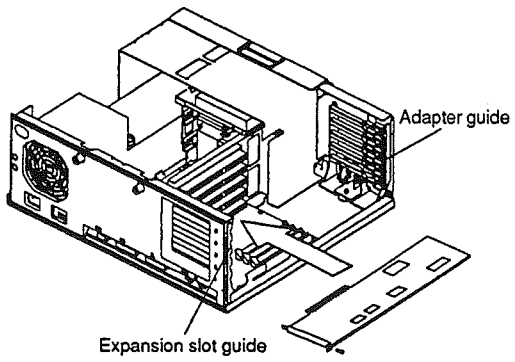
The following is a generalized procedure for mounting the Board. Refer to directions in the manual that came with the computer for details on specific computers.

1, 2, 3...

1. Look into the computer and locate an expansion connector without a board mounted to it.
2. Remove the screws from the expansion slot cover using a flat-blade screwdriver, and remove the cover.



3. Remove the power connector and the dust cover on the front panel of the Board.
4. Hold the Board with the top of the Board facing you. Insert the Board so that one end lines up with the adapter guide and the other end lines up with the expansion slot guide. Make sure that the Board is inserted all the way into the connector.
5. Tighten down the screws loosened in step 2.



Note The Board cannot be mounted with the power and optical connectors attached.

3-3-3 Mounting the Cover

1, 2, 3...

1. Place the cover onto the computer
2. Tighten the cover screws.
3. Connect all disconnected cords and cables to the rear of the computer.

Note Leave an gap of at least 5 cm on either side of the computer to keep the computer from overheating.

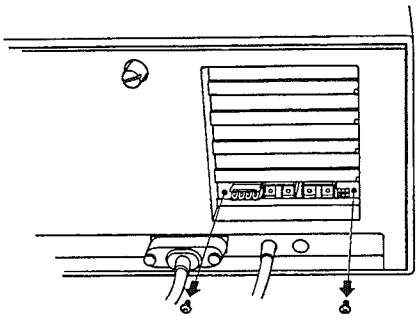
3-4 Cable Connections

3-4-1 Mounting the Cable Bracket

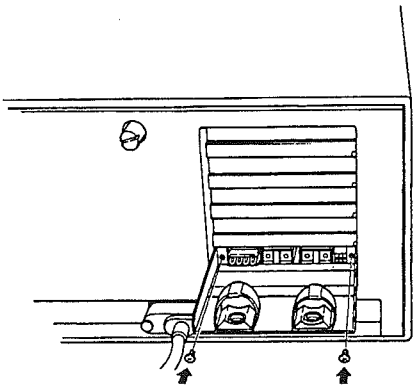
Mount the cable bracket as described below to secure the optical fiber cable and power line.

1, 2, 3...

1. Remove the screws (M3 x 2) mounted to the front panel of the Board.



2. Use the screws removed in step 1. (M3 x 2) to secure the cable bracket to the front panel of the Board as shown in the figure below.

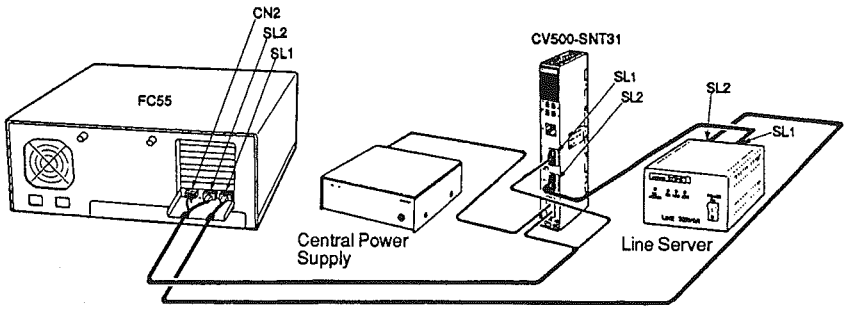


3-4-2 Optical Fiber Cables and Power Lines

Transmission Path

Wire the SYSMAC NET Support Board (S3200-NSB11-E) with optical fiber cables.

Also wire a power supply line to the Central Power Supply (S3200-CPS03) to provide power to the network. The figure below shows a wiring example.



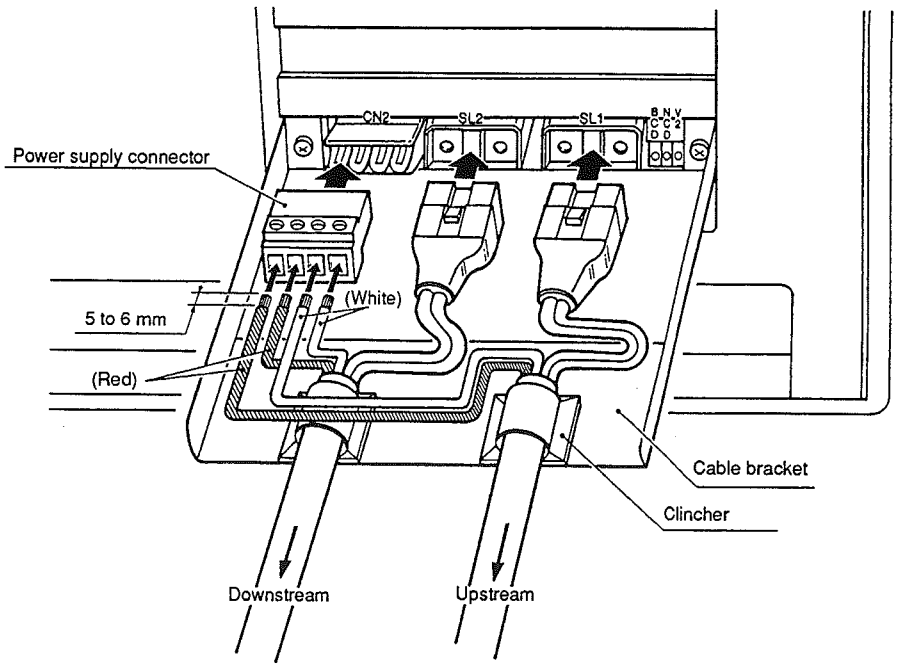
Connect the optical fiber cable from SL1 to the upstream node's SL2 connector and the optical fiber cable from SL2 to the downstream node's SL1 connector as shown above.

Connecting Optical Fiber Cables and Power Line

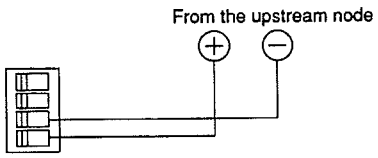
Follow the procedure below to connect the optical fiber cables and power line to the SYSMAC NET Support Board (S3200-NSB11-E).

1, 2, 3...

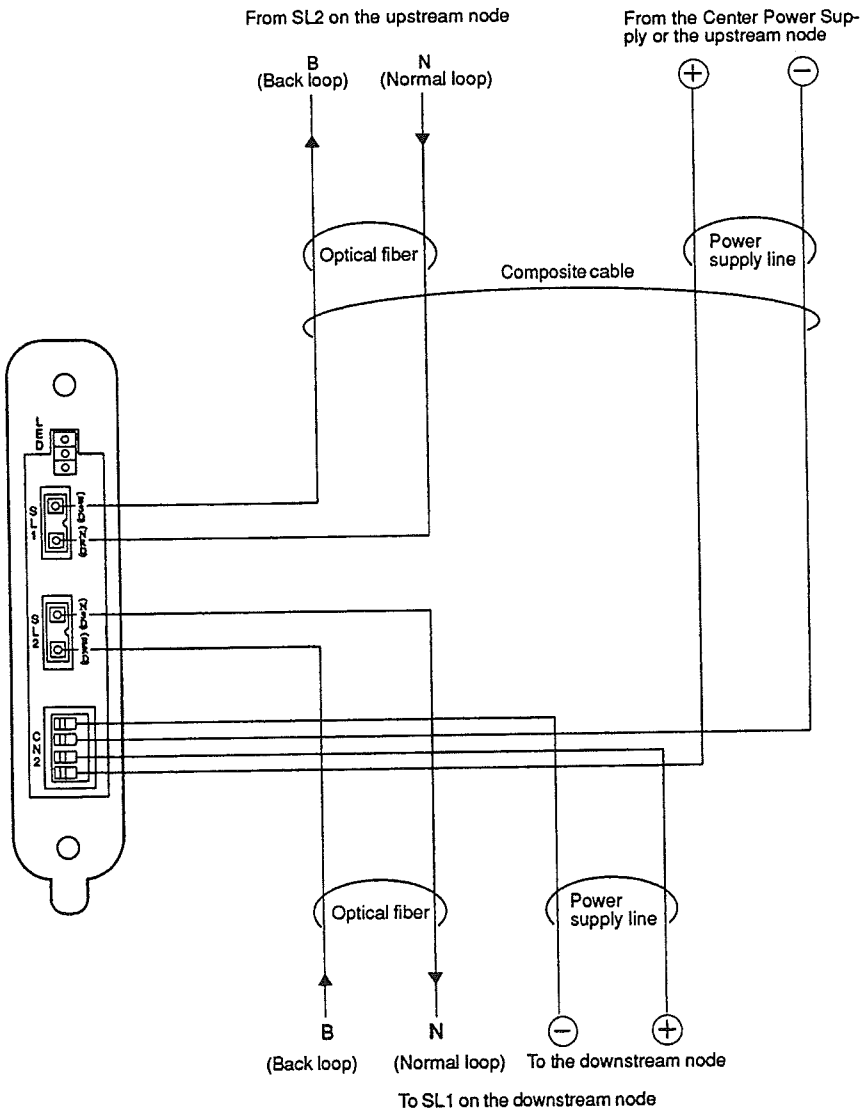
1. Use a flat-blade screwdriver to secure the power line to the power connector as shown in the figure below. Make sure that the conductive part of the power line is not protruding from the connector.
2. Connect the optical fiber cable on the upstream side to SL1, connect the optical fiber cable on the downstream side to SL2, and connect the power connector to CN2 using the appropriate cables and connectors.
3. Secure the cables with the clinchers.



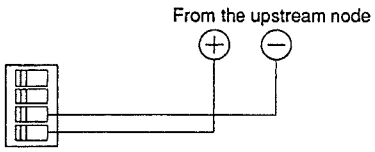
Note At the end node, connect the power line to CN2 as shown below.



Connecting Diagram for SYSMAC NET Cables



At the end node, connect the power line to CN2 as shown below.



3-5 Software Installation

Software installation is required for basic software, datagram service software, and the FINS library.

If the CONFIG.SYS file does not contain ANSI.SYS, then use an editor to add the following line:

DEVICE=C:\DOS\ANSI.SYS

Screens will not display properly without ANSI.SYS.

3-5-1 Executing the Install Program (INST 32M)

Execute the install program as described below and input numerical figures when prompted on the screen. The software installation automatically updates the CONFIG.SYS and AUTOEXEC.BAT files.

Once the required items are input and the program ends, the basic software and datagram service will be in the SN3200 directory. The CONFIG.SYS and AUTOEXEC.BAT files will also be updated.

The following explanation is for a standard IBM PC/AT or compatible computer with floppy disk drive "A" and hard disk drive "C."

Starting Up the Install Program (INST32M)

1, 2, 3... 1. Insert the SYSMAC NET Support Software into drive A.

2. Input INST32M↵ at the drive A prompt.

```
A:\>INST32M /E
```

The following screen is displayed.

```
* * * * * * * * * SYSNET          INSTALL PROGRAM * * * Version 1.05



    <NOTES>     When install program executes,'CONFIG.SYS','AUTOEXEC.BAT'

              are made in root directry

                If these files already exist,next treatment will be done

                  1.The present fail is preserved as the file name of
                   extention mark '.ORG'

                  2.In case the information of    SYSNET    don't exist
                   yet,these information will be added

                  3.If the information of    SYSNET    already exist
                   these information will be renewed


               Do you want to install? [Y/N]          :
```

3. Input Y↵.

```
              Do you want to install? [Y/N]          :    Y
```

Installing the Basic Software

4. The following screen is displayed. Since the floppy disk is inserted in drive A, input A↵.

```
                    Insert disk of  SYSNET in drive



                          Drive name      :A
```

5. Input of the install destination is requested next. Since the software will be installed on drive C, input C↵.

```
Insert disk of  SYSNET in drive

Drive name      :A

Specify drive name of the entered side(installed side)

Drive name      :C
```

6. The following inquiry is displayed on the lower part of the screen. Input Y↵.

```
Do you use basically software of    SYSNET    ?
    [Y/N]       :   Y
```

"Copying" is displayed and loading begins. The following screen is displayed when the software is loaded.

7. Since new installation will be selected here, just enter ↵.

```
Select New entered or renewal of entered

[new: 0  renewal: 1]      :  0
```

CONFIG.SYS and AUTOEXEC.BAT Settings

8. On the following screen, input the number of buffers and files. In this example 20↵ and 20↵ are input.

```
Enter the Parametor of CONFIG.SYS

    buffers         [present value=20]      20

    files           [present value=20]      20
```

Reference Information

Number of buffers: The number of system buffers that the OS will use.
Number of files: The number of files that the OS can open at once.
For further details, refer to your DOS manual.

9. Input parameters of SYSMAC NET link driver on the following screen.

```
Enter the parametor of    SYSNET    Driver

     I/O address
         [    0H  -  FF0H  present=   0H]          : 0

     Interrupt
         [INT 00H  - INT 00H  present=INT 00H]     :

     Network Address
         [ 00H -  7FH present= 00H]                :

     Language of Utilities
         [0 :JAPANESE  1 :ENGLISH]                 :

     Concentrator connection
         [0 :none,1 :exist]                        :

     Automatic setting of Routing table
         [0 :none,1 :exist]                        :
```

I/O Address: The I/O address used to access the SYSMAC NET Support Board. Input the value set on the Board (normally 300↵).

Interrupt: The interrupt level for SYSMAC NET communications. Skip this item since the default value set on the Board is used.

Network address: Input the network address. Here, 0↵ is input.

Language of Utilities: Specify whether the messages output to screen will be in Japanese or English. Input either number. Input 1↵ for this example.

Concentrator Connection: Normally a concentrator is not used with the SYSMAC NET System, so input 0↵.

Automatic Setting of Routing Table: If "Exist" is selected here, the routing table setting command will be stored in the AUTOEXEC.BAT file so the routing table will be set automatically in the SYSMAC NET link driver when the computer is started up.
A routing table is not set in this example, so input 0↵.

Reference Information

- Refer to *3-2-3 I/O Address Settings* for more information on I/O addresses.
- Refer to *3-2-4 Interrupt Level Settings* for more information on interrupts.
- See *Section 4 Routing Table Setting Utility* for more information on routing tables.

Loading the Datagram Service (UDP/IP)

10. The following inquiry will come up. Input Y↵.

```
Do you use datagram service?        [Y/N]     :  Y
```

The following screen is displayed.

```
Do you use datagram service?          [Y/N]      :   Y

Insert the datagram service floppy in drive  :A

and press [RET] key
```

11. Since the datagram service software is included in the SYSMAC NET Support Software, just enter ↵.

"Copying" is displayed on the lower part of the screen, and loading begins. The following screen is displayed when the software is loaded.

```
transmitting file (TFTP) service    [0: DON'T,  1: DO ]   0

              Auto restart          [0: DON'T,  1: DO ]


buffer size of datagram             [1-2000] byte

number of datagram buffer           [1-32]

number of datagram buffer with ACK [0-32]
```

12. Input the datagram service parameters given below on the above screen.

Transmitting File (TFTP) Service:	The transmitting file (TFTP) service is not supported at this time, so input 0↵.
Auto Restart:	There is no need to enter anything here.
Buffer Size of Datagram:	Here, 2000↵ is input
Number of Datagram Buffers:	The number of datagram buffers must set high enough to allow for the datagram communications load. Here, 3↵ is input.
Number of Datagram Buffers with ACK:	The number of datagram buffers with ACK is not supported at this time, so input 0↵.

The following service loading screen is displayed after all the items in step 12 are input. Since these services are not presently supported, they must be handled as described below.

13. Input N↵ on the next screen.

```
Do you use file server service (server station)?

        [Y/N]      :   N
```

14. Input N↵ on the next screen.

```
Do you use file server service (requester station)?

        [Y/N]      :   N
```

15. Input N↵ on the next screen.

```
Do you use TCP service

        [Y/N]      :   N
```

16. Input N↵ on the next screen.

```
Do you use name service?

        [Y/N]      :   N
```

Summary of Settings

The following display shows the settings made with the Install Program.

```
ContenParametor of    SYSNET    Driver I/O Address
     Parametor of COFIG.SYS          Buffer              20
                                      Files              20
                                                         300
                                   Interrupt             00
                                   Network Address       00
                                   Output message        English
                                   Connection with F.C.  ****
                          Automatic fixture of Routing table ****

     Using Service
               Datagram                                  USE
                    Buffer size                          2000
                    Number of datagram buffer            3
                    Number of datagram with ACK buffer   0
               Transmitting file(TFTP)                   ****
                    Auto restart                         ****
               File server(server)                       ****
                    Auto restart                         ****
               File server(requester)                    ****
               Name service                              ****
                    Auto restart                         ****
               TCP service                               ****
Are you sure? [Y/N]       :
```

17. Check the setting details, and input Y↵ if they are correct.

```
Are you sure? [Y/N]          :  Y
```

Updating CONFIG.SYS and AUTOEXEC.BAT

18. Input Y↵ on the following screen.

```
CONFIG.SYS and AUTOEXEC.BAT will be made

Are you sure ?  [Y/N]          : Y
```

When the files are created, the following screen is displayed.

```
CONFIG.SYS and AUTOEXEC.BAT will be made

Are you sure ?   [Y/N]          : Y

                    <<FINISH OF MAKING>>



*  Extract the system disk of  SYSNET,

    restart computer
```

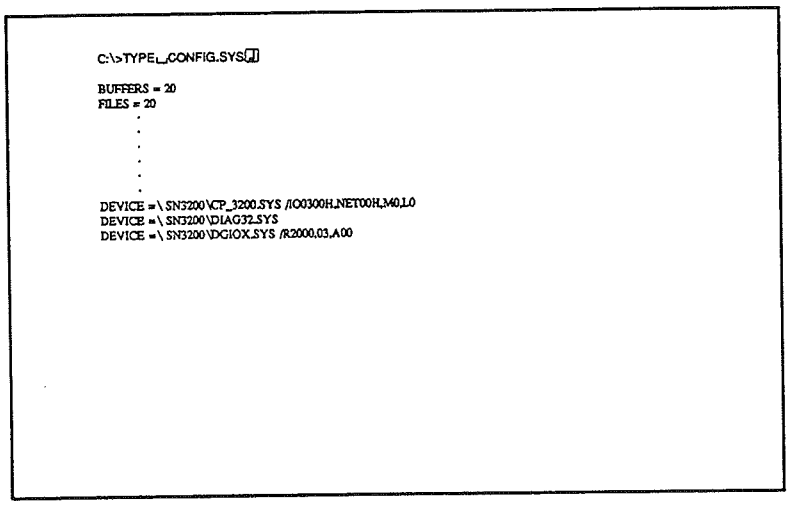
The software installation is now completed. Restart the system to use the SYSMAC NET Support Board.

Note Refer to *3-6 Tests Following Setup* and perform the communications tests before actually communicating for the first time.

3-5-2 CONFIG.SYS Check

Make sure that CP_3200.SYS, DIAG32.SYS, and DGIOX.SYS are properly listed in the CONFIG.SYS file.

Input TYPE CONFIG.SYS↵ at the prompt for the root directory of drive C.



Make sure that the three lines above were added correctly.

The following explains the parameters.

CP_3200.SYS (SYSMAC NET Link Driver)

DEVICE = \SN3200\CP_3200.SYS /IO0300H/, /NET00H, M0, L0
1 2 3 4

1, 2, 3...

1. I/O address (I/OxxxxH)

   The same value must be set as the hardware setting.
   xxxx: 0000 to 03F0 (4-digit hexadecimal)

2. Network address (NETxxH)

   The same value must be set for all nodes in the same network.
   xx: 00 to 7F (2-digit hexadecimal)

3. Display language (Mx)

   The display language specifies the language used to display utility messages.
   x=0: Japanese, x=1: English

4. Concentrator connection Y/N (Lx)

   Normally a concentrator is not used, so specify 0.
   x=0: No, x=1: Yes

DIAG32.SYS (Node Diagnostic Response)

DEVICE = \SN3200\DGIOX.SYS

No parameters are required.

DGIOX.SYS (Datagram Service)

DEVICE = \SN3200\DGIOX.SYS /R2000, 03, A00
1 2 3

1, 2, 3...

1. Buffer size

   1 to 2000 (Decimal)

2. Number of reception buffers

   1 to 32 (Decimal)

3. Number of datagram buffers with ACK

   0 (Not supported)

3-5-3 File Check

Make sure that the files listed below have been copied to the SN3200 directory after installation is completed.

Input the following at the prompt for the SN3200 directory.

```
C:\SN3200>DIR | MORE
```

or

```
C:\SN3200>DIR/W
```

File List

DIAG32.SYS	13684	90-06-27	5:52
PCDSPLTM.C	10862	92-07-08	7:01
CP_3200.SYS	9973	92-07-15	3:33
PCDSPLTM.EXE	10434	92-06-18	1:01
STAT32.EXE	18897	91-11-06	3:03
RT2_2	230	89-06-20	11:22
RT2_1	237	89-05-12	10:34
VERMNG	2545	91-09-26	19:58
RT1_1	119	89-05-12	10:33
RT1_2	119	89-06-20	11:15
LTEST.EXE	33954	90-04-04	2:05
RT1_3	119	89-12-19	18:52
SCAE2	1731	89-04-07	9:42
SCAE1	1611	89-04-07	9:42
SCA7	1916	91-08-30	13:11
SCA5	2038	89-12-21	17:00
SCA4	1942	89-12-21	17:04
SCA3	1791	89-02-10	17:49
SCA2	1611	89-04-07	9:43
SCA1	1505	89-02-10	17:48
SCAE7	2152	91-07-02	13:48
SCAE6	2107	89-12-21	17:03
SCAE5	2107	89-12-21	20:54
SCAE4	2007	89-12-21	20:54
SCAE3	1879	89-04-07	9:39
SBE1	297	89-12-21	16:59
SBE2	443	90-05-29	16:53
SBEE1	260	89-04-10	15:37
SBEE2	374	90-05-29	16:49
SBF1	297	89-12-21	16:57
SBF2	443	90-05-29	16:53
SBFE1	260	89-12-21	17:08
SCA6	2038	91-11-26	8:59
SBFE2	374	90-05-29	16:49
DIAGMT32.DAT	1	92-07-08	19:27
DGTESTM.EXE	43925	89-12-15	1:01
PCDSPMSM.C	11634	92-04-21	17:56
ROUTE.DAT	1	92-07-08	18:56
DGSUB.BIN	13628	90-06-18	2:11
CONF32.EXE	22065	91-11-05	18:26
INST32M.EXE	103070	92-02-19	1:05
VER32.EXE	11365	91-11-06	3:03
PCDSPMSM.EXE	8659	89-12-05	1:01
DGSUB.OBJ	8972	90-06-18	2:11
RTREAD.EXE	16848	90-06-26	3:02
OPTCONF.EXE	28129	89-12-21	13:27
RTSET.EXE	15154	92-07-09	16:48
TBLCONF.EXE	30337	89-12-20	22:23
CUT32.EXE	9133	89-12-11	3:01
DIAGMT32.EXE	179426	91-09-16	5:54
ATDSPBAM.BAS	3344	92-05-14	6:22
CONFIG.SMP	86	90-04-25	9:21
DGIOX.SYS	11449	92-07-09	2:14

3-6 Tests Following Setup

Perform the following tests after setting the hardware and installing the software in order to diagnose whether the setup was correct or not.

3-6-1 System Reset

1, 2, 3...

1. If there is a floppy disk in drive A, remove the disk at this time.
2. Press DEL while holding down both the CTRL and ALT keys to reset the system. Make sure that the following screen is displayed after the DOS system starts up.

```
SYSNET          CP_3200 V 3.0 R 3.3
     LOADED BIOS.
```

The following screen is displayed if the resident DIAG32.SYS module for node diagnosis was properly installed.

```
DIAGNOSTIC SERVICE driver is now active
```

Error Messages

The following message is displayed if there is an error in SYSMAC NET driver parameters.

```
(irregular parameter of BIOS)
```

The following message is displayed if the setup was not correct.

```
(WARNING NSB-11 ADAPTER CARD NOT INSTALLED)
```

The following message is displayed if DIAG.SYS installation was incorrect.

```
Faile to load DIAGNOSTIC
SYSNET BIOS is not existed
```

If any of these messages is displayed, correct the CONFIG.SYS parameters as well as the NSB rotary switch and short pin settings, and then restart the system.

3-6-2 Check Using the Version Display Utility

The version display utility displays information set for the SYSMAC NET link driver. Check to make sure that the settings are correct.

Input VER32↵ at the prompt for the SN3200 directory.

```
C:\SN3200> VER32
```

The screen below is displayed.

```
        * * *     SYSNET    VERSION INFORMATION   * * *  Version 3.03



                  Type
                  Version              3.0
                  Revision             3.3
                  Packet Length (MAX) 2048  Byte
                  Interrupt Number    10
                  I/O Address         0300H
                  Interrupt Process Address
                       Offset 1FB8H  Segment 1B25H
C:\SN3200>
```

Refer to *8-1 Version Display Utility* for details on the display.

3-6-3 Status Information Check

Status information can be displayed on SYSMAC NET link driver settings or individual node status. Check the network address, local node address, and loop status.

Input STAT32↵ at the DOS prompt.

```
C:\SN3200> STAT32
```

The following screen is displayed.

```
        * * *   SYSNET      STATUS INFORMATION   * * *  Version 3.03



        Net work Address  = 000
        Node Address      = 018
        Optical LAN       = normal
        Power             = OFF
              80 D3 12 A4 01 2A 2D   VER=V 3.0,R 3.3

                                  Illegal Interrupt              0
                                  Receive Interrupt Error        0
   Number of                      Send    Interrupt Error        0
   Total  send            0       Error in Receive Process       0
   Normal send            0       PCB Packet Type Unmatch        0
   Total  receive         0       Illegal Loop                   0
   Normal receive         0       Can't Use The Send Buffer      0
   Send Execute           0       Receive Data Short             0
   Send Request           0       Send    Time out               0
   IP   Send              0       Receive Time out               0

   When you have the option to set the /P,you can look at the
C:\SN3200>                                    counter of every PROTOCOL.
```

Check the board settings, CONFIG.SYS file parameters, and optical fiber cables if a loop error is indicated.

Refer to *8-2 Status Display Utility* for details on this display.

3-6-4 Loop Test

The loop test determines whether a computer that has been set up can communicate on the network or not.

In the loop test, 2K bytes of test data is transmitted from the computer onto the network using the address of the local node (i.e., the computer). The received data is compared to the transmitted data, and the results are displayed.

The procedure for the test is given below.

1, 2, 3... 1. Input LTEST↵ at the prompt for the SN3200 directory.

```
C:\SN3200> LTEST
```

The following initial screen is displayed.

```
        *** SYSNET LOOP TEST UTILITY PROGRAM *** Version 2.05


This program tests the SYSNET by cpmparing data
transmitted for own node and received data.
2k byte test data is changed its copmposition of format every time.


                < Press [P] or [G] key to start >
    [P]         key----> Print out the result of the test.
    [G]         key----> Not to print.
    [ESC]       key----> Exit from this test.
```

2. Input G to start the loop test. Input P to print out the test results. The results are printed out when the test is completed.
3. Press the Escape key when a sufficient number of tests has been performed to end the test and display the results.

```
                                        network          address = 00h
                                        node             addesss = 12h
                                        loop             status  = D3h
Start Date 1992/10/15 Time 11:13:50     data                     = 3Fh


Total   Normal   Time out   Abnormal length    Abnormal data
  64      64

Message :
```

4. Press any key while test results are displayed on screen to end the utility and display a prompt.

Refer to *Section 6 Loop Test Utility* for procedures when messages are displayed or errors are indicated.

SECTION 4
Routing Table Setting Utility

A routing table must be set for communications with interconnected (i.e., remote) networks when more than one network is connected in a system. Refer to this section to set the routing table.

4-1 General Description

Small-scale LAN systems can be constructed with just one network, but larger-scale systems often must be constructed with multiple networks.

A routing table is required when multiple networks are connected together so that nodes on one network can communicate with nodes on the other networks.

The routing table setting utility simplifies the process of setting routing tables and reading routing tables that are set.

This section describes routing, routing tables, network addresses, and node addresses, and explains the procedure for using the routing table setting utility.

4-2 What Is a Routing Table?

4-2-1 Routing

A node in one network cannot communicate with a node mounted in another network in the same way that it communicates with other nodes within its own network. Here communications must go through at least one gateway or a bridge.

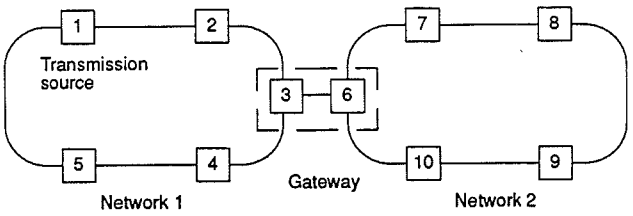
Therefore the gateway or bridge to go through must be set in order to communicate with nodes in the other network. Routing refers to a function that directs communications through a specified gateway or bridge when transmitting to other networks.

