Chapter 6 Communication program

6.1 Programming method

In Mnet and Fnet communication module, programming methods are divided into three :

– **High speed link**

High speed link is used when other station's data or information is exchanged in each given time and cyclically. Self or other station's data being in changing can be effectively used for operating system through cyclically referring, and the communication can be performed only through setting parameters.

For how to set, specify other station area and self area to be sent/received in parameter of GMWIN, specify data size, speed, and station number, and then perform communication.

For data size, 1(16 points)~12,800 words for Mnet, and 1~3,840 words for Fnet can be communicated, and for communication cycle, 20ms~10sec. can be set according to communicating contents. Because simple parameter setting enables communication with other station, it is easy to use, and internal data processing is also high speed, thus many data can be cyclically processed at a time.

– **Function block**

High speed link is a cyclic communication, but the communication through function block is a service that communicates when special event occurs to perform communication with other station. Function block can be used when other station has error, which is sent to another station, or special contact is entered to communicate. For how to prepare programming, using function block according to data type previously created in GMWIN program mode, specify the enable conditions, the module position in which communication module is mounted, station number, data area of self station, and other station area, and then prepare it. High speed link has unit of word(16 points) as data size, but function block has Bit, Byte, and Word, etc. as data size depending on data type to communicate with other station.

– **Simultaneous use of high speed link and function block**

For some data, high speed link and function block can be simultaneously used for program when the appropriate contents is sent if Tx/Rx of data are cyclically performed, and special event occurs.

Table 6.1 Difference between *high speed link* operation and operation through *function block*

Contents	*High speed link*	*Function block*
Basic unit of Tx/Rx data	1 word(16 points)	Available according to data type Ex.) Bit, Byte, Word…
Communication cycle	20ms~10sec.	Used whenever *function block* enable condition is started up.
Module available for communication	Used between Mnet/Fnet GLOFA communication modules	Used for communication with Mnet/Fnet communication module and other company's communication module(Mini-Map only).
Specifying station number	Used by setting station number of the front of communication module in parameter	Fnet uses the station number of the front of communication module, and Mnet uses MAC address.
How to operate	Parameter setting→downloading to PLC→*high speed link* allowed→RUN	Compiling→downloading to PLC→RUN
Control through CPU operation mode key	Used if *high speed link* is allowed even in state that CPU module is RUN, STOP, and PAUSE.	Performs operation according to key status of CPU module.

6.2 *High speed link*

6.2.1 Introduction

High speed link is a communication service which transmits data by setting link parameter, and a high speed data transmitting service that can exchange data through setting size of Tx/Rx(Transmission and Receive) data, period of Tx/Rx, area of Tx/Rx, and area of storage with *high speed link* parameters of GMWIN.

– Function of *high speed link* block setting :

1) If there are many Tx/Rx areas, Max. 64 blocks of each 32 of Tx/Rx can be set.
2) Mnet module can be set up to 200 words and Fnet can be set up to 60 words per block.
3) Max. link point can be used up to 12,800 words in Mnet module, and 3,840 words in Fnet module.

– Function of Tx/Rx period setting :

User can set the period of Tx/Rx according to each block, and the period of Tx/Rx can be set from 20ms to 10sec according to the area that quick Tx/Rx is specially needed or not.

– Function of Tx/Rx area setting :

Tx/Rx area can be set according to data block in GMWIN depending on user's I/O.

– **Function of *high speed link* information providing :**
High speed link information is provided to user through GMWIN user keyword, so reliable communication system can be constructed easily.

