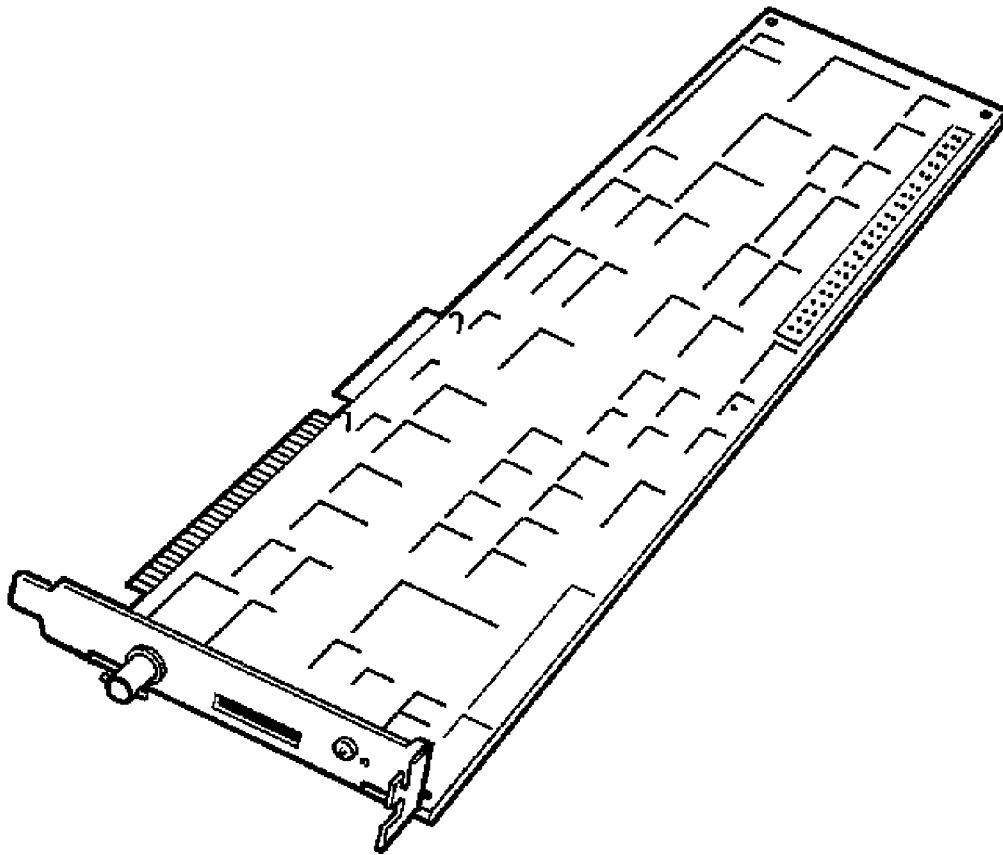


# **SYSMAC LINK Support Board**

## **Operation Manual**

*Revised March 1993*



## **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 relative 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.

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# TABLE OF CONTENTS

<b>SECTION 1</b> .....	<b>1</b>
<b>Introduction</b> .....	<b>1</b>
1-1 Board Capabilities .....	2
1-2 Network Communications .....	2
1-2-1 Network Configuration .....	3
1-2-2 Routing Tables .....	3
1-2-3 SYSMAC LINK System Features .....	5
1-2-4 Network Control .....	5
1-3 Data Links .....	6
1-4 Data Read/Write Services .....	10
1-5 RAS Functions .....	11
1-5-1 Echo-back Tests .....	11
1-5-2 Broadcast Tests .....	11
1-5-3 Polling Unit Backup .....	11
1-5-4 Error Log .....	11
<b>SECTION 2</b> .....	<b>13</b>
<b>Board Components and Switch Settings</b> .....	<b>13</b>
2-1 SYSMAC LINK Support Board Components .....	14
2-2 Indicators .....	14
2-3 Setting Switches .....	15
2-3-1 Interrupt Line Connector .....	15
2-3-2 DIP Switch .....	15
2-3-3 Node Address Switches .....	16
<b>SECTION 3</b> .....	<b>17</b>
<b>Installation</b> .....	<b>17</b>
3-1 Support Board Installation .....	18
3-2 Cable Connection .....	19
<b>SECTION 4</b> .....	<b>21</b>
<b>Software</b> .....	<b>21</b>
4-1 SLSS Files .....	22
4-2 Copying SLSS Files .....	22
4-3 SLSS Installation .....	23
4-3-1 BIOS Installation .....	23
4-3-2 SYSMAC LINK Driver Installation .....	24
4-4 Starting and Exiting SLSS .....	24
<b>SECTION 5</b> .....	<b>27</b>
<b>Support Utility</b> .....	<b>27</b>
5-1 Main Menu .....	28
5-2 Keyboard .....	29
5-3 Preparation for Operation .....	30
5-4 Starting and Exiting the Support Utility .....	31
5-5 Data Link Operations .....	33
5-5-1 Edit Data Link Table .....	33
5-5-2 Initialize Data Link Table .....	39
5-5-3 Transfer Data Link Table .....	39
5-5-4 Compare Data Link Tables .....	44
5-5-5 Delete Data Link Table .....	48

5-5-6	Start/Stop Data Link .....	50
5-5-7	Data Link Monitor .....	51
5-6	Network Parameters .....	54
5-7	Routing Table Operations .....	55
5-7-1	Edit Routing Tables .....	56
5-7-2	Transfer Routing Tables .....	61
5-7-3	Delete Routing Tables .....	63
5-8	Echo-back Test .....	65
5-9	Broadcast Test .....	67
5-10	Local Network Status .....	68
5-11	Status Read .....	69
5-12	Error Log .....	70
5-13	Node Status Read .....	72
<b>SECTION 6 .....</b>		<b>75</b>
<b>Network Communications .....</b>		<b>75</b>
6-1	Data Link Operation .....	76
6-2	Data Read/Write Services .....	77
6-3	Table Load Utility .....	77
6-4	Libraries .....	79
6-4-1	C Library .....	79
6-4-2	BASIC Library .....	79
<b>SECTION 7 .....</b>		<b>83</b>
<b>C and BASIC Commands .....</b>		<b>83</b>
7-1	C Commands .....	84
7-1-1	SYSMAC LINK OPEN – slkopen .....	84
7-1-2	SYSMAC LINK CLOSE – slkclose .....	84
7-1-3	SYSMAC LINK SEND – slksend .....	85
7-1-4	SYSMAC LINK RECEIVE – slkrecv .....	86
7-1-5	SYSMAC LINK RECEIVE WAIT – slkrcvw .....	88
7-1-6	SYSMAC LINK READ – slkread .....	90
7-1-7	SYSMAC LINK WRITE – slkwrite .....	91
7-1-8	SYSMAC LINK STATUS READ – slkstatrd .....	92
7-1-9	SYSMAC LINK COMMAND – slkcmd .....	93
7-2	BASIC Commands .....	95
7-2-1	SYSMAC LINK OPEN – SLKOPEN .....	95
7-2-2	SYSMAC LINK CLOSE – SLKCLOSE .....	95
7-2-3	SYSMAC LINK SEND – SLKSEND .....	96
7-2-4	SYSMAC LINK RECEIVE – SLKRECV .....	98
7-2-5	SYSMAC LINK RECEIVE WAIT – SLKRCVW .....	100
7-2-6	SYSMAC LINK READ – SLKREAD .....	102
7-2-7	SYSMAC LINK WRITE – SLKWRITE .....	104
7-2-8	SYSMAC LINK STATUS READ – SLKSTATRD .....	105
7-2-9	SYSMAC LINK COMMAND – SLKCMD .....	107
<b>SECTION 8 .....</b>		<b>109</b>
<b>Sample Programs .....</b>		<b>109</b>
8-1	Data Link Program .....	110
8-2	SYSMAC LINK Test Program .....	116
8-3	Common Data Link Problems .....	120
<b>SECTION 9 .....</b>		<b>121</b>
<b>Troubleshooting and Inspection .....</b>		<b>121</b>
9-1	Initialization Errors .....	122

# TABLE OF CONTENTS

9-2	Operating Errors .....	122
9-2-1	Indicators .....	123
9-2-2	Support Utility Error Messages .....	123
9-2-3	Error Codes .....	124
9-2-4	Node Status Errors .....	127
9-2-5	Data Link Status Errors .....	127
9-2-6	C/BASIC Command Errors .....	127
9-3	Periodic Inspection .....	128
9-3-1	Handling Precautions .....	129
9-3-2	Tools and Equipment Needed for Inspection .....	129
<b>Appendix A .....</b>		<b>131</b>
<b>Standard Models .....</b>		<b>131</b>
<b>Appendix B .....</b>		<b>133</b>
<b>Specifications .....</b>		<b>133</b>
<b>Index .....</b>		<b>135</b>
<b>Revision History .....</b>		<b>137</b>

## About this Manual:

This manual describes the installation and operation of the CV-series SYSMAC LINK Support Board and includes the sections described below. The SYSMAC LINK is designed to be installed in an IBM PC/AT or compatible computer to enable the computer to connect to a SYSMAC LINK System and operate as a network node.

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

**Section 1 Introduction** introduces the features and operations possible with SYSMAC LINK Support Boards.

**Section 2 Board Components and Switch Settings** presents the names and functions of the SYSMAC LINK Support Boards' components and the switch settings.

**Section 3 Installation** explains how to install the Support Board in a computer and connect it to a SYSMAC LINK System.

**Section 4 Software** explains how to install the software required to operate the Support Board.

**Section 5 Support Utility** describes the features and operation of the Support Utility, including procedures required to establish, test, and monitor network communications.

**Section 6 Network Communications** introduces the data link function, the data read/write services, the Table Load Utility, and C and BASIC commands.

**Section 7 C and BASIC Commands** provides information on the C and BASIC commands provided with the Support Board.

**Section 8 Troubleshooting and Inspection** provides information to help identify and correct errors that might occur in the System. This section also includes inspection procedures that must be periodically performed.

**Appendices** are provided that list OMRON products used in SYSMAC LINK Systems and SYSMAC LINK Support Board specifications.

# SECTION 1

## Introduction

This section introduces the features and operations of the SYSMAC LINK Support Board.

1-1	Board Capabilities .....	2
1-2	Network Communications .....	2
1-2-1	Network Configuration .....	3
1-2-2	Routing Tables .....	3
1-2-3	SYSMAC LINK System Features .....	5
1-2-4	Network Control .....	5
1-3	Data Links .....	6
1-4	Data Read/Write Services .....	10
1-5	RAS Functions .....	11
1-5-1	Echo-back Tests .....	11
1-5-2	Broadcast Tests .....	11
1-5-3	Polling Unit Backup .....	11
1-5-4	Error Log .....	11

## 1-1 Board Capabilities

The SYSMAC LINK System provides high-speed, high-capacity communications between any nodes (PCs or computers) in the network, and enables remote monitoring and programming and automatic data transfer via data links.

The SYSMAC LINK Support Board is equipped with the same basic features as the SYSMAC LINK Units, but there are some differences due to the board format. The following table shows the differences between the SYSMAC LINK Support Board and the SYSMAC LINK Units.

Item	SYSMAC LINK Unit	SYSMAC LINK Support Board
<b>Network participation</b>	A Unit is included in or removed from the network when the power is turned on or off.	A Board is added to the network with the <i>slkopen</i> command and removed with the <i>slkclose</i> command.
<b>Reception data processing</b>	Data is automatically written directly to the CPU.	Data is written via the driver using a command.
<b>Response processing</b>	The Unit automatically awaits a response when a command is sent.	A program is required to receive the response when a command is sent.
	The Unit returns a response automatically.	A program is required to return responses.
<b>Unit number</b>	Unit numbers can be set from 0 to 15.	The unit number is automatically set to 0.
<b>Multiple network participation</b>	Up to 4 SYSMAC LINK Units can be mounted per node and all can be used simultaneously.	Only 1 SYSMAC LINK Support Board can be used per node.
<b>Data links</b>	The beginning data link word can be changed.	The beginning data link word is fixed.
<b>Backup</b>	Memory is backed up.	Memory is not backed up.
<b>Connecting cables</b>	Optical fiber or coaxial cable can be used.	Only coaxial cable can be used.
<b>Multiple transmissions</b>	Up to 8 ports can be used to simultaneously execute up to 8 instructions.	Only 1 port can be used executing only one command at a time.

In addition to the differences listed in the table above, there are some differences in the actual structure of the data links and the use of SYSMAC LINK functions.

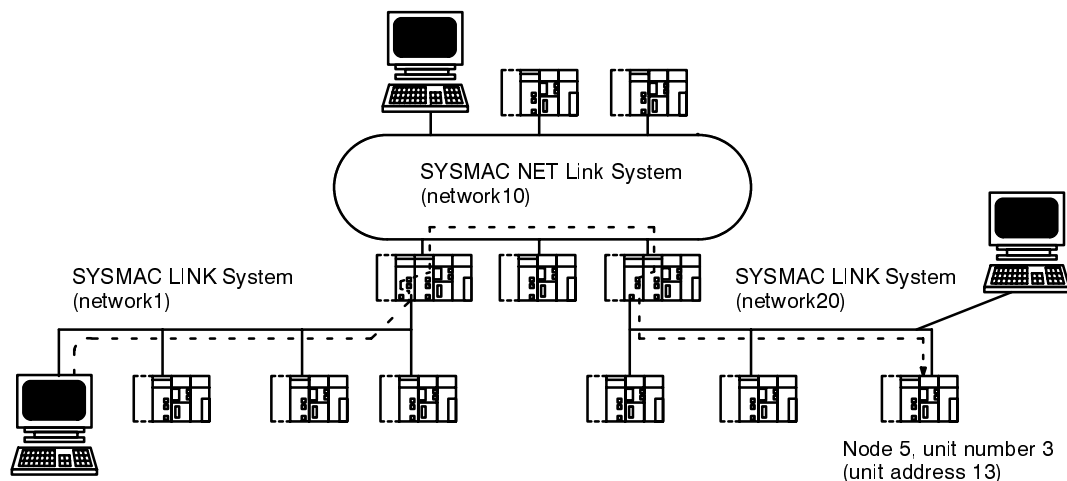
## 1-2 Network Communications

An IBM PC/AT or compatible computer can be added to a SYSMAC LINK Network simply by installing a Support Board. Once the computer is in the network, the control system can be controlled from the computer by manipulating data in PCs in the network. The functions of a SYSMAC LINK Support Board are almost identical to those of a coaxial SYSMAC LINK Unit.



## 1-2-1 Network Configuration

As shown in the diagram below, a computer equipped with a Support Board can communicate with nodes as far as two operating levels away.



### Network Addresses

Each network in the system is assigned a unique network address (1 to 127) in the routing tables. When communicating with a node on another network, the transmission is directed to the desired network by specifying its network address.

A network address of 0 directs a transmission to a node within the same network

### Node Addresses

Each node within a subsystem is assigned a unique node address using a rotary switch. In SYSMAC LINK Systems node addresses can be set from 1 to 62.

### Unit Numbers

Each Unit within a node is assigned a unique unit number (0 to 15). The unit number of a SYSMAC LINK Support Board is fixed to 0. (There can only be one Support Board at a node.)

### Unit Addresses

The unit address is used to identify the destination of transmissions, and is calculated from the unit number and type of Unit.

## 1-2-2 Routing Tables

The routing tables indicate the routes that data will travel when data is transmitted between networks in a multilevel SYSMAC LINK System. Routing tables must be registered if data is to be transmitted between networks.

**Note** In a computer with a Support Board installed, the routing tables must be registered with the load table utility; the routing tables cannot be registered from the GPC or CVSS. Routing tables are composed of a local network table and a relay network table, which are described below.

### Local Network Table

When two or more Link Units (SYSMAC LINK or SYSMAC NET Link Units) are mounted to one PC, the local network table indicates the network addresses of those Link Units.

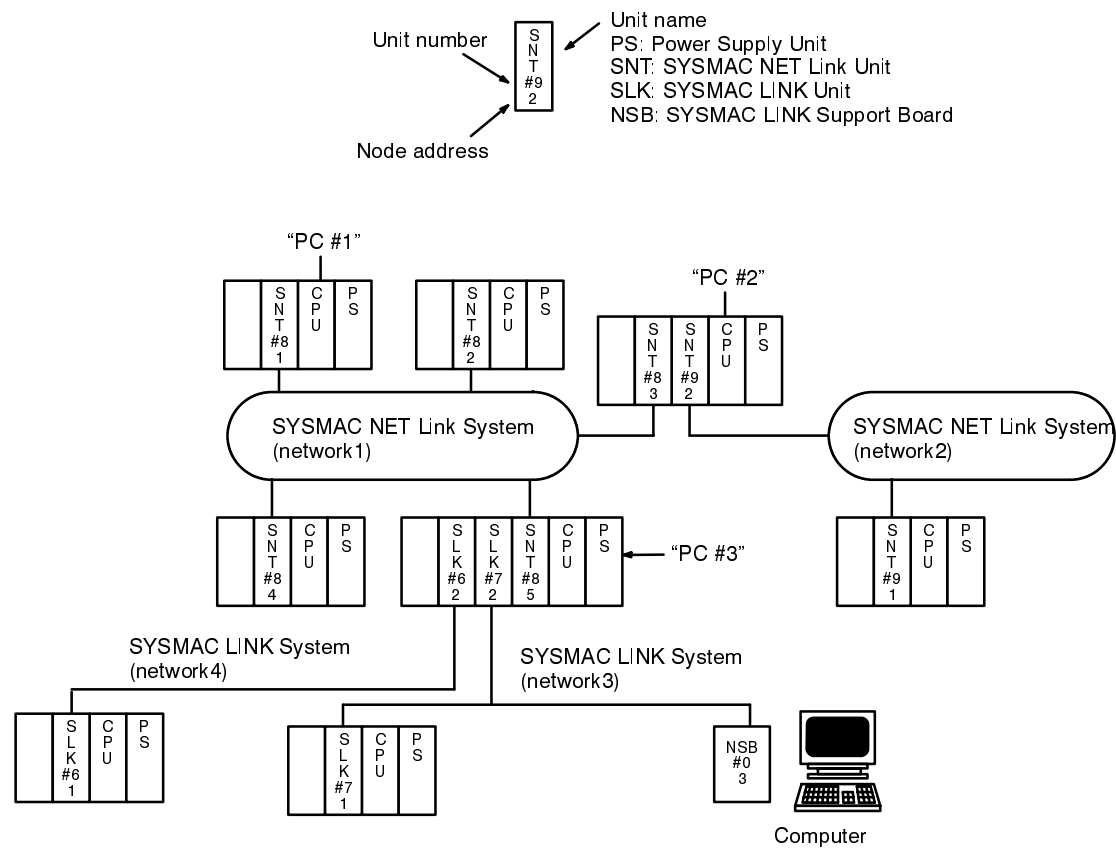
**Note** The unit number of a SYSMAC LINK Support Board is fixed to 0, so the unit number is set to 0 in the local network table.

### Relay Network Table

The relay network table indicates the relay nodes that the transmission will pass through on the way to the destination network.

Example

The diagram below shows several Link Units and a Support Board in a typical network. The routing tables for some nodes in this network are described after the diagram.



The routing tables for "PC #1":

Local network	Unit number
1	8

Destination network	Relay network	Relay node
2	1	3
3	1	5
4	1	5

The routing tables for "PC #2":

Local network	Unit number
1	8
2	9

Destination network	Relay network	Relay node
3	1	5
4	1	5

The routing tables for "PC #3":

Local network	Unit
1	8
3	7
4	6

Destination network	Relay network	Relay node
2	1	3

The routing tables for the host computer:

Local network	Unit
3	0

Destination network	Relay network	Relay node
1	3	2
2	3	2
4	3	2

### 1-2-3 SYSMAC LINK System Features

SYSMAC LINK Units and Support Boards are equipped with a variety of special features.

#### **Distributed Control with Data Links**

Data links automatically transfer data to and from PCs and computers in the network, establishing a simple but powerful link between nodes. Data written to the data link area of a node is automatically transferred to other nodes that are part of the same data link.

#### **CV-mode Commands**

SYSMAC LINK Support Boards can transmit or receive CV-mode commands. Transmitted CV-mode commands can be used to control PCs and CPU Bus Units in the network.

#### **RAS Functions**

SYSMAC LINK Systems are equipped with several RAS functions (RAS is an acronym for Reliability, Availability, and Serviceability) to aid in network maintenance and error processing. The Echo-back Test and Broadcast Test functions aid in communications troubleshooting. The error log function records the time and type of errors that occur. The Polling Unit Backup function prevents the network from failing when one Unit fails.

### 1-2-4 Network Control

SYSMAC LINK Units and Support Boards communicate through the SYSMAC LINK Network, a token bus LAN. The elements of the OMRON token bus network are described below.

#### **Polling Unit**

In a SYSMAC LINK Network there is one node, called the polling unit, that controls communications in the network. Normally, the Unit with the lowest node address is the polling unit. If the polling unit happens to fail, the node with the next higher node address automatically becomes the polling unit, preventing the whole network from failing.

#### **Start-up Node**

The node that starts the data link in a SYSMAC LINK Network is called the start-up node. The data links operate using the settings in the memory area of the PC at the start-up node.

## **Token**

To avoid having two nodes attempt to transmit simultaneously, only one node has the right to transmit at a time. The Unit with that right is identified by a token that is passed in sequence from Unit to Unit, beginning with the polling unit.

If the token is passed to a Unit that doesn't have data to transmit, it is immediately passed to the Unit with the next higher node address. The Unit with the highest node address passes the token back to the polling unit. In this way, each Unit in the network has its turn to transmit data without conflicting with other Units.

## **Transmission Cycle**

One complete circuit of the token around the network is known as a token cycle. At the end of each token cycle, the polling unit polls all of the nodes in the network to check whether any nodes have been added to or removed from the network. The updated information on the network is transmitted to all nodes. This polling and updating process is known as the control cycle.

When the control cycle is completed, the polling unit once again passes the token, beginning the next token cycle. Together the token cycle and control cycle make up the transmission cycle and the time required for the transmission cycle is known as the transmission cycle time.

## **Network Parameters**

The transmission cycle time is one of the network parameters. The other network parameters are the number of polling units, allowed number of frames, and the maximum node address. These parameters are transmitted from the polling unit to the other nodes in the network.

### **Transmission Cycle Time**

This parameter sets a timer that fixes the length of the transmission cycle to the specified time. The timer operates only when data links are in operation. Set the transmission cycle time when setting data link tables' common link parameters. When the timer is in operation, the transmission cycle time is fixed at the specified value, independent of the number of events that occur. When the transmission cycle time is not set (the default condition) or data links are not in operation, the transmission cycle time will vary depending on the demands of the system.

### **Number of Polled Units**

This parameter determines how many nodes will be polled by the polling unit during a control cycle. Setting a high number of Units increases the transmission cycle time, but reduces the time required to recognize that nodes have been removed from or added to the network. The default value for this parameter is 4.

### **Maximum Node Address**

This parameter sets the maximum node address that a node can have and still be a part of the network. Nodes with node addresses greater than the maximum node address will not be polled, and therefore cannot participate in network communications. Setting a low maximum node address eliminates unnecessary polling of nonexistent nodes above the maximum. The default value for this parameter is 62.

### **Allowed Number of Frames**

This parameter determines how many event transmissions can take place during a transmission cycle when data links are operating. Each event transmission requires roughly 3 frames. With the default value of 10 frames, up to 4 event transmissions can occur.

### **Update Cycle Time**

This parameter sets the time interval for data exchange (updating words in the data link areas) when data links are in operation.

## **1-3 Data Links**

Data links can be created between nodes in a SYSMAC LINK Network to exchange data automatically.

Data links are coordinated in the network with the common link parameters and update parameters. Common link parameters are the same in all nodes that are

in the data link and contain general information about the data link such as which nodes are in it. Update parameters are different for each node and determine the location of the data link areas in each node.

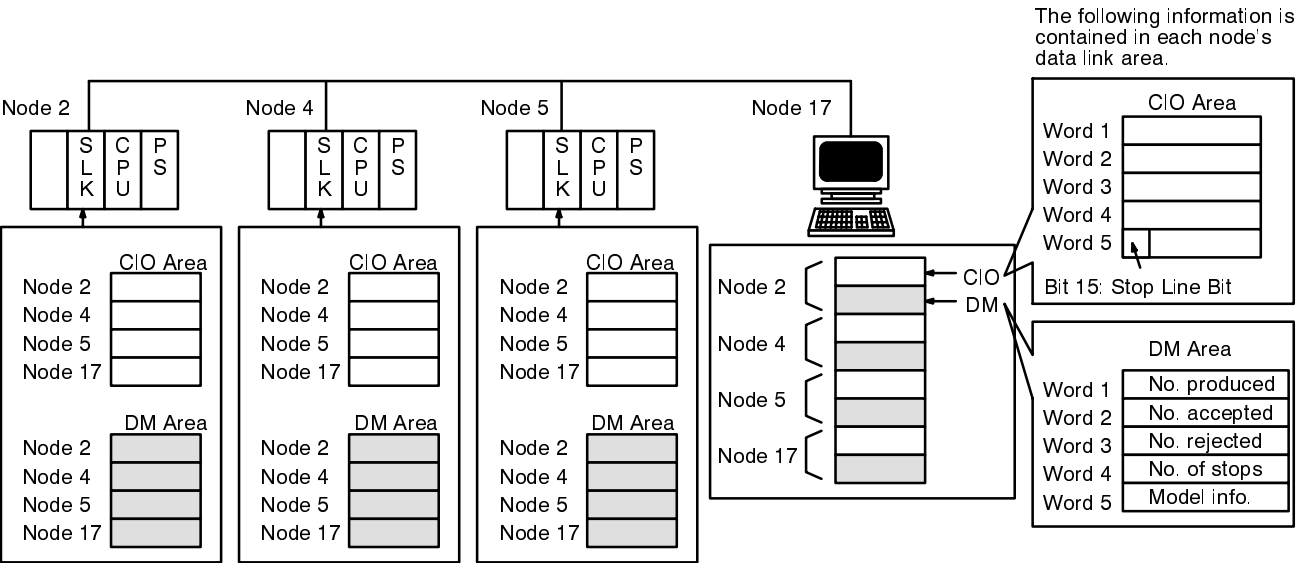
### Data Link Specifications

Basic specifications for data links are provided in the following table.

Item	Description
No. of nodes in data link	2 to 62 nodes
No. of linked words per node	CIO Area: 254 words (508 bytes) DM Area: 254 words (508 bytes)
Max. number of linked words in network	2966 words (918 words for any network with one or more C200H PCs)

### Data Link Areas

A region of the CIO and DM Areas can be set aside as the data link area in each PC that is in the data link. The diagram below shows an example of a data link between three PCs and a computer, as well as the structure of the data link areas in each node. The abbreviations refer to the following Units: PS=Power Supply Unit; SLK=SYSMAC LINK Unit.



### Computer/PC Differences

There are three differences between data link areas in PCs and computers with a SYSMAC LINK Support Board:

1. Unlike OMRON PCs, computers do not have CIO and DM Areas, so the computer's data link area is allocated alternately to CIO and DM Area data, as shown in the diagram above.
2. The beginning word of the data link area is fixed for computers. (The default location will be used even if a different beginning word is set in the update parameters.)
3. Automatic generation of data tables cannot be specified for the Support Board. If the data link is activated from another node where automatic generation is specified, the data link table will be generated in the computer according to the settings in the start-up node.

### Data Link Tables

The parameters required to set data link tables are described below. Refer to *Section 5 Support Utility* for details on actually entering these parameters into the computer.

**Note** In a computer with a Support Board installed, the data link table must be set with the load table utility; the data link table cannot be registered from the GPC or CVSS.

### Common Link Parameters

Common link parameters determine the transmission cycle time of the data link, which areas will be enabled for data links, and how many CIO and DM words will be transmitted from each PC. The same common link parameters must be set in all nodes that are to be part of the same data link in the network.

Parameter	Description
<b>Transmission cycle time</b>	Enter a value between 5 and 255 ms to fix the transmission cycle time. ---: self-generating
<b>No. of CIO words transmitted by each node</b>	Enter the number of CIO words transmitted by each node from 1 to 254 (1 to 254 words) -: Not part of data link 0: Can only read CIO words from other nodes.
<b>No. of DM words transmitted by each node</b>	Enter the number of DM words transmitted by each node from 1 to 254 (1 to 254 words) -: Not part of data link 0: Can only read DM words from other nodes.

### Update Parameters

Update parameters are set separately for each node to determine what links will actually be created for that node. Enter the number of link words in the CIO and DM Areas for the local node as well as all of the nodes that will have links to the local node.

Parameter	Description
<b>Node address</b>	Enter the node addresses of the local node and nodes that will link to the local node. Nodes set to “-” in the Common Link Parameters cannot be set here.
<b>No. of words per node</b>	Indicate the number of CIO and DM words in the data link for each node designated above. (Same as the “No. of CIO words” and “No. of DM words” in the Common Link Parameters.)
<b>Beginning status word</b>	Set the beginning word of the region in memory that will contain the Data Link Status Flags for the nodes in the data link. Effective for C-series PCs only.
<b>Beginning CIO word</b>	Not effective for the SYSMAC LINK Support Board. ( CIO 1000 to CIO 1063 in CV-series PCs correspond to LR 00 to LR 63 in C-series PCs.)
<b>Beginning DM word</b>	Not effective for the SYSMAC LINK Support Board.

**Note** The local node must be included in the update parameters.

### Data Link Activation

A data link can be activated from any node in the network as long as the required settings have been made. The settings of the PC or computer at the start-up node will define the data link. The data link can be stopped from any node in the data link.

There are 4 ways to activate or stop a data link from a computer with a SYSMAC LINK Support Board:

- 1, 2, 3...**
  1. The data link can be started or stopped by sending a CV-mode command. The DATA LINK START command (command code 04 01) starts a data link. The DATA LINK HALT command (command code 04 02) stops a data link. Refer to *1-4 Data Read/Write Services* for details.
  2. A data link can be started or stopped with the Support Utility. Refer to *5-4 Starting and Exiting the Support Utility* for details.

3. A data link can be started or stopped with CVSS. Refer to the *CV Support Software: Online Operation Manual* for details.
4. A data link can also be started or stopped by manipulating control bits in PCs in the network. Refer to the SYSMAC LINK Unit's *System Manual* for details.

## Data Link Status

There are 4 ways to check the status of a data link from a computer with a SYSMAC LINK Support Board:

- 1, 2, 3...**
1. The orange "LNK" indicator on the SYSMAC LINK Support Board indicates the operational status of the data link, as shown below.

LNK indicator	Data link status
ON	The Unit is part of an operating data link.
Flashing	A data link error has occurred.
OFF	The Unit is not part of an operating data link.

2. The data link status can be checked by sending a CV-mode command, the DATA LINK STATUS READ command (command code 06 03). Refer to 1-4 *Data Read/Write Services* for details.
3. The data link status can be checked using the Support Utility. Refer to 5-5-7 *Data Link Monitor* for details.
4. The data link status can be checked using a BASIC or C-language command (SLKSTATRD). Refer to *Section 7 C and BASIC Commands* for details.

## Example Data Link Tables

In this example, there are four nodes in the data link (2, 5, 6, and 8), but some nodes will not receive data from others. The settings for the common link and update parameters are shown below

### Common Link Parameters

Enter the number of DM and CIO (I/O #) Area link words for each node in the data link, as shown below. Setting the number of CIO Area link words to "0" for node 8 means that node 8 will be able to receive but not send CIO Area data.

Node	I/O #	DM #
01	—	—
02	10	10
03	—	—
04	—	—
05	15	10
06	5	5
07	—	—
08	0	5
09	—	—
10	—	—

### Update Parameters

Enter the model (PC or Support Board), beginning CIO and DM words, and beginning status word, then set the number of CIO and DM link words for the local node each node that will link to the local node.