4-2-2 Routing Tables

A routing table lists paths from the transmitting node to the receiving node. The information listed in the table consists of the network address of the communication destination as well as the address of the first gateway (first hop address).

In the network shown below, for example, node 1 on network 1 is to communicate with a node on network 2. Here, the following information must be listed in the routing table.

Destination network address: 2
Gateway address (First hop address): 3

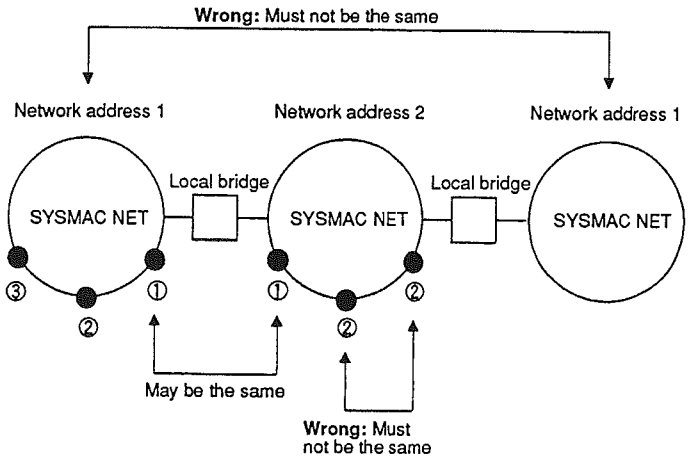


Figures in boxes indicate node addresses.

4-2-3 Network and Node Addresses

A network address is assigned to each network in order to enable routing. The assigned network address must not be the same as any other network address.

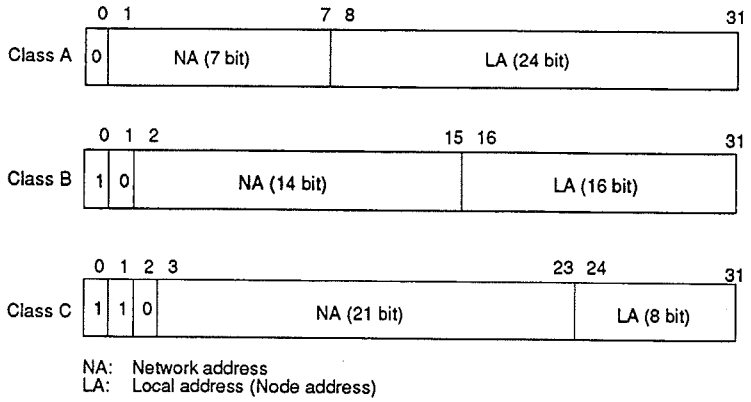
A network with multiple nodes uses a unique node address for each node. The same node address cannot be used twice within the same network, although the same node address can be used again in different networks.



4-2-4 IP Addresses

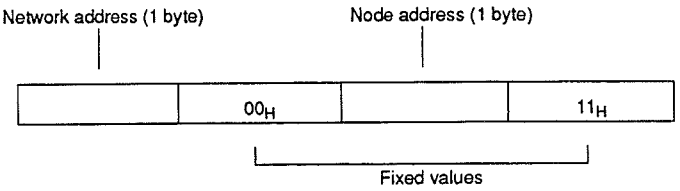
The network and node addresses described above together form what is known as an internet protocol (IP) address. An IP address is represented by 4 bytes (32 bits) allocated to the network and node addresses. There are three ways to allocate bits. The SYSMAC NET System uses Class A.

IP Address Format



The node address set for the SYSMAC NET Support Board and the network address set for the SYSMAC NET link driver are used unaltered in the IP address so that the SYSMAC NET network and node addresses can be obtained directly from the IP address.

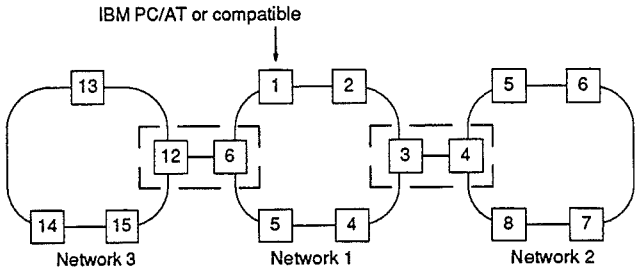
SYSMAC NET Address Format



4-3 Editing Routing Table Files

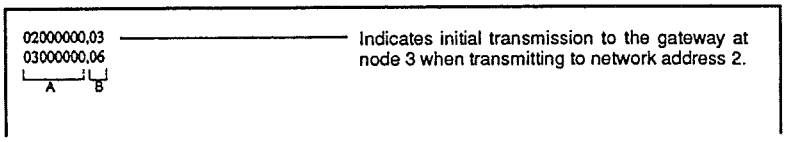
Routing data is stored in a data file (ROUTE.DAT) to set routing tables.

The following describes the procedure for storing routing data for node address #1 (IBM PC/AT or compatible computer) using the network configuration shown below as an example.



1, 2, 3...

1. Start the editor and open the ROUTE.DAT file located in the SN3200 directory.
2. Enter one piece of the routing table on each line. Here, input the following.



- Write the network address in hexadecimal in section A. The network address is expressed in bytes 1 to 4. Class A IP addresses are used in SYSMAC NET Systems, so set the network address in the first byte and insert zeroes in the next three bytes to make four data bytes.
- Use a comma to separate the network and gateway addresses.
- Enter the gateway address in hexadecimal in section B.

Note a) A maximum of 80 lines can be stored in a routing table file. An error will be generated if the table contains more than 80 lines or no lines when the routing table is set.

b) The network address may be 2 or more bytes long when connecting to a LAN system other than SYSMAC NET System. The routing table setting utility can set network addresses ranging from 1 to 4 bytes.

4-4 Reading and Setting Routing Tables

4-4-1 Routing Table Settings

The following procedure is used to set routing tables.

1, 2, 3...

1. Input RTREAD↵ at the SN3200 directory prompt.

```
C:\SN3200>RTREAD
```

The RTREAD selection menu is displayed.

```
* * *          SYSNET    RTREAD          * * *      Version 3.02


          1 : SET THE ROUTING PARAMETER.

          2 : DISPLAY THE ROUTING TABLE.




         Enter your requirement.
```

2. Enter 1. Data will be read from the ROUTE.DAT file, and set in the routing table for the SYSMAC NET link driver. The following message is displayed if the routing table is set correctly.

```
          Set up Parameters ROUTING TABLE.
```

3. Press the Escape key to display the RTREAD selection menu.
4. Press the Escape key again to quit and display a prompt.

Note a) Refer to *4-3 Editing Routing Table Files* and store routing data in the ROUTE.DAT file before attempting to set a routing table.

b) Create or copy the ROUTE.DAT file to the directory from which RTREAD will be executed.

Error Messages

One of the following messages is displayed when there is an error.

Create a ROUTE.DAT file if the following error appears.

```
ROUTE.DAT file not found.
Make a ROUTE.DAT file by "EDLIN".
```

If the following error appears, the number of records in the ROUTE.DAT file may disagree with the actual number of addresses, or a character that is not hexadecimal (0 to F) may be entered as an address. Use an editor to correct the ROUTE.DAT file.

```
Illigal Parameter in ROUTE.DAT file.
Make a ROUTE.DAT file by "EDLIN".

( Exsample. )

01000000,09
80210000,10
  |       +---------->GATEWAY Node Address
  +------------------->Network      Address
```

Note

1. A routing table set with the routing table setting utility is not saved when computer power is turned off. Set the routing table each time the system is started.
2. Refer to *4-5 Automatic Routing Table Settings* for information about setting a routing table automatically when the computer is started.

Reference Information

Japanese or English language displays can be selected by attaching the option when inputting the command as shown below. If no option is selected, the language set in the CONFIG.SYS will be displayed.

```
C:\SN3200> RTREAD/E↵    English
C:\SN3200> RTREAD/J↵    Japanese
```

The displays can also be switched by entering CTRL + E on the RTREAD selection menu.

4-4-2 Reading Routing Tables

The following describes the procedure for reading routing tables.

1, 2, 3...

1. After executing RTREAD, enter 2 from the RTREAD selection menu shown below.

```
* * *          SYSNET    RTREAD          * * *      Version 3.02


              1 : SET THE ROUTING PARAMETER.

              2 : DISPLAY THE ROUTING TABLE.




             Enter your requirement.
```

The following screen is displayed with proper execution.

```
Network      Address (Hex)    GATEWAY Node Address (Hex)

                  02               0A
                  03               0C
```

2. Press the Escape key to display the RTREAD selection menu.
3. Press the Escape key again to quit and display a prompt.

The following screen is displayed if there is no routing table.

```
Return status :FFFF



ROUTING TABLE not found.
```

If the return status is not 0, then the SYSMAC NET link driver is malfunctioning. Check to see if the SYSMAC NET link driver is loaded properly in the CONFIG.SYS.

4-5 Automatic Routing Table Settings

The following procedure can be used to automatically set the routing table when the computer is started.

1, 2, 3...

1. Write the routing data in the ROUTE.DAT file.
2. Write RTSET in the AUTOEXEC.BAT file.
3. Move the ROUTE.DAT file to the root directory.
4. Move the RTSET.EXE file to the root directory.
5. Restart the computer.

The following message is displayed if the routing table is set correctly.

```
* * *          SYSNET   RTSET          * * *      Version 3.03


Set up Parameters ROUTING TABLE.
```

Reference Information

- Refer to *4-3 Editing Routing Table Files* for the procedure for editing ROUTE.DAT files.
- Step 2. is not necessary if automatic setting of the routing table is selected in the install program (INST32M). Refer to *3-5-1 Executing The Install Program (INST32M)* for further details.
- The routing table is set if RTSET↵ is entered from a prompt for the directory containing ROUTE.DAT and RTSET.EXE. This function is the same as *4-4-1 Routing Table Settings*.

Note The ROUTE.DAT and RTSET.EXE files must be moved to the root directory in order to set a routing table automatically.

SECTION 5
Diagnostic Utility Program

This section describes the Diagnostic Utility Program, which is used to check operation when the SYSMAC NET System is installed and to troubleshoot the system when errors occur.

5-1 Introduction

When using the SYSMAC NET System for inter-node communications, it is important to have operations to perform operational tests after installation and to correct the errors that might occur during regular communications operations. In addition, it is important to have various statistical data for network management. The Diagnostic Utility Program provides these operations.

All of the nodes connected to the SYSMAC NET System will respond to diagnostic requests from the Diagnostic Utility Program. The network administrator can use this utility program to determine the status of the network and identify any problem spots.

The Diagnostic Utility Program can be broadly divided into the following 7 operations.

Read Node Status Displays LAN-related information for the specified node or all nodes. The load conditions of each node can also be displayed so any errors that occur can be identified.

Dump Memory Displays the contents of memory from a specified node.

Set Comment Inputs comments to distinguish nodes.

Echo Back Test Performs a echo back test with the specified node, transmitting and receiving back arbitrary test data. This operation can be used to determine whether the network can carry out normal communications with other nodes.

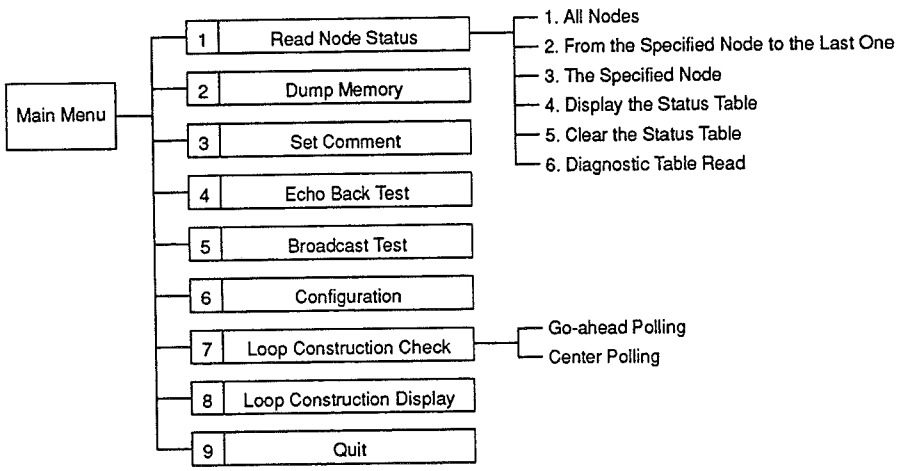
Broadcast Test Sends test data to all nodes. This operation can be used to determine whether all of the nodes are receiving normally and locate problem nodes.

Configuration Sets the Diagnostic Utility Program's reception wait timer value and the display format for the Read Node Status operation.

Loop Construction Check/Display Determines the order of the active nodes in the network and lists the status of the nodes in the network.

5-2 Menu Structure

The following diagram shows the menu structure for the Diagnostic Utility Program. Read *5-3 Starting and Exiting the Utility Program* and *5-4 Basic Operations* before proceeding to a particular operation.



5-3 Starting and Exiting the Utility Program

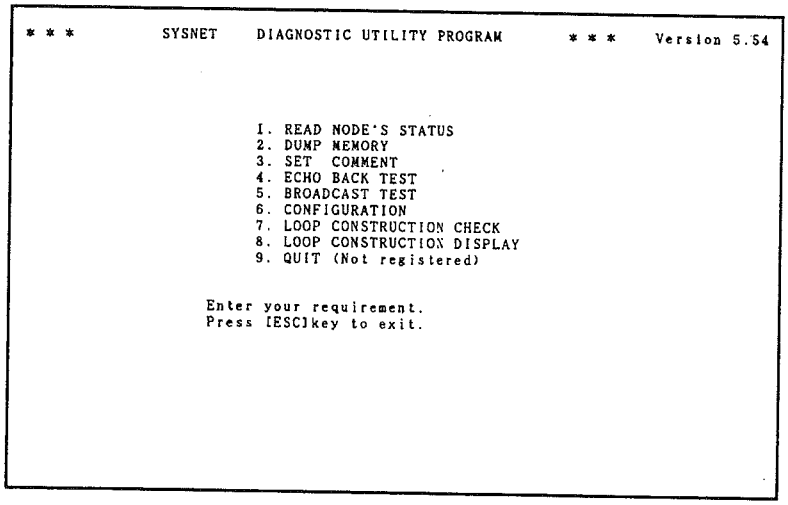
This section explains how to start and exit the Diagnostic Utility Program.

5-3-1 Starting the Utility Program

To start the utility program, change to the "SN3200" directory and enter "DIAGMT32."

```
C:\SN3200>DIAGMT32
```

The following menu will be displayed. A process can be entered by pressing its corresponding number, 1 through 8.



Note It is possible to select Japanese or English displays by adding an option when starting the utility program. If the option is omitted, the language set in the CONFIG.SYS file (English) will be displayed.

```
C:\SN3200> DIAGMT32 /E ..... English
C:\SN3200> DIAGMT32 /J ..... Japanese
```

The display language can be toggled from the main menu by pressing the Control+E Keys.

5-3-2 Exiting the Utility Program

Exit the utility program by pressing the Escape Key or the "9" Key from the main menu. If another display is shown, press the Escape Key repeatedly to return to the main menu and exit. There are some differences in exiting by pressing Escape or "9."

Exiting by Pressing "9"

When the Read Node Status or Loop Construction Display operations have been performed, the information is recorded and can be displayed again later. This information can be displayed again any number of times during program execution, but all of the information will be cleared when the utility program is exited by pressing "9." Also, any comments set with the Set Comment operation won't be registered.

Exiting by Pressing Escape

When the utility program is exited by pressing the Escape Key, the information is written to the DIAGMT32.DAT file in the system volume. For example, if the Read Node Status operation is performed and the utility program is exited by pressing the Escape Key, the information set with the Read Node Status operation can be displayed by the Display the Status Table operation. Comments will also be registered.

5-4 Basic Operations

This section describes the operations used to input data, move between input fields, and output to the printer. These operations are the same regardless of where they are used.

5-4-1 Inputting Values

The following parameters have common input conditions when they appear as input fields.

Network Address

Network addresses range from 0 to 127 (decimal). The network address is used to identify the network. Specifying "0" for the destination network address indicates the local network. For example, if the local network address is "5" it can be indicated by entering either "5" or "0" for the destination network address.

Node Number

Node numbers range from 1 to 126 (decimal). Up to 126 nodes can be connected in one network. Input the node number of the node which you want to test.

Segment

The segment ranges from 0 to FFFF (hexadecimal).

Offset

The offset ranges from 0 to FFFF (hexadecimal). The segment and offset specify addresses in the other node's memory.

If the other node is an x86 series (Intel) node, the segment and offset are used as they are.

If the other node is an NSU or Bridge and the CPU is a 68000-series (Motorola) CPU, specify the segment and offset by the following method:

```
Segment: 0100
Offset:     8000
         ------
         018000 <-- The actual address is 18000.
```

The actual address is the segment × 256 plus the offset.

5-4-2 Moving Input Fields

After inputting a value for an item or after selecting "Y" (Yes) or "N" (No), move to the next item by pressing the Return Key. If there are multiple numeric inputs, press the Escape Key to go back to the previous item to change the value that was input.

For items that provide a specific selection of settings, the input field will move to the next item when a number is input to make a selection.

5-4-3 Outputting to the Printer

Depending on the process, the results of processing can be displayed on the screen and simultaneously output to the printer. The following message will be displayed at the end of a process if the process supports printing.

```
Do you want to print the report ? <y/n>
```

When the message is displayed, enter "Y" to output the results to the printer; enter "N" to display the results without outputting the data to the printer.

5-4-4 Common Display Contents

The following information on the local node will be displayed at the top of the screen.

1, 2, 3...

1. The local network address
2. The local node number

3. Information on the status of the LAN, as shown in the following table.

Loop status	Display code	
	Power not supplied.	Power supplied.
Normal loop	$D3_H$	$F3_H$
Upstream loopback	DB_H	FB_H
Downstream loopback	$D7_H$	$F7_H$
Loop error	DF_H	FF_H

5-5 Read Node Status

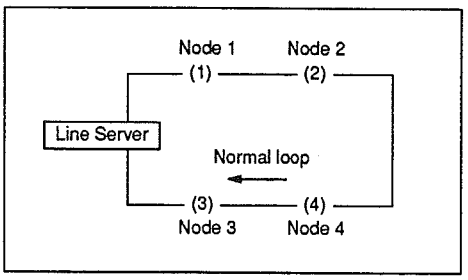
Data cannot be transferred to and from another node if that node's configuration is not correct. It is important to verify that the other node's configuration is set correctly before transmitting. The required information can be obtained with the Read Node Status operation.

5-5-1 Read Node Status Information

The information that can be obtained with the Read Node Status operation is described below.

Loop Status (Optical LAN)

It can be determined whether the loop's status is normal, upstream loopback, or downstream loopback. All of the nodes are normal if a SYSMAC NET System loop is connected as shown in the following diagram.



If the connection between nodes 1 and 2 is broken, node 1 would become an upstream loopback, node 2 would become a downstream loopback, and the other nodes would be normal.

In this way it is possible to know how each node is actually connected. When an upstream loopback or downstream loopback is displayed in the results of a Read Node Status operation, the optical fiber cable might not be connected properly. Check the cable connections.

Node Identifier (Type)

In the SYSMAC NET System, each node is given a 3-character identifier. For example, an IBM PC/AT or compatible is registered as "ICA." This operation allows the type of node to be identified.

Identifier	Node
ICA	FC55, PC/AT, or AX (PC-DOS or MS-DOS)
TAA	OMRON Programmable Controller
VAA	LUNA-FA, FX9200, or YEWMAC500
AAA	FASMIC
FAA	FMR or Panacom M (MS-DOS)
FBA	FMR (iRMX86)
FCA	FMR (iRMX286)
FDA	FMR (OS/2)
IAA	PS/55 (MS-DOS)
IDA	PS/55 (MS-DOS Microchannel)
IEA	PS/55 (OS/2 Microchannel)
JAB	YEWMAC300
NAA	PC9801, PC-286, or PC-386 (MS-DOS)
NAB	PC9801, PC-286, or PC-386 (MS-DOS)
NAC	PC9801 (OS/2)
OAA	if800
PAA	PANAFACOM C-280, or FACOM II/A OPERATE 7000
PBA	PANAFACOM C-280EX, or FACOM ΣmkII OPERATE 7000mkII
PCA	PANAFACOM C-380EX, or FACOM Σ(mkII) OPERATE 8000(mkII)
RAA	μPORT-II, FA286, Techno-PRO, FA286
UAA	Ustation
SAB	BSC-procedure Datagram
SAC	Asynchronous BASIC-procedure Datagram
SBB	Ethernet G/W DL Router
SBC	SN-3200 to SN3300 G/W
SBD	Remote Bridge
SBE	Local Bridge
SBG	Ethernet Gateway IP Router
SBH	X 25 Gateway
SBI	Remote Bridge IP Class A
SCA	Asynchronous Non-procedure Datagram
SCB	Asynchronous Non-procedure Virtual Circuit
SCC	Asynchronous Non-procedure Permanent Datagram
SCD	Address Memory-type Datagram
SDA	HDLC-procedure Datagram
VAB	SN3500 IP Router
JAC	Yokogawa Electronics Programmable Controller
DAA	Mitsubishi Electronics Programmable Controller
AAB	Fuji Electronics Programmable Controller
HAA	Sharp Programmable Controller
YAA	Yaskawa Electronics Programmable Controller

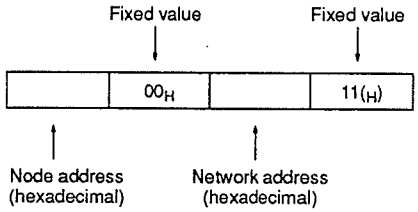
Comments

The comments for each node are displayed simultaneously when the results of the Read Node Status operation are displayed. Refer to *5-7 Set Comment* for details on registering comments.

The comments are convenient for locating a problem node if comments such as the mounting location have been registered for each node.

IP Addresses (IP Type)

In the SYSMAC NET System, the IP address is expressed in 4 bytes, as shown below.



Even if communications are successful in node diagnostics, they may be unsuccessful with other programs. One possible cause is a mistake in the network address setting. The first byte of the Read Node Status operation's IP address can be checked to see whether such a mistake was made.

Loop Test Information

Refer to *5-9 Broadcast Test* for details.

5-5-2 Read Node Status Menu

The Read Node Status menu will be displayed when "1. Read Node Status" is selected from the main menu.

```
* * *          SYSNET     DIAGNOSTIC UTILITY PROGRAM          * * *


                    < < READ NODE STATUS  > >

                    1. ALL NODES
                    2. FROM THE SPECIFIED NODE TO THE LAST ONE
                    3. THE SPECIFIED NODE
                    4. DISPLAY THE STATUS TABLE
                    5. CLEAR THE STATUS TABLE
                    6. DIAGNOSTIC TABLE READ



                  Select from 1 to 6 by numeric key.
                  Press [ESC]key to exit.
```

Operations

The following six operations can be selected from the Read Node Status menu.

1, 2, 3...

1. Access the status, maintenance, and broadcast test information for all nodes.
2. Access the status, maintenance, and broadcast test information in order from a specified node.
3. Accesses the status, maintenance, and broadcast test information for a specified node only.
4. Displays the above information (accessed by operations 1 through 3) (this information is recorded in a table in memory).
5. Clears the status table.
6. Displays the contents of the specified node's diagnostic table.

Procedure

Press the corresponding operation number to execute one of the six Read Node Status operations. The Read Node Status menu will be displayed again when the selected operation is completed. Press the Escape Key to return to the main menu.

5-5-3 Operation 1: All Nodes

Information will be read for all nodes in the specified network when "1. All Nodes" is selected from the Read Node Status menu. The procedure is as follows:

1, 2, 3... 1. Enter "1" at the Read Node Status menu to select "1. All Nodes." The following display will appear.

```
* * *          ALL      NODES                    * * *
Network             1       Node address  12     Optical LAN   D3



       Node = 1 -> 126


     Enter Network


               Press [ESC]key to exit.
                Do you want to print the report ? <y/n>
```

2. Enter the desired network address. (Just press Return to specify the local network.)
3. Indicate whether the results should be output to the printer.
   (Enter "Y" to output the results to the printer, "N" to cancel.)
   The status of nodes 1 through 126 in the specified network will be listed in order, as shown in the following diagram.

```
  * * *          READ NODE'S STATUS          * * *
    Network             1       Node address  12     Optical LAN   D3
  Network               Ø
                                                      (---Loop test----)
Node Optical LAN        Pwr. Type     Comment          l P  type       count
Ø1   Normal             OFF  UAA                    Ø1ØØØ111   (short)    Ø
Ø2   Timeout            ***  ***
Ø3   Timeout            ***  ***
Ø4   Timeout            ***  ***
Ø5   Timeout            ***  ***
Ø6   Timeout            ***  ***
Ø7   Timeout            ***  ***
Ø8   Timeout            ***  ***
Ø9   Timeout            ***  ***
1Ø   Timeout            ***  ***
11   Timeout            ***  ***
12   Normal             OFF  NAA                    Ø1ØØØC11               Ø
13   Timeout            ***  ***
14   Timeout            ***  ***
15   Timeout            ***  ***
```

Refer to *5-5-1 Read Node Status Information* for details on the information provided in the table.

The gray section in the above display may be displayed as a "Display terminals limit to set the comment data." or "Display terminals limit to respond." Refer to *5-10 Configuration* for details.

The "0" under the number of loop tests (count) might not be displayed for some nodes.

The number of loop tests is displayed as a 4-byte counter when the other node's node diagnosis operation is version 5.51 or higher, and a 2-byte counter when the other node's node diagnosis operation is pre-version 5.51. "Short" will be displayed with the 2-byte counter.

4. When the operation is completed, press any key to return to the Read Node Status menu. (Press the Escape Key to abort the operation while in progress, then press any key to return to the Read Node Status menu.)

5-5-4 Operation 2: From the Specified Node to the Last One

Information will be read from the specified node to the last node in the specified network when "2. From the Specified Node ..." is selected from the Read Node Status menu. The procedure is as follows:

1, 2, 3... 1. Enter "2" at the Read Node Status menu. The following display will appear.

```
* * *  FROM THE SPECIFIED NODE TO THE LAST ONE * * *
Network          1      Node address  12    Optical LAN    D3


      Enter Network

      Enter Node Address.



         Press [ESC]key to exit.
```

2. Enter the network address of the network that the node is in.
3. Enter the node number of the first node from which information is to be read.
4. Indicate whether the results should be output to the printer.

   The status of the specified node through the last node in the specified network will be listed. The format of the list is the same as the one shown in *5-5-3 Operation 1: All Nodes*, but starts at the specified node.

   The operation can be aborted while in progress by pressing the Escape Key.

5-5-5 Operation 3: The Specified Node

When "3. The Specified Node" is selected from the Read Node Status menu, the utility program will display the response status in hexadecimal and ASCII in addition to the node status information provided by operations 1 and 2. The procedure is as follows:

1, 2, 3... 1. Enter "3" at the Read Node Status menu. The following display will appear.

```
* * *     THE  SPECIFIED NODE              * * *
Network            1       Node address  12     Optical LAN    D3


                  Enter Network

                  Enter node address.
```

2. Enter the network address of the network that the node is in.
3. Enter the node number of the desired node.
4. Indicate whether the results should be output to the printer.

   Information from the specified node will be listed, as shown in the following diagram.

```
    * * *    THE  DIAGNOSTIC TABLE DISPLAY   * * *
    Network             1       Node address  12     Optical LAN    D3
  Network               Ø
                                                          (---Loop test----)
Node      Optical LAN    Pwr.  Type      Comment              1 P  type       count
Ø1   Normal              OFF   UAA                      ØlØØØlll   (short)     Ø

      ØØØØ   CØ Ø2 Ø1 Ø1 3Ø 3Ø 3Ø 3Ø-3Ø 3Ø 3Ø 3Ø 56 2Ø 35 2E    ....ØØØØØØØØV 5.
      ØØ1Ø   36 2C 52 2Ø 3Ø 2E 3Ø 2Ø-3Ø 37 3Ø 39 31 36 55 41    6,R Ø.Ø 87Ø916UA
      ØØ2Ø   41 2Ø Ø1 ØØ Ø1 11 2Ø 2Ø-ØØ ØØ 91 E5 9Ø 58 2Ø 2Ø    A ....  .....X
      ØØ3Ø   2Ø 2Ø 2Ø 2Ø 2Ø 2Ø 2Ø 2Ø-ØØ ØØ 5F Ø2 1C ØØ ØØ ØØ      ..-.....
      ØØ4Ø   ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ-ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ    ................
      ØØ5Ø   ØØ ØØ ØØ Ø4 ØØ ØØ ØØ Ø2-3E 7F 53 56 55 57 2Ø 56    ........> SVUW V
      ØØ6Ø   65 72 33 2E 31 78 2Ø 83-8A 83 8A 81 5B 83 58 83    er3.1x .....[.X.
      ØØ7Ø   81 83 82 2Ø 2Ø 2Ø 2Ø 2Ø-2Ø 2Ø 2Ø 2Ø 2Ø 2Ø 2Ø 2Ø    ...
      ØØ8Ø   ØØ ØØ 92 4A 2Ø ØØ ØØ ØØ-ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ    ...J ............
      ØØ9Ø   ØØ ØØ ØØ ØØ 56 34 2E 3Ø-ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ    ....V4.Ø........
      ØØAØ   ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ-ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ    ................
      ØØBØ   ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ-ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ    ................
      ØØCØ   ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ-ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ    ................
      ØØDØ   ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ-ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ    ................
      ØØEØ   ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ-ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ    ................
      ØØFØ   ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ-ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ    ................
```

The programmers of the communications software use this data for analysis. The primary information it contains is shown in the following table.