Table 6.2.1 Max. *high speed link* points according to device type

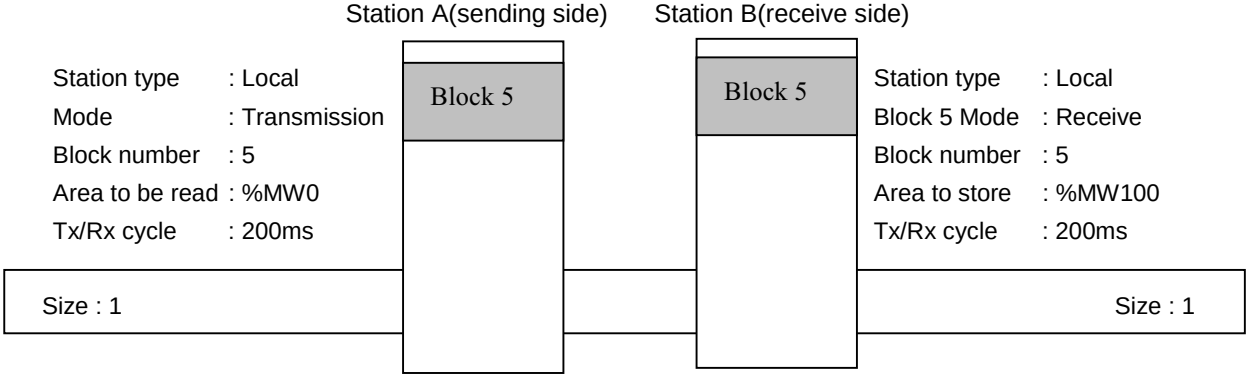
Segments		Max. number of points for communication	Max. number of points for transmission	Max. block number	Max. number of points per block	Remark
Mnet communicat-ion module	G3L-MUEA	12,800 word	6,400 word	64(0~63)	200 word	
	G0L-MUEA	12,800 word	6,400 word	64(0~63)	200 word	
Fnet communicat-ion module	G3L-FUEA/FUOA	3,840 word	1,920 word	64(0~63)	60 word	Identical value for electric/ optical
	G3L-RBEA/RBOA	3,840 word	1,920 word	64(0~63)	60 word	
	G4L-FUEA	3,840 word	1,920 word	64(0~63)	60 word	
	G4L-RBEA	3,840 word	1,920 word	64(0~63)	60 word	
	G5L-FUEA	3,840 word	1,920 word	64(0~63)	60 word	
	G0L-FUEA	3,840 word	1,920 word	64(0~63)	60 word	
	G6L-FUEA	3,840 word	1,920 word	64(0~63)	60 word	

6.2.2 Tx/Rx data processing of *high speed link*

Tx/Rx data processing in *high speed link* can be described as follows(Ex. of local communication) :