**Node 2:** PC; Beginning I/O word: 1000; Beginning DM word: 0

#	Node	I/O	DM
1	2	10	10
2	5	15	10
3	6	5	5
4	8	0	5

**Node 5:** NSB; Beginning I/O word: ----; Beginning DM word: ----

#	Node	I/O	DM
1	2	10	10
2	5	15	10
3	6	5	5

**Node 6:** PC; Beginning I/O word: 1005; Beginning DM word: 0

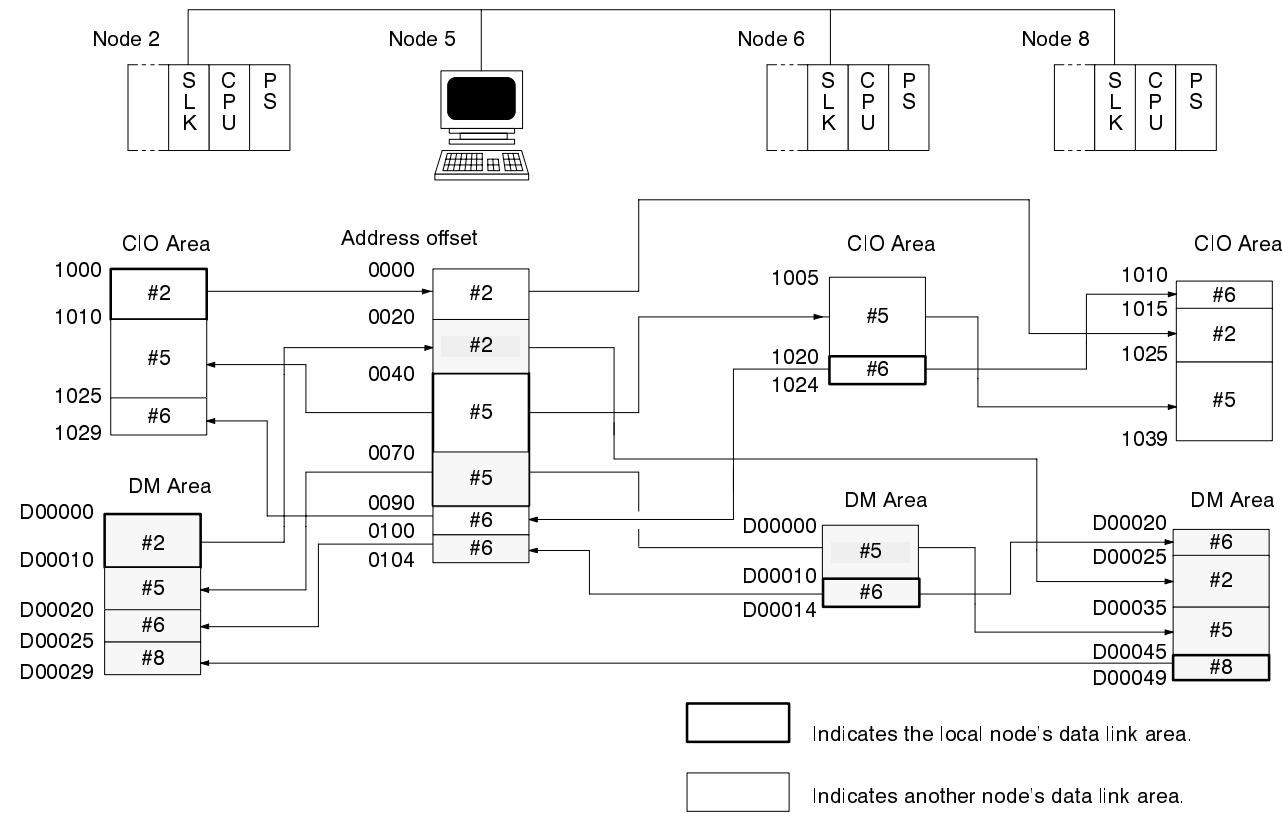
#	Node	I/O	DM
1	5	15	10
2	6	5	5

**Node 8:** PC; Beginning I/O word: 1010; Beginning DM word: 20

#	Node	I/O	DM
1	6	5	5
2	2	10	10
3	5	15	10
4	8	0	5

Data Flow

The flow of data in the data link is shown below. The abbreviations refer to the following Units: PS=Power Supply Unit; SLK=SYSMAC LINK Unit.



1-4 Data Read/Write Services

A computer equipped with a SYSMAC LINK Support Board can send and receive CV-mode commands. These commands support data read/write services, so that data can be transmitted between PCs and computers in the network and so that operation at other nodes can be controlled remotely.

The data read/write services use a command/response format. Each time data or a command from a computer or CV-series PC is transmitted, the receiving node returns a response. If responses aren't needed, the Unit can be set so that responses are not returned. The same transmission can also be broadcast simultaneously to all nodes on the network in a broadcast transmission.

Command Transmission

CV-mode commands are transmitted from a computer via user programming at the computer. If a response is required, programming to receive the response must be prepared too. (In PCs responses can be received automatically.)



**Command Reception**

When a CV-mode command addressed to the computer is received from another node, it will be processed in one of the two ways described below, depending on the command.

- 1, 2, 3...**
1. If the command is addressed to the Support Board (destination unit number 10 or FE), the Support Board automatically processes the command and returns a response.
  2. If the command is addressed to the computer (destination unit number 1), the Support Board just acts as an interface for the program. A routine that processes the command and returns the proper response must be programmed prior to command reception.

## **1-5 RAS Functions**

RAS is an acronym for Reliability, Availability, and Serviceability. RAS functions enhance these three features of the SYSMAC LINK Network.

### **1-5-1 Echo-back Tests**

The echo-back test is used to test communications between two nodes in the network; it involves transmitting data to a specified node and requesting the node to send back the data that was sent. With a SYSMAC LINK Support Board, the echo-back test can be executed using either the Support Utility or a CV-mode command.

### **1-5-2 Broadcast Tests**

The broadcast test is used to test communications to all other nodes in the network; it involves transmitting data to all nodes in the network simultaneously and then reading the results (number of receptions for each node) of the test. With a SYSMAC LINK Support Board, the echo-back test can be executed using either the Support Utility or a CV-mode command.

### **1-5-3 Polling Unit Backup**

SYSMAC LINK Units provide an automatic backup function. If the SYSMAC LINK Unit which is currently the polling unit fails, the Network is automatically restructured to make the next lowest numbered functional node within the Network the new polling unit so that the Network continues to function.

### **1-5-4 Error Log**

The error log records the time and type of errors that occur in the network. With a SYSMAC LINK Support Board, the contents of the error log area can be read using either the Support Utility or a CV-mode command. The error log is cleared when power is interrupted or the Board is reset.

## SECTION 2

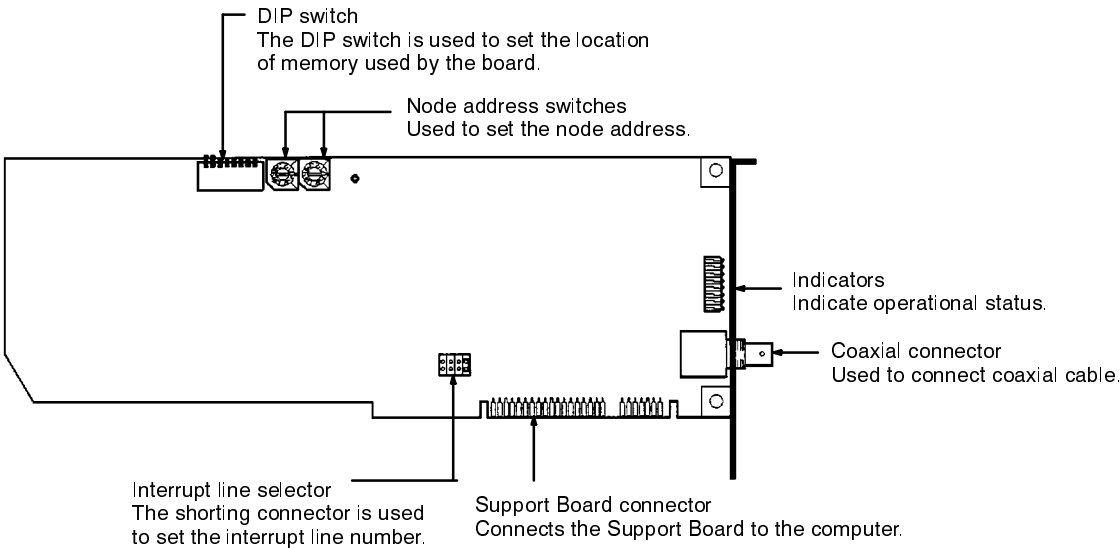
# Board Components and Switch Settings

The names and functions of the SYSMAC LINK Support Board's components and switch settings are described in this section.

2-1	SYSMAC LINK Support Board Components .....	14
2-2	Indicators .....	14
2-3	Setting Switches .....	15
2-3-1	Interrupt Line Connector .....	15
2-3-2	DIP Switch .....	15
2-3-3	Node Address Switches .....	16

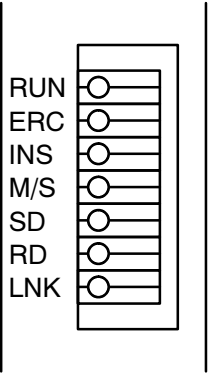
# 2-1 SYSMAC LINK Support Board Components

The main components of the SYSMAC LINK Support Board are shown in the following diagram.



# 2-2 Indicators

The status of the SYSMAC LINK Support Board is indicated by the indicators shown below.



Indicator			Meaning
Name	Color	Condition	
RUN	Green	Lit	Support Board is operating normally.
		Not lit	Watchdog timer error has occurred or the SYSMAC LINK BIOS has not been installed.
ERC	Red	Lit	Communications error has occurred, node address setting is incorrect, or same node address has been set twice.
		Not lit	None of the above errors has occurred.
INS	Orange	Lit	Support Board is part of Network.
		Not lit	Support Board is not part of Network.
M/S (polling unit)	Orange	Lit	Support Board is polling unit.
		Not lit	Support Board is not part of Network or is polled unit.
SD (send data)	Orange	Lit	Support Board is sending data.
		Not lit	Support Board is not sending data.

Name	Color	Condition	
RD (receive data)	Orange	Lit	Support Board is receiving data.
		Not lit	Support Board is not receiving data
LNK (data link)	Orange	Lit	Support Board is part of active data link.
		Flashing	Error has been made in data link table settings.
		Not lit	Support Board is not part of active data link.

## 2-3 Setting Switches

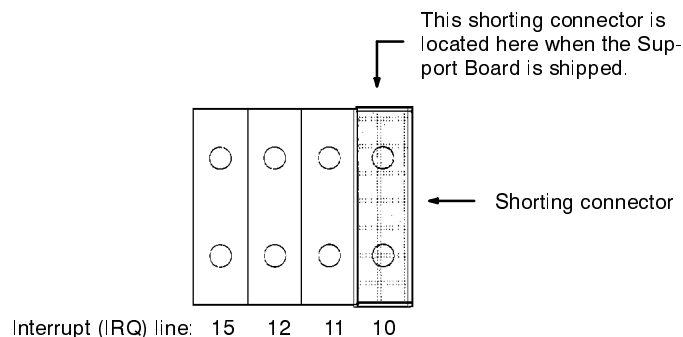
Set the Support Board switches and the interrupt line connector before installing the Support Board in the computer.

Switch settings determine how the SYSMAC LINK Board will work on a Network. Be sure to turn the power off to the PC before setting the switches. Errors in switch settings, which may not always be detected by the System, can cause faulty data communications. Set and check all switch settings carefully.

### 2-3-1 Interrupt Line Connector

The Support Board is factory-set to interrupt the computer on interrupt line 10 (IRQ10). If another board set for interrupt line 10 is already installed in the computer, this setting will have to be changed to prevent conflicts. The setting is changed by moving the shorting connector to another position.

There are 4 positions for the shorting connector, as shown in the diagram below. If IRQ10 is being used, move the shorting connector to IRQ11, IRQ12, or IRQ15.


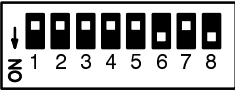
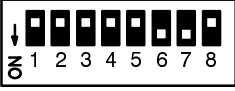



**Note** The “/I” option in the CONFIG.SYS BIOS registration must be changed when the interrupt line number is changed. Refer to 4-3 *SLSS Installation* for details.

### 2-3-2 DIP Switch

The DIP switch is used to set the area of RAM memory that is used as a buffer between the computer and the Support Board. The Board is factory-set to use D8000 through DFFFF, but can be changed if this region is already being used by the computer.

The region of RAM memory used as a buffer is determined by the settings of pins 7 and 8, as shown in the following table. Pins 1 through 5 should always be OFF, and pin 6 should always be ON.

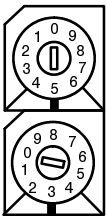
Pin Settings	RAM Region	Segment
	C0000 to C7FFF	C000
	C8000 to CFFFF	C800
	D0000 to D7FFF	D000
	D8000 to CFFFF	D800

**Note** The “/A” option in the CONFIG.SYS BIOS registration must be changed when the RAM memory location is changed. Refer to 4-3 *SLSS Installation* for details.

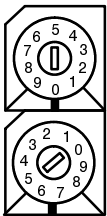
### 2-3-3 Node Address Switches

Node address switches determine the node address. The top switch (next to the DIP switch) sets the tens digit; the bottom switch sets the ones digit. The node address must be between 01 and 62. Each SYSMAC LINK Unit or Board in a Network must have its own unique node address. Restart the Board by toggling the power after changing the node address setting.

Use a small flat-blade screwdriver to set node address switches, being careful not to damage them. The examples below show the node address switches set to 53 and 07.



Node address set to 53.



Node address set to 07.

- Note**
1. A communications error will occur and the ERC indicator will light if the node address is not between 01 and 62.
  2. Each node in a network must have a unique node address.

**SECTION 3**  
**Installation**

This section explains how to install the SYSMAC LINK Support Board.

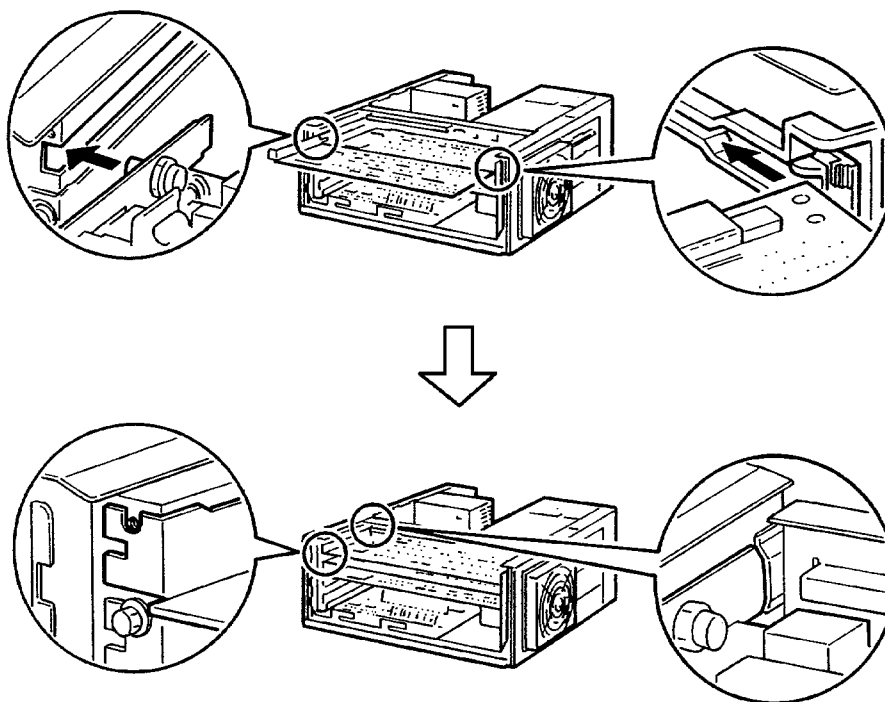
3-1	Support Board Installation .....	18
3-2	Cable Connection .....	19

## 3-1 Support Board Installation

Once the SYSMAC LINK Support Board's switches have been set, it can be installed in an IBM PC/AT or compatible computer. Before installing the Board, be sure that all of the computer's peripheral devices have been turned off.

Follow the procedure below to install the Support Board in an IBM PC/AT or compatible computer.

- 1, 2, 3...**
1. Remove the computer's cover by unscrewing the screws on the back of the computer, sliding the cover forward, and lifting it off.
  2. Remove the slot cover. Set aside the screw that held the slot cover; it will be used to hold the Support Board. Store the slot cover in case it is needed sometime in the future.
  3. Install the Support Board in the computer. When installing the Board be sure to insert the connector into the slot on the back end, and then slide the Board into the slot on the front end.  
Insert the Board until the metal mounting bracket fits into the computer, and is flush with the edge of the computer.



4. Replace the screw that was set aside in step 2 to secure the Board to the computer.
5. Replace the computer's cover and screw in the screws on the back of the computer.

## 3-2 Cable Connection

SYSMAC LINK Units can be connected with coaxial cable and BNC connectors. This section describes the procedures required to connect these cables.

### Required Components

1, 2, 3...

#### 1. Coaxial Cable and Connectors:

Use the 5C-2V coaxial cable designed for indoor use. Install connectors on each end of the cable. Cables must be continuous. No intervening cable connectors or breaks are permitted.

#### 2. F-adapters (C1000H-CE001):

Coaxial cables are connected to the SYSMAC LINK Units and Support Boards via F-adapters. One F-adapter is included as an accessory with the SYSMAC LINK Support Board.

#### 3. Termination Resistor (C1000H-TER01):

Two Termination Resistors (sold separately) are required for each network, one for the unused connector at each end of the network.

#### 4. Mounting Bracket

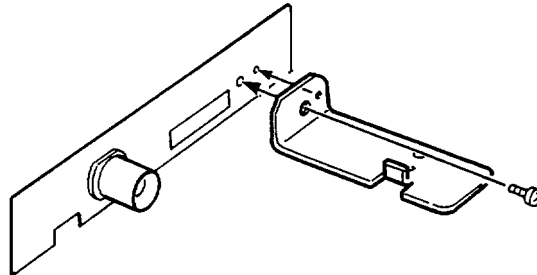
The coaxial cable is secured to the SYSMAC LINK Support Board with a Mounting Bracket. One bracket is included as an accessory with the SYSMAC LINK Support Board.

### Connection Procedure

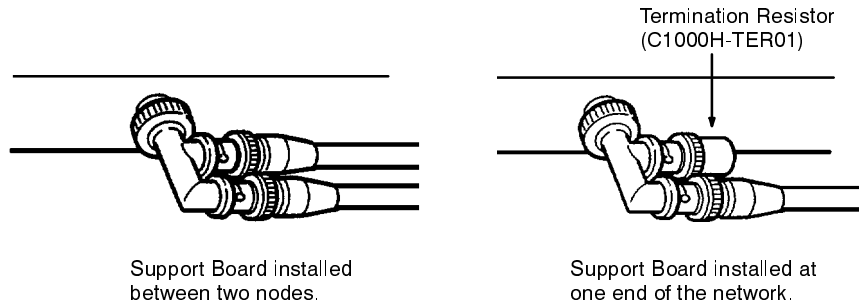
The connection procedure is described below.

1, 2, 3...

1. Align the Mounting Bracket with the Support Board and attach it with the enclosed screw.

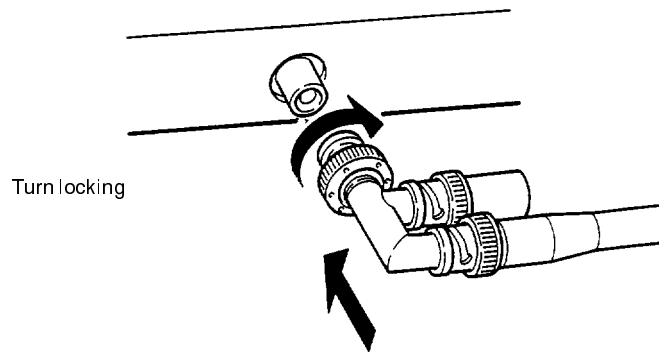


2. If the Support Board is being placed between two other nodes, attach the cables from those nodes to the F-Adaptor provided with the Support Board.  
If the Support Board is being placed at one end of the network, attach the cable from the adjacent node and a Termination Resistor (C1000H-TER01) to the F-Adaptor.

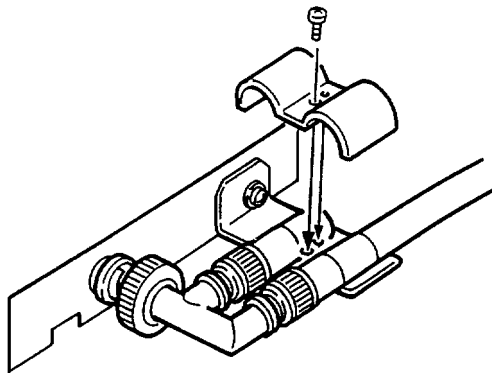




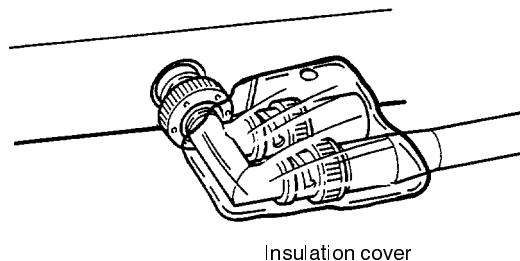
3. Connect the F-Adaptor to the SYSMAC LINK Support Board by firmly pushing the F-adapter onto the coaxial connector on the Board and turning the locking ring to the right until it locks.



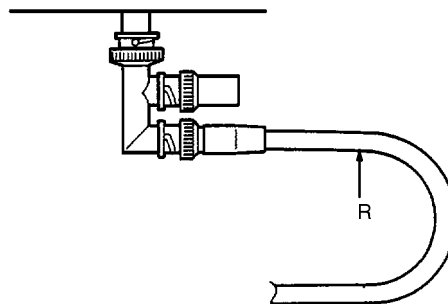
4. Place the cable and Termination Resistor (or two cables) on the bottom part of the Mounting Bracket, align the top part of the bracket, and attach it with the provided screw.



5. Place an insulation cover over the F-adapter.



6. Any bends in the coaxial cable must be 45 mm in radius or greater (six times the outer diameter of the cable). When laying the cable, make bends of 110 mm in radius or greater (15 times the outer diameter of the cable).



# SECTION 4

## Software

This section explains how to make backup copies of the SYSMAC LINK Support Software (SLSS) and install SLSS on the computer's hard disk.

4-1	SLSS Files .....	22
4-2	Copying SLSS Files .....	22
4-3	SLSS Installation .....	23
4-3-1	BIOS Installation .....	23
4-3-2	SYSMAC LINK Driver Installation .....	24
4-4	Starting and Exiting SLSS .....	24

## 4-1 SLSS Files

The SYSMAC LINK Support Software (SLSS) is used to control the SYSMAC LINK Support Board from the host computer. The table below shows the files which are included in SLSS.

Filename	Contents
SLKDVB.SYS	SYSMAC LINK Driver
SLKBSIB.SYS	SYSMAC LINK BIOS
SLKMSC.LIB	MS-C Library
SLKQBS.OBJ	Quick BASIC Library (for SYSMAC LINK) IBM BASIC Compiler/2 Libraries
SLKQBS.BIN	Quick BASIC Library (for loading)
SLKUTYIB.EXE	SYSMAC LINK Support Utility
SYSMAC.MSG	Japanese messages for the SYSMAC LINK Support Utility
SYSLNK.MSG	English messages for the SYSMAC LINK Support Utility
SLKTBLD.EXE	Table Load Utility

## 4-2 Copying SLSS Files

Before installing SLSS, all important files should be copied with the DOS *copy* command to prevent accidental loss of the data they contain. Refer to your DOS user's manual for details on using the *copy* command.

Depending on the application, some files might not be needed, as described below.

### Essential Files

The following files are essential.

Filename	Contents
SLKDVB.SYS	SYSMAC LINK Driver
SLKBSIB.SYS	SYSMAC LINK BIOS

**Note** Copy these files onto a system disk. Refer to your DOS user's manual for details on using the *SYS* command to make system disks.

### C Files

The following file should be copied if the C language will be used.

Filename	Contents
SLKMSC.LIB	MS-C Library

### BASIC Files

The following files should be copied if the BASIC language will be used.

Filename	Contents
SLKQBS.OBJ	Quick BASIC Library (for SYSMAC LINK) IBM BASIC Compiler/2 Libraries
SLKQBS.BIN	Quick BASIC Library (for loading)

### Support Utility Files

The following files should be copied if the Support Utility will be used.

Filename	Contents
SLKUTYIB.EXE	SYSMAC LINK Support Utility
SYSMAC.MSG	Japanese messages for the SYSMAC LINK Support Utility
SYSLNK.MSG	English messages for the SYSMAC LINK Support Utility

### Table Load Utility Files

The following file should be copied if the Table Load Utility will be used.

Filename	Contents
SLKTBLD.EXE	Table Load Utility

## 4-3 SLSS Installation

To use the SLSS, the SYSMAC LINK BIOS and SYSMAC LINK driver must first be installed in memory. The installation procedure is described below.

**Note** The SYSMAC LINK BIOS must be installed first for the SYSMAC LINK driver to operate. Add the BIOS to the CONFIG.SYS file first, and then the driver.

### 4-3-1 BIOS Installation

Add the following line to the CONFIG.SYS file:

```
DEVICE=[ d: ][ path ]SLKBSIB.SYS[ options ]
```

Items in the square brackets are optional. If they are needed, enter the information within the brackets, not the brackets themselves. Refer to your DOS user's manual for details on using the *device* command.

Item	Meaning	Example
d:	Disk drive. Enter the letter name of the appropriate drive.	A:
path	The directory path. (Usually the root directory.)	\SLSS
options	The options are used to set BIOS operating parameters. Options are described in detail below. The options can be entered in any order, and unneeded options can be left out. Options can be entered in either upper or lower-case letters.	/AC000/T0A/E

#### Options

##### /An (Memory Address)

This option specifies the location of the RAM memory used by the Support Board. The hexadecimal number entered here must match the memory address set on the Support Board's DIP switch. Refer to 2-3-2 *DIP Switch* for details on this setting.

Enter the desired memory address after /A. For example, enter /AC000 to set C000H as the memory address. The default setting for this option is D800H.

##### /S (Data Link R/W Mode)

If the /S option is included, data updating will not be stopped when data is being read from or written to the data link area. If the /S option is not included, data updating will be stopped when data is being read from or written to the data link area.

Normally the /S option is not included in the command because new and old data might be mixed together if the data is updated while data is being transferred to or from the data link area.

##### /K (Start-up Mode)

This option specifies whether the Board can function as the polling unit. If the /K option is included, the Board will be a polled unit. If the /K option is not included, the Board can be the polling unit.

Normally the /K option is not included and the Board can be the polling unit.

##### /In (Interrupt Line Number)

This option sets the kind of interrupt signal that will be sent from the Support Board. The hexadecimal number entered here must match the interrupt line number set with the interrupt line connector. Refer to 2-3-2 *Interrupt Line Connector* for details on this setting.

Enter the desired interrupt line number after /I in hexadecimal. For example, enter /IB to set the interrupt line number to IRQ11. The default setting for this option is IRQ10.

##### /Tn (Response Timeout Setting)

This option sets the response watchdog timer interval, the time that the Board will wait for a response after sending a transmission. The timer interval is in seconds.

Enter the timer interval after /T in 2-digit hexadecimal. For example, enter /T0A to set the timer interval to 10 seconds. The default setting for this option is 2 seconds.

**/E (Message Mode)**

This option specifies whether messages will be displayed in Japanese or English. If the /E option is included, messages will be displayed in English. If the /E option is not included, messages will be displayed in Japanese.

Normally the /E option is included and messages will be displayed in English.

**4-3-2 SYSMAC LINK Driver Installation**

The SYSMAC LINK BIOS must be installed before the SYSMAC LINK driver. To install the SYSMAC LINK driver, add the following line to the CONFIG.SYS file:

```
DEVICE=[ d: ][ path ]SLKDVB.SYS[ options ]
```

Items in the square brackets are optional. If they are needed, enter the information within the brackets, not the brackets themselves. Refer to your DOS user's manual for details on using the device command.

Item	Meaning	Example
d:	Disk drive. Enter the letter name of the appropriate drive.	A:
path	The directory path. (Usually the root directory.)	\SLSS
options	The options are used to set BIOS operating parameters. Options are described in detail below. The options can be entered in any order, and unneeded options can be left out. Options can be entered in either upper or lower-case letters.	/AC000/T0A/E

**Options****/E (Message Mode)**

This option specifies whether the messages will be displayed in Japanese or English. If the /E option is included, messages will be displayed in English. If the /E option is not included, messages will be displayed in Japanese.

Normally the /E option is included and messages will be displayed in English.

**/Bn (Communications Buffer Size)**

This option sets the size of the transmission and reception buffers. The buffer size can range from 3 to 99 (in decimal). Each unit set here represents 554 bytes of memory. The first 554 bytes are reserved for the transmission buffer, and the remainder are allocated to the reception buffer.

Enter the buffer size after /B in decimal. For example, enter /B6 to set the buffer size to 6 (6×554=3324 bytes). In this case, 554 bytes would be allocated to the transmission buffer 2770 bytes would be allocated to the reception buffer.

The default setting for this option is 3. (Reserving 554 bytes in the transmission buffer and 1108 bytes in the reception buffer.)

**4-4 Starting and Exiting SLSS**

This section explains how to start and exit SLSS on a computer with a SYSMAC LINK Support Board. Be sure to verify that the software is operating properly after installing the Support Board and SLSS.

**Starting SLSS**

The procedure for starting SLSS is described below.

- 1, 2, 3...**
  1. Insert the floppy disk containing SLSS into the disk drive. If SLSS has been installed on the hard disk, this step isn't necessary.
  2. Turn on the computer. The computer should boot from the floppy disk.
    - a) The computer's system messages will appear on the screen. These messages will vary depending on the computer model and the contents of the CONFIG.SYS file.
    - b) The following message will appear as the SYSMAC LINK BIOS is loaded into memory:

```
SYSMAC LINK BIOS Ver._._  
(C)Copyright OMRON Corporation 199_
```

The following message will appear if an error occurs as the SYSMAC LINK BIOS is loaded into memory:

```
SYSMAC LINK BIOS Ver._._
(C)Copyright OMRON Corporation 199_
not installed.
```

A message describing the error will be displayed after this message.

- c) The following message will appear as the SYSMAC LINK driver is loaded into memory:

```
SYSMAC LINK DRIVER Ver._._
(C)Copyright OMRON Corporation 199_
```

The word "DRIVER" will be displayed in Japanese katakana characters if the /E option was not included in the DEVICE command when installing the driver.

The following message will appear if an error occurs as the SYSMAC LINK driver is loaded into memory:

```
SYSMAC LINK DRIVER Ver._._
(C)Copyright OMRON Corporation 199_
not installed.
```

A message describing the error will be displayed after this message.

- d) If there are other drivers in the CONFIG.SYS file besides the SYSMAC LINK BIOS and driver, their messages will appear on the screen. These messages will vary depending on the contents of the CONFIG.SYS file.
- e) If programs have been set up to run automatically, they will be executed; otherwise the DOS prompt will appear.

## Exiting SLSS

There isn't a particular procedure for exiting SLSS. To exit, exit the program that is currently being executed and turn off the computer.

**Caution** On some computers with hard disks, the hard disk must be returned to its original state before turning off the power. This operation is performed with the RETRACT command. Refer to your DOS user's manual for details on using the RETRACT command.

## Checking SLSS Operation

The indicators on the back of the Support Board will indicate whether it is operating properly or not, as shown in the following table. Refer to 2-2 *Indicators* for more details on the indicators.

Name	Color	Condition during proper operation	Condition when error has occurred
RUN	Green	Lit	Not lit
ERC	Red	Not lit	Lit
INS	Orange	Lit	Not Lit
M/S	Orange	Lit or not lit*	Not lit*
SD	Orange	Lit	Not Lit
RD	Orange	Lit	Not Lit
LNK	Orange	Lit or not lit	Flashing

**Note** \*The M/S indicator indicates whether the Board is a polling unit or polled unit; it does not indicate errors. The M/S indicator will not be lit when an error has occurred that causes the INS indicator to be off.

