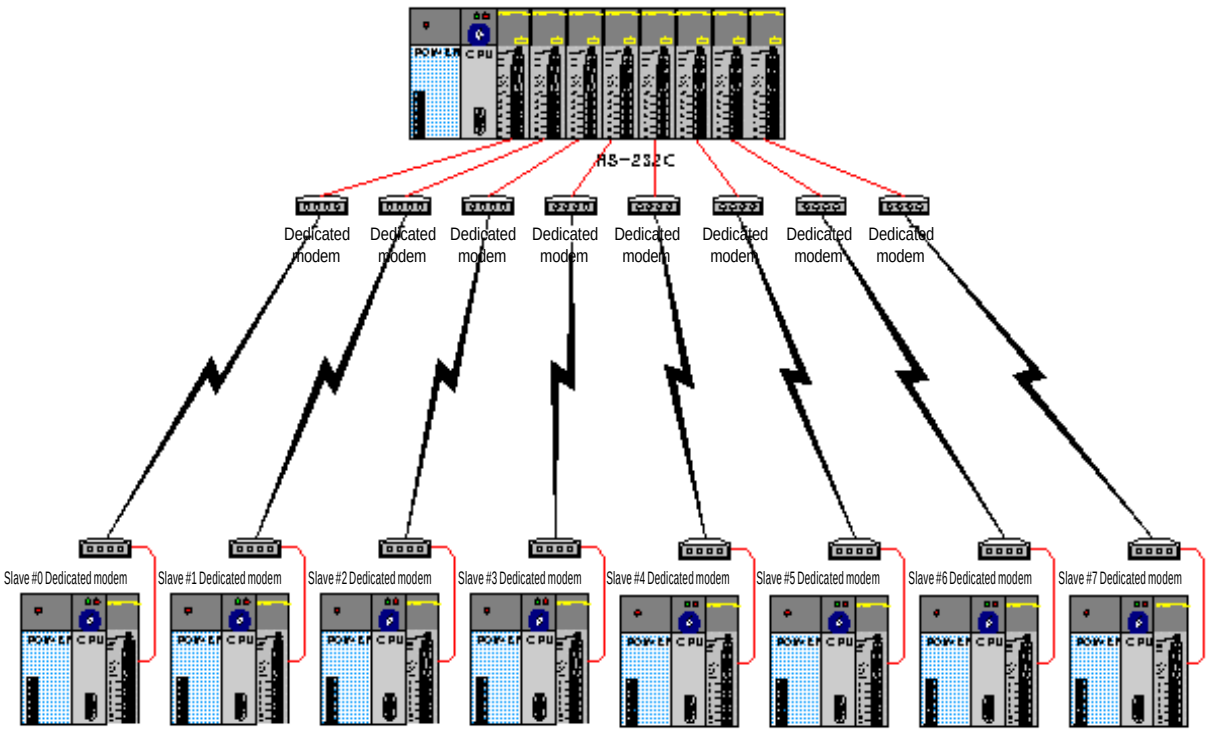
Chapter 8 Exercising program

Communication system using Cnet I/F module can be variously configured according to application fields. This chapter describes system configuration and exercise programming with various application fields supposed.

8.1 TM (Tele Metering) system using dedicated modem

In TM master/slave communication system with dedicated modem configured as in [Figure 8.1] through GLOFA Cnet I/F module, higher TM master on which 8 Cnet I/F modules are mounted performs data communication with 8 lower TM slave stations via dedicated modem. TM master uses GM2 CPU and TM slave uses GM4 CPU. And in this system, Cnet I/F module of slot No.0~7 in TM master inputs and outputs data through dedicated modem communication with 8 stations of slave station No.0~7.

[Figure 8.1] TM/TC dedicated modem system



[Table 8.1] describes TX/RX data mapping between TM master station and 8 slave stations. In master station as shown in [Table 8.1], 20 bytes data from %MB0 area is written to %MB200 area of slave station and 50 bytes data from %MB100 area of slave station is saved in starting %MB400 area of master station. TX/RX areas of slave stations are all the same in 8 stations and TX/RX area of master station is specified to Offset as much as the size of TX/RX data.

[Table 8.1] TX/RX data map

Area / Station No.	Master station memory				Slave station memory			
	TX Area	Length	RX area	Length	TX area	Length	RX area	Length
Station 0	%MB0	20bytes	%MB400	50bytes	%MB100	50bytes	%MB200	20bytes
Station 1	%MB20	20bytes	%MB450	50bytes	%MB100	50bytes	%MB200	20bytes
Station 2	%MB40	20bytes	%MB500	50bytes	%MB100	50bytes	%MB200	20bytes
Station 3	%MB60	20bytes	%MB550	50bytes	%MB100	50bytes	%MB200	20bytes
Station 4	%MB80	20bytes	%MB600	50bytes	%MB100	50bytes	%MB200	20bytes
Station 5	%MB100	20bytes	%MB650	50bytes	%MB100	50bytes	%MB200	20bytes
Station 6	%MB120	20bytes	%MB700	50bytes	%MB100	50bytes	%MB200	20bytes
Station 7	%MB140	20bytes	%MB750	50bytes	%MB100	50bytes	%MB200	20bytes

8.1.1 Exercising program

As Ex.8.1.1 is 1:1 communication system via dedicated modem for TM master/slave communication, setting for dedicated modem communication in Cnet I/F module and 1:1 communication programming between Cnet I/F modules shall be prepared. Next is the procedure to follow the above in order. Basic parameters related communication should be identical between master/slave stations, and set as agreed with modem specification as below.

- ❑ Communication Speed : 9600 BPS
- ❑ Data bit : 8 bits
- ❑ Start/Stop bit : 1 bit
- ❑ Parity : None

1) Dedicated modem connection

Connect 9-pin cable with dedicated modem and Cnet I/F module via RS-232C channel. Refer to 4.4 How to connect to dedicated modem for connection type prior to connection between Cnet I/F module and dedicated modem.

2) Dedicated modem setting

Refer to user's manual for setting of operation type of dedicated modem as agreed with communication type with Cnet I/F module. Related items to communication with Cnet I/F module are to be set as follows. Dedicated modem shall be set identical between master/slave sides

.

Item	Setting contents	Remark
Communication speed	9600 BPS	Identical to Cnet I/F module
Data type	Asynchronous 10 bits	Data-8bits/Start-1bit/Stop-1bit
RTS-CTS delay	0 msec	Set to the smallest value
DTR control	Forced ON	
Comm mode	4-line type	As agreed with the dedicated line spec.

3) Setting of basic parameters

Mode and basic parameters need setting for TM master slave communication. [Table 8.2] describes setting items for this. For dedicated modem communication, apply setting to RS-232C channel.

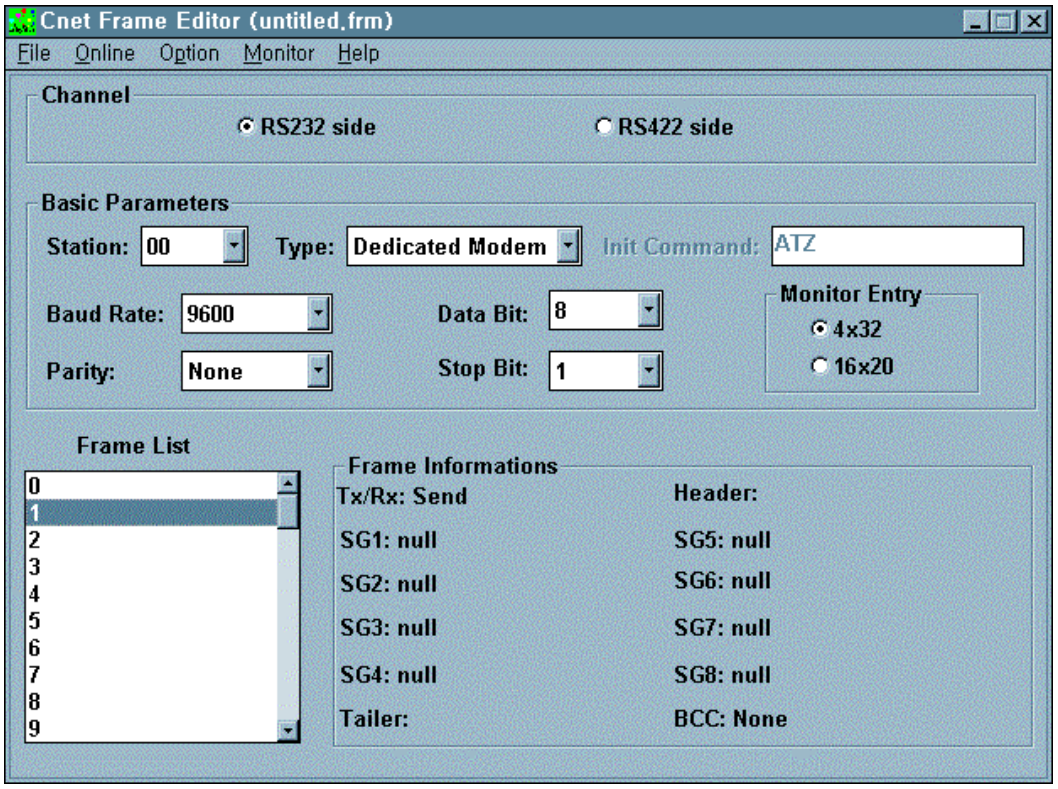
[Table 8.2] Setting items

Setting item	TM master module	TM slave module	Remark
Module name	G3L-CUEA	G4L-CUEA	
Channel mode	Stand-alone mode	Stand-alone mode	
Operation mode[Note1]	'3' : dedicated mode Ver.2.0	'3' : dedicated mode	
RS-232C station No.	Basic value(Not used)	0 ~ 7 station available	RS-232C channel setting only valid
RS-232C communication type	Dedicated modem		
RS-232C communication speed	9600 BPS/DATA 8 bits/START 1 bit/STOP 1 bit		

Remark

[Note1] Cnet I/F module in TM master side shall be of Ver.2.0 or later as is in dedicated master mode to communicate. TM slave side as used in dedicated mode slave is available regardless of the version.

Next is setting screen of Frame Editor to be set as in [Table 8.2].

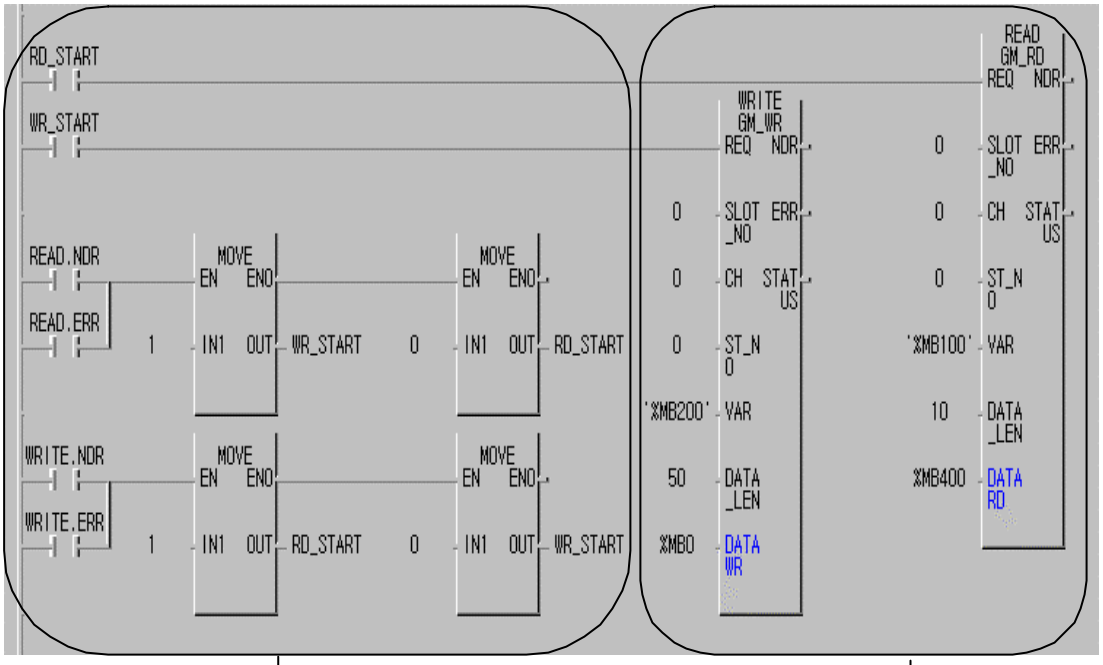


Download setting values of Frame Editor via each RS-232C channel for basic setting.

4) GMWIN programming

If dedicated modem and Cnet I/F module have been set, GMWIN program shall be prepared in TM master station for master operation in dedicated communication. For master function service in dedicated communication, GM_RD/GM_WR Function Blocks shall be used, with library insertion selected from project menu prior to programming to add the communication library to project. Since TM master station is GM2, insert COMMUNI.1FB. Each dedicated master program is to be prepared for 8 TM master Cnet I/F modules. [Figure 8.2] shows a program for Cnet I/F module of master station slot 0. The program in [Figure 8.2] is composed of two parts of 2 Function Block programs and interlock program to allow communication in order through the interlock engaged in execution of Function Block.

[Figure 8.2] Dedicated master program



Interlock program:

Connect the contact point adjusting execution condition of READ/WRITE Function Blocks to Function Block's REQ' input to allow two Function Blocks executed in order.

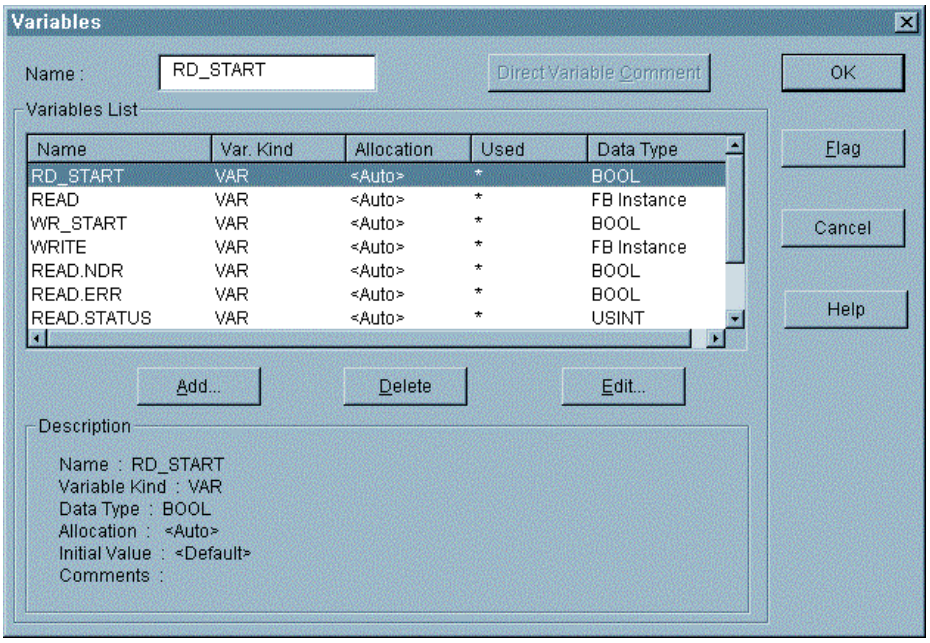
- RD_START: As an auto-variable, executed in the first scan by READ Function Block as initially set to '1'.
- WR_START: Auto-variable, initial value '0'
- OR-connect READ.NDR/READ.ERR to execute READ F/B first and then WRITE F/B with WR_START ON.
- OR-connect WRITE.NDR/WRITE.ERR to execute WRITE F/B first and then READ F/B with RD_START ON.

Function Block program for dedicated commu-nication master:

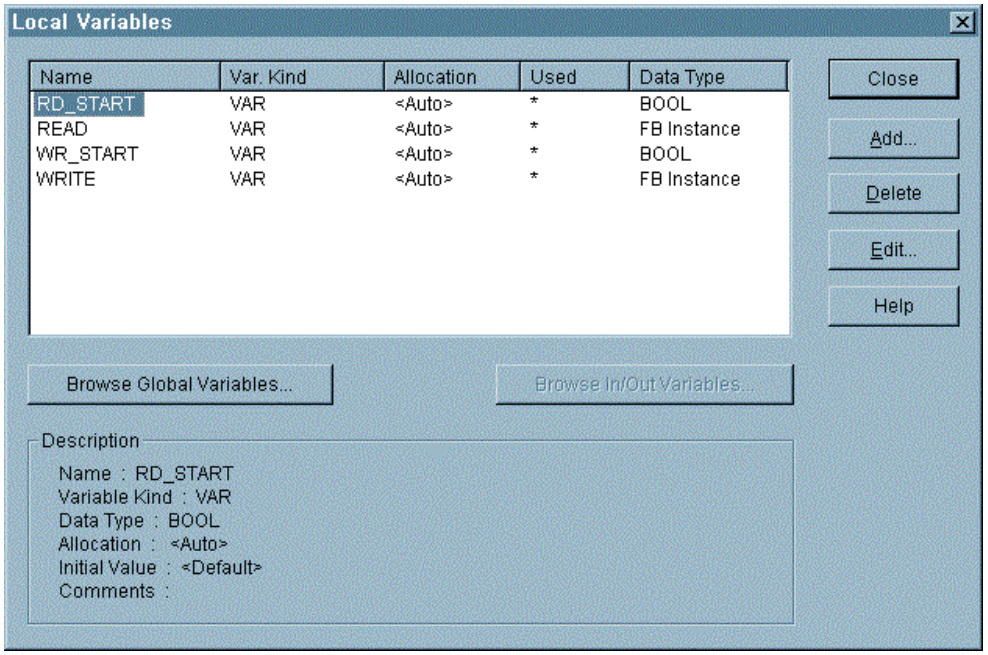
Specify input variables as below with GM_RD Function Block for READ and GM_WR Function Block for WRITE.

- SLOT_NO : Where the module is mounted
- CH : Channel setting
- ST_NO : Slave station No.
- VAR : Slave memory area
- DATA_LEN : Data length
- DATA_RD : RX data saving area
- DATA_WR : TX data saving area

Setting values of RD_START variables used in interlock contact point are as follows. Initial value as an auto-variable is set to '1' to execute GM_RD Function Block in the first scan.

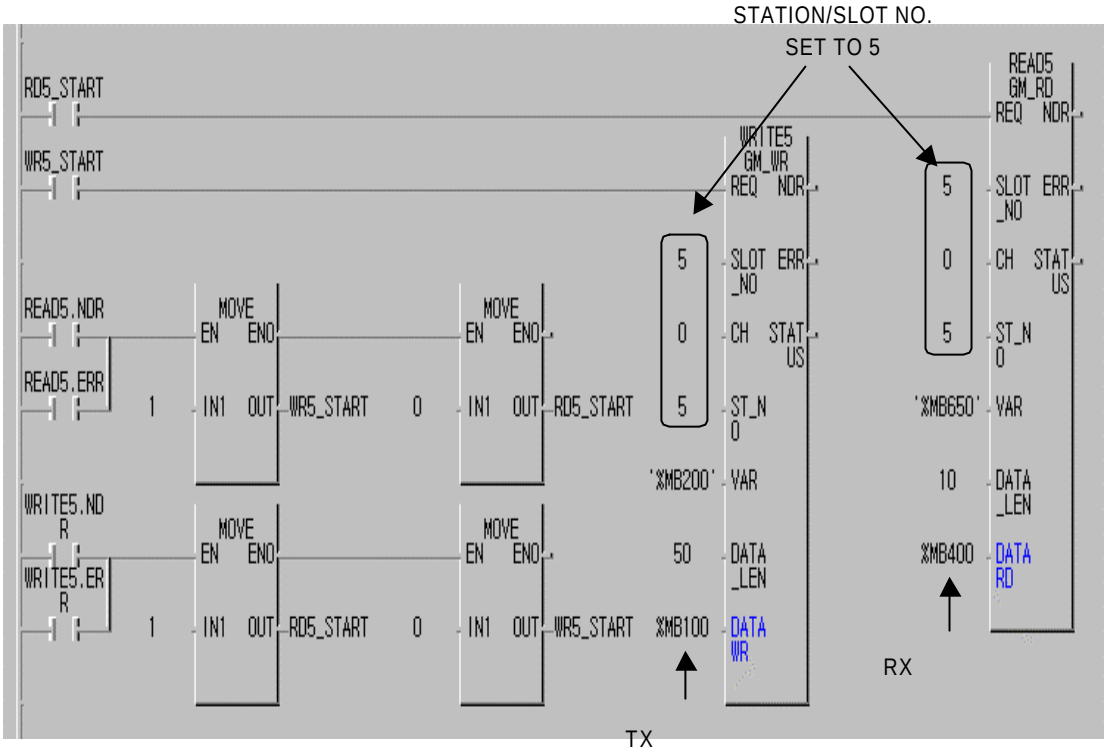


Setting values of WR_START variables are as follows. Initial value is set to '0' in auto-variable after GM_RD Function Block is executed by interlock program to allow GM_WR Function Block executed.



Program in [Figure 8.2] has used GM_RD Function Block to read data and GM_WR Function Block to write data of slave station No.0. To communicate the program in [Figure 8.2] with slave station No.0~7, prepare each program with slot No. and memory address set as agreed with [Table 8.1] to complete communication programming of dedicated communication master. [Figure 8.3] shows dedicated communication program of master station slot No.5 to communicate with slave station No.5.

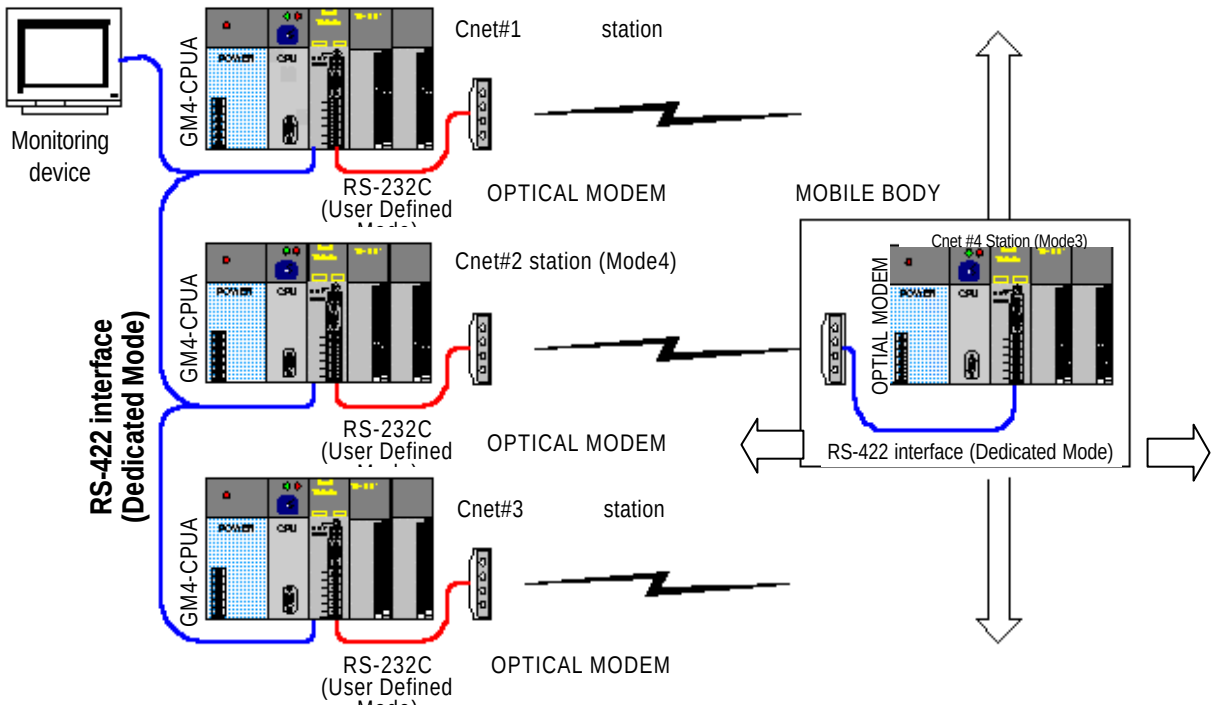
[Figure 8.3] Communication program with slave station 5



8.2 Communication system between Cnet I/F modules using optical modem

Optical modem is mainly used in communication with mobile body which is hard to communicate with via communication cable. For communication with GLOFA PLC on mobile body in lineal motion like parking tower or GLOFA PLC which is fixed, RS-232C/RS-422 channel of the module shall be connected with optical modem. [Figure 8.4] shows communication system between GLOFA PLCs and with monitoring device via optical modem.