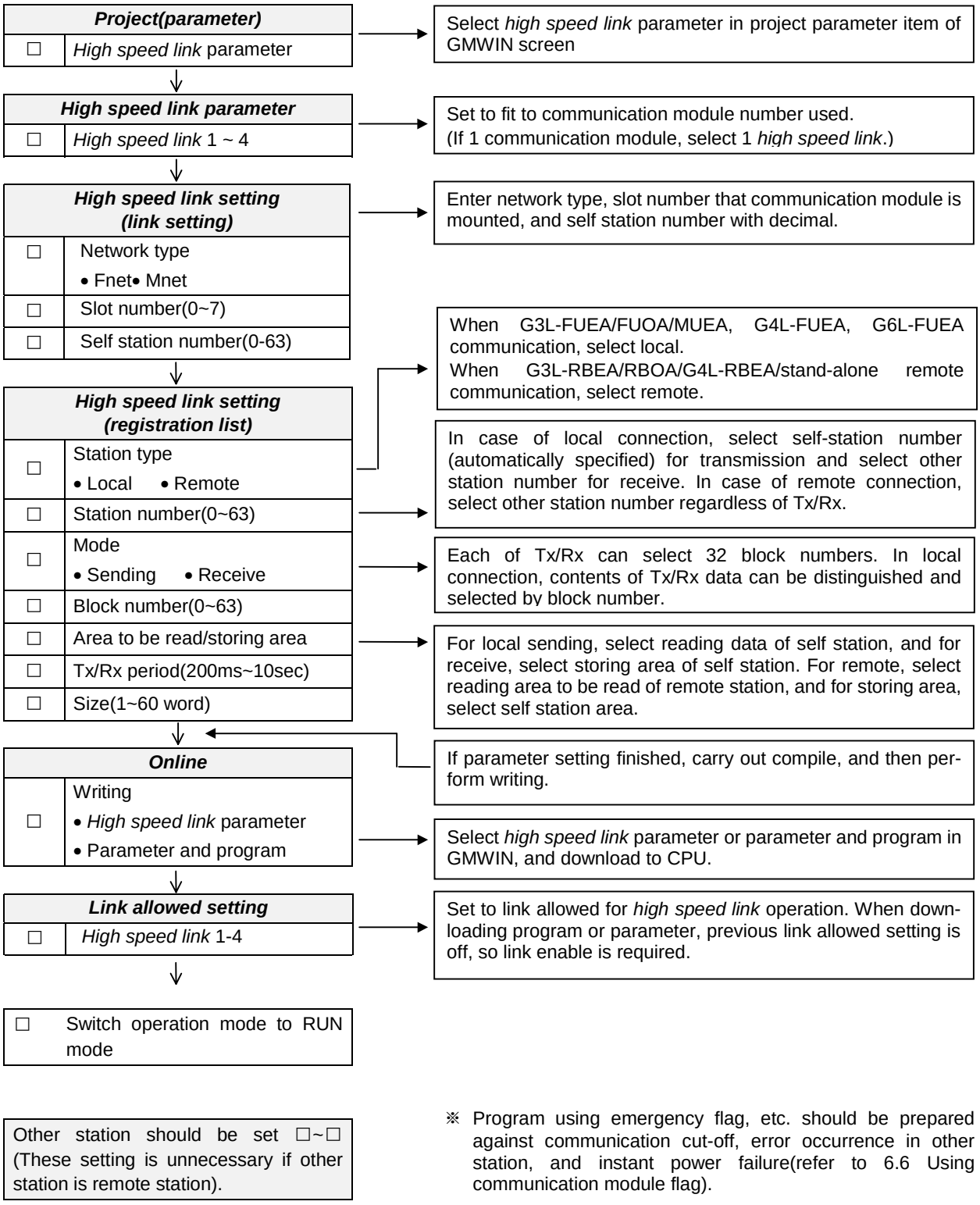
Ex.) When A station sends %MW0 data, and B station receives the data %MW0 from A station and stores it to %MW100 of B station.

In *high speed link* parameter, there are each 32 block numbers for transmission and receive that is used to send/receive data, block number can be specified from 0 to 63 to use for transmission or receive. When sending data, the sending side may determine only which data is read and what number of block the data is sent to. The other station number, therefore, is unnecessary to be specified(excluding remote communication). Here, it is supposed that A station parameter has data %MW0 as area to be read, mode is transmission, and block number is optional No.5.
Because the receive side(B station) has to receive the data of the A station that is sending data %MW0 through block number No.5, the B station *high speed link* parameter must have the mode set to receive, the station number set to A, the block number 5, and storing area %MW100. As a caution, receive side must receive data through the same block number as the number sent from sending side. Sending side can use various block numbers through various station numbers to send data, so verify which data is sent and what number of block the data is sent to, and receive the data through the corresponding block number. Only if so, the required data can be received.



* For communication parameter setting with remote module, see 6.2.4 *high speed link* parameter setting.

6.2.3 Operation procedure by *high speed link*



※ Program using emergency flag, etc. should be prepared against communication cut-off, error occurrence in other station, and instant power failure(refer to 6.6 Using communication module flag).

6.2.4 Parameter setting of *high speed link*

To select *high speed link* parameter, select link parameter in project screen of GMWIN, and set appropriate item. Setting sequence and functions according to items are as follows:

1) Setting project of GMWIN

If *high speed link* parameter is selected in project basic screen of Fig. 6.2.4(A), the *high speed link* parameter base screen is opened as Fig. 6.2.4(B), and the appropriate item can be selected.