## SECTION 5

### Support Utility

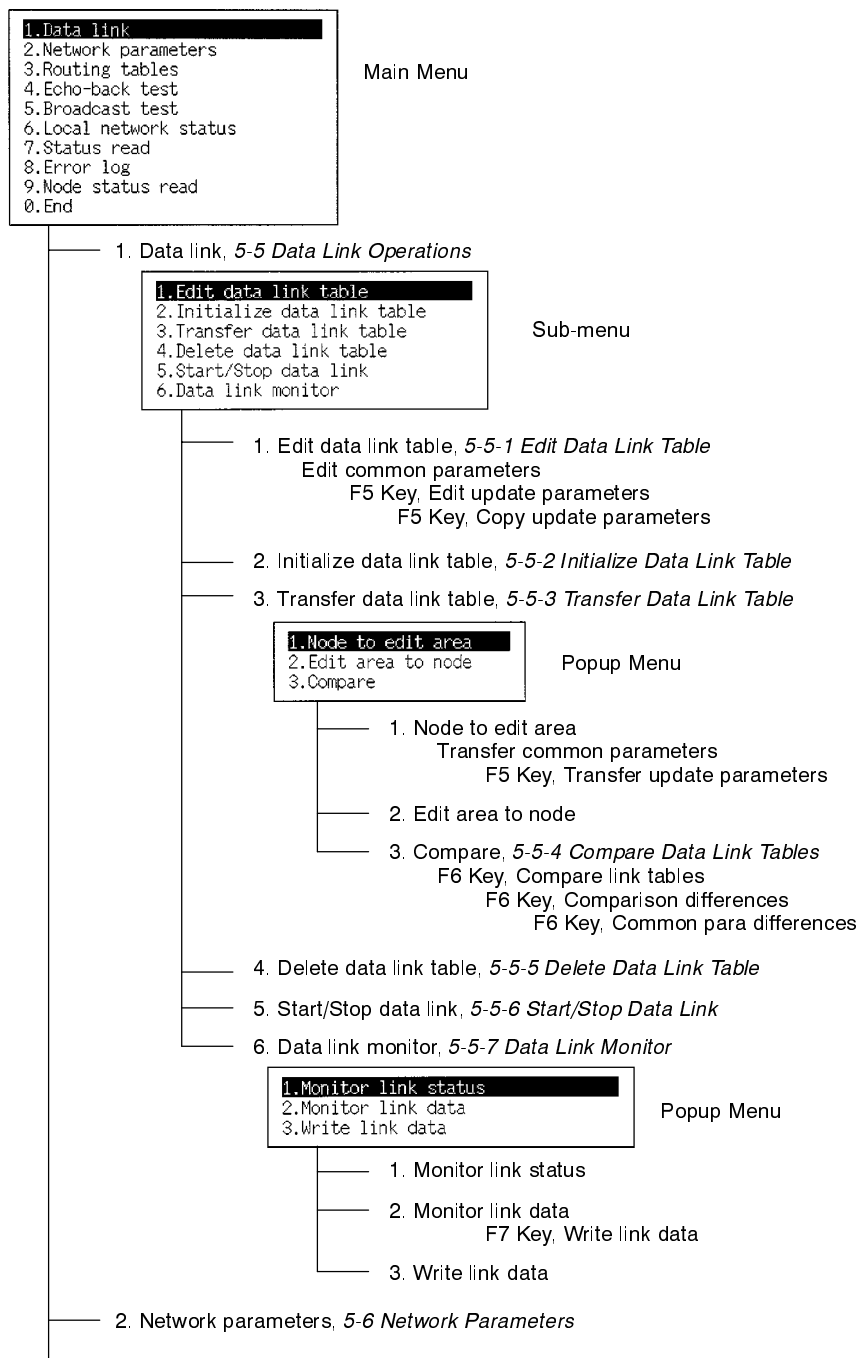
This section explains how to use the SYSMAC LINK Support Utility to monitor and test Support Board operation and change Support Board settings.

5-1	Main Menu .....	28
5-2	Keyboard .....	29
5-3	Preparation for Operation .....	30
5-4	Starting and Exiting the Support Utility .....	31
5-5	Data Link Operations .....	33
5-5-1	Edit Data Link Table .....	33
5-5-2	Initialize Data Link Table .....	39
5-5-3	Transfer Data Link Table .....	39
5-5-4	Compare Data Link Tables .....	44
5-5-5	Delete Data Link Table .....	48
5-5-6	Start/Stop Data Link .....	50
5-5-7	Data Link Monitor .....	51
5-6	Network Parameters .....	54
5-7	Routing Table Operations .....	55
5-7-1	Edit Routing Tables .....	56
5-7-2	Transfer Routing Tables .....	61
5-7-3	Delete Routing Tables .....	63
5-8	Echo-back Test .....	65
5-9	Broadcast Test .....	67
5-10	Local Network Status .....	68
5-11	Status Read .....	69
5-12	Error Log .....	70
5-13	Node Status Read .....	72

## 5-1 Main Menu

There are ten operations listed in the Main Menu, as shown below. Operations *1. Data link* and *3. Routing tables* have sub-menus which are described in detail in *5-5 Data Link Operations* and *5-7 Routing Table Operations*.

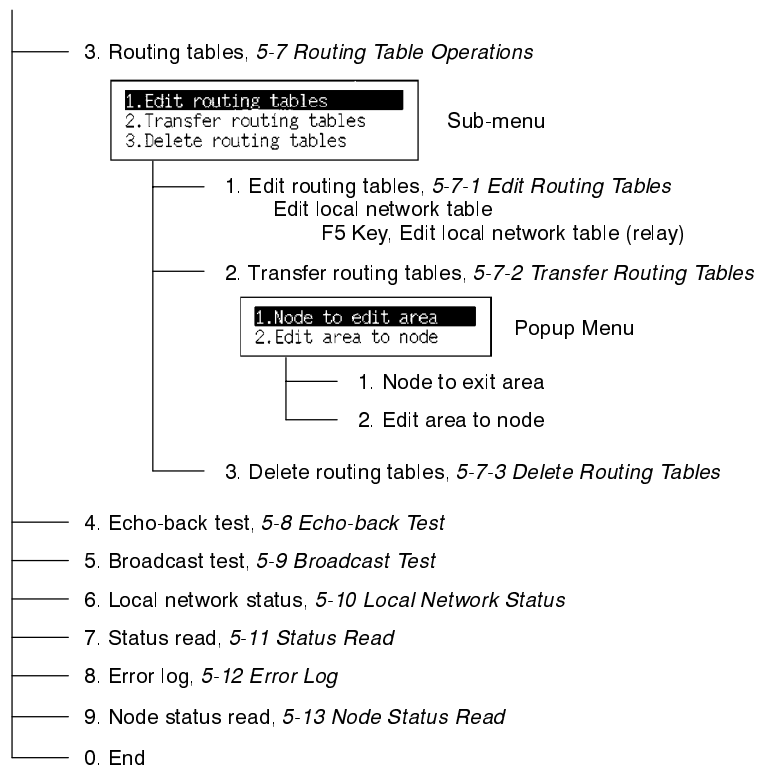
The text in italics indicates the reference section where a more detailed description can be found.



Continued on the next page



Continued from the previous page



## 5-2 Keyboard

Functions in SLSS can be selected from the displayed menu or from the functions shown at the bottom of the screen.

### Using the Menus

There are two ways to select an operation from the menu displayed on the screen:

- 1, 2, 3... 1. Press the letter key of the letter that precedes the operation in the menu.
2. Move the cursor until the desired operation is highlighted and then press the Enter Key.

### Using the Function Keys

The 10 function keys (F1 to F10) are used to select the functions displayed at the bottom of the screen. The functions displayed will vary depending on the operation being performed.

The following table shows the kind of functions assigned to the function keys.

Key	Function
F1	Press the F1 Key to return to the Main Menu.
F2	Press the F2 Key to display the sub-menu. (Main Menu operations 1. Data link and 3. Routing table have sub-menus.)
F4	Press the F4 Key to display the previous page.
F5	Press the F5 Key to display the next page.
F6	Press the F6 Key to execute the selected operation.
F9	Press the F9 Key to cancel the current operation. (Transfer, verify, clear, and test operations can be cancelled.)
F10	Press the F10 Key to end the current operation and return to the previous display.
Esc Key	Press the Esc Key to clear the current display.

### Initial Displays

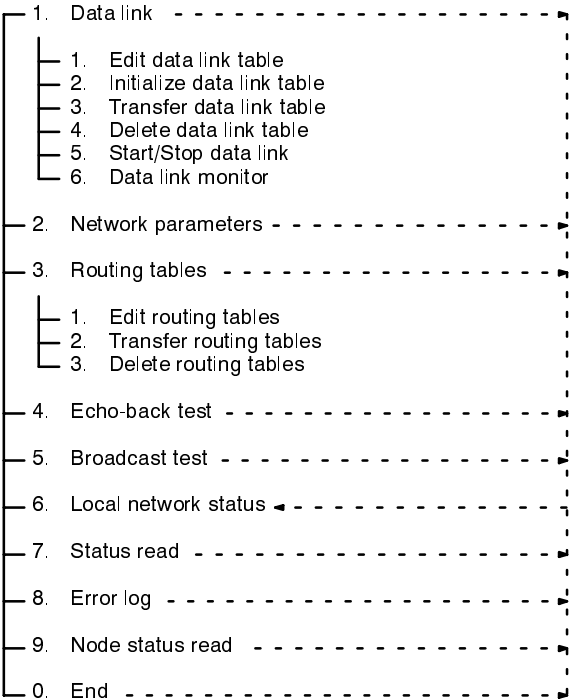
The display for the 6. *Local network status* operation will appear when the SYS-MAC LINK Support Utility is first started. This display will also appear when other operations are completed.

### Data Link Display

When the 1. *Data link* operation is selected, the Edit Common Parameters Display will appear, not the sub-menu for the data link operation. The Edit Common Parameters Display will also appear when a data link operation is completed.

### Routing Table Display

When the 3. *Routing tables* operation is selected, the Edit Network Table Display will appear, not the sub-menu for the routing table operation. The Edit Network Table Display will also appear when a routing table operation is completed.



## 5-3 Preparation for Operation

Verify that the files and drivers below have been installed before using the Support Utility.

### Files

The files shown in the table below are required to use the Support Utility. Be sure that these files have been copied to the system disk or hard disk that will be used.

File type	Filename
BIOS	SLKBSIB.SYS
Support Board device driver	SLKDVIB.SYS
SYSMAC LINK Support Utility	SLKUTYIB.EXE
Message file*	SYSLNK.MSG
Table Load Utility	SLKTBLLD.EXE

**Note** \*Be sure to copy the message file into the same directory as the Support Utility.

**Drivers**

Verify that the SYSMAC LINK BIOS and driver have been properly set into the CONFIG.SYS file. In particular be sure that required changes, such as Support Board settings, have been made.

Driver type	Command
Console control driver	DEVICE=ANSI.SYS
SYSMAC LINK BIOS	DEVICE=SLKBSIB.SYS
SYSMAC LINK driver	DEVICE=SLKDVIB.SYS

## 5-4 Starting and Exiting the Support Utility

This section describes how to start and exit the Support Utility.

**Reading Tables**

The SYSMAC LINK Support Board does not have backup memory, so the necessary settings must be read from the files at start-up using the Table Load Utility. File names and contents are shown below.

Table type	Filename	Option code
Routing tables	ROUTING.DAT	R
Network parameters	NETPARA.DAT	N
Data link tables	DATALINK.DAT	L

- Note**
1. At least one of the three option codes shown above must be specified.
  2. The files read using the Table Load Utility must be entered using a Support Utility operation such as the status read operation. Be sure to write the files using the Support Utility before using the Table Load Utility.

The option codes (R, N, and/or L) are the only required settings for the Table Load Utility; they can be entered in any order. The drive and directory from which the tables will be read can be specified using the /D option.

The Table Load Utility is executed by entering the following command:

```
SLKTBLLD [/R][N][L] [/Dpathname]
```

Items in the square brackets are optional. If they are needed, enter the information within the brackets, not the brackets themselves. In the following example the routing table and network parameters are read from the OMRON directory in drive A:

```
SLKTBLLD /RN /DA:OMRON
```

Refer to 6-3 *Table Load Utility* for details on using the Table Load Utility.

**Starting the Support Utility**

Start the Support Utility after reading the necessary tables using the Table Load Utility.

The Support Utility is started by entering the following command:

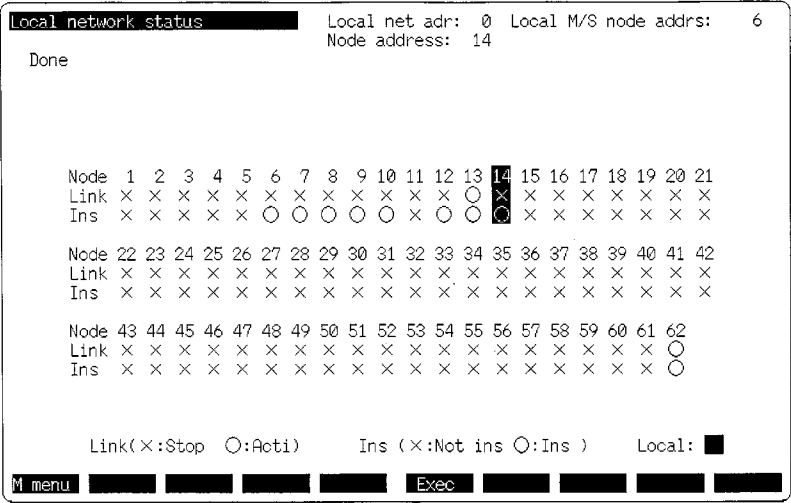
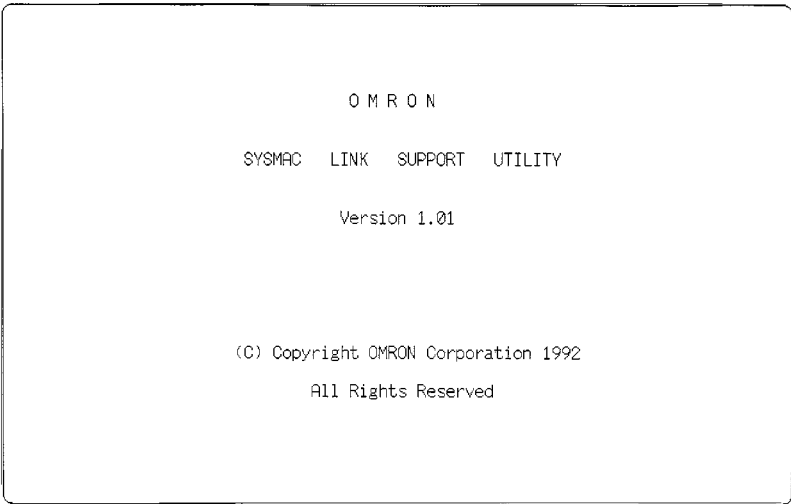
```
SLKUTYIB [/E] [/Dpathname]
```

Items in the square brackets are optional. If they are needed, enter the information within the brackets, not the brackets themselves.

Item	Option code	Function
Message type	/E (default setting)	Messages are displayed in English.
Drive and path*	/Dpathname	Indicates the drive and directory that will be accessed when the Support Utility reads from or writes to files.

- Note** \*The current drive and current directory will be accessed when the drive and path are not specified.

The following displays will appear when the Support Utility is started:



Exiting the Support Utility

Follow the procedure below to exit the Support Utility.

- 1, 2, 3...
1. Press the F1 Key to display the Main Menu.
  2. Select 0. End from the Main Menu. The following popup menu will appear:



3. Press the Left or Right Cursor Key to highlight "OK" and press the Enter Key.
4. The Support Utility will be exited and the computer will return to DOS.

Joining/Exiting the Network

The Support Board is automatically added to the network when the Support Utility is started and removed from the network when the Support Utility is exited.

Joining/Exiting a Data Link

If all of the conditions listed below are met, the Support Board is automatically added to a data link when it is added to the network.

- 1, 2, 3...
1. A data link is already active in the local network.

2. The Support Board node is properly registered in the data link's common link parameters.
3. The Support Board's common link parameters match the data link's common link parameters.

If the Support Board is part of a data link when it is removed from the network, it will be treated as node in which a communications error has occurred. After removal from the network, the Support Board can be rejoined to the network and data links by starting the Support Utility.

## 5-5 Data Link Operations

The six data link operations in the data link sub-menu are listed below. These operations are described in this section.

- 1, 2, 3...**
1. Edit data link table
  2. Initialize data link table
  3. Transfer data link table
  4. Delete data link table
  5. Start/Stop data link
  6. Data link monitor

### 5-5-1 Edit Data Link Table

This operation is used to create and edit data link tables. There are two parts to the data link tables, the common link parameters and update parameters.

#### Editing Common Link Parameters

Follow the procedure below to create and edit common link parameters.

- 1, 2, 3...**
1. Display the Main Menu and select *1. Data link*.

```
1.Data link
2.Network parameters
3.Routing tables
4.Echo-back test
5.Broadcast test
6.Local network status
7.Status read
8.Error log
9.Node status read
0.End
```

2. As shown below, the Edit Common Parameters Display will appear. If a data link table file (SYSDLT.SLK) exists in the directory, its contents will be read and displayed.

Data link

Edit common parameters

Cycle time: 0ms

Node	CIO	DM
1	1	1
2	1	1
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	-	-
9	-	-
10	-	-
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	-	-

Node	CIO	DM
17	-	-
18	-	-
19	-	-
20	-	-
21	-	-
22	-	-
23	-	-
24	-	-
25	-	-
26	-	-
27	-	-
28	-	-
29	-	-
30	-	-
31	-	-
32	-	-

Node	CIO	DM
33	-	-
34	-	-
35	-	-
36	-	-
37	-	-
38	-	-
39	-	-
40	-	-
41	-	-
42	-	-
43	-	-
44	-	-
45	-	-
46	-	-
47	-	-
48	-	-

Node	CIO	DM
49	-	-
50	-	-
51	-	-
52	-	-
53	-	-
54	-	-
55	-	-
56	-	-
57	-	-
58	-	-
59	-	-
60	-	-
61	-	-
62	-	-

M menu

S menu

EdtUPar

Reg

Clear

End

- Set the transmission cycle time to 0 ms or to between 5 and 255 ms. The default setting is 0 ms. When the transmission cycle time is set to 0 ms, the transmission cycle time will vary according the demands of the network.
3. Move the cursor using the Cursor Keys, input the number of CIO and DM words that will be transmitted by each node, and press the Enter Key. For nodes that will be in the data link, set the number of words between 0 and 254. When a node will be part of the data link for either the CIO or DM Area but not both, enter 0 for the number of words in the unused area.
- For nodes that will not be in the data link, set the number of words to “-” in the DM Area. When a hyphen is entered in the DM column, a hyphen will be displayed in the I/O (CIO) column as well.
- The initial settings are 1 word in the I/O and DM columns for nodes 1 and 2, and hyphens in all other nodes.
4. Press the F6 Key to write the new settings to the data link table file (SYSDLT.SLK). A message will be displayed indicating that the new settings are being written to the disk, and another message will be displayed when the new settings have been written.

The contents of the data link table that is being edited can be cleared by pressing the F7 Key. The contents of the data link table file on the disk will not be affected by pressing F7.

**Editing Update Parameters** Follow the procedure below to create and edit update parameters.

- 1, 2, 3...**
1. Display the Main Menu and select **1. Data link**. The Edit Common Parameters Display will appear. If a data link table file (SYSDLT.SLK) exists in the directory, its contents will be read and displayed.

Data link

Local net adr: 0 Local M/S node adrs: 6

Edit common parameters

Node address: 14

Cycle time: 100ms

Node	CIO	DM	Node	CIO	DM	Node	CIO	DM	Node	CIO	DM
1	100	100	17	-	-	33	-	-	49	-	-
2	50	50	18	-	-	34	-	-	50	-	-
3	-	-	19	-	-	35	-	-	51	-	-
4	10	10	20	-	-	36	-	-	52	-	-
5	100	100	21	-	-	37	-	-	53	-	-
6	5	0	22	-	-	38	-	-	54	-	-
7	-	-	23	-	-	39	-	-	55	-	-
8	100	100	24	-	-	40	-	-	56	-	-
9	5	0	25	-	-	41	-	-	57	-	-
10	-	-	26	-	-	42	-	-	58	-	-
11	0	50	27	-	-	43	-	-	59	-	-
12	2	10	28	-	-	44	-	-	60	-	-
13	-	-	29	-	-	45	-	-	61	-	-
14	-	-	30	-	-	46	-	-	62	-	-
15	-	-	31	-	-	47	-	-			
16	-	-	32	-	-	48	-	-			

M menu S menu EditUPar Reg Clear End

2. Use the Cursor Keys to move the cursor to the node whose update parameters you want to edit. The update parameters of nodes that are not in the data link cannot be edited.
3. Press the F5 Key to edit the update parameters. The update parameters of the indicated node will be displayed, as shown below.

Data link

Local net adr: 0 Local M/S node adrs: 6

Edit update parameters

Node address: 14

Node addr: 1 Link Wd [CIO 0] [DM 0] Status Wd [DM 200]

Node	CIO	DM	Node	CIO	DM	Node	CIO	DM	Node	CIO	DM
1	100	100									
2	50	50									

M menu S menu Delete Add Copy Reg Clear P node N node End

4. Input the node address (1 to 62) of the node whose update parameters you want to edit and press the Enter Key. Initially, the node address selected in

step 2. will be displayed. The update parameters of nodes that are not in the data link cannot be edited.

**Data link** [redacted] Local net adr: 0 Local M/S node adrs: 6  
Edit update parameters Node address: 14

Node addr[ 1 ] Link Wd [CIO [redacted] [DM 0] Status Wd [DM 200]

Node	CIO	DM	Node	CIO	DM	Node	CIO	DM	Node	CIO	DM	Node	CIO	DM
1	100	100												
2	50	50												

M menu S menu Delete Add Copy Reg Clear P node N node End

5. Input the beginning CIO word (0 to 2555) and press the Enter Key. This setting is not effective with the SYSMAC LINK Support Board.  
For C-series SYSMAC LINK Units, the input range is CIO 1000 to CIO 1063, corresponding to LR 00 to LR 63 in the C-series PCs.

Data link [REDACTED] Local net addr: 0 Local M/S node addr: 6  
 Edit update parameters Node address: 14

Node addr[ 1] Link Wd [CIO 1111] [DM [REDACTED]] Status Wd [DM 200]

Node	CIO	DM	Node	CIO	DM	Node	CIO	DM	Node	CIO	DM	Node	CIO	DM
1	100	100												
2	50	50												

M menu S menu Delete Add Copy Reg Clear P node N node End





Press the F3 Key to delete the node address at the cursor location. The remaining node addresses will be moved up when the node address at the cursor location is deleted.

Press the F4 Key to insert a node address at the cursor location. The lowest node address in the common link parameters but not in the update parameters will be inserted. The remaining node addresses in the table will be moved down to accommodate the new node address.

Press the F7 Key to clear the node address settings.

Press the F8 Key to display the update parameters of the previous node (the next lowest node address). If the currently displayed node is the lowest, nothing will happen when the F8 Key is pressed.

Press the F9 Key to display the update parameters of the next node (the next higher node address). If the currently displayed node is the highest, nothing will happen when the F9 Key is pressed.

### Copying Update Parameters

The update parameters currently displayed can be copied to other nodes. Follow the procedure below to copy update parameters.

- 1, 2, 3... 1. Press the F5 Key (copy). The Copy Update Parameters Display will appear and the local node's node address will be displayed in reverse video.

Data link
Local net adr: 0 Local M/S node addr: 6

Copy update parameters
Node address: 14

Nd to copy: 1  
Use Return Key to clear nodes not to get copy.

Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn
1	●	11	○	21	○	31	○	41	○	51	○	61	○
2	○	12	○	22	○	32	○	42	○	52	○	62	○
3	○	13	○	23	○	33	○	43	○	53	○		
4	○	14	○	24	○	34	○	44	○	54	○		
5	○	15	○	25	○	35	○	45	○	55	○		
6	○	16	○	26	○	36	○	46	○	56	○		
7	○	17	○	27	○	37	○	47	○	57	○		
8	○	18	○	28	○	38	○	48	○	58	○		
9	○	19	○	29	○	39	○	49	○	59	○		
10	○	20	○	30	○	40	○	50	○	60	○		

Exec
End

2. The update parameters will be copied to nodes in the list that have a circle next to them. Use the Cursor Keys to move the cursor to the nodes to which you do not want the update parameters to be copied and press the Enter Key to delete the circle.
3. Press the F6 Key to copy the update parameters to the other nodes. A message will be displayed indicating that the new settings are being copied, and another message will be displayed when the new settings have been copied. If one of the indicated nodes is not in the network, an error will occur but the copying will continue.

5-5-2 Initialize Data Link Table

This operation is used to delete the data link table information contained in the computer's editing area. Follow the procedure below to initialize the data link table.

- 1, 2, 3...
1. Display the data link operation sub-menu and select 2. *Initialize data link table*. The Initialize Data Link Table Display will appear.

Data link

Local net adr: 0 Local M/S node adrs: 6

Edit common parameters

Node address: 14

Cycle time: 100ms

1.Edit data link table

2.Initialize data link table

3.Transfer data link table

4.Delete data link table

5.Start/Stop data link

6.Data link monitor

Node	CIO	DM
33	-	-
34	-	-
35	-	-
36	-	-
37	-	-
38	-	-
39	-	-
40	-	-
41	-	-
42	-	-
43	-	-
44	-	-
45	-	-
46	-	-
47	-	-
48	-	-

Node	CIO	DM
49	-	-
50	-	-
51	-	-
52	-	-
53	-	-
54	-	-
55	-	-
56	-	-
57	-	-
58	-	-
59	-	-
60	-	-
61	-	-
62	-	-

6	5	0
7	-	-
8	100	100
9	5	0
10	-	-
11	0	50
12	2	10
13	-	-
14	-	-
15	-	-
16	-	-

22	-	-
23	-	-
24	-	-
25	-	-
26	-	-
27	-	-
28	-	-
29	-	-
30	-	-
31	-	-
32	-	-

M menu S menu EditUPar Reg Clear End

Data link

Local net adr: 0 Local M/S node adrs: 6

Initialize data link table

Node address: 14

Please press the Execute Key

M menu S menu Exec End

2. Press the F6 Key to initialize the data link table. A message will be displayed indicating that the data link table is being deleted, and another message will be displayed when the data link table has been deleted.

5-5-3 Transfer Data Link Table

This operation is used to transfer data link table information between the nodes in the network and the computer's editing area. Data link table information can be read from the nodes in the network, edited in the computer's editing area, and then written to the nodes again.

39

## Transfer from the Nodes to the Computer

### Common Link Parameters

Follow the procedure below to transfer the common link parameters from other nodes to the computer.

- 1, 2, 3... 1. Display the data link operation sub-menu and select 3. *Transfer data link table.*

```
1.Edit data link table
2.Initialize data link table
3.Transfer data link table
4.Delete data link table
5.Start/Stop data link
6.Data link monitor
```

2. The popup menu shown below will appear when 3. *Transfer data link table* is selected.

```
1.Node to edit area
2.Edit area to node
3.Compare
```

3. Select 1. *Node to edit area*. The Transfer Common Parameters Display will appear.

Data link	Local net adr: 0	Local M/S node adrs: 6
Transfer common parameters	Node address: 14	
Node to edit area		
Network address: 0		
Source node adr: 14		
Please press the Execute Key		
M menu	S menu	TrsUPar Exec End

4. Enter the network address (0 to 127) and source node address (1 to 62) of the node from which the data link table will be transferred.  
Initially the local node's network address and source node address will be displayed. Entering 0 for the network address indicates the local network.
5. Press the F6 Key to transfer the specified node's common link parameters to the computer's editing area. A message will be displayed indicating that the common link parameters are being transferred, and another message will be displayed when the data has been transferred.

### Update Parameters

Follow the procedure below to transfer the update parameters from other nodes to the computer. The transfer can be cancelled in progress by pressing the F9 Key.

- 1, 2, 3... 1. Display the data link operation sub-menu and select 3. *Transfer data link table.*

```

1.Edit data link table
2.Initialize data link table
3.Transfer data link table
4.Delete data link table
5.Start/Stop data link
6.Data link monitor

```

2. The popup menu shown below will appear when 3. *Transfer data link table* is selected.

```

1.Node to edit area
2.Edit area to node
3.Compare

```

3. Select 1. *Node to edit area*. The Transfer Common Parameters Display will appear.
4. Press F5 to transfer update parameters.
5. Enter the network address (0 to 127) of the nodes from which the update parameters will be transferred.

Entering 0 for the network address indicates the local network. The local node's node address will be displayed in reverse video.

Data link Transfer update parameters Local net adr: 0 Local M/S node adr: 6  
Node address: 14

Network adr: 0  
Use Return Key to clear nodes not to be source.

Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn
1	<input type="radio"/>	11	<input type="radio"/>	21	<input type="radio"/>	31	<input type="radio"/>	41	<input type="radio"/>	51	<input type="radio"/>	61	<input type="radio"/>
2	<input type="radio"/>	12	<input type="radio"/>	22	<input type="radio"/>	32	<input type="radio"/>	42	<input type="radio"/>	52	<input type="radio"/>	62	<input type="radio"/>
3	<input type="radio"/>	13	<input type="radio"/>	23	<input type="radio"/>	33	<input type="radio"/>	43	<input type="radio"/>	53	<input type="radio"/>		
4	<input type="radio"/>	14	<input checked="" type="radio"/>	24	<input type="radio"/>	34	<input type="radio"/>	44	<input type="radio"/>	54	<input type="radio"/>		
5	<input type="radio"/>	15	<input type="radio"/>	25	<input type="radio"/>	35	<input type="radio"/>	45	<input type="radio"/>	55	<input type="radio"/>		
6	<input type="radio"/>	16	<input type="radio"/>	26	<input type="radio"/>	36	<input type="radio"/>	46	<input type="radio"/>	56	<input type="radio"/>		
7	<input type="radio"/>	17	<input type="radio"/>	27	<input type="radio"/>	37	<input type="radio"/>	47	<input type="radio"/>	57	<input type="radio"/>		
8	<input type="radio"/>	18	<input type="radio"/>	28	<input type="radio"/>	38	<input type="radio"/>	48	<input type="radio"/>	58	<input type="radio"/>		
9	<input type="radio"/>	19	<input type="radio"/>	29	<input type="radio"/>	39	<input type="radio"/>	49	<input type="radio"/>	59	<input type="radio"/>		
10	<input type="radio"/>	20	<input type="radio"/>	30	<input type="radio"/>	40	<input type="radio"/>	50	<input type="radio"/>	60	<input type="radio"/>		

M menu S menu Exco End

6. The update parameters will be transferred from nodes that have a circle next to them. Use the Cursor Keys to move the cursor to the nodes from which

you do not want the update parameters to be transferred and press the Enter Key to delete the circle.

Data link

Transfer update parameters

Local net adr: 0 Local M/S node adrs: 6  
Node address: 14

Network adr: 0  
 Use Return Key to clear nodes not to be source.

Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn
1	<input type="radio"/>	11	<input type="radio"/>	21	<input type="radio"/>	31	<input type="radio"/>	41	<input type="radio"/>	51	<input type="radio"/>	61	<input type="radio"/>
2		12		22		32		42		52		62	
3	<input type="radio"/>	13	<input type="radio"/>	23	<input type="radio"/>	33	<input type="radio"/>	43	<input type="radio"/>	53	<input type="radio"/>		
4		14		24		34		44		54			
5	<input type="radio"/>	15	<input type="radio"/>	25	<input type="radio"/>	35	<input type="radio"/>	45	<input type="radio"/>	55	<input type="radio"/>		
6		16		26		36		46		56			
7	<input type="radio"/>	17	<input type="radio"/>	27	<input type="radio"/>	37	<input type="radio"/>	47	<input type="radio"/>	57	<input type="radio"/>		
8		18		28		38		48		58			
9	<input type="radio"/>	19	<input type="radio"/>	29	<input type="radio"/>	39	<input type="radio"/>	49	<input type="radio"/>	59	<input type="radio"/>		
10		20		30		40		50		60			

M menu

S menu

Exec

End

- Press the F6 Key to transfer the update parameters. A message will be displayed indicating that the data is being transferred and the results of the transfer for each node will be displayed as each transfer is completed, as shown below. If one of the indicated nodes is not in the network, an error will occur but the transfer will continue from the next node.