[Figure 8.4] Optical modem communication system



1~3 stations in [Figure 8.4] as of the module mounted on the fixed PLCs installed respectively at 1~3 floors in the parking tower communicate with monitoring device via RS-422 channel, and RS-232C channel communicates with station 4 on mobile body via optical modem. Module on mobile body moves vertically and horizontally as mounted on flatcar for car lift. Communication is performed with station 1 at 1st fl., station 2 at 2nd fl. and station 3 at 3rd fl. via optical modem. And only when horizontal position is in the specified allowance from other station's optical modem, communication is available in accordance with the communication characteristics of optical modem. Thus, communication is not allowed during vertical movement, while allowed during horizontal movement in the horizontal allowance as not changed from the fixed optical modem. Along with this method, information about mobile body's location and vehicles, and commands for loading/unloading vehicles can be transferred from monitoring device to mobile bodies. Monitoring device communicates in station 1 with station 3 via RS-422 communication, with dedicated communication master functions available.

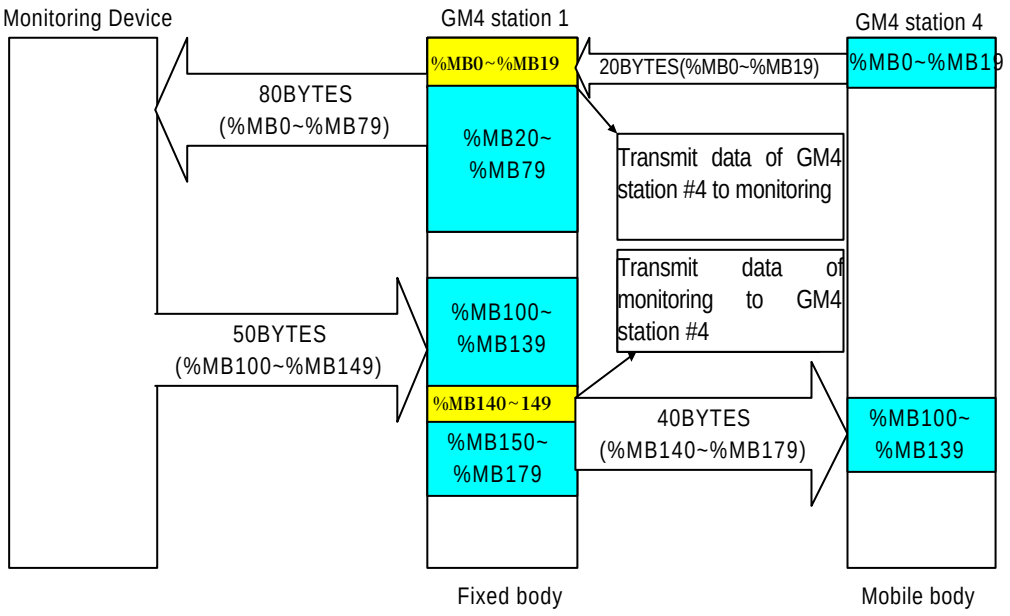
8.2.1 Exercising program

RS-422 channel of 1~3 stations responds to reading/writing request of monitoring device through dedicated mode slave, thus, communication programming is not required for RS-422 channel in GLOFA-PLC. However, user defined program shall be prepared in user mode for RS-232C channel which operates as a master station to communicate with the module on mobile body. Because the module on mobile body operates as a dedicated mode slave, communication programming isn't necessary. In system as in [Figure 8.4], communication between monitoring device and module on mobile body is unavailable, thus, memory of PLC 1~3 stations shall be shared to change data with station 4 and monitoring device. [Table 8.3] describes communication with monitoring device and data TX/RX map between Cnet I/F modules for this.

[Table 8.3] Data TX/RX map

Area / Station No.		TX/RX map with monitoring device				TX/RX map between Cnet I/F modules			
		TX area	Length	RX area	Length	TX area	Length	RX area	Length
Fixed body	Station 1	%MB0	80bytes	%MB100	50bytes	%MB140	40bytes	%MB0	20bytes
	Station 2	%MB0	80bytes	%MB100	50bytes	%MB140	40bytes	%MB0	20bytes
	Station 3	%MB0	80bytes	%MB100	50bytes	%MB140	40bytes	%MB0	20bytes
Mobile body	Station 4	Direct communication with monitoring device unavailable (data change via Cnet 1~3 stations)				%MB0	20bytes	%MB100	40bytes

[Figure 8.5] Data TX/RX path



[Figure 8.5] describes TX/RX data path according to data TX/RX map in [Table 8.3] with the example of Cnet stations 1 & 4 and monitoring device. Cnet stations 2 & 3 are the same case as in communication via the identical path. Direct communication between monitoring device and station 4 on mobile body is unavailable in the figure, thus, data will be changed through station 1. As shown in [Figure 8.4], 20 bytes from %MB0 of station 1 is the saving area of data read from station 4 of mobile body, and via this area monitoring device starts reading data of station 4. To the contrary, when data is written from monitoring device to station 4, 50 bytes data is written from %MB100 address of station 1 and 10 bytes data of 50 bytes starting from %MB140 address is re-transmitted to station 4 to change data between monitoring device and station 4.

1) Optical modem connection

Connect 9-pin cable with Cnet stations 1,2,3 and optical modem via RS-232C channel. Since optical modem connection is same as in dedicated modem, refer to 4.4 How to connect to modem for connection between Cnet I/F module and dedicated modem. Optical modem on mobile body is connected with Cnet I/F module station 4 via RS-422 cable, thus, use optical modem which supports RS-422 communication for connection in accordance with RS-422's standard connection method.

2) Setting of basic parameters

Identical basic parameters shall be set in RS-422 channel of Cnet stations 1,2,3 for communication with monitoring device, and RS-232C channel shall be set to dedicated modem mode in operation of user mode to operate as a communication master station of Cnet station 4. [Table 8.4] describes setting items of Cnet I/F module for this. Set operation mode switch as specified in the table and prepare basic parameters through Frame Editor to download to Cnet I/F module and then to complete basic setting.

[Table 8.4] Setting items of Cnet I/F module

Setting item		Cnet on fixed body	Cnet on mobile body	Remark
Operation mode switch		'4'	'3'	
RS-232C	Operation mode	User defined communication[Note]	Not used	Parameters in RS-232C channel of Cnet stations 1,2,3 shall be set identical.
	Station No.	Basic value(Not used)		
	Communication speed	19200bps		
	Data/Stop	Data-8/Start-1/Stop-1		

Setting item		Cnet on fixed body	Cnet on mobile body	Remark
RS-422	Operation mode	Dedicated communication	Dedicated communication	Communication parameters shall be agreed with monitoring device.
	Station No.	Set 1,2,3 stations in order	Station 4	
	Communi-cation speed	19200 BPS	19200 BPS	
	Data/Stop	Data-8/Start-1/Stop-1	Data-8/Start-1/Stop-1	

Remark

[Note1] If module Ver.2.0 is used, set RS-232C channel to dedicated mode for dedicated master mode service so to simplify programming. Refer to 7.3 Dedicated communication master in the manual for programming procedure.

[Table 8.4] describes setting items of the module. Communication method and specification shall be set identical also for monitoring device and optical modem. Refer to user's manual of the applied product for setting of optical modem and monitoring device.

3) Programming

GMWIN program shall be prepared for user defined communication via RS-232C channel of Cnet stations 1,2,3 in system of [Figure 8.4], and frame for communication via dedicated communication protocol shall be also prepared in Frame Editor. RS-422 channel of Cnet 1,2,3 stations needs no additional communication programming because the monitoring device operates as a master station. Cnet station 4 needs no communication programming either because it operates as a dedicated mode slave. Data memory mapping is all identical for communication of Cnet 1,2,3 stations, thus, the same program may be shared in those 3 stations. Next is how to prepare the program in station 1.

A) Dedicated communication protocol to be used: Cnet station 1 shall prepare frame in user defined mode for communication through dedicated communication protocol of Cnet station 4. Use continuous reading/writing commands of direct variables in dedicated communication protocol to allow communication between station 1 and station 4 through TX/RX map between Cnet I/F modules in [Table 8.3]. Next is for protocol of dedicated communication slave to communicate through the map in [Table 8.3]. Refer to 7.2 in this manual for details.

① Continuous writing request of direct variables (writing 40 bytes to %MB100 of station 4)

Classification	Header	Station No.	Command	Variable length	Variable name	Number of data	Data	Tail	BCC
Frame	ENQ	H04	wSB	H06	%MB100	H28	40 bytes data	EOT	BCC

② Response format to continuous writing request of direct variables (ACK response)

Classification	Header	Station No.	Command	Tail	BCC
Frame	ACK	H04	wSB	ETX	BCC

③ Continuous reading request of direct variables (reading 20 bytes from %MB0 of station 4)

Classification	Header	Station No.	Command	Variable Length	Variable Name	Number of data	Tail	BCC
Frame	ENQ	H04	rSB	H04	%MB0	H14	EOT	BCC

④ Response to continuous reading request of direct variables (ACK response)

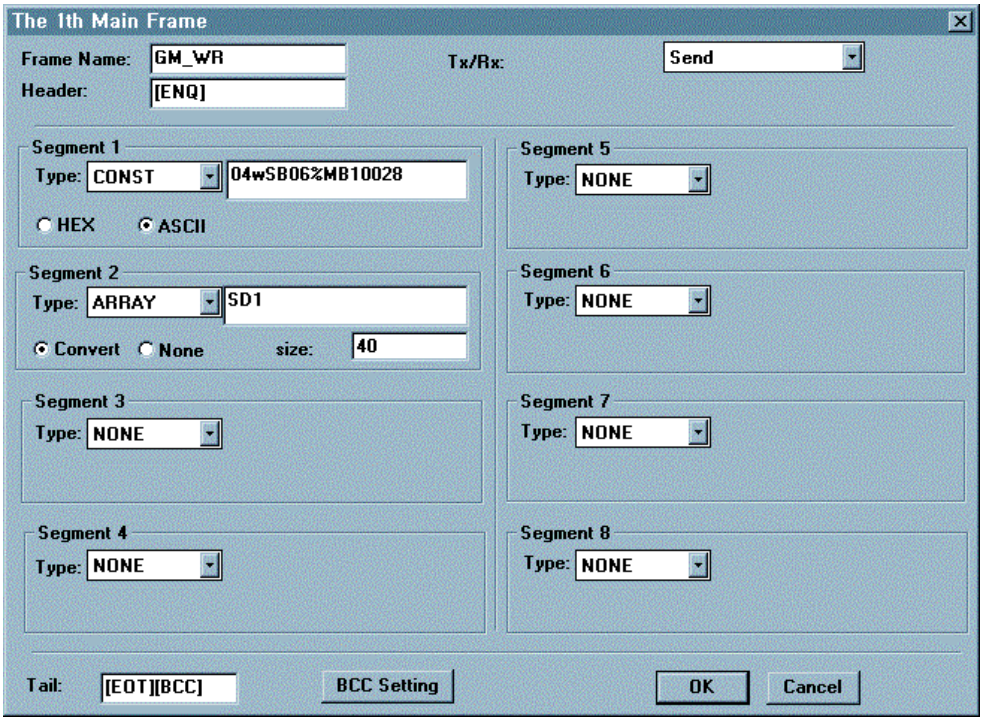
Classification	Header	Station No.	Command	Number of blocks	Number of data	Data	Tail	BCC
Frame	ACK	H04	rSB	01	H14	20 bytes data	ETX	BCC

Remark

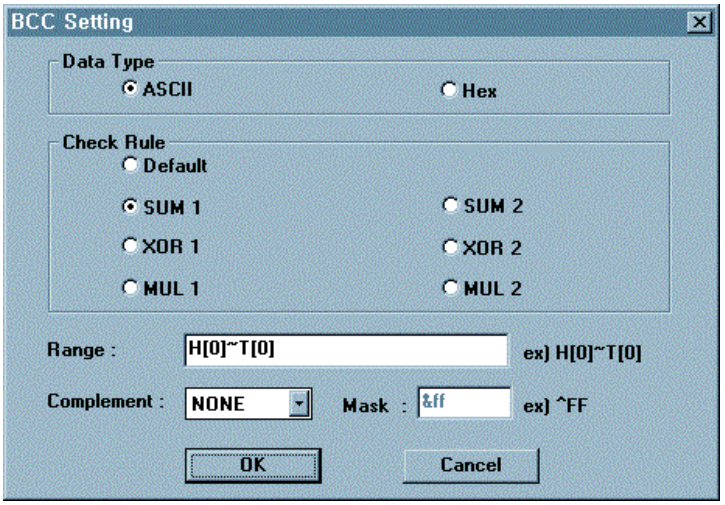
[Note1] Number of data in frame is in HEX unit

B) Frame edit : Edit and download 4 frames above to module using Frame Editor. Enter 4 frames as below. Next is frame entry screen.

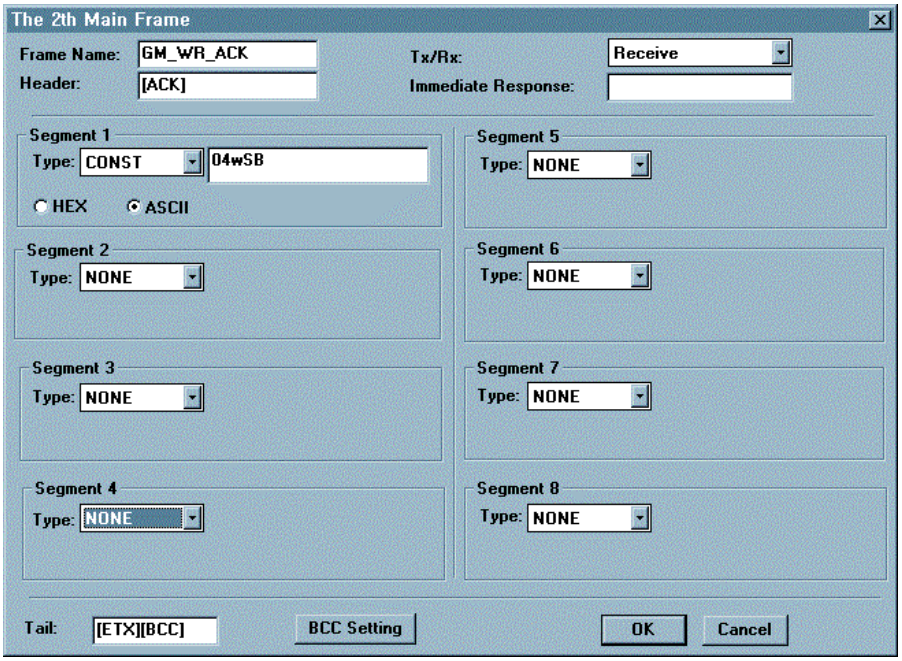
- Write request frame : GM_WR_REQ (TX frame)



Frame name above is 'GM_WR' entered as TX frame. Station No., command and variable as of CONST are registered in segment 1 and data TX area of ARRAY type is specified in segment 2. As is in ASCII communication, select Convert to convert TX data to ASCII figures. [BCC] is added behind the tail as the lower case 'w' is used in command with BCC type set as below. BCC type is identical all for dedicated communication frames.

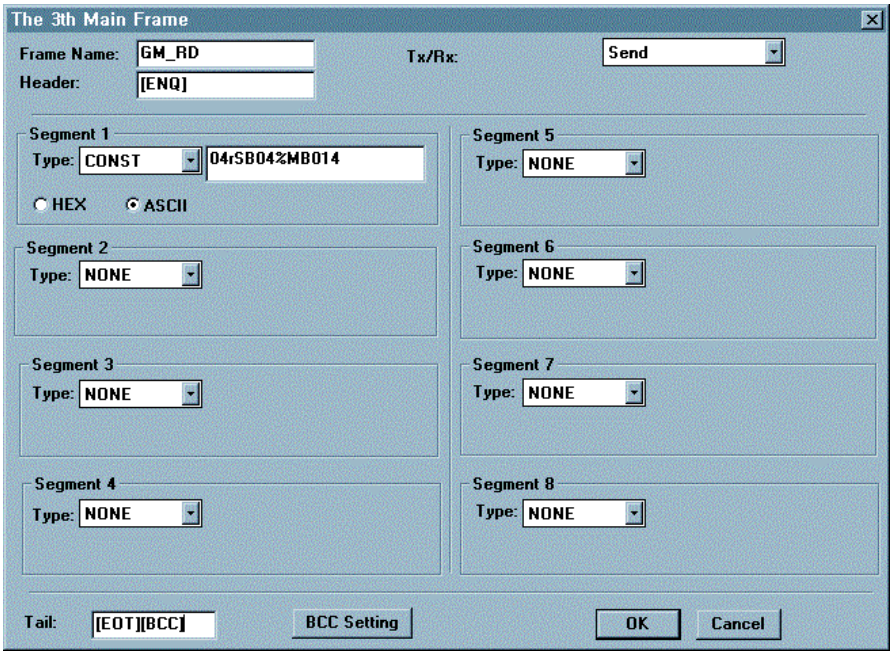


- Response frame to Write request: GM_WR_ACK (RX frame)



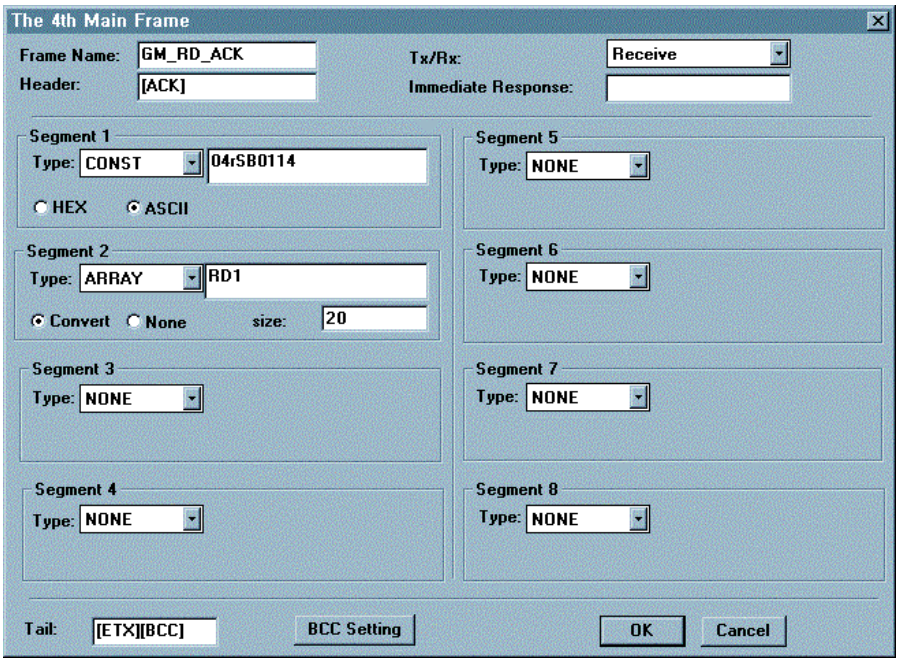
Frame name is 'GM_WR_ACK'. Response frame to Write request has no data, thus, enter only RX frame as of CONST in segment 1.

- Read request frame : GM_RD (TX frame)



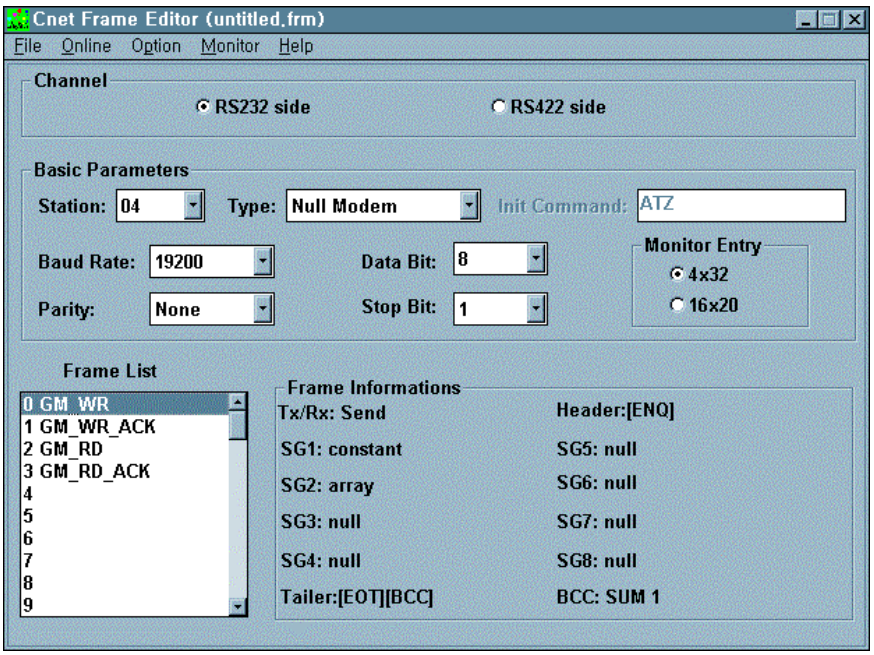
Frame name is 'GM_RD'. And as of TX frame, it requests reading of 14 bytes data in HEX.

- Response frame to Read request: GM_RD_ACK (RX frame)



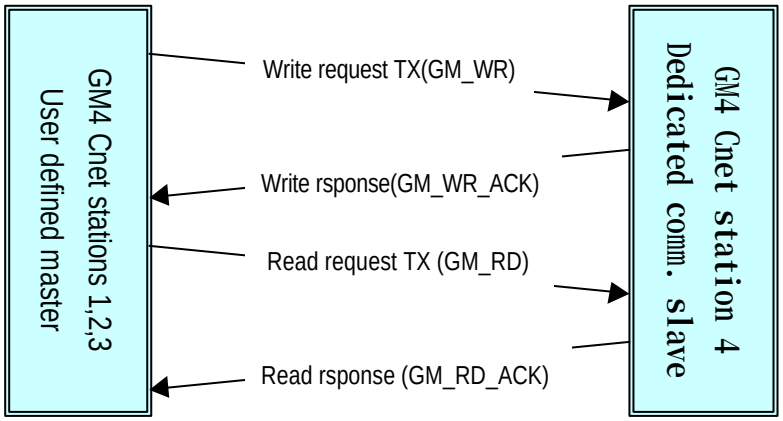
Frame name is 'GM_RD_ACK'. Since RX frame has a data, enter CONST in segment 1 and allocate 20 bytes of data RX area in ARRAY to segment 2. As in ASCII communication, select Convert to convert received ASCII data to HEX to allow receiving in figures.