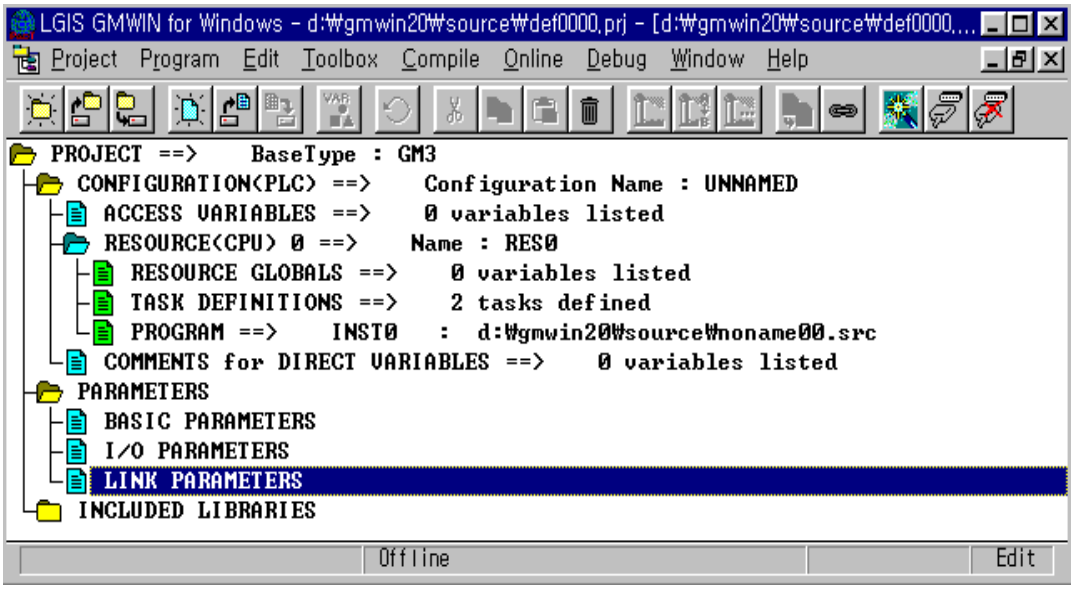


Fig. 6.2.4(A) Basic screen of GMWIN project

2) Selecting link parameter

(1) How to set : Fig. 6.2.4(B) is setting *high speed link* parameter in project screen.

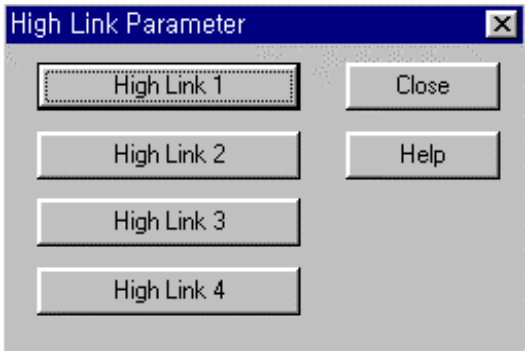


Fig. 6.2.4(B) Base screen of *high speed link* parameter

(2) Setting function : *High speed link* 1~4 items of Fig. 6.2.4(B) means max. number of mountable communication modules according to PLC CPU type. GLOFA GM1/GM2/GM3 CPU are mountable up to 4 units, and GLOFA GM4 is up to 2 units.

A) If 1 communication module is used, select *high speed link* 1.

B) For one communication module, only one *high speed link* parameter can be set.

Table 6.2.4(A) shows communication type and max. number of mountable units according to GLOFA CPU unit.

Table 6.2.4(A) Mounting of communication module according to CPU type

Segments	Communication module	Max. number of mounting devices	Remark
GLOFA-GM1	G3L-MUEA, G3L-FUEA, G3L-FUOA	4	Each of communication module can be combined.
GLOFA-GM2			
GLOFA-GM3			
GLOFA-GM4	G4L-FUEA	2	
GLOFA-GM5	G5L-FUEA	1	
GLOFA-GM6	G6L-FUEA	2	

3) Link parameter setting

If the appropriate parameter is selected in parameter setting base screen of Fig. 6.2.4(B), *high speed link* parameter setting window opens as Fig. 6.2.4(C), and the initial values are displayed as figure when first setting of parameters.