Data link

Transfer update parameters

Local net adr: 0 Local M/S node adrs: 3  
Node address: 14

Done  
 Network adr: 0

Node	Result	Node	Result	Node	Result
1	Normal end	33	Error ( 8201000e )		
3	Normal end	35	Error ( 8201000e )		
5	Normal end	37	Error ( 8201000e )		
7	Normal end	39	Error ( 8201000e )		
9	Normal end	41	Error ( 8201000e )		
11	Normal end	43	Error ( 8201000e )		
13	Normal end	45	Error ( 8201000e )		
15	Normal end	47	Error ( 8201000e )		
17	Error ( 8201000e )	49	Error ( 8201000e )		
19	Error ( 8201000e )	51	Error ( 8201000e )		
21	Error ( 8201000e )	53	Error ( 8201000e )		
23	Error ( 8201000e )	55	Error ( 8201000e )		
25	Error ( 8201000e )	57	Error ( 8201000e )		
27	Error ( 8201000e )	59	Error ( 8201000e )		
29	Error ( 8201000e )	61	Error ( 8201000e )		
31	Error ( 8201000e )				

P page

N page

Stop

End

## Transfer from the Computer to the Nodes

### Data Link Tables

Follow the procedure below to transfer the data link table from the computer to other nodes.

- 1, 2, 3...** 1. Display the data link operation sub-menu and select 3. *Transfer data link table.*

```

1.Edit data link table
2.Initialize data link table
3.Transfer data link table
4.Delete data link table
5.Start/Stop data link
6.Data link monitor
  
```

2. The popup menu shown below will appear when 3. *Transfer data link table* is selected.

```

1.Node to edit area
2.Edit area to node
3.Compare
  
```

3. Select 2. *Edit area to node.* The Transfer Link Table Display will appear.

Data link
Local net adr: 0 Local M/S node addr: 1

Transfer link table
Node address: 14

Network adr: 0  
Use Return Key to clear nodes not to get a link table.

Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn
1	○												
3	○												
5	○												
7	○												
9	○												
11	○												
13	○												
15	○												

M menu
S menu
Exec
End

4. Enter the network address (0 to 127) of the nodes to which the data will be transferred. Initially the local node's network address and node address will be displayed.

Entering 0 for the network address indicates the local network. The local node's node address will be displayed in reverse video. The node

addresses set in the common link parameters in the editing area will be displayed.

Data link

Transfer link table

Local net adr: 0 Local M/S node adrs: 1  
Node address: 14

Network adr: 0  
Use Return Key to clear nodes not to get a link table.

Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn
1	○												
3	○												
5	○												
7	○												
9	○												
11	○												
13	○												
15	○												

M menu S menu Exec End

5. Data will be transferred to nodes that have a circle next to them. Use the Cursor Keys to move the cursor to the nodes to which you do not want the data link table in the editing area to be transferred and press the Enter Key to delete the circle.
6. Press the F6 Key to transfer the data link table. A message will be displayed indicating that the data is being transferred and the results of the transfer for each node will be displayed as each transfer is completed, as shown below. If one of the indicated nodes is not in the network, an error will occur but the transfer will continue from the next node.  
If the local node is among the specified nodes, the data link table will be saved to the disk automatically. The data link table will be saved in a file called DATALINK.DAT. This file can be used with the Table Load Utility. Refer to 6-3 Table Load Utility for details.

Data link

Transfer link table

Local net adr: 0 Local M/S node adrs: 9  
Node address: 14

Done  
Network adr: 0

Node	Result	Node	Result	Node	Result
1	Normal end				
5	Normal end				
7	Normal end				
9	Normal end				
11	Normal end				
13	Normal end				
15	Normal end				

P page N page Stop End

5-5-4 Compare Data Link Tables

This operation is used to compare the data link tables in the computer’s editing area to those in the nodes in the network. The results show whether the tables match or not.

**Comparing Data Link Tables** Follow the procedure below to compare the data link tables. The operation can be cancelled in progress by pressing the F9 Key.



- 1, 2, 3... 1. Display the data link operation sub-menu and select 3. *Transfer data link table.*

```

1.Edit data link table
2.Initialize data link table
3.Transfer data link table
4.Delete data link table
5.Start/Stop data link
6.Data link monitor

```

2. The popup menu shown below will appear when 3. *Transfer data link table* is selected.

```

1.Node to edit area
2.Edit area to node
3.Compare

```

3. Select 3. *Compare*. The Compare Link Tables Display will appear.

Data link XXXXXXXXXX Local net adr: 1 Local M/S node adrs: 6  
 Compare link tables Node address: 6

Network adr: 1  
 Use Return Key to clear nodes not to be compared.

Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn
1	○												
2	○												
3	○												
5	○												
6	○												
8	○												
9	○												
11	○												
12	○												

M menu S menu XXXX XXXX XXXX Exec XXXX XXXX XXXX End

4. Enter the network address (0 to 127) of the nodes to which the data will be transferred. Initially the local node's network address and node address will be displayed.

Entering 0 for the network address indicates the local network. The local node's node address will be displayed in reverse video. The node addresses set in the common link parameters in the editing area will be displayed.

5. The tables of nodes that have a circle next to them will be compared. Use the Cursor Keys to move the cursor to the nodes whose data link tables you do

not want to be compared to the data link table in the editing area and press the Enter Key to delete the circle.

Data link

Compare link tables

Local net adr: 1    Local M/S node adrs: 6  
Node address: 6

Network adr: 1  
Use Return Key to clear nodes not to be compared.

Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn
1	<input type="radio"/>												
2	<input type="radio"/>												
3	<input type="radio"/>												
5	<input type="radio"/>												
6	<input checked="" type="radio"/>												
8	<input type="radio"/>												
9	<input type="radio"/>												
11	<input type="radio"/>												
12	<input type="radio"/>												

M menu   S menu   Exec   End

6. Press the F6 key to begin the comparison. A message will be displayed indicating that the data is being compared and the results of the comparison for each node will be displayed as it is completed, as shown below.

Data link

Compare link tables

Local net adr: 1    Local M/S node adrs: 6  
Node address: 6

Done  
Network adr: 1 Designate node to display comparison differences.: 8

Node	Result	Node	Result	Node	Result
1	Communications error				
3	Data differs				
6	Data differs				
9	Normal end				
12	Normal end				

P page   N page   Exec   Stop   End

Displaying Results

Follow the procedure below to display the differences between the data link tables in the computer's editing area and a specified node.

- 1, 2, 3... 1. After comparing data link tables, the nodes that do not match will be listed. Enter the number of any listed node to display its data table differences.

Data link

Local net adr: 1 Local M/S node adrs: 6

Compare link tables Node address: 6

Done

Network adr: 1 Designate node to display comparison differences.: 3

Node	Result	Node	Result	Node	Result
1	Communications error				
3	Data differs				
6	Data differs				
9	Normal end				
12	Normal end				

P page

N page

Exec

Stop

End

2. Press the F6 Key to display the comparison results for the specified node.

Data link

Local net adr: 1 Local M/S node adrs: 6

Compare link tables Node address: 6

Comparison differences

Network addr: 1

Comp nd addr: 3

Upper:edit area

Lower:cmp node

No. of nodes	
Cycle time(ms)	5 30
Begin status word	AR 27 DM 200
Begin CIO word	
Begin DM word	10 0

Exec

End

3. Press the F6 Key again to display the differences between the common link parameters. The table will be empty if there were no differences.

Data link XXXXXXXXXX Local net adr: 1 Local M/S node addr: 6  
 Compare link tables Node address: 6  
 Common para differences  
 Network adr: 1 Compare nd ad: 3 Upper:Edit ar Lower:Cmp node

Node	CIO	DM
1	50	50
	0	0
3	10	10
	50	1
6	5	0
	0	0

P page N page Exec End

4. Press the F6 Key again to display the differences between the update parameters. The table will be empty if there were no differences.

Data link XXXXXXXXXX Local net adr: 1 Local M/S node addr: 6  
 Compare link tables Node address: 6  
 Update para differences  
 Network adr: 1 Compare nd ad: 3 Upper:Edit ar Lower:Cmp node

Node	CIO	DM
1	50	50
1	0	0
3	10	10
3	50	1
6	5	0
6	0	0

P page N page Exec End

### 5-5-5 Delete Data Link Table

This operation is used to delete the data link tables from specified nodes in the network. The procedure to delete the data link tables is described below. The operation can be cancelled in progress by pressing the F9 Key.

- 1, 2, 3... 1. Display the data link operation sub-menu and select 4. *Delete data link table.*

```

1.Edit data link table
2.Initialize data link table
3.Transfer data link table
4.Delete data link table
5.Start/Stop data link
6.Data link monitor
  
```

2. Enter the network address (0 to 127) of the nodes from which the data link tables will be deleted. Initially the local node's network address and node address will be displayed.

Entering 0 for the network address indicates the local network. The local node's node address will be displayed in reverse video if the local network is selected.

Data link

Delete data link table

Local net adr: 1

Local M/S node addr: 6

Node address: 6

Network adr: 1

Use Return Key to clear nodes not to delete.

Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn
1	<input type="radio"/>	11	<input type="radio"/>	21	<input type="radio"/>	31	<input type="radio"/>	41	<input type="radio"/>	51	<input type="radio"/>	61	<input type="radio"/>
2	<input type="radio"/>	12	<input type="radio"/>	22	<input type="radio"/>	32	<input type="radio"/>	42	<input type="radio"/>	52	<input type="radio"/>	62	<input type="radio"/>
3	<input type="radio"/>	13	<input type="radio"/>	23	<input type="radio"/>	33	<input type="radio"/>	43	<input type="radio"/>	53	<input type="radio"/>		
4	<input type="radio"/>	14	<input type="radio"/>	24	<input type="radio"/>	34	<input type="radio"/>	44	<input type="radio"/>	54	<input type="radio"/>		
5	<input type="radio"/>	15	<input type="radio"/>	25	<input type="radio"/>	35	<input type="radio"/>	45	<input type="radio"/>	55	<input type="radio"/>		
6	<input type="radio"/>	16	<input type="radio"/>	26	<input type="radio"/>	36	<input type="radio"/>	46	<input type="radio"/>	56	<input type="radio"/>		
7	<input type="radio"/>	17	<input type="radio"/>	27	<input type="radio"/>	37	<input type="radio"/>	47	<input type="radio"/>	57	<input type="radio"/>		
8	<input type="radio"/>	18	<input type="radio"/>	28	<input type="radio"/>	38	<input type="radio"/>	48	<input type="radio"/>	58	<input type="radio"/>		
9	<input type="radio"/>	19	<input type="radio"/>	29	<input type="radio"/>	39	<input type="radio"/>	49	<input type="radio"/>	59	<input type="radio"/>		
10	<input type="radio"/>	20	<input type="radio"/>	30	<input type="radio"/>	40	<input type="radio"/>	50	<input type="radio"/>	60	<input type="radio"/>		

M menu

S menu

Exec

End

3. The tables of nodes that have a circle next to them will be deleted. Use the Cursor Keys to move the cursor to the nodes whose data link tables you do not want to be deleted and press the Enter Key to delete the circle.

Data link

Delete data link table

Local net adr: 1

Local M/S node addr: 6

Node address: 6

Network adr: 1

Use Return Key to clear nodes not to delete.

Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn
1	<input type="radio"/>	11	<input type="radio"/>	21	<input type="radio"/>	31	<input type="radio"/>	41	<input type="radio"/>	51	<input type="radio"/>	61	<input type="radio"/>
2	<input type="radio"/>	12	<input type="radio"/>	22	<input type="radio"/>	32	<input type="radio"/>	42	<input type="radio"/>	52	<input type="radio"/>	62	<input type="radio"/>
3	<input type="radio"/>	13	<input type="radio"/>	23	<input type="radio"/>	33	<input type="radio"/>	43	<input type="radio"/>	53	<input type="radio"/>		
4	<input type="radio"/>	14	<input type="radio"/>	24	<input type="radio"/>	34	<input type="radio"/>	44	<input type="radio"/>	54	<input type="radio"/>		
5	<input type="radio"/>	15	<input type="radio"/>	25	<input type="radio"/>	35	<input type="radio"/>	45	<input type="radio"/>	55	<input type="radio"/>		
6	<input type="radio"/>	16	<input type="radio"/>	26	<input type="radio"/>	36	<input type="radio"/>	46	<input type="radio"/>	56	<input type="radio"/>		
7	<input type="radio"/>	17	<input type="radio"/>	27	<input type="radio"/>	37	<input type="radio"/>	47	<input type="radio"/>	57	<input type="radio"/>		
8	<input type="radio"/>	18	<input type="radio"/>	28	<input type="radio"/>	38	<input type="radio"/>	48	<input type="radio"/>	58	<input type="radio"/>		
9	<input type="radio"/>	19	<input type="radio"/>	29	<input type="radio"/>	39	<input type="radio"/>	49	<input type="radio"/>	59	<input type="radio"/>		
10	<input type="radio"/>	20	<input type="radio"/>	30	<input type="radio"/>	40	<input type="radio"/>	50	<input type="radio"/>	60	<input type="radio"/>		

M menu

S menu

Exec

End

4. Press the F6 Key to begin deleting data link tables. A message will be displayed as each data link table is being deleted. Another message and the results of the operation will be displayed when it is completed.

If the local node is among the specified nodes, the DATALINK.DAT file containing the computer's data link table will be deleted from the disk automatically. This is the file used with the Table Load Utility. Change the Table Load

Utility option settings when deleting the DATALINK.DAT file. Refer to 6-3 Table Load Utility for details.

Data link

Delete data link table

Done

Network adr: 1

Local net adr: 1

Node address: 6

Local M/S node adrs: 6

Node	Result	Node	Result	Node	Result
1	Error ( 82010106 )	33	Error ( 82010106 )		
3	Normal end	35	Error ( 82010106 )		
5	Error ( 82010106 )	37	Error ( 82010106 )		
7	Error ( 82010106 )	39	Error ( 82010106 )		
9	Normal end	41	Error ( 82010106 )		
11	Error ( 82010106 )	43	Error ( 82010106 )		
13	Error ( 82010106 )	45	Error ( 82010106 )		
15	Error ( 82010106 )	47	Error ( 82010106 )		
17	Error ( 82010106 )	49	Error ( 82010106 )		
19	Error ( 82010106 )	51	Error ( 82010106 )		
21	Error ( 82010106 )	53	Error ( 82010106 )		
23	Error ( 82010106 )	55	Error ( 82010106 )		
25	Error ( 82010106 )	57	Error ( 82010106 )		
27	Error ( 82010106 )	59	Error ( 82010106 )		
29	Error ( 82010106 )	61	Error ( 82010106 )		
31	Error ( 82010106 )				

P page

N page

Stop

End

5-5-6 Start/Stop Data Link

This operation is used to start or stop the data link in the specified node. The procedure to start or stop the data link is described below.

- 1, 2, 3...
1. Display the data link operation sub-menu and select 5. *Start/Stop data link*.

1.Edit data link table

2.Initialize data link table

3.Transfer data link table

4.Delete data link table

5.Start/Stop data link

6.Data link monitor

2. The Start/Stop Data Link Display will appear when 5. *Start/Stop data link* is selected. Initially the local node's network address and node address will be displayed and the cursor will be located at start if the data link is active or stop if the data link is stopped.

Enter the network address (0 to 127) and node address (1 to 62) of the node in which the data link will be started or stopped. Entering 0 for the network address indicates the local network.

Data link		Local net adr:	1	Local M/S node addr:	6
Start/Stop data link		Node address:	6		
		Network address:	1		
		Node address:	6		
		Strt/Stop:	Strt	Stop	
M menu	S menu			Exec	End

3. Use the left and right Cursor Keys to move the cursor to start or stop.
4. Press the F6 Key to start or stop the data link. A message will be displayed as each the operation is being performed and another message will be displayed when it is completed.

### 5-5-7 Data Link Monitor

This operation can be used to monitor the operational status of nodes in the data link, monitor the bit status of words in the data link area, or change the bit status of words in the data link area.

#### Monitoring Node Status

Follow the procedure below to monitor the operational status of nodes in the data link.

- 1, 2, 3... 1. Display the data link operation sub-menu and select 6. *Data link monitor*.

```

1.Edit data link table
2.Initialize data link table
3.Transfer data link table
4.Delete data link table
5.Start/Stop data link
6.Data link monitor

```

2. The popup menu shown below will appear when 6. *Data link monitor* is selected.

```

1.Monitor link status
2.Monitor link data
3.Write link data

```

3. Select **1. Monitor link status**. The Monitor Link Status Display will appear. The operational status of the local node will always be run.

[illegible]

## Monitoring the Data Link Area

Follow the procedure below to monitor the content of words in the data link area.  
The operation can be cancelled in progress by pressing the F9 Key.

**Note** Data monitoring can be restarted after cancellation with the F9 Key by pressing the F6 Key.

- 1, 2, 3...** 1. Display the data link operation sub-menu and select 6. *Data link monitor*.

- 1.Edit data link table
- 2.Initialize data link table
- 3.Transfer data link table
- 4.Delete data link table
- 5.Start/Stop data link
- 6.Data link monitor

2. The popup menu shown below will appear when *6. Data link monitor* is selected.

1. Monitor link status
2. Monitor link data
3. Write link data



3. Select **2. Monitor link data**. The Monitor Link Data Display will appear. The node addresses of all nodes in the data link will be displayed.

**Data link**  
 Monitor link data

Local net adr: 0    Local M/S node addr: 3  
 Node address: 6

Use Return Key to clear nodes not to monitor.

Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn
1	●												
3	○												
7	○												
9	○												
12	○												

M menu
S menu
Exec
End

4. The data link data of nodes that have a circle next to them will be monitored. Use the Cursor Keys to move the cursor to the nodes whose data link area data you do not want to be monitored and press the Enter Key to delete the circle.
5. Press the F6 Key to begin monitoring data link data. The contents of the data link area displayed will be updated continuously.

If the local node is not active in the data link, a message will be displayed indicating that it is not in the data link. In this case, press any key to bring up the Edit Common Parameters Display.

**Data link**  
 Monitor link data  
 Executing

Local net adr: 0    Local M/S node addr: 3  
 Node address: 6

		Area	Wds	0	1	2	3	4	5	6	7	8	9
Node addr:	1	CIO	000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
Data link:	Acti		010	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
Comm stats:	Norm		020	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
PC status:	Norm		030	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
Range			040	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
CIO words:	62		050	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
DM words:	62		060	0000	0000								
		DM	000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
			010	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
			020	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
			030	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
			040	0000	0000	0000	0000	0000	0000	0000	0000	0000	ffff
			050	ffff	ffff	ffff	ffff	ffff	ffff	ffff	ffff	ffff	ffff
			060	ffff	ffff								

M menu
S menu
P page
N page
Write
Stop
End

It is possible to switch from the Monitor Link Data Display to the Write Link Data Display by pressing the F7 Key. Data can be written to the local node only. Refer to the next procedure for details on writing data to the data link area.

### Writing to the Data Link Area

Follow the procedure below to write to words in the data link area allocated to the SYSMAC LINK Support Board. Data cannot be written to words other than those allocated to the local node (the Support Board).

- 1, 2, 3... 1. Display the data link operation sub-menu and select 6. *Data link monitor*.

```

1.Edit data link table
2.Initialize data link table
3.Transfer data link table
4.Delete data link table
5.Start/Stop data link
6.Data link monitor

```

2. The popup menu shown below will appear when 6. *Data link monitor* is selected.

```

1.Monitor link status
2.Monitor link data
3.Write link data

```

3. Select 3. *Write link data*. The Write Link Data Display will appear. The data link area data will be displayed in hexadecimal, as shown below.

If the local node is not active in the data link, a message will be displayed indicating that it is not in the data link. In this case, press any key to bring up the Edit Common Parameters Display.

Data link		Local net adr: 0 Local M/S node addr: 3											
Write link data		Node address: 6											
		Area	Wds	0	1	2	3	4	5	6	7	8	9
Data link: Acti Comm stats: Norm PC status: Norm Range CIO words: 62 DM words: 62	CIO	000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
		010	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
		020	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
		030	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
		040	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
		050	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
		060	0000	0000									
DM	000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	
	010	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	
	020	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	
	030	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	
	040	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	
	050	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	
	060	0000	0000										

M menu S menu Cancel P page N page Exec End

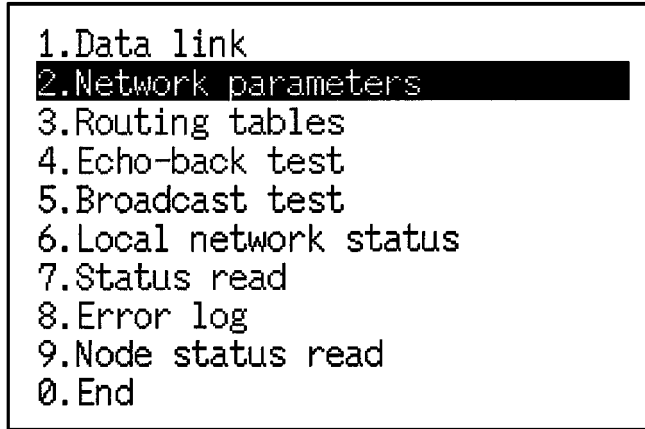
4. Use the Cursor Keys to move the cursor to the word whose data link area data you want to be change. Input the new data and press the Enter Key. Press the F3 Key to clear the input area and reset the display. When the F3 Key is pressed, the data is read from the data link area again and the display is updated.
5. Press the F6 Key to write the new data to the data link area. A message will be displayed indicating that the data is being written to the data link area and another message will appear when the operation has been completed.

## 5-6 Network Parameters

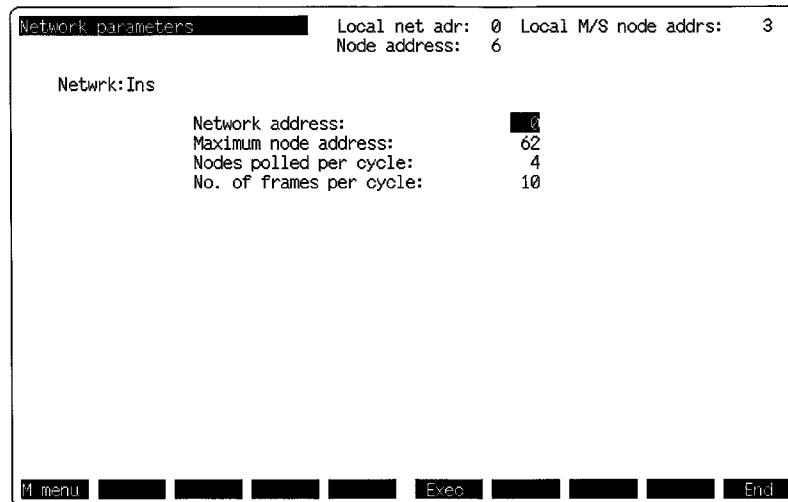
This operation is used to set the network parameters for the specified network. Three network parameters (maximum node address, nodes polled per cycle, and number of frames per cycle) can be set.

Follow the procedure below to set network parameters.

- 1, 2, 3... 1. Display the Main Menu and select 2. *Network parameters*.



2. The Network Parameters Display (below) will appear. Initially the local network address and its current network parameters will be displayed.
- Input the network address (0 to 127) and press the Enter Key. A network address of 0 indicates the local network.
  - Input the maximum node address (2 to 62) and press the Enter Key.
  - Input the nodes polled per cycle (1 to 61) and press the Enter Key.
  - Input the number of frames per cycle (5 to 255) and press the Enter Key.



3. Press the F6 Key to set the new network parameters. A message will be displayed indicating that the new parameters are being set and another message will be displayed indicating that the operation has been completed.
- If the local network is specified, the new network parameters will be saved to the disk automatically. The network parameters will be saved in a file called NETPARA.DAT. This file is the one used with the Table Load Utility. Refer to 6-3 *Table Load Utility* for details.

## 5-7 Routing Table Operations

The three routing table operations in the routing table sub-menu are listed below. These operations are described in this section.

- 1, 2, 3... 1. Edit routing tables

2. Transfer routing tables
3. Delete routing tables

## 5-7-1 Edit Routing Tables

This operation is used to create, edit, and save routing tables to disk. Routing tables in both the local network and relay networks can be edited.

### Editing Local Network Routing Tables

Follow the procedure below to create or edit routing tables in the local network.

- 1, 2, 3... 1. Display the Main Menu and select 3. *Routing tables*.

```

1.Data link
2.Network parameters
3.Routing tables
4.Echo-back test
5.Broadcast test
6.Local network status
7.Status read
8.Error log
9.Node status read
0.End
    
```

The Edit Local Network Table Display (below) will appear when 3. *Routing tables* is selected.

**Routing tables**

Edit local network table

Local net adr: 0 Local M/S node adrs: 3

Node address: 6

Input file name to edit

No. of netwk: 0 File:

NO	Local netwk address	Special I/O Unit No.
1		
2		
3		
4		
5		
6		
7		
8		

NO	Local netwk address	Special I/O Unit No.
9		
10		
11		
12		
13		
14		
15		
16		

M menu
S menu
Delete
Add
Relay
Reg
Clear
File

End

2. Enter the filename of the file that contains the local network's routing table. The filename can be input directly or selected from a list of files.
  - a) To enter the filename directly, input the filename (8 characters or fewer) and press the Enter Key.

- b) If a file already exists on disk, it can be selected from a list of files. Press the F8 Key to display a list of the files in the directory.

Routing tables		Local net adr:	0	Local M/S node addr:	3
Edit local network table		Node address:	6		
File directory					
Designate file name with Return Key					
FILE0	FILE9				
FILE1	FILE10				
FILE2	FILE11				
FILE3	FILE12				
FILE4	FILE13				
FILE5					
FILE6					
FILE7					
FILE8					

Use the Cursor Keys to move the cursor to the desired filename and press the Enter Key. The Edit Local Network Table Display will appear and the desired filename will be in the input area.

```

Routing tables
Edit local network table

Local net adr: 0 Local M/S node addr: 3
Node address: 6

Input file name to edit
No. of netwk: 0 File: FILE0

NO Local netwk Special I/O
address Unit No.

1
2
3
4
5
6
7
8

NO Local netwk Special I/O
address Unit No.

9
10
11
12
13
14
15
16

M menu S menu Delete Add Relay Reg Clear File End

```

Press the Enter Key again to accept the filename. The local network's routing table data will be displayed.

Routing tables

Local net adr: 0 Local M/S node addr: 3

Edit local network table

Node address: 6

Input file name to edit

No. of netwk: 3 File: FILE0

NO	Local netwk address	Special I/O Unit No.
1	1	1
2	2	2
3	3	3
4		
5		
6		
7		
8		

NO	Local netwk address	Special I/O Unit No.
9		
10		
11		
12		
13		
14		
15		
16		

M menu

S menu

Delete

Add

Relay

Reg

Clear

File

End

- Set the local network address (1 to 127) and Special I/O Unit unit number (0 to 15). If either the local network address or unit number is not set in an entry, the entry will not be effective. A setting where the unit number is 0 and the local network address is from 1 to 127 is necessary in the Support Board's routing table.

The number of networks value will change when the total number of networks in the table is changed.

If you want to change the name of the file being edited, move the cursor to the filename input area and input the new name.

Press the F3 Key to delete the entry at the cursor location. The number of networks value will be reduced by the number of entries deleted.

Press the F4 Key to insert an entry at the cursor location. The lowest node address network address and unit number not yet used in the table will be inserted and the number of networks value will be increased by 1.

Press the F7 Key to clear all entries from the table. The number of networks value will be reset to 0.

- Press F6 to enter the filename for the file that will contain the routing tables. The filename can be input directly or selected from a list of files.

Routing tables

Local net adr: 0 Local M/S node addr: 3

Edit local network table

Node address: 6

Input file name to edit

No. of netwk: 5 File: FILE0

NO	Local netwk address	Special I/O Unit No.
1	5	4
2	4	0
3	1	1
4	2	2
5	3	3
6		
7		
8		

NO	Local netwk address	Special I/O Unit No.
9		
10		
11		
12		
13		
14		
15		
16		

M menu

S menu

Delete

Add

Relay

Reg

Clear

File

End

- a) To enter the filename directly, input the filename (8 characters or fewer) and press the Enter Key. If the desired filename is already in the input area, simply press the Enter Key.
- b) If the file already exists, it can be selected from a list of files. Press the F8 Key to display a list of the files in the directory.

Routing tables
Local net adr: 0 Local M/S node addr: 3

Edit local network table
Node address: 6

File directory

Designate file name with Return Key

FILE0	FILE9					
FILE1	FILE10					
FILE2	FILE11					
FILE3	FILE12					
FILE4	FILE13					
FILE5						
FILE6						
FILE7						
FILE8						

End

Use the Cursor Keys to move the cursor to the desired filename and press the Enter Key. The Edit Local Network Table Display will appear and the desired filename will be in the input area.

Routing tables
Local net adr: 0 Local M/S node addr: 3

Edit local network table
Node address: 6

Input file name to register

No. of netwk: 5
File: FILE11

NO	Local netwk address	Special I/O Unit No.	NO	Local netwk address	Special I/O Unit No.
1	5	4	9		
2	4	0	10		
3	1	1	11		
4	2	2	12		
5	3	3	13		
6			14		
7			15		
8			16		

M menu
S menu
Delete
Add
Relay
Reg
Clear
File
End

Press the Enter Key again to accept the filename. If you want enter another filename, move the cursor to the input area with the up and down arrows.

If a file with the given filename already exists, a popup menu will appear warning the old version will be overwritten.

Will overwrite file. OK?

OK
Cancel

Move the cursor to "Cancel" and press the Enter Key if you do not want to overwrite the old version. The Edit Local Network Table Display will appear again.

To overwrite the old version, move the cursor to "OK" and press the Enter Key. A message will appear indicating that the data is being saved and another message will appear when the operation is complete.

### Editing Relay Network Routing Tables

1, 2, 3...

Follow the procedure below to create or edit routing tables in relay networks.

1. Display the Main Menu and select 3. *Routing tables*. The Edit Local Network Table Display (below) will appear.

Routing tables

Local net adr: 0 Local M/S node adrs: 3

Edit local network table

Node address: 6

Input file name to edit  
 No. of netwk: 0 File:

NO	Local netwk address	Special I/O Unit No.
1		
2		
3		
4		
5		
6		
7		
8		

NO	Local netwk address	Special I/O Unit No.
9		
10		
11		
12		
13		
14		
15		
16		

M menu

S menu

Delete

Add

Relay

Reg

Clear

File

End

2. Press the F5 Key and the Edit Local Network Table Display (below) will appear.

Routing tables

Local net adr: 0 Local M/S node adrs: 3

Edit relay table

Node address: 6

No. of netwk: 2 File: FILE11

NO	Last netwk addr	Relay adr	
		Netwrk	Node
1	4	3	1
2	5	3	1
3			
4			
5			
6			
7			
8			
9			
10			

NO	Last netwk addr	Relay adr	
		Netwrk	Node
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

M menu

S menu

Delete

Add

Clear

End

3. Set the destination network addresses (1 to 127), relay network addresses (1 to 127), and relay node addresses (1 to 62 for SYSMAC LINK Units, 1 to 126 for SYSMAC NET Link Units).

Press the F3 Key to delete the entry at the cursor location. The number of networks value will be reduced by the number of entries deleted.

Press the F4 Key to insert an entry at the cursor location. The lowest node address destination network address not yet used in the table will be inserted. The relay network address and relay node address that were on the line before will be used for the new entry. If the line was empty, the previous line's relay net-



work address and relay node address will be used. The number of networks value will be increased by 1.

Press the F7 Key to clear all entries from the table. The number of networks value will be reset to 0.

## 5-7-2 Transfer Routing Tables

This operation is used to transfer routing table information between the nodes in the network and the computer's editing area. Routing table information can be read from the nodes in the network, edited in the computer's editing area, and then written to the nodes again.

### Transfer from the Nodes to the Computer

Follow the procedure below to transfer routing tables from other nodes to the computer.