Byte position	Contents
0	DMA status
1	LAN status
2	Local node number
3	Network address
12 to 23	SYSMAC NET link driver
30 to 32	Node identifier

5-5-6 Operation 4: Display the Status Table

The status table will be displayed when "4. Display the Status Table" is selected from the Read Node Status menu. The status table contains the results recorded during the execution of previous Read Node Status operations.

The format of the table is the same as the one shown in *5-5-3 Operation 1: All Nodes*. Six asterisks "******" will be displayed in the loop status column for any nodes that weren't accessed in previous Read Node Status operations.

The procedure is as follows:

1, 2, 3...

1. Enter "4" at the Read Node Status menu.
2. Indicate whether the results should be output to the printer.

```
  * * *        READ NODE'S STATUS          * * *
    Network            1      Node address  12    Optical LAN   D3

                                                    (---Loop test----)
Node Optical LAN       Pwr. Type     Comment          I P  type      count
01   Normal            OFF  UAA                   01000111   (short)    0
02   Timeout           ***  ***
03   Timeout           ***  ***
04   Timeout           ***  ***
05   Timeout           ***  ***
06   Timeout           ***  ***
07   Timeout           ***  ***
08   Timeout           ***  ***
09   Timeout           ***  ***
10   Timeout           ***  ***
11   Timeout           ***  ***
12   Normal            OFF  ICA                   01000C11              0
13   Timeout           ***  ***
14   Timeout           ***  ***
15   Timeout           ***  ***
```

3. Press any key except the Escape Key to display information for the next nodes. When all of the nodes have been displayed a message will be displayed indicating the operation has been completed.

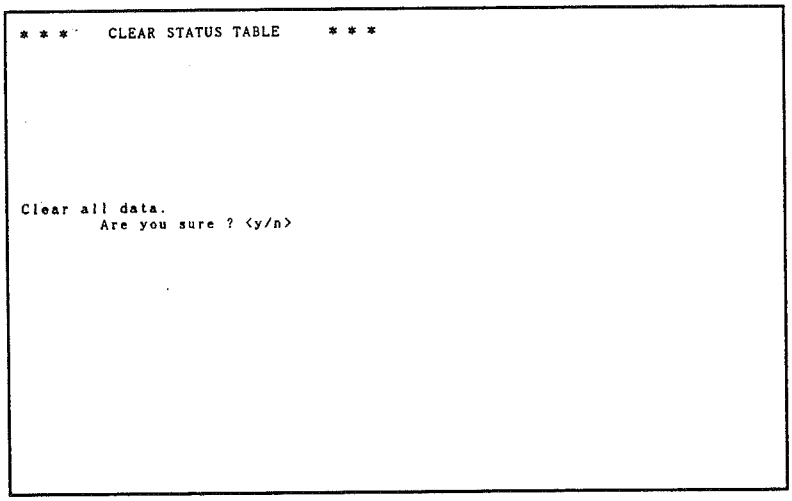
   Press any key to return to the Read Node Status menu. (Press the Escape Key to abort the operation while in progress and return to the Read Node Status menu.)

Note If operation "3. The Specified Node" is executed after operation "1. All Nodes" has been executed, the table entry for the specified node will be refreshed but the rest of the table will remain unchanged. The entire table is refreshed only when operation "1. All Nodes" or operation "2. From the Specified Node ..." is executed.

5-5-7 Operation 5: Clear the Status Table

The contents of the previously recorded status table (except the comments) will be cleared when "5. Clear the Status Table" is selected from the Read Node Status menu. The procedure is as follows:

1, 2, 3... 1. Enter "5" at the Read Node Status menu. The following confirmation prompt will appear.



2. Enter "Y" to clear the status table, "N" to cancel the operation. The Read Node Status menu will be displayed.

Note The comments must be cleared with the Set Comment operation, located in the main menu. Refer to *5-7 Set Comment* for more details.

5-5-8 Operation 6: Diagnostic Table Read

All nodes connected to the SYSMAC NET System (except the C500-SNT31-V4 and earlier nodes) have a diagnostic table that records the number of data transfers and errors for the node. The diagnostic table's counters will be read and displayed when "6. Diagnostic Table Read" is selected from the Read Node Status menu.

When communicating with another node, this operation can be used to analyze activity and problems. For example, if a node isn't receiving, the counters can be checked with this operation to determine whether the transmitter wasn't transmitting or the receiver wasn't able to receive even though the transmitter was transmitting. Also, protocol counters can be displayed for specified protocols.

The procedure is as follows:

1, 2, 3... 1. Enter "6" at the Read Node Status menu.

2. Enter the network address of the network that the desired node is in.

3. Enter the node number of the desired node. The diagnostic table will be listed, as shown in the following diagram.

```
    * * *        THE  DIAGNOSTIC TABLE READ          * * *
     Network          1       Node address  12     Optical LAN   D3
   Network            Ø

                                                        (---Loop test----)
Node     Optical LAN   Pwr. Type     Comment              I P ctype tim  count
12   Normal            OFF   ICA                      Ø1ØØØC11              Ø

LAN Software Version   V 3.Ø,R 3.2   Illegal Interrupt              Ø
DIAG         Version   V5.52         Receive Interrupt Error        Ø
Number of                            Send    Interrupt Error        Ø
Total  send            81            Error in Receive Process       Ø
Normal send            61            PCB Packet Type Unmatch        Ø
Total  receive         24            Illegal Loop                   Ø
Normal receive         23            Can't Use The Send Buffer      Ø
Send Execute            Ø            Receive Data Short             Ø
Send Request            Ø            Send    Time out               Ø
IP   Send              81            Receive Time out               Ø

upper data :

    This Time :95/Ø2/21 11:Ø2:44

[ESC]:Exit R:Redisp C:Difference Pr.Counter(1:UDP 2:DIAG 3:LTEST 4:TCP 5:ETC
```

Display Information

The number of transmissions, receptions, and errors show statistical information for all of the data counted by the SYSMAC NET link driver. Refer to *Appendix 3* for details. The following kinds of errors should be considered when errors are counted on the right side of the display.

1, 2, 3...

1. Incorrect data was transmitted from the other node.
2. There is an error in the NSB.
3. There is an error in the transmission path.
4. Data processing isn't being carried out in the other node.
5. Processing isn't correct in the local node (a malfunction due to noise, for example).

It is important to perform other tests such as the echo back and broadcast tests and use these results in conjunction with the diagnostic table information.

Redisplay

If "R" is entered at the diagnostic table display, the diagnostic table will be displayed again for the node specified in step 3 in the procedure above.

Comparison Display

If "C" is entered at the diagnostic table display, the diagnostic table will be displayed again for the node specified in step 3 in the procedure above. The difference between the previous results and the new results will also be displayed.

Software Compatibility

The following table shows the Units that support the Diagnostic Table Read operation. A "Yes" in the table indicates that the diagnostic table can be read from that Unit (NSB).

Model	Diagnostic Table Read
C500-SNT31-□□ (C Series)	No
CV500-SNT31 (CV Series)	Yes

Protocol Counter Display

If "1," "2," "3," or "4" is entered at the diagnostic table display, the counters for UDP, DIAG, LTEST, or TCP protocol will be displayed. When specifying another packet type, enter "5" and then input the packet type in hexadecimal.

The diagnostic table for each packet type will be displayed when "1," "2," "3," or "4" has been entered. The following example is a display for "1" (UDP).

```
*****       DIAGNOSTIC TABLE READ          *****
  Network          1       Node address  12     Optical LAN    D3
Network            Ø

       Packet Type (Hex) :              11    (UDP)
       Number of
       Send     Packet Count                        1
       Receive Packet Count                       353
       Send Busy                                    Ø
       Send Data Size Overflow                      Ø
       Send Data Size Too short                     Ø
       Node Address Error                           Ø
       Receive Busy                                 Ø
       Receive Packet Overflow                      Ø
       Receive Packet (IP Length)                   Ø
       Send Interrupt Error                         Ø


  This time :95/Ø2/21 11:Ø6:Ø8

SCJ:Exit R:Redisp C:Difference
```

If "R" is entered, the counter for each protocol will be read again and the new data will be displayed.

If "C" is entered, the new data will be displayed along with the difference between the previous data and the new data.

When errors occur for only a specific packet type, it is possible that a program using that packet type is the source of the problem. Check the local node using that packet type or the program in the other node.

5-6 Dump Memory

5-6-1 Introduction

This operation can display the contents of another node's memory. The memory contents are displayed in 256-byte blocks.

When the other node is a personal computer operating with MS-DOS, the segment and offset specify the personal computer's physical address; the contents of the physical address will be displayed as they are. With some models, the contents of the memory in the NSB will be displayed.

When the other node is a personal computer operating with OS/2, the data at the virtual address will be displayed, not the data in the physical addresses.

There are some models that don't support the dump memory operation. Many communications software developers use this operation for problem analysis and don't reveal the function of the data stored in particular addresses.

5-6-2 Operation

The procedure for the Dump Memory operation is listed below.

1, 2, 3...

1. Enter "2" at the main menu to select "2. Dump Memory." The following display will appear.

```
* * *              DUMP  MEMORY                    * * *
Network            1       Node address  12     Optical LAN    D3

          < <          Dump  memory          > >


                Network Address

                Node Address

                Start Address Segment

                              Offset
```

2. Enter the network address (decimal) of the network that the desired node is in.
3. Enter the node number (decimal) of the desired node.
4. Enter the start segment in hexadecimal.
5. Enter the start offset in hexadecimal.
6. Indicate whether the results should be output to the printer.
   Data from the specified node will be listed, as shown below.

```
          * * *       Dump      memory          * * *
   Network                1        Node address  12     Optical LAN    D3

  Network                 0             Node address          12

0000:0000   A7 4F EB 08 36 09 80 FD-F0 08 80 FD 36 09 80 FD    .O..6.......6...
0000:0010   36 09 80 FD 53 08 78 27-43 7A 60 00 36 09 80 FD    6...S.x'Cz`.6...
0000:0020   38 06 80 FD AC 0F DB 0F-E7 1F AF 28 45 19 AF 28    8..........(E..(
0000:0030   3D 18 80 FD 37 09 80 FD-37 09 80 FD 37 09 80 FD    =...7...7...7...
0000:0040   36 09 80 FD BE 0C 00 D7-69 23 80 FD F7 22 80 FD    6.......i#...".."
0000:0050   37 09 80 FD 37 09 80 FD-37 09 80 FD 37 09 80 FD    7...7...7...7...
0000:0060   68 0D DB 0F 96 15 80 FD-4D 85 60 00 55 05 4C 26    h.......M.`.U.L&
0000:0070   00 05 80 FD 36 09 80 FD-EC 27 80 FD 00 02 80 FD    ....6....'......
0000:0080   60 11 EB 08 9D 08 4C 26-2F 01 AE 40 3C 01 AE 40    `.....L&/..@<..@
0000:0090   DA 04 AE 40 1D 13 EB 08-0E 09 4C 26 0C 5C EB 08    ...@......L&.¥..
0000:00A0   66 11 EB 08 12 84 60 00-66 11 EB 08 66 11 EB 08    f.....`.f...f...
0000:00B0   66 11 EB 08 66 11 EB 08-57 02 AE 40 59 14 EB 08    f...f...W..@Y...
0000:00C0   EA 67 11 EB 08 11 EB 08-66 11 EB 08 66 11 EB 08    .g......f...f...
0000:00D0   66 11 EB 08 66 11 EB 08-66 11 EB 08 66 11 EB 08    f...f...f...f...
0000:00E0   66 11 EB 08 66 11 EB 08-66 11 EB 08 66 11 EB 08    f...f...f...f...
0000:00F0   66 11 EB 08 66 11 EB 08-66 11 EB 08 66 11 EB 08    f...f...f...f...

        [ESC]:Exit  1:Alter your requirement  2:Forward  3:Backward  4:Redisp
```

7. The following options will appear at the bottom of the screen. Press the corresponding key to select that option.
   Escape: Return to the main menu.
   1: Reset the dump parameters starting with the node number.
   2: Dump the next 256 bytes of data.
   3: Dump the previous 256 bytes of data.
   4: Redisplay the same 256 bytes of data.

5-7 Set Comment

5-7-1 Introduction

The nodes in each network can be identified by their node numbers, but it can be difficult to locate each node when there are a lot of nodes in the network. This operation can be used to assign a 20-character comment to nodes to identify them according to their location, duty, model, or any other factor.

The comments are stored in a file on disk and displayed along with the node number when the Read Node Status operation is executed. If the order that the nodes are registered is different from the actual order of the nodes in the network, the nodes won't be displayed correctly when the Loop Construction Display operation is executed. See *5-12 Loop Construction Display* for details.

The procedure for inputting comments in the local network is different from the procedure for other networks, as described below.

5-7-2 Inputting Comments in the Local Network

Use the procedure below to input comments for nodes in the local (self) network.

1, 2, 3... 1. Enter "3" at the main menu to select "3. Set Comment." The following display will appear.

```
                * * *          SET  COMMENT                    * * *
Network           1       Node address  12    Optical LAN     D3

     You can set trivial comment to each node within 2Ø
     characters. Comments are independent by network address.
     If you set self network comment, you must appoint
     order of node.

                    Enter network address.
               (In case of self network, enter Ø .)

                    Press [ESC]key to exit.
```

2. Enter "0" to proceed; the following confirmation prompt will be displayed. (To return to the Set Comment menu, press the Escape Key.)

```
      * * *       SELF NETWORK COMMENT SET        * * *


Enter node No. and it's comment from line sever(SL2 side).
Order of nodes are entried by order of input.
Last input node is recognized as next line server.



Do you want to clear the comment data ? <Y/N>
```

3. Enter "Y" to clear all of the data and bring up the comment input field shown in the following diagram.
   Enter "N" to display the existing comment. Enter "N" when modifying or adding to comments.

   Note If you enter "Y" accidentally, input "9" at the next display to return to the confirmation prompt without clearing any data.

```
            * * *       SELF NETWORK COMMENT SET        * * *

                node address          --- comment  ---
      + LINE SV +



          Enter your requirement.
1:append  2:modify  3:delete  4:insert  5:up  6:doum     9:quit  [ESC]:exit
```

4. The following options will appear at the bottom of the screen. Press the corresponding key to select that option.

   1: Append data to the end of the registered data. (Enter "1" when inputting new comments.)
   2: Change a registered node's comment.
   3: Delete a registered node.
   4: Insert a new node between registered nodes.
   5: Display the next page, if there are 2 or more pages.
   6: Display the previous page, if there are 2 or more pages.
   9: Cancel the changes made up to this point and return to the status before the Input Comment operation was executed.
   Escape: Record the changes made and exit the Input Comment operation.

   Enter "1" when inputting new comments. Up to 20 characters can be input. Directions will appear at the bottom of the screen when an option is selected or comments are input.

   After the comments have been input, press the Escape Key to return to the main menu. Press the Escape Key again to exit the Diagnostic Utility Program.

   Note If "9" is pressed to quit instead of the Escape Key, any changes that were made won't be saved.

5-7-3 Inputting Comments in Other Networks

Use the procedure below to input comments for nodes in other networks.

1, 2, 3... 1. Enter "3" at the main menu to select "3. Set Comment." The following display will appear.

```
                * * *          SET  COMMENT                    * * *
Network           1       Node address  12     Optical LAN    D3

      You can set trivial comment to each node within 20
      characters. Comments are independent by network address.
      If you set self network comment, you must appoint
      order of node.

                    Enter network address.
                (In case of self network, enter 0 .)

                    Press [ESC]key to exit.
```

2. Enter the network address of the desired network.

```
* * *          SET  COMMENT                    * * *
Network           I      Node address  12    Optical LAN   D3


 Network address    3

     Node Address:
     Comment    :




     If you want to clear the comment, enter
          '999' as node address.
               Press any key to start.
               Press [ESC]key to exit.
```

3. The comment input field will be displayed when the node number is entered. If a comment has been registered for the specified node, it will be displayed in the input field.
4. Input the comment and press Return. The display will return to Set Comment menu.
5. Press the Escape Key to return to the main menu. (Press the Escape Key again to exit the Diagnostic Utility Program.)

Note If "9" is pressed to quit instead of the Escape Key, the comment that was input won't be saved.

5-8 Echo Back Test

5-8-1 Introduction

This test transmits 2,000 bytes of test data to the specified node. The specified node returns that test data, the original data is compared to the returned data, and the results are displayed.

By the results of comparison between the original data to the returned data, the network administrator can verify that the test data hasn't been changed in the round-trip to and from the specified node.

5-8-2 Operation

The procedure for the Echo Back Test is listed below.

1, 2, 3... 1. Enter "4" at the main menu to select "4. Echo Back Test." The following display will appear.

```
* * *   ECHO BACK TEST    * * *
Network          1      Node address  12    Optical LAN   D3




     Enter Network address
     Enter node address of Dest.
     Press [ESC]key to exit.
```

2. Enter the network address of the network that the desired node is in.
3. Enter the node number of the desired node. The echo back test will begin when the node number is entered, and the results will be displayed as shown below.

```
* * *   ECHO BACK TEST    * * *
Network          1      Node address  12    Optical LAN   D3


                Start :   95/02/21   11:17:23
                Stop :    95/02/21   11:17:33
     Network address              0
     Node address of Destination  1              Transfer data   0082
Count          Normal      Timeout       Invalid length     Invalid data
  98             98


     Press any key to exit.
```

The number of packets received will be displayed if the received data length or contents differ from the transmitted data.

The test will continue even if a token loss occurs.

Refer to *5-8-3 Displayed Information and Diagnosis* for details on the information displayed.

4. Press the Escape Key to terminate the test.
5. Press any key to return to the main menu.

5-8-3 Displayed Information and Diagnosis

The meaning of the information displayed at the bottom of the screen is described below.

Test Count and Normal

When the "Count" and "Normal" values are the same, the other node is receiving and transmitting data normally. At the least, communications with the other node are verified at the basic software level.

When the Echo Back Test is normal and there is an error in communications with the program, a problem in the higher-layer UDP protocol or program is likely.

Reception Timeout

A timeout indicates that the response data wasn't received even though the timeout value specified in the configuration had passed. The following causes are possible.

1, 2, 3...

1. When reception of the test data is always timed out, check whether the power is off at the other node or it is unable to perform node diagnosis. Check the other node's operation. Also check whether a mistake was made in connecting the optical fiber cables. Recheck the connections at each node and Line Server.
2. It is possible that the timeout value is too small, so that the test data is being transmitted normally from the other node, but the local node is timing out before that data arrives. (The test data returns after the timeout.)

   In this case, increase the timeout value. Refer to *5-10 Configuration* for details on the setting the timeout value.
3. It is possible that the data is being lost enroute due to an error in the transmission path.

   When the timeout occurs in only about 1% or less of the attempts, a loopback might have occurred because an optical connector became disconnected or the power was interrupted in a node other than the one being tested. In this case, the test data might be lost.

   When the other node is not the cause and a problem is suspected in the network, perform a broadcast test. Refer to *5-9 Broadcast Test* for details.

   It is also possible to discover where the test data was lost by performing the Diagnostic Table Read operation (in the Read Node Status menu), checking the diagnostic tables for the local node and destination node as well as the diagnostic tables for each protocol.
4. When the transmission path and nodes are normal, but too many other packets have been received at the local node or destination node, the test data will be lost.

   This might be caused by a difference in levels between the capability of the node's CPU or the operating software. Also, it may be that the destination node was unable to do the communications processing because it was busy processing the program.

Invalid Length

This counter indicates that the length of data returned is different from the length of data transmitted. It is possible that there is an operational error in the destination node's basic communications software (SYSMAC NET link driver or the software in the NSB's ROM). Doublecheck the settings.

Invalid Data

This counter indicates that the content of the returned test data is different from the transmitted data. The following 2 causes should be considered:

1, 2, 3...

1. When invalid data is returned even though no timeouts have occurred, there might be a faulty node in the network or an operational error in the destination node's basic communications software. Doublecheck the settings.
2. When invalid data is returned after a timeout occurred, it is possible that the data wasn't corrupted but that the previously transmitted test data was re-

turned after the timeout occurred. Increase the timeout value and try the test again.

5-9 Broadcast Test

This section describes the broadcast test, which transmits the same test data to all of the nodes in the local network.

5-9-1 Introduction

When data has been transmitted to another node but not received and you suspect that the packet has been lost in the transmission path, this test allows you to pinpoint where the packet was lost.

The broadcast test cannot be used to test another network connected through a Unit such as a Bridge; it is only used to test the network to which the transmitting node belongs.

In the broadcast test, the broadcast packet (node number = FF) is transmitted from the transmitting node to all of the other nodes in the network.

When the other nodes receive the packet, they check the packet's class and increment the counter by one if it is the same class as the previous packet, or start counting from 1 if it is different from the previous packet. The date and time in the broadcast packet are also recorded in the local node's memory.

Precautions

Take the following precautions when performing broadcast tests.

1, 2, 3...

1. Make sure that there is only one node transmitting a broadcast test in the network. The test results won't be reliable if 2 or more nodes execute a broadcast test at the same time.
2. It is easier to find the fault in the network if the test data transmission interval is shortened, but a packet might be lost in nodes that receive a lot of application (user data) packets. Therefore, it might be necessary to perform the test when the application programs aren't being executed.
3. When the reception status display is selected and the local node's reception count is displayed, packets are transmitted to the local node and inspected. There might be a negative effect on other processes if the reception status display is operating and the local node is receiving a lot of packets. Do not use the reception status display unless it is really necessary.

5-9-2 Operation

There are two operations in the broadcast test. The first transmits test data to the other nodes in the network and the second operation receives data back to the local node to check the reception results (the reception status display).

Transmission of Test Data Use the following procedure to perform the broadcast test.

1, 2, 3... 1. Enter "5" at the main menu to select "5. Broadcast Test." The following display will appear.

```
* * *       BROADCAST  TEST       * * *
Network          1      Node address  12    Optical LAN   D3

                1 : Transmit

                2 : Receive

                Enter number.
                Press [ESC]key to exit.
```

2. Enter "1" to start the broadcast test. The following display will appear.

```
* * *       BROADCAST  TEST       * * *
Network          1      Node address  12    Optical LAN   D3

                Class  (A - Z)              :

                Count  (Max =9999)          :
                       (Ø = Aging)
                Interval (Max =9999)        :
                         ([Ø.1msec])

        Press [ESC]key to exit.
```

3. Enter the class (A to Z) and press Return. The class is an identifying code attached to the frame. When more than one test is performed, use a different class from the previous test.
4. Enter the number of broadcasts ("count," 0 to 9999) and press Return. If "0" is entered, broadcasting will continue until the Escape Key is pressed.
5. Enter the test interval (0 to 9999) and press Return. The test interval units are 0.1 ms, so the possible range is 0 to 999.9 ms.

The following display will appear.

```
* * *       BROADCAST  TEST        * * *
Network          1      Node address  12    Optical LAN   D3

                Class  (A - Z)                : A

                Count  (Max =9999)            : 0
                       (0 = Aging)
                Interval (Max =9999)          : 1
                       ([0.1msec])
     ----------------------------------------

                Start     :95/02/21   11:19:48

                Send      :95/02/21   11:20:00

                Count     :189

                Stop      :95/02/21   11:20:00
          Press [ESC]key to exit.
```

6. When the test is over, press any key to return to the main menu.
   (The test can be terminated before it is over by pressing the Escape Key.)

Reception Status

Enter "5" at the main menu to select "5. Broadcast Test." Then enter "2" to bring up the reception status display shown below.

```
* * *       BROADCAST  TEST        * * *
Network          1      Node address  12    Optical LAN   D3




                Type :A

                Receive   :95/02/21   11:20:09

                Count:189


          Press [ESC]key to exit.
```

5-9-3 Interpreting Test Results

After performing a broadcast test (transmitting test data), use the following operations to diagnose the status of the network.

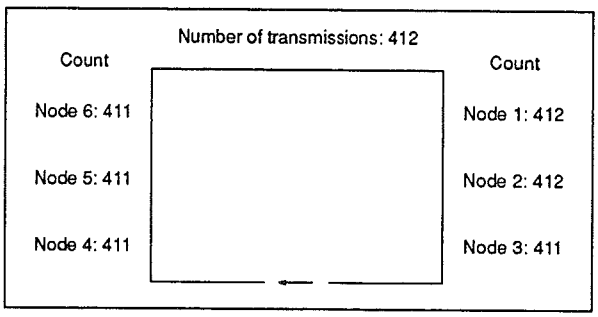
Using "Read Node Status"

Execute the "All Nodes" operation from the Read Node Status menu and check the count under the "loop test" heading to see whether each node received the test packets properly. Refer to *5-5-3 Operation 1: All Nodes* for details on this Read Node Status operation.

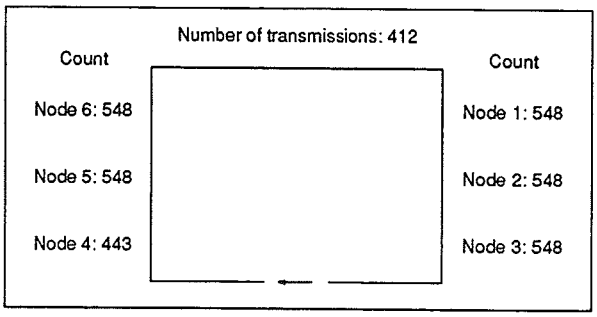
Using "Loop Construction Display"

It is easier to diagnose the network by executing the "Loop Construction Display" operation to display the test results. Refer to *5-12 Loop Construction Display* for details on this operation.

In the following example, all of the nodes downstream from a certain node (node 2) have a lower count. It appears that a packet was lost between nodes 2 and 3. Check the LAN elements such as the optical fiber cable, connectors, and boards between nodes 2 and 3.



In this example, node 4 has a low count, but the downstream nodes (5 and 6) have the correct count.



One of the following 3 problems might have occurred.

1, 2, 3...

1. The affected node (node 4) was reset during the measurement.
2. Software processing in the affected node was too slow and the test packets were lost.
3. Test packets were lost because the affected node was busy with other data transfers and the reception buffer overflowed.

Precautions

Take the following precautions when interpreting broadcast test results.

1, 2, 3...

1. If the other node's Diagnostic Utility program is earlier than version 4.00, it won't support the broadcast test and won't display the correct results. The version of the other node's diagnostic operation can be displayed with the Read Node Status operation. Refer to *5-5-5 Operation 3: The Specified Node* for details.
2. In Loop Construction Display, the count is displayed with a 2-byte counter for all of the nodes so the count might differ from the number of transmissions. Compare the count from node to node to locate problems.

   If the Read Node Status operation shows that the version of the other node's diagnostic operation is earlier than 5.51, the counter is a 2-byte counter and "short" will be displayed.

5-10 Configuration

5-10-1 Introduction

The Configuration operation is used to set the Diagnostic Utility Program's time-out value (the maximum time from the transmission of test data to the reception of a response) and the display format for the Read Node Status operation. A timeout occurs if the timeout value elapses before a response is received from the destination node.

5-10-2 Operation

Use the procedure below to execute the Configuration operation.

1, 2, 3... 1. Enter "6" at the main menu to select "6. Configuration." The following display will appear.

```
    * * *   CONFIGURATION    * * *
    Network          1       Node address  12    Optical LAN   D3


         Timeout  (0-999)                                  :1

Select display pattern for node status information :  0
          0:All stations
          1:Stations with comment only
          2:Suppress timeout node's




               Press [ESC]key to exit.
```

2. Enter the timeout value (1 to 999 seconds) and press Return.
3. Enter the format (0 to 2) to be used for the Read Node Status operation and press Return. The three formats are as follows:

   0: Execute Read Node Status for all nodes.
   1: Execute Read Node Statusonly for nodes that have comments.
   2: Execute Read Node Status for all nodes except those that have timed out.

   When the format is entered, the configuration will be set and the main menu will be displayed.

5-11 Loop Construction Check

5-11-1 Introduction

This operation checks the order of the nodes operating in the network and displays their status information. There are two polling methods available in the Loop Construction Check operation: go-ahead polling and center polling. These polling methods are described next.

5-11-2 The Go-ahead Polling Method

The startup node creates the polling data and adds it to the local node information. This data is transmitted to the next node. The node that received the polling data adds its local node information and transmits it to the next node.

In this way, the polling data goes around the network while each node's information is added and finally returns to the startup node. The startup node displays the loop construction based on the returned polling data.

The polling data will be lost and the inquiry will fail when there is a node with a version of software that can't process the node diagnosis response operation, even if there is an NSB in the network that can receive the polling data. (A time-out will occur if the inquiry fails.)

Precautions

Take the following precautions when using this method.

1, 2, 3...

1. This operation can't detect when a loopback has occurred in the Line Server. Therefore, just an upstream loopback might be displayed or the display might appear normal although a loopback has actually occurred.
2. In order for go-ahead polling to be executed properly, all of the nodes in the network must have a release of the node diagnosis response operation that is version 5.0 or higher. Furthermore, the NSB must handle the Loop Construction Check operation.

   The version of the Diagnostic Utility Program for the response is displayed with the Read Node Status operation. Refer to *5-5-8 Operation 6: Diagnostic Table Read* for details.
3. Only nodes in the same network can be checked.