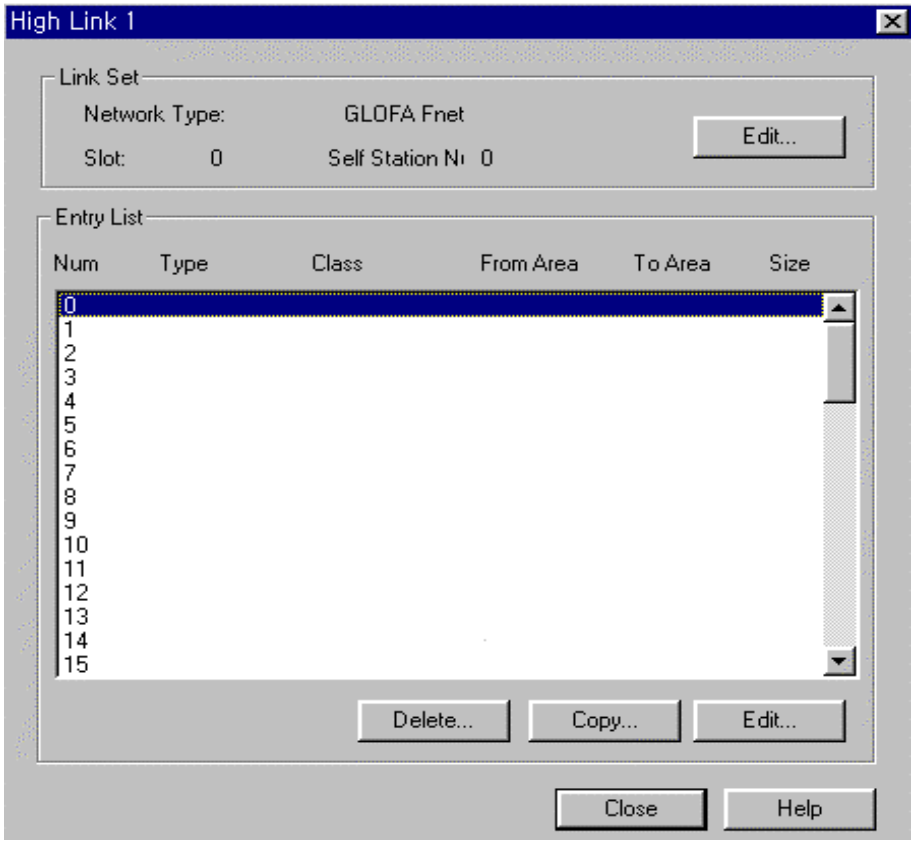


Fig. 6.2.4(C) Initial screen of parameter setting

Initial screen of parameter setting is composed of 'Link setting' and 'Registration list'. How to set and functions are as follows :

(1) Link setting

Link setting is to set basic items of communication module to perform *high speed link*.