- 1, 2, 3... 1. Display the routing table operation sub-menu and select 2. *Transfer routing tables*.

```
1.Edit routing tables
2.Transfer routing tables
3.Delete routing tables
```

2. The popup menu shown below will appear when 2. *Transfer routing tables* is selected.

```
1.Node to edit area
2.Edit area to node
```

3. Select 1. *Node to edit area*. The Transfer Routing Tables (Node to edit area) Display will appear.

Routing tables
Transfer routing tables

Local net adr: 0
Local M/S node addr: 3
Node address: 6

Node to edit area

Network address: 0
Source node adr: 6

Please press the Execute Key

M menu S menu Exec End

4. Enter the network address (0 to 127) and source node address (1 to 62 for SYSMAC LINK Units, 1 to 126 for SYSMAC NET Link Units) of the source node.

Initially the local node's network address and node address will be displayed. If you want to designate the Support Board, simply press the Enter Key.

Entering 0 for the network address also indicates the local network.

5. Press the F6 Key to transfer the specified node's routing table to the computer's editing area. A message will be displayed indicating that the routing table is being transferred, and another message will be displayed when the data has been transferred.
6. Press the F10 Key when the transfer has been completed. A message will appear requesting a filename for the file containing the routing table. Input the filename (8 characters or fewer) and press the Enter Key.

Routing tables
Local net adr: 0 Local M/S node addr: 3

Edit local network table
Node address: 6

Input file name for routing tables  
 No. of netwk: 0 File:

NO	Local netwk address	Special I/O Unit No.
1		
2		
3		
4		
5		
6		
7		
8		

NO	Local netwk address	Special I/O Unit No.
9		
10		
11		
12		
13		
14		
15		
16		

M menu
S menu
Delete
Add
Relay
Reg
Clear
File
 
End

7. Edit the routing table if necessary.

**Transfer from the Computer to the Nodes**

Follow the procedure below to transfer routing tables from the computer's editing area to other nodes.

- 1, 2, 3...**
1. Display the routing table operation sub-menu and select *2. Transfer routing tables*.

1.Edit routing tables

**2.Transfer routing tables**

3.Delete routing tables

2. The popup menu shown below will appear when *2. Transfer routing tables* is selected.

1.Node to edit area

**2.Edit area to node**



Entering 0 for the network address indicates the local network. The local node's node address will be displayed in reverse video if the local network is selected.

Routing tables

Delete routing tables

Local net adr: 1 Local M/S node adrs: 1

Node address: 6

Network adr: 1

Use Return Key to clear nodes not to delete.

Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn
1	○	11	○	21	○	31	○	41	○	51	○	61	○
2	○	12	○	22	○	32	○	42	○	52	○	62	○
3	○	13	○	23	○	33	○	43	○	53	○		
4	○	14	○	24	○	34	○	44	○	54	○		
5	○	15	○	25	○	35	○	45	○	55	○		
6	○	16	○	26	○	36	○	46	○	56	○		
7	○	17	○	27	○	37	○	47	○	57	○		
8	○	18	○	28	○	38	○	48	○	58	○		
9	○	19	○	29	○	39	○	49	○	59	○		
10	○	20	○	30	○	40	○	50	○	60	○		

M menu

S menu

P page

N page

Exec

End

- The tables of nodes that have a circle next to them will be deleted. Use the Cursor Keys to move the cursor to the nodes whose routing tables you do not want to be deleted and press the Enter Key to delete the circle.

Routing tables

Delete routing tables

Local net adr: 1 Local M/S node adrs: 1

Node address: 6

Network adr: 0

Use Return Key to clear nodes not to delete.

Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn	Node	Dsgn
1	○	11	○	21	○	31	○	41	○	51	○	61	○
2	○	12	○	22	○	32	○	42	○	52	○	62	○
3	○	13	○	23	○	33	○	43	○	53	○		
4	○	14	○	24	○	34	○	44	○	54	○		
5	○	15	○	25	○	35	○	45	○	55	○		
6	○	16	○	26	○	36	○	46	○	56	○		
7	○	17	○	27	○	37	○	47	○	57	○		
8	○	18	○	28	○	38	○	48	○	58	○		
9	○	19	○	29	○	39	○	49	○	59	○		
10	○	20	○	30	○	40	○	50	○	60	○		

M menu

S menu

P page

N page

Exec

End

- Press the F6 Key to begin deleting routing tables. A message will be displayed as each routing table is being deleted. Another message and the results of the operation will be displayed when it is completed.

If the local node is among the specified nodes, the ROUTING.DAT file containing the computer's routing table will be deleted from the disk automatically. This is the file used with the Table Load Utility. Change the Table Load

Utility option settings when deleting the ROUTING.DAT file. Refer to 6-3 Table Load Utility for details.

Routing tables

Delete routing tables

Done

Network adr: 0

Local net adr: 1

Node address: 6

Local M/S node adrs: 1

Node	Result	Node	Result	Node	Result
1	Normal end	33	Error ( 82010006 )		
3	Normal end	35	Error ( 82010006 )		
4	Error ( 82010106 )	37	Error ( 82010006 )		
6	Normal end	39	Error ( 82010006 )		
9	Error ( 0401 )	41	Error ( 82010006 )		
12	Error ( 0401 )	43	Error ( 82010006 )		
13	Error ( 82010006 )	45	Error ( 82010006 )		
15	Error ( 82010006 )	47	Error ( 82010006 )		
17	Error ( 82010006 )	49	Error ( 82010006 )		
19	Error ( 82010006 )	51	Error ( 82010006 )		
21	Error ( 82010006 )	53	Error ( 82010006 )		
23	Error ( 82010006 )	55	Error ( 82010006 )		
25	Error ( 82010006 )	57	Error ( 82010006 )		
27	Error ( 82010006 )	59	Error ( 82010006 )		
29	Error ( 82010006 )	61	Error ( 82010006 )		
31	Error ( 82010006 )				

P page

N page

Stop

End

5-8 Echo-back Test

The echo-back test involves transmitting data to a specific node and requesting the node to send back the same data. The test procedure is described below. The operation can be cancelled in progress by pressing the F9 Key.

- 1, 2, 3...
1. Display the Main Menu and select 4. *Echo-back test*.

1.Data link
2.Network parameters
3.Routing tables
4.Echo-back test
5.Broadcast test
6.Local network status
7.Status read
8.Error log
9.Node status read
0.End

2. Enter the following parameters:
- The **network address** (0 to 127) of the other node. Initially the local node's network address will be displayed. Entering 0 for the network address indicates the local network.

The **node address** (1 to 62, or \*) of the other node. Initially the node address will be set to \*. Enter \* for the node address to test all nodes in the network.

The **data length** (1 to 512 bytes). Initially the data length will be set to 512.

The **number of tests** (1 to 999, or \*). Initially the number of tests will be set to 1. Enter \* for the test to repeat until the it is cancelled by pressing the F9 Key.

Echo-back test

Local net adr: 0Local M/S node addr: 1Node address: 6

Network adr: 0Node address: \*Data length: 512No. of tests: 1

Tests:Success:Failures:

Cycle time ( x100us )Avge:Max.:Min.:

Total length(byte):

Node 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21  
Test  
Ins  
Node 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42  
Test  
Ins  
Node 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62  
Test  
Ins

Test (X: Fail O: Succ) Ins (X: Not ins O: Ins - : Unkn) Local:

M menuExecStopEnd

3. Press the F6 Key to begin the test. A message will be displayed as the test is in progress and another message and the results of the operation will be displayed when it is completed.

Echo-back test

Local net adr: 0Local M/S node addr: 1Node address: 6

Done

Network adr: 0Node address: 12Data length: 512No. of tests: 100

Tests: 100Success: 100Failures: 0

Cycle time ( x100us )Avge: 74Max.: 77Min.: 54

Total length(byte): 105000

Node 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21  
Test  
Ins  
Node 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42  
Test  
Ins  
Node 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62  
Test  
Ins

Test (X: Fail O: Succ) Ins (X: Not ins O: Ins - : Unkn) Local:

M menuExecStopEnd

The total number of tests, number of successful tests, number of failed tests, transmission test time (average, minimum, and maximum), and total data length will be updated continuously as the test proceeds.

## 5-9 Broadcast Test

The broadcast test transmits data to all nodes in the specified network simultaneously and then reads the results (number of receptions for each node) of the test. The test procedure is described below. The operation can be cancelled in progress by pressing the F9 Key.

- 1, 2, 3... 1. Display the Main Menu and select 5. *Broadcast test*.

```
1.Data link
2.Network parameters
3.Routing tables
4.Echo-back test
5.Broadcast test
6.Local network status
7.Status read
8.Error log
9.Node status read
0.End
```

2. Enter the following parameters:

The **network address** (0 to 127) of the network to be tested. Initially the local node's network address will be displayed. Entering 0 for the network address indicates the local network.

The **data length** (1 to 512 bytes). Initially the data length will be set to 512.

The **number of tests** (1 to 999). Initially the number of tests will be set to 1.

Broadcast test	Local net adr: 0	Local M/S node addr: 1
	Node address: 6	
Network adr: 0		
Data length: 512		
No. of tests: 1		
M menu		Exec
		End

- 3. Press the F6 Key to begin the test. A message will be displayed as the test is in progress and another message and the results of the operation will be displayed when it is completed.

Broadcast test

Local net adr: 0 Local M/S node adrs: 1  
Node address: 6

Done  
Network adr: 0 Data ln: 1/ 1

Node addr	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Success	1	***	1	***	***	0	***	***	1	***	***	1	***	***	***	***

Node addr	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Success	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***

Node addr	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Success	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***

Node addr	49	50	51	52	53	54	55	56	57	58	59	60	61	62
Success	***	***	***	***	***	***	***	***	***	***	***	***	***	***

Exec

Stop

End

The number of successful tests will be displayed. The number of successful tests for the local node is normally 0.

5-10 Local Network Status

This operation is used to check the operational status of nodes in the local network. The procedure is described below.

- 1, 2, 3...
- 1. Display the Main Menu and select 6. Local network status.

1.Data link
2.Network parameters
3.Routing tables
4.Echo-back test
5.Broadcast test
6.Local network status
7.Status read
8.Error log
9.Node status read
0.End

- 2. The Local Network Status Display will appear when 6. Local network status is selected from the Main Menu. The network check will begin automatically



and a message will be displayed indicating that the check is in progress. The results will be displayed when the check is completed.

Local network status		Local net adr: 0	Local M/S node addr: 1
Done		Node address: 6	
Node	1	2	3
Link	x	x	x
Ins	o	x	o
Node	4	5	6
Link	x	x	x
Ins	x	x	x
Node	7	8	9
Link	x	x	x
Ins	x	x	x
Node	10	11	12
Link	x	x	x
Ins	x	x	x
Node	13	14	15
Link	x	x	x
Ins	x	x	x
Node	16	17	18
Link	x	x	x
Ins	x	x	x
Node	19	20	21
Link	x	x	x
Ins	x	x	x
Node	22	23	24
Link	x	x	x
Ins	x	x	x
Node	25	26	27
Link	x	x	x
Ins	x	x	x
Node	28	29	30
Link	x	x	x
Ins	x	x	x
Node	31	32	33
Link	x	x	x
Ins	x	x	x
Node	34	35	36
Link	x	x	x
Ins	x	x	x
Node	37	38	39
Link	x	x	x
Ins	x	x	x
Node	40	41	42
Link	x	x	x
Ins	x	x	x
Node	43	44	45
Link	x	x	x
Ins	x	x	x
Node	46	47	48
Link	x	x	x
Ins	x	x	x
Node	49	50	51
Link	x	x	x
Ins	x	x	x
Node	52	53	54
Link	x	x	x
Ins	x	x	x
Node	55	56	57
Link	x	x	x
Ins	x	x	x
Node	58	59	60
Link	x	x	x
Ins	x	x	x
Node	61	62	
Link	x	x	
Ins	x	x	
Link(x:Stop o:Acti)    Ins (x:Not ins o:Ins)    Local: ■			
M menu    Exec			

The results indicate whether each node is in the network and whether it is in the data link.

- Press F6 to perform another check of the network. Once again, a message will be displayed indicating that the check is in progress and the results will be displayed when the check is completed.

## 5-11 Status Read

This operation is used to check whether the Support Board's data link table, network parameters, or routing tables have been changed or deleted through the network. Normally the check will indicate that the data has been changed unless the network parameters and other data were read into the Board at start-up using the Table Load Utility. The procedure is described below.

- 1, 2, 3... 1. Display the Main Menu and select 7. *Status read*.

```

1.Data link
2.Network parameters
3.Routing tables
4.Echo-back test
5.Broadcast test
6.Local network status
7.Status read
8.Error log
9.Node status read
0.End

```

- The Status Read Display will appear when 7. *Status read* is selected from the Main Menu. The check will begin automatically and a message will be displayed indicating that the check is in progress. The results will be displayed when the check is completed.

A circle indicates that the data has been changed and a cross indicates that the data has not been changed.

Status read

Local net adr: 0 Local M/S node adrs: 3  
Node address: 6

Done

Table name	Chg
Data link table	×
Network parameters	×
Routing tables	○

○:Changed    ×:No change

M menu    Exec    Reg    End

- Press F6 to perform another check. Once again, a message will be displayed indicating that the check is in progress and the results will be displayed when the check is completed.

Press F7 to save the changed tables to disk. If a table has been deleted through the network, pressing F7 will delete that file from the disk. If there haven't been any changes, pressing F7 will have no effect.

The data link tables are saved in a file called DATALINK.DAT, the network parameters in NETPARA.DAT, and the routing table in ROUTING.DAT. These are the files used with the Table Load Utility. Change the Table Load Utility option settings when any of these files have been deleted. Refer to 6-3 *Table Load Utility* for details.

**Note** When the changes have been saved to disk, the circles in the results display will be changed to crosses.

## 5-12 Error Log

This operation is used to display the error log from the specified node. The procedure is described below. The operation can be cancelled in progress by pressing the F9 Key.

- 1, 2, 3... 1. Display the Main Menu and select 8. *Error log*.

```

1.Data link
2.Network parameters
3.Routing tables
4.Echo-back test
5.Broadcast test
6.Local network status
7.Status read
8.Error log
9.Node status read
0.End

```

- Initially the local node's network address and node address will be displayed. If you want to designate the Support Board, simply press the Enter Key.

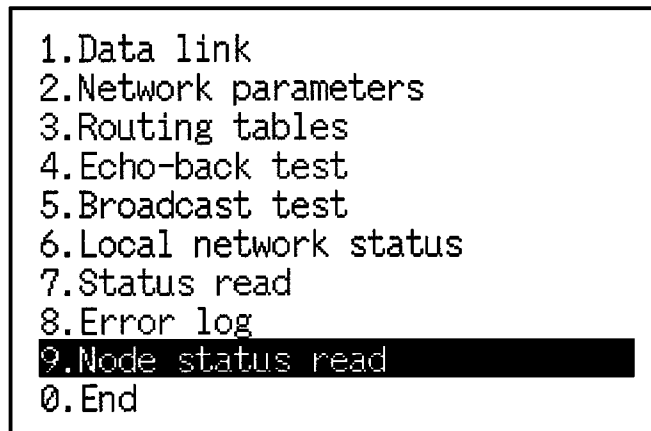
3. Press the F6 Key to read the error log from the specified node. A message will be displayed indicating that the error log is being transferred, and another message will be displayed when the data has been transferred.

4. Press the F7 Key to clear the error log in the specified node. A message will be displayed indicating that the error log is being cleared, and another message will be displayed when the data has been cleared.

## 5-13 Node Status Read

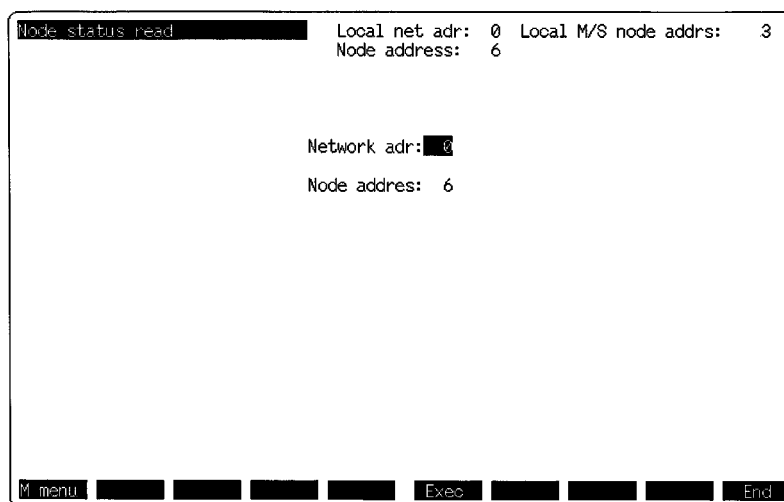
This operation is used to check the operational status of the specified node. The procedure is described below.

- 1, 2, 3...** 1. Display the Main Menu and select 9. *Node status read.*



2. The Node Status Read Display will appear when *9. Node status read* is selected from the Main Menu. Enter the network address (0 to 127) and node address (1 to 62) of the desired node. Entering 0 for the network address indicates the local network.

Initially the local node's network address and node address will be displayed. If you want to designate the Support Board, simply press the Enter Key.



3. Press the F6 Key to read the error log from the specified node. A message will be displayed indicating that the specified node's status is being checked, and another message will be displayed when the operation has been completed.

The status of the specified node will be displayed as shown below.

Node status read

Local net adr: 0   Local M/S node adrs: 3  
Node address: 6

Done  
Network adr: 0   Node adrs: 6   Dat lnk:Stop

Oper mode	Line status	Error msg
Test oper mode	- Pwr stat	No Node adr set err Dup nd addr err Net para mismatch
Com controller err   Backup status   Log status		
WDT error Memory err Contr err Tx err Self-test err	- Netwk para err - Data lnk tbl err - Routing tbl err - Memory SW err - EEPROM err	- Current log data - Full log data

M menu   End

- Note**
- 1. The abbreviations for some of the statuses are described below:  
Test oper mode: Test operation mode  
Pwr stat: Power status
  - 2. Other error messages and statuses are described in *Section 9 Troubleshooting and Inspection*.

# SECTION 6

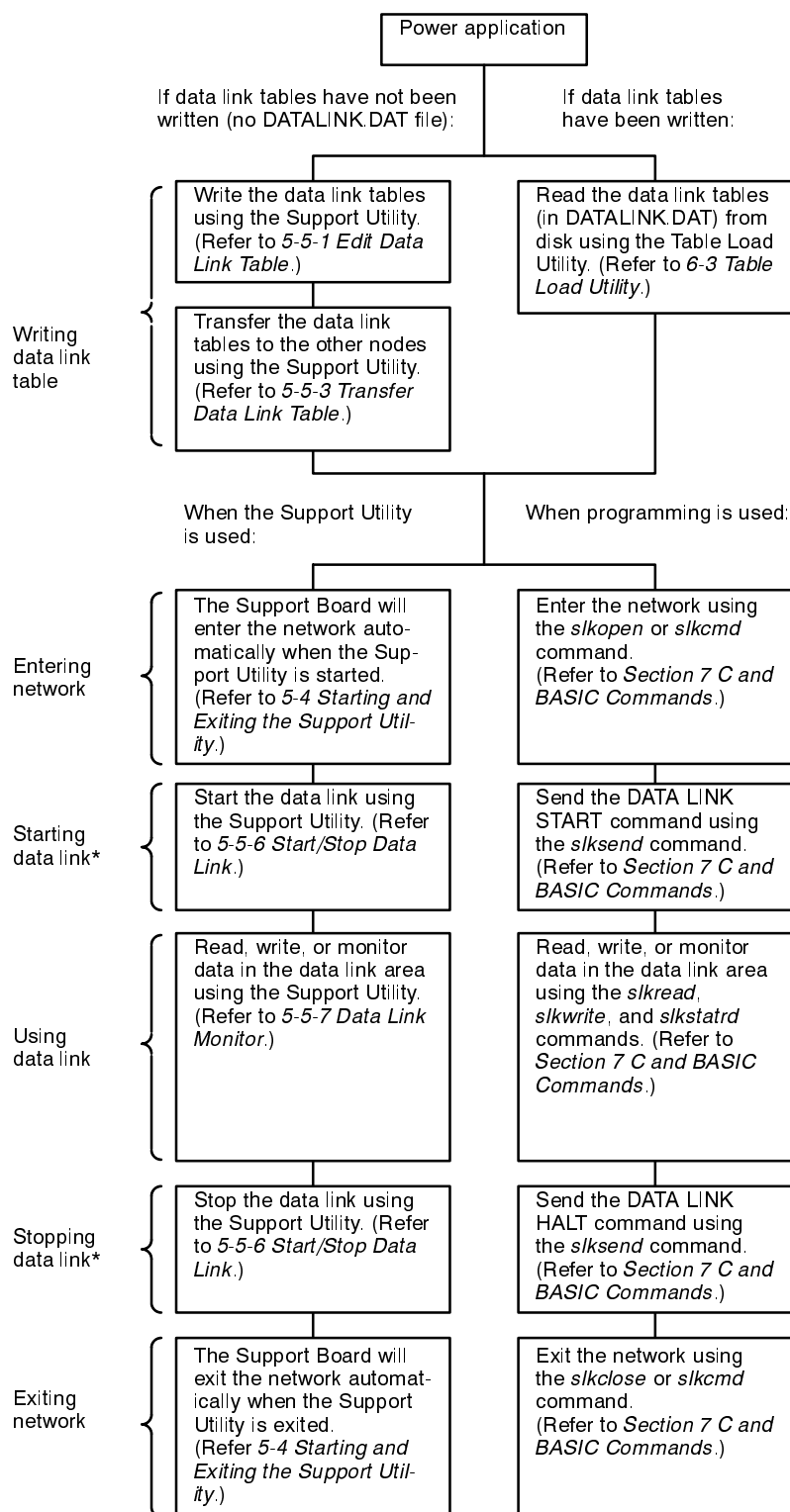
## Network Communications

Communications across the SYSMAC LINK and other interconnecting networks are described in this section.

6-1	Data Link Operation .....	76
6-2	Data Read/Write Services .....	77
6-3	Table Load Utility .....	77
6-4	Libraries .....	79
6-4-1	C Library .....	79
6-4-2	BASIC Library .....	79

## 6-1 Data Link Operation

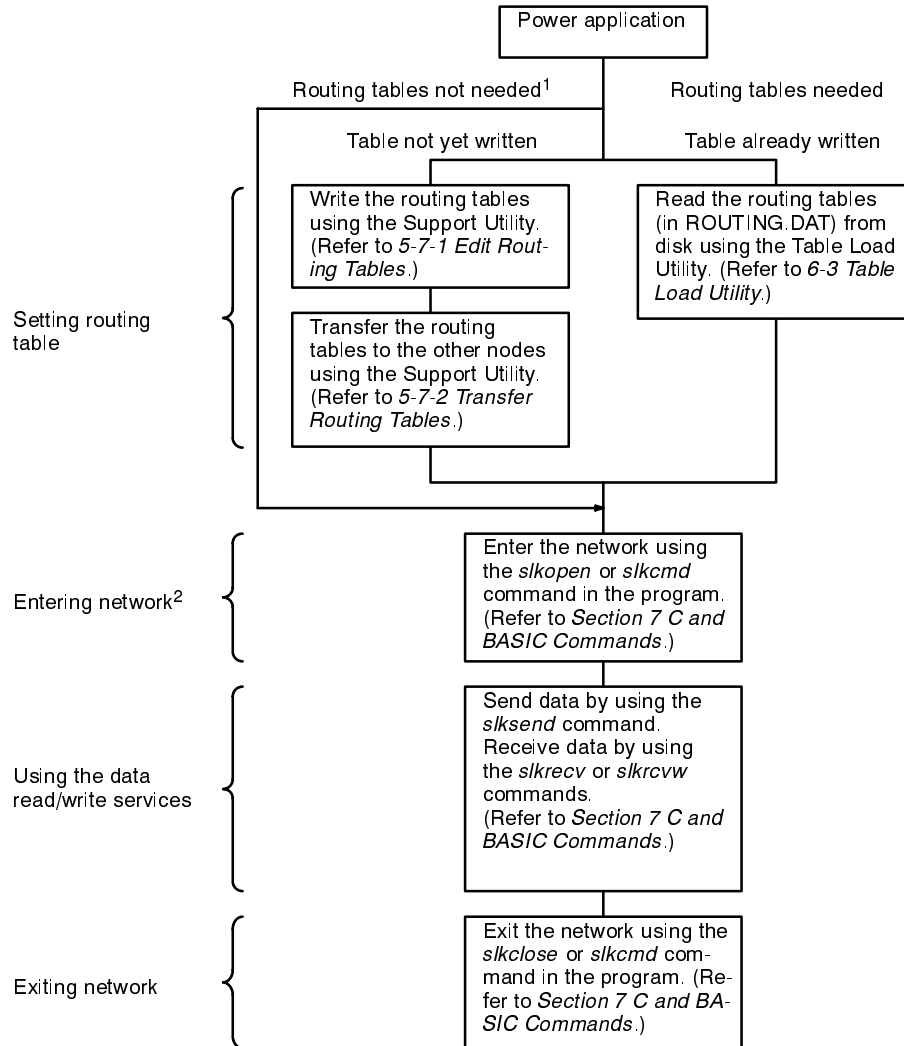
The following flowchart shows the general procedure involved in preparing, starting, and stopping a data link. This procedure can be performed after the drivers and other SLSS software have been installed.



**Note** \*The data link can also be started or stopped from peripheral devices or by sending CV-mode commands (DATA LINK START and DATA LINK HALT) from other nodes.

## 6-2 Data Read/Write Services

The flowchart below shows the general procedure involved in preparing and using the data read/write services. This procedure can be performed after the drivers and other SLSS software have been installed.



- Note**
1. Routing tables are not needed if all communications will take place with other nodes in the local network, but a routing table must be prepared if there will be communications between networks.
  2. The Support Utility does not have an operation that sends or receives data. Always use the data read/write services in the program.

## 6-3 Table Load Utility

The Table Load Utility reads the routing tables, network parameters, and data link tables into the Support Board from their files on disk (ROUTING.DAT, NET-PARA.DAT, and DATALINK.DAT, respectively). The Support Board's memory does not have a backup, so if these settings are needed they must be read from memory after power interruptions.



The tables and network parameters will be cleared if the computer is reset or power is interrupted, and they can be changed with the Support Utility or by commands.

**Note** The Table Load Utility is normally inserted in the AUTOEXEC.BAT.

## Syntax

The Table Load Utility has the following syntax:

```
SLKTBLLD [/R][N][L] [/E] [/Dpathname]
```

Items in the square brackets are optional. If they are needed, enter the information within the brackets, not the brackets themselves. Options are described in the following table:

Option	Code	Function
Routing table <sup>1</sup>	R	Indicates the routing tables should be read from the disk.
Network parameters <sup>1</sup>	N	Indicates the network parameters should be read from the disk.
Data link table <sup>1</sup>	L	Indicates the data link tables should be read from the disk.
Message type	/E (default setting)	Messages are displayed in English.
Drive and path <sup>2</sup>	/Dpathname	Indicates the drive and directory that will be accessed when the Support Utility reads from or writes to files.

**Note** 1. At least one of the R, N, L options must be specified in the command. The routing tables, network parameters, and data link tables will be read from the disk in that order, regardless of the order of the R, N, L options.

The three files indicated by the R, N, and L options are generated as described next:

The routing table file (ROUTING.DAT) is generated when either the status read operation or transfer routing table (editing area to node) operation is executed.

The network parameters file (NETPARA.DAT) is generated when either the status read operation or set network parameters operation is executed.

The data link table file (DATALINK.DAT) is generated when either the status read operation or transfer data link table (editing area to node) operation is executed.

2. Specify the drive and directory where the ROUTING.DAT, NETPARA.DAT, and DATALINK.DAT files are located if they are not in the same drive and directory as the Table Load Utility. A space may be inserted between D and the pathname.

## Example

In the following example the routing tables, network parameters, and data link table files are read from the "OMRON" directory in drive A and messages are displayed in English:

```
SLKTBLLD /RNL /E /DA:OMRON
```

## Messages

The following messages will be displayed when the routing tables, network parameters, and data link table files are read without error:

```
Routing table installed.
Network parameter installed.
Datalink table installed.
```

The following messages will be displayed when the options were input incorrectly:

```
Routing table not installed.
Invalid parameter.
Network parameter not installed.
Invalid parameter.
Datalink table not installed.
Invalid parameter.
```

**Note** Options that were input incorrectly will be ignored, but any options that were input correctly will be executed.

The following messages will be displayed if the reading of the files is aborted for some reason:

```
Routing table not installed.
Network parameter not installed.
Datalink table not installed.
```

The files will not be usable. Check the drive, pathname, and other variables for causes of the error.

## 6-4 Libraries

There are two libraries of commands prepared for use with the Support Board. One library is in C and the other is in BASIC. This section describes how to use these libraries. For details on individual commands, refer to *Section 7 C and BASIC Commands*. Refer to *Section 8 Sample Programs* for programming examples.

### 6-4-1 C Library

Use only the Microsoft C (Ver. 6.0) library for C programming. The library file is SLKMSC.LIB. The commands in the C library are described in the following table.

Command	Function	Page
<i>slkopen</i>	Opens the SYSMAC LINK driver and adds the Support Board to the network.	84
<i>slkclose</i>	Closes the SYSMAC LINK driver and removes the Support Board from the network.	84
<i>slksend</i>	Transmits a message or CV-mode command.	85
<i>slkrecv</i>	Receives a message or CV-mode command.	86
<i>slkrcvw</i>	Receives a message or CV-mode command. The time that the Support Board waits for the message can be specified with this command.	88
<i>slkread</i>	Reads data from the data link area.	90
<i>slkwrite</i>	Writes data to the data link area.	91
<i>slkstatrd</i>	Checks the operational status of the Support Board.	92
<i>slkcmd</i>	Adds/removes the Support Board to/from the network.	93

The commands listed above are used in the program. Refer to *Section 8 Sample Programs* for programming examples.

#### Compiler

Enter the following command to compile the library:

```
cl /AL /Zp /c source filename
```

#### Links

Enter the following command to link to the library:

```
link object filename,,,slkmsc.lib
```

## 6-4-2 BASIC Library

Use the libraries listed in the following table for BASIC programming.

BASIC software		Library file
Quick BASIC (Ver. 4.5)	For loading	SLKQBS.BIN
	For linking	SLKQBS.OBJ
IBM BASIC Compiler/2 (Ver. 1.07)		SLKQBS.OBJ

The commands in the C library are described in the following table.

Command	Function	Command number	Page
SLKOPEN	Opens the SYSMAC LINK driver and adds the Support Board to the network.	1	95
SLKCLOSE	Closes the SYSMAC LINK driver and removes the Support Board from the network.	2	95
SLKSEND	Transmits a message or CV-mode command.	3	96
SLKRECV	Receives a message or CV-mode command.	4	98
SLKRCVW	Receives a message or CV-mode command. The time that the Support Board waits for the message can be specified with this command.	5	100
SLKREAD	Reads data from the data link area.	6	102
SLKWRITE	Writes data to the data link area.	7	104
SLKSTATRD	Checks the operational status of the Support Board.	8	105
SLKCMD	Adds/removes the Support Board to/from the network.	10	107

### Quick BASIC

There are two ways to use Quick BASIC; the BASIC library can be loaded or a link can be made to the interface routine. The two methods use different files and different notation.

#### Load Method

Follow the procedure below to load the BASIC library. Refer to *Section 8 Sample Programs* for details on actual applications.