- Total screen of frame entry: Next is the basic screen of Frame Editor where 4 frames are registered showing frames 0 ~ 3 are entered in frame list.



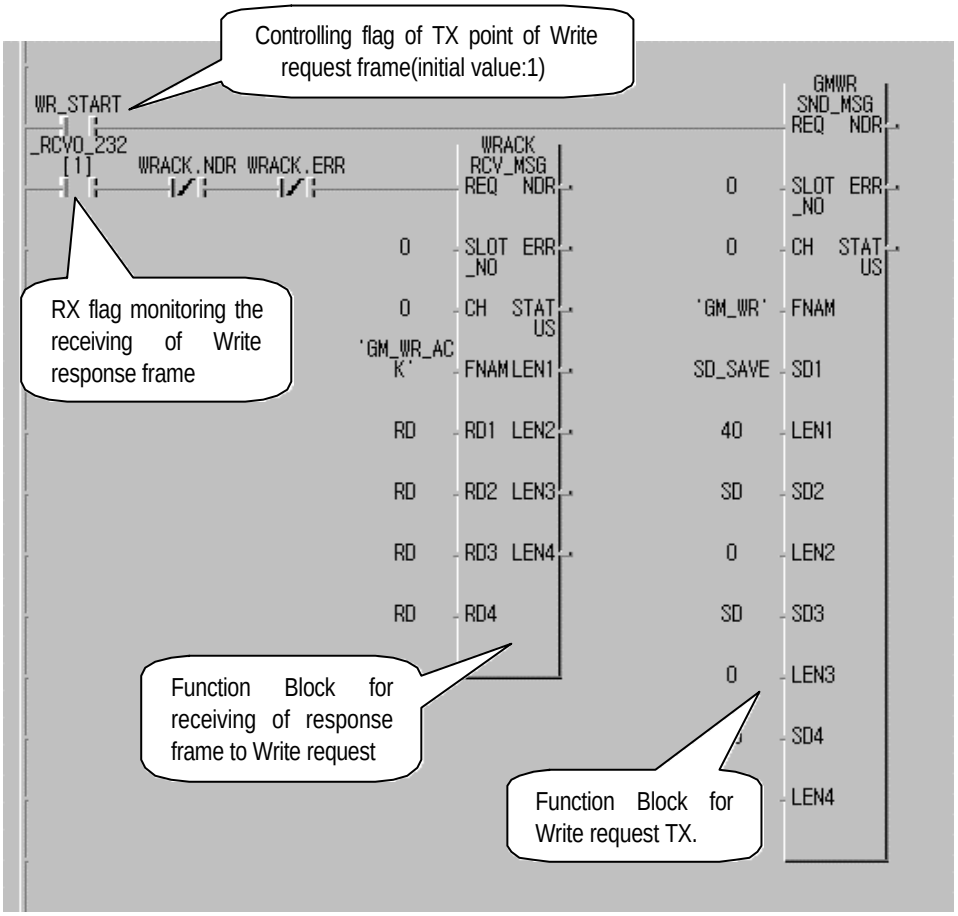
After frame edit above is finished, save the file and download the frame to Cnet I/F module to run RS-232C channel for preparation of operation. TX sequence of 4 frames is as shown in [Figure 8.6]. User defined program shall be prepared in GMWIN to allow TX/RX in order as in the figure.

[Figure 8.6] TX sequence of TX/RX frames



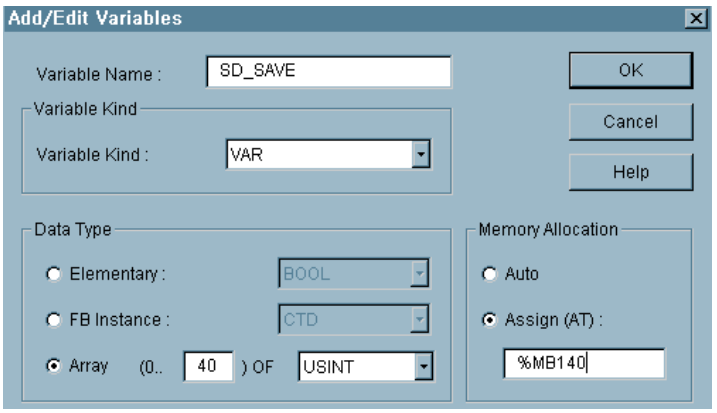
C) GMWIN programming : After frame edit is completed, prepare program via GMWIN to allow TX/RX in sequence as in [Figure 8.6]. Use SND_MSG/RCV_MSG Function Blocks to allow Cnet 1,2,3 stations in user defined mode to communicate with Cnet station 4 which is dedicated communication slave station, with library insertion selected from project menu prior to programming to insert COMMUNI.4FB. User defined TX/RX programs shall be set respectively for 1,2,3 stations. Data mapping is all identical for 3 stations, thus, the same program may be used.
[Figure 8.7] shows program for data writing and its response frame receiving.

[Figure 8.7] Function Block program for data writing



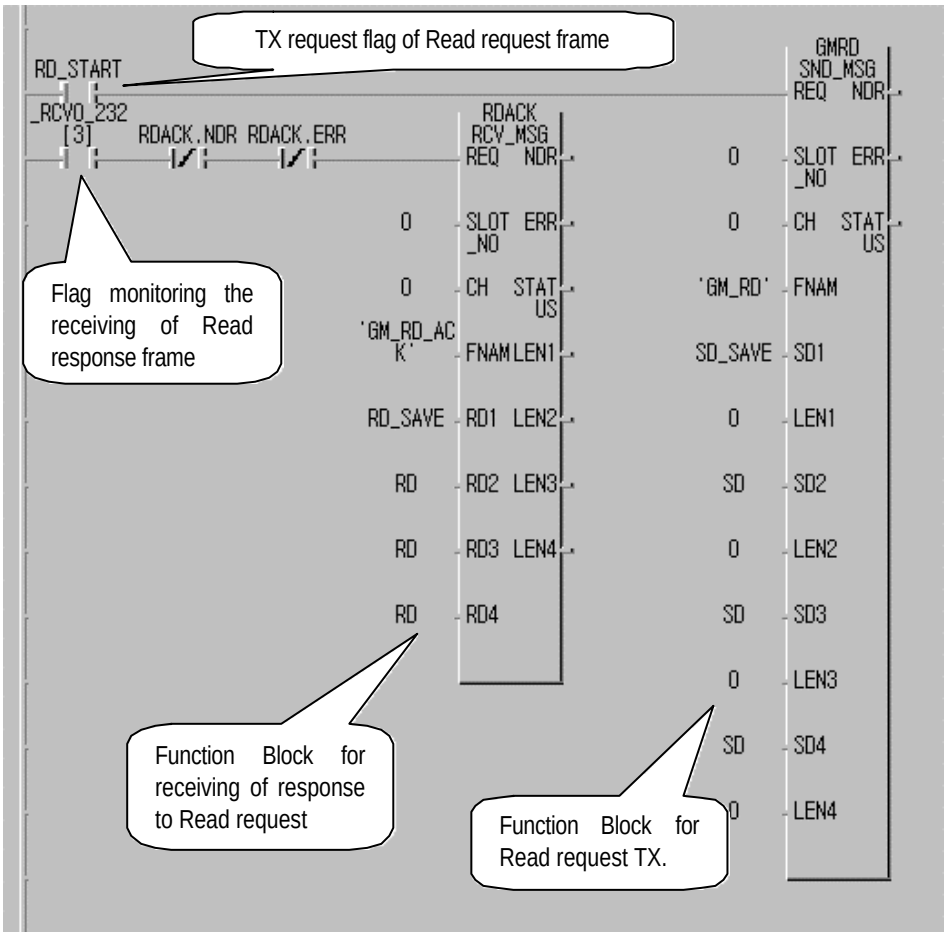
Use SND_MSG Function Block in the figure to send 40 bytes of TX data to 'GM_WR' frame via RS-232C channel. TX point of time is controlled through 'WR_START'. In case of normal response after GM_WR frame is sent, execute RCV_MSG Function Block if 'GM_WR_ACK' frame is received with '_RCV0_232[1]' flag turned 'ON' among received flags in RS-232C channel. TX data is saved in SD1 area of SND_MSG Function Block, while 40 bytes data in variable area of 'SD_SAVE' is transmitted as in [Figure 8.7].

Next is setting screen of SD_SAVE variables. Memory of 41bytes is allocated to %MB140 address starting. Data size of TX variable shall be set at least identical to the data size to be sent.

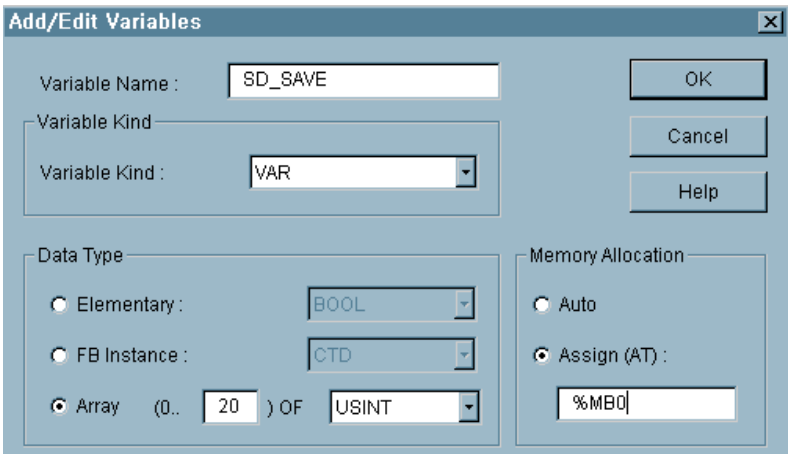


[Figure 8.8] shows Function Block program for transmission of Read data.

[Figure 8.8] Function Block to read data

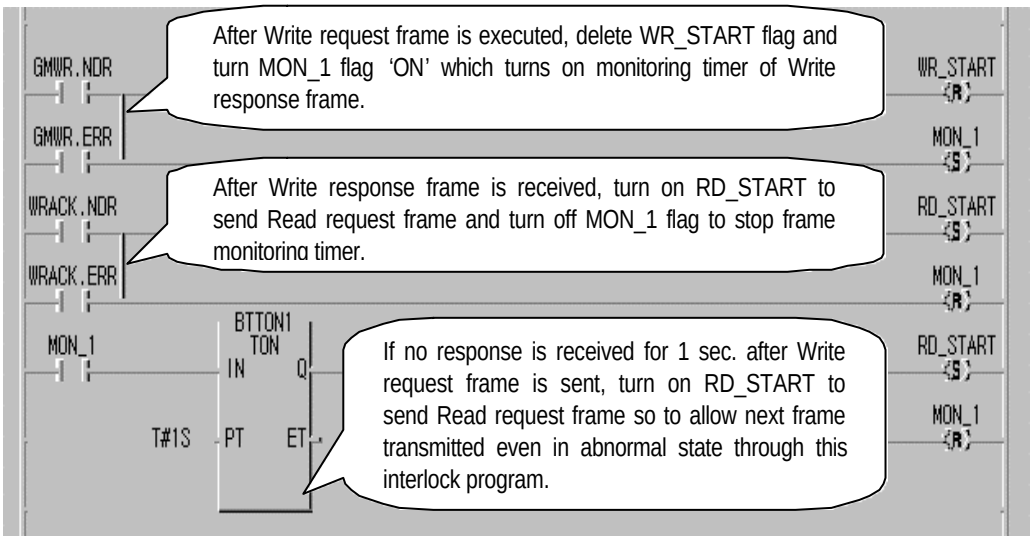


In [Figure 8.8], Read is requested via SND_MSG Function Block to read data and to respond to this, 20 bytes data is sent to GM_RD_ACK frame from dedicated slave station. If GM_RD_ACK frame is received, _RCV0_232[3] is 'ON' to execute RCV_MSG Function Block and save the received data to RD_SAVE area set to RX data variable. Memory for RD_SAVE is allocated to %MB0 area as below and data size shall be set at least identical to the size of the received data. Next is variable setting screen of RD_SAVE which is a saving variable of RX data.



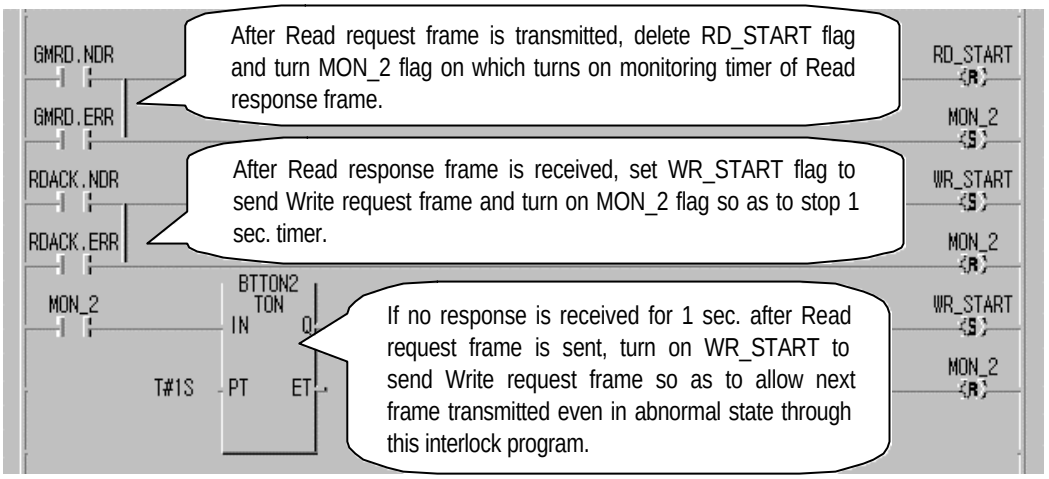
[Figure 8.9] shows interlock program of Write data Function Block. If in normal communication, it allows TX/RX as in sequence shown in [Figure 8.6] and even in abnormal communication, it allows communication in the following sequence after waiting for response 1 sec.

[Figure 8.9] Interlock program to Write data



[Figure 8.10] shows interlock program of Read data Function Block. If in normal communication, it allows TX/RX as in sequence shown in [Figure 8.6] and even in abnormal communication, it allows communication in the following sequence after waiting for response 1 sec..

[Figure 8.10] Interlock program to Read data



Prepare one program integrated by 4 programs above and let it downloaded to PLC through compile process, and then run the program to allow communication with dedicated communication slave station in user defined mode. Identical frame list and program can be also used in Cnet station 2 & 3. And if the program is run via compile and download, identical communication is available in station 2 & 3.

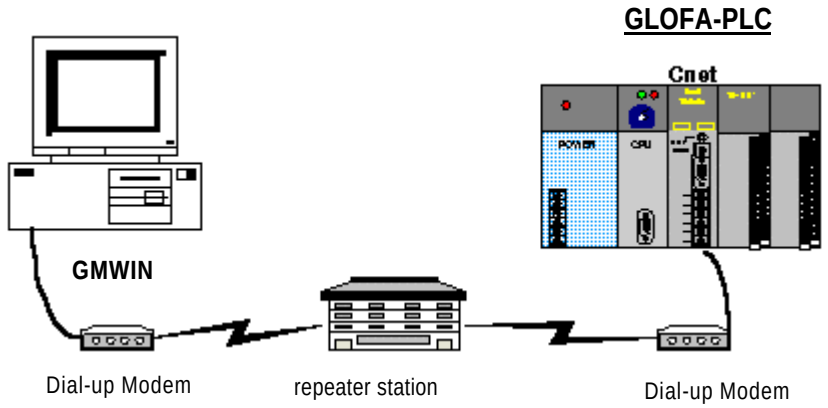
Remark

[Note1] Waiting time for response shall be set larger enough than max. response time estimated in consideration of frame length and data transmission speed.

8.3 GMWIN connection using dial-up modem

Cnet I/F module has a remote communication function via telephone line. With this function in the system as shown in [Figure 8.11], connect external modem to module and apply GMWIN connection via dial-up modem in PC to change programs and to monitor variables as described below. [Figure 8.11] shows an example of system configuration through dial-up modem and telephone line.

[Figure 8.11] GMWIN connection via dial-up modem



8.3.1 Exercising program

For GMWIN connection via dial-up modem, set operation mode of this module to GMWIN mode and dial-up modem connection mode, and connect modem with Cnet I/F module through modem setting and RS-232C cable.

1) Operation setting

For dial-up modem connection with Cnet I/F module, set basic parameters as specified in [Table 8.5].

[Table 8.5] Setting items

Setting item	TM master Cnet I/F module	Remark
Module name	G3L-CUEA	
Channel mode	Stand-alone mode	
RS-232C operation mode	GMWIN mode	
RS-232C station No.	Station 0	Setting available only in Ver.2.0
RS-232C communication type	Dial-up modem	
Modem initializing command	Set initial value as in the user's manual	Basic value, 'ATZ'
RS-232C communication speed	38400 BPS / DATA 8 bits / START 1 bit / STOP 1 bit	As agreed with the speed of dial-up modem

2) Operation setting

Connect 9-pin to 25-pin cable with dial-up modem and Cnet I/F module via RS-232C channel in the following type.

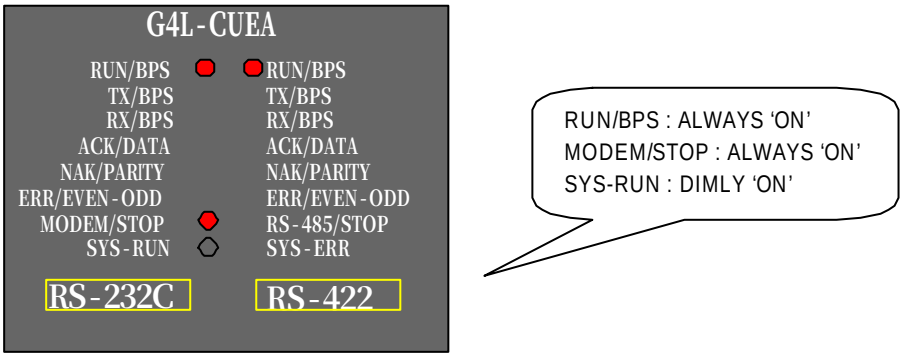
[Table 8.6] Modem connection with Cnet I/F module

Cnet (9-pin) male		Connection No. and signal direction	Modem side(25-pin) male	
Pin No.	Name		Pin No.	Name
1	CD	←	CD	8
2	RXD	←	RXD	3
3	TXD	→	TXD	2
4	DTR	→	DTR	20
5	SG	↔	SG	7
6	DSR	←	DSR	6
7	RTS	→	RTS	4
8	CTS	←	CTS	5
9	RI		RI	22

3) Modem initializing

If mode setting and connection between modem and Cnet I/F module via cable are completed, link phone line to modem and let PLC powered on to initialize modem. Modem initializing is accomplished by modem initializing command set previously in Cnet I/F module after powered on. If modem has been successfully initialized, Cnet LED is displayed as below.

Cnet I/F module LED status in stand-by mode



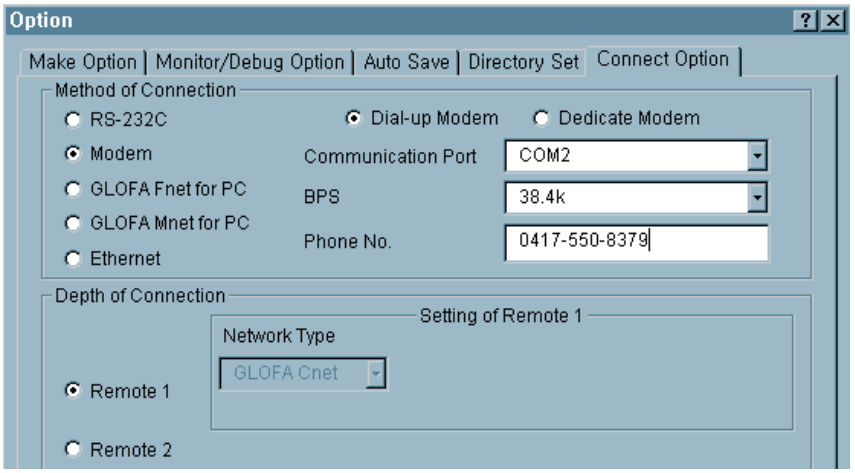
The figure above shows the case that modem has been initialized normally. If not initialized, TX LED will flash in a cycle of 1 sec. in the figure. If so, refer to Chapter 4 How to connect to dial-up modem in the manual to shoot the trouble.

4) Telephoning and remote connection

If modem has been initialized, Cnet I/F module waits for telephoning and remote connection from GMWIN in connection stand-by status. Since Cnet I/F module has no telephoning function, install modem on PC where GMWIN is mounted on to connect through telephoning. Next is how to make a phone call in GMWIN.

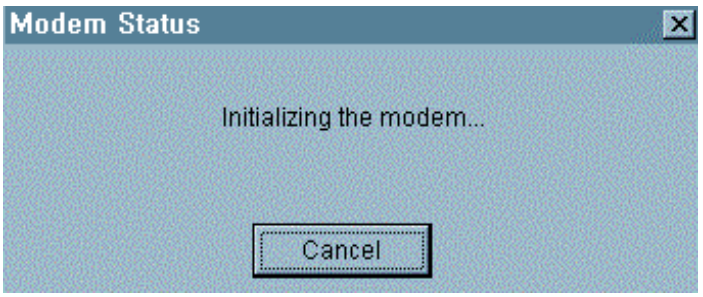
A) Install modem on PC. Internal modem can be applied to PC side.

B) Run GMWIN program and select method of connection from connect option in project option. Set method of connection type to modem and dial-up modem, and communication port and transmission speed which are set in internal or external modem linked with PC. Communication speed as is related with dial-up modem performance shall be set similar to that of modem.



C) Select Remote 1 of depth of connection stages and set station No. as specified in Cnet I/F module. The station No. shall be surely input if the module is of Ver.2.0 or later. For the former versions, no need to set station No. because basic values are good enough for connection. Station numbers are not compared for GMWIN connection in the former versions.

D) Select Connect in On-line after connection option setting to display dialog box for modem initializing.

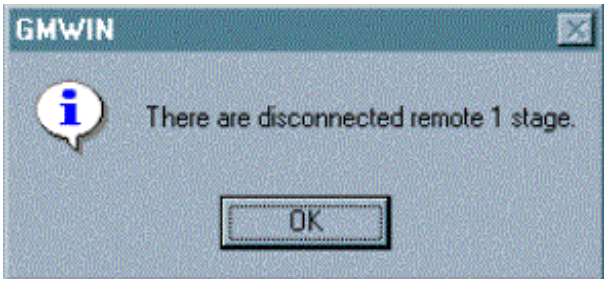


E) If COM port of modem is incorrectly set or connection with modem is abnormal, the following error message is displayed. In this case, inspect COM port or modem connection.