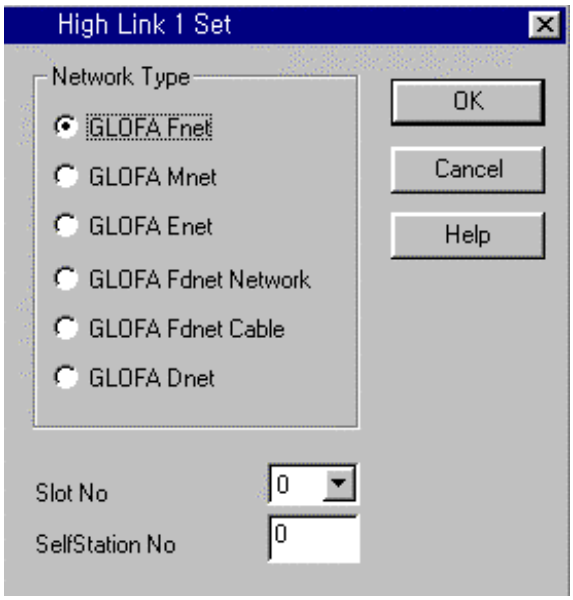


Fig. 6.2.4(D) *High speed link* setting screen

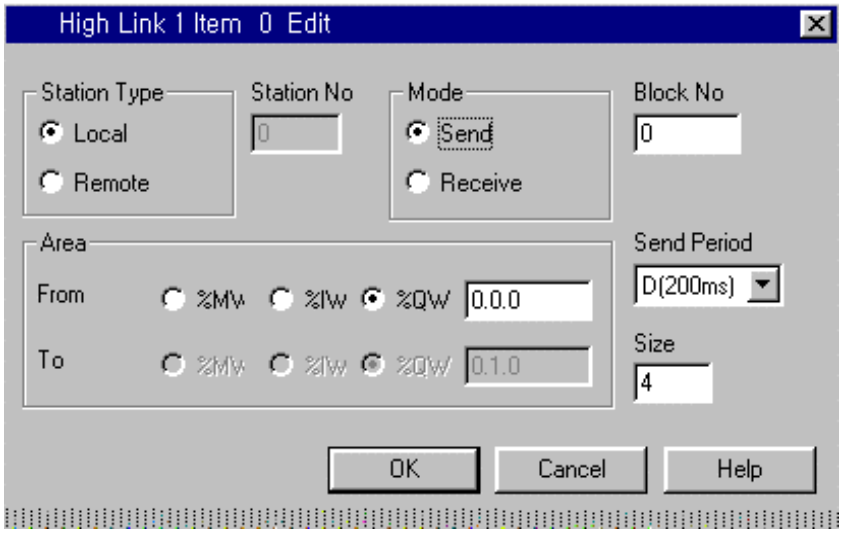
Network type : Set communication module type, and select Fnet or Mnet according to communication module type mounted.

Slot number : Set one of 0~7 for slot number that communication module to mounted(right side of CPU module is 0 slot).

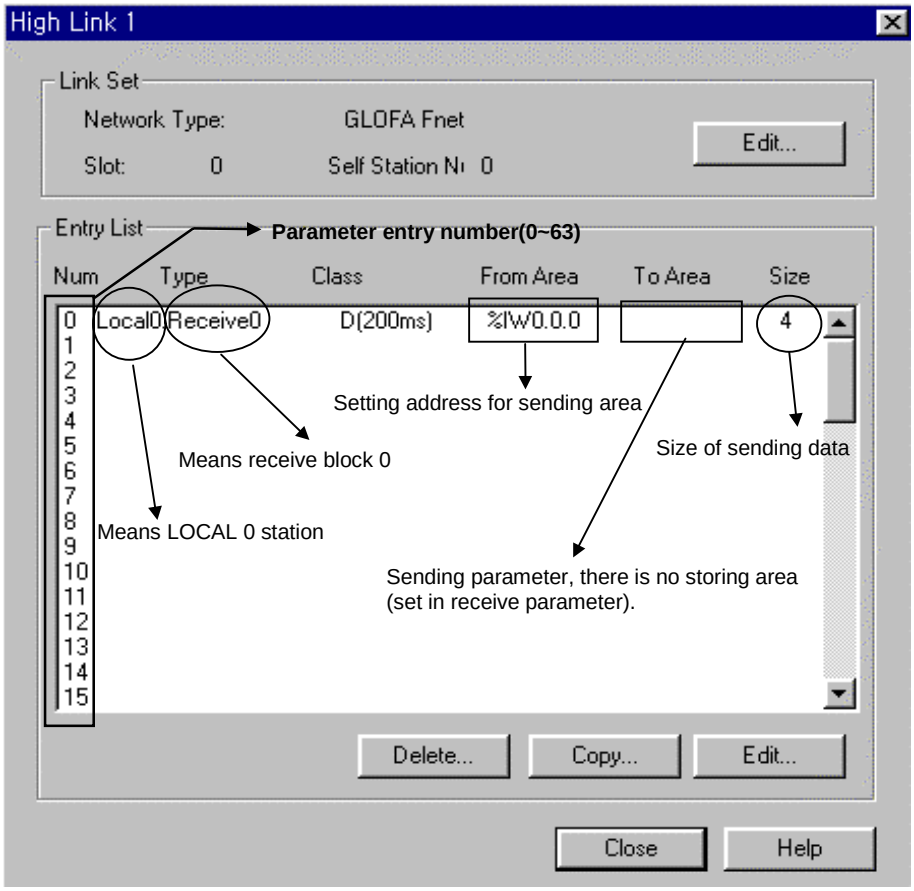
Self station : Enter self station number set in station number switch of the front of communication module. It is decimal, which can be set from 0 to 63. Self station number is unique number to distinguish communication module in the same network system, so don't use duplicated station number.