- 1, 2, 3... 1. Load the BASIC library into user memory with a BLOAD statement. Use a DEF SEG statement to define the segment of storage before loading the library. An example is shown below:

```
DIM LIB%(1 TO 9000)
SEGPTR = VARSEG(LIB%(1)) + VARPTR(LIB%(1))/16 + 1
DEF SEG = SEGPTR
BLOAD "SLKQBS.BIN",0
```

2. Multiply the command number (see table above) of the command you want to use by 3 and use the result as an offset for a CALL ABSOLUTE statement. The example shown below is for the SLKWRITE command (command number 7):

```
SLKWRITE% = 7*3
CALL ABSOLUTE(SEG (ODE%, SEF OFS%, SEG TEXT$, SEG
RS%, SLKWRITE%))
```

3. The procedure to execute the program depends on whether a compiler or interpreter is used.

- a) When a compiler is used, enter the following statements to compile, link, and execute the program:

```
BC program_name;
LINK program_name;
program_name
```

- b) When an interpreter is used, enter one of the following statements to start Quick BASIC:

```
QB program_name /L
or
QB program_name /L QB.QLB
```

### Link Method

Follow the procedure below to link to the BASIC library. Refer to *Section 8 Sample Programs* for details on actual applications.

- 1, 2, 3...** 1. Use a FUNCTION statement at the beginning of the program to declare the name of a command. An example is shown below:

```
DECLARE FUNCTION SLKOPEN (RET%)
```

2. Use the declared command name and execute the function. An example is shown below:

```
d% = SLKOPEN (RET%)
```

**Note** A dummy variable such as d% is required.

3. Enter the following statements to compile the source, link to the installation routine, and execute the program:

```
BC program_name;
LINK program_name+SLKQBS;
program_name
```

**Note** When the link method is used, the program cannot be executed with an interpreter.

### IBM BASIC Compiler/2

The IBM BASIC Compiler/2 is always used by linking to the installation routine.

- 1, 2, 3...** 1. Use a FUNCTION statement at the beginning of the program to declare the name of a command. An example is shown below:

```
DECLARE FUNCTION SLKOPEN (RET%)
```

2. Use the declared command name and execute the function. An example is shown below:

```
d% = SLKOPEN (RET%)
```

**Note** A dummy variable such as d% is required.

3. Enter the following statements to compile the source, link to the installation routine, and execute the program:

```
BASCOM program_name;
LINK program_name+SLKQBS;
program_name
```

## SECTION 7

# C and BASIC Commands

The commands in the two libraries included in the SYSMAC LINK Support Software are described in this section. Refer to *6-4 Libraries* for details on using the C and BASIC libraries.

7-1	C Commands .....	84
7-1-1	SYSMAC LINK OPEN – slkopen .....	84
7-1-2	SYSMAC LINK CLOSE – slkclose .....	84
7-1-3	SYSMAC LINK SEND – slksend .....	85
7-1-4	SYSMAC LINK RECEIVE – slkrecv .....	86
7-1-5	SYSMAC LINK RECEIVE WAIT – slkrcvw .....	88
7-1-6	SYSMAC LINK READ – slkread .....	90
7-1-7	SYSMAC LINK WRITE – slkwrite .....	91
7-1-8	SYSMAC LINK STATUS READ – slkstatrd .....	92
7-1-9	SYSMAC LINK COMMAND – slkcmd .....	93
7-2	BASIC Commands .....	95
7-2-1	SYSMAC LINK OPEN – SLKOPEN .....	95
7-2-2	SYSMAC LINK CLOSE – SLKCLOSE .....	95
7-2-3	SYSMAC LINK SEND – SLKSEND .....	96
7-2-4	SYSMAC LINK RECEIVE – SLKRECV .....	98
7-2-5	SYSMAC LINK RECEIVE WAIT – SLKRCVW .....	100
7-2-6	SYSMAC LINK READ – SLKREAD .....	102
7-2-7	SYSMAC LINK WRITE – SLKWRITE .....	104
7-2-8	SYSMAC LINK STATUS READ – SLKSTATRD .....	105
7-2-9	SYSMAC LINK COMMAND – SLKCMD .....	107

## 7-1 C Commands

The following table shows the commands in the C library. Refer to *6-4 Libraries* for details on using the C library.

Command	Function	Page
<i>slkopen</i>	Opens the SYSMAC LINK driver and adds the Support Board to the network.	84
<i>slkclose</i>	Closes the SYSMAC LINK driver and removes the Support Board from the network.	84
<i>slksend</i>	Transmits a message or CV-mode command.	85
<i>slkrecv</i>	Receives a message or CV-mode command.	86
<i>slkrcvw</i>	Receives a message or CV-mode command. The time that the Support Board waits for the message can be specified with this command.	88
<i>slkread</i>	Reads data from the data link area.	90
<i>slkwrite</i>	Writes data to the data link area.	91
<i>slkstatrd</i>	Checks the operational status of the Support Board.	92
<i>slkcmd</i>	Adds/removes the Support Board to/from the network.	93

### 7-1-1 SYSMAC LINK OPEN – *slkopen*

This command opens the SYSMAC LINK driver and adds the Support Board to the network. Other C commands in the library can be executed after the *slkopen* command has been executed.

Use the *slkclose* command to close the Support Board's device driver and remove it from the network.

The *slkcmd* command can also be used to add/remove the Support Board to/from the network. Other C commands can still be executed when the *slkcmd* command has been used to remove the Support Board from the network.

**Note** It is necessary to open the SYSMAC LINK driver even if C commands will not be sent to other nodes in the network, only to the Support Board itself.

#### Command Syntax

```
int slkopen()
```

#### Parameters

None

#### Responses

The following table shows the possible responses when *slkopen* is executed:

Response	Meaning
0	The command was executed normally.
-3	The Support Board's driver was already open.
-10	A system call error occurred.
-16	A Support Board error has occurred.

#### Related Commands

*slkclose()*, *slkcmd()*

### 7-1-2 SYSMAC LINK CLOSE – *slkclose*

This command closes the SYSMAC LINK driver and removes the Support Board from the network. Other C commands cannot be executed when the Support Board has been removed from the network by the *slkclose* command. Use the *slkcmd* command to remove the Support Board from the network but still allow other C commands to be executed.

Use the *slkopen* command to open the Support Board's device driver and add it to the network.

**Note** Close the SYSMAC LINK driver before exiting application programs.

**Command Syntax** `int slkclose()`

**Parameters** None

**Responses** The following table shows the possible responses when *slkclose* is executed:

Response	Meaning
0	The command was executed normally.
-2	The Support Board's driver was not open.
-16	A Support Board error has occurred.

**Related Commands** `slkopen()`, `slkcmd()`

### 7-1-3 SYSMAC LINK SEND – *slksend*

This command is used to send CV-mode commands and responses. A response is automatically returned to commands addressed to the Support Board, but not to commands addressed to the computer.

When returning responses to CV-mode commands received in the host computer's program through the Support Board, set the *type* parameter to 1 to indicate a response. Refer to the *CV500/CV1000 Operation Manual: Host Interface* for details on CV-mode commands and responses.

The destination information and command/response data are specified in the structure of *slkio*.

**Note** The CV-mode command or response will not be sent when the command is executed, but when the Support Board receives the token giving it the right to transmit.

**Command Syntax** `int slksend(sndbuf, nbyte)`

```

struct      slkio *sndbuf;
unsigned int  nbyte;

struct  slkio{
    unsigned int  type;
    unsigned int  sid;
    unsigned int  netadr;
    unsigned int  nodeadr;
    unsigned int  unitadr;
    unsigned char *text;
};

```

**Parameters**

The parameters for the *slksend* command are described in the following table:

Parameter	Format	Function
<i>sndbuf</i>	Variable	Pointer to structure of <i>slkio</i>
<i>nbyte</i>	Integer (2 to 542)	Indicates the number of bytes of data (from the CV-mode command or response code to the end code) being transmitted. Up to 542 bytes can be transmitted.
<i>type</i> <sup>1</sup>	Integer (0, 1, or 2)	Indicates the type of transmission, as shown below: 0: command (response required) 1: response 2: command (response not required)
<i>sid</i>	Integer (0 to 255)	The “service ID number;” can be used to identify the process which is the source of the transmission.
<i>netadr</i>	Integer (0 to 127)	Specifies the destination network address.
<i>nodeadr</i>	Integer (0 to 126, or 255)	Specifies the destination node address. A value of 0 indicates the Support Board itself and a value of 255 indicates a broadcast transmission to all nodes.  Nodes in a SYSMAC LINK network can have node addresses from 1 to 62, and nodes in a SYSMAC NET Link network can have node addresses from 1 to 126.
<i>unitadr</i>	Integer <sup>2</sup>	Indicates whether a transmission sent to a host computer is addressed to the Support Board or the computer program.  16 or 254: Support Board <sup>3</sup> 1: computer program
<i>text</i>	Character string	The data to be transmitted (from the CV-mode command or response code to the end code). Each byte can be from 0 to 255 (00 to FF in hexadecimal).

- Note**
1. When a command requiring a response is sent and the *type* parameter is set to 0, either the *slkrecv* or *slkrcvw* command must be used to receive the response.
  2. The *unitadr* parameter depends on the type of Unit or Board at the destination node. Refer to the Unit's *Operation Manual* for details.
  3. The Support Board's unit address is fixed at 16 because its unit number is fixed at 0.

**Responses**

The following table shows the possible responses when *slksend* is executed:

Response	Meaning
0	The command was executed normally.
-1	Parameter error.
-4	The Support Board is not in the network.
-7	Transmission timeout.
-8	The Support Board is busy. (One of the communication buffers is full.)
-10	A system call error occurred.
-16	A Support Board error has occurred.

**Related Commands**

*slkrecv()*, *slkrcvw()*

**7-1-4 SYSMAC LINK RECEIVE – *slkrecv***

This command is used to read CV-mode commands and responses received in the reception buffer and store the data according to the parameters. If the reception buffer is empty, the Support Board waits until data is received and all other



processes will be stopped while waiting. The command can be cancelled by pressing the Escape Key (Esc).

### Command Syntax

```
int slkrecev(rcvbuf, nbyte)
```

```

struct          slkio *rcvbuf;
unsigned int     nbyte;

struct  slkio{
    unsigned int  type;
    unsigned int  sid;
    unsigned int  netadr;
    unsigned int  nodeadr;
    unsigned int  unitadr;
    unsigned char *text;
};

```

### Parameters

The parameters for the *slkrecev* command are described in the following table:

Parameter	Format	Function
<i>rcvbuf</i>	Variable	Pointer to structure of <i>slkio</i>
<i>nbyte</i>	Integer (2 to 542)	Indicates the number of bytes of data that will be read from the reception buffer to text. Up to 542 bytes can be read.
<i>type</i>	Integer (0, 1, or 2)	Indicates the type of transmission, as shown below: 0: command (response required) 1: response 2: command (response not required)
<i>sid</i>	Integer (0 to 255)	The "service ID number;" can be used to identify the process which is the source of the transmission.
<i>netadr</i>	Integer (0 to 127)	Specifies the source network address.
<i>nodeadr</i>	Integer (0 to 126, or 255)	Specifies the source node address. A value of 0 indicates the Support Board itself and a value of 255 indicates a broadcast transmission to all nodes.  Nodes in a SYSMAC LINK network can have node addresses from 1 to 62, and nodes in a SYSMAC NET Link network can have node addresses from 1 to 126.
<i>unitadr</i>	Integer	The unit address of the source. The unit address parameter depends on the type of Unit or Board at the source node. Refer to the Unit's <i>Operation Manual</i> for details.
<i>text</i>	Character string	The data read from the Support Board's reception buffer. The buffer contains the data from the CV-mode command or response code to the end code. Each byte can be from 0 to 255 (00 to FF in hexadecimal).

### Description

Two commands are provided to read data from the reception buffer, *slkrecev* and *slkrcvw*. The commands operate differently if the reception buffer is empty:

- 1, 2, 3...**
  1. If the reception buffer is empty when *slkrecev* is executed, the computer will be put on standby until data is received or the Esc Key is pressed. No other processes will be executed while the computer is on standby.
  2. If the reception buffer is empty when *slkrcvw* is executed, the computer will be put on standby until data is received or a specified time elapses. No other processes will be executed while the computer is on standby.

When the *slkrecev* command is executed, the number of bytes of data specified by the *nbyte* parameter will be read from the reception buffer and stored in *text*.

The source information and command/response data are stored in the structure of *slkio*.

If the number of bytes specified by *nbyte* is greater than the number of bytes of data in the buffer, all of the data in the buffer will be read. If the number of bytes of data in the buffer is greater than *nbyte*, only *nbyte* bytes of data will be read from the buffer; the remaining data will be lost. When *slkrecv* is completed normally, the response will indicate the actual number of bytes received in the buffer, regardless of the value of *nbyte*.

- Note**
1. Before using the *slkrecv* command, be sure to allocate *nbyte* bytes of memory to *text*.
  2. Use the *slkrecv* or *slkrcvw* commands as often as possible to read data from the reception buffer. If the reception buffer fills up, more data cannot be received.
  3. Refer to the *CV500/CV1000 Operation Manual: Host Interface* for details on CV-mode commands and responses.
  4. The size of the reception buffer is specified by the /B option when installing the SYSMAC LINK driver. The default reception buffer size is 554×2 bytes. Refer to 4-3-2 *SYSMAC LINK Driver Installation* for details.

## Responses

The following table shows the possible responses when *slkrecv* is executed:

Response	Meaning
Positive number	The number of bytes of data received in the reception buffer. (The command was executed normally.)
-1	Parameter error.
-10	A system call error occurred.
-16	A Support Board error has occurred.
-27	The command was cancelled by pressing the Esc Key.

## Related Commands

*slksend()*, *slkrcvw()*

## 7-1-5 SYSMAC LINK RECEIVE WAIT – *slkrcvw*

This command is used to read CV-mode commands and responses received in the reception buffer and store the data according to the parameters. If the reception buffer is empty, the Support Board waits until data is received or the specified time elapses. All other processes will be stopped while waiting.

## Command Syntax

```
int slkrcvw(rcvbuf, nbyte, time)
```

```

struct          slkio *rcvbuf;
unsigned int     nbyte;
int             time;

struct  slkio{
        unsigned int  type;
        unsigned int  sid;
        unsigned int  netadr;
        unsigned int  nodeadr;
        unsigned int  unitadr;
        unsigned char *text;
};
```

## Parameters

The parameters for the *slkrcvw* command are described in the following table:

Parameter	Format	Function
<i>rcvbuf</i>	Variable	Pointer to structure of <i>slkio</i>
<i>nbyte</i>	Integer (2 to 542)	Indicates the number of bytes of data that will be read from the reception buffer to text. Up to 542 bytes can be read.
<i>time</i>	Integer (0 to 255)	Specifies the time that the computer will standby when the reception buffer is empty. The time is set in 0.1 s units (0 to 25.5 s).
<i>type</i>	Integer (0, 1, or 2)	Indicates the type of transmission, as shown below: 0: command (response required) 1: response 2: command (response not required)
<i>sid</i>	Integer (0 to 255)	The “service ID number;” can be used to identify the process which is the source of the transmission.
<i>netadr</i>	Integer (0 to 127)	Specifies the source network address.
<i>nodeadr</i>	Integer (0 to 126, or 255)	Specifies the source node address. A value of 0 indicates the Support Board itself and a value of 255 indicates a broadcast transmission to all nodes.  Nodes in a SYSMAC LINK network can have node addresses from 1 to 62, and nodes in a SYSMAC NET Link network can have node addresses from 1 to 126.
<i>unitadr</i>	Integer	The unit address of the source. The unit address parameter depends on the type of Unit or Board at the source node. Refer to the Unit's <i>Operation Manual</i> for details.
<i>text</i>	Character string	The data read from the Support Board's reception buffer. The buffer contains the data from the CV-mode command or response code to the end code. Each byte can be from 0 to 255 (00 to FF in hexadecimal).

## Description

Two commands are provided to read data from the reception buffer, *slkreclv* and *slkrcvw*. The commands operate differently if the reception buffer is empty:

- 1, 2, 3... 1. If the reception buffer is empty when *slkreclv* is executed, the computer will be put on standby until data is received or the Esc Key is pressed. No other processes will be executed while the computer is on standby.
2. If the reception buffer is empty when *slkrcvw* is executed, the computer will be put on standby until data is received or a specified time elapses. No other processes will be executed while the computer is on standby.

When the *slkrcvw* command is executed, the number of bytes of data specified by the *nbyte* parameter will be read from the reception buffer and stored in *text*. The source information and command/response data are stored in the structure of *slkio*.

If the number of bytes specified by *nbyte* is greater than the number of bytes of data in the buffer, all of the data in the buffer will be read. If the number of bytes of data in the buffer is greater than *nbyte*, only *nbyte* bytes of data will be read from the buffer; the remaining data will be lost. When *slkrcvw* is completed normally, the response will indicate the actual number of bytes received in the buffer, regardless of the value of *nbyte*.

- Note**
1. Before using the *slkrcvw* command, be sure to allocate *nbyte* bytes of memory to *text*.
  2. Use the *slkreclv* or *slkrcvw* commands as often as possible to read data from the reception buffer. If the reception buffer fills up, more data cannot be received.

3. Refer to the *CV500/CV1000 Operation Manual: Host Interface* for details on CV-mode commands and responses.
4. The size of the reception buffer is specified by the /B option when installing the SYSMAC LINK driver. The default reception buffer size is 554×2 bytes. Refer to 4-3-2 SYSMAC LINK Driver Installation for details.

## Responses

The following table shows the possible responses when *slkrcvw* is executed:

Response	Meaning
Positive number	The number of bytes of data received in the reception buffer. (The command was executed normally.)
-1	Parameter error.
-10	A system call error occurred.
-16	A Support Board error has occurred.
-25	The command was cancelled when the specified time elapsed.
-26	The command was cancelled because the reception buffer was empty. (This response is returned only when the <i>time</i> parameter is set to 0.)

## Related Commands

*slksend()*, *slkrecv()*

## 7-1-6 SYSMAC LINK READ – *slkread*

This command is used to read data from the data link area.

## Command Syntax

```
int slkread(linkbuf, size, offset)
```

```

    unsigned char *linkbuf;
    unsigned int  size;
    unsigned int  offset;
```

## Parameters

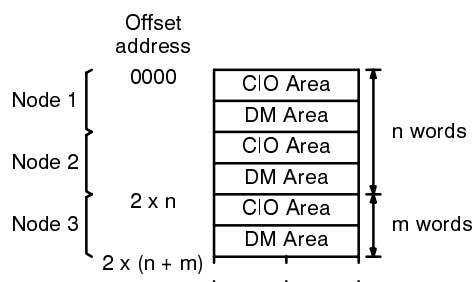
The parameters for the *slkread* command are described in the following table:

Parameter	Format	Function
<i>linkbuf</i>	Character string	Indicates the area where the data link data is stored. Data can be from 0 to 255; two bytes equal one word.
<i>size</i>	Integer (1 to 5932)	Indicates the number of bytes of data that will be read. Up to 5,932 bytes (2,966 words) can be read.
<i>offset</i>	Integer (0 to 5931)	Indicates the offset from the beginning of the data link area. This parameter specifies the beginning address from which data will be read.

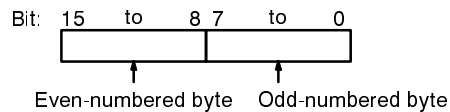
## Description

When the *slkread* command is executed, the number of bytes of data specified by the *size* parameter will be read from the data link area beginning at the address specified by the *offset* parameter and stored in the memory area specified by the *linkbuf* parameter.

In the example below the *m* words of the data link area allocated to node 3 are read. There are *n* words allocated to nodes 1 and 2, so the *offset* parameter is set to 2×*n* bytes. All *m* words will be read, so the *size* parameter is set to 2×*m* bytes.



Even-numbered bytes correspond to the leftmost byte of words, and odd-numbered bytes correspond to the rightmost byte of words, as shown below.



- Note**
1. Before using the *slkread* command, be sure to allocate the number of bytes of memory specified by the *size* parameter to *linkbuf*.
  2. If the /S option is selected when installing the SYSMAC LINK BIOS, all of the data link data might not be read in the same transmission cycle.

## Responses

The following table shows the possible responses when *slkread* is executed:

Response	Meaning
0	The command was executed normally.
-1	Parameter error.
-10	A system call error occurred.
-14	Data link area specification error.
-16	A Support Board error has occurred.

## Related Commands

*slkwrite()*

## 7-1-7 SYSMAC LINK WRITE – *slkwrite*

This command is used to write data to the data link area.

## Command Syntax

```
int slkwrite(wlinkbuf, size, offset)
```

```
    unsigned char *wlinkbuf;
    unsigned int   size;
    unsigned int   offset;
```

## Parameters

The parameters for the *slkwrite* command are described in the following table:

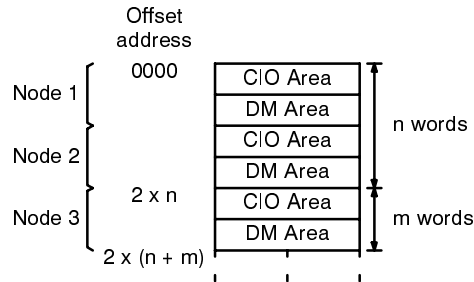
Parameter	Format	Function
<i>wlinkbuf</i>	Character string	Indicates the area where the data link data is stored. Data can be from 0 to 255; two bytes equal one word.
<i>size</i>	Integer (1 to 5932)	Indicates the number of bytes of data that will be written. Up to 5,932 bytes (2,966 words) can be written.
<i>offset</i>	Integer (0 to 5931)	Indicates the offset from the beginning of the data link area. This parameter specifies the beginning address to which data will be written.

## Description

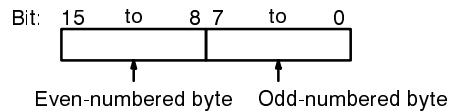
When the *slkwrite* command is executed, the number of bytes of data specified by the *size* parameter will be read from the memory area specified by the *wlinkbuf* parameter and written to the data link area beginning at the address specified by the *offset* parameter.

In the example below data from the *wlinkbuf* area is written to the *m* words of the data link area allocated to the Support Board (node 3). There are *n* words allo-

cated to nodes 1 and 2, so the *offset* parameter is set to  $2 \times n$  bytes. All  $m$  words will be written, so the *size* parameter is set to  $2 \times m$  bytes.



Even-numbered bytes correspond to the leftmost byte of words, and odd-numbered bytes correspond to the rightmost byte of words, as shown below.



- Note**
1. Data should be written only to the section of the data link area allocated to the Support Board.
  2. If the /S option is selected when installing the SYSMAC LINK BIOS, more than one transmission cycle may be required to write all the data.

## Responses

The following table shows the possible responses when *slkwrite* is executed:

Response	Meaning
0	The command was executed normally.
-1	Parameter error.
-10	A system call error occurred.
-14	Data link area specification error.
-16	A Support Board error has occurred.

## Related Commands

*slkread()*

## 7-1-8 SYSMAC LINK STATUS READ – *slkstatrd*

This command is used to check the operational status of the Support Board.

## Command Syntax

```
int slkstatrd(rcvbuf, nbyte)
```

```
    unsigned char *rcvbuf;
    unsigned int  nbyte;
```

## Parameters

The parameters for the *slkstatrd* command are described in the following table:

Parameter	Format	Function
<i>rcvbuf</i>	Character string	Indicates the area where the operational status data will be stored. Data can be from 0 to 255.
<i>nbyte</i>	Integer (1 to 50)	Indicates the number of bytes of data that will be read from the reception buffer to text. Up to 50 bytes can be read.

## Description

When the *slkstatrd* command is executed, the number of bytes of operational status data specified by the *nbyte* parameter will be written to the memory area



**Parameters**

The parameter for the *slkcmd* command is described in the following table:

Parameter	Format	Function
<i>cmd</i>	Integer (0 or 1)	Indicates whether to add the Support Board to the network or remove it from the network.  0: Add Support Board to network. 1: Remove Support Board from network.

**Responses**

The following table shows the possible responses when *slkcmd* is executed:

Response	Meaning
0	The command was executed normally.
-1	Parameter error.
-10	A system call error occurred.
-16	A Support Board error has occurred.

**Related Commands**

*slkopen()*, *slkclose()*



## 7-2 BASIC Commands

The following table shows the commands in the BASIC library. Refer *6-4 Libraries* for details on using the BASIC library.

Command	Function	Command number	Page
SLKOPEN	Opens the SYSMAC LINK driver and adds the Support Board to the network.	1	95
SLKCLOSE	Closes the SYSMAC LINK driver and removes the Support Board from the network.	2	95
SLKSEND	Transmits a message or CV-mode command.	3	96
SLKRECV	Receives a message or CV-mode command.	4	98
SLKRCVW	Receives a message or CV-mode command. The time that the Support Board waits for the message can be specified with this command.	5	100
SLKREAD	Reads data from the data link area.	6	102
SLKWRITE	Writes data to the data link area.	7	104
SLKSTATRD	Checks the operational status of the Support Board.	8	105
SLKCMD	Adds/removes the Support Board to/from the network.	10	107

### 7-2-1 SYSMAC LINK OPEN – SLKOPEN

This command opens the SYSMAC LINK driver and adds the Support Board to the network. Other BASIC commands in the library can be executed after the SLKOPEN command has been executed.

The SLKCMD command can be used to add/remove the Support Board to/from the network. Other BASIC commands can still be executed when the SLKCMD command has been used to remove the Support Board from the network.

Use the SLKCLOSE command to close the SYSMAC LINK driver and remove the Support Board from the network.

**Note** It is necessary to open the SYSMAC LINK driver even if BASIC commands will not be sent to other nodes in the network, only to the Support Board itself.

#### Command Syntax

SLKOPEN(RET%)

#### Parameters

The parameter for the SLKOPEN command is described in the following table:

Parameter	Format	Function
RET%	Integer	Contains the response code indicating the result of the command execution. Refer to the following table for the meaning of response codes.

#### Responses

The following table shows the possible responses when SLKOPEN is executed:

Response	Meaning
0	The command was executed normally.
-3	The Support Board's driver was already open.
-10	A system call error occurred.
-16	A Support Board error has occurred.

#### Related Commands

SLKCLOSE, SLKCMD

### 7-2-2 SYSMAC LINK CLOSE – SLKCLOSE

This command closes the SYSMAC LINK driver and removes the Support Board from the network. Other BASIC commands cannot be executed when the

Support Board has been removed from the network by the SLKCLOSE command. Use the SLKCMD command to remove the Support Board from the network but still allow other BASIC commands to be executed.

Use the SLKOPEN command to open the Support Board's device driver and add it to the network.

**Note** Close the SYSMAC LINK driver before exiting application programs.

### Command Syntax

SLKCLOSE(RET%)

### Parameters

The parameter for the SLKCLOSE command is described in the following table:

Parameter	Format	Function
RET%	Integer	Contains the response code indicating the result of the command execution. Refer to the following table for the meaning of response codes.

### Responses

The following table shows the possible responses when SLKCLOSE is executed:

Response	Meaning
0	The command was executed normally.
-2	The Support Board's driver was not open.
-16	A Support Board error has occurred.

### Related Commands

SLKOPEN, SLKCMD

## 7-2-3 SYSMAC LINK SEND – SLKSEND

This command is used to send CV-mode commands and responses. A response is automatically returned to commands addressed to the Support Board, but not to commands addressed to the computer. Refer to the *CV500/CV1000 Operation Manual: Host Interface* for details on CV-mode commands and responses.

### Command Syntax

SLKSEND(CODE%, NET%, NODE%, UNIT%, TYP%, SID%, TEXT\$, RS%)

### Parameters

The parameters for the SLKSEND command are described in the following table:

Parameter	Format	Function
CODE%	Integer (0 or 1)	Indicates the data format as shown below. If ASCII code is indicated, the data is converted from ASCII to binary before transmission.  0: Binary code 1: ASCII code
NET%	Integer (0 to 127)	Specifies the destination network address. (A 0 indicates the local network.)
NODE%	Integer (0 to 126, or 255)	Specifies the destination node address. A value of 0 indicates the Support Board itself and a value of 255 indicates a broadcast transmission to all nodes.  Nodes in a SYSMAC LINK network can have node addresses from 1 to 62, and nodes in a SYSMAC NET Link network can have node addresses from 1 to 126.
UNIT%	Integer <sup>1</sup>	Indicates whether a transmission sent to a host computer is addressed to the Support Board or the computer.  16 or 254: Support Board 1: computer

Parameter	Format	Function
TYP%	Integer <sup>2</sup> (0, 1, or 2)	Indicates the type of transmission, as shown below: 0: command (response required) 1: response 2: command (response not required)
SID%	Integer (0 to 255)	The "service ID number;" can be used to identify the process which is the source of the transmission.
TEXT\$	Character string	The data to be transmitted (from the CV-mode command or response code to the end code). Binary data must be from 00 to FF.  ASCII characters can be from 0 to 9, a to f, or A to F. Each byte contains two characters corresponding to hexadecimal numbers, so be sure to enter an even number of characters.
RS% (input)	Integer (0 to 2)	Indicates whether the TEXT\$ data is the last packet of a string of data or an intermediate packet. This parameter is also used to cancel a transmission involving more than one packet and clear the transmission buffer.  0: Last or only packet 1: Intermediate packet 2: Cancel and clear transmission buffer
RS% (output)	Integer (-29 to 0)	Contains the response code indicating the result of the command execution. Refer to the following table for the meaning of response codes.

- Note**
1. The unit address parameter depends on the type of Unit or Board at the destination node. Refer to the Unit's *Operation Manual* for details.
  2. When a command requiring a response is sent and the TYP% parameter is set to 0, either the SLKRECV or SLKRCVW command must be used to receive the response.

### Description

This command is used to send CV-mode commands and responses. The parameters contain the command/response data and indicate the destination node. If the CODE% parameter specifies ASCII code, the data is converted to binary code before transmission.

In BASIC, a single TEXT\$ text string can contain up to 255 characters if ASCII code is specified or up to 255 bytes of data if binary code is specified. If more data is being transmitted, the data must be broken up into packets of up to 254 ASCII characters or 255 bytes of binary data. The total length of the data packets cannot exceed the transmission buffer capacity of 542 bytes.

The RS% parameter is used to distinguish intermediate packets of data from the last (or only) packets, as described in the table above. The TEXT\$ data of SLKSEND commands with RS%=1 is stored in the transmission buffer until an SLKSEND command with RS%=0 is entered. Enter an SLKSEND command with RS%=2 to clear the transmission buffer.

Do not change the NET%, NODE%, UNIT%, TYP%, or SID% parameters when more than one SLKSEND command is used to send a large batch of data.

- Note**
1. The CV-mode command or response will not be sent when the command with RS%=0 is entered, but when the Support Board receives the token giving it the right to transmit.
  2. The SLKSEND command is also used to return responses to CV-mode commands received in the host computer's program through the Support Board. Set the TYP% parameter to 1 to indicate a response.

**Responses**

The following table shows the possible responses when SLKSEND is executed:

Response	Meaning
0	The command was executed normally.
-1	Parameter error.
-4	The Support Board is not in the network.
-7	Transmission timeout.
-8	The Support Board is busy. (The buffer is full.)
-9	The internal buffer is full.
-10	A system call error occurred.
-16	A Support Board error has occurred.
-29	NET%, NODE%, UNIT%, TYP%, or SID% parameters were changed when more than one command was used to send a large batch of data.

**Related Commands**

SLKRCV, SLKRCVW

**7-2-4 SYSMAC LINK RECEIVE – SLKRCV**

This command is used to read CV-mode commands and responses received in the reception buffer and store the data according to the parameters. If the reception buffer is empty, the Support Board waits until data is received and all other processes will be stopped while waiting. The command can be cancelled in this waiting state by pressing the Escape Key (Esc).

**Command Syntax**

SLKRCV(CODE%, NET%, NODE%, UNIT%, TYP%, SID%, TEXT\$, LENG%, RET%, RC%)

**Parameters**

The parameters for the SLKRCV command are described in the following table:

Parameter	Format	Function
CODE%	Integer (0 or 1)	Indicates the data format as shown below. If ASCII code is indicated, the data is converted from binary to ASCII before transfer to TEXT\$.  0: Binary code 1: ASCII code
NET%	Integer (0 to 127)	Specifies the source network address. (A 0 indicates the local network.)
NODE%	Integer (0 to 126, or 255)	Specifies the source node address. A value of 0 indicates the Support Board itself and a value of 255 indicates a broadcast transmission to all nodes.  Nodes in a SYSMAC LINK network can have node addresses from 1 to 62, and nodes in a SYSMAC NET Link network can have node addresses from 1 to 126.
UNIT%	Integer (0 to 255)	The unit address of the source. The unit address parameter depends on the type of Unit or Board at the source node. Refer to the Unit's <i>Operation Manual</i> for details.
TYP%	Integer <sup>1</sup> (0, 1, or 2)	Indicates the type of transmission, as shown below: 0: command (response required) 1: response 2: command (response not required)
SID%	Integer (0 to 255)	The "service ID number;" can be used to identify the process which is the source of the transmission.