F) If telephoning is completed, GMWIN tries remote connection automatically and if remote connection is completed, program write and run/stop icon menus are activated as below.

G) This means that remote 1 stage connection is completed just like the connection status that RS-232C cable is connected as moved, where all functions in On-line menu are available.

H) To release connection in remote connection status, select Disconnect in On-line menu to display Disconnect menu box as in the figure below indicating Disconnected.



I) If connection is released, GMWIN hangs up the phone automatically to disconnect it.

J) If the phone is hung up normally, local and remote modem is restored to initial status to allow remote connection again via telephoning.

8.4 Communication with GOLDSEC MJUC24

With user defined mode in this module, communication with different model of device is available through function to define other company's protocol via Frame Editor in user defined mode. Next is how to communicate via GOLDSEC MJ71C24 computer link communication module of GOLDSEC PLC in GLOFA-PLC. [Figure 8.12] shows system configuration for communication with GOLDSEC PLC via RS-422 channel. 12-word data is read from D0100 of GOLDSEC PLC to save in starting %MW50 of GLOFA PLC in order, while GOLDSEC PLC is set to station 1.

[Figure 8.12] Communication between GLOFA PLC and GOLDSEC PLC

8.4.1 Exercising program

As shown in [Figure 8.12], Cnet I/F module operates as a master station in user defined mode. If total Read command of memory word unit is applied among dedicated protocols of GOLDSEC PLC, continuous reading of D area in GOLDSEC PLC is available. Set mode and basic setting items of Cnet I/F module and then prepare frame and GMWIN program for this service

1) Setting items

As in communication via RS-422 channel of Cnet I/F module, set operation mode and basic parameters for RS-422 channel. [Table 8.7] describes setting items of Cnet I/F module.

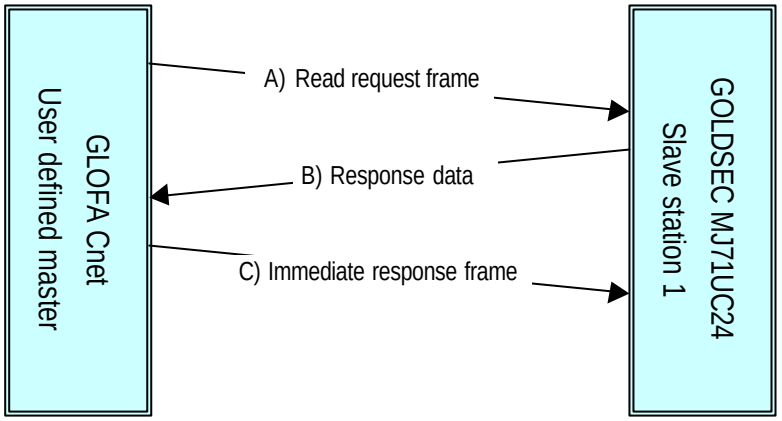
[Table 8.7] Setting items

RS-422 channel setting item	Setting contents	Remark
Operation mode	Mode '2' user defined mode	RS-232C channel not used
RS-422 station No.	Basic value (Not used)	Communication speed and basic communication spec. shall be as specified in spec. of MJ71UC24 computer link module.
Communication type	RS-422	
RS-422 basic parameters	9600 BPS / DATA 8 bits / START 1 bit / STOP 1 bit	

2) Communication protocol

Communication protocol to communicate with MJ71UC24 computer link module is as follows.

[Figure 8.13] TX sequence of TX/RX frames



If GLOFA Cnet sends A) Read request frame first, MJ71UC24, to respond to this, reads data of applicable area to transmit B) Response data frame, and Cnet I/F module sends C) Immediately Response frame to inform MJ71UC24 of data received. Next is TX/RX frame structure.

A) Read request frame(Cnets' request : Read request of 12 words in D0100 of station 1)

Classification	Header	Station No.	PLC No.	Command	Message wait	Head device	Number of device
Frame	ENQ	01	FF	WR	0	D0100	0C

B) Response format to total Read (Response of MJ71UC24 side)

Classification	Header	Station No.	PLC No.	Data	Tail
Frame	STX	01	FF	Data (12 words) of D0100 address	ETX

C) Immediate response

Classification	Header	Station No.	PLC No.
Frame	ACK	01	FF

Next is for communication frame contents. Refer to the user's manual of GOLDSEC-M computer link unit for more information.

- ❑ Station No. : Station No.(station 1) of MJ71UC24
- ❑ PLC No. : Set to FF
- ❑ Command : WR (Total Read command of word unit in device memory)

❑ Message wait : Min. stand-by time until transmitted after frame is received.

❑ Head device : 5 characters as a starting address in PLC memory

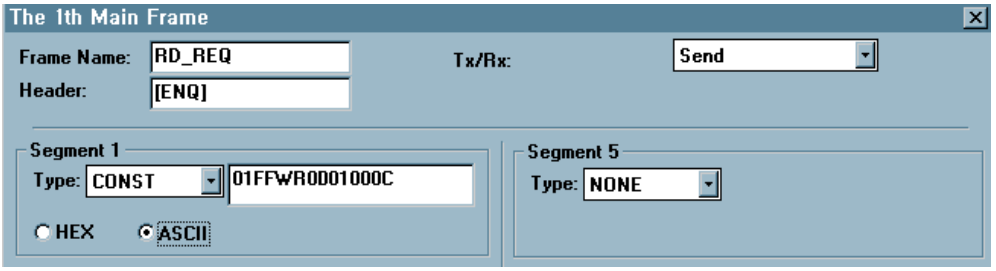
❑ Number of devices: Data length to read (word unit)

❑ Data : Data appropriate for the number of devices specified.

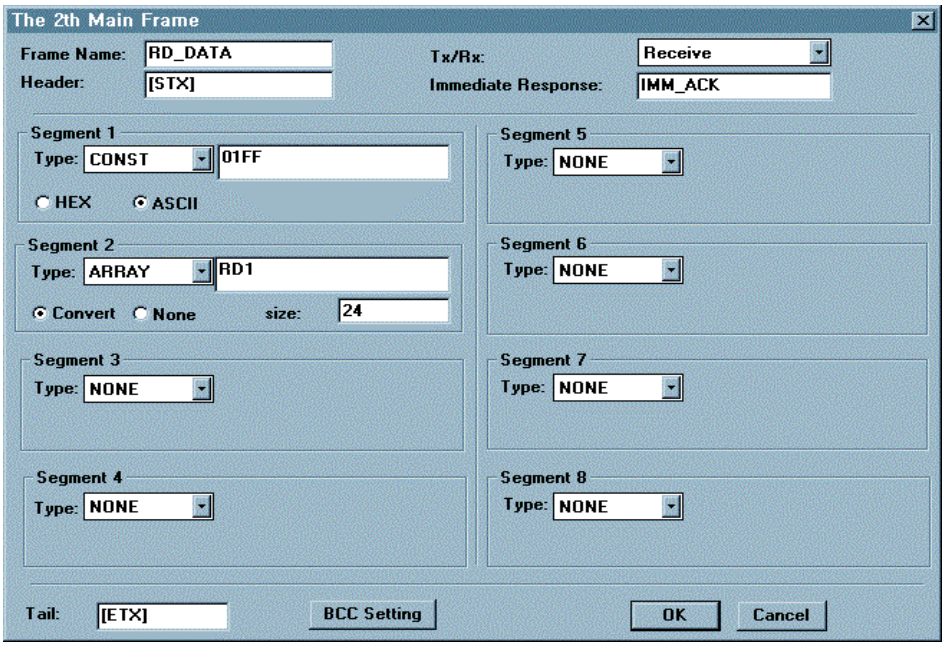
3) Frame edit

Define 3 frames above through Frame Editor.

A) Read request frame: Read request frame as of TX frame is configured in CONST where no ARRAY type is applied. Next is edit screen of Read request frame for transmission.

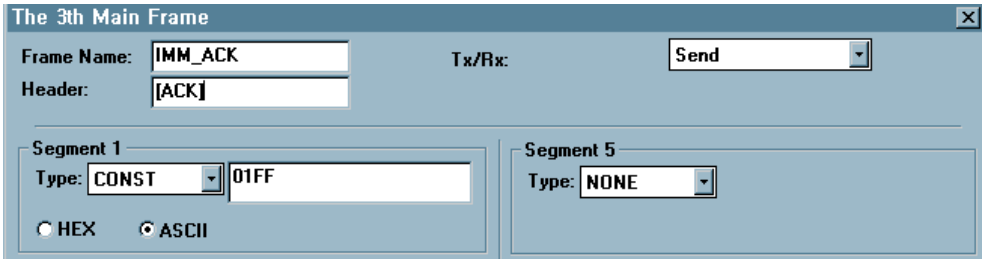


B) Total Read response frame : Response frame to Read request is defined by RX frame, while ARRAY variable is set to saving area of RX data behind PLC No.. As in ASCII communication, select Convert for data type to convert ASCII code into HEX value so to be received by PLC, and enter 24 as RX data is in byte unit.

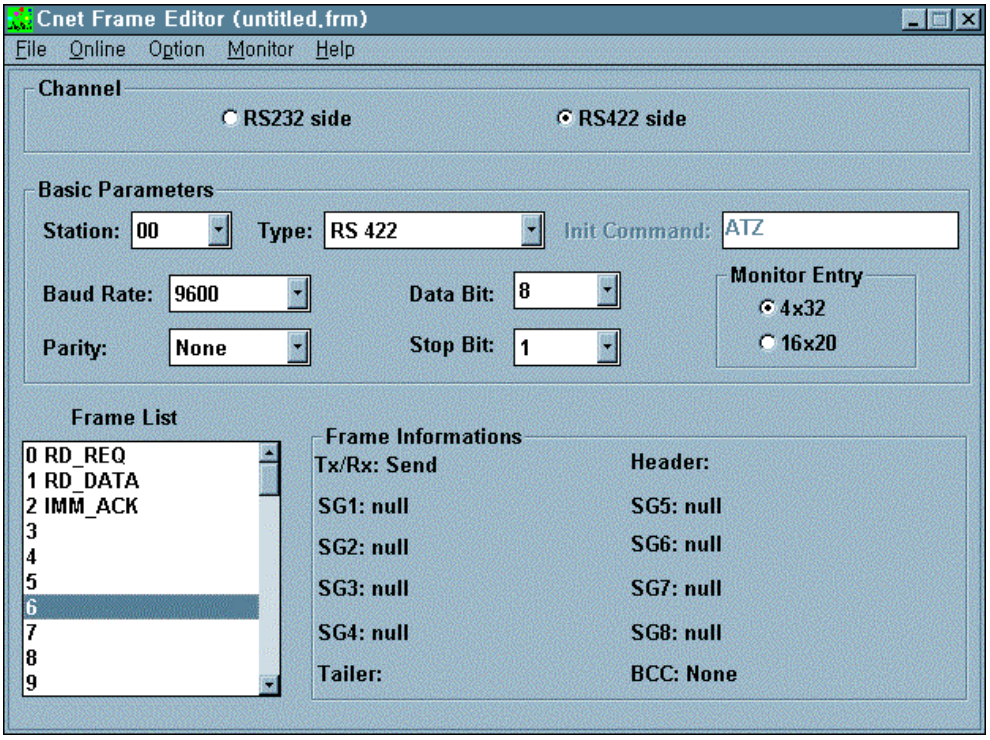


If RX frame is received, set IMM_ACK to immediate response to send IMM_ACK frame through immediate response from Cnet when RD_DATA is received. Immediate response frame is described below.

C) Immediate response frame : Define IMM_ACK frame as below for TX frame to send IMM_ACK frame from Cnet if RD_DATA frame is received.

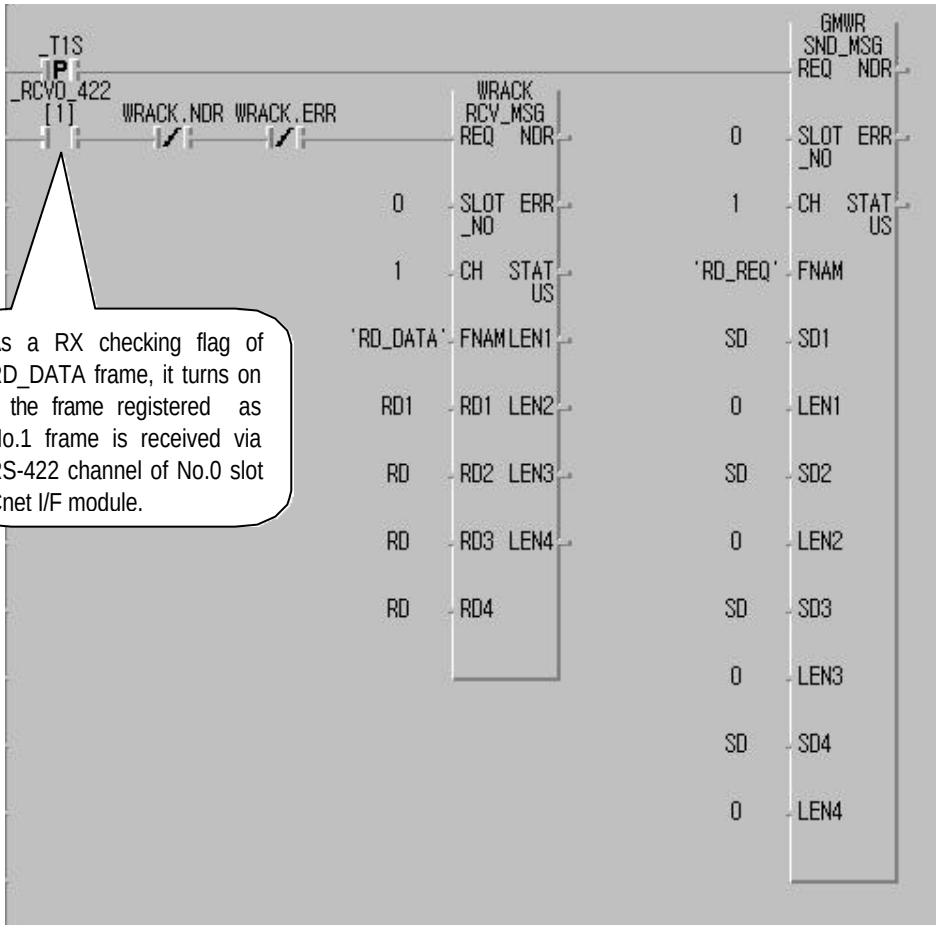


Frame Editor screen where frame has been defined is as below. After frame edit above is completed, write frames and basic parameters via RS-422 channel through On-line connection and then run channel operation to finish preparation of Cnet operation.

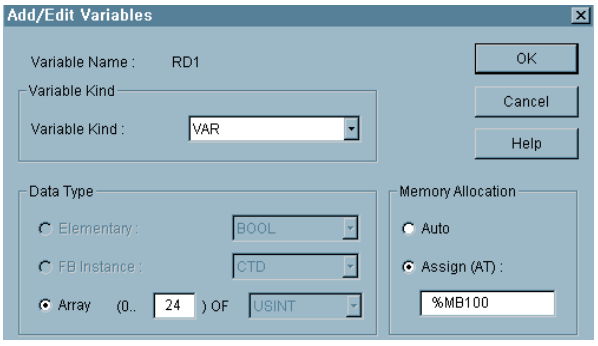


4) GMWIN programming

After frame edit and download are completed, prepare program in GMWIN to save TX/RX data of TX frames. Next figure shows GMWIN program for TX/RX communication with MJ71UC24. With 1 sec. timer, 'RD_REQ' frame is transmitted in a cycle of 1 sec. and 24 bytes of data received are saved in variable area of 'RD1' if 'RD_DATA' frame is received.



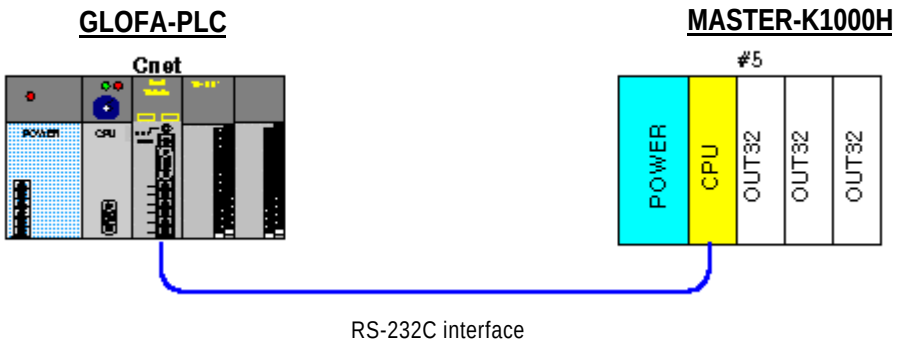
RX data is saved in variable defined to RD1 of RCV_MSG Function Block with variable allocation set to %MB100 and with 25 ARRAY variables reserved to receive 24 bytes data.



8.5 Communication with MASTER-K 1000H

Communication between GLOFA-PLC and MASTER-K 1000H PLC will be described below. [Figure 8.14] shows the system where this module is connected with CPU communication port of MASTER-K 1000H via RS-232C. Programming for Cnet I/F module as of a master station to write data in MASTERK-K1000H output area in accordance with MASTER-K 1000H's dedicated communication protocol is described in the figure. It's an example for Read 10-word data from %MW100 address of GLOFA PLC and Write 10-word data to output areas of 5 cards from output card P00 of MASTER-K 1000H.

[Figure 8.14] Communication system between GLOFA PLC and MASTER-K PLC



8.5.1 Exercising program

Cnet I/F module operates as a master station in user defined mode, and writes data to MASTER-K 1000H via CPU port of MASTER-K 1000H PLC through dedicated protocol and WORD WRITE command among MASTER-K dedicated communication protocols, while MASTER-K 1000H operated as a slave station processes Write data request of GLOFA-Cnet to respond to the following result in the structure as shown in [Figure 8.14]. Prepare frame and GMWIN program for this after setting of Cnet I/F module mode and basic setting items.

1) Setting items

As in communication via RS-232C channel of Cnet I/F module, set operation mode and basic parameters for RS-232C channel. [Table 8.8] describes setting items of Cnet.

[Table 8.8] Setting items of Cnet I/F module

RS-232C channel setting item	Setting contents	Remark
Operation mode	Mode '2' user defined mode	RS-422 channel not used
RS-232C station No.	Basic value(Not used)	Communication speed and basic communication spec. shall be as specified in spec. of MASTER-K 1000H communication.
Communication type	Null modem	
RS-232C basic parameters	9600 BPS/DATA 8 bits /START 1 bit/STOP 1 bit	

2) Communication cable connection and basic setting

Connect Cnet with computer communication port in MASTER-K 1000H CPU as shown in [Figure 8.15]. Handshake-free type of null modem connection in RS-232C communication is applied with MASTER-K 1000H communication type set to RS-232C communication and 9600 BPS/Data 8 bits/Start 1 bit/Stop 1 bit through DIP switch along with station No. set to station 5. Refer to the user's manual for MASTER-K series communication to set MASTER-K 1000H communication.

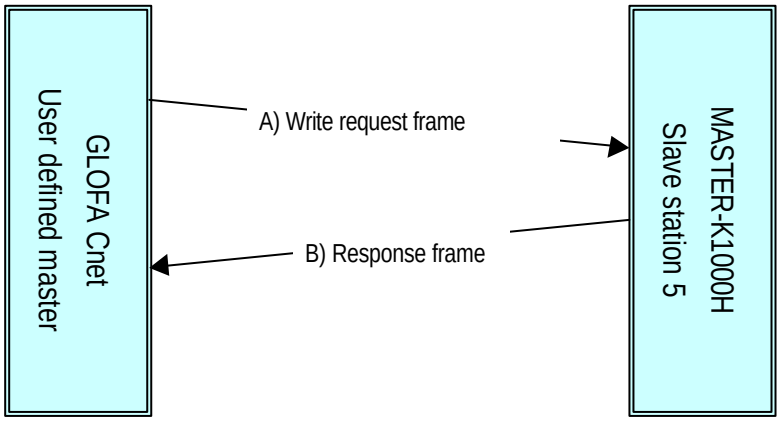
[Figure 8.15] 3-line connection between Cnet and MASTER-K 1000H (Handshake-free)

Cnet(9-pin)		Connection No. and Signal direction	MASTER-K1000 CPU	
Pin No.	Name		Pin No.	Name
1	CD		CD	8
2	RXD		RXD	3
3	TXD		TXD	2
4	DTR		DTR	20
5	SG		SG	7
6	DSR		DSR	6
7	RTS		RTS	4
8	CTS		CTS	5
9	RI		RI	22

3) TX/RX sequence of communication frame

TX/RX procedure to communicate in MASTER-K 1000H computer communication type is as follows. Cnet I/F module operates as a master station and MASTER-K 1000H operates as a slave to respond to Cnet's request as shown in the figure.

[Figure 8.16] TX sequence of TX/RX frames



When GLOFA Cnet sends A) Write request frame first, MASTER-K 1000H to respond to this, writes data to applicable area and sends B) Response frame. Next is TX/RX frame structure.

A) Word Write frame (Cnet's request : Write request of 10 words in P00 of station 1)

Classification	Header	Station No.	Command	Address	Number	Data	Tail	BCC
Frame	ENQ	05	w	P00	0A	20 bytes Data	EOT	

BCC calculation range

B) Response format to Word Write (Response of MASTER-K 1000H)

Classification	Header	Station No.	Command	Tail	BCC
Frame	ACK	05	w	EOT	E0

BCC calculation range

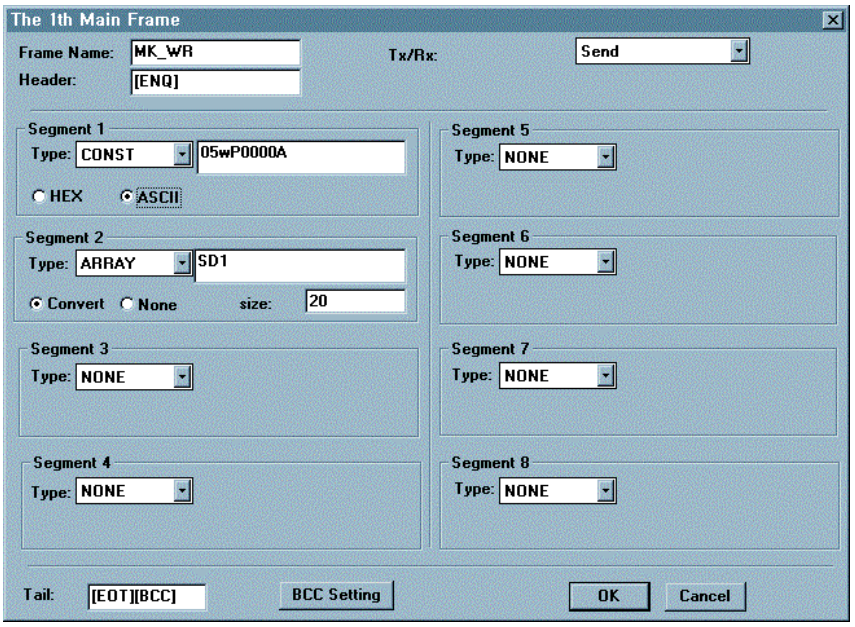
Next is for communication frame contents. Refer to the user's manual of MASTER-K 1000H for more information.