5-11-3 Operation with Go-ahead Polling

The procedure for checking the loop construction with go-ahead polling is as follows:

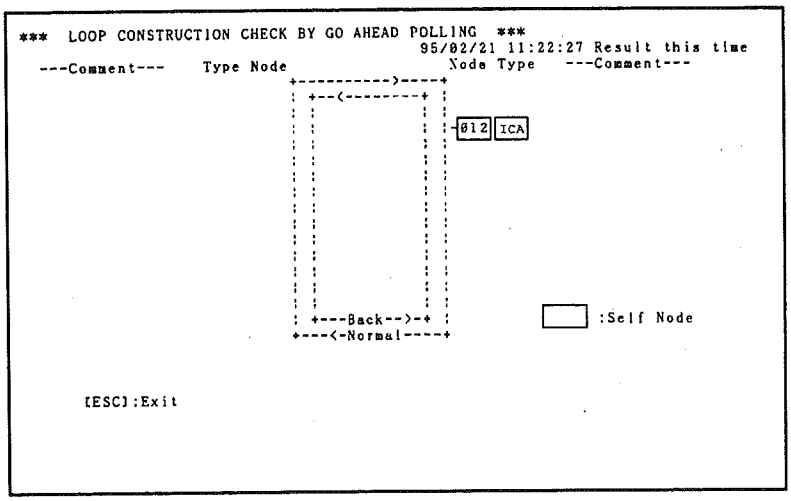
1, 2, 3...

1. Enter "7" at the main menu to select "7. Loop Construction Check." The following display will appear.

```
      * * * LOOP CONSTRUCTION CHECK * * *

We can analyse the active loop structure by following 2 ways.

      1. Go ahead polling
         This check is finished in a short time.
        We get only limited information of that go ahead
        polling matched( NSB & software ) node.

      2. Center polling
         This check takes a little time.
        We can get mode information of go ahead polling.

               Enter your requirement.
```

2. Enter "1" to select go-ahead polling. The loop construction check will begin and the results will be displayed when it is completed.

a) The following display will appear if go-ahead polling is completed successfully.

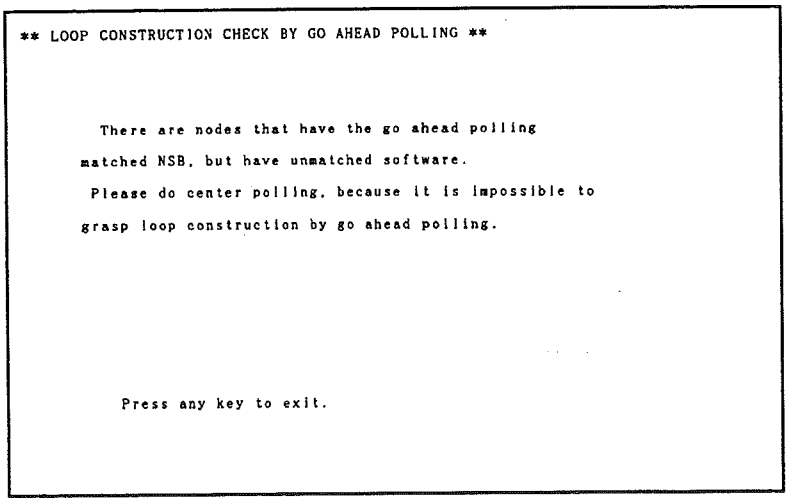


The order of the nodes in the network is displayed as the outer, normal loop. The node identifiers and comments are displayed alongside the node numbers.

The nodes displayed here aren't necessarily all of the nodes in the network. There may be nodes in between the displayed nodes, where the NSB can't receive the polling data.

Also when there is a loopback, the location is displayed by an interconnection between the normal loop and back loop.

b) The following display will appear if go-ahead polling fails.



This display appears because the go-ahead polling has timed out. The timeout value is set using the Configuration operation. Refer to *5-10 Configuration* for more details on the timeout value setting.

The software referred to in the message is the Diagnostic Utiltiy Program software.

5-11-4 The Center Polling Method

The startup node broadcasts the center polling data to all of the nodes in the network (including the startup node itself). When each node receives this data, it clears the existing "upstream node number" and sends an upstream notification to the next node. The "transmission source node number" is included in this upstream notification and can't be received by an NSB unless the NSB supports center polling.

When a node receives an upstream notification from its upstream node, it takes the transmission source node number from that data and uses it as its new "upstream node number."

After transmitting the center polling data, the startup node performs a Read Node Status on all of the nodes. Each node's Read Node Status information indicates its "upstream node number" and these numbers are used to analyze the loop construction.

Upstream Notification

The upstream notification allows the local node to recognize the node number of its upstream node. Information containing the node numbers is passed through the network and each node records the address of its upstream node.

Precautions

Take the following precautions when using this method.

1, 2, 3...

1. Nodes with a Diagnostic Utility program earlier than version 5.01 don't have the operation that sets the "upstream node number" when the upstream notification is received. Furthermore, these nodes can't transmit an "upstream notification" to the next node.
2. Some NSBs shipped before 1989 do not support the operation that receives the upstream notification.
3. This operation can't be executed when the local network's comments haven't been input.

5-11-5 Operation with Center Polling

The procedure for checking the loop construction with center polling is as follows:

1, 2, 3...

1. Enter "7" at the main menu to select "7. Loop Construction Check."
2. Enter "2" to select center polling. The following display will appear. (Press the Escape Key to abort the operation while it's in progress.)

```
** LOOP CONSTRUCTION CHECK BY CENTER POLLING **


              NOW STATUS READING


          Inquiring node       Ø16
          Remaining nodes      11Ø

    Data is inquired for all node(1 - 126).


  Press [ESC]key to exit.
```

The node that performs the Read Node Status operation must be set for "All stations" or "Stations with comment only." That setting and the timeout value

setting are made with the Configuration operation. Refer to *5-10 Configuration* for more details.

The following display will appear when the Read Node Status operations have been completed for all of the nodes.

```
** LOOP CONSTRUCTION CHECK BY CENTER POLLING **

              ANALYZING RESULT

          Groupe            :     001
          Stand alone node  :     001
    Groupe     : There are over 2 nodes that related each other.
                 It is possible to decide order of nodes,
                but it is impossible to decide order of group
    Stand alone node : It has no relation with another node.

In case of watching node's order, please imput that group No.
, and in case of stand alone node,please imput 99.
[ESC]:Exit
```

The display will indicate the number of groups and stand-alone nodes identified by analysis of the upstream node numbers.

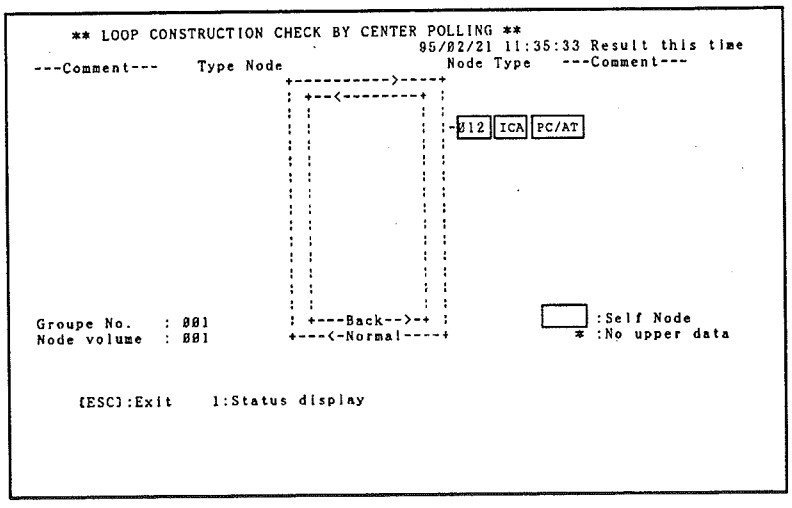
There may be different versions of the node diagnosis operation in the nodes in the network, but the existence of the nodes can always be identified with center polling.

When there is 1 group, the loop construction can be analyzed to show the order of all of the nodes clearly.

When there are 2 or more groups, the data is insufficient so the network is analyzed by dividing it into several groups. Group numbers are added automatically (from 1 to the total number of groups in the network).

3. Enter the desired group number to display the configuration of nodes in that group. A list of the stand-alone nodes' status information will be displayed if "99" is entered for the group number.

   a) The following example shows the results when there is just 1 group.



This example shows the results when the check was able to make a complete loop of the network. The outer loop is the normal loop and the inner loop is the back loop. The node identifiers and comments are displayed alongside the node numbers. Stand-alone nodes aren't displayed in this diagram.

An asterisk is displayed next to the node number of nodes that don't confirm the upstream data.

If a "1" is input while these results are displayed, an input prompt will appear for a node number. The status information for the desired node will be displayed at the bottom of the screen when the node number is entered.

```
   Groupe No.    : 001                                    :Self Node
   Node volume   : 001                                  * :No upper data

Node     Optical LAN   Pwr. Type     Comment          I P  type count  time
12   Normal            OFF  NAA PC-9801           01000C11 A   189  11:20:09
        [ESC]:Exit      1:Status display
```

b) The following example shows the results when there are several groups.

```
      ** LOOP CONSTRUCTION CHECK BY CENTER POLLING **
                                          95/02/21 11:49:07 Result this time
   ---Comment---    Type Node                Node Type   ---Comment---
                                DOWN          UP
                                 :  :          :  :
                                 :  :          :  :- *004 SBG NSU
                                 :  :          :  :
                                 :  :          :  :
                                 :  :          :  :
                                 :  :          :  :
                                 :  :          :  :
                                 :  :          :  :
                                 :  :          :  :
PC/AT                  ICA 012-  :  :          :  :
                                 :  :          :  :
   Groupe No.    : 001           :  +---Back-->-+  :          [ ]:Self Node
   Node volume   : 002           +---<-Normal----+            * :No upper data


      [ESC]:Exit     1:Status display
```

When there are several stand-alone nodes, it isn't possible to determine the connections before and after the stand-alone node, so the network is divided into groups in the display. Stand-alone nodes aren't displayed.

Status information can be displayed by pressing "1," as in the previous example.

Note Even when there is just one group, this pattern will be displayed when the positions of the most upstream node and the most downstream node are uncertain.

c) The following example shows the display for a stand-alone node.

```
        ** DISPLAY STAND ALONE NODE **

      Stand alone node : It has no relation with another node.
                                                    (---Loop test----)
Node     Optical LAN   Pwr. Type     Comment          I P  type count  time
01   Normal            OFF  UAA FX-9200             01000111       0


                        Press any key to exit.
```

The stand-alone node's node number, status information, and broadcast test results will be displayed.

5-11-6 Units Supporting the Loop Construction Check Operation

Some Communications Units don't support the Loop Construction Check operation, as shown in the following table.

Series	Model	Go-ahead Polling	Center Polling
C Series	C500-SNT31	No	No
	C500-SNT31-V1	No	No
	C500-SNT31-V2	Yes	Yes
	C500-SNT31-V3	Yes	Yes
	C500-SNT31-V4	Yes	Yes
CV Series	CV500-SNT31	Yes	Yes

Go-ahead polling can't be performed in a network that contains even one C500-SNT31 or C500-SNT31-V1 SYSMAC NET Link Unit. Center polling can be performed.

5-12 Loop Construction Display

5-12-1 Introduction

This operation displays each node's information in the order that the network's nodes were defined with the Set Comment operation. The displayed information includes the status display and the upstream data display. The loop construction can be checked again with center polling for either display.

Precautions

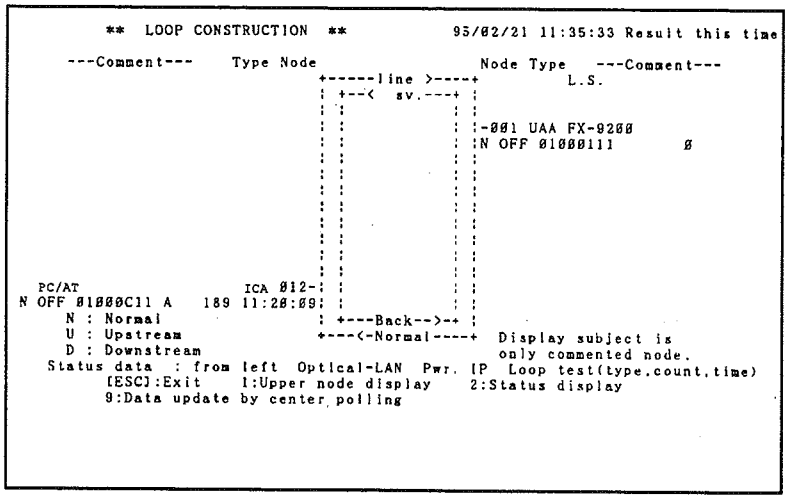
Take the following precautions when displaying the loop construction.

1, 2, 3...

1. This operation can't be executed when the local network's comments haven't been input. Refer to *5-7-2 Inputting Comments in the Local Network* for details on inputting comments.
2. The order in which the nodes are displayed is determined when the comments are input; the results of analysis performed during execution of the Loop Construction Check operation aren't used to determine the order.

5-12-2 Displaying the Loop Construction

Enter "8" at the main menu to select "8. Loop Construction Display." Each node's information is displayed alongside the configuration diagram, as shown below.



The display shows the loop construction with the Line Server in the center of the screen and the nodes in order with the outer loop as the normal loop.

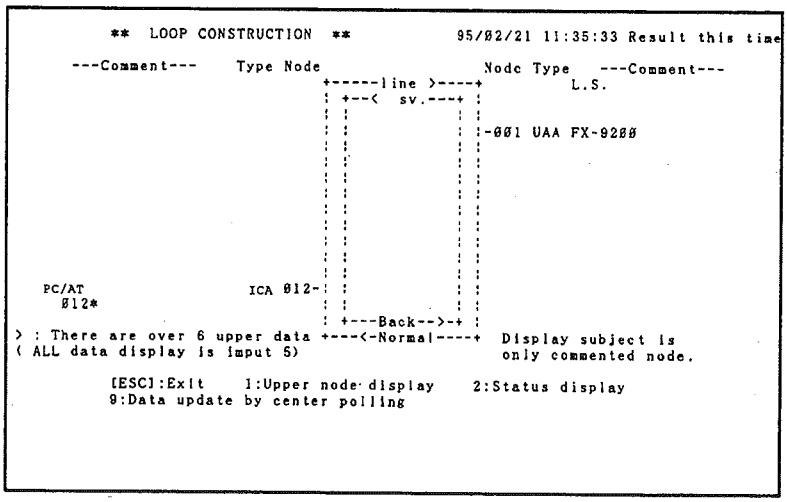
The node information indicates the node number, node type, and comments on the first line and the node status (N, U, or D), power supply, IP address, and broadcast test results on the second line.

Note A date and time is shown in the upper-right corner of the screen. This is the last time that the loop construction information was checked by center polling. The displayed information was collected at that time.

5-12-3 Displaying Upstream Data

Use the following procedure to display the upstream data.

1, 2, 3... 1. Enter "1" from the loop construction display accessed in *5-12-2 Displaying the Loop Construction*. The upstream data will be displayed as shown below.



A single node can have upstream data for 20 nodes max., but only 6 upstream nodes can be displayed because of display limitations. If there is upstream data for more than 6 nodes, a ">" symbol will be displayed at the bottom of the screen indicating that there is more data to be displayed.

2. Input "5" when you want to display all of the upstream data. An input prompt ("Input node number.") will be displayed.
3. When the desired node number is entered, all of the upstream data for that node will be displayed at the bottom of the screen.

Note A date and time is shown in the upper-right corner of the screen. This is the last time that the loop construction information was checked by center polling. The displayed information was collected at that time.

5-12-4 Refreshing Data with Center Polling

This operation performs a loop construction check with center polling, collects the latest node information, and displays that node information on screen.

1, 2, 3... 1. Enter "9" from the loop construction display accessed in *5-12-2 Displaying the Loop Construction* or the upstream data display accessed in *5-12-3 Displaying Upstream Data.*

Center polling will begin and the following display will appear.

```
**  LOOP CONSTRUCTION  **

                NOW STATUS READING

            Inquiring node       004
            Remaining nodes      000

      Data is inquired for only commented node.

    Press [ESC]key to exit.
```

2. When the configuration check is completed, the status display will be shown with the latest node information.

5-13 Error Messages

An error message and error code will be displayed when an error occurs in the Diagnostic Utility Program. Error messages can be divided into the following 3 categories:

1, 2, 3... 1. Error messages during operation (except transmission and reception)
2. Error messages during transmission processes
3. Error messages during reception processes

This section lists the Diagnostic Utility Program's error messages as well as the likely causes and remedies for the indicated error.

5-13-1 Operational Error Messages

Error message	Likely cause	Remedy
Cannot Find Packet Type in the PCB.	The packet type specified in the protocol counter of the diagnostic table display isn't supported.	Enter the correct packet type.
Cannot open the DIAG driver.	The SYSMAC NET link driver (CP_3200.SYS) or DIAG32.SYS hasn't been loaded.	Register the SYSMAC NET link driver (CP_3200.SYS) and DIAG32.SYS in the CONFIG.SYS file and reset the Unit.
Partner don't have this operation.	The other node's Diagnostic Utility program is earlier than version 5.51, so the diagnostic table can't be read.	Replace the other node's Diagnostic Utility program with version 5.51 or higher.
Write error to the DIAGMT32.DT file.	An error occurred writing to the data file when exiting a menu display by pressing the Escape Key.	It is possible that there isn't enough free space to write the file or the disk is faulty. Check the amount of free memory and make sure that the disk is not write-protected.

5-13-2 Transmission-processing Error Messages

Error message	Likely cause	Remedy
Network address or Destination address is invalid. Error code: 7B00	An invalid address was specified for the destination node. For example, an attempt was made to transmit to a network address that isn't registered in the routing table.	When transmitting to a node outside the local network, register that address in the routing table. It is possible that there is a problem with the NSB board if this message is displayed when transmitting to a node within the local network (with network address set to 0 and node address set to 1 to 126).
Cannot use optical LAN. Error code: 0005	A network error has occurred because the Line Server's power supply is off or an optical fiber cable is disconnected.	Make sure that the Peripheral Devices are connected correctly.
Send process is busy. Error code: 4405	An attempt was made to transmit more data even though the previously transmitted data hasn't been completely processed.	Increase the interval between transmissions.
Token loss. Check the Line Server. Error code: 7A00	The token was lost because the Line Server's power supply is off or an optical fiber cable is disconnected.	Make sure that the Peripheral Devices are connected correctly. Have the user application perform the transmission process again.
An error detected in send process. Error code: XXXX	When data transmission was attempted, an error code was returned that doesn't correspond to error messages from the SYSMAC NET link driver.	It is possible that an older version of the SYSMAC NET link driver or DIAG32.SYS program is being used. Check the versions of these programs.

5-13-3 Reception-processing Error Messages

Error message	Likely cause	Remedy
Destination: Node address error Error code: 4F01	The data received by the destination node was addressed to another node.	There may be an error in the other node's DIAG program.
Destination: No effect command. Error code: 4F02	The data received from the destination was invalid.	There may be an error in the other node's DIAG program or the program may be older than version 5.51.
Destination: Maintenance read error. Error code: 4F03	There was an error at the destination during the maintenance read operation performed when the Read Node Status's response data was returned.	There may be an error in the other node's DIAG program.

Error message	Likely cause	Remedy
Destination: Maintenance read error. Error code: 4F04	There was an error at the destination during the Read Node Status operation performed when the Read Node Status's response data was returned.	There may be an error in the other node's DIAG program.
Destination: address error. Error code: 4F05	The address specified for a memory read (segment + offset) either doesn't exist in the other node or isn't readable.	Specify a correct address.
Destination abnormal status. Error code: XXXX	An error code was returned that doesn't correspond to an error message. When the error code is 6, there is a node in the local network with a different network address.	There may be an error in the other node's DIAG program or the program may be older than version 5.51. When the error code is 6, check the network address settings.
Timeout (receive). Error code: 4400	The response data wasn't returned within the timeout value set with the Configuration operation. The specified node might not exist in the network or it might be down.	Check the status of the specified node.
Buffer short (receive). Error code: 0D00	The amount of data received exceeds the capacity of the reception buffer provided in this utility program.	The buffer capacity provided is usually sufficient, so contact your OMRON representative if this error code is returned.
An error detected in receive. Error code: XXXX	An error code that doesn't correspond to an error message was returned when data reception was attempted.	It is possible that an older version of the SYSMAC NET link driver or DIAG32.SYS program is being used. Check the versions of these programs.

5-14 Troubleshooting

5-14-1 Introduction

This section explains how to correct the problems that can occur when using the SYSMAC NET System for communications. There are 3 major problems preventing communications with another node.

1, 2, 3...

1. Communication is completely disabled for unknown reasons; the transmitting node, transmission path, or reception node could be at fault.
2. Communications are usually possible, but data is lost for some reason.
3. Communications are normal with the Diagnostic Utility program, but problems occur with the application programs.

In addition to the hardware and software that make up the network, the trouble could be caused by the operating system, application program, or hardware that aren't directly involved in data transmission and reception. Furthermore there are cases where the tests required to track down the cause of the problem can't be performed; for example, it might not be possible to perform the tests with the system operating.

The network administrator can use the troubleshooting techniques described in this section to select a method to identify the problem that takes the system's limitations into account and then solve the problem. Start troubleshooting with *5-14-2 Communications Configuration/Equipment Problems* when there aren't any particular limitations to the problem-solving or you don't know where to start troubleshooting.

All of the networks should operate in normal status; the system should operate in a loopback status only when an error has occurred.

5-14-2 Communications Configuration/Equipment Problems

Data losses will occur in cases 1, 2, and 3 described in the table below. Data loses will be indicated by increases in timeouts for or low reception counts for broadcast tests.

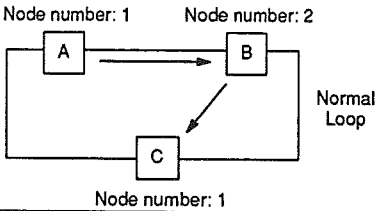
Token losses will also occur occasionally. Check the user program and the operating status of each piece of equipment when problems occur. Depending on the operating status, these problems can be ignored in some cases.

These problems might occur when the system is operating, but the user can set up a system to re-transmit data if necessary. With communications that use UDP/IP connectionless protocols, the program in the receiving node should notify the transmitting node of the arrival of the data. If the transmitting node doesn't receive this notification within a specified time, a timeout occurs. Set up a process in the program that will re-transmit the data if a timeout occurs.

Case	Recommended troubleshooting method
1	A cable was broken or a connector was disconnected and then the connection was re-established, so the network has switched between loopback and normal status. An error will occur in a data packet if the packet was being transmitted when the network entered the loopback status or was restored to normal status.
2	An error might occur in a data packet if the packet was being transmitted when a power supply (the power supply of the node connected to the concentrator or the Central Power Supply Unit) is turned on or off.
3	A packet might be discarded if a large number of packets arrive at one node and that node's hardware or software buffer overflows. This can occur when the node broadcasts a transmission and requests responses from the other nodes, but there are too many other nodes. There are hardware reception buffers that contain 7 or 15 packets. The size of the software reception buffers varies from Unit to Unit. The user can determine whether the packet was discarded by checking the protocol with the Read Node Status operation, although some Units don't support this operation. Refer to *5-5-8 Operation 6: Diagnostic Table Read* for details.

5-14-3 Problems between Transmitting and Receiving Nodes

Perform tests 4 through 8 in the following table. Try the solution described if the problem spot is identified and proceed to *5-14-4 Problems within the Transmitting Node or Receiving Node* and *5-14-5 Problems with Other Network Devices* if further troubleshooting is required.

Case	Recommended troubleshooting method
4	Check whether the Line Server's power supply is on.
5	Check whether there is another node in the same network with the same node number. This can be checked with the Read Node Status operation (1. All Nodes) or the Loop Construction Check operation. A node's information won't be displayed unless its power supply is on. In the following example, the data transmitted from node A to node B is received by node B, but the response from node B to node A is intercepted by node C, which has the same node number as node A. 

Case	Recommended troubleshooting method
6	Perform echo back tests between the problem nodes and from other nodes. Proceed to *5-14-4 Problems within the Transmitting Node or Receiving Node* and *5-14-5 Problems with Other Network Devices* if all of these tests result in errors. Proceed to case 7 if errors occur rarely. If the test results are normal, execute a test program that uses the same protocol as the user program, for example, a test program in a datagram. The idea is to create a simple program for testing. If this test results are normal, there is a problem with the user program. Proceed to case 7 if errors occur.
7	Execute a broadcast test and check whether there are any nodes with a low count of reception packets. Refer to *5-9 Broadcast Test* for details.
8	If the problem developed after the system was modified, return the system to its original configuration and test it. It is possible that the problem developed because the comments input with this utility program and materials created for management weren't changed along with the system configuration.

5-14-4 Problems within the Transmitting Node or Receiving Node

Refer to the manuals included with each Unit or Board and perform the following tests. Take the appropriate corrective steps and test the device if the problem is isolated.

Case	Recommended troubleshooting method
9	Check whether the settings and LED indicators on each device (NSB, etc.) are correct.
10	Use a test program to check whether the software is installed properly. Display and check the settings for the local node, such as the node number.

Perform the following tests if the results of cases 9 and 10 were normal.

Case	Recommended troubleshooting method
11	After turning on the power supply for the affected node, perform a communications test without operating any other user programs. If the node operates normally, there is probably a problem in a user program that is affecting the node.
12	Re-install the LAN-related software from the floppy disk and test the system. Replace the Unit and/or NSB and test the system.
13	When using another optional board or device driver, the problem could be caused by a conflict of the I/O addresses or interrupt levels being used. Stop the use of these optional operations in both the hardware and software, and perform tests in a configuration using optional operations related to the SYSMAC NET System only. When there is a conflict, refer to the manual of the optional operation involved and change its settings.
14	The malfunction might be caused by a faulty power supply, an error in the Unit itself, or the operating system. Refer to the manuals for the Units and operating system and check for any problems. Also, check the power supply with some diagnostic equipment, such as an AC line analyzer.
15	When several of the same device are being used, there might be a common problem or characteristic problem with that model.
16	Try connecting just the Line Server and the affected Unit and performing a loop test.

5-14-5 Problems with other Network Devices

Refer to each device's manual and check the other devices in the network to see whether the problem is caused by a Line Server, Cable, Bridge, Router, Gate-

way, Central Power Supply, or other device. If a problem is isolated, correct it and test the system again.

Case	Recommended troubleshooting method
17	Check whether the Line Server's LEDs are normal.
18	Check whether the Central Power Supply Unit's settings are correct.
19	Use the Node Configuration Utility to check whether the set parameters (such as the local network addresses in Bridges, Routers, and Gateways and the routing table values) are correct. Also check the devices' switch settings and LED indicators.

Check whether the cable connections are correct. In order to verify that the inter-node connections are secure, turn off the power supplies to all of the devices connected to the network and perform the following tests.

First of all, turn on the Line Server's power supply, then turn on the power supplies of the downstream node. Next, use a loop test or other test with that node to check whether communication is possible in the LAN.

If the results are normal, perform the same test on the next downstream node. If the results aren't normal, there is an error in the cables, connectors, NSB, or other hardware between the problem node and its upstream node. In this case, use an optical power meter to measure the light levels and check the status of the faulty device.

SECTION 6
Loop Test Utility

The loop test utility is used to diagnose whether an IBM PC/AT or compatible computer setup with SYSMAC NET System can communicate or not.

6-1 General Description

The loop test utility is a program that diagnoses whether a computer setup with SYSMAC NET System can communicated on the SYSMAC NET network or not.

In the loop test, 2 Kbytes of test data is transmitted onto the SYSMAC NET network from the computer to the computer's node address. The received data is compared to the transmitted data, and the results are then displayed.

6-2 Procedure

The following procedure is used to execute the loop test.

1, 2, 3... 1. Enter LTEST↵ at the prompt for the SN3200 directory.

```
C:\SN3200> LTEST
```

The following initial screen is displayed.

```
        *** SYSNET LOOP TEST UTILITY PROGRAM *** Version 2.05


This program tests the SYSNET by cpmparing data
transmitted for own node and received data.
2k byte test data is changed its copmposition of format every time.



            < Press [P] or [G] key to start >
    [P]     key----> Print out the result of the test.
    [G]     key----> Not to print.
    [ESC]   key----> Exit from this test.
```

2. Input G to start the loop test. Input P to print out the test results. The results are printed out when the test is completed.

Note A Japanese or English language display can be selected by attaching the option when inputting the command as shown below. If no option is selected, the language set in the CONFIG.SYS will be used.

```
C:\SN3200> LTEST␣/E↵    English
C:\SN3200> LTEST␣/J↵    Japanese
```

The display can also be switched by entering CTRL + E from the initial screen.