Parameter	Format	Function
TEXT\$	Character string	The data (from the CV-mode command or response code to the end code) read from the Support Board's reception buffer. Binary data can be from 00 to FF. ASCII characters can be from 0 to 9, a to f, or A to F. Each byte contains two characters corresponding to hexadecimal numbers.
LENG%	Integer (0 to 542)	Indicates the number of bytes of data read from the reception buffer and stored in TEXT\$. The number of bytes are calculated before conversion to ASCII code if ASCII code is specified in the CODE% parameter.
RET%	Integer (-27 to 0)	Contains the response code indicating the result of the command execution. Refer to the following table for the meaning of response codes.
RC%	Integer (0 to 541)	Indicates the number of bytes of data remaining in the reception buffer when all of the data could not be stored in TEXT\$. (The number of bytes are calculated before conversion to ASCII code if ASCII code is specified in the CODE% parameter.)

### Description

Two commands are provided to read data from the reception buffer, SLKRECV and SLKRCVW. The commands operate differently if the reception buffer is empty:

- 1, 2, 3...**
1. If the reception buffer is empty when SLKRECV is executed, the computer will be put on standby until data is received or the Esc Key is pressed. No other processes will be executed while the computer is on standby.
  2. If the reception buffer is empty when SLKRCVW is executed, the computer will be put on standby until data is received or a specified time elapses. No other processes will be executed while the computer is on standby.

When the SLKRECV command is executed, data will be read from the reception buffer and stored in TEXT\$ and information on the source node is stored in other parameters. The binary data will be converted to ASCII code if ASCII code is specified in the CODE% parameter. Data is cleared from the buffer as it is stored in TEXT\$. The LENG% parameter indicates the number of bytes of data (in binary) read from the buffer.

If the reception buffer contains more data than can be stored in TEXT\$, the number of bytes of data remaining in the buffer will be stored in RC%. In this case, continue executing the SLKRECV command until RC%=0. New data cannot be read from the buffer until all of the remaining data has been read and RC%=0.

- Note**
1. Before using the SLKRECV command, be sure to allocate enough memory to TEXT\$ (enough for 255 characters).
  2. Use the SLKRECV or SLKRCVW commands as often as possible to read data from the reception buffer. If the reception buffer fills up, more data cannot be received.
  3. The size of the reception buffer is specified by the /B option when installing the SYSMAC LINK driver. The default reception buffer size is 554×2 bytes (including 12×2 bytes for headers). Refer to 4-3-2 SYSMAC LINK Driver Installation for details.
  4. The LENG% and RC% parameters indicate the number of bytes of data for binary data. If the ASCII code is specified, the actual number of ASCII characters is twice the number of bytes indicated in these parameters.

**Responses**

The following table shows the possible responses when SLKRCV is executed:

Response	Meaning
Positive number	The number of bytes of data received. (The command was executed normally.)
-1	Parameter error.
-10	A system call error occurred.
-16	A Support Board error has occurred.
-27	The command was cancelled by pressing the Esc Key.

**Related Commands**

SLKSEND, SLKRCVW

**7-2-5 SYSMAC LINK RECEIVE WAIT – SLKRCVW**

This command is used to read CV-mode commands and responses received in the reception buffer and store the data according to the parameters. If the reception buffer is empty, the Support Board waits until data is received or the specified time elapses. All other processes will be stopped while waiting.

**Command Syntax**

SLKRCVW(CODE%, NET%, NODE%, UNIT%, TYP%, SID%, TEXT\$, LENG%, RET%, RC%, TIM%)

**Parameters**

The parameters for the SLKRCVW command are described in the following table:

Parameter	Format	Function
CODE%	Integer (0 or 1)	Indicates the data format as shown below. If ASCII code is indicated, the data is converted from binary to ASCII before transfer to TEXT\$.  0: Binary code 1: ASCII code
NET%	Integer (0 to 127)	Specifies the source network address. (A 0 indicates the local network.)
NODE%	Integer (0 to 126, or 255)	Specifies the source node address. A value of 0 indicates the Support Board itself and a value of 255 indicates a broadcast transmission to all nodes.  Nodes in a SYSMAC LINK network can have node addresses from 1 to 62, and nodes in a SYSMAC NET Link network can have node addresses from 1 to 126.
UNIT%	Integer (0 to 255)	The unit address of the source. The unit address parameter depends on the type of Unit or Board at the source node. Refer to the Unit's <i>Operation Manual</i> for details.
TYP%	Integer <sup>1</sup> (0, 1, or 2)	Indicates the type of transmission, as shown below:  0: command (response required) 1: response 2: command (response not required)
SID%	Integer (0 to 255)	The "service ID number;" can be used to identify the process which is the source of the transmission.
TEXT\$	Character string	The data (from the CV-mode command or response code to the end code) read from the Support Board's reception buffer. Binary data can be from 00 to FF.  ASCII characters can be from 0 to 9, a to f, or A to F. Each byte contains two characters corresponding to hexadecimal numbers.
LENG%	Integer (0 to 542)	Indicates the number of bytes of data read from the reception buffer and stored in TEXT\$. The number of bytes are calculated before conversion to ASCII code if ASCII code is specified in the CODE% parameter.

Parameter	Format	Function
RET%	Integer (-26 to 0)	Contains the response code indicating the result of the command execution. Refer to the following table for the meaning of response codes.
RC%	Integer (0 to 541)	Indicates the number of bytes of data remaining in the reception buffer when all of the data could not be stored in TEXT\$. (The number of bytes are calculated before conversion to ASCII code if ASCII code is specified in the CODE% parameter.)
TIM%	Integer (0 to 255)	Specifies the time that the computer will standby when the reception buffer is empty. The time is set in 0.1 s units (0 to 25.5 s).

**Description**

Two commands are provided to read data from the reception buffer, SLKRECV and SLKRCVW. The commands operate differently if the reception buffer is empty:

- 1, 2, 3...**
1. If the reception buffer is empty when SLKRECV is executed, the computer will be put on standby until data is received or the Esc Key is pressed. No other processes will be executed while the computer is on standby.
  2. If the reception buffer is empty when SLKRCVW is executed, the computer will be put on standby until data is received or a specified time elapses. No other processes will be executed while the computer is on standby.

When the SLKRCVW command is executed, data will be read from the reception buffer and stored in TEXT\$ and information on the source node is stored in other parameters. The binary data will be converted to ASCII code if ASCII code is specified in the CODE% parameter. Data is cleared from the buffer as it is stored in TEXT\$. The LENG% parameter indicates the number of bytes of data (in binary) read from the buffer.

If the reception buffer contains more data than can be stored in TEXT\$, the number of bytes of data remaining in the buffer will be stored in RC%. In this case, continue executing the SLKRECV command until RC%=0. New data cannot be read from the buffer until all of the remaining data has been read and RC%=0.

- Note**
1. Before using the SLKRECV command, be sure to allocate enough memory to TEXT\$ (enough for 255 characters).
  2. Use the SLKRECV or SLKRCVW commands as often as possible to read data from the reception buffer. If the reception buffer fills up, more data cannot be received.
  3. The size of the reception buffer is specified by the /B option when installing the SYSMAC LINK driver. The default reception buffer size is 554×2 bytes (including 12×2 bytes for headers). Refer to 4-3-2 *SYSMAC LINK Driver Installation* for details.
  4. The LENG% and RC% parameters indicate the number of bytes of data for binary data. If the ASCII code is specified, the actual number of ASCII characters is twice the number of bytes indicated in these parameters.

**Responses**

The following table shows the possible responses when SLKRCVW is executed:

Response	Meaning
Positive number	The number of bytes of data received. (The command was executed normally.)
-1	Parameter error.
-10	A system call error occurred.
-16	A Support Board error has occurred.
-25	The command was cancelled when the specified time elapsed.
-26	The command was cancelled because the reception buffer was empty. (This response is returned only when the TIM% parameter is set to 0.)

**Related Commands**

SLKSEND, SLKRECV

**7-2-6 SYSMAC LINK READ – SLKREAD**

This command is used to read data from the data link area.

**Command Syntax**

SLKREAD(CODE%, OFS%, TEXT\$, LENG%, RET%, RC%)

**Parameters**

The parameters for the SLKREAD command are described in the following table:

Parameter	Format	Function
CODE%	Integer (0 or 1)	Indicates the data format as shown below. If ASCII code is indicated, the data is converted from binary to ASCII before transfer to TEXT\$.  0: Binary code 1: ASCII code
OFS%	Integer (0 to 5931)	Indicates the offset from the beginning of the data link area. This parameter specifies the beginning address from which data will be read.
TEXT\$	Character string	The data (from the CV-mode command or response code to the end code) read from the Support Board's reception buffer. Binary data can be from 00 to FF.  ASCII characters can be from 0 to 9, a to f, or A to F. Each byte contains two characters corresponding to hexadecimal numbers.
LENG% (input)	Integer (0 to 5932)	Indicates the number of bytes of data that will be read. Up to 5,932 bytes (2,966 words) can be read.
LENG% (output)	Integer (0 to 5932)	Indicates the number of bytes of data read from the internal buffer and stored in TEXT\$. (The number of bytes are calculated before conversion to ASCII code if ASCII code is specified in the CODE% parameter.)
RET%	Integer (-16 to 0)	Contains the response code indicating the result of the command execution. Refer to the following table for the meaning of response codes.
RC%	Integer (0 to 541)	Indicates the number of bytes of data remaining in the internal buffer when all of the data could not be stored in TEXT\$. (The number of bytes are calculated before conversion to ASCII code if ASCII code is specified in the CODE% parameter.)

**Description**

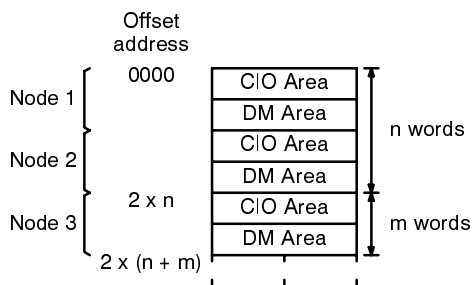
When the SLKREAD command is executed, the number of bytes of data specified by the LENG% parameter will be read from the data link area beginning at the address specified by the OFS% parameter and stored in an internal buffer. As much data as TEXT\$ can contain will be transferred from the internal buffer to TEXT\$.



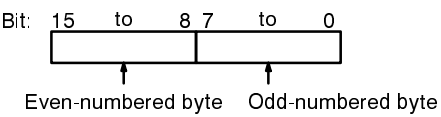
If ASCII code is specified in the CODE% parameter, the binary data will be converted to ASCII code before transferral to TEXT%. Data is cleared from the buffer as it is stored in TEXT\$.

If the buffer contains more data than can be stored in TEXT\$, the number of bytes of data (in binary) transferred to TEXT\$ is indicated in the LENG% parameter, and the number of bytes of data remaining in the buffer is indicated in RC%. In this case, continue executing the SLKREAD command with the same OFS% setting until RC%=0. New data cannot be read from the buffer until all of the remaining data has been read and RC%=0.

In the example below the m words of the data link area allocated to node 3 are read. There are n words allocated to nodes 1 and 2, so the OFS% parameter is set to 2×n bytes. All m words will be read, so the LENG% parameter is set to 2×m bytes.



Even-numbered bytes correspond to the leftmost byte of words, and odd-numbered bytes correspond to the rightmost byte of words, as shown below.



- Note**
1. Before using the SLKREAD command, be sure to allocate enough memory to TEXT\$ by a command such as the one below. Refer to your DOS user's manual for details on the SPACE command.  
`TEXT$=SPACE$(255)`
  2. The internal buffer can contain up to 5,932 bytes of binary data.
  3. If the /S option is selected when installing the SYSMAC LINK BIOS, all of the data link data might not be read in the same transmission cycle.
  4. The LENG% and OFS% parameters indicate the number of bytes of data for binary data. If the ASCII code is specified, the actual number of ASCII characters is twice the number of bytes indicated in these parameters.

**Responses**

The following table shows the possible responses when SLKREAD is executed:

Response	Meaning
0	The command was executed normally.
-1	Parameter error.
-10	A system call error occurred.
-14	Data link area specification error.
-16	A Support Board error has occurred.

**Related Commands**

SLKWRITE

## 7-2-7 SYSMAC LINK WRITE – SLKWRITE

This command is used to write data to the data link area.

### Command Syntax

SLKWRITE(CODE%, OFS%, TEXT\$, RS%)

### Parameters

The parameters for the SLKWRITE command are described in the following table:

Parameter	Format	Function
CODE%	Integer (0 or 1)	Indicates the data format as shown below. If ASCII code is indicated, the data is converted from binary to ASCII before transfer to TEXT\$.  0: Binary code 1: ASCII code
OFS%	Integer (0 to 5931)	Indicates the offset from the beginning of the data link area. This parameter specifies the beginning address from which data will be read.
TEXT\$	Character string	The data (from the CV-mode command or response code to the end code) read from the Support Board's reception buffer. Binary data can be from 00 to FF. ASCII characters can be from 0 to 9, a to f, or A to F. Each byte contains two characters corresponding to hexadecimal numbers.
RS% (input)	Integer (0 to 2)	Indicates whether the TEXT\$ data is the last packet of a string of data or an intermediate packet. This parameter is also used to cancel a transmission involving more than one packet and clear the transmission buffer.  0: Last or only packet 1: Intermediate packet 2: Cancel and clear transmission buffer
RS% (output)	Integer (-29 to 0)	Contains the response code indicating the result of the command execution. Refer to the following table for the meaning of response codes.

### Description

When the SLKWRITE command is executed, the data in TEXT\$ will be written to the data link area beginning at the address specified by the OFS% parameter.

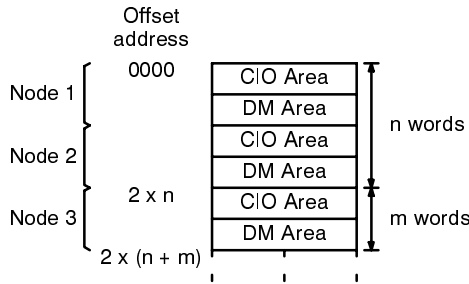
In BASIC, a single TEXT\$ text string can contain up to 255 characters if ASCII code is specified or up to 255 bytes of data if binary code is specified. If more data is being transmitted, the data must be broken up into packets of up to 254 ASCII characters or 255 bytes of binary data.

The RS% parameter is used to distinguish intermediate packets of data from the last (or only) packets, as described in the table above. The TEXT\$ data of SLKWRITE commands with RS%=1 is stored in the internal buffer until an SLKWRITE command with RS%=0 is entered. Do not change the setting of the OFS% parameter when using more than one SLKWRITE command to write a large batch of data.

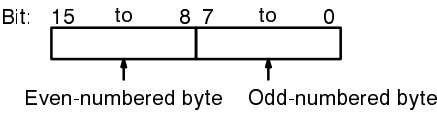
Enter an SLKWRITE command with RS%=2 to clear the buffer. Any data stored in the buffer with an SLKWRITE commands with RS%=1 will be erased before it is written to the data link area.

In the example below data from the wlinkbuf area is written to the m words of the data link area allocated to the Support Board (node 3). There are n words allo-

cated to nodes 1 and 2, so the OFS% parameter is set to 2×n bytes. All m words will be written, so the LENG% parameter is set to 2×m bytes.



Even-numbered bytes correspond to the leftmost byte of words, and odd-numbered bytes correspond to the rightmost byte of words, as shown below.



- Note**
1. Data should be written only to the section of the data link area allocated to the Support Board.
  2. If the /S option is selected when installing the SYSMAC LINK BIOS, more than one transmission cycle may be required to write all the data.
  3. The internal buffer can contain up to 5,932 bytes of binary data.
  4. The OFS% parameter indicates the number of bytes of binary data.
  5. The data in the internal buffer will not be written to the data link area and will not be available for transfer to other nodes until the last packet of data (RS%=0) is entered.

**Responses**

The following table shows the possible responses when SLKSEND is executed:

Response	Meaning
0	The command was executed normally.
-1	Parameter error.
-9	The internal buffer is full.
-10	A system call error occurred.
-14	Data link area specification error.
-16	A Support Board error has occurred.
-29	Parameters were changed when more than one command was used to send a large batch of data.

**Related Commands**

SLKREAD

**7-2-8 SYSMAC LINK STATUS READ – SLKSTATRD**

This command is used to check the operational status of the Support Board.

**Command Syntax**

SLKSTATRD(CODE%, TEXT\$, LENG%, RET%)

## Parameters

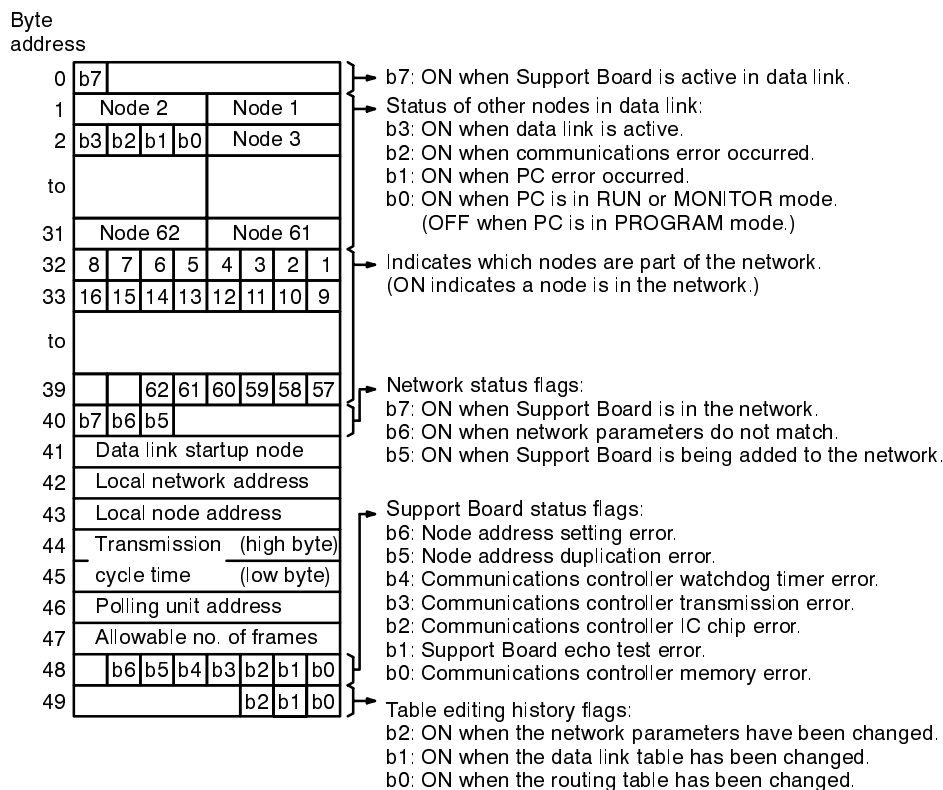
The parameters for the SLKSTATRD command are described in the following table:

Parameter	Format	Function
CODE%	Integer (0 or 1)	Indicates the data format as shown below. If ASCII code is indicated, the data is converted from binary to ASCII before transfer to TEXT\$.  0: Binary code 1: ASCII code
TEXT\$	Character string	The status data is written to TEXT\$. Binary data can be from 00 to FF.  ASCII characters can be from 0 to 9, a to f, or A to F. Each byte contains two characters corresponding to hexadecimal numbers.
LENG%)	Integer (1 to 50)	Indicates the number of bytes of data that will be read. Up to 50 bytes can be read.
RET%	Integer (-10 to 0)	Contains the response code indicating the result of the command execution. Refer to the following table for the meaning of response codes.

### Description

When the SLKSTATRD command is executed, the number of bytes data available in TEXT\$ will be overwritten with operational status data beginning with the first byte shown in the diagram below. If ASCII code is specified in the CODE% parameter, the binary data will be converted to ASCII code before transferral to TEXT%.

Enter the number of bytes of data that will be read in LENG% in binary.



**Note** Before using the SLKSTATRD command, be sure to allocate memory to TEXT%.

**Responses**

The following table shows the possible responses when SLKSTATRD is executed:

Response	Meaning
0	The command was executed normally.
-1	Parameter error.
-10	A system call error occurred.

**7-2-9 SYSMAC LINK COMMAND – SLKCMD**

This command is used to add the Support Board to the network or remove it from the network. Unlike the SLKOPEN and SLKCLOSE commands, SLKCMD does not open or close the SYSMAC LINK driver, it operates only when the SYSMAC LINK driver is already open.

When the Support Board is removed from the network with the SLKCLOSE command, the driver is closed and other commands from the BASIC library cannot be used. However, when the Support Board is removed from the network with the SLKCMD command, the driver remains open and other commands from the BASIC library can still be used.

**Note** The SLKCMD command cannot open the SYSMAC LINK driver, the driver must be opened with the SLKOPEN command beforehand.

**Command Syntax**

SLKCMD(CMD%, RET%)

**Parameters**

The parameters for the SLKCMD command are described in the following table:

Parameter	Format	Function
CMD%	Integer (0 or 1)	Indicates whether to add the Support Board to the network or remove it from the network.  0: Add Support Board to network. 1: Remove Support Board from network.
RET%	Integer (-16 to 0)	Contains the response code indicating the result of the command execution. Refer to the following table for the meaning of response codes.

**Responses**

The following table shows the possible responses when SLKCMD is executed:

Response	Meaning
0	The command was executed normally.
-1	Parameter error.
-10	A system call error occurred.
-16	A Support Board error has occurred.

**Related Commands**

SLKOPEN, SLKCLOSE

# SECTION 8

## Sample Programs

Two sample programs are described in this section. One program operates a data link and the other tests SYSMAC LINK network operation.

8-1	Data Link Program .....	110
8-2	SYSMAC LINK Test Program .....	116
8-3	Common Data Link Problems .....	120



111



```

1245         END IF
1250     END SUB
1255     '
1260     '##### SLKCLOSE #####
1265     SUB Subclose STATIC
1270         print "SLKCLOSE ....."
1275         slkclose% = 2 * 3
1280         CALL ABSOLUTE (SEG RET%, slkclose%)      (Closes the SYSMAC LINK driver.)
1285         IF RET% <> 0 THEN
1290             PRINT "SLKCLOSE ....."
1295             PRINT "          Return Status = ";RET%
1300         ELSE
1305             PRINT "OK ! Return Status = ";RET%
1310         END IF
1315     END SUB
1320     '
1325     '##### SLKSEND #####
1330     SUB Subsend STATIC
1335         PRINT "SLKSEND ....."
1340         slksend% = 3 * 3
1345         INPUT "          Destination NET  Addr. = ";NET%      (Inputs the destina-
tion network address.)
1350         INPUT "          NODE Addr. = ";NOD%      (Inputs the destina-
tion node address.)
1355         INPUT "          PORT Addr. = ";PORT%      (Inputs the destina-
tion port address.)
1360         INPUT "          ICF(0/1/2) = ";TYP%      (Type of data.
(Command/Response/Response not required.))
1365         INPUT "          SID          = ";SID%      (Inputs the service
ID.)
1370         PRINT "    Send Data ....."      (Inputs the transmission data.)
1375         LINE INPUT TEXTS$
1380         INPUT "          MODE(0/1/2) = ";RS%      (Inputs the input
mode (destination packet/continue/internal buffer clear input).)
1385         CODE% = 1      (Designates the ASCII code.)
1390         CALL ABSOLUTE (SEG CODE%, SEG NET%, SEG NOD%, SEG PORT%, SEG TYP%,
SEG SID%, SEG TEXTS$, SEG RS%,slksend%)      (Executes the transmission of the message.)
1395         IF RS% <> 0 THEN
1400             PRINT "SLKSEND ERROR !!!"
1405             PRINT "          Return Status = ";RS%
1410         ELSE
1415             PRINT "OK ! Return Status = ";RS%
1420         END IF
1425     END SUB
1430     '
1435     '##### SLKRECV #####
1440     SUB Subrecv STATIC
1445         PRINT "SLKRECV ....."

```

```

1450      slkrecv% = 4 * 3
1455      TEXT$ = SPACE$(542 * 2)
1460      CODE% = 1
1465      CALL ABSOLUTE (SEG CODE%, SEG NET%, SEG NOD%, SEG PORT%, SEG TYP%,
SEG SID%, SEG TEXT$, SEG LENG%, SEG RET%, SEG RC%, slkrecv%)      (Executes reception
of message (1).)
1470      PRINT "          Source NET  Addr. = "; NET%      (Displays the sender net-
work address.)
1475      PRINT "          NODE Addr. = "; NOD%      (Displays the sender node
address.)
1480      PRINT "          PORT Addr. = "; PORT%      (Displays the sender port
address.)
1485      PRINT "          ICF(0/1/2) = ";TYP%      (Displays the type of data.
(Command/Response/Response not required.))
1490      PRINT "          SID          = ";SID%      (Displays the service ID.)
1495      PRINT "          RECV Data Length = ";LENG%      (Displays the length of the
reception data by the number of bytes.)
1500      PRINT "          Remain Data Length= ";RC%      (Displays the number of the
remaining bytes of the data.)
1505      IF RET% <> 0 THEN
1510          PRINT "SLKRCVW ERROR !!!"
1515          PRINT "          Return Status = ";RET%
1520      ELSE
1525          print "OK ! Return Status = ";RET%
1530          PRINT RTRIM$(TEXT$)
1535      END IF
1540 END SUB
1545 '
1550 '##### SLKRCVW #####
1555 SUB Subrcvw STATIC
1560      PRINT "SLKRCVW ....."
1565      slkrcvw% = 5 * 3
1570      TEXT$ = SPACE$(542 * 2)
1575      INPUT "          Wait Timer Count = ";TIM%      (Inputs the time re-
quired for reception (X 100ms).)
1580      CODE% = 1
1585      CALL ABSOLUTE (SEG CODE%, SEG NET%, SEG NOD%, SEG PORT%, SEG TYP%,
SEG SID%, SEG TEXT$, SEG LENG%, SEG RET%, SEG RC%, SEG TIM%, slkrecv%) (Executes
reception of message (2) (with designation of waiting time).)
1590      PRINT "          Source NET  Addr. = "; NET%      (Displays the transmission
network address.)
1595      PRINT "          NODE Addr. = "; NOD%      (Displays the transmission
node address.)
1600      PRINT "          PORT Addr. = "; PORT%      (Displays the transmission
port address.)
1605      PRINT "          ICF(0/1/2) = ";TYP%      (Displays the type of data.
(Command/Response/Response not required.))
1610      PRINT "          SID          = ";SID%      (Displays the service ID.)
1615      PRINT "          RECV Data Length = ";LENG%      (Displays the length of the
reception data by the number of bytes.)

```

```

1620          PRINT "          Remain Data Length= ";RC%          (Displays the number of the
remaining bytes of the data.)
1625          IF RET% <> 0 THEN
1630              PRINT "SLKRECV ERROR !!!"
1635              PRINT "          Return Status = ";RET%
1640          ELSE
1645              print "OK ! Return Status = ";RET%
1650              PRINT RTRIM$(TEXT$)
1655          END IF
1660 END SUB
1665 '
1670 '##### SLKREAD #####
1675 SUB Subread STATIC
1680          PRINT "SLKREAD ....."
1685          slkread% = 6 * 3
1690          TEXT$ = SPACE$(5932 * 2)
1695          INPUT "          Read Data Offset [byte]          =";OFS%          (Inputs the
start address from which the data is read.)
1700          Input "          All Read Data Length [byte] = ";LENG%          (Inputs the
number of bytes of the data to be read.)
1705          CODE% = 1          (Designates the ASCII code.)
1710          CALL ABSOLUTE (SEG CODE%, SEG OFS%, SEG TEXT$, SEG LENG%, SEG
RET%, SEG RC%, slkread%)          (Reads the data of the data link area.)
1715          PRINT "          Read Data Length [byte]          =";LENG%          (Displays
the number of bytes of the TEXT$ stored data.)
1720          PRINT "          Remain Data Length [byte] = ";RC%          (The num-
ber of bytes of the remaining data.)
1725          IF RET% <> 0 THEN
1730              PRINT "SLKREAD ....."
1735              PRINT "          Return Status = ";RET%
1740          ELSE
1745              print "OK ! Return Status = ";RET%
1750              PRINT RTRIM$(TEXT$)          (Displays the data to be read.)
1755          END IF
1760 END SUB
1765 '
1770 '##### SLKWRITE #####
1775 SUB Subwrite STATIC
1780          PRINT "SLKWRITE ....."
1785          slkwrite% = 7 * 3
1790          INPUT "          Write Data Offset [byte] = ";OFS%          (Inputs the
start address to which the data is written.)
1795          PRINT "          Write Data ....."
1800          LINE INPUT TEXT$          (Inputs the data to be written.)
1805          INPUT "          MODE(0/1/2)          = ";RS%          (Inputs the
input mode (final data/continue/internal buffer area).)
1810          CODE% = 1          (Designates the ASCII code.)
1815          CALL ABSOLUTE (SEG CODE%, SEG OFS%, SEG TEXT$, SEG RS%, slkwrite%)
(Writes the data to the data link area.)