- ❑ Station No. : Station No. 5 (station No. of MASTERK-1000H)
- ❑ Command : w (BCC checked in WORD WRITE with the lower case of command)
- ❑ Address : P00 (P area of MASTER-K 1000H)
- ❑ Number : 0A (number of HEX data to write in word unit)
- ❑ Data : Data to write in specified device
- ❑ BCC : ASCII code sum of HEX data from station No. to tail.

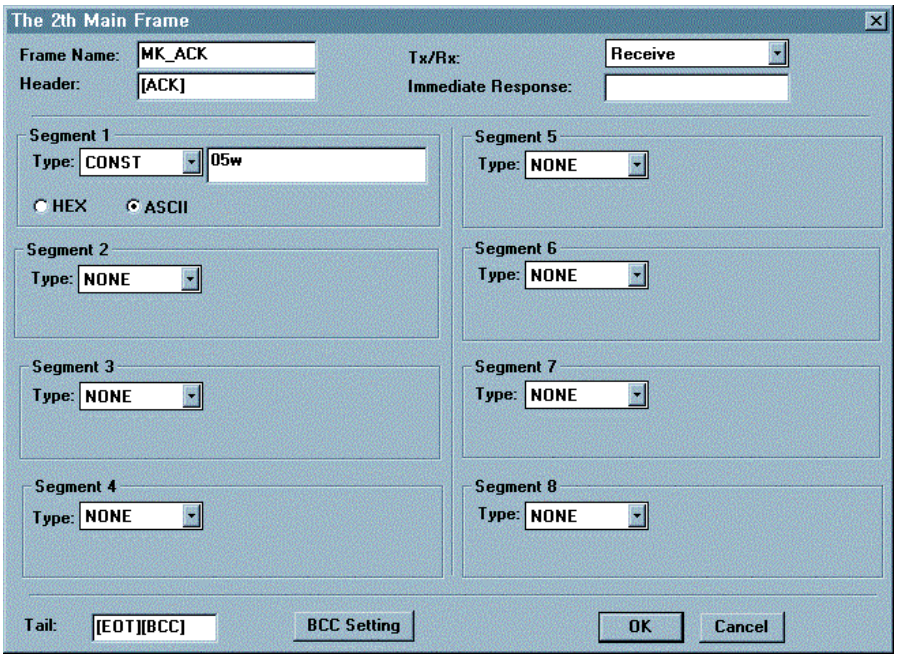
3) Frame edit

Define 2 frames above through Frame Editor.

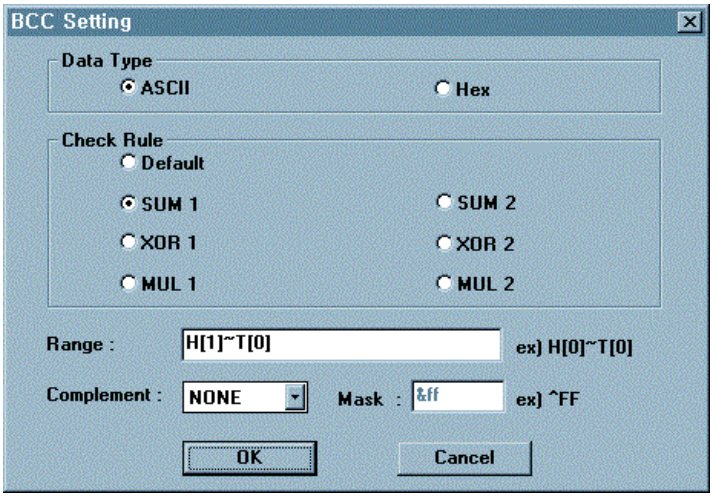
A) Write request frame : Write request frame as of TX frame is configured to send data via segment in ARRAY type to defined protocol. Next is Frame Editor screen of transmission frame edited. MK_WR is used for frame name, and the number of TX data is set to 20 bytes with station No. and constant command in CONST input to segment 1 and ARRAY variable to segment 2. ARRAY type is set to Convert to convert TX data to ASCII. As is TX frame, set TX/RX to Send.



B) Response frame: To respond to Write frame, MASTER-K 1000H sends the response frame below. RX frame to receive this is defined as below. Set frame name to MK_ACK and enter '05w' of RX frame CONST data for station No. and command. RX frame has no data, thus, no need to set ARRAY segment. Set [BCC] behind the tail to let BCC checked. Since BCC uses lower case command in Cnet's request frame, let BCC checked in all TX/RX frames.



C) BCC checking : BCC sends / receives HEX data sum from station No. to tail with ASCII converted result attached to the tail. BCC setting is as follows.

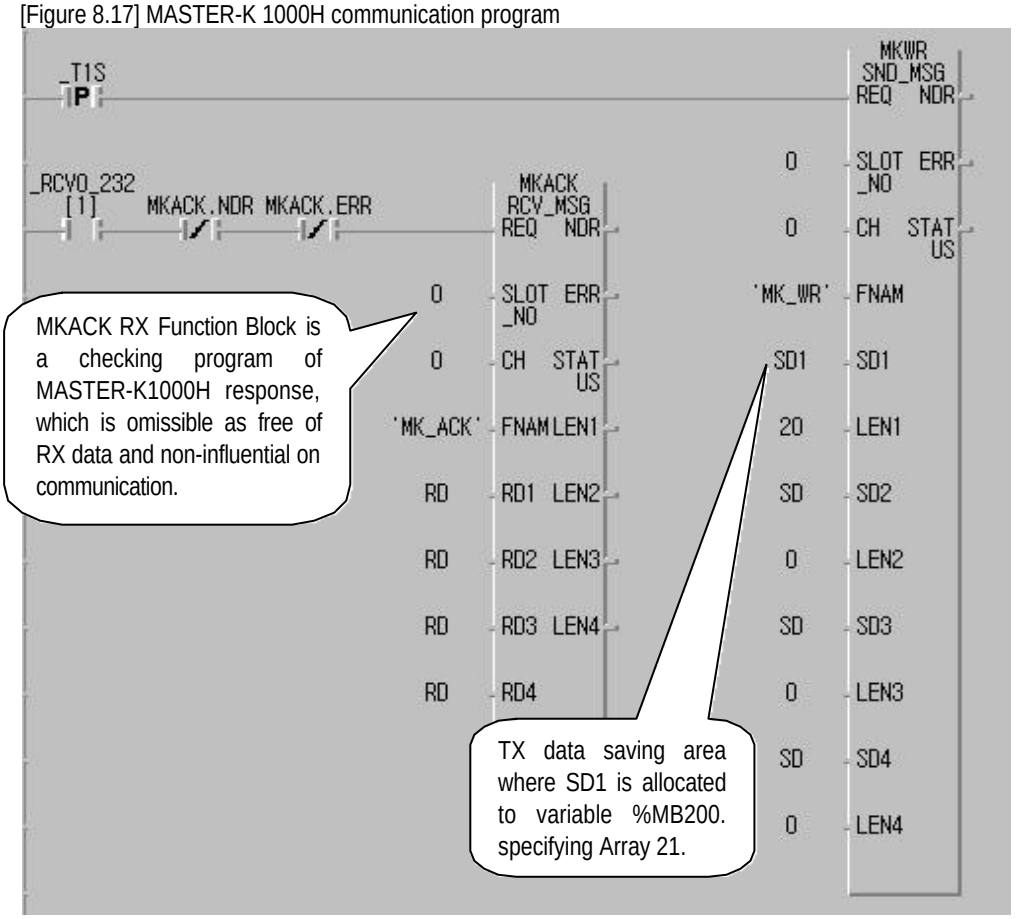


D) Frame download : Download the prepared frame and basic parameters as above to Cnet I/F module and run RS-232C channel to complete basic setting for Cnet I/F module. Subsequently, prepare PLC program through GMWIN program.

4) GMWIN programming

After frame edit and download are completed, prepare TX/RX program with SND_MSG/RCV_MSG in GMWIN for TX/RX by the prepared frame. Program for frame transmission and RX data saving shall be also prepared in GMWIN. [Figure 8.17] shows GMWIN program for communication with MASTER-K 1000H. With 1 sec. timer, 'MK_WR' frame is transmitted in a cycle of 1 sec. and TX area of %MB200 is allocated in SD1 area of TX frame to transmit 20 bytes starting from %MW100 address. Download the program shown in [Figure 8.17] to PLC and run program to allow TX/RX through Cnet.

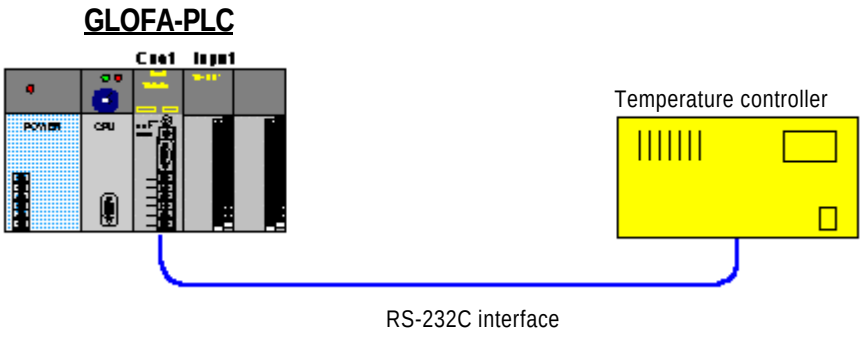
[Figure 8.17] MASTER-K 1000H communication program



8.6 Communication with HEX communication equipment

Communication with devices which communicate with GLOFA-PLC through HEX protocol is described as below. HEX communication needs only half amount of ASCII communication data, so it enables double speed communication comparatively even in the same communication speed. The figure shows an example of user defined mode communication of Cnet I/F module as a master station, with temperature controller which performs HEX communication. 12-word data per channel of temperature input 12 channels of temperature controller are read one by one and saved to %MB300 address of GLOFA PLC, and if No.0 bit input value of slot No.1 input module in GLOFA PLC is turned on, 24 bytes data is read from %MB1000 address and output to 12 channels of D/A output module of temperature controller in this program example. GLOFA Cnet I/F module and temperature controller perform 1:1 communication via RS-232C channel in the system configuration as shown in [Figure 8.18].

[Figure 8.18] Communication system of GLOFA-PLC with temperature controller



8.6.1 Exercising program

Cnet I/F module operates as a master station in user defined mode, and temperature controller operated as a slave responds to Read/Write data requests of GLOFA Cnet I/F module via RS-232C communication port in [Figure 8.18]. For this service, set mode and basic items of Cnet I/F module and then prepare frame and GMWIN program. As communication protocol of temperature controller is in HEX communication here, HEX value is to be defined in the frame of Cnet I/F module, which is supported only in Cnet Ver.2.0 or later. Ver.2.0

Remark

[Note1] When setting of constant in Frame Editor, HEX value can't be input, thus, former modules than Cnet Ver.2.0 are unavailable for the service. Frame Editor also shall be of Ver. 2.0 or later for the service.

1) Setting items

As in communication via RS-232C channel of Cnet I/F module Ver.2.0, set operation mode and basic parameters for RS-232C channel. [Table 8.9] describes setting items of Cnet I/F module.

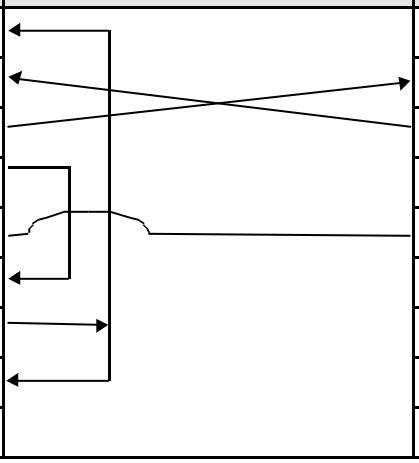
[Table 8.9] Setting items of Cnet I/F module

RS-232C channel setting item	Setting contents	Remark
Operation mode	Mode '2' user defined mode	RS-422 channel not used.
RS-232C station No.	Basic value (Not used)	Communication speed and basic communication spec. shall be as specified in spec. of temperature controller communication.
Communication type	Null modem	
RS-232C basic parameters	38400 BPS / DATA 8 bits / START 1 bit / STOP 1 bit	

2) Communication cable connection and basic setting

RS-232C communication channel of temperature controller is connected with Cnet RS-232C channel. If Handshake-free type of null modem communication is applied to temperature controller, perform connection as shown in [Figure 8.19]. After that, set communication type of temperature controller identical to the communication type of Cnet I/F module in [Table 8.9] to complete basic setting for communication. Refer to the user's manual of temperature controller to set temperature controller.

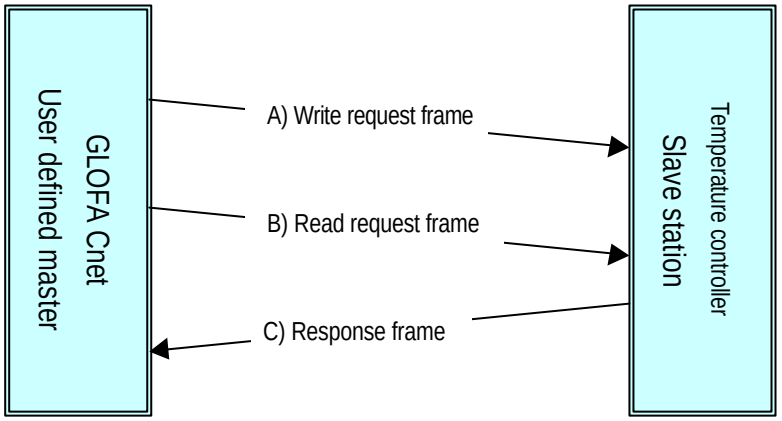
[Figure 8.19] 3-line connection between Cnet and temperature controller (Handshake-free)

Cnet(9-pin)		Connection No. and signal direction	Temperature controller	
Pin No.	Name		Pin No.	Name
1	CD			
2	RXD		RXD	2
3	TXD		TXD	3
4	DTR			
5	SG		SG	7
6	DSR			
7	RTS			
8	CTS			
9	RI			

3) Communication protocol of temperature controller

For communication between Cnet I/F module and temperature controller, communication type of temperature controller is to be informed of. The example describes how to prepare program supposing that communication protocol is as shown in [Figure 8.20].

[Figure 8.20] Communication protocol of temperature controller



A) Write request frame(Cnet's request : Write data of 12 channels in temperature controller)

Classification	Header	Device ID	Command	Address	Channel number	Data
Frame	[DLE][STX]	01	01	30	0c	12-word data

BCC calculation range

BCC	Tail
	[DLE][ETX]

B) Read request frame(Cnet's request : Read temperature value of 12 channels in temperature controller)

Classification	Header	Device ID	Command	Address	Channel number	BCC	Tail
Frame	[DLE][STX]	01	02	80	0c		[DLE][ETX]

BCC calculation range

C) Read response frame (Temperature controller's response : sends temperature value of 12 channels)

Classification	Header	Device ID	Command	Status	Channel number	Data
Frame	[DLE][ACK]	01	02	00	0c	12 word data

BCC calculation range

BCC	Tail
	[DLE][EOT]

Communication protocol in [Figure 8.20] is a protocol for HEX communication with data areas all in HEX except header and tail.

Communication frame is described next.

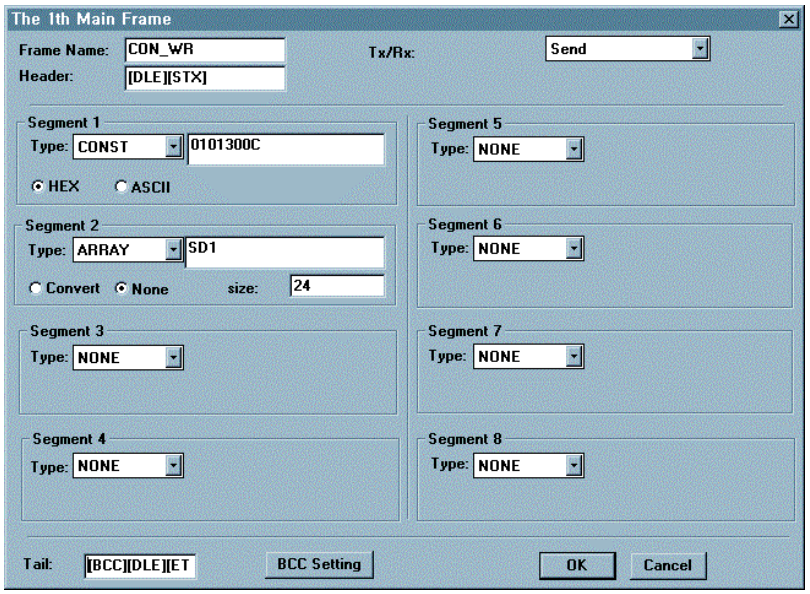
- ❑ Header : Indicates start of frame with [DLE][STX] in request frame and continuous control characters of [DLE][ACK] in response frame.
- ❑ Tail : Indicates end of frame with [DLE][ETX] in request frame and continuous control characters of [DLE][EOT] in response frame.
- ❑ Device ID : Means temperature controller No. with '01' used in.
- ❑ Command : Dependent on Read/Write commands, '01' for Write and '02' for Read command.
- ❑ Address : Memory address of temperature controller.
- ❑ Channel number : I/O channels number of temperature controller.
- ❑ Data : I/O channel data of temperature controller.
- ❑ Status : Indicates the status of response frame. '00' if displayed means response successful.
- ❑ BCC : HEX data sum from Device-ID next to header to BCC prior.

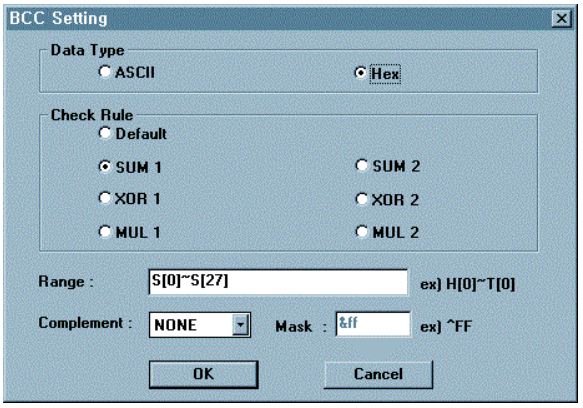
4) Frame edit

Define 3 frames above through Frame Editor to download to Cnet I/F module.

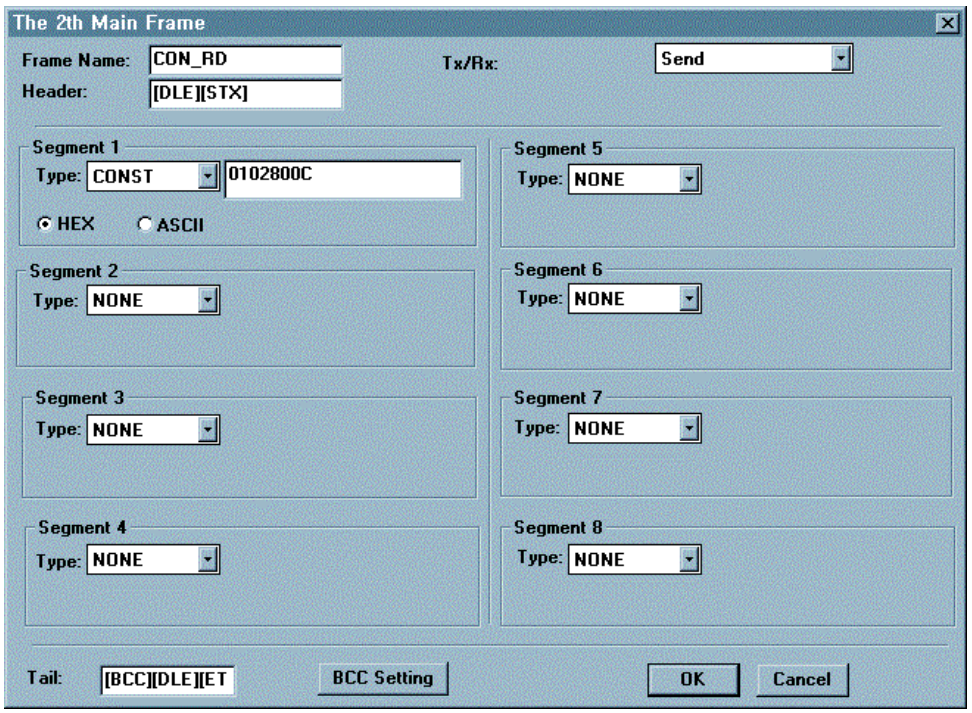
A) Write request frame : Write request frame as of TX frame is configured to send data to specified protocol through segment of ARRAY type. Next is Frame Editor screen of TX frame edited. CON_WR is entered in frame name, CONST in segment 1, HEX for channel number in Device-ID, ARRAY variable in segment 2 and 24 bytes for TX number of data.

Enter None for Array type to send TX data in HEX without ASCII conversion. As is TX frame, set TX/RX to Send. Enter [BCC] in tail and set BCC as below with data only inside segment added to send 1 byte BCC data in HEX value together. Set the range of S[0]~S[27] as the data length of segment is 28 bytes.

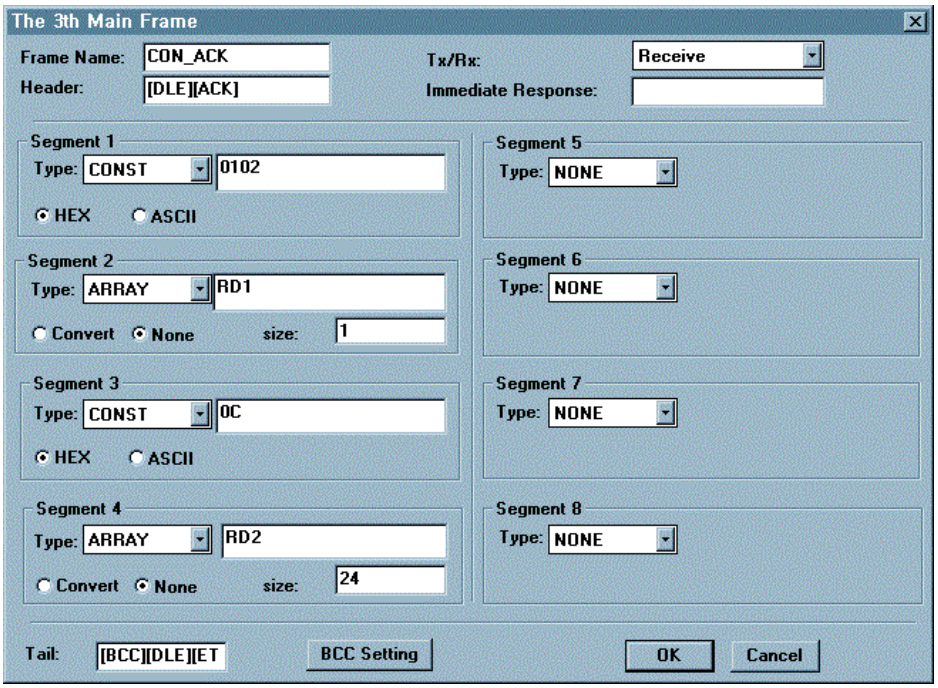




B) Read request frame: It is TX frame to read channel data through temperature controller in Cnet. TX frame for Read request shall be registered as follows. Input CON_RD for frame name. Because TX frame has no data area, use just one segment set to Constant. Set [BCC] in front of tail and let [BCC] checked. BCC checking range and calculation method are same as in Write request frame.