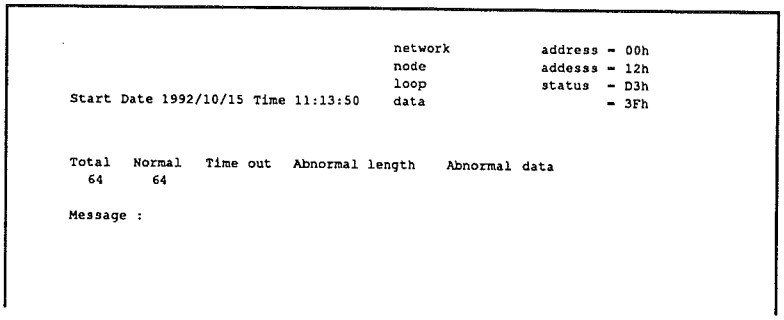
3. Press the Escape Key when the loop test has been performed a sufficient number of times to display the results.

```
                                    network         address = 00h
                                    node            addesss = 12h
                                    loop            status  = D3h
Start Date 1992/10/15 Time 11:13:50 data                    = 3Fh


Total   Normal   Time out   Abnormal length    Abnormal data
  64      64

Message :
```

4. Press any key while test results are displayed on screen to end the utility and display a prompt.

6-3 Test Results

The test results are described below.



Network Address The network address is displayed in hexadecimal.

Terminal Address The node address for the SYSMAC NET Support Board mounted in the computer is displayed in hexadecimal.

Loop Status The network status (LAN status) is displayed. Details of the display are provided below.

Loop status	Normal loop	Upstream loop back	Downstream loop back	Loop error
No power supplied	$D3_H$	DB_H	$D7_H$	DF_H
Power supplied	$F3_H$	FB_H	$F7_H$	FF_H

First Data Value The first value for test data that is sent is displayed in hexadecimal.

Reception Time Outs The number of times transmitted data was not returned to the local node after about 2 seconds.

Number of Receive Data Errors The number of times the receive data bytes were bit not the same as the number of send data bytes.

Inconsistent Data The number of times the send and receive received data did not match.

6-5 Error Messages

The following table lists messages displayed in the loop test as well as check locations for each message.

Error Check Locations

No.	Message	Main location checked					
		SYSMAC NET link driver	User utility	SYSMAC NET Support Board	Line Server	Other nodes	Cables
1	SYSNET BIOS is not loaded. Check CONFIG.SYS file.	Yes					
2	Lost Token! Check the LINE SERVER.	Yes		Yes	Yes	Yes	Yes
3	Receive Time Out.	Yes		Yes	Yes	Yes	Yes
4	Abnormal loop status.	Yes		Yes	Yes	Yes	Yes
5	Status read is not performed normally.	Yes		Yes	Yes		
6	Packet can't release normally.	Yes	Yes				
7	This packet-type has already been initialized.	Yes	Yes				
8	Too many registered packet-types.	Yes	Yes				
9	Send-request has already been issued.	Yes	Yes				
10	Miscelaneous transmit error. Return status is XXh.		Yes				
11	Receive process has already excuted.		Yes				
12	Illegal buffer size.		Yes				
13	Mescelaneous receive error. Return status is XXh.						
14	Error of Transmit data length.		Yes				
15	Destination node address error.		Yes				
16	Invalid Packet-type.		Yes				
17	data length error						
18	compare error						

Handling Procedures

Check the following items first when messages 1 to 4 are displayed.

Item no.	Item checked
1	Is Line Server power ON? Are the proper LED indicators lit?
2	Are the optical fiber, power, and other cables properly connected?
3	Is the monitor LED indicator on the SYSMAC NET Support Board lit?
4	Does another node have the same address in this network?

Check the following for messages 1 to 9 (those requiring checking the SYSMAC NET link driver).

Item no.	Item checked
5	Are the setting for the Board switches and short pins as well as the parameter set by the SYSMAC NET link driver correct according to the version and the read status displays?

Check the following for messages 6 to 16 (those requiring checking the user software and utilities).

Item no.	Item checked
6	After starting the computer, execute the loop test without having user software and utilities execute even once. If there is no test error, the user software is the problem. If there is an error, execute the node diagnosis utility to display the status of the local node. The loop test utility is malfunctioning if there is no status error. If there is a status error, then the problem is not in the loop test utility.

If the problem area is found through checks 1 to 6, correct the settings and cabling. If the problem area is not found, use the SYSMAC NET Support Software to reinstall all software, and then perform the test again.

Check the following if the problem cannot be isolated using checks 1 to 6.

Item no.	Item no.
7	There may be problems if the addresses (I/O and interrupt) being used are competing with another option boards and device drivers. Turn off all hardware and software optional functions and test in an environment where only SYSMAC NET-related options are in use. Refer to the manual for the optional functions if there is any competition, and reset the addresses to ones not currently being used.
8	Consider error operation due to a poor power supply as well as computer, OS, or other malfunctions. Refer to the computer and OS manuals to check for such malfunctions.
9	Check to see if the same problem occurs in similar devices if more than one of the same device is being used.
10	Construct a loop with a Line Server and the two problem nodes, and then perform a loop test to see if the problem still occurs.

SECTION 7
Node Configuration Utility

The node configuration utility sets various parameters related to NSUs and Bridges connected to SYSMAC NET System. Refer to this section to set any NSUs or Bridges that are used.

7-1 General Description

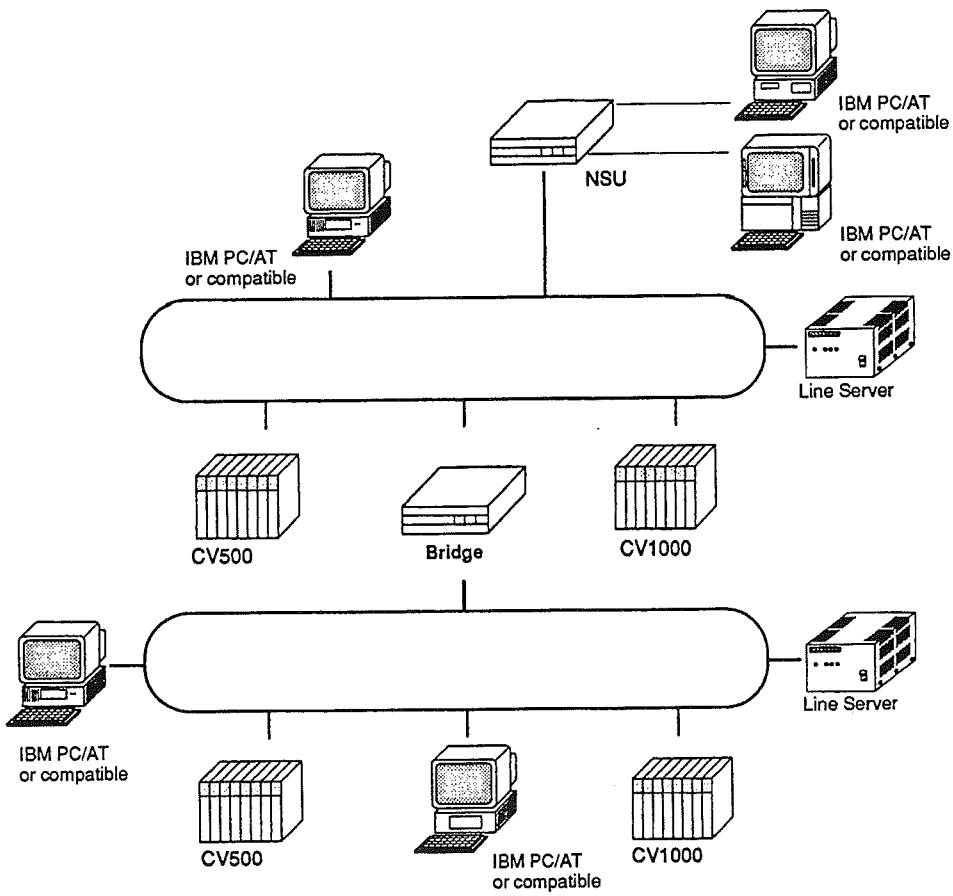
The node configuration utility sets various parameters related to NSUs (Network Service Units) and Bridges connected to a SYSMAC NET System.

System administrators should perform utility operations. NSU configurations enable communications with workstations, personal computers, and other devices that do not support SYSMAC NET Systems.

Bridge configurations and IP routing table settings enable the construction of multiple level networks.

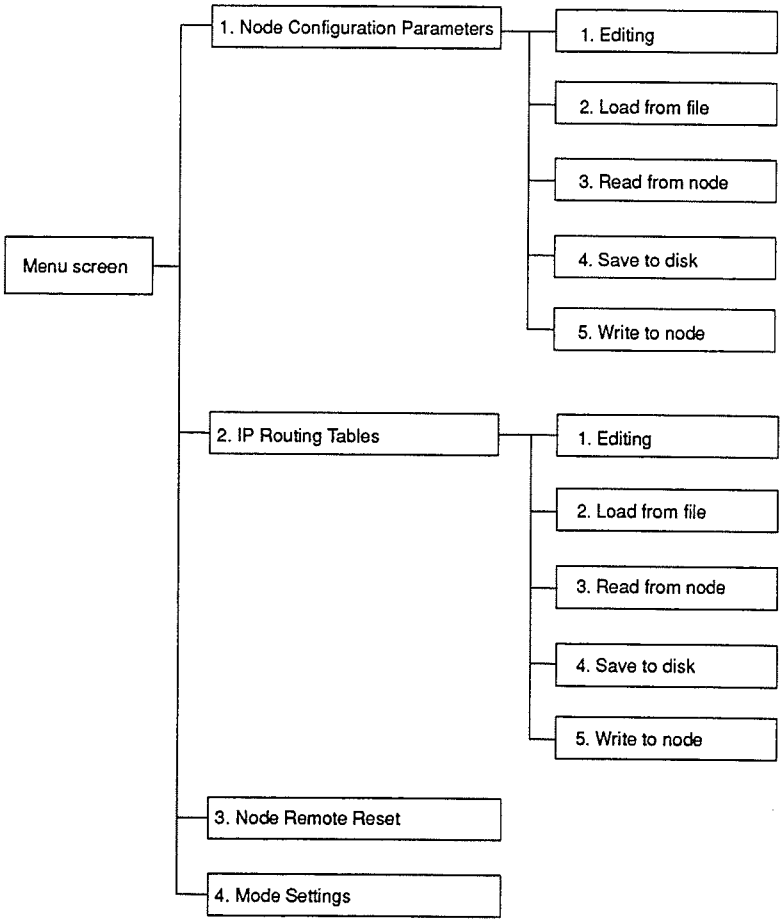
Be sure to read *7-2 NSU and Bridge Preparation* prior to using this utility.

The following shows an example of a network constructed with an NSU and a Bridge.



Menu Structure

The following illustration shows the menu structure of the node configuration utility.



7-2 NSU and Bridge Preparation

The items that must be performed prior to using the node configuration utility to configure an NSU or Bridge are described next.

The following NSU and Bridge models are described.

- NSU SYSMAC NET Network Service Unit (S3200-NSUA1-10)
- Bridge SYSMAC NET Bridge (S3200-NSUG4-10E)

The following procedure is used for NSU and Bridge preparation.

1, 2, 3...

1. Set pin 4 of DIP switch 1 on the back of the NSU or Bridge to ON.
2. Reset by pressing the RESET button located on the left side of SW1. The NSU and Bridge can also be reset using the remote reset (see *7-5 Node Remote Reset*) or by turning the power on and off on.
3. Turn OFF pin 4 on DIP switch 1. The NSU or Bridge can be set using the node configuration utility.

Note

1. Be sure to perform the above preparation steps before using the node configuration utility. Configuration data that was set without prior preparation will be completely invalid. Items can be set, but the settings will not be used in the NSU or the Bridge.

2. Be sure to reset the NSU or Bridge after it is set by the node configuration utility. Configuration data that has been set will not be used unless the NSU or Bridge is reset.

7-3 Starting and Quitting

The following procedure is used to start and quit the node configuration utility.

Startup Procedure

Enter CONF32↵ from the prompt for the SN3200 directory.

```
C:\SN3200> CONF32↵
```

The following screen will be displayed if the startup is normal.

```
SYSNET    Configuration Utility   V1.04



Enter drive number (a-z) : a
```

Quitting Procedure

Press the Escape Key from the screen shown above to quit the node configuration utility and return a prompt. (The Escape Key will return one screen or one item while the utility is running, so entering the Escape Key several times will quit the utility.)

If an item is input incorrectly, the item can be entered again by entering the Escape Key.

Reference Information

A Japanese or English language display can be selected by entering a command with an option attached. Enter the following:

```
C:\SN3200> CONF32␣/E↵   English
C:\SN3200> CONF32␣/J↵   Japanese
```

If no option is specified, the language set in the CONFIG.SYS will be used.

7-4 Settings Parameters

A request for the following parameters will be displayed when the node configuration utility starts up. The procedure is explained below.

```
SYSNET    Configuration Utility   V1.04



Enter drive number (a-z) : a
```

1, 2, 3...

1. Enter the name of the disk drive storing accessory and data files (disk drive containing the SN3200 directory during installation) using A to Z and press Return.

   The network address will be requested.

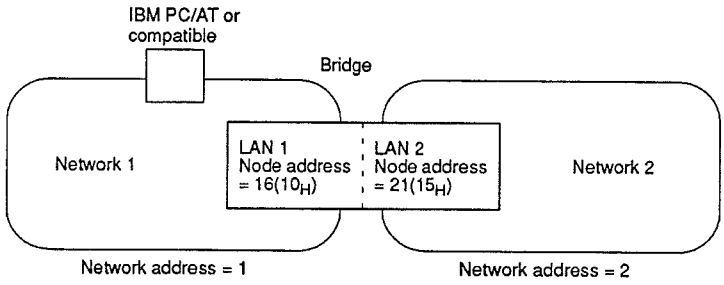
2. Input a number between 0 to 127 to specify the network address where the node that will be connected, and press Return.

   The node address will be requested.

3. Use 1 to 126 to specify the node address, and press Return.

Note Be sure to enter the decimal address for the node in the network of the computer from which the node configuration utility starts up if a Bridge is specified in step 3. above.

Example: Enter 16_7 for the example below.



The following is an example of the parameters.

```
SYSNET    Configuration Utility  V1.04



Enter drive number (a-z) : c

Enter network number : 0

Enter node number :
```

The menu screen will be displayed when the node address is entered and Return is pressed.

Note The following error message will be displayed if the wrong network address or node address is entered.

Status cannot be read errno = x
This type of node is not currently supported. Type: XXX Version. XX

Press the Escape key to cancel incorrect inputs.

Refer to *7-9 Summary of Error Messages* for more details on error messages.

7-5 Node Remote Reset

The node remote reset is used to reset a configured node. The remote reset enables newly configured data for that node.

Make sure that the initialize switch for the node being reset is OFF prior to resetting. Leaving the initialize switch ON disables all configuration details.

The following procedure is used to reset remote node.

1, 2, 3... 1. Enter 3 from the menu screen shown below to select "1. Node remote reset."

Menu Screen

```
        SYSNET    Configuration Utility     V1.04


    Net No.0       Nod No.124      Node Type: SCA

    1. Node Configuration Parameters
    2. IP Routing Tables
    3. Node Remote Reset
    4. Mode Setting




    Enter command >>
```

2. Pressing 3 displays the password prompt, so enter the password. If the correct password is not entered after three tries, the utility will wait for another command. Start again from step 1.

```
  PASSWORD >>_
```

The node is reset when the correct password is entered. After the reset is completed, the utility will wait for another command.

Note

1. The password for the node configuration utility is s3200, and it must be entered with a lowercase s. Since the password is used to prevent accidental overwriting or setting rather than for security purposes, it cannot be changed or deleted.
2. Some nodes do not support remote resetting, so refer to the operating manual for each node to determine whether remote resetting is available or not.
3. Make sure that the initialize switch of the node being reset is OFF. Leaving the initialize switch ON disables all configuration details.

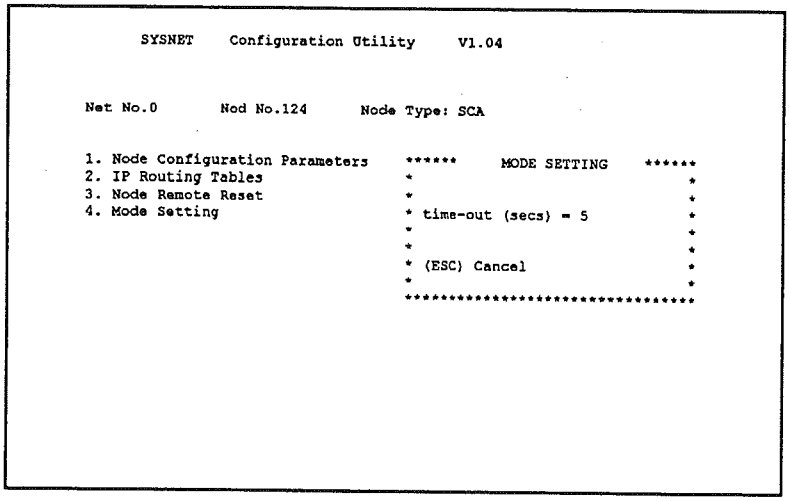
7-6 Mode Settings

The mode setting function sets the timeout time. The timeout time is the maximum amount of time in seconds to wait for a response from the destination of a transmission.

The default timeout value is set at 5 seconds because it takes a while to get a response from a node when communicating through a Bridge, for example.

The mode setting procedure is given below.

1, 2, 3... 1. Enter 4 on the menu screen to select "Mode setting." The following screen will be displayed.



2. Enter the timeout time, and press Return. After the timeout time is set, the utility will wait for another command.

7-7 Node Configuration Parameter Settings

7-7-1 General Description

An NSU is set with "1. Node configuration parameters." This function sets parameters for the two NSU ports. Parameters for the two ports, PORT1 and PORT2, can be set individually.

The following processes are available.

1, 2, 3...

1. Editing
   Edits node configuration parameters.
2. Load from file
   Reads the node configuration parameter data file.
3. Read from node
   Reads node configuration parameters from the NSU.
4. Save to disk
   Writes edited node configuration parameters to the node configuration parameter data file.
5. Write to node
   Writes edited node configuration parameters to the NSU.

*The password must be entered to execute processes 4. and 5.

Note

1. The password for the node configuration utility is s3200, and it must be entered with a lowercase s. Since the password is used to prevent accidental overwriting or setting rather than for security purposes, it cannot be changed or deleted.
2. Refer to *7-2 NSU and Bridge Preparations* to prepare the NSU prior to setting configuration data in the NSU.
3. Be sure to reset the NSU after the node data parameters are set.

7-7-2 Editing and Writing to Nodes

The following procedure is used to edit node configuration parameters and to write them to an NSU. The NSU is configured using the series of operations provided below.

1, 2, 3...

1. Enter 1 on the menu screen to select "1. Node configuration parameters." The following screen will be displayed, and the utility will wait for another command. The screen contains default values read from file.

   Enter CRTL + J to display the following screen so that other items and details can be checked. Refer to the NSU manual for more details about the items and details. Enter CTRL + K to return to the previous screen.

```
  < Node Configuration Parameter Configuration >
    Net:0  Node:124  Node Type:SCA
No.      Item                                                    Contents
------------------------------------------------------------------------------
 1.PORT1 Port name                                              :
 2.PORT2 Port name                                              :
 3.PORT1 Non-intervension monitor timer                         : 0
 4.PORT2 Non-intervension monitor timer                         : 0
 5.PORT1 Speed                                                  : 9600
 6.PORT2 Speed                                                  : 9600
 7.PORT1 Bits                                                   : 8bits
 8.PORT2 Bits                                                   : 8bits
 9.PORT1 Parity                                                 : no parity
10.PORT2 Parity                                                 : no parity
11.PORT1 Stop bits                                              : 1 bit
12.PORT2 Stop bits                                              : 1 bit
-----Status:   Enter number of item to be changed > 1   ------------------

ESC:       terminate                          1. Editing
CTRL-J:    next entry                         2. Load from file
CTRL-K:    previous entry                     3. Read from node
P:         print                              4. Save to disk
                                              5. Write to node
```

2. Enter 1 on the screen above to change to the status display shown below. The edit mode is selected if "1. Editing" is highlighted.

```
-----Status:   Enter number of item to be changed > 1   ------------------

ESC:       return to menu                     1. Editing
CTRL-J:    next entry                         2. Load from file
CTRL-K:    previous entry                     3. Read from node
                                              4. Save to disk
                                              5. Write to node
```

3. Enter the number of the item to be changed, and press Return. Here, enter 5 and Enter to change the baud rate (speed) at PORT1. The cursor will move to the PORT1 baud rate location.

   The status will change as shown below, and the input format will be displayed.

```
-----Status:   Select code name                  ------------------

<  Input format   >                             1. Editing
CTRL-J/K: enter to switch                       2. Load from file
CR:       enter to select                       3. Read from node
ESC:      return to menu                        4. Save to disk
                                                5. Write to node
```

4. Enter CTRL + J or CRTL + K to select the desired speed.
5. The settings are made by pressing Return.

   Use the status and input format displays described above to set other items that need to be changed.

6. Press the Escape key to end the setting. The utility will wait for another command as indicated in step 1.
7. Enter 5 to select "5. Write to Node."
8. Enter the password. Node configuration data that was set is written to the NSU when the correct password is entered.

NSU Reset

If node configuration parameters are simply written to the NSU without a reset, the data will not be used in the NSU. Be sure to use a remote reset or a hardware reset to reset the NSU. Refer to *7-5 Node Remote Reset* for more details on a remote reset.

7-7-3 Load from File

When "Load from File" is executed, data in the node configuration parameter data file (iXXXX4) is read and displayed. Edited data displayed on screen will be lost when data is loaded from disk.

The procedure is explained below.

1, 2, 3... 1. Enter 2 on the command input screen shown below.

```
-----Status:   Enter Command >  2                  ------------------

ESC:       terminate                          1. Editing
CTRL-J:    next entry                         2. Load from file
CTRL-K:    previous entry                     3. Read from node
P:         print                              4. Save to disk
                                              5. Write to node
```

The following screen will be displayed.

```
-----Status:   OK ? [y/n]                      ------------------

ESC:       terminate                          1. Editing
CTRL-J:    next entry                         2. Load from file
CTRL-K:    previous entry                     3. Read from node
P:         print                              4. Save to disk
                                              5. Write to node
```

2. Enter Y to load and display the node configuration parameter data file.
   Enter N to cancel loading, and return the utility to for another command.

After loading is completed, the utility will wait for another command.

Note

1. A node configuration parameter data file is created using "4. Save to Disk." This data file is not included with the SYSMAC NET Support Software.
2. If "4. Save to Disk" has not been performed at least once before or if the file is not located in the directory from which the utility was started, then "node configuration parameter data file (C:iXXXX4) not found" will be displayed, and loading is terminated. Press the Escape Key at this point.

7-7-4 Read from Node

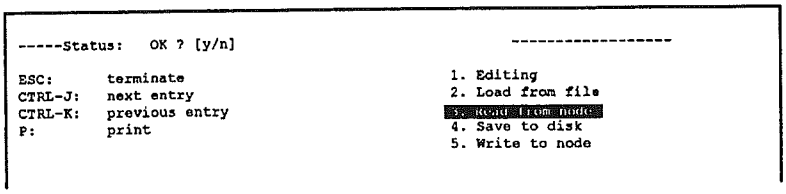
When "Read from Node" is executed, node configuration parameters set in the NSU specified for the node configuration utility are read and displayed. Edited data displayed on screen will be lost when data is read from the node.

The procedure is explained below.

1, 2, 3... 1. Enter 3 on the command input screen shown below.

```
-----Status:   Enter Command >  3                  ------------------

ESC:       terminate                          1. Editing
CTRL-J:    next entry                         2. Load from file
CTRL-K:    previous entry                     3. Read from node
P:         print                              4. Save to disk
                                              5. Write to node
```

The following screen will be displayed.



2. Enter Y to read and display data from the NSU.
   Enter N to cancel the read.

After loading is completed, the utility will wait for another command.

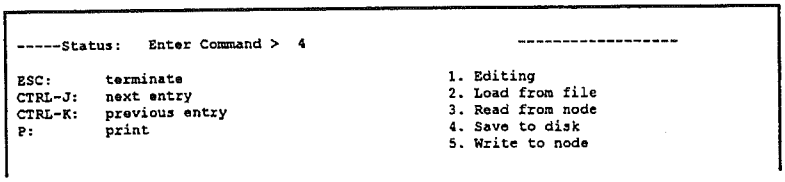
7-7-5 Save to Disk

"Save to disk" writes data set in "1. Editing" to the node configuration parameter data file.

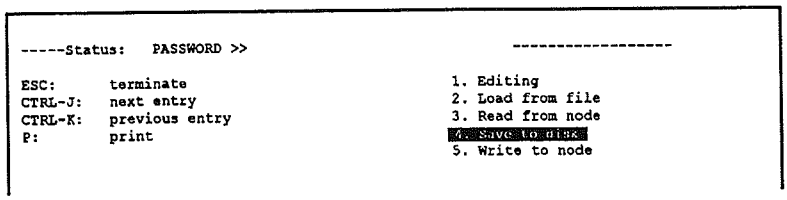
The file will be overwritten when data is saved to disk.

The procedure is explained below.

1, 2, 3... 1. Enter 4 on the command input screen shown below.



The following screen will be displayed.



2. Enter the password. Data is written to the NSU when the correct password is entered.

Enter the password again if the wrong password is entered. If the correct password is not entered after three tries, the utility will wait for another command at step 1. Press the Escape Key to cancel the save.

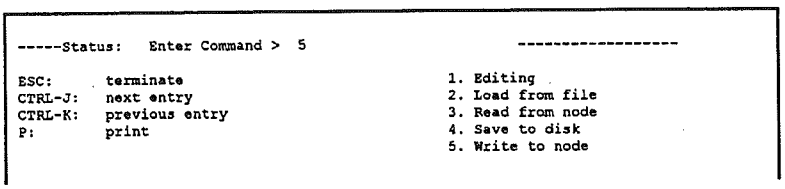
After the save is completed, the utility will wait for the next command.

7-7-6 Write to Node

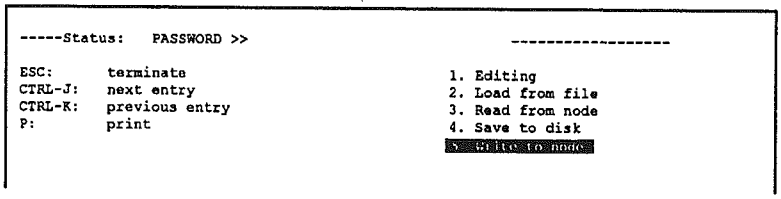
"Write to node" writes edited node configuration parameters to the NSU.

The procedure is explained below.

1, 2, 3... 1. Enter 5 on the command input screen shown below.



The following screen will be displayed.



2. Enter the password. Data is written to the NSU when the correct password is entered.

Note If the configuration is simply written to the NSU without a reset, the data will not be used in the NSU. Be sure to use a remote reset or a hardware reset to reset the NSU.

7-8 Configuration Data to a Bridge

7-8-1 General Description

Node configuration parameters and IP routing tables must be set in a Bridge when a multiple level network is constructed using a Bridge.

The settings are performed with "1. Node configuration parameters" and "2. IP routing tables" in the node configuration utility.

The following procedures are used.

Node Configuration Parameters

1, 2, 3...

1. Editing
   Edits node configuration parameters.
2. Load from file
   Reads the node configuration parameter data file.
3. Read from node
   Reads node configuration parameters from the NSU.
4. Save to disk
   Writes edited node configuration parameters to the node configuration parameter data file.
5. Write to node
   Writes edited node configuration parameters to the NSU.

*The password must be entered to execute processes 4. and 5.

IP Routing Tables

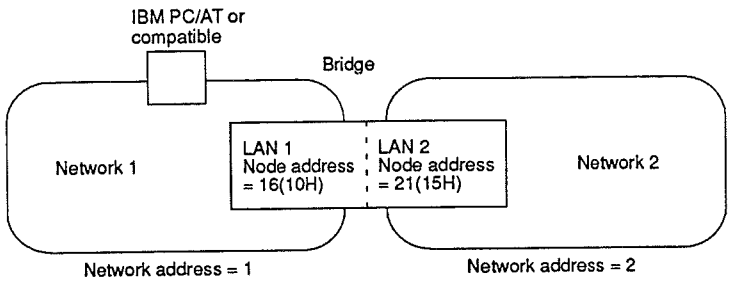
1, 2, 3...

1. Editing
   Edits an IP routing table.
2. Load from file
   Reads the IP routing table data file from disk.
3. Read from node
   Reads the IP routing table data from the Bridge.
4. Save to disk
   Writes the IP routing table data to disk.
5. Write to node
   Writes the IP routing table data to the Bridge.

*The password must be entered to execute processes 4. and 5..

Example of a Network That Uses a Bridge

The following shows an example of two networks connected by a Bridge. Configuration data from the computer to a Bridge will be described using this network.



Reference Information

- The Bridge consists of two nodes as shown in the figure above.
- Routing uses the basic concept and settings performed in *Section 4 Routing Table Setting Utility.* The data required for routing consists of the destination network address and the first hop address (gateway IP address).

Note

1. The password for the node configuration utility is s3200, and it must be entered with a lowercase s. Since the password is used to prevent accidental overwriting or setting rather than for security purposes, it cannot be changed or deleted.
2. Refer to *7-2 NSU and Bridge Preparations* to prepare the Bridge prior to setting configuration data in the Bridge.
3. Be sure to reset the Bridge after setting the node data parameters and IP routing address tables to the Bridge.
4. In addition to setting the IP routing table to the Bridge, routing tables must also be set for each node when communicating between networks.
5. Refer to *Section 4 Routing Table Setting Utility* to set the routing table for the computer node. Refer to the respective manuals for more information about setting routing tables for other nodes.