```

```

1820      IF RS% <> 0 THEN
1825          PRINT "SLKWRITE ERROR !!!"
1830          PRINT "          Return Status = ";RS%
1835      ELSE
1840          print "OK ! Return Status = ";RET%
1845      END IF
1850  END SUB
1855  '
1860  '##### SLKSTATRD #####
1865  SUB Substat STATIC
1870      PRINT "SLKSTATRD ....."
1875      slkstatrd% = 8 * 3
1880      TEXT$ = SPACE$(50 * 2)
1885      CODE% = 1      (Designates the ASCII code.)
1890      CALL ABSOLUTE (SEG CODE%, SEG TEXT$, SEG LENG%, SEG RET%,
slkstatrd%)      (Reads the status.)
1895      PRINT "          Read Data Length [byte] = ";LENG%      (Displays the num-
ber of bytes of the data to be read.)
1900      IF RET% <> 0 THEN
1905          PRINT "SLKSTATRD ERROR !!!"
1910          PRINT "          Return Status = ";RET%
1915      ELSE
1920          print "OK ! Return Status = ";RET%
1925          PRINT TEXT$      (Displays the data to be read.)
1930      END IF
1935  END SUB
1940  '
1945  '##### SLKCMD #####
1950  SUB Submycmd STATIC
1955      PRINT "SLKCMD ....."
1960      slkcmd% = 10 * 3
1965      INPUT "          CMD% (ENTRY[0]/LRAVE[1]) = ";CMD%      (Input for entering
or leaving the network.)
1970      CALL ABSOLUTE (SEG CMD%, SEG RET%, slkcmd%)
1975      IF RET% <> 0 THEN
1980          PRINT "SLKCMD ERROR !!!"
1985          PRINT          Return Status = ";RET%
1990      ELSE
1995          print "OK ! Return Status = ";RET%
2000      END IF
2005  END SUB

```

## 8-2 SYSMAC LINK Test Program

The following sample program is used to test the operation of Support Board commands; it is intended to be used as a reference when developing programs.

```

'
'      IBM BASIC Compiler/2 TEST PROGRAM
'
'      BASCOM      SLKTEST;
'      LINK        SLKTEST.OBJ+SLKIBMBS.OBJ;
'
'
1000  '
1030  PRINT "SYSMAC LINK TEST PROGRAM"
1040  PRINT "PROGRAM SELECT"
1050  PRINT "1.SLKOPEN      2.SLKCLOSE      3.SLKSEND      4.SLKRECV      5.SLKRCVW"
1060  PRINT "6.SLKREAD      7.SLKWRITE      8.SLKSTATRD  9.SLKMENTRD  10.SLKCMD"
1070  INPUT "      SELECT PROGRAM NO. =>",PGNO%
1080  PRINT
1090  IF PGNO%=1 THEN 1210
1100  IF PGNO%=2 THEN 1260
1110  IF PGNO%=3 THEN 1310
1120  IF PGNO%=4 THEN 1440
1130  IF PGNO%=5 THEN 1680
1140  IF PGNO%=6 THEN 1930
1150  IF PGNO%=7 THEN 2140
1160  IF PGNO%=8 THEN 2250
1170  IF PGNO%=9 THEN 2440
1180  IF PGNO%=10 THEN 2630
1190  IF PGNO%=0 THEN END ELSE GOTO 1040
1210  'slkopen
1230  CALL SLKOPEN(RET%)
1235  'DECLARE SUB NSBOPEN ALIAS "SLKOPEN" (RET%)
1237  'NSBOPEN RET%
1240  PRINT "      SLKOPEN STATUS CODE =>";RET%
1250  GOTO 1040
1260  'slkclose
1280  CALL SLKCLOSE(RET%)
1290  PRINT "      SLKCLOSE STATUS CODE =>";RET%
1300  GOTO 1040
1310  'slksend
1330  PRINT "      SLKSEND PARAMETER SET"
1340  INPUT "      NET%      =>",NET%
1350  INPUT "      NOD%      =>",NOD%
1360  INPUT "      PORT%     =>",PORT%
1370  INPUT "      TYPE%     =>",TYPED%
1380  INPUT "      SID%      =>",SID%

```

```
1390 INPUT "      TEXT$      =>",TEXT$
1400 INPUT "      RS%        =>",RS%
1410 CALL SLKSEND(NET%, NOD%, PORT%, TYPED%, SID%, TEXT$, RS%)
1420 PRINT "      SLKSEND STATUS CODE=";RS%
1425 print "text$ = ";text$
1430 GOTO 1040
1440 'slkrecv
1460 RS%=-1:TYPED%=-1:SID%=-1:NET%=-1:NOD%=-1:PORT%=-1:LENG%=-1:ORG%=-1:RET%=-1
1470 PRINT "      SLKRECV PARAMETER SET"
1480 TEXT$=""
1490 INPUT "      TEXT$ SIZE (0-255)  =>",LN%
1500 IF LN% = 0 THEN 1540
1510 FOR I=1 TO LN%
1520     TEXT$=TEXT$+" "
1530 NEXT I
1540 CALL SLKRECV(NET%, NOD%, PORT%, TYPED%, SID%, TEXT$, LENG%, RET%, RC%)
1550 IF RET% = 0 THEN
1560     PRINT "      TYPE%      =>",TYPED%
1570     PRINT "      SID%       =>",SID%
1580     PRINT "      NET%       =>",NET%
1590     PRINT "      NOD%       =>",NOD%
1600     PRINT "      PORT%      =>",PORT%
1610     PRINT "      LENG%      =>",LENG%
1620     PRINT "      RC%       =>",RC%
1630     PRINT "      RECV DATA(TEXT$)      =>",TEXT$
1640 ELSE
1650     PRINT "      SLKRECV STATUS CODE=>";RET%
1660 END IF
1670 GOTO 1040
1680 'slkrcvw
1700 RS%=-1:TYPED%=-1:SID%=-1:NET%=-1:NOD%=-1:PORT%=-1:LENG%=-1:ORG%=-1:RET%=-1
1710 PRINT "      SLKRVCW PARAMETER SET"
1720 INPUT "      TEXT$ SIZE (0-255)  =>",LN%
1730 INPUT "      TIME      =>",TIM%
1740 TEXT$=""
1750 IF LN% = 0 THEN 1790
1760 FOR I%=1 TO LN%
1770     TEXT$=TEXT$+" "
1780 NEXT I%
1790 CALL SLKRVCW(NET%, NOD%, PORT%, TYPED%, SID%, TEXT$, LENG%, RET%, RC%,
TIM%)
1800 IF RET% = 0 THEN
1810     PRINT "      TYPE%      =>",TYPED%
1820     PRINT "      SID%       =>",SID%
1830     PRINT "      NET%       =>",NET%
1840     PRINT "      NOD%       =>",NOD%
1850     PRINT "      PORT%      =>",PORT%
```

```
1860     PRINT "    LENG%    =>", LENG%
1870     PRINT "    RC%      =>", RC%
1880     PRINT "    RCVW DATA(TEXT$)  =>", TEXT$
1890 ELSE
1900     PRINT "    SLKRCSVW STATUS CODE=>";RET%
1910 END IF
1920 GOTO 1040
1930 'slkread
1950 RET%=-1
1960 PRINT "    SLKREAD PARAMETER SET"
1970 TEXT$=""
1980 INPUT "    LENG%    =>", LENG%
1990 INPUT "    OFS%     =>", OFS%
2000 INPUT "    TEXT$ SIZE (0-255)      =>", LN%
2010 IF LN% = 0 THEN 2050
2020 FOR I=1 TO LN%
2030     TEXT$=TEXT$+" "
2040 NEXT I
2050 CALL SLKREAD(OFS%, TEXT$, LENG%, RET%, RC%)
2060 IF RET% = 0 THEN
2070     PRINT "    RC%      =>", RC%
2080     PRINT "    LENG%    =>", LENG%
2090     PRINT "    READ DATA(TEXT$)  =>", TEXT$
2100 ELSE
2110     PRINT "    SLKREAD STATUS CODE=>";RET%
2120 END IF
2130 GOTO 1040
2140 'slkwrite
2160 RET%=-1
2170 PRINT "    SLKWRITE PARAMETER SET"
2180 TEXT$=""
2190 INPUT "    RS%      =>", RS%
2200 INPUT "    OFS%     =>", OFS%
2210 INPUT "    WRITE DATA(TEXT$) =>", TEXT$
2220 CALL SLKWRITE(OFS%, TEXT$, RS%)
2230     PRINT "    SLKWRITE STATUS CODE=>";RS%
2240 GOTO 1040
2250 'slkstatrd
2270 RET%=-1
2280 PRINT "    SLKSTATRD PARAMETER SET"
2290 INPUT "    TEXT$ SIZE (0-255)  =>", LN%
2300 TEXT$=""
2310 IF LN% = 0 THEN 2360
2320 FOR I%=1 TO LN%
2330 IF LN% = 0 THEN 2360
2340     TEXT$=TEXT$+" "
```

```
2350 NEXT I%
2360 CALL SLKSTATRD(TEXT$, LENG%, RET%)
2370 IF RET% = 0 THEN
2380     PRINT "    STATUS DATA(TEXT$)    =>",TEXT$
2390     PRINT "    LENG%    =>",LENG%
2400 ELSE
2410     PRINT "    SLKSTATRD STATUS CODE=>";RET%
2420 END IF
2430 GOTO 1040
2440 'slkmentrd
2460 RET%=-1
2470 LENG%=-1
2480 PRINT "    SLKMMENTRD PARAMETER SET"
2490 INPUT "    TEXT$ SIZE (0-255)  =>",LN%
2500 TEXT$=""
2510 IF LN% = 0 THEN 2550
2520 FOR I%=1 TO LN%
2530     TEXT$=TEXT$+" "
2540 NEXT I%
2541 'DECLARE SUB SLKMMENTRD(TEXT$, LENG%, RET%)
2542 'SLKMMENTRD TEXT$, LENG%, RET%
2550 CALL SLKMMENTRD(TEXT$, LENG%, RET%)
2560 IF RET% = 0 THEN
2570     PRINT "    MAINTENANCE DATA(TEXT$) =>",TEXT$
2580     PRINT "    LENG%    =>",LENG%
2590 ELSE
2600     PRINT "    SLKMMENTRD STATUS CODE=>";RET%
2610 END IF
2620 GOTO 1040
2630 'slkcmd
2650 CMD%=-1
2660 PRINT "    SLKCMD PARAMETER SET"
2670 INPUT "    CMD%    =>",CMD%
2680 CALL SLKCMD(CMD%, RET%)
2690 PRINT "    SLKCMD STATUS CODE=>";RET%
2700 GOTO 1040
```



## 8-3 Common Data Link Problems

Three minor problems that often occur with data link operation when the program is executed are described in this section.

### Problem 1

An error (error code 2201) occurs when the data link tables are transferred from the computer to the other nodes in the network.

#### Solution

Nodes that are part of an active data link cannot receive data link tables. Stop the data link, transfer the tables, and then start the data link again.

### Problem 2

Data cannot be written to another node's data link area.

#### Solution

It is normal not to be able to write to the parts of the data link area allocated to other nodes. It is only possible to write to the part of the data link area allocated to the Support Board; that data is automatically transferred to the other nodes in the network. Be careful to indicate the right part of the data link area when writing data.

### Problem 3

The data link was operating properly at first, but then the computer dropped out of the data link. All other nodes continue operating in the data link.

#### Solution

Unlike PCs, the data link tables in the Support Board are not backed up by a battery. If there is a power interruption or the computer is turned off, the data link tables will be erased from the Support Board. After turning on the computer, transfer the data link tables to the Support Board with the Table Load Utility or SYSMAC LINK Support Utility.

## SECTION 9

# Troubleshooting and Inspection

Information to help identify and correct errors that might occur is provided in this section. This section also includes inspection procedures that must be periodically performed.

9-1	Initialization Errors .....	122
9-2	Operating Errors .....	122
9-2-1	Indicators .....	123
9-2-2	Support Utility Error Messages .....	123
9-2-3	Error Codes .....	124
9-2-4	Node Status Errors .....	127
9-2-5	Data Link Status Errors .....	127
9-2-6	C/BASIC Command Errors .....	127
9-3	Periodic Inspection .....	128
9-3-1	Handling Precautions .....	129
9-3-2	Tools and Equipment Needed for Inspection .....	129

## 9-1 Initialization Errors

The SYSMAC LINK BIOS and SYSMAC LINK driver might not be loaded into memory properly if an error has been made in parameter settings.

### SYSMAC LINK BIOS

Error messages will appear if an error occurs as the SYSMAC LINK BIOS is loaded into memory.

Probable causes and remedies are listed below:

- 1, 2, 3... 1. Check whether the SYSMAC LINK Support Board is installed. If it isn't, install the Board and restart the computer.
2. Check whether the SYSMAC LINK BIOS option parameters are correct. If they aren't, set the options again and restart the computer.

### SYSMAC LINK Driver

Error messages will appear if an error occurs as the SYSMAC LINK driver is loaded into memory.

Probable causes and remedies are listed below:

- 1, 2, 3... 1. Check whether the SYSMAC LINK BIOS was correctly defined and registered first. If it wasn't, copy the SYSMAC LINK BIOS into the CONFIG.SYS file and restart the computer.
2. Check whether the SYSMAC LINK driver option parameters are correct. If they aren't, set the options again and restart the computer.
3. Was the /W option specified in the SYSMAC LINK BIOS options. This option cannot be specified when using the SYSMAC LINK driver. Reload the SYSMAC LINK BIOS without this option and restart the computer.

## 9-2 Operating Errors

There are several methods to determine the cause of errors that occur during Support Board operation. These methods are listed in the table below and described in detail later in this section.

Method	Reference
Checking the status of Support Board indicators.	9-2-1 Indicators
Checking Support Utility error messages displayed during operation.	9-2-2 Support Utility Error Messages
Checking error history. The error history can be checked with the Support Utility's error history function or the CV-mode command ERROR HISTORY READ (21 02).	9-2-3 Error Codes
Checking node status. The operational status of the network can be checked with the Support Utility's read node status function, the <i>slkstatrd</i> command, or the CV-mode command CONTROLLER STATUS READ (06 01).	9-2-4 Node Status Errors
Checking data link status. The operational status of the data link can be checked with the Support Utility's data link monitor function, the <i>slkstatrd</i> command, or the CV-mode command CONTROLLER STATUS READ (06 01).	9-2-5 Data Link Status Errors
Checking responses to C or BASIC commands.	9-2-6 C/BASIC Command Errors
Checking CV-mode command responses and end codes.	Refer to the CV500/CV1000 Operation Manual: Host Interface.

## 9-2-1 Indicators

The table below lists error conditions indicated by the Support Board indicators, their probable cause, and possible remedies.

Error indicator	Probable cause	Remedy
RUN indicator not lit	SYSMAC LINK Support Board faulty	Replace the Support Board.
	SYSMAC LINK Support Board not mounted securely.	Tighten screws to secure the Support Board.
	Host computer faulty.	Replace computer.
	SYSMAC LINK BIOS is not installed.	Install SYSMAC LINK BIOS.
ERC indicator lit	Communications controller faulty	Replace Support Board.
	Error in setting node address	Reset node address and restart the computer.
INS indicator not lit	Termination resistor connection faulty	Connect termination resistor correctly.
	Cable connection faulty	Connect cables correctly.
	Local node's node address greater than the maximum node address set in the polling unit's network parameters	Increase the maximum node address or decrease the local node address.
LNK indicator flashing	Data link table error on local node	Re-create data link tables.
	Error when reading data link table from file.	Re-create data link tables.
	Data link table of currently operating node and data link table of the local node don't match.	Stop data link and modify the data link tables (common link parameters) of either the currently operating node or the local node so they match.
	Local node has no data link tables.	Create data link tables.

## 9-2-2 Support Utility Error Messages

Error messages that might be displayed when using the Support Utility, the conditions they indicate, their probable cause, and possible remedies are listed below.

### General Error Messages

Message	Probable cause	Remedy
62 files already exist	The maximum number (62) of routing table files already exist.	Delete unneeded files or overwrite an existing file.
Drive not ready	The disk drive is empty.	Insert a disk into the disk drive.
Not enough disk space	There isn't enough free space on the disk.	Delete unneeded files from the disk or use a new disk.
Write-protected	The disk is write-protected.	Turn off the write-protect switch and execute the operation again.

### Communications Error Messages

Message	Probable cause	Remedy
Com controller err	The communication node is faulty and the Board has stopped functioning.	Replace the Support Board.
Communications error	The communications routing is incorrect or the specified node does not exist.	Check the communications routing and execute again.
Data differs	Data link table comparison revealed mismatch.	Correct the data link tables and execute again.
Data link is not active	The data link is not in operation.	Start the data link and execute again.
Dup nd addr err	The Support Board's node address is the same as another node's node address.	Check the other node addresses in the network and reset the Support Board's node address.

Message	Probable cause	Remedy
Error (xxxx)	The response to a CV-mode command indicates an error.	Check the parameters for the CV-mode command and execute again.
Memory error	The communication node is faulty and the Support Board has stopped functioning.	Replace the Support Board.
Monitor node - can't write	The local node does not have a write area in the data link area.	Correct the data link table.
Node adr set error	The Support Board's node address exceeds the acceptable range.	Set the node address from 1 to 62.
Not in data link	The data link table has not been set or the local node is not in the data link table.	Correct the data link table.
Not in data link - can't monitor	The data link table has not been set or the local node is not in the data link table.	Correct the data link table.
Not in data link - can't write	The data link table has not been set or the local node is not in the data link table.	Correct the data link table.
Not in network	The Support Board is not in the network or the destination node is not in the network (02 01 end code was returned).	Check whether the Support Board and destination node are in the network and execute again.
NSB does not exist	The Support Board is loose or not installed.	Install the Support Board and restart computer.
Parameters incorrect	Parameter settings are incorrect.	Correct the parameter settings and execute again.
Receive timeout	Error in parameter settings.	Check parameter settings.
Response err (xxxx)	The response to a CV-mode command is incorrect.	Check the parameters for the CV-mode command and execute again.
Routing tables do not exist	The routing table has not been set in the editing area.	Set the routing table in the editing area.
Self-test err	The communication node is faulty and data transfer is impossible.	Replace the Support Board.
Send timeout	Transmission timeout	Transmit data again.
System call error	SYSMAC LINK BIOS is not installed.	Install SYSMAC LINK BIOS.
Tx error	The Support Board's controller IC is faulty.	Replace the Support Board.
WDT error	The Support Board's controller IC is faulty.	Replace the Support Board.

### 9-2-3 Error Codes

The error codes recorded in the error history provide useful details on error conditions. The error codes are contained in the first word in 4-digit hexadecimal and, unless otherwise stated, the second word indicates the destination node and network, as shown below:

Word	Bit(s)	Function
First	00 to 15	Contains the error code in 4-digit hexadecimal.
Second	00 to 07	Contains the destination node address.
	08 to 14	Contains the destination network address.
	15	This bit is turned OFF to indicate a command, ON to indicate a response.

The table below lists error codes, the probable cause of errors, and recommended remedies.

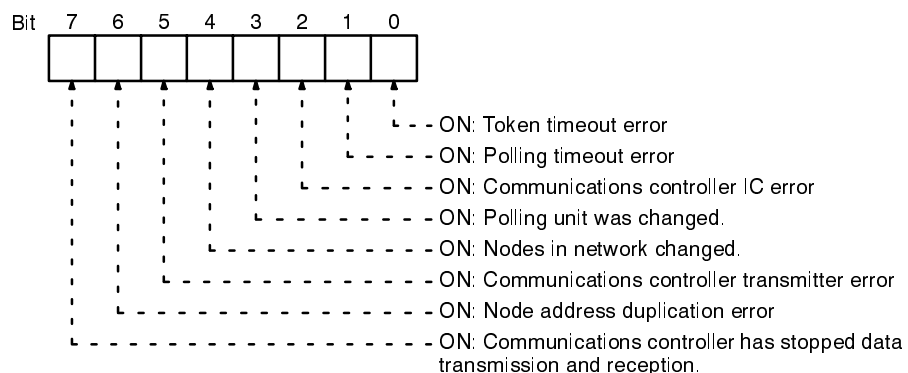
Error code	Probable cause	Remedy
0003	An error occurred in the RAM memory used by the Support Board and computer. A value of 0100 in the second word indicates cyclic, 0200 indicates event.	Check the operating conditions.
0101	Local node not part of Network	Add to Network.
0102	Token time-out, node address too high	Set the local node's node address below the maximum node address
0103	Number of transmit retries exceeded	Check communications with internode echo test. If the test fails, check network.
0104	Allowed number of frames exceeded	Either check the execution of events in the network and reduce the number of events occurring in one cycle, or increase the allowed number of frames.
0105	Node address setting error (range)	Make sure the node address is within specified range and that there are no duplicate node addresses.
0106	Node address duplication error	Make sure that there are no duplicate node addresses.
0107	Destination node not part of Network	Add to Network.
0108	No node with the specified node address	Check the destination node's node address and unit address.
0109	Busy error, destination node busy	Increase the number of transmit retry attempts or re-evaluate the system so that the destination node is not so busy receiving data.
010A	Error occurred in the communications controller	Replace the Support Board if the error message indicates a communications controller error
010B	Error occurred in the PC at the destination node	Clear the error in the CPU (refer to the PC's Operating Manual)
010D	Destination node address is not set in the routing table.	Make sure the destination node address is set in the routing table.
010E	Routing tables aren't registered.	Set the source nodes, destination nodes, and relay nodes in the routing tables.
010F	Routing table error	Set the routing tables correctly.
0110	The allowed number of relay nodes (2) was exceeded in the command.	Redesign the network or reconsider the routing tables to reduce the number of relay nodes in the command.
0111	The command is longer than the max. permissible length.	Check the command format of the command and set it correctly.
0117	The internal buffer is full.	Increase the number of transmit retry attempts or re-evaluate the system to reduce congestion.
0118	Received packet of data discarded because of incorrect content.	Check whether a node is transmitting incorrect data packets.

Error code	Probable cause	Remedy
0206	Nodes removed from network (not including the local node)  The first two digits of the second word indicate the maximum node address, and the last two digits indicate the number of nodes removed.	Check the network parameters, removed nodes, cable connections, and terminators.
0207	Nodes removed from network (including the local node)  The first two digits of the second word indicate the maximum node address, and the last two digits indicate the number of nodes removed.	Check the network parameters, removed nodes, cable connections, and terminators.
0208	The polling unit has been changed.  The first two digits of the second word indicate the old polling unit's node address, and the last two digits indicate the new polling unit's node address.	Check the old polling unit.
0209	Network parameters do not match.	Check the network parameters and reset them if necessary.
020C	Token time-out  The second word contains flags that indicate operational status of the network. See the diagram on error status flags below.	Check the network parameters, cable connections, and terminators.
0212	Communications controller has ceased data transmission and reception.  The second word contains flags that indicate operational status of the network. See the diagram on error status flags below.	Check the cables, connections, and terminators.

**Note** Errors indicated by error codes 0101 to 0111 are recorded only when the frame was discarded because transmission was impossible.

### Error Status Flags

The diagram below shows the function of the second word following the error code information for error codes 020C and 0212. (Bits 08 through 15 are 0.)



### 9-2-4 Node Status Errors

The table below describes conditions indicated in the node status information, the probable cause of errors, and recommended remedies.

Error	Probable cause	Remedy
Communications Controller error	Noise or environmental influences	Run an internode echo test; if an error occurs, recheck the operating environment.
	Consider replacing communications-related hardware if one of the following errors occurs: Communications Controller watchdog error Communications Controller memory error Communications Controller chip bad Transmitter in Communications Controller bad Local node internode echo test error	Reinitialize the SYSMAC LINK Support Board by toggling the computer's power. If the problem recurs, replace the Support Board.
Routing table error	There is an error in the routing tables.	Set the routing tables correctly.
Data link table error	There is an error in the data link tables.	Set the data link tables correctly.
Network parameters error	There is an error in the network parameters.	Set the network parameters correctly.
Network parameters mismatch	Network parameters being used in the currently operating Network do not match the network parameters set in the Unit in question.	Use the CVSS or host computer to check the network parameters and reset them if necessary.

### 9-2-5 Data Link Status Errors

The following table lists data link status errors, their probable cause, and possible remedies. Check all nodes in question.

Data link status	Probable cause	Remedy
Communications error ON	Error resulting from noise	Run an internode echo test; if the results are not OK, re-check the operating environment.
	Unit in question is not part of the Network	Add the Unit to the Network.
	Transmission cycle time too short	Increase transmission cycle time.
Node not in data link	Node in question is not part of the data link	Add the node in question to the data link.

### 9-2-6 C/BASIC Command Errors

The following table lists the response codes that might be returned after executing C or BASIC commands, the probable cause of errors, and recommended remedies.

Code	Probable cause	Remedy
0	Normal completion, no error	---
-1	Parameter settings are incorrect.	Correct the parameter settings and execute again.
-2	SYSMAC LINK driver is not open.	Open the driver and continue operation.
-3	SYSMAC LINK driver is already open.	Operation can continue.
-4	Local node is not in the network.	Add the Support Board to the network.
-7	Transmission timeout	Check the parameters and execute again.
-8	Local node is busy, transmission/reception buffer full	Reduce the number of transmissions or increase the number of receptions to reduce congestion.



Code	Probable cause	Remedy
-9	Internal buffer is full (transmission/write data is too long)	Make sure that the amount of data being transmitted or written to the data link area is within limits and execute again.
-10	System call error (SYSMAC LINK driver not installed)	Install the driver and execute again.
-14	Data link area specification error.	Check the data link area and parameters and execute again.
-16	Support Board error (The node address is incorrect or the Support Board itself is faulty.)	Use the <i>slkstatrd</i> command to check the Support Board's status and check the node address setting. If the problem recurs, replace the Support Board.
-25	After executing the <i>slkrcvw</i> command, the set time expired and data reception was cancelled.	Re-execute the command and increase the set time if necessary.
-26	After executing the <i>slkrcvw</i> command data reception was cancelled because the reception buffer was empty. (Standby time set to 0.)	Re-execute the command and increase the set time if necessary.
-27	After executing the <i>slkreclv</i> command, data reception was cancelled by pressing the ESC key.	Re-execute the command.
-29	Different parameters (NET%, NODE%, UNIT%, TYP%, or SID%) were used in the commands when transmitting a large batch of data in more than one packet with BASIC SLKSEND commands. A different parameter (OFS%) must be used when using the BASIC SLKWRITE function to write in parts.	Use the same parameters as the earlier commands and execute again.

## 9-3 Periodic Inspection

SYSMAC LINK Support Boards must be inspected on a regular basis to ensure correct operation. SYSMAC LINK Support Boards are built primarily of solid-state components and contain almost no parts subject to wear. Nevertheless, the life span of some solid-state components can be shortened as a result of adverse environmental conditions.

We recommend that the following points be checked at least once every 6 to 12 months as part of a standard inspection program. More frequent inspections might be required depending on the location in which the Support Board is being

used. If any of these items deviate from the prescribed standards, take appropriate action to correct the condition.

Item	Description
Ambient conditions	Temperature and humidity should be within the computer's acceptable ranges. Dust should not be allowed to accumulate and a dust-free location is recommended.
Installation	Is the Support Board installed securely? Cable connectors tight? Power supply connections tight? Cabling used for external wiring intact (no breaks)?

We recommend that users have a backup Support Board available to make repairs and minimize down-time if a problem occurs in a SYSMAC LINK Support Board.

### 9-3-1 Handling Precautions

Please observe the following precautions in the event of a problem:

- Always turn the computer's power off when replacing a SYSMAC LINK Support Board.
- If a SYSMAC LINK Support Board fails, replace it with a new one and immediately verify that the new Support Board is working properly.
- When returning a malfunctioning SYSMAC LINK Support Board for repair, please attach a detailed description of the problem to the Support Board and return it to the sales office nearest you (see listing at the end of this publication).
- If you suspect that a poor connection is the cause of a malfunction, clean the connectors using a clean, soft cloth and industrial-grade alcohol. Remove any lint or threads left from the cloth, and re-mount the SYSMAC LINK Support Board.

### 9-3-2 Tools and Equipment Needed for Inspection

The following tools and equipment will be needed to perform inspection and adjustments:

- Assorted flat-blade and Phillips screwdrivers
- Circuit tester or digital voltmeter
- Industrial-grade alcohol and clean cotton cloth
- Synchroscope
- Pen-chart recording oscilloscope
- Thermometer, hygrometer

# Appendix A

## Standard Models

### SYSMAC LINK System Components

Name	Model
SYSMAC LINK Support Board Set*	3G8F5-SLK21-E
CV-series SYSMAC Host Link Unit	CV500-LK201
C-series SYSMAC LINK Units	C200H-SLK21-V1
	C1000H-SLK21-V1
F-adapter	C1000H-CE001
Termination Resistor	C1000H-TER01

**Note** \*The SYSMAC LINK Support Board Set includes the Support Board itself, SYSMAC LINK Support Software, network control software, and an F-adapter.

# Appendix B

## Specifications

### Communications Specifications

Item	Specification
Model number	3G8F5-SLK21-E
Weight	Approximately 250 g (not including mounting bracket)
Current consumption	0.6 A max.
Communications method	Token ring (N:N)
Transmission method	Manchester encoding, baseband
Data transmission rate	2 Mbps
Media	Coaxial cable (5C-2V)
Media format	Bus
No. of nodes	62 max.
Distance between nodes	Total: 1 km
Message length	512 bytes max. (not including header)
Connectors	BNC (F-adaptor)
Link functions	Data link, data read/write service
Data link link words	2,966 words max. (918 words max. with C200H in data link)
Send buffer capacity	552 bytes (see note)
Receive buffer capacity	552×10 bytes (see note)
RAS functions	Automatic polling unit backup, self-diagnostics (internode echo tests), watchdog timer, error checking (CRC-CCITT) generating function = $X^{16} + X^{12} + X^5 + 1$

**Note** These buffers are built into the Support Board itself; they are different from the buffers set with the SYSMAC LINK drivers /B option.

# Index

## A—B

- allowed number of frames, 6
- BASIC commands, 95
  - SYSMAC LINK CLOSE, 95
  - SYSMAC LINK COMMAND, 107
  - SYSMAC LINK OPEN, 95
  - SYSMAC LINK READ, 102
  - SYSMAC LINK RECEIVE, 98
  - SYSMAC LINK RECEIVE WAIT, 100
  - SYSMAC LINK SEND, 96
  - SYSMAC LINK STATUS READ, 105
  - SYSMAC LINK WRITE, 104
- broadcast test, 11, 67

## C

- C commands, 84
  - SYSMAC LINK CLOSE, 84
  - SYSMAC LINK COMMAND, 93
  - SYSMAC LINK OPEN, 84
  - SYSMAC LINK READ, 90
  - SYSMAC LINK RECEIVE, 86
  - SYSMAC LINK RECEIVE WAIT, 88
  - SYSMAC LINK SEND, 85
  - SYSMAC LINK STATUS READ, 92
  - SYSMAC LINK WRITE, 91
- cables, connecting transmission cables, 18, 19
  - components, 19
- commands, 79
  - BASIC, 79, 95
    - IBM BASIC Compiler, 81
    - Quick BASIC, 80
  - C, 79, 84
    - compiler, 79
    - links, 79
- common link parameters, 8
- communications
  - specifications, 133
  - testing
    - broadcast test, 11, 67
    - echo-back test, 11, 65
- control cycle, definition, 6
- control unit
  - backup, 11
  - definition, 5
- copying
  - files, 22
  - update parameters, 38

## D

- data link, 6
  - activating, 8
  - areas, 7
  - common link parameters, 8, 9
  - comparing, 44
    - displaying results, 47
  - data flow, 10
  - data link area, definition, 7
  - deleting, 48
  - edit, 33
    - common link parameters, 33
    - update parameters, 35
  - errors, 127
  - initializing, 39
  - monitoring, 51
    - data link area, 52
    - node status, 51
  - operation, 76
  - problems, 120
  - sample program, 110
  - start-up node, 5
  - starting, 50
  - status, 9
  - stopping, 50
  - tables, 7
    - examples, 9
  - transferring, 39
    - computer to nodes, 43
    - nodes to computer, 40
  - update parameters, 8, 9
  - writing, data link area, 53
- data read/write services, 10, 77
  - reception, 11
  - transmission, 10
- DIP switch, 15
- drivers, 31

## E

- echo-back, 11
- echo-back test, 65
- error log function, 11, 70
- errors
  - BASIC commands, 127
  - C commands, 127
  - data link status, 127
  - error codes, 124
  - error log function, 11, 70
  - error status flags, 126
  - indicators, 123
  - initialization, 122
    - BIOS, 122
    - driver, 122
  - node status, 127
  - Support Utility error messages, 123
- Esc Key, 29

## F–I

files  
  copying, 22  
  starting, 30

function keys, 29

indicators, 14

inspection, 128  
  handling, 129  
  tools and equipment needed, 129

installation, 17  
  SLSS, 23  
    BIOS, 23  
    SYSMAC LINK driver, 24

interrupt line connector, 15

## K–N

keyboard, 29  
  function keys, 29

LED indicator. *See* indicators

libraries, 79  
  BASIC, 79  
    IBM BASIC Compiler/2, 81  
    Quick BASIC, 80  
  C, 79  
    compiler, 79  
    links, 79

main menu, 28

maximum node address, 6

network  
  configuration, 3  
  control, 5  
  parameters, 6  
    setting, 54  
  status, 68

number of polling units, 6

## P–R

precautions, handling, 129

program  
  sample data link program, 110  
  sample network testing program, 116

RAS, 11

routing tables, 3  
  deleting, 63  
  editing, 56  
    local network, 56  
    relay network, 60  
  transferring, 61  
    computer to nodes, 62  
    nodes to computer, 61

## S

sample program  
  data link, 110  
  procedure, 110  
  special key functions, 110  
  network testing program, 116

screen displays  
  data link, 30  
  main menu, 28  
  routing table, 30

SLCC  
  checking, 25  
  exiting, 25  
  starting, 24

SLSS  
  copying, 22  
  files, 22

specifications, 133

standard models, 131

start-up node, definition, 5

status  
  network, 68  
  read, 69  
  read node, 72

Support Utility, 31  
  data link, 32  
  exiting, 32  
  network, 32  
  reading tables, 31  
  starting, 31

switches  
  DIP, 15  
  interrupt line connector, 15  
  node address, 16  
  setting, 15

SYSMAC LINK System, multilevel, 3

SYSMAC LINK Unit, components, 14

## T–U

table load utility, 77  
  messages, 78  
  syntax, 78

test  
  broadcast, 11, 67  
  echo-back, 11, 65

token, definition, 6

token cycle, definition, 6

transmission cycle, 6

transmission cycle time, 6  
  definition, 6

update cycle time, 6

## Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.

Cat. No. W220-E1-1A

↑  
Revision code

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	January 1993	Original production
1A	March 1993	<b>Page 131:</b> Model numbers corrected.