(2) Registration list setting

Registration list setting is an area to register actual Tx/Rx information of data. Set from '0' that is registration number of registration list area. For this, double click on the number position to set or select the 'Modification…' button to set the appropriate contents in the modification screen of *high speed link* item as Fig. 6.2.4(E).



(A) Modification screen of *high speed link*



(B) Example of sending parameter setting screen

Fig. 6.2.4(E) Screen of *high speed link* parameter setting

The functions according to each registration item of Fig. 6.2.4(E) are as follows :

– ***Registration number*** : This is serial number indicating the sequence registered, which can be set up to 64 from 0 to 63, and is regardless of Tx/Rx sequence.

– ***Station type*** : Determines the type of other station to send/receive.

Local type : G3L-FUEA/FUOA/MUEA. G4L-FUEA, G5L-FUEA, G6L-FUEA, G0L-FUEA/MUEA, monitoring interface module and the others.
Remote type : G3L-RBEA/RBOA, G4L-RBEA, Stand-alone remote, and the others.

– ***Station number*** : When other station to communicate is local type, set self station number for sending, and other station number for receiving. When it is remote type, set other station number for both of Tx/Rx. That is, when *high speed link* data is sent, don't specify other station number in order that data can be received by any receiving station, but when receiving, set other station number to distinguish the other station of which data is to be received. Because there is no parameter setting function in remote station itself during communication with remote station, specify remote station number during Tx/Rx.
* For sending of local type, self station number is automatically set.

Table 6.2.4(B) How to set station number

Station Type	Sending	Receiving	Station number Range
Local	Self station number	Other station number	0 ~ 63(Decimal)
Remote	Other station number	Other station number	

– ***Mode*** : This is an item determining whether data of appropriate block is sent/received. Therefore select sending for sending, and receiving for receiving. The number of blocks for Tx/Rx can be set up to 32. So if set to 32 or more, normal communication is impossible due to parameter error.

– ***Block number*** : This is set to send and receive many data of several area from one station, and distinguishes data of many blocks each other. Station number and block number configured from sending station is sent with sending data. If the receive station wants to receive this data, it must receive the appropriate block number sent from sending station. Number of blocks for Tx/Rx can be set Max. 32(0~31) for one station. It is impossible that the same block number is set for the same station number.

– ***Area*** : After selecting data area to send/receive, directly enter and set the address. When the area is %MW, directly enter the word area(Ex. : For 100th word area, select ⊙%MW, and enter 100). When it is %IW or %QW, after selecting ⊙%IW or ⊙%QW, directly enter(Ex.: When specifying 16 points for the 1st slot of main base, ⊙%IW 0.1.0)

Local out : Specifies one of %MW, %IW, %QW for area to read which data of self station is to be sent.

Local in : Specifies one of %MW, %IW, %QW for storing area of self station that data received from other station is to be stored.

Remote out : Specifies which data to read in self station(one of %MW, %IW, %QW for area to read), and which area of remote station to be sent(Only %QW of storing area is able to be specified. That is, remote sending data can be sent to remote output side only).