7-8-2 Node Configuration Parameters

Node configuration parameters specify data such as the networks to which the nodes of the Bridge belong to. The data is written to the node on the Bridge on the network side of the computer that starts up the node configuration utility.

In the example shown above, the data will be written to the node at node address16 on network address 1. Start up the utility and use the parameters (Refer to *7-4 Settings Parameters.*) to specify 1 for the network address and 16 for the node address.

The following procedure is used to set a Bridge for the network example shown above.

1, 2, 3... 1. Enter 1 on the menu screen to select "1. Node configuration parameters." The screen below will be displayed, and the utility will wait for another command.

```
  < Node Configuration Parameter Configuration >
    Net:1  Node:16 Node Type:SBE
No.      Item                                          Contents
-------------------------------------------------------------------------
 1.LAN1 Network address                                : 0
 2.LAN2 Network address                                : 0
 3.Gateway TTL initial value                           : 0
 4.Gateway TTL decrease value                          : 0
 5.Gateway TTL limit value                             : 0
 6.IP trace switch                                     : don't log
 7.Broadcast packet pass                               : don't pass
 8.Netware packet pass                                 : don't pass



-----Status:   Enter Command >                  ----------------------

ESC:       terminate                          1. Editing
CTRL-J:    next entry                         2. Load from file
CTRL-K:    previous entry                     3. Read from node
P:         print                              4. Save to disk
                                              5. Write to node
```

2. Enter 3 to select "3. Read from node." Confirmation of status is requested.

   Status: OK? [Y/N]

3. Enter Y to display the data read from the Bridge (initial settings) as shown below.

Note If step 3. is executed without preparing the Bridge as described in *7-2 NSU and Bridge Preparations*, data set in the Bridge will be read rather than the initial settings.

```
  < Node Configuration Parameter Configuration >
    Net:1  Node:16 Node Type:SBE
No.      Item                                          Contents
-------------------------------------------------------------------------
 1.LAN1 Network address                                : 0
 2.LAN2 Network address                                : 0
 3.Gateway TTL initial value                           : 15
 4.Gateway TTL decrease value                          : 1
 5.Gateway TTL limit value                             : 1
 6.IP trace switch                                     : don't log
 7.Broadcast packet pass                               :
 8.Netware packet pass                                 : don't pass
```

4. Enter 1 to select "1. Editing." The number of the item to changed is prompted.
5. Enter 1 and Return.
6. Enter the network address of the LAN1 side of the Bridge. Enter 1 and Return here because LAN1 is connected to network address 1. The number of the item to changed is prompted.

7. Enter just Return.
8. Enter the network address on the LAN2 side of the Bridge. Enter 2 and Return here because the LAN2 is connected to network address2. The following screen will be displayed.

```
  < Node Configuration Parameter Configuration >
    Net:1  Node:16 Node Type:SBE
No.       Item                                          Contents
-------------------------------------------------------------------------------
 1.LAN1 Network address                                 : 1
 2.LAN2 Network address                                 : 2
 3.Gateway TTL initial value                            : 15
 4.Gateway TTL decrease value                           : 1
 5.Gateway TTL limit value                              : 1
 6.IP trace switch                                      : don't log
 7.Broadcast packet pass                                : don't pass
 8.Netware packet pass                                  : don't pass



-----Status:   Enter Command >                    ----------------------

ESC:       terminate                              1. Editing
CTRL-J:    next entry                             2. Load from file
CTRL-K:    previous entry                         3. Read from node
P:         print                                  4. Save to disk
                                                  5. Write to node
```

Items 3 to 6 are not changed here. Refer to the Bridge manual for more details on items 3 to 6.

9. Press the Escape Key, and the utility will wait for another command.
10. Enter 5 to select "5. Write to node." Enter the password. Node configuration parameters will be written to the Bridge when the correct password is entered.
11. Press the Escape Key to return to the menu screen. Node configuration parameter settings are now completed.

7-8-3 IP Routing Table Settings (Editing and Write to Node)

The following procedure is used to set IP routing tables.

1, 2, 3...

1. Enter 2 on the menu screen to select "2. IP Routing Tables." the following screen will be displayed, and the utility will wait for another command. LAN1

on the upper left side of the screen is highlighted because the routing table for LAN1 is being edited.

```
   SYSNET IP Routing Table Configuration
    < LAN1 >  LAN2 ->                          Net:1  Node:16 Node Type:SBE

  No. Net-addr      1st-hop-addr  No_entry      No_entry
-------------------------------------------------------------------------------




------ Status :  Enter Command >                        ----------------------

ESC:       terminate                          1. Editing
CTRL-J:    next entry                         2. Load from file
CTRL-K:    previous entry                     3. Read from node
CTRL-H/L:  enter to switch                    4. Save to disk
                                              5. Write to node
```

2. Enter 1 to change the status as shown below. The utility will wait for an editing command.

```
------ Status :  Enter edit command >                   ----------------------

ESC:       enter to return                    1. Data Entry
CTRL-J:    next entry                         2. Data Deletion
CTRL-K:    previous entry                     3. Data Modification
```

3. Enter 1 here to create a new routing table. The following screen will be displayed.

```
   SYSNET IP Routing Table Configuration
    < LAN1 >  LAN2 ->                          Net:1  Node:16 Node Type:SBE

  No. Net-addr      1st-hop-addr  No_entry      No_entry
-------------------------------------------------------------------------------
   1. 00000000




------ Status :  Enter hexadecimal value                ----------------------
ESC:       enter to return
<  Input format   >
  Data count, byte count     : (1data/4byte)     1. Data Entry
                                                 2. Data Deletion
                                                 3. Data Modification
```

4. Enter the network address in up to 8 hexadecimal digits. Since the destination address is 2, enter 02 and Return here. If the entry is not 8 digits long, the remaining digits will be filled in with zeroes as shown below.

```
   SYSNET IP Routing Table Configuration
   <- LAN 1  LAN2 ->                          Net:1  Node:16 Node Type:SBE

 No. Net-addr      1st-hop-addr  No_entry      No_entry
-------------------------------------------------------------------------------
   1. 02000000      00000000
```

5. Enter the first hop address (gateway IP address) in up to 8 hexadecimal digits. Since network 1 is connected to network 2 through the node at node address 16, enter 01001011 and Return here.

```
   SYSNET IP Routing Table Configuration
   <- LAN 1  LAN2 ->                          Net:1  Node:16 Node Type:SBE

 No. Net-addr      1st-hop-addr  No_entry      No_entry
-------------------------------------------------------------------------------
   1. 02000000      01001011
   2. 00000000
```

6. Press the Escape Key twice. The utility will wait for another command.

Reference Information

Refer to *4-2 What Is A Routing Table?* for further details on network, node, and IP addresses.

7. Enter 5 to select "5. Write to node."

```
------ Status :  Enter Command >   5                  ------------------------

ESC:       terminate                          1. Editing
CTRL-J:    next entry                         2. Load from file
CTRL-K:    previous entry                     3. Read from node
CTRL-H/L:  enter to switch                    4. Save to disk
                                              5. Write to node
```

8. Enter the password.

```
------ Status :PASSWORD   >>                  ------------------------

ESC:       terminate                          1. Editing
CTRL-J:    next entry                         2. Load from file
CTRL-K:    previous entry                     3. Read from node
CTRL-H/L:  enter to switch                    4. Save to disk
                                              5. Write to node
```

9. Enter CRTL + L to switch to LAN2 editing. LAN2 is highlighted as shown below.

```
   SYSNET IP Routing Table Configuration
   <- LAN 1  LAN2 ->                          Net:1  Node:16 Node Type:SBE

 No. Net-addr      1st-hop-addr  No_entry      No_entry
-------------------------------------------------------------------------------
```

10. Enter the following by repeating steps 2. to 5.

```
SYSNET IP Routing Table Configuration
<- LAN 1 [LAN2 ->]                          Net:1  Node:16 Node Type:SBE

No. Net-addr      1st-hop-addr  No_entry      No_entry
-------------------------------------------------------------------------------
  1. 01000000     02001511
  2. 00000000
```

The settings above mean that network 2 is connected to network 1 through node address 21 (15_H)

11. Press the Escape Key twice. The utility will wait for another command.
12. Enter 5, and then enter the password.
13. Press the Escape Key to return to the menu screen. The IP routing table is now set.

Resetting a Bridge

If node configuration parameters and IP routing tables are simply written to the Bridge without a reset, the data will not be used in the Bridge. Be sure to use a remote reset or a hardware reset to reset the Bridge.

Refer to *7-5 Node Remote Reset* for more information about remote resetting.

7-8-4 Load from File

When "Load from File" is executed, data in the routing data file (rXXXX1) is read and displayed. Edited data on screen will be lost when data is loaded from disk. The procedure is explained below.

1, 2, 3... 1. Enter 2 on the command input screen shown below.

```
------ Status :  Enter Command >   2                  ----------------------

ESC:       terminate                        1. Editing
CTRL-J:    next entry                       2. Load from file
CTRL-K:    previous entry                   3. Read from node
CTRL-H/L:  enter to switch                  4. Save to disk
                                            5. Write to node
```

The following screen will be displayed.

```
------ Status :  OK ?  [y/n]                ----------------------

ESC:       terminate                        1. Editing
CTRL-J:    next entry                       2. Load from file
CTRL-K:    previous entry                   3. Read from node
CTRL-H/L:  enter to switch                  4. Save to disk
                                            5. Write to node
```

2. Enter Y to load and display the routing data file.
   Enter N to cancel loading. The utility will wait for another command.

After loading is completed, the utility will wait for another command.

Note

1. A routing data file is created by performing "4. Save to Disk." The data file is not included with the SYSMAC NET Support Software.
2. If "4. Save to Disk" has not been performed at least once before or if the file is not located in the directory from which the utility was started, then "node configuration parameter data file (C:rXXXX1) not found" will be displayed, and loading is terminated. Press the Escape Key at this point.

7-8-5 Read from Node

When "Read from Node" is executed, the IP routing table of the Bridge specified when the node configuration utility was started are read and displayed. Edited data displayed on screen will be lost when data is read from a node.

The procedure is explained below.

1, 2, 3... 1. Enter 3 on the command input screen shown below.

```
------ Status :  Enter Command >   3                    ----------------------

ESC:       terminate                          1. Editing
CTRL-J:    next entry                         2. Load from file
CTRL-K:    previous entry                     3. Read from node
CTRL-H/L:  enter to switch                    4. Save to disk
                                              5. Write to node
```

The following screen will be displayed.

```
------ Status :  OK ?  [y/n]                  ----------------------

ESC:       terminate                          1. Editing
CTRL-J:    next entry                         2. Load from file
CTRL-K:    previous entry                     3. Read from node
CTRL-H/L:  enter to switch                    4. Save to disk
                                              5. Write to node
```

2. Enter Y to read and display data from the Bridge.
   Enter N to cancel the read.

After loading is completed, the utility will wait for another command.

7-8-6 Save to Disk

"Save To Disk" writes data set in "1. Editing" to the routing data file.
The file will be overwritten when data is saved to disk.
The procedure is explained below.

1, 2, 3... 1. Enter 4 on the command input screen shown below.

```
------ Status :  Enter Command >   4                    ----------------------

ESC:       terminate                          1. Editing
CTRL-J:    next entry                         2. Load from file
CTRL-K:    previous entry                     3. Read from node
CTRL-H/L:  enter to switch                    4. Save to disk
                                              5. Write to node
```

The following screen will be displayed.

```
------ Status :PASSWORD   >>                  ----------------------

ESC:       terminate                          1. Editing
CTRL-J:    next entry                         2. Load from file
CTRL-K:    previous entry                     3. Read from node
CTRL-H/L:  enter to switch                    4. Save to disk
                                              5. Write to node
```

2. Enter the password. Data is written to the routing data file when the correct password is entered.

Enter the password again if the wrong password is entered. If the correct password is not entered after three tries, the utility will wait for another command at step 1.. Press the Escape Key to cancel the save.

7-8-7 Write to Node

"Write To Node" writes the edited IP routing table to the Bridge.
The procedure is explained below.

1, 2, 3... 1. Enter 5 on the command input screen shown below.

```
------ Status :  Enter Command >   5

ESC:       terminate
CTRL-J:    next entry
CTRL-K:    previous entry
CTRL-H/L:  enter to switch

                                        1. Editing
                                        2. Load from file
                                        3. Read from node
                                        4. Save to disk
                                        5. Write to node
```

The following screen will be displayed.

```
------ Status :PASSWORD   >>

ESC:       terminate
CTRL-J:    next entry
CTRL-K:    previous entry
CTRL-H/L:  enter to switch

                                        1. Editing
                                        2. Load from file
                                        3. Read from node
                                        4. Save to disk
                                        5. Write to node
```

2. Enter the password. Data is written to the Bridge when the correct password is entered.

Enter the password again if the wrong password is entered. If the correct password is not entered after three tries, the utility will wait for another command at step 1. Press the Escape Key to cancel the save.

Note If configuration is simply written to the Bridge without a reset, the data will not be used in the Bridge. Be sure to use a remote reset or a hardware reset to reset the Bridge.

7-9 Error Messages

The following messagse may appear when using the SYSMAC NET Support Board.

Message	Details
Cannot open DIAG driver. errno = XX	DIAG32 and CP_3200 are not loaded in the system. ERR: 02: File not found 03: Wrong bus name 04: Too many files open
Vermng: Currently unsupported node type.: XX ver. XX	The status of the target node was read, and the type of node obtained (model name and version) was not loaded in the VERMNG file.
Cannot perform status read. errno = XX	The status of the target node cannot be read. ERR: 04: Node address error 05: Loop error 06: Transmission busy 07: Token loss error 8004: No data to send
Cannot open file. (file : XXXX)	Files provided with the configuration utility cannot be opened.
Specified node does not respond errno = XX	errorno: 05: Loop error 06: Transmission busy 07: Token loss error 8004: No data to send
Cannot transmit to node errno = XX	errorno: 05: Loop error 06: Transmission busy 07: Token loss error
Invalid number	The item number entered during editing not found.
Input value out of range	The value entered is not valid for the item.
XXXX: File not present	The data file to be loaded from disk not found.
XXXX: Cannot create file	The file to be saved to disk cannot be created.
XXXX: Cannot read file	Data cannot be read from the file.

SECTION 8
Other Utilities

This section describes procedures for operating the version display utility, the status display utility, and the packet removal utility.

8-1 Version Display Utility

8-1-1 Operating Procedure

The version display utility displays data set in the SYSMAC NET link driver. This is not the data set with for the NSB.

Enter VER32↵ at the prompt for the SN3200 directory.

```
C:\SN3200> VER32↵
```

The following will be displayed.

```
        * * *    SYSNET    VERSION INFORMATION    * * *  Version 3.03



                  Type                 CP_3200
                  Version              3.0
                  Revision             3.3
                  Packet Length (MAX)  2048  Byte
                  Interrupt Number     11
                  I/O Address          0300H
                  Interrupt Process Address
                       Offset 1FB8H  Segment 1B25H
C:\SN3200>
```

When the version display is completed, the utility will quit, and a prompt will return.

Reference Information

A Japanese or English language display can be selected by entering a command with an option attached. Enter the following:

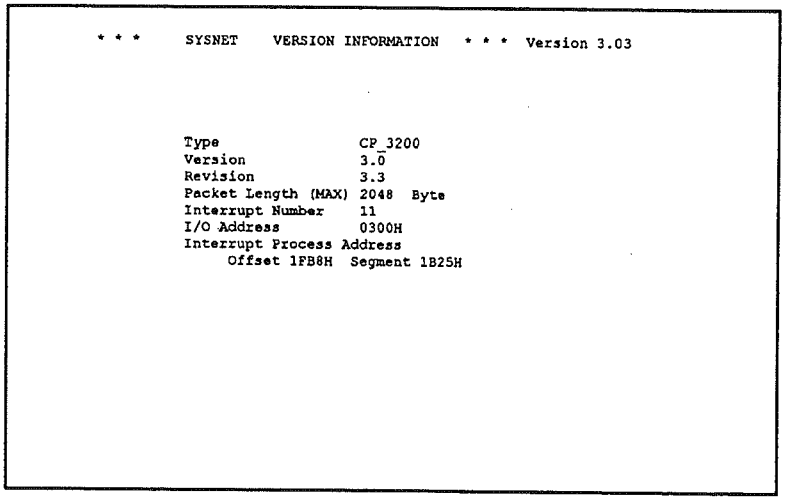
```
C:\SN3200> VER32␣/E↵    English
C:\SN3200> VER32␣/J↵    Japanese
```

If no option is specified, the language set in the CONFIG.SYS will be used.

8-1-2 Display Details

The display details of the version display are described next.

Version Display Screen



Display Details

Type:	Displays SYSMAC NET link driver types.
Version, Revision:	Displays the SYSMAC NET version and revision.
Packet Length:	Displays the maximum packet length that can be transmitted and received through the SYSMAC NET link driver. The user portion is even shorter because the maximum packet length also includes the header section.
Interrupt Number, I/O Address:	Displays SYSMAC NET link driver parameters from the CONFIG.SYS file.
Interrupt Process Address:	A maintenance display used by the manufacturer.

Make sure that the model name and version displayed are correct.

8-2 Status Display Utility

8-2-1 Operating Procedure

The status display utility displays various information related to your node. Since it displays data set in the SYSMAC NET link driver and SYSMAC NET Support Board as well as statistical information for send and receive data handled by the SYSMAC NET link driver, the utility is used for network maintenance.

Enter STAT32↵ at the prompt for the SN3200 directory.

```
C:\SN3200> STAT32
```

The SYSMAC NET node data on the next page will be displayed.

Reference Information

A Japanese or English language display can be selected by entering a command with an option attached. Enter the following:

```
C:\SN3200> STAT32␣/E↵    English
C:\SN3200> STAT32␣/J↵    Japanese
```

If no option is specified, the language set in the CONFIG.SYS will be used.

8-2-2 Display Details

The display details for SYSMAC NET node data are described next.

SYSMAC NET Node Data Screen

The following screen will be displayed when STAT32$_7$ is entered.

```
        * * *   SYSNET      STATUS INFORMATION   * * *  Version 3.03



        Net work Address  = 000
        Node Address      = 018
        Optical LAN       = normal
        Power             = OFF
              80 D3 12 A4 01 2A 2D   VER=V 3.0,R 3.3

                                  Illegal Interrupt              0
                                  Receive Interrupt Error        0
   Number of                      Send    Interrupt Error        0
   Total  send              0     Error in Receive Process       0
   Normal send              0     PCB Packet Type Unmatch        0
   Total  receive           0     Illegal Loop                   0
   Normal receive           0     Can't Use The Send Buffer      0
   Send Execute             0     Receive Data Short             0
   Send Request             0     Send    Time out               0
   IP   Send                0     Receive Time out               0

   When you have the option to set the /P,you can look at the
C:\SN3200>                                    counter of every PROTOCOL.
```

SYSMAC Net Node Data Details

Network Address:	Displays decimal values set with SYSMAC NET link driver parameters in the CONFIG.SYS file.
Node Address (number):	Displays decimal values set with the rotary switches on the Board.
Optical LAN:	Displays normal, upstream/downstream loop back, and individual status for loop malfunctions.
Power:	Displays ON when the Central Power Supply is supplying power, and OFF when it is not.
Counts:	Displays the values counted by the SYSMAC NET link driver as well as statistical information for data handled by the SYSMAC NET link driver.

Error Counts

Error counts on the right side (illegal interrupt to receive time out) can be caused by the following. Use the loop test, node diagnosis, or other utility to determine the cause and appropriate action.

- Error data is sent from another node. (Sometimes, a packet type that the local node cannot process may be broadcast.)
- A SYSMAC NET Support Board malfunction.
- A error in the transmission path caused the packet to be lost.
- The other node is not processing the data.
- The processing program at the local node is creating the error.

Diagnosis by Packet Type

The diagnosis counter screen for individual packet types shown below will be displayed when diagnosis is executed with the /P option attached to the command.

```
        * * *   SYSNET      STATUS INFORMATION   * * *  Version 3.03



        Net work Address  = 000
        Node Address      = 018
        Optical LAN       = normal
        Power             = OFF
             80 D3 12 A4 01 2A 2D   VER=V 3.0,R 3.3

Packet Type (Hex)        DIAG       UDP
Number of
Send Packet Count          35         0
Rcv  Packet Count          30         0
Send Busy                   0         0
Send Data Size Over         0         0
Send Data Size short        0         0
Node Address Error          0         0
Receive Busy                0         0
Rcv Packet Over             0         0
Rcv Packet (IP Length)      0         0
Send Interrupt Error        0         0
        [ESC]:Exit   'N':Next   'P':Prevew
```

Press the Escape Key to exit.

Check the program at the local node or the other nodes using the packet type when an error is generated for a specific packet type.

8-3 Packet Removal Utility

8-3-1 General Description

The packet removal utility deletes packet types stored in the SYSMAC NET link driver from the driver.

The utility deletes from the SYSMAC NET link driver all packet types from 80_H to FF_H provided for the user, and may be used when a program shuts down due to an error. This utility is not used under normal circumstances.

8-3-2 Procedure

Enter CUT32↵ at the prompt for the SN3200 directory. The packets will be deleted immediately.

```
    * * *    SYSNET     PACKET TYPE CUT  * * *  Version 3.01



    Releasing Packet Types.       =  80H - ffH

                                  BD
```

The packets deleted at this time are displayed. (Example BD)
After the packets are deleted, "Removal completed" will be displayed, and the utility end.

Reference Information

A Japanese or English language display can be selected by entering a command with an option attached. Enter the following:

```
C:\SN3200> CUT32␣/E↵    English
C:\SN3200> CUT32␣/J↵    Japanese
```

If no option is specified, the language set in the CONFIG.SYS will be used.

SECTION 9
Datagram Service Test Program

The datagram service test program performs sending and receiving tests with other nodes using the SYSMAC NET datagram function.

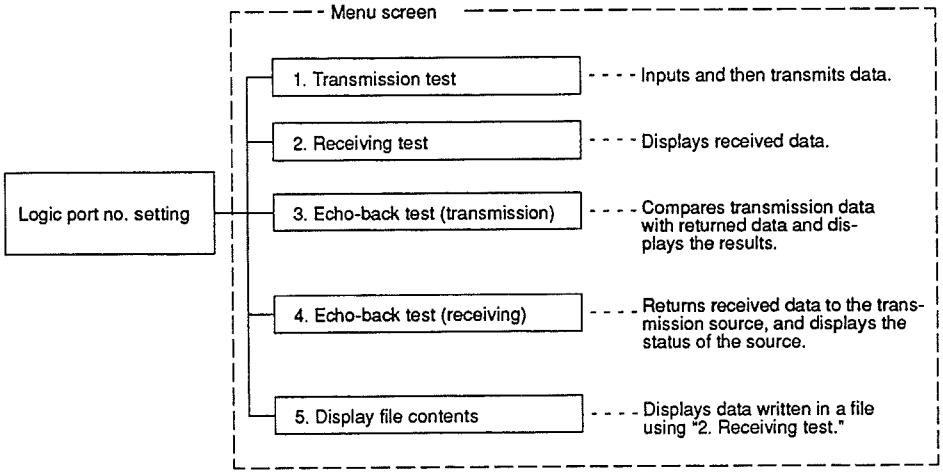
9-1 General Description

This section describes using the test program for the datagram service. The program performs sending and receiving tests with other nodes using the SYSMAC NET datagram function. The test program not only outputs received data to a file, but also reads and displays data output to the file.

Since the program is interactive, communication tests can be performed simply by entering numbers.

9-2 Menu Structure

The menu structure and functions for the test program are briefly outlined below.



9-3 Starting and Exiting

The following procedure is used to start and exit the test program.

9-3-1 Starting

Enter DGTESTM↵ at the prompt for the SN3200 directory.

```
C:\SN3200> DGTESTM↵
```

When the test program starts, the setting screen for the logic port number (Refer to *9-4 Logic Port Number Setting*) will be displayed.

9-3-2 Exiting

Press the Escape Key from the logic port number setting screen to exit the test program and return to a prompt.

Press the Escape Key several times when exiting from another screen. Each time the Escape Key is entered, it returns one screen.

Reference Information

A Japanese or English language display can be selected by entering a command with an option attached. Enter the following:

```
C:\SN3200> DGTESTM␣/E↵   English
C:¥SN3200> DGTESTM␣/J↵   Japanese
```

If no option is specified, the language set in the CONFIG.SYS will be used.

9-4 Logic Port Number Setting

The following procedure is used to set the logic port number used to perform communication tests.

The procedure is given below.

1, 2, 3... 1. Enter DGTESTM↵ at the prompt for the SN3200 directory.

```
C:\SN3200> DGTESTM↵
```

The logic port number setting screen will be displayed.

```
     * * *          SYSNET    DGTESTM                * * *    Version 1.01


<<   LOGICAL PORT No. SETTING >>
            Set up the disignated logical port No.


       logical port No.     ( 0 -- 89, 110 -- 254 )     =



                Press [ESC]key to exit
```

2. Enter a number from 0 to 89 or 110 to 254 for the port number, and enter Return.

The following menu screen will be displayed if the port number is entered correctly.

```
     * * *          SYSNET    DGTESTM                * * *    Version 1.01
<<      MENU        >>
  self net :000    self node:018    self port:001        loop   :normal


                     1 TRANSMISSON TEST
                     2 RECEIVEING TEST
                     3 ECHO-BACK TEST (TRANSMISSION)
                     4 ECHO-BACK TEST (RECEIVING)
                     5 DISPLAY FILE CONTENTS


               Enter number.
               Press [ESC]key to exit
```

9-5 Transmission Test

Specify the transmission destination and create transmission data to perform the transmission test. The transmission destination can be set using one of two procedures. The following procedures is used to execute the transmission test.

9-5-1 Selecting the Input Method

One of the following procedures can be used to specify the transmission destination.

- Specify the destination by entering the network and node addresses individually.
- Specify the destination by entering the IP address.

The following describes the procedures.

1, 2, 3... 1. Enter 1 on the menu screen.

The input method selection screen shown below will be displayed.

```
     * * *          SYSNET    DGTESTM                  * * *     Version 1.01
<<TRANSMISSION. ENTERING METHOD SELECTION>>
  self net :000     self node:018     self port:001         loop   :normal

          There are two ways in destination address setting.


          1 Entering destination network address (1byte)

            and destination node address      (1byte)


          2 Entering destination IP address (4byte)


               Enter number.

               Press [ESC]key to exit
```

2. Enter 1 or 2.

   Go to *9-5-2 Transmission Destination Designation 1*, if 1 is input.
   Go to *9-5-3 Transmission Destination Designation 2*, if 2 is input.

9-5-2 Transmission Destination Designation 1

The following screen will be displayed when 1 is selected on the input method selection screen.

```
<<TRANSMISSION TEST>>
  self net :000     self node:018     self port:001          loop   :normal

            dest/source network address =

            dest/source node address    =

            dest/source port No.        =

            transmission times (0=asing)=

            interval([0.1sec])          =

            transmission data           = enter by character

                                                        Press [ESC]key to exit
--------------------------------------------------------------------------------


 count
```

1, 2, 3...

1. Enter the network address of the transmission destination. Enter 0 to 127 or 255, and press Return.
2. Enter the node address of the transmission destination. Enter 1 to 126 or 255, and press Return.
   If 255 is specified in step 1., then only 255 can be specified for the node address as well.
3. Enter the port number of the transmission destination. Enter 0 to 65535, and press Return.

The transmission destination is now specified. Go to *9-5-4 Setting and Executing Transmission Data.*

9-5-3 Transmission Destination Designation 2

The following screen will be displayed when 2 is selected on the input method selection screen.

```
<<TRANSMISSION TEST>>
  self net :000     self node:018     self port:001          loop   :normal


            dest/source IP address      =

            dest/source port No.        =

            transmission times (0=asing)=

            interval([0.1sec])          =

            transmission data           = enter by character

                                                        Press [ESC]key to exit
--------------------------------------------------------------------------------


 count
```

1, 2, 3... 1. Enter the IP address of the transmission destination. Enter the IP address using the formats given below. Enter decimal digits for each byte, and separate the bytes with periods.

[First byte].[Second byte].[Third byte].[Fourth byte]

Enter a decimal number with each byte separated by periods so the hexadecimal IP address will look as follows:

00000311H becomes 0.0.3.11
0A0B0C0DH becomes 10.11.12.13
10111213H becomes 16.17.18.19
FFFFFFFFH becomes 255.255.255.255

2. Enter the transmission destination board number. Enter 1 to 126 or 255, and press Return.

The transmission destination is now specified. Go to *9-5-4 Setting and Executing Transmission Data.*

9-5-4 Setting and Executing Transmission Data

After the transmission destination is specified, set the number of transmissions, transmission intervals, and the transmission data, and then execute the transmission test.

The setting and executing procedures are described below.

```
<<TRANSMISSION TEST>>
  self net :000     self node:018     self port:001          loop   :normal

            dest/source network address =0

            dest/source node address    =11

            dest/source port No.        =1

            transmission times (0=asing)=

            interval([0.1sec])          =

            transmission data           = enter by character

                                                    Press [ESC]key to exit
--------------------------------------------------------------------------------


 count
```

Note The screen displayed is the same screen in *9-5-2 Transmission Destination Designation 1.*

1, 2, 3... 1. Enter the number of transmissions. Enter 0 to 9999, and press Return. The transmission will be sent continuously until the Escape Key is entered if 0 is entered.