C) Read response frame : Set RX frame to receive TX frame which responds to Read request in temperature controller. The right figure shows setting screen of RX frame. CON_ACK is entered in frame name, ARRAY segment in RX data area of temperature controller's response frame, HEX in command, CONST where is out of '00' and ARRAY in STATUS area as RX data is HEX '00' with STATUS value checked in PLC program.[Note1] Set RX data area to ARRAY and conversion option to None in order to allow RX data to be received in HEX value by PLC program.



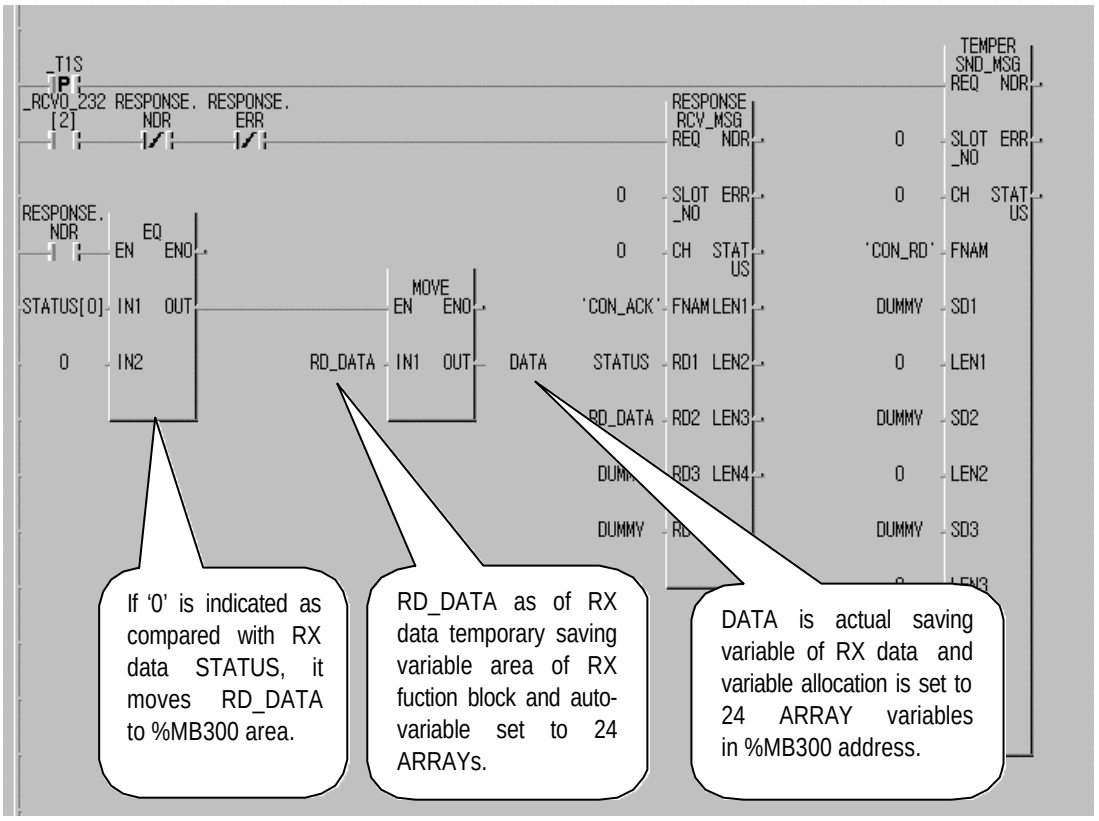
Remark

[Note1] HEX data of CONST segment can be set in an even number unit in frame edit. If '00' is in CONST data, setting is unavailable. In this case, set only '00' area to ARRAY.

5) GMWIN programming

After frame edit and download are completed, prepare TX/RX program via SND_MSG/RCV_MSG in GMWIN for TX/RX of the prepared frames. [Figure 8.21] shows TX/RX program to read data of temperature controller. It requests Read by transmission of 'Temperature' Function Block in a cycle of 1 sec. and receives its response frame to 'Response' Function Block to save HEX data of STAUTS and temperature data of 24 bytes among RX data to RD_DATA area temporally. Temporal data of RD_DATA if STATUS value is '0' saves 24 bytes of RX data in starting %MB300 address in order through this program.

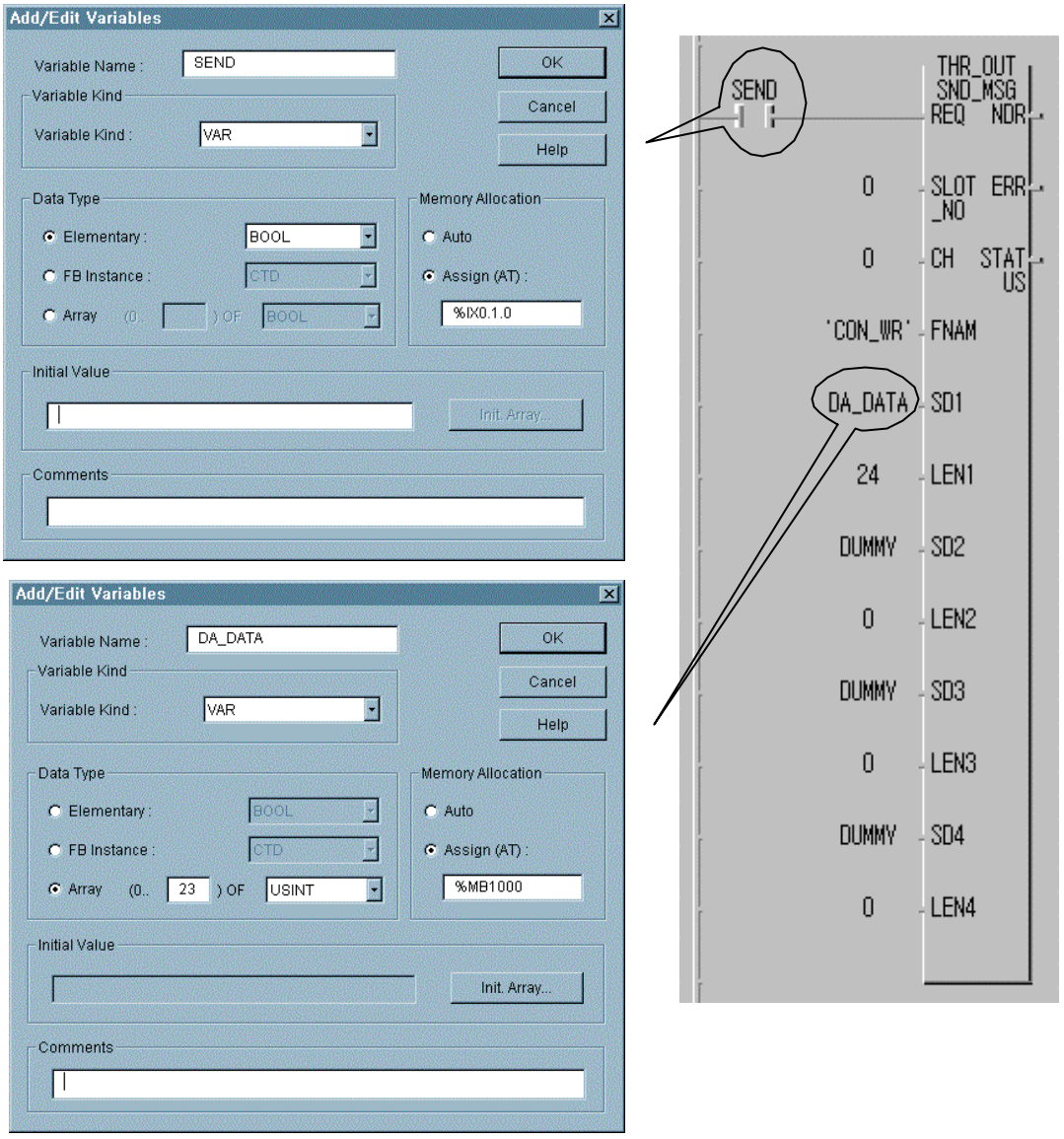
[Figure 8.21] Read data program of temperature controller



STATUS set to RD1 of 'Response' Function Block is auto-variable to save data set to ARRAY segment in Frame Editor to save RX data received in '00' of RX frame, and checks normal response as compared with this area.

[Figure 8.22] shows a program to write data with temperature controller. 'TX button' as of variable allocated to %IX0.1.0, sends TX data if 'ON' entered. TX data allocates 'DA_DATA' to %MB1000 to send 24 bytes data from %MB1000.

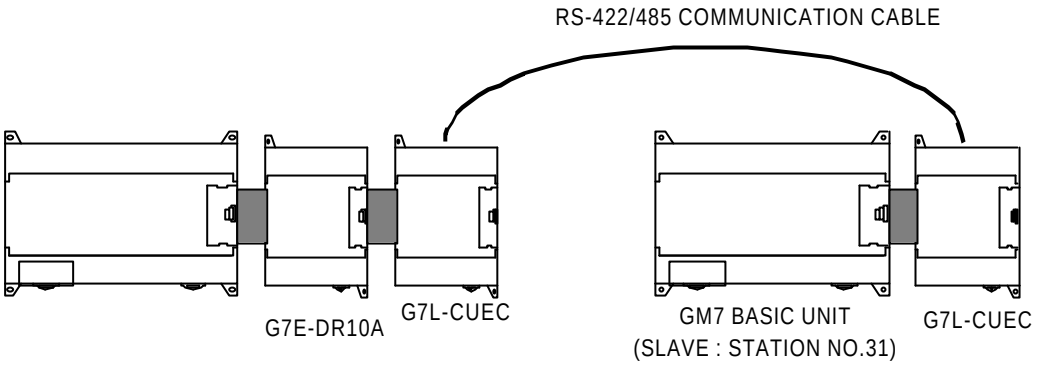
[Figure 8.22] Write data program of temperature controller



After compile and link of programs in [Figure 8.21] and [Figure 8.22], let them downloaded to PLC CPU and run to start communication through the defined protocol.

8.7 Example of using G7L-CUEC

8.7.1 Dedicated communication master



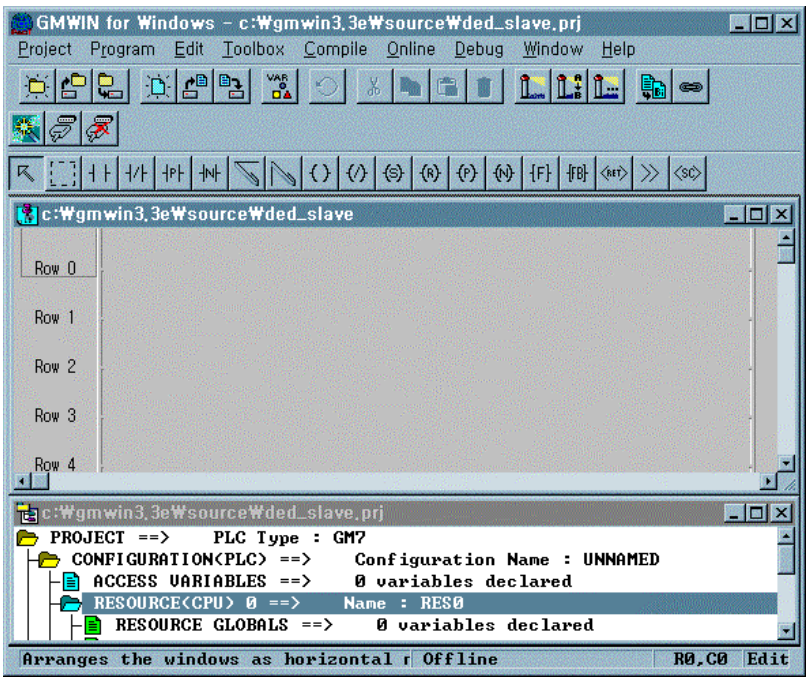
The following describes the example of system configuration as above with GM7 basic unit operation.

- In master GM7 basic unit, data is changed through ROL Function and MOV Function in M area, written to output contact of slave GM7 basic unit, and then read again in master GM7 basic unit finally to be written to output contact of G7E-DR10A which is extended digital I/O module.

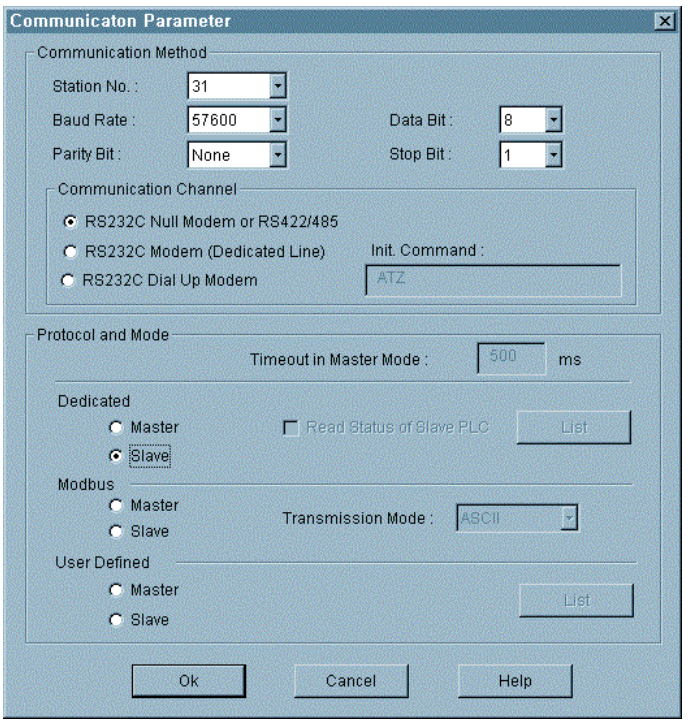
1) Communication parameter setting and program of slave station

A) Perform operations in slave station No.31.

B) Create new project file and new program for slave station.



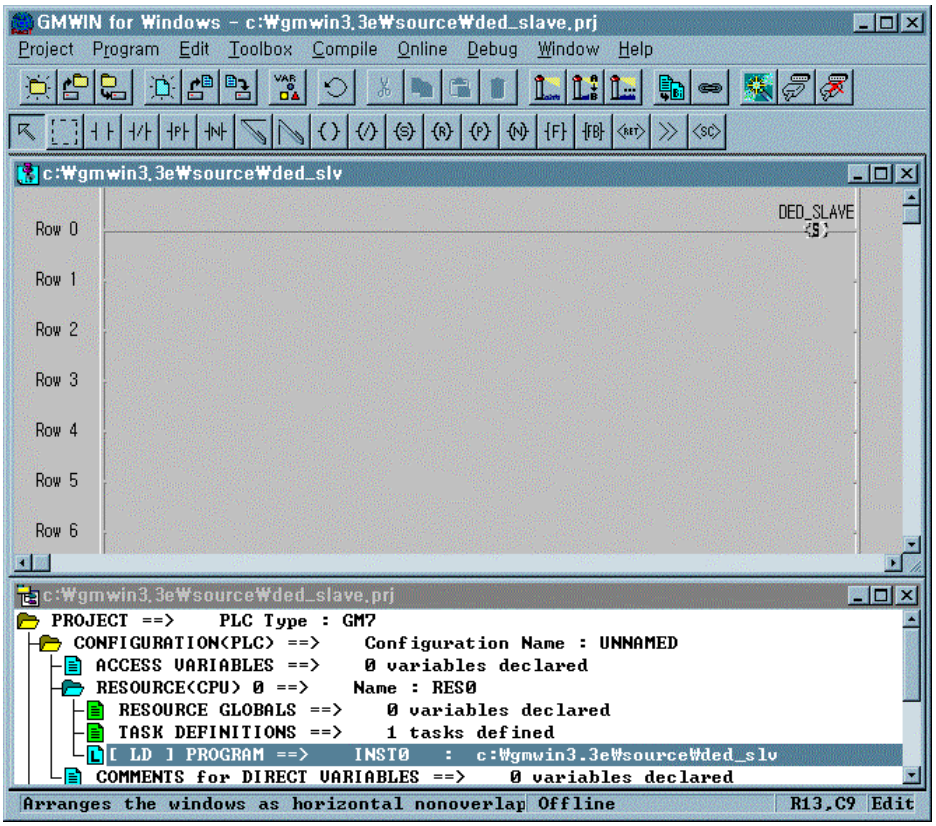
C) Select communication parameter in GMWIN parameters and double-click on it to open communication parameter menu window.



- Set parameters as below and click on OK button.

Communication method						Protocol and mode
Station No.	Baud rate	Data bit	Parity bit	Stop bit	Communication channel	Dedicated
31	57600	8	None	1	RS232C null modem or RS422/485	Slave

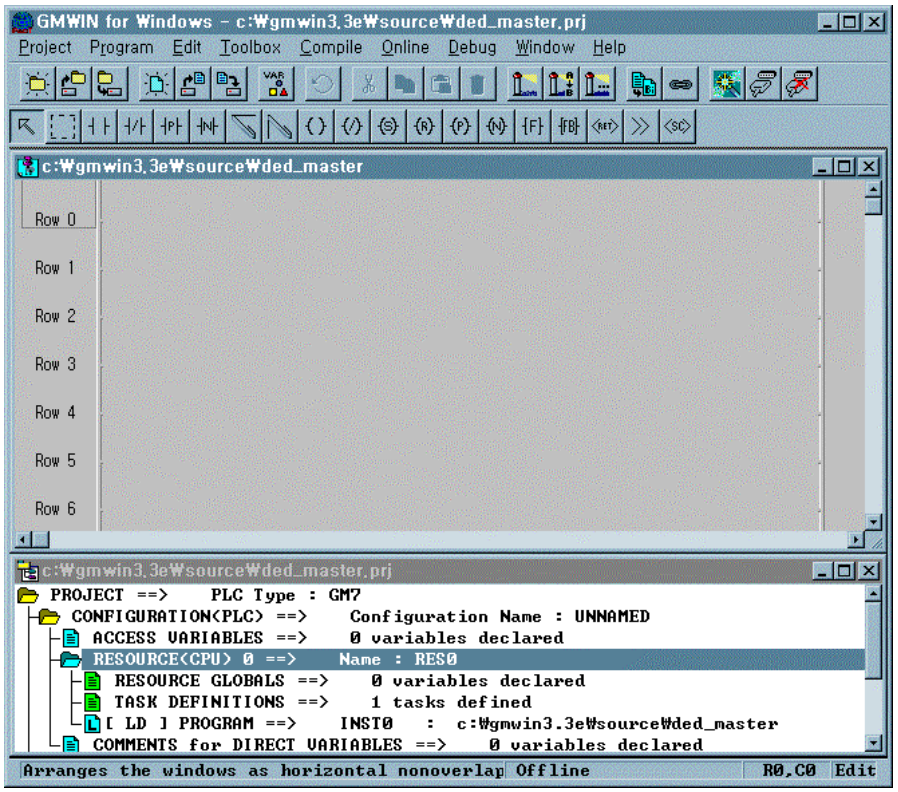
D) Prepare program as in the figure below and let it downloaded to GM7 basic unit of slave station. Refer to user's manual of GMWIN for the details of programming and downloading.



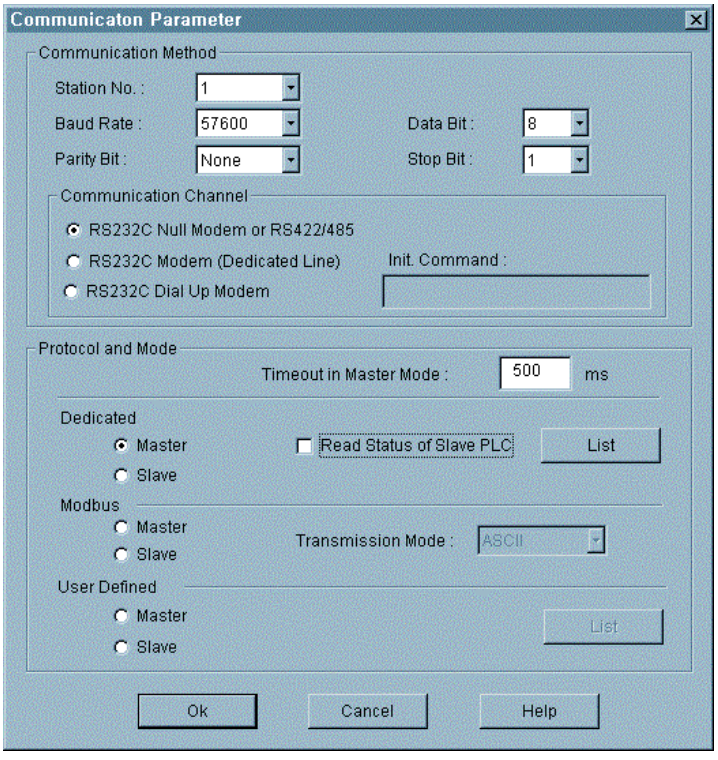
2) Communication parameter setting and program of master station

A) Perform operations in master station No.1.

B) Create new project file and new program for master station.



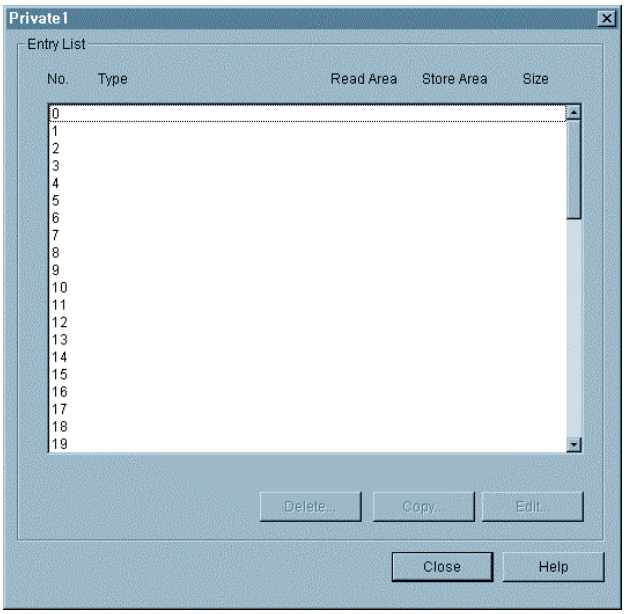
C) Select communication parameter in GMWIN parameters and double-click on it to open communication parameter menu window.



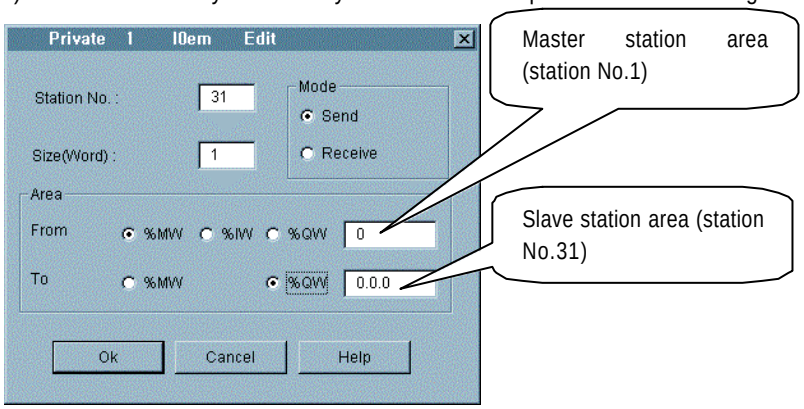
- Set parameters as below and click on entry list button.