Remote in : Specifies one of %MW, %IW, %QW for which area to read in not self station but other remote station(Only %IW of area to read is able to be specified. That is, only remote input data can be read.) and which position to store it. Because memory map is different depending to CPU device type, refer to the memory map specified in the appropriate manual. Settable area according to station type that has been described as above is shown in Table 6.2.4(C).

Table 6.2.4(C) Setting area according to station type

Station type \ Mode		Sending			Receive			Remark
		%IW	%QW	%MW	%IW	%QW	%MW	
Local	Area to read	○	○	○	×	×	×	Area means CPU memory area
	Storing area	×	×	×	○	○	○	
Remote	Area to read	○	○	○	○	×	×	
	Storing area	×	○	×	○	○	○	

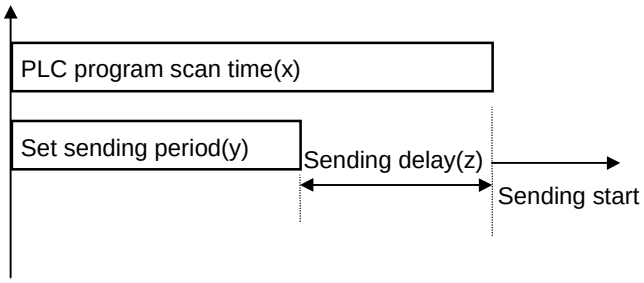
○ : Settable × : Not settable

Remark

For I/O address of stand-alone remote, allocate %IW0.0.0 for input, %QW0.0.0 for output.

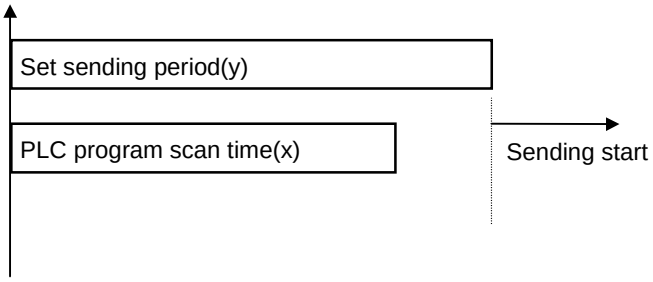
– ***Size*** : This means size of Tx/Rx data(unit is 1 word(16 points)). Module type of Fnet system can be set up to Max.60 word and Mnet system 200 word. If data size configured in receive mode is smaller than received data size, only the size of data configured in receive mode will be stored in storing area.

– ***Tx/Rx period*** : *High speed link* executes transmission and receive service when PLC program is finished by the parameter which user previously configured. If scan time of PLC program is short(within several ms), communication module transmits data according to program per scan, and the increase of communication quantity with this causes reduction of entire communication efficiency. To prevent this, user can set Tx/Rx period from 20ms to 10sec. If there is no setting, default of 200ms is automatically set. Tx/Rx period means transmission period if appropriate block is set to transmission, and this means data receive checking period of the appropriate block if it is set to receive. Transmission period determines data transmission period. If scan time of PLC program is longer than transmission period previously set, it will be transmitted when program scan is finished, and transmission period will be the same as scan time of PLC program(Fig. 6.2.4(F)).



Sending delay time : (z) = (x)-(y) ms

(a) Data sending delay time (PLC program scan time> Sending period)



Sending delay time : (z) = 0 ms

(b) Data sending delay time(PLC program scan time< Sending period)

Fig. 6.2.4(F) PLC program scan and sending period

Reamrks

When user sets receive period, user must set bigger value than transmission period of other station to check whether transmission is normal or not.

6.2.5 Operation of *High speed link*

If *high speed link* parameter setting is finished, perform parameter writing with PLC CPU after execution of 'make' in compile menu of GMWIN. If, thus, *high speed link* service is started, *high speed link* service starts through parameter setting. The starting sequence of *high speed link* is as follows :