2. Enter the transmission interval. Enter 0 to 9999, and press Return. Enter in 0.1-second increments. If 10 and Return are entered, for example, data will be transmitted in 1-second intervals.

3. Create the transmission data using one of the three procedures given below.

Character Input

```
transmission data          = enter by character
```

Enter the characters to be transmitted and press Return on the display above. Up to 36 bytes can be entered.

Hexadecimal Format

```
transmission data          = enter by character
```

press Return on the display above. The following screen will be displayed.

```
transmission data          = enter by hexadecimal
```

Enter 0 to 9, A to F or a to f, and press Return. Up to 80 characters can be entered.

For example, if the data to be sent is in the format on the left, then input the format on the right.

12345 becomes 3132333435
ABCDE becomes 4142434445
abcde becomes 6162636465

Number of Incremental Data Bytes

```
transmission data          = enter by hexadecimal
```

Press Return on the display above. The screen below will be displayed.

```
transmission data          = increment data
<<length  (1~ 2000 Byte)>> =
```

Specify from 1 to 2000 here, and press Return. Incremental data is data provided in the program that is written 00_H, 01_H, 02_H..., FF_H, 00_H, 01_H from the top of the user area in increments of 01_H.

4. After inputting the transmission data, enter G to transmit. Press the Escape Key to end the transmission test without transmitting the specified number of times. After ending, the number of transmissions, start time, and end time are displayed.
5. After exiting, press the Escape Key to return to the input method selection screen.

Note 1. If the transmission interval for continuous transmission in transmission test and echo-back test transmission is too long, the Escape Key must be held

down until the transmission ends. The longer the transmission interval, the longer it takes to end.

2. Shortening the transmission interval for continuous transmission in the transmission test and echo-back test with DGTESTM.EXE may cause a "Transmission buffer full" error.

9-6 Receiving Test

When the receiving test is executed, the transmission destination address and received data are displayed each time data is received. Received data and other information can also be output to a file.

The following procedure is used to execute the receiving test.

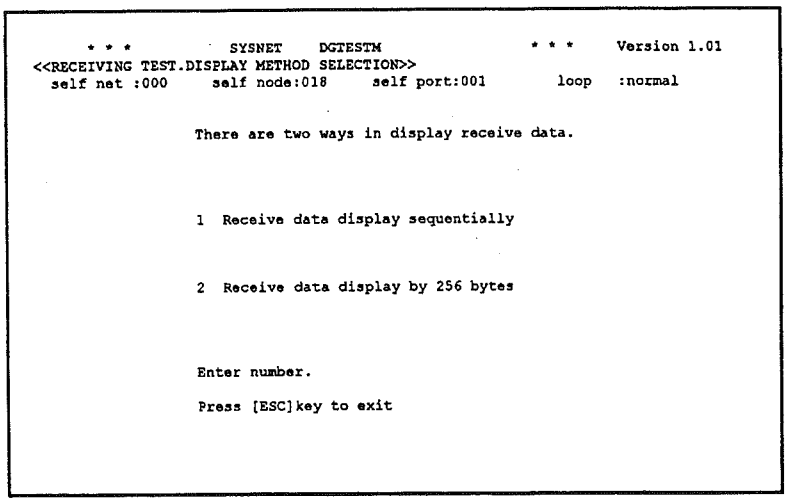
9-6-1 Display Method and File Output Selection

Received data will be displayed in one of the following two ways.

- Received data displayed continuously.
- Received data displayed in one-page (256 bytes) increments.

1, 2, 3... 1. Enter 2 on the menu screen.

The display method selection screen shown below will be displayed.



2. Enter 1 or 2.

The file output selection screen shown below will be displayed.

```
    * * *          SYSNET     DGTESTM                    * * *     Version 1.01
<<RECEIVING TEST.FILE OUTPUT METHOD SELECTION>>
  self net :000     self node:018     self port:001        loop   :normal

            Do you output receiving data,source address and

            source port No.

                          1 yes (output)


                          2 no (no output)


               Enter number.

               Press [ESC]key to exit
```

3. Enter 1 or 2.

   The test program will wait for the file name if 1 is selected.

```
            Enter file name.          [                                ]
```

4. Enter the file name, and press Return.

   Attach the path name using up to 30 characters if the file is not in the current directory.

   If an existing file name is entered, the received data and other information is added to the end of the file.

   If a non-existent file name is entered, a new file is created for the received data.

5. Entering the file name shifts the screen to the received data display.
6. If 2 is selected, the screen immediately shifts to the received data display.

Refer to *9-6-2 Received Data Display 1 (Continuous Display)* if 1 is entered on the display method selection screen.

Refer to *9-6-3 Received Data Display 2 (Displays in 256-byte Increments)* if 2 is entered on the display method selection screen.

Note Files cannot be deleted with the test program. Delete unnecessary files using DOS commands.

9-6-2 Received Data Display 1 (Continuous Display)

The following screen will be displayed via the file output selection screen when "1. Display received data continuously" is selected on the display method selection screen.

```
<<RECEIVING TEST >>
  self net :000     self node:018    self port:001        loop   :normal
source net :      source node:      source port:          data length:
source IP  :             rec. time  :                   remain length:









   [ESC]:exit
```

This screen displays the transmission destination, received data, and other information when data has been received (or is being received).

The IP address will be displayed in hexadecimal. Received data will be displayed in both hexadecimal and characters.

Pressing the Escape Key ends the received data display, and returns to the file output selection screen.

9-6-3 Received Data Display 2 (Displays in 256-byte Increments)

The following screen will be displayed from the file output selection screen when "2. Display received data in 256 block increments" is selected on the display method selection screen.

```
<<RECEIVING TEST >>
  self net :000     self node:018     self port:001        loop   :normal
source net :000   source node:       source port:          data length:2000
source IP  :             rec. time  :                   remain length:1744

      000  30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F  0123456789:;<=>?
      010  40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F  @ABCDEFGHIJKLMNO
      020  50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F  PQRSTUVWXYZ[\]^_
      030  60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F  `abcdefghijklmno
      040  70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F  pqrstuvwxyz{|}~.
      050  80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F  ................
      060  90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F  ................
      070  A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF  ................
      080  B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF  ................
      090  C0 C1 C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF  ................
      0A0  D0 D1 D2 D3 D4 D5 D6 D7 D8 D9 DA DB DC DD DE DF  ................
      0B0  E0 E1 E2 E3 E4 E5 E6 E7 E8 E9 EA EB EC ED EE EF  ................
      0C0  F0 F1 F2 F3 F4 F5 F6 F7 F8 F9 FA FB FC FD FE FF  ................
      0D0  00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F  ................
      0E0  10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F  ................
      0F0  20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F   !"#.%&'( ) *+,- . /

   [ESC]:exit    'N':next data    'B':prev page     other key :next page
```

When data is received, the transmission destination and received data up to the 256th byte will be displayed, and the system will wait for key input.

Enter one of the keys listed below.

Escape	Return to the file output selection screen.
N	Go on standby to received data.
B	Display received data in 256-byte increments in front of data already displayed, and the system will wait for key input. The B input is ignored when displaying received data from byte 0.
Other keys	Displays data in 256-byte increments continuously after received data already displayed. When there is no more data remaining on the display, the system will wait for the next data.

9-7 Echo-back Test (Transmission)

In echo-back tests, data is transmitted to a remote node and then returned from the remote node. The test compares the transmission data with the returned data and displays the results.

The following procedure is used to execute the echo-back test.

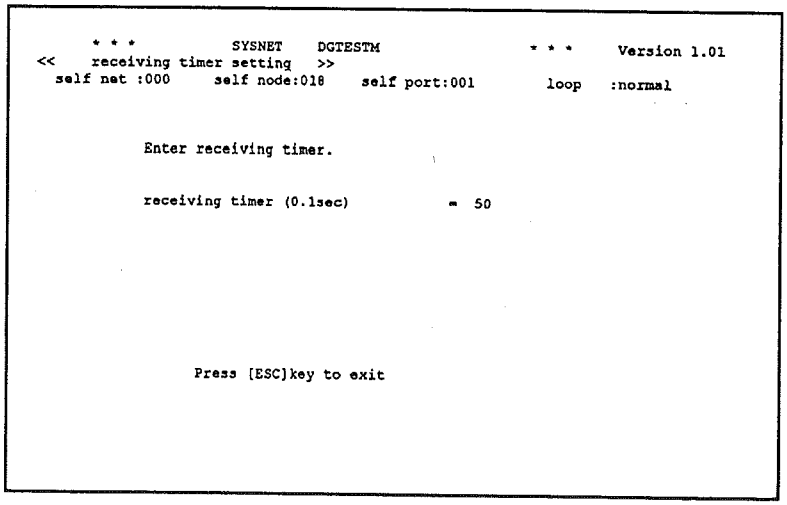
9-7-1 Setting the Reception Standby Timer Value

The receive standby timer value specifies exactly how long to wait for data after it is transmitted.

If received data is not returned after the specified amount of time, reception is terminated, and the next data block is transmitted.

The following procedure is used to set the standby timer value.

1, 2, 3... 1. Enter 3 on the menu screen to display the following screen.



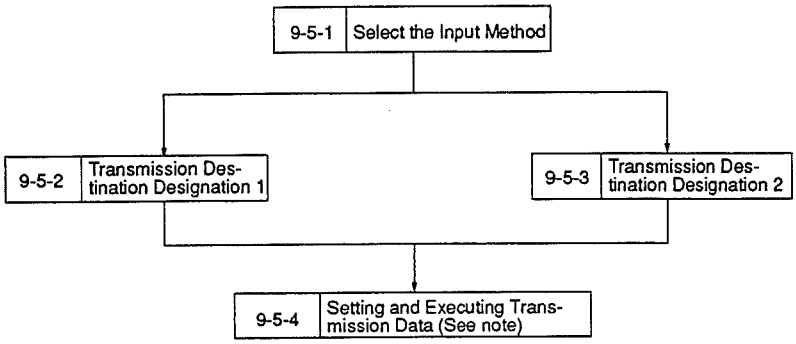
2. Enter a number between 0 and 9999, and press Return. The time is in 0.1-second increments. The default value is 50, or 5 seconds. If the default value is okay, just enter Return. Press the Escape Key to return to the menu screen.

Note If the receive standby timer value is too long for the echo-back test, the Escape Key must be held down until transmission ends. The longer the receive standby timer value, the longer it takes to end.

9-7-2 Execution and Results

Procedure

Operations after the receive standby timer value is set are the same as those described in *9-5 Receiving Test.* Refer to the following sections for more details.



Note Incremental data is transmitted in the echo-back test. Creating the transmission data is simply a matter of specifying the number of bytes transmitted. Transmission data in character or hexadecimal format cannot be created.

Results Display

When the transmission part of the echo-back test is executed, the results are displayed on the lower part of the screen as shown below.

```
<<ECHO-BACK TEST (TRANSMISSION)>>
  self net :000     self node:018     self port:001        loop   :normal

            dest/source network address =0

            dest/source node address    =11

            dest/source port No.        =1

            transmission times (0=asing)=50

            interval([0.1sec])          =5

            <<length  (1~ 2000 Byte)>>  =2000

                                                    Press [ESC]key to exit
--------------------------------------------------------------------------------

count       normal      abnormal length   unmatch     time out      first
50          50                                                      31
```

Note This screen will be displayed when 1 is selected on the input method selection screen.

Communications are normal if the value given for "count" is the same as that for "normal." An error has been generated when any of the items below is counted.

Abnormal length	The lengths of the transmission and receive data are different.
Unmatch	The contents of the transmission and receive data are different.
Time out	Returned data is not received within the receive standby timer value.

9-8 Echo-back Test (Receiving)

In this test, received data is returned to the transmitting node. Information on the transmission node and the received data are displayed.

Enter 4 on the menu screen to display the following screen.

```
<<ECHO-BACK TEST (RECEIVING)>>
  self net :000     self node:018    self port:001        loop   :normal


            dest/source network address =
            dest/source node address    =
            dest/source IP address      =
            dest/source port No.        =
            receive count               =
            first part of data          =
            receive data length         =


                 Press [ESC]key to exit
```

When data has been received (or is being received), the received data is returned to the transmitting node, and the data shown on the screen above will be displayed.

The remote IP address will be displayed in hexadecimal format.

Pressing any key after the Escape Key returns to the menu screen.

9-9 Display File Contents

When "Display File Contents" is executed, the data written in the file when "2. Receiving Test" on the menu screen is executed are read and displayed.

9-9-1 Executing Procedure

The setting and executing procedures are described below.

1, 2, 3... 1. Enter 5 on the menu screen to display the following screen.

```
<< DISPLAY FILE CONTENTS >>
  self net :000     self node:018    self port:001        loop   :normal




          Enter file name.            [                              ]




         Press [ESC]key to exit
```

2. Enter the file name, and enter Return to display file contents. Add the path name if the file is not in the current directory.

The following will be displayed when a file name that does not exist is entered.

```
File not existed or unable to open  file.
```

Here, press any key to return to standby awaiting file name input.

Pressing the Escape Key returns to the menu screen.

9-9-2 Display Contents

If the file with the specified name is found, the data shown in the following screen will be displayed, and the system will wait for key input. Received data up to the 256th byte will be displayed.

```
<< DISPLAY FILE CONTENTS >>
self net :000     self node:018     self port:001          loop    :normal
source net :000   source node:      source port:           data length:2000
source IP  :              rec. time  :                    remain length:1744

        000   30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F  0123456789:;<=>?
        010   40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F  @ABCDEFGHIJKLMNO
        020   50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F  PQRSTUVWXYZ[¥]^_
        030   60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F  `abcdefghijklmno
        040   70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F  pqrstuvwxyz{|}~.
        050   80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F  ................
        060   90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F  ................
        070   A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF  ................
        080   B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF  ................
        090   C0 C1 C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF  ................
        0A0   D0 D1 D2 D3 D4 D5 D6 D7 D8 D9 DA DB DC DD DE DF  ................
        0B0   E0 E1 E2 E3 E4 E5 E6 E7 E8 E9 EA EB EC ED EE EF  ................
        0C0   F0 F1 F2 F3 F4 F5 F6 F7 F8 F9 FA FB FC FD FE FF  ................
        0D0   00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F  ................
        0E0   10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F  ................
        0F0   20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F   !"#.%&'( ) *+,- . /

   [ESC]:exit    'N':next data    'B':prev page     other key :next page
```

Enter one of the keys listed below to select the processing.

Escape:	Returns to the file name input screen.
N:	Data following the data on screen (second data item here) will be displayed, and the system will again wait for key input.
B:	The data block of 256 bytes prior to the received data on screen will be displayed, and the system will again wait for key input.
Other keys:	The data block of 256 bytes following the received data on screen will be displayed, and the system will again wait for key input. When there is no data left to display, the next block of received data will be displayed.

Note When no more data is left to receive, "No more data, or the file being read has been lost" will be displayed.

9-10 Summary of Error Messages

An error message and the return status (COM, AX) are displayed when there is an error.

Return status (COM, AX), error messages, and corrections are given below.

Process	COM	AX	Error Message	Corrections
Common	00_H	01_H	DGIOX version unmatch	DGTESTM.EXE is transmitting or receiving the IP address. Be sure to use DGIOX.SYS version 1.08 or higher.
Program startup	00_H	02_H	DGIOX not exist.	Check to see if the DGIOX program is there, and load the program from the CONFIG.SYS.
	00_H	04_H	too many opend files.	Increase the FILES= value in the CONFIG.SYS.
Transmission	03_H	02_H	transmission buffer full	Increase the transmission interval. If that does not solve the problem, check to see if the Line Server power is ON, and if the interrupt level is set correctly.
	03_H	04_H	destination address error	Check the routing table, and specify the other network address correctly.
	03_H	05_H	abnormal loop status	Check to see if the loop is properly connected.
Program start up	10_H	02_H	NSB not exited or invalid instration.	Check to see if the NSB is properly installed, and check the I/O address settings in the CONFIG.SYS.
	10_H	03_H	abnormal loop status	Check to see if the loop is properly connected.
Reception	10_H	04_H	Unable to write.	Insufficient disk capacity. Delete any unnecessary files.
File contents display	10_H	05_H	File not existed or unable to open file.	Check to see if the specified file is there.
	10_H	06_H	Data not existed or unable to read	All the data was read (Normal), or the file is damaged (Error). Check the specified file.
Reception	10_H	07_H	Unable to open file.	Enter the correct file name, and increase the FILES= value in the CONFIG.SYS. Insufficient disk capacity. Delete any unnecessary files.
Common	10_H	08_H	Unable to close file.	Insert the correct floppy disk.

SECTION 10
Datagram Services

This section describes the datagram service. Use the datagram service when communicating with nodes that do not support the FINS protocol, such as C-series PCs.

10-1 Introduction

Use the datagram service (UDP/IP) when communicating with nodes that do not support the FINS protocol, such as C-series PCs. The datagram service can be used with either the BASIC or C programming languages.

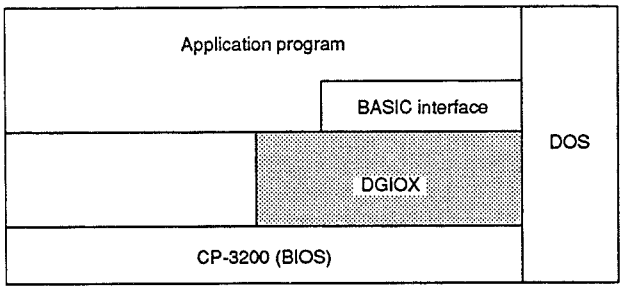
With BASIC, the user creates programs using the BASIC library. With C, the user creates C programs that access the DGIOX I/O module.

10-2 Datagram Service

This section briefly explains the DGIOX I/O module, which supports use of the datagram service.

DGIOX Functions

The DGIOX resides in the computer's main memory, as shown in the following diagram, and acts as an interface between the BIOS and application program. The DGIOX performs datagram services requested by the application program, such as transmitting data to other nodes and passing data received from other nodes to the application program.



DGIOX Ports

The DGIOX has ports numbered 0 to 254 (excluding 90 to 109). One of these port addresses must be specified when accessing the DGIOX from the application program.

The DGIOX manages transmission and reception independently for each port address. Data that is sent to a port that has not been opened will not be passed on to the application program – it will be discarded.

Do not specify port addresses 90 through 109.

Starting Datagram Services

If the system is set up using the method described in *Section 3 Setup*, the operating system will automatically load the BIOS and DGIOX when the computer is booted. The following message will be displayed if the DGIOX has been loaded successfully.

```
SYSNET DATAGRAM SERVICE is successfully loaded.
(DGIOX Version *.**)
```

C-mode Commands and Responses

Use C-mode commands and responses when transmitting messages to a C-series PC, or CV-series PC that is set for C-mode commands and responses. The following table lists the C-mode commands that can be addressed to PCs. Refer to the Operation Manual provided with the Communications Unit for more details on these commands.

Command code	Command name	Compatible PC modes
00	IR/SR AREA READ	RUN, MONITOR, and PROGRAM
01	IR/SR AREA WRITE	MONITOR and PROGRAM
02	LR AREA READ	RUN, MONITOR, and PROGRAM
03	LR AREA WRITE	MONITOR and PROGRAM
04	HR AREA READ	RUN, MONITOR, and PROGRAM
05	HR AREA WRITE	MONITOR and PROGRAM
06	TIM/CNT PV READ	RUN, MONITOR, and PROGRAM
07	TIM/CNT FLAG DATA READ	MONITOR and PROGRAM
08	TIM/CNT PV READ	RUN, MONITOR, and PROGRAM
0A	DM AREA READ	
0B	DM AREA WRITE	MONITOR and PROGRAM
10	STATUS READ	RUN, MONITOR, and PROGRAM
11	STATUS WRITE	
12	ERROR LOG READ	
13	FORCED SET/RESET	MONITOR and PROGRAM
14	FORCED SET/RESET CANCEL	
17	PROGRAM READ	RUN, MONITOR, and PROGRAM
18	PROGRAM WRITE	MONITOR and PROGRAM
19	I/O TABLE READ	The PC mode is irrelevant.
1A	I/O TABLE WRITE	PROGRAM
1C	AR AREA READ	RUN, MONITOR, and PROGRAM
1D	AR AREA WRITE	MONITOR and PROGRAM
1E	DATA LINK STATUS READ	RUN, MONITOR, and PROGRAM
1F	DATA LINK TABLE READ	The PC mode is irrelevant.
20	DATA LINK TABLE WRITE	
21	START DATA LINK	
22	HALT DATA LINK	
23	ROUTING TABLE SET	
24	ROUTING TABLE READ	
25	TEST	
26	INITIALIZE	
2A	SET NAME	RUN, MONITOR, and PROGRAM
2B	DELETE NAME	
2C	READ NAME	
2D	SET CLOCK	
60	TRANSMIT DATA	
61	RECEIVE DATA	

10-3 Programming in BASIC

This section explains how to create BASIC programs needed to use the datagram service. Refer to sample program ATDSPBAM.BAS.

Loading the Library

Load the interface library at the beginning of the program. The following type of programming should be used.

```
LABEL=&H9C00
DEF SEG=LABEL
BLOAD "DGSUB.BIN",0
DEF SEG
```

Call Statements

Use the following format for calls.

```
function_name=function_number: DEF SEG=LABEL
CALL function_name (argument): DEF SEG
```

Integer-type Arguments

Integer-type (%) interface arguments are being used, so use the following type of programming to handle values that exceed 32768.

```
10    IF SEGPTR(6) >=32768
      THEN  K1%=32767-SEGPTR(6)
      ELSE  K1%=SEGPTR(6)
15    REM                          Same for SEGPTR(7),(8)
20    CALL  INIT(K1%,K2%,K3%,RST%)
```

Return Values

Similarly, negative return values should be corrected as shown below.

```
100   CALL DREC(NA%,DA%,PA%,D%,CT%,RST%,RC%)
110   IF PA%<0
      THEN  PA2!=65536+PA%
      ELSE  PA2!=PA%
```

The process above is not necessary when return values are converted with HEX$(), as shown below.

```
100   CALL AREC(NA%,DA%,PA%,D%,CT%,RST%,RC%)
110   PRINT HEX$(NA%),HEX$(DA%)
```

10-4 BASIC Functions

This section describes the functions provided in the DGIOX BASIC interface. The following items are detailed for each function.

Format Shows how to use the function.

Function Number Shows the function number defined in the library.

Description Describes the operation performed by the function.

Arguments Describes the meanings and setting ranges of arguments used by the function.

Command Shows the command and its meaning when there is a command in the argument.

Return Codes Describes the return codes returned to the source of the function call. Return codes are hexadecimal.

Precautions Describes precautions to observe when using the function.

10-4-1 DINIT – Initialize 1

Format

CALL DINIT (RS%)

Function Number

00

Description

Opens the datagram service (DGIOX) and clears the transmission buffer. Provides the necessary information to the datagram service interface routine (DGSUB).

Arguments

I/O	Argument	Remarks
Input	RS%: Flags	00: Use interpreter. Other than 00: Use compiler.
Output	RS%: Return code	See below.

Return Codes

Return code	Meaning
0000	Normal completion
8001	Port address error: This routine uses port 0. A fatal error is indicated when this code is returned. Check the system.
0002	The datagram service (DGIOX) has not been loaded. The DGIOX must be loaded.

Precautions

Be sure to execute this function once at the beginning of the program.

Use the PRINT– Initialize 2 function when specifying the local port address.

Do not use DINIT and PRINT simultaneously.

10-4-2 PRINT – Initialize 2

Format

CALL PRINT (PT%, RS%)

Function Number

09

Description

Opens the datagram service (DGIOX), clears the transmission buffer, and specifies the port that will be used. Provides the necessary information to the datagram service interface routine (DGSUB).

Arguments

I/O	Argument	Remarks
Input	PT%: Port address	Specify an address from 0 to 254, but not 90 to 109.
	RS%: Flags	00: Use interpreter. Other than 00: Use compiler.
Output	RS%: Return code	See below.

Return Codes

Return code	Meaning
0000	Normal completion
8001	Port address error
0002	The datagram service (DGIOX) has not been loaded. The DGIOX must be loaded.

Precautions

Be sure to execute this function once at the beginning of the program.

This function is the same as DINIT except for the port address specification.

Do not use DINIT and PRINT simultaneously.

10-4-3 DSTAT – Read Status

Format

CALL DSTAT (X1%, X2%, X3%)

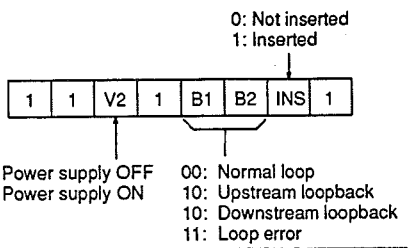
Function Number

01

Description

Reads the status of the NSB.

Arguments

I/O	Argument	Remarks
Output	X1%: DMA control status	Used by the manufacturer for troubleshooting.
	X2%: NSB loop status	Negative when there is a loop error. 
	X3%: Local node number	Node numbers range from 1 to 126.

Precautions

It is easier to read the status of the bits in argument X2% if it is converted with HEX$().

10-4-4 DREC – Receive 1

Format

DREC (NA%, DA%, PA%, D$, CT%, RST%, RC%)

Function Number

02

Description

Requests data reception.

Returns the data in the reception queue if there is already data there; otherwise DREC waits until data is received or the Escape Key is pressed.

Arguments

I/O	Argument		Remarks
Output	NA%:	Source network address	---
	DA%:	Source node number	---
	PA%:	Source port address	---
Input	D$:	Reception buffer	Allocate memory to the buffer.
Output	D$:	Reception data	---
	CT%:	Reception data length	The amount of data in D$
	RST%:	Return code	See below.
	RC%:	Remaining data	The amount of data remaining

Return Codes

Return code	Meaning
00	Normal completion
01	Port address error
03	Reception was terminated by pressing the Escape Key.

10-4-5 DRECT – Receive 2

Format

CALL DRECT (NA%, DA%, PA%, D$, CT%, RST%, RC%, TIM%)

Function Number

03

Description

Requests data reception.

Returns the data in the reception queue if there is already data there; otherwise DRECT waits for the specified length of time for data to be received. A timeout error (return code 02) will occur if data is not received within the specified time.

Arguments

I/O	Argument		Remarks
Output	NA%:	Source network address	---
	DA%:	Source node number	---
	PA%:	Source port address	---
Input	D$:	Reception buffer	Allocate memory to the buffer.
Output	D$:	Reception data	---
	CT%:	Reception data length	The amount of data in D$
	RST%:	Return code	See below.
	RC%:	Remaining data	The amount of data remaining
Input	TIM%:	Timer setting	Sets the waiting time in 100-ms units.

Return Codes

Return code	Meaning
00	Normal completion
01	Port address error
02	Timeout

10-4-6 DREC – Receive 3

Format

CALL DREC (I1%, I2%, PA%, D$, CT%, RST%, RC%)

Function Number

06

Description

Requests data reception.

Returns the data in the reception queue if there is already data there; otherwise DREC waits until data is received or the Escape Key is pressed.

Arguments

I/O	Argument		Remarks
Output	I1%:	Source IP address	Upper 2 bytes
	I2%:	Source IP address	Lower 2 bytes
	PA%:	Source port address	---
Input	D$:	Reception buffer	Allocate memory to the buffer.
Output	CT%:	Reception data length	The amount of reception data
	RST%:	Return code	See below.
	RC%:	Remaining data	The amount of data remaining

Return Codes

Return code	Meaning
00	Normal completion
01	Port address error
03	Reception was terminated by pressing the Escape Key.

Precautions

This command cannot be used unless the DGIOX release is version 1.06 or higher. This function is the same as the DREC function with function number 02, except the transmission source address is expressed as an IP address. For example, if data was received from the node with IP address &H003008C11, I1% would be &H0300 and I2% would be &H8C11.

Also, all of the port addresses can be handled, from 0 to 65535 (2 bytes). With the DREC function with function number 02, only addresses 0 to 255 (1 byte) can be handled.

Refer to *4-2-4 IP Addresses* for details on IP addresses.

10-4-7 DRECT – Receive 4

Format

CALL DRECT (I1%, I2%, PA%, D$, CT%, RST%, RC%, TIM%)

Function Number

07

Description

Requests data reception.

Returns the data in the reception queue if there is already data there; otherwise DRECT waits for the specified length of time for data to be received. A timeout error (return code 02) will occur if data is not received within the specified time.

Arguments

I/O	Argument		Remarks
Output	I1%:	Source IP address	Upper 2 bytes
	I2%:	Source IP address	Lower 2 bytes
	PA%:	Source port address	---
Input	D$:	Reception buffer	Allocate memory to the buffer.
Output	D$:	Reception data	---
	CT%:	Reception data length	The amount of data in D$
	RST%:	Return code	See below.
	RC%:	Remaining data	The amount of data remaining
Input	TIM%:	Timer setting	Sets the waiting time in 100-ms units.

Return Codes

Return code	Meaning
00	Normal completion
01	Port address error
02	Timeout

Precautions

This command cannot be used unless the DGIOX release is version 1.06 or higher. This function is the same as the DRECT function with function number 03, except the transmission source address is expressed as an IP address. For example, if data was received from the node with IP address &H003008C11, I1% would be &H0300 and I2% would be &H8C11.

Also, all of the port addresses can be handled, from 0 to 65535 (2 bytes). With the DRECT function with function number 03, only addresses 0 to 255 (1 byte) can be handled.