Communication method						Protocol and mode	
Station No.	Baud rate	Data bit	Parity bit	Stop bit	Communication channel	Dedicated	Read status of slave PLC
1	57600	8	None	1	RS232C null modem or RS422/485	Master	Not selected

D) Press entry list button to activate entry list window.



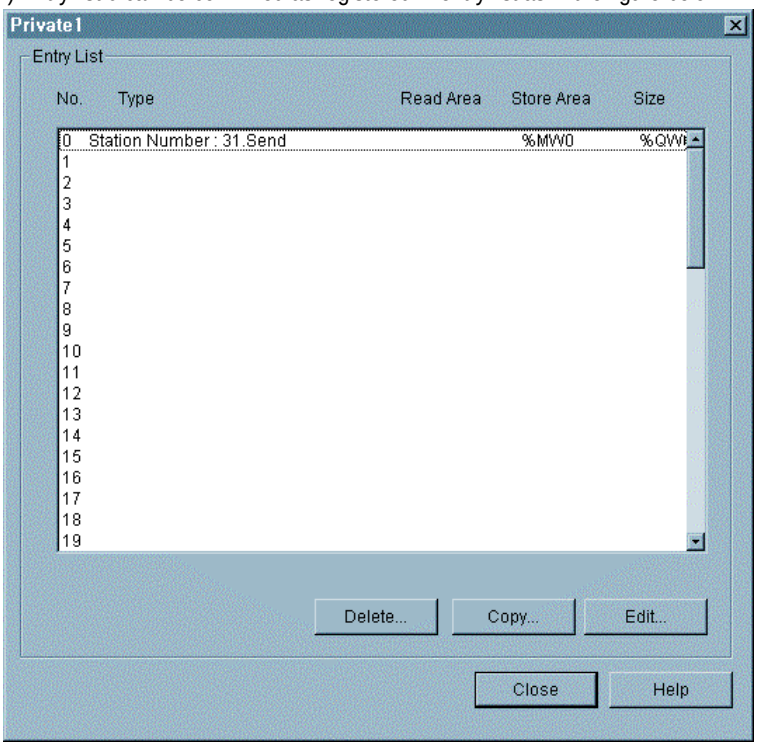
E) Double-click on entry list 0 in entry list with mouse to open the window showing Private 1 Item 0 Edit.



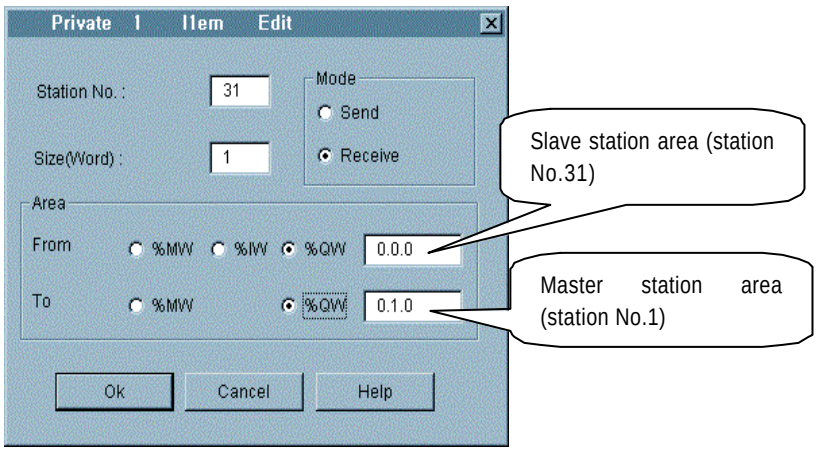
- Set parameters as below and click on OK button.

Other station No.	Size	Mode	Area to read	Saving area
31	1	TX	%MW0 (Refer to the figure above)	%QW0.0.0 (Refer to the figure above)

F) Entry list 0 can be confirmed as registered in entry list as in the figure below.



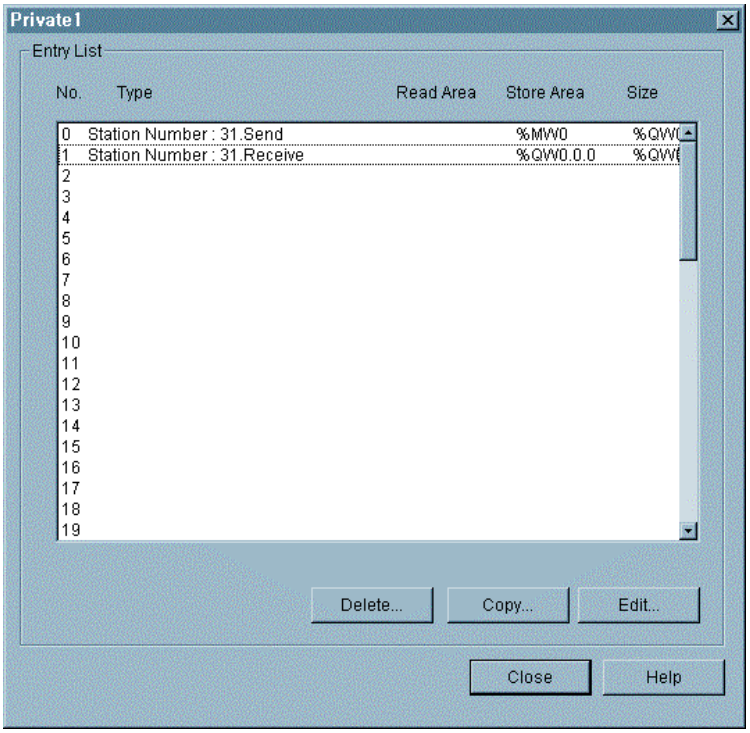
G) Double-click on entry list 1 with mouse again to enter entry list 1 as below.



- Set parameters as below and click on OK button.

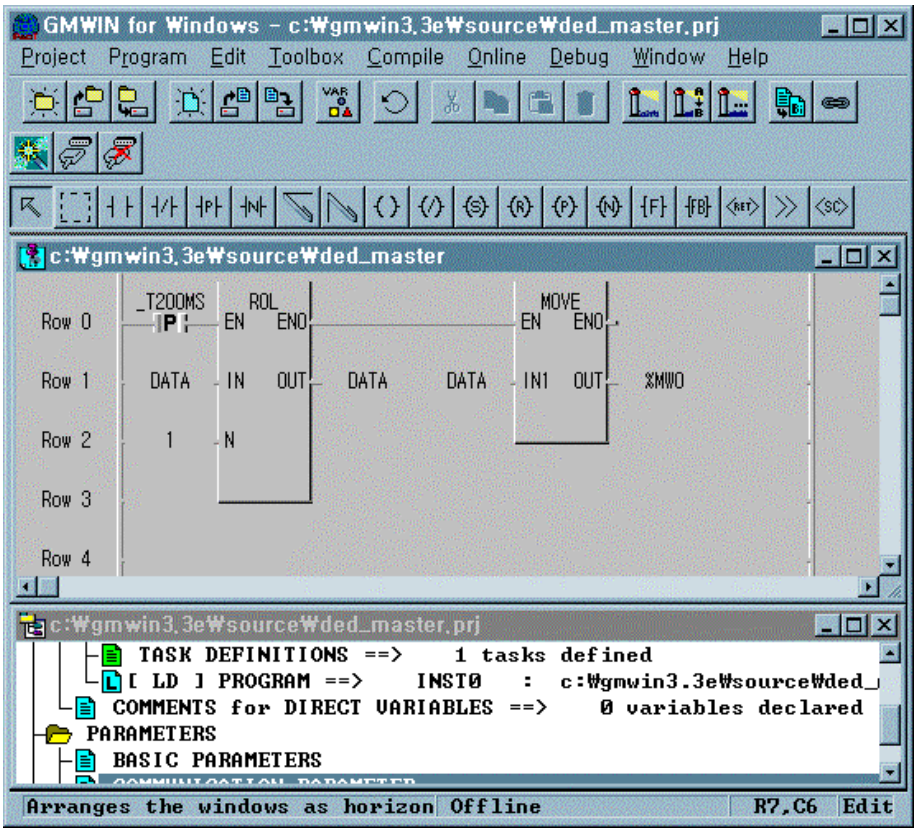
Other station No.	Size	Mode	Area to read	Saving area
31	1	RX	%QW0.O.O (Refer to the figure above)	%QW0.1.0 (Refer to the figure above)

H) Check if entry list 0 and entry list 1 are registered as in the figure below and then press Close button to go to communication parameter window.

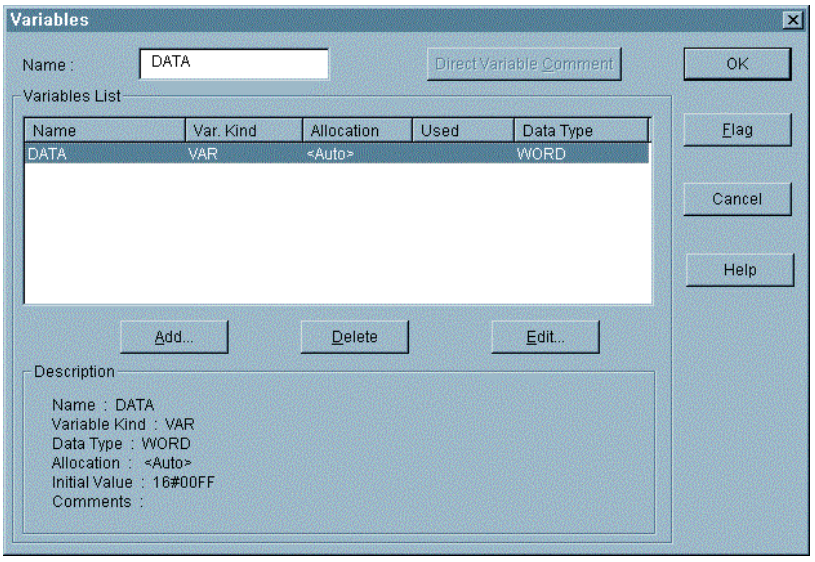


I) Click on OK button in communication parameter window to complete parameter setting input.

J) Prepare program as in the figure below and let it downloaded to GM7 basic unit of master station. Refer to user's manual of GMWIN for the details of programming and downloading.



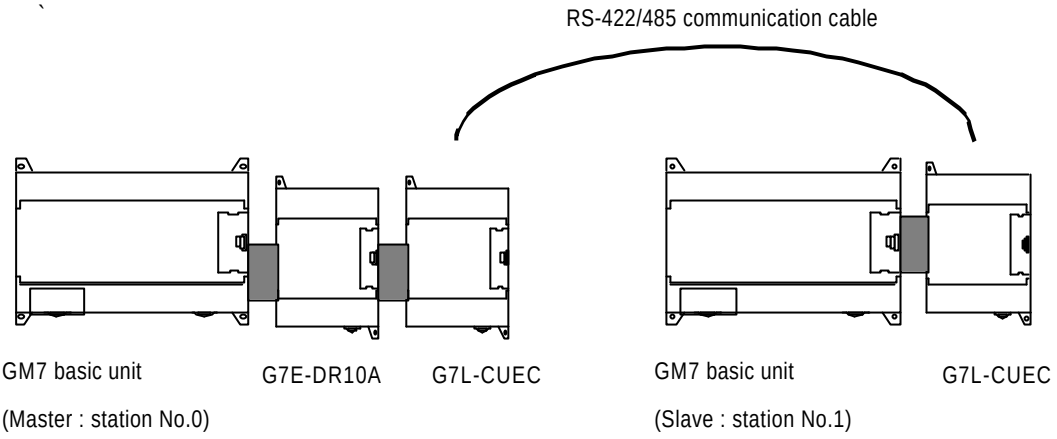
K) 'DATA', variable of program is HFF in HEX as an initial value with WORD type as in the figure below.



L) Set 'Enable Communication' in On-line status to execute master function in dedicated communication between LG GM7 basic units.

8.7.2 User's definition

Example of protocol-defined communication between GM7 basic units is described in system configuration as below.



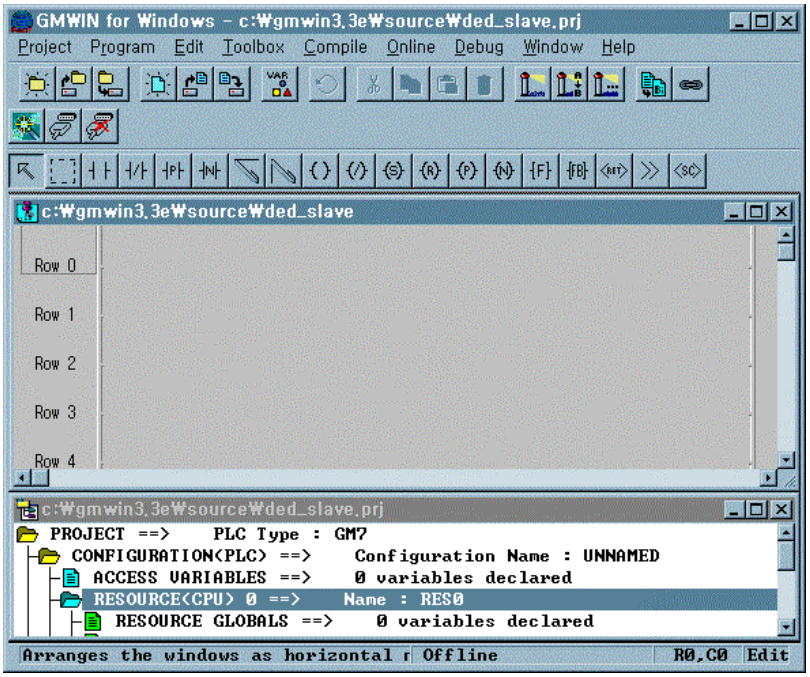
Data in M area of master station is sent to slave station, successively saved in M area as received by slave station, output to direct variable, and then transmitted to the master station again as processed.

Master saves the received data to M area again, outputs to direct variable, processes and then sends the data to slave station again repeatedly.

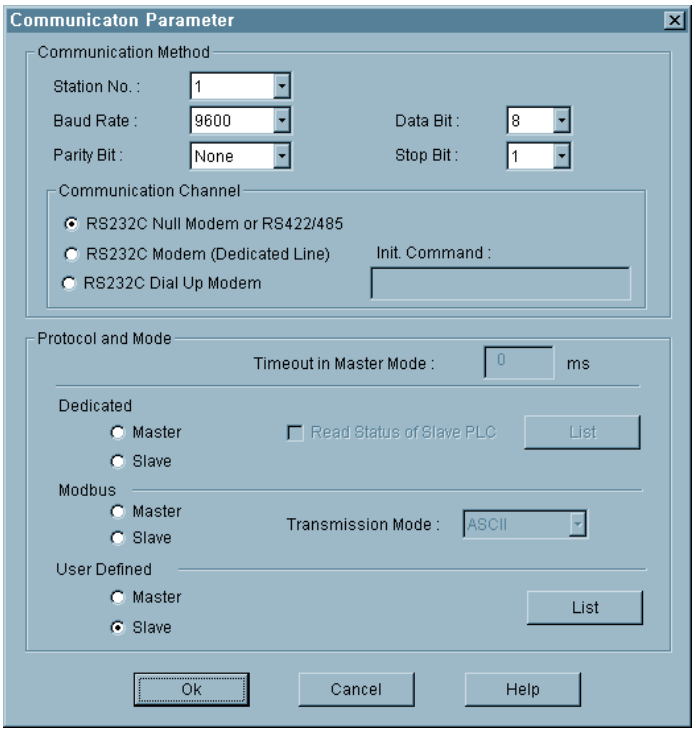
1) Communication parameter setting and program of slave station

A) Perform operations in slave station No.1.

B) Create new project file and new program for slave station..



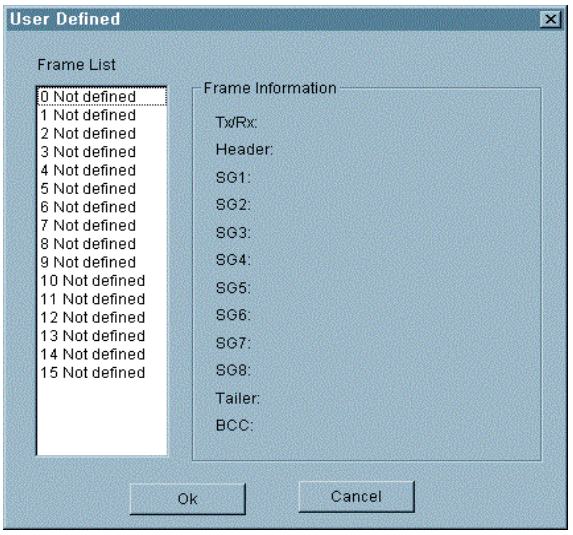
C) Select communication parameter in GMWIN parameters and double-click on it to open communication parameter menu window.



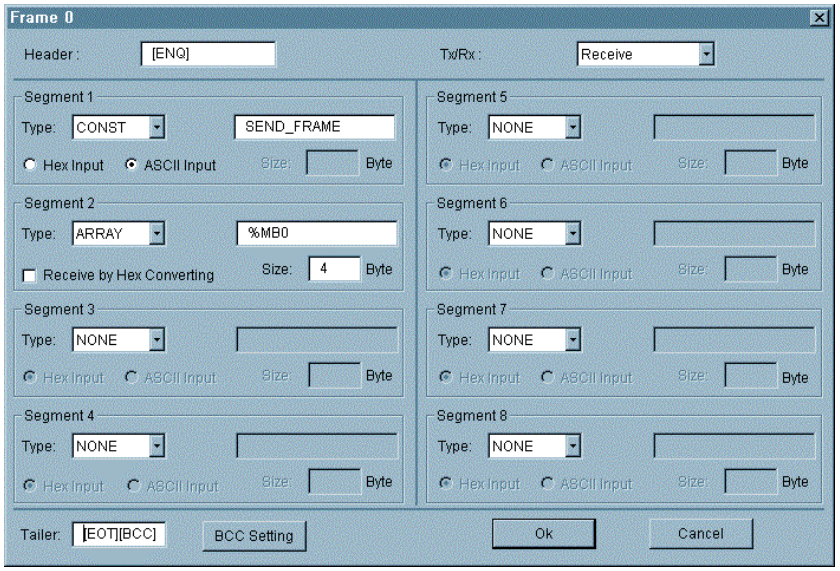
- Set parameters as below and click on OK button.

Communication method						Protocol and mode
Station No.	Baud rate	Data bit	Parity bit	Stop bit	Communication channel	User defined
1	9600	8	None	1	RS232C null modem or RS422/485	Slave

D) Click on entry list button to display the figure below.

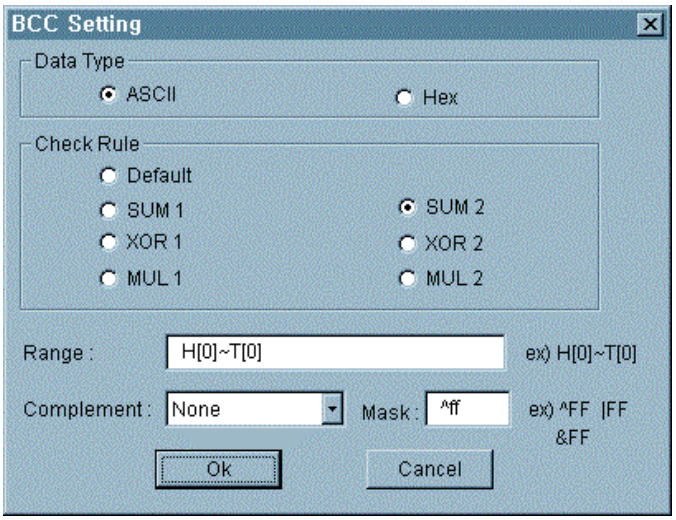


E) Double-click on frame list 0 to activate Frame 0 window and set as shown in the figure below.



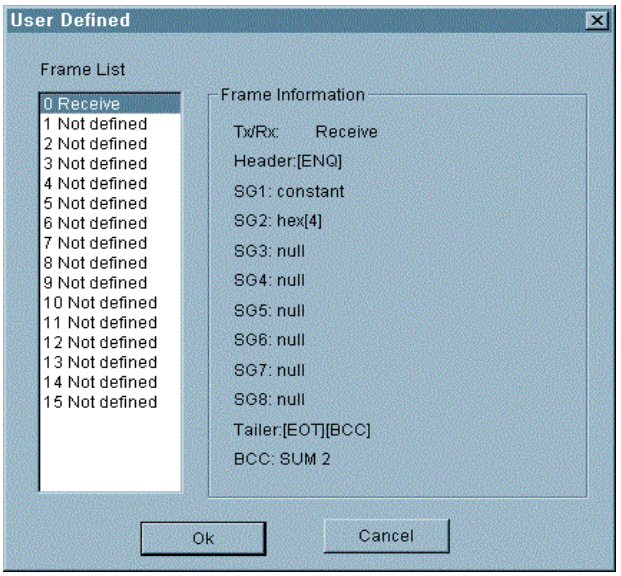
Item	Setting value
Header	[ENQ]
TX/RX	RX
Segment 1	Type : CONST, Field : SND_FRAME, ASCII input selection button
Segment 2	Type : ARRAY, Field : %MB0, Size : 4 bytes
Tail	[EOT][BCC]

F) After setting, press BCC setting button as "[BCC]" is set to tail, and set BCC as in the figure below if BCC setting window is activated and then click on OK button.

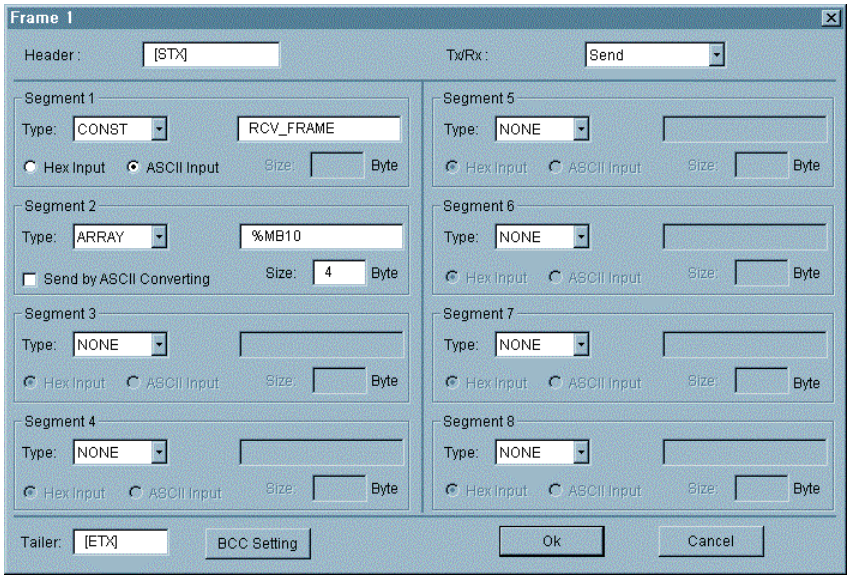


Item	Setting value
Type	ASCII
Type	SUM 2
Range	H(0)~T(0), namely, from Head [ENQ] to Tail [EOT].
Complement	None
Mask	Apply masking with HFF through XOR.

G) After BCC setting, click on OK button in Frame 0 window to register the frame as in the figure below.

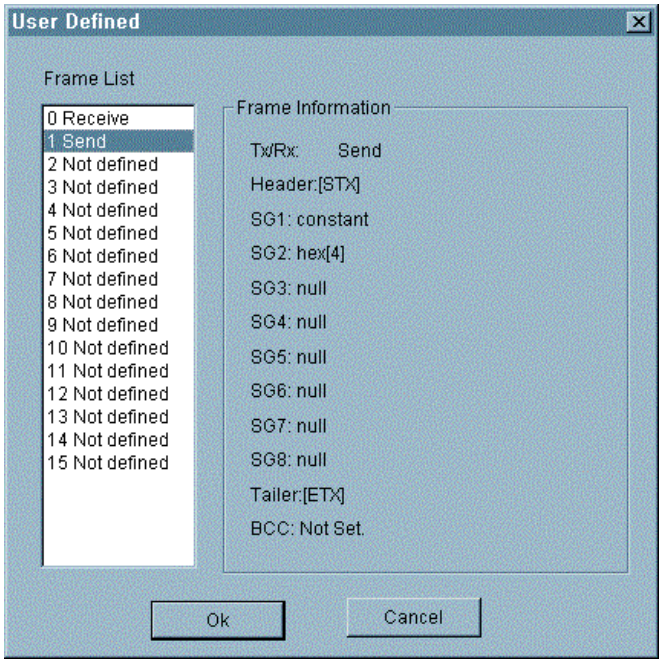


H) Double-click on the following frame list 1 and activate Frame 1 window to set as in the figure below.



Item	Setting value
Header	[STX]
TXRX	TX
Segment 1	Type : CONST, Field : RCV_FRAME, ASCII input selection button
Segment 2	Type : ARRAY, Field : %MB10, Size : 4 bytes
Tail	[ETX]

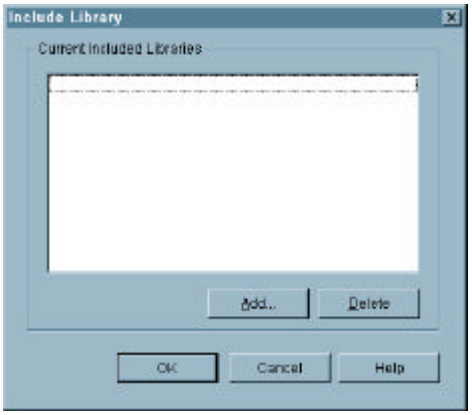
I) After frame setting, click on OK button in Frame 1 window to register the frame as in the figure below.

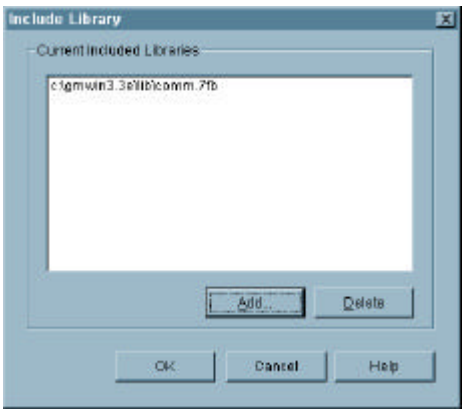


J) Click on OK button to go to communication parameter setting and then click on OK button again to complete setting.

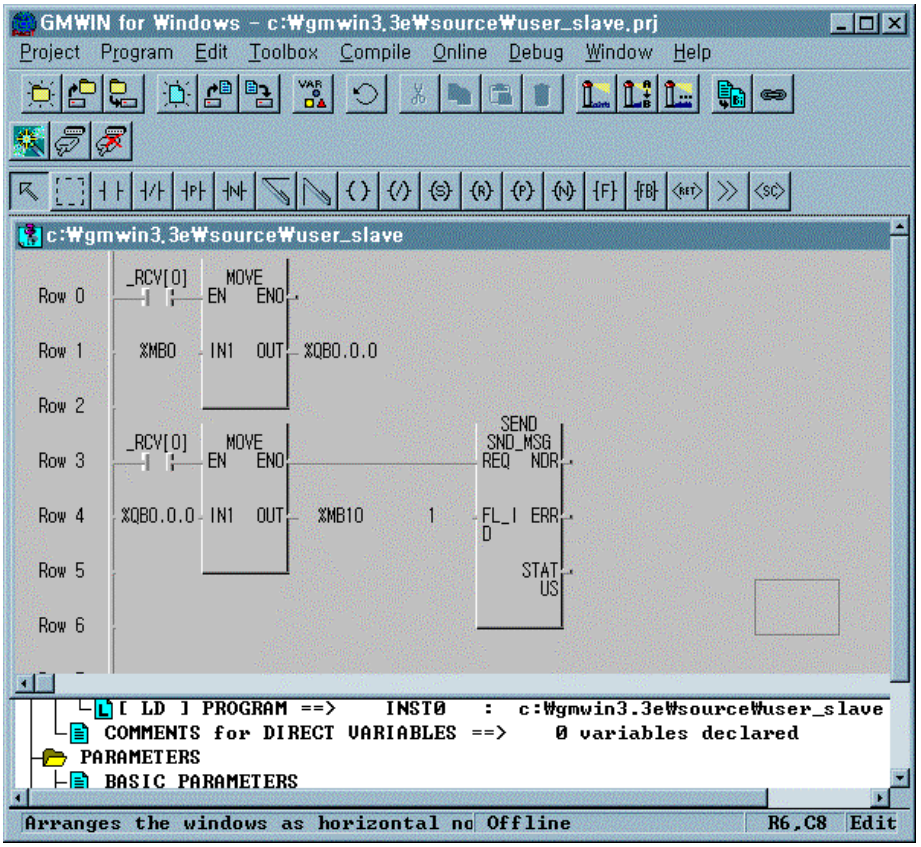
K) Prepare program as in the figure and let it downloaded to GM7 basic unit of slave station.
Refer to user's manual of GMWIN for the details of programming and downloading.

- In the program, Function Block is used. Prior to Function Block service, double-click on the item of GMWIN 'Included libraries' to open Include Library window as below. Click on 'Add(A)… ' button to add COMM.7FB library and then press OK button.





- If Frame 0 of RX frame is received, the value is saved in %MB0 of slave station. (Refer to frame setting of Frame 0.) The saved value of %MB0 at this time is output to direct variable, %QB0.0.0 and value output to direct variable, %QB0.0.0 is saved again to %MB10. If all the procedure is completed without error, Frame 1 in frame list is sent from Function Block. Frame 1 is the TX frame of 4 bytes data saved in %MB10.

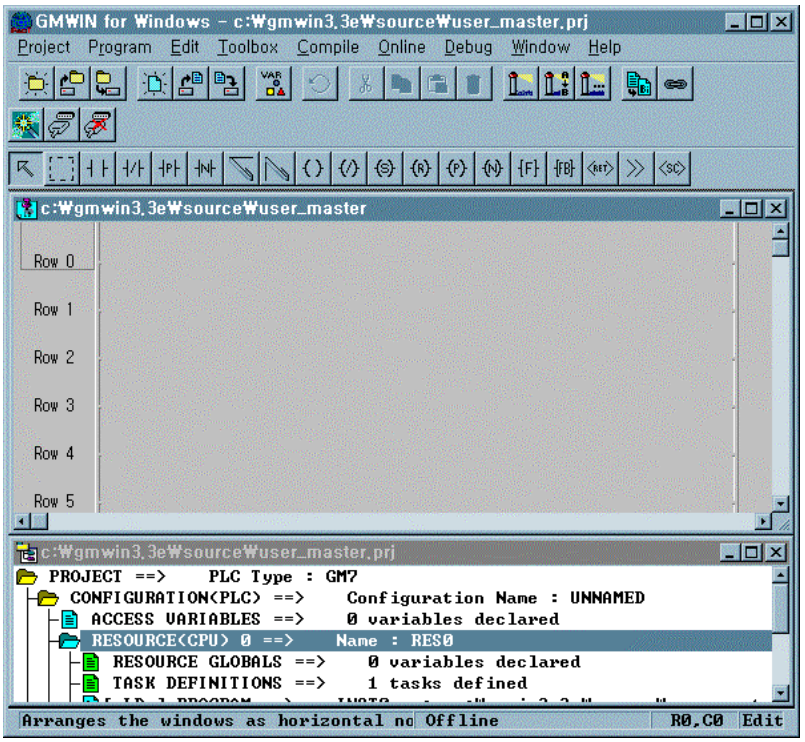


- If Frame 0 of RX frame is not received, this program operates never.
- **Surely set both master / slave stations to "Communication Enable" to start communication.**

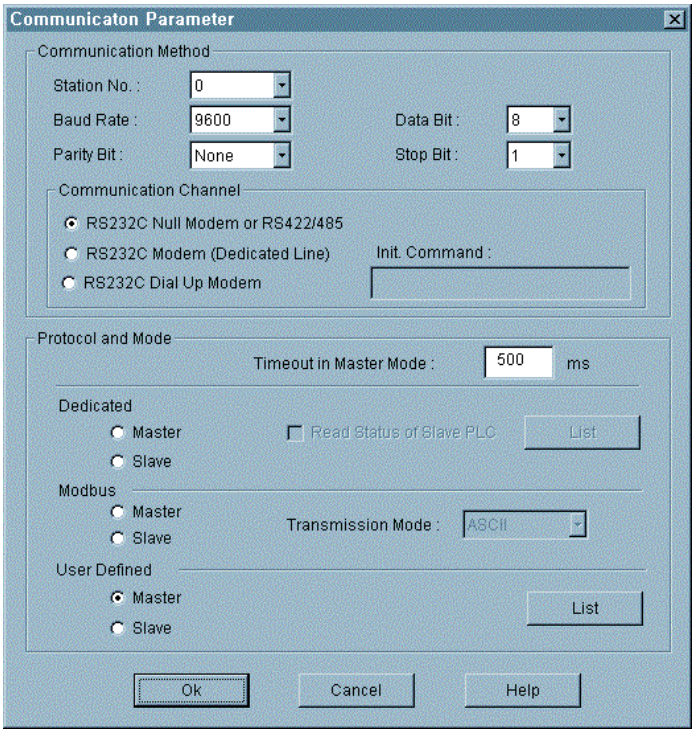
2) Communication parameter setting and program of master station

A) Perform operations in master station No.0.

B) Create new project file and new program for master station.



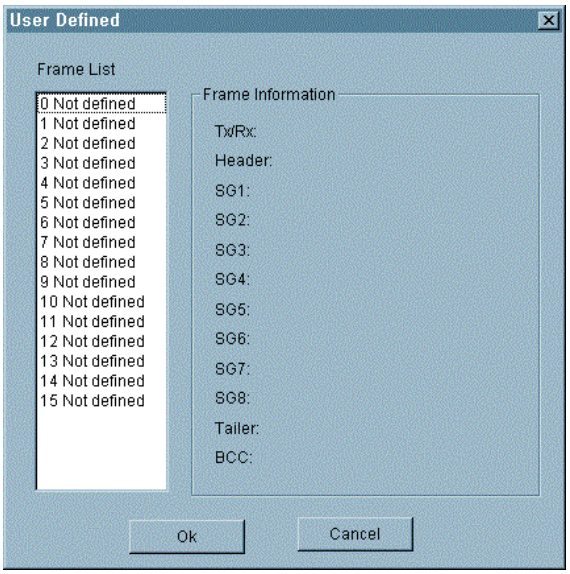
C) Select communication parameter in GMWIN parameters and double-click on it to open communication parameter menu window.



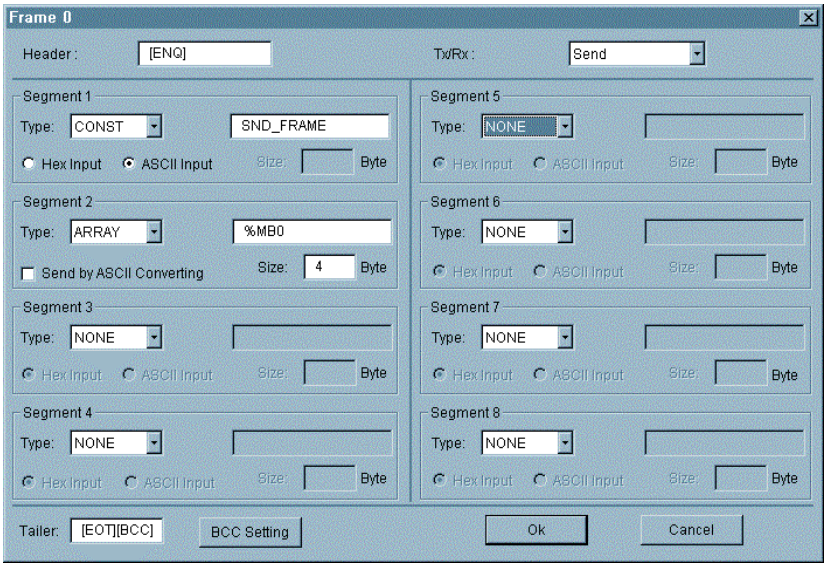
- Set parameters as below and click on OK button.

Communication method						Protocol and mode
Station No.	Baud rate	Data bit	Parity bit	Stop bit	Communication channel	User defined
0	9600	8	None	1	RS232C null modem or RS422/485	Master

D) Click on entry list button to display the figure below.

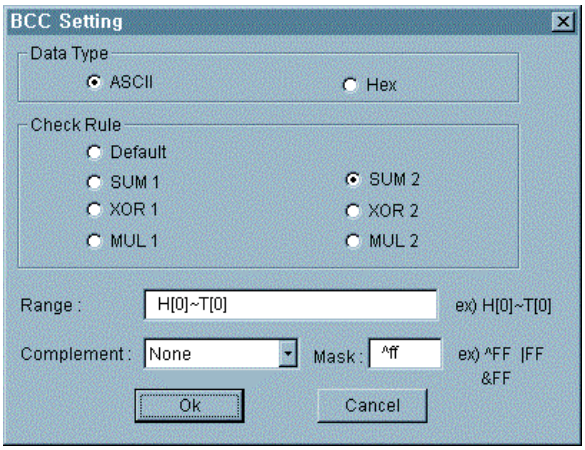


E) Double-click on frame list 0 to activate Frame 0 window and set as shown in the figure below .



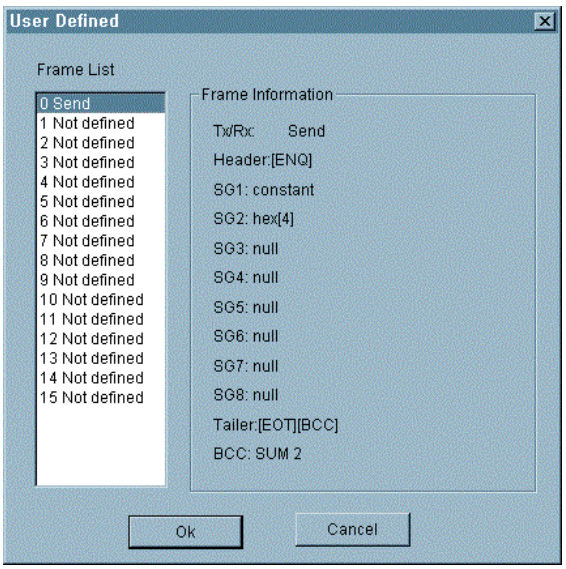
Item	Setting value
Header	[ENQ]
TX/RX	TX
Segment 1	Type : CONST, Field : SND_FRAME, ASCII input selection button
Segment 2	Type : ARRAY, Field : %MB0, Size : 4 bytes
Tail	[EOT][BCC]

F) After setting, press BCC setting button as “[BCC]” is set to tail, and set BCC as in the figure below if BCC setting window is activated and then click on OK button.

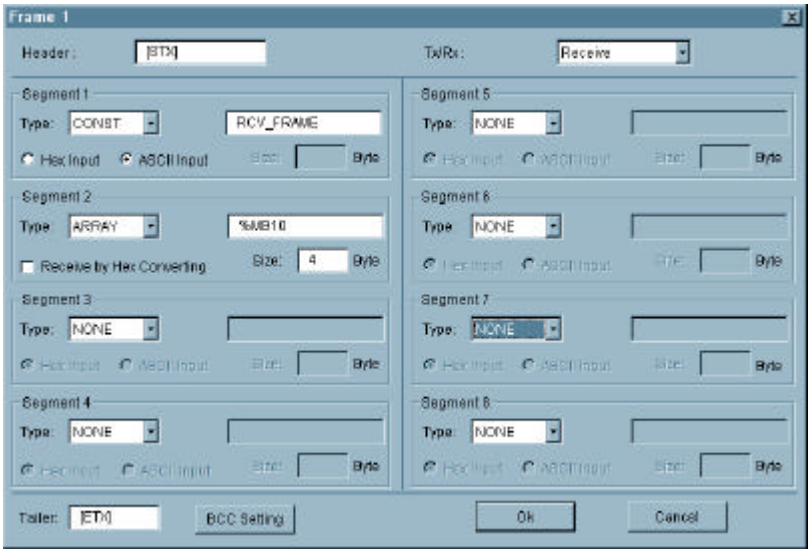


Item	Setting value
Type	ASCII
Type	SUM 2
Range	H(0)~T(0), namely, from Head [ENQ] to Tail [EOT].
Complement	None
Mask	Apply masking with HFF through XOR.

G) After BCC setting, click on OK button in Frame 0 window to register the frame as in the figure below.

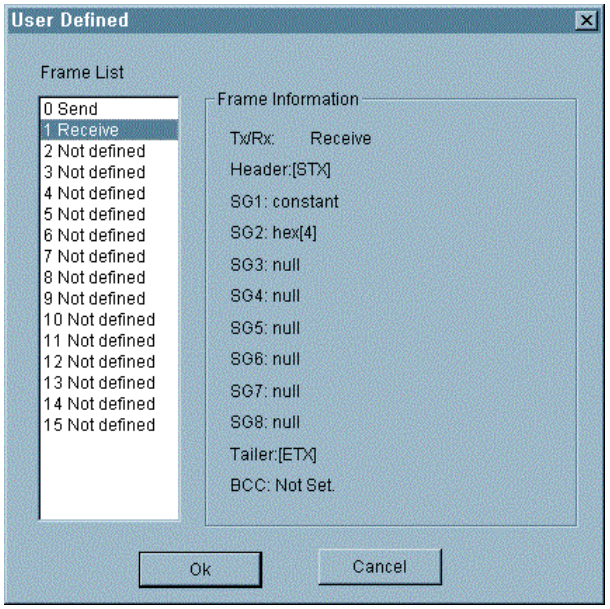


H) Double-click on the following frame list 1 and activate Frame 1 window to set as in the figure below.



Item	Setting value
Header	[STX]
TX/RX	RX
Segment 1	Type : CONST, Field : RCV_FRAME, ASCII input selection button
Segment 2	Type : ARRAY, Field : %MB10, Size : 4 bytes
Tail	[ETX]

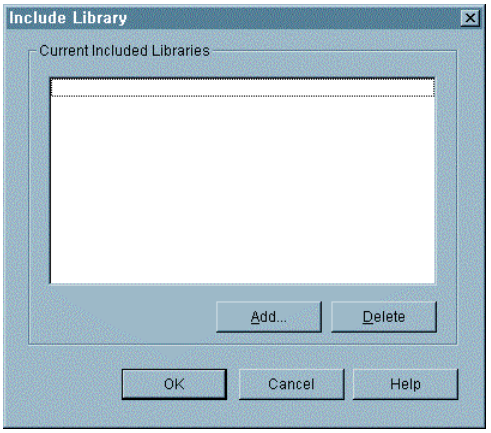
I) After frame setting, click on OK button in Frame 1 window to register the frame as in the figure below.

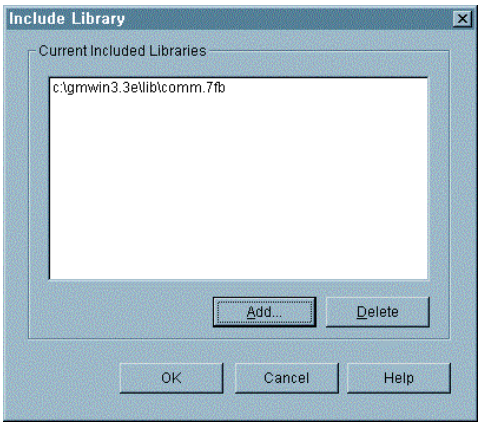


J) Click on OK button to go to communication parameter setting and then click on OK button again to complete setting.

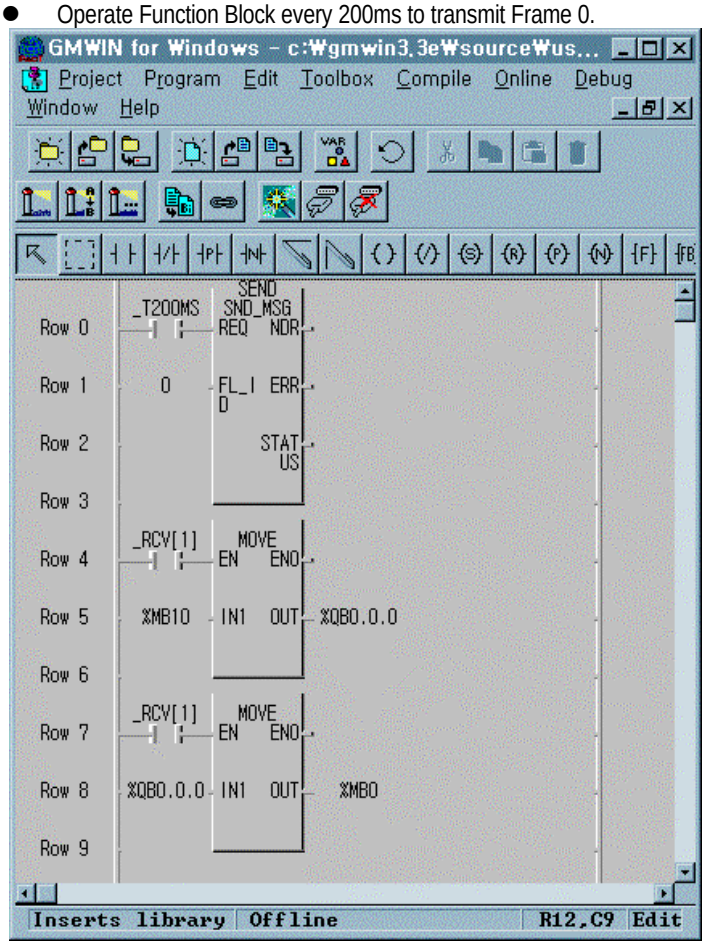
k) Prepare program as in the figure and let it downloaded to GM7 basic unit of slave station.
Refer to user's manual of GMWIN for the details of programming and downloading.

- In the program, Function Block is used