Refer to *4-2-4 IP Addresses* for details on IP addresses.

10-4-8 DSEND – Transmit 1

Format

CALL DSEND (NA%, DA%, PA%, D$, RST%)

Function Number

04

Description

Specifies the destination node and requests data transmission. If the data cannot fit in a single character variable, execute DSEND repeatedly with the "continue" command to store the data in the transmission buffer before transmission. Up to 2000 bytes of data can be transmitted at one time.

Arguments

I/O	Argument		Remarks
Input	NA%:	Destination network address	---
	DA%:	Destination node number	---
	PA%:	Destination port address	---
	D$:	Transmission data	---
	RST%:	Command code	See below.
Output	RST%:	Return code	See below.

Command Codes

Command code	Meaning
00	End notice (last packet)
01	Continue
02	Clear transmission buffer

Return Codes

Return code	Meaning
00	Normal completion
01	Buffer full (Occurs when more than 2000 bytes are stored with the continue command.)
02	Data for another destination node is in the buffer. (Occurs when a continue command is used but NA% or DA% is changed.)
03	Port address error
04	DGIOX transmission buffer full
05	Transmit byte count error
06	Destination address error
07	Loop error
08	Command error (The command code must be 00, 01, or 02.)

Broadcast

Broadcasting enables simultaneous data transmission to all of the nodes in the network and is achieved by setting the destination node number (DA%) to 255 (FF in hexadecimal).

The port address can also be specified when broadcasting. For example, if the node address is set to 255 and the port address is set to 0, data will be transmitted to port 0 in all nodes. Set the port address to 255 to broadcast to all ports.

Argument settings			Receiving nodes (ports)
NA%	DA%	PA%	
00	FF	00	All nodes will receive the transmission when datagram port 0 is being used. (NSUs will not receive.)
00	FF	01	All nodes will receive the transmission when datagram port 1 is being used. (NSUs will receive in port 1 only.)
00	FF	02	All nodes will receive the transmission when datagram port 2 is being used. (NSUs will receive in port 2 only.)
00	FF	FF	Depends upon the node. (NSUs will receive in ports 1 and 2, DOS personal computers will receive in port addresses 0 to 89 and 110 to 255.)

10-4-9 DSEND – Transmit 2

Format

CALL DSEND (I1%, I2%, PA%, D$, RST%)

Function Number

08

Description

Specifies the destination node and requests data transmission. If the data cannot fit in a single character variable, execute DSEND repeatedly with the "continue" command to store the data in the transmission buffer before transmission.

Arguments

I/O	Argument		Remarks
Input	I1%:	Destination IP address	Upper 2 bytes
	I2%:	Destination IP address	Lower 2 bytes
	PA%:	Destination port address	---
	D$:	Transmission data	---
	RST%:	Command code	See below
Output	RST%:	Return code	See below.

Command Codes

Command code	Meaning
00	End notice (last packet)
01	Continue
02	Clear transmission buffer

Return Codes

Return code	Meaning
00	Normal completion
01	Buffer full (Occurs when more than 2000 bytes are stored with the continue command.)
02	Data for another destination node is in the buffer. (Occurs when a continue command is used but NA% or DA% is changed.)
03	Port address error
04	DGIOX transmission buffer full
05	Transmit byte count error
06	Destination address error
07	Loop error
08	Command error (The command code must be 00, 01, or 02.)

Precautions

This command cannot be used unless the DGIOX release is version 1.06 or higher. This function is the same as the DSEND function with function number 04, except the destination address is expressed as an IP address.

Two-byte port addresses (0 to 65535) can be specified. With the DSEND function with function number 04, only addresses 0 to 255 (1 byte) can be specified.

10-4-10 DCUT – Close

Format

CALL DCUT

Function Number

05

Description

Closes the datagram service.

Arguments

None

Precautions

Be sure to execute this function at the end of the program.

10-5 Using the DGIOX with C Programming

The DGIOX must be accessed directly when the DGIOX is used in a C program because a C interface is not supported. This section explains how to access and use the DGIOX, and provides a sample C program and programming advice.

10-5-1 Accessing the DGIOX

When using the DGIOX, first open the driver through DOS. Opening the driver yields the "file handle" used to refer to the file. This file handle is the basis for I/O requests made when using each DGIOX service.

When finished using the DGIOX, close the driver through DOS.

1. Opening the File

When using the DGIOX, first obtain the file handle by opening the file.

Calling Sequence

```
AX ← 3D02
DS : DX ← Pointer to the path name (DB "SUMDG",0)
INT 21
```

Return Values

An error has occurred when the carry is set (1).

```
AX=02 ← File not found
AX=03 ← Invalid path
AX=04 ← Too many open files, etc. Refer to your DOS manual.
```

The file was opened successfully when the carry is not set (0).

```
AX=file handle
```

2. Accessing the DGIOX File

Prepare the required I/O parameters, use the file handle, and make the request.

Calling Sequence

```
AX ← 4403
AX ← 007F
BX ← File handle
DS : DX ← Pointer to parameters
INT 21
```

Return Values

An error has occurred when the carry is set (1).

```
AX=06 ← Invalid file handle or other error. Refer to your DOS manual.
```

When the carry is not set (0):

```
AX=00 ← Normal completion
AX=FF ← Invalid command
AX=7F ← Operating system malfunction
AX=other ← Error code. Refer to the description of the command.
```

3. Closing the File

Close the DGIOX when you have finished using it.

Calling Sequence

```
AX ← 3E
BX ← File handle
INT 21
```

Return Values

The close failed when the carry is set (1).

```
AX=06 ← Invalid file handle
```

The close was successful when the carry is not set (0).

10-5-2 List of DGIOX Service Functions

The following table lists the DGIOX service functions.

Command code	Name	Description
01	Initialize	Initializes the service.
02	Receive	Requests reception of a command or response.
03	Transmit	Requests transmission of a command or response.
04	Status Read	Writes status in the buffer provided in the user program.

10-5-3 Initialize – 01

Description

Defines the local port address and clears the transmission and reception buffers.

Parameter Format

0	Port Address
1	01 (Command)
2	Not used.

Parameter Settings

Parameter	Settings
Port address	Specify the local port address. Port addresses 0 through 89 and 110 through 255 are valid.
Command	Set the command code to 01 (hexadecimal).

Return Codes

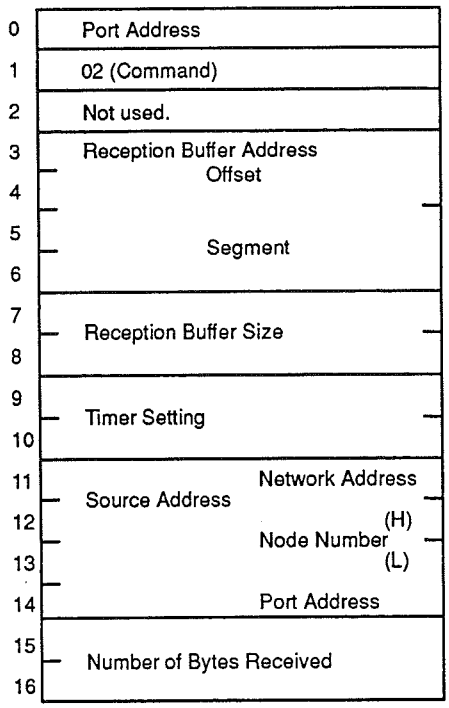
AX	Meaning
00	Normal completion
01	Port address error

10-5-4 Receive – 02

Description

Takes received data from the DGIOX buffer and passes it on to the user program. If the reception buffer is empty, this function waits for the specified time and returns a timeout error (AX = 2) if no data is received.

Parameter Format



Parameter Settings

Parameter	Settings
Port address	Set the port address of the port that was specified in the Initialize function.
Command	Set the command code to 02 (hexadecimal).
Reception buffer address	Set the leading address of the buffer that will receive the data.
Reception buffer size	Set the size (number of bytes) of the reception buffer.
Timer setting	Set the time (in 100-ms units) to wait to receive data. For example set to 10 to specify 1 second. There is no waiting time when the timer setting is 0.
Source address	Contains the network address, node number, and port address of the source.
Number of bytes received.	Contains the number of bytes of data received.

Return Codes

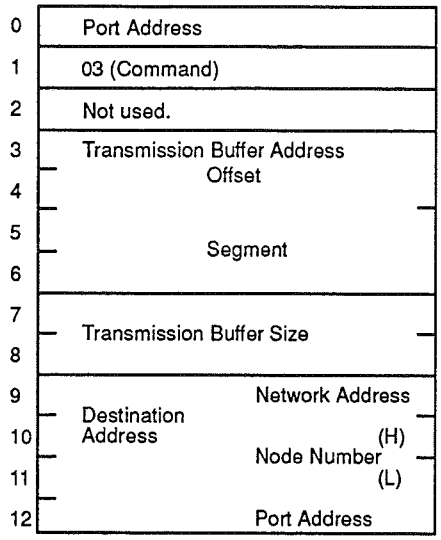
AX	Meaning
00	Normal completion
01	Port address error
03	Timeout
04	The amount of data received exceeds the size of the DGIOX's reception buffer.

10-5-5 Transmit – 03

Description

Requests data transmission. The response is returned to the user program when the transmission data is written to the DGIOX transmission buffer.

Parameter Format



Parameter Settings

Parameter	Settings
Port address	Set the port address of the port that was specified in the Initialize function.
Command	Set the command code to 03 (hexadecimal).
Transmission buffer address	Set the leading address of the transmission data.
Transmission buffer size	Set the number of bytes of transmission data (0 to 2000).
Destination address	Set the network address, node number, and port address of the destination.

Return Codes

AX	Meaning
00	Normal completion
01	Port address error
02	Transmission buffer full
03	Transmission buffer size error
04	Destination address error
05	Loop error

10-5-6 Status Read – 04

Description

Writes the following status information to the buffer provided by the user program.

0	RIE	RDIE	TDIE	RDI	TDI	RDE	TDE	RCVI
1	1	1	V2	1	B1	B2	INS	1
2	Local Node Number							
3	8259 Mask Status							
4	Local Network Address							

Status Read Flags/Bits

Flag/Bit	Meaning
RIE	Reception Interrupt Enabled Flag
RDIE	Reception DMA Completion Interrupt Enabled Flag
TDIE	Transmission DMA Completion Interrupt Enabled Flag
RDI	Reception DMA Completion Interrupt
TDI	Transmission DMA Completion Interrupt
RDE	Reception DMA Completion Enabled Flag
TDE	Transmission DMA Completion Enabled Flag
RCVI	Reception Interrupt
V2	Power Supply Flag (ON when center power is being supplied.)
B1, B2	Loop status (the node's status in the network) 00: Normal 10: Upstream loopback 01: Downstream loopback 11: Loop error
INS	Insertion status (ON when inserted.)

The "8259 Mask Status" reflects the mask status of the Interrupt Controller.

Parameter Format

0	Not used.
1	04 (Command)
2	Not used.
3	Status Buffer Address offset
4	
5	segment
6	
7	Buffer Size
8	

Parameter Settings

Parameter	Settings
Command	Set the command code to 04 (hexadecimal).
Status buffer address	Set the leading address of the area where the status information will be stored.
Buffer size	Set the number of bytes in the status buffer.

Return Codes

AX	Meaning
00	Normal completion

10-5-7 Sample C Program

This section describes the contents of the sample program included with the SYSMAC NET Support Software. The sample program, shown at the end of the section, is automatically copied to the SN3200 directory when the software is installed.

Program's Filename PCDSPMSM.C

Compiling Command `CL /AS /Zp PCDSPMSM.C`

Description The main elements of the program are described below.

1, 2, 3... 1. Declaration of the Parameter Structures

Structure	Usage
struct para_s	Parameter structure for the Initialize, Status Read, and Transmit functions
struct para_r	Parameter structure for the Receive function
struct stread	Buffer structure for the Status Read function

2. Creation of Transmission Data

   Writes 36 bytes of data in the s_buf transmission buffer. The transmission data are ASCII codes "0x30" through "0x4f."

3. Open Datagram

   Opens the DGIOX and obtains the file handle. "SUMDG" is DGIOX's device name (reserved file name). When completed normally, the return status of int86x is set in the variable f_hundle. If an error occurs, the following message will be displayed and the program will end.

```
UDP service access error
AX = ***
```

4. Initialization

   Initializes port 0. If an error occurs, the following message will be displayed and the program will end.

```
Initialize error
AX = ***
```

5. Status Read

   Sets the local network address and local node number in the Status Read buffer. If an error occurs, the following message will be displayed and the program will end.

```
Status-read error
AX = ***
```

6. Data Transmission:

   Transmits 36 bytes of data to the local node. If an error occurs, the following message will be displayed and the program will end.

```
Transmission error
AX = ***
```

7. Data Reception:
   Sets a waiting time of 5 seconds and receives data. If an error occurs, the following message will be displayed and the program will end.

```
Receive error
AX = ***
```

8. Display Received Data:
   The received data will be displayed as shown below if the reception was successful.

```
Source network address==> ***
Source node address==> ***
Source port address==> ***
Receive data length==> ***
Receive data
0123456789:;<=>@?ABCDEFGHIJKLMNOPQRS
```

9. Close Datagram:
   Closes the file and exits. If an error occurs, the following message will be displayed and the program will end.

```
UDP service close error
```

Sample Program The sample program is listed below.

Note The following sample program appears in Japanese only. The English translation of the Japanese sample program is provided as an aid to running the Japanese sample program.

```
/*************************************************************************
*                                                                        *
*     sample program code                                                *
*                                                                        *
*     file name    :     pcdspmsm.c (Version 1.01)                       *
*                                                                        *
*     OS           :     MS-DOS                                          *
*     protocol     :     UDP                                             *
*     language     :     MS-C                                            *
*                                                                        *
*     compire      :     CL /AS /Zp PCDSPMSM.C                           *
*                                                                        *
*************************************************************************/

#include          <dos.h>

#define SOURCELP        0           /* port No.                    */
#define S_LENGTH        36          /* transmit data length        */
#define R_LENGTH        2000        /* buffer size                 */
#define SET_TIME        50          /* waiting time                */
#define DGINIT          0x01        /* initialize command          */
#define DGRECV          0x02        /* receive command             */
#define DGSEND          0x03        /* transmit command            */
#define STREADMY        0x04        /* status-read command         */

      /* usage of initialize,status-read,transmit parameter  */
struct para_s{
      unsigned char port;           /* port No.                    */
      unsigned char com;            /* command                     */
      unsigned char dum;            /* dummy (0 fixed)             */
      unsigned short buf_o;         /* buffer address (OFFSET)     */
      unsigned short buf_s;         /* buffer address (SEGMENT)    */
      unsigned short bufl;          /* buffer size (MAX 2000)      */
      unsigned char net;            /* target network address      */
      unsigned char node_h;         /* dummy (0 fixed)             */
      unsigned char node_l;         /* target node address         */
      unsigned char lp;             /* target port No.             */
};
      /* usage of receive */
struct para_r{
      unsigned char port;           /* port No.                    */
      unsigned char com;            /* command (2 fixed)           */
      unsigned char dum;            /* dummy (0 fixed)             */
      unsigned short buf_o;         /* buffer address (OFFSET)     */
      unsigned short buf_s;         /* buffer address (SEGMENT)    */
      unsigned short bufl;          /* buffer size (MAX 2000)      */
      unsigned short timer;         /* waiting time                */
      unsigned char net;            /* source network address      */
      unsigned char node_h;         /* dummy (0 fixed)             */
      unsigned char node_l;         /* source node address         */
      unsigned char lp;             /* source port No.             */
      unsigned short length;        /* receive length              */
```

```
};
      /* usage of status-read */
struct stread{
      unsigned char nsb_h;          /* NSB status (high)              */
      unsigned char nsb_l;          /* NSB status (low)               */
      unsigned char node_add;       /* self node address              */
      unsigned char mask;           /* 8259 masked bit                */
      unsigned char net_add;        /* self network address           */
};

struct para_s para1 = {0};    /* for initialize parameter           */
struct para_r para2 = {0};    /* for receive parameter              */
struct para_s para3 = {0};    /* for transmit parameter             */
struct para_s para4 = {0};    /* for status-read parameter          */

struct stread status = {0};   /* for status-read buffer             */

unsigned char s_buf[2000];          /* transmit buffer              */
unsigned char r_buf[2000];          /* receive buffer               */

/*********************************************************************
*                                                                    *
*                           main routine                             *
*                                                                    *
*********************************************************************/
main()
{
      union REGS inregs, outregs;

      struct SREGS segregs;         /* for segment register         */

      int f_hundle;                 /* file handle                  */
      int ret;                      /* return value                 */

      int               i;          /* repeat count                 */
      unsigned char     data;       /* transmission data            */

      char far *filename = "SUMDG"; /* device name                  */

      char far          *pa;        /* pointer of para1             */
      char far          *pb;        /* pointer of para2             */
      char far          *pc;        /* pointer of para3             */
      char far          *pd;        /* pointer of para4             */

      char far          *statpoint; /* pointer of status-read buffer */
      char far          *sbpoint;   /* pointer of transmit buffer   */
      char far          *rbpoint;   /* pointer of receive buffer    */

            /*********************************************
            *          make out transmit data             *
            *********************************************/
for(i = 0, data = 0x30; i < 36; i++, data++)
{
            s_buf[i]=data;
}
```

```
/***********************************************
*   UDP service open and get it's file handle   *
***********************************************/
inregs.x.ax = 0x3d02;
inregs.x.dx = FP_OFF(filename);
segregs.ds = FP_SEG(filename);

ret = int86x(0x21, &inregs, &outregs, &segregs);

            /***********************************************
            *                  error judgment               *
            ***********************************************/
if(outregs.x.cflag != 0)            /* check carry flag                */
{
      printf("UDP service access error\n");
      printf("AX = %x\n", ret);

      cl_dg(f_hundle);              /* UDP service close               */

      exit(1);
}

f_hundle = ret;                     /* file handle                     */

/*****************************************************
*                 initialize                         *
*****************************************************/
para1.port = SOURCELP;              /* port No.                        */
para1.com = DGINIT;                 /* command                         */

pa = (char far *)&para1;
inregs.x.dx = FP_OFF(pa);
segregs.ds = FP_SEG(pa);            /* pointre of para1                */

inregs.x.ax = 0x4403;
inregs.x.cx = 0x7f;
inregs.x.bx = f_hundle;

ret = int86x(0x21, &inregs, &outregs, &segregs);

            /***********************************************
            *                  error judgment               *
            ***********************************************/
if((outregs.x.cflag != 0)||(ret != 0))
{
      printf("initialize error\n");
      printf("AX = %x\n", ret);

      cl_dg(f_hundle);              /* UDP service close               */

      exit(1);
}


/*****************************************************
*                 status-read                        *
*****************************************************/
```

```
para4.port = SOURCELP;                  /* port No.                          */
para4.com = STREADMY;                   /* command                           */
para4.bufl = 5;                         /* buffer size                       */

statpoint = (char far *)&status;
para4.buf_o = (short)FP_OFF(statpoint);
para4.buf_s = (short)FP_SEG(statpoint);

pb = (char far *)&para4;                /* pointer of status-read buffer     */
inregs.x.dx = FP_OFF(pb);
segregs.ds = FP_SEG(pb);

inregs.x.ax = 0x4403;
inregs.x.cx = 0x7f;
inregs.x.bx = f_hundle;

ret = int86x(0x21, &inregs, &outregs, &segregs);

            /***********************************************
            *           error judgment                     *
            ***********************************************/
if((outregs.x.cflag != 0)||(ret != 0))
{
      printf("status-read error\n");
      printf("AX = %x\n", ret);

      cl_dg(f_hundle);                  /* UDP service close                 */

      exit(1);
}

/*****************************************************
*           transmit process address to myself       *
*****************************************************/
para3.port = SOURCELP;                  /* port No.                          */
para3.com = DGSEND;                     /* command                           */
para3.bufl = S_LENGTH;                  /* transmission data length          */
para3.net = status.net_add;             /* target network address            */
para3.node_l = status.node_add;         /* target node address               */
para3.lp = SOURCELP;                    /* target port No.                   */

sbpoint = (char far *)s_buf;
para3.buf_o = (short)FP_OFF(sbpoint);
para3.buf_s = (short)FP_SEG(sbpoint);

pc = (char *)&para3;                    /* transmission data buffer          */

inregs.x.dx = FP_OFF(pc);
segregs.ds = FP_SEG(pc);

inregs.x.ax = 0x4403;
inregs.x.cx = 0x7f;
inregs.x.bx = f_hundle;

ret = int86x(0x21, &inregs, &outregs, &segregs);

            /***********************************************
```

```
            *           error judgment                          *
            ***********************************************/
if((outregs.x.cflag != 0)||(ret != 0))
{
      printf("transmission error\n");
      printf("AX = %x\n", ret);

      cl_dg(f_hundle);              /* UDP service close                */

      exit(1);
}

/*****************************************************
*           receive Process                          *
*           waiting time is 5sec.                    *
*****************************************************/
para2.port = SOURCELP;              /* port No.                         */
para2.com = DGRECV;                 /* command                          */
para2.bufl = R_LENGTH;              /* buffer size (2000byte)           */
para2.timer = SET_TIME;             /* waiting time value               */

rbpoint = (char far *)r_buf;
para2.buf_o = (short)FP_OFF(rbpoint);
para2.buf_s = (short)FP_SEG(rbpoint);

pd = (char *)&para2;                /* receive buffer pointer           */
inregs.x.dx = FP_OFF(pd);
segregs.ds = FP_SEG(pd);

inregs.x.ax = 0x4403;
inregs.x.cx = 0x7f;
inregs.x.bx = f_hundle;

ret = int86x(0x21, &inregs, &outregs, &segregs);

            /***********************************************
            *           error judgment                      *
            ***********************************************/
if((outregs.x.cflag != 0)||(ret != 0))
{
      printf("receive error\n");
      printf("AX = %x\n", ret);

      cl_dg(f_hundle);              /* UDP service close                */

      exit(1);
}

            /***********************************************
            *           display receive information       *
            ***********************************************/
            printf("source network address ==> %d\n",para2.net);
            printf("source node address    ==> %d\n",para2.node_l);
            printf("source port No.        ==> %d\n",para2.lp);
            printf("receive data length    ==> %d\n",para2.length);
            printf("receive data\n");
```

```
        for(i = 0; i < para2.length ; i++)
        {
              printf("%c",r_buf[i]);
        }

        cl_dg(f_hundle);        /* UDP service close                */

        exit(0);
}

/*****************************************************
*                                                    *
*        UDP service close                           *
*                                                    *
*****************************************************/
cl_dg(f_hundle)
        int f_hundle;           /* file handle                      */
{
        int ret;                /* return value                     */

        ret = close(f_hundle);  /* file close                       */

              /*********************************************
              *           error judgment                   *
              *********************************************/
        if(ret != 0)
              printf("UDP service Close error\n");
}

/*************************************************************************
*                       concluded                                        *
*************************************************************************/
```

Appendix
Diagnostic Table Contents

The diagnostic table maintains the counts of 27 items that can be useful when troubleshooting the system. To display the diagnostic table, select "6. Diagnostic Table Read" from the Read Node's Status menu.

No.	Item	Process	Normal/ Error	Remarks
1	Total Sends	Transmit	---	Shows the total count of transmissions (the total of items 2, 10, 12, 13, 14, 16, and all transmission errors in the protocol table).
2	Normal Sends	Transmit	Normal	Shows the total count of successful transmissions.
3	Total Receives	Receive	---	Shows the total count of receptions (the total of items 4, 9, 11, 15, 17, and all reception errors in the protocol table).
4	Normal Receives	Receive	Normal	Shows the total count of successful receptions.
5	Send Executions	Transmit	---	The count of separate command transmission requests Breakdown of transmission requests (for DOS computers) The total of items 5, 6, and 7 is the same as item 1. It isn't necessary to set items 5, 6, and 7. (Optional items)
6	Send Requests	Transmit	---	
7	IP Sends	Transmit	---	
8	Illegal Interrupts	---	Error	There was an undefined interrupt.
9	Receive Interrupt Errors	Receive	Error	There was an unsupported protocol (packet type).
10	Send Interrupt Errors	Transmit	Error	There is a send interrupt even though the transmission process isn't performed.
11	Errors in Receive Process	Receive	Error	There was an unsupported protocol.
12	PCB Packet Type Mismatches	Transmit	Error	There was a transmission request with an unsupported protocol.
13	Illegal Loops	Transmit	Error	There was a loop (network) error during transmission.
14	No. of "Can't Use the Send Buffer"	Transmit	Error	Can't start transmission process because there is data left over from the previous transmission.
15	No. of "Receive Data Short"	Receive	Error	The data length is less than 28 bytes. (3200 header data missing.)
16	Send Timeouts	Transmit	Error	Transmission wasn't completed within the required time.
17	Receive Timeouts	Receive	Error	Reception wasn't completed within the required time.

The protocol counters are incremented for the following items in the situations described.

No.	Item	Process	Normal/ Error	Remarks
1	Send Packet Count	Transmit	Normal	---
2	Receive Packet Count	Receive	Normal	---
3	Send Busy Count	Transmit	Error	The IP process was busy and the transmission was cancelled.
4	Send Data Size Overflow Count	Transmit	Error	The data transferred from the protocol exceeded the prescribed length.
5	Send Data Size Too Short Count	Transmit	Error	The data transferred from the protocol was less than the prescribed length.
6	Node Address Error Count	Transmit	Error	The node number was greater than 126. The network address was 00, but the node number wasn't in the local network's registered routing table values.
7	Receive Busy Count	Receive	Error	The host protocol wasn't able to receive.
8	Receive Packet Overflow Count	Receive	Error	The amount of received data exceeds the size of the reception buffer.
9	Receive Packet (IP Length) Count	Receive	Error	The amount of received data did not match the IP length.
10	Send Interrupt Error Count	Transmit	Error	The protocol was not in transmission completed wait status when transmission was completed.

Glossary

Back-loop Function See *Loop-back Function.*

Bridge A bridge connects two networks. A SYSMAC LINK – SYSMAC NET Link bridge can be made with the FC55.

Broadcast Test This test transmits test data to all of the nodes in the network a specified number of times and then reads the number of receptions from each node.

Communications Cycle Time The communications cycle time is the sum of the time required to pass the node around the network for nodes to transmit data (the token passing time) and the time required for the Control Node to poll each node in the network (the control cycle time). The SYSMAC NET Link and SYSMAC LINK Systems communicate by repeating these steps.

Echo-back Test This test transmits test data to the specified node and then compares the returned data to the originally transmitted data. (The transmitted and returned data should be identical.)

IP Address The network address and node number together are known as the IP (Internet Protocol) address. The IP address is expressed in 4 bytes (32 bits) divided between the network address and node number.

Loop-back Function When a break occurs in the transmission path of the ring, this function automatically uses a loop-back to create a new transmission path and prevent the entire network from going down.

Maximum Node Number This network parameter indicates the maximum node number that can be added in a SYSMAC NET Link or SYSMAC Link Network. A node can't be added to the network if its node number is greater than this value.

Network Address Each network is assigned its own network address to distinguish it from other networks. Network addresses range from 1 to 127. Network address 0 is usually used to specify the local network.

Node Bypass Function When a node in the network goes down because of a power interruption or malfunction, this function automatically bypasses that node to prevent the entire network from going down. A Center Power Supply Unit (S3200-CP03) is required to perform the node bypass function.

Node Number Each node within a network is assigned its own node number to distinguish it from other nodes. Node numbers range from 1 to 126 in SYSMAC NET Link Networks and from 1 to 62 in SYSMAC LINK Networks.

Port Address See *Unit Address.*

RAS Functions The acronym "RAS" is short for "Reliability, Availability, and Serviceability" and means high reliability, quick recovery after an error, and easy maintenance.

Routing Table This table registers the communications paths to other networks and is required for communication with those other networks.

Server Function After a command is received and processed at unit address 0, a response is returned to the source.

Token

When several nodes are connected by a single cable, as in a LAN, only one node can transmit data at a time. To prevent two nodes from transmitting data simultaneously, a control code called the "token" is passed around the network and only the node that possesses the token has the right to transmit data.

Token Bus

Token bus is a communications protocol in which the token (transmission right) is passed around a logical ring of the nodes physically connected in a bus structure. Each node transmits data when it acquires the token.

Unit Address

When a node such as a PC is composed of several Units, each Unit within the node is assigned its own unit address. Unit address 0 specifies the node itself (such as the PC or personal computer) and unit address 0fxe (hexadecimal) specifies the SYSMAC NET Link or SYSMAC LINK Unit/Support Board.

User Application (Client)

Transmits commands from the user program and receives responses from the destination.

User Application (Server)

After a command is received from another node and processed in the user program, a response is returned.

User Application (Transmission)

Performs data transmission only.

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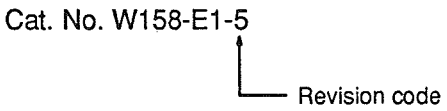
Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.



The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
1	June 1989	Original production
2	July 1989	Redundancies removed, and general cleaning of text and graphics.
3	December 1989	Corrections and additional information. **Pages:** 2, 5, 13 through 16, 18 through 22, 24, 29 through 38, 42, 43, 66, 81
4	April 1990	Corrections and additional information. General cleaning of graphics.
5	June 1995	All the information in this manual has been completely revised.

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Cat. No. W158-E1-5

Note: Specifications subject to change without notice.

Printed in Japan
1199-0.03M 0653178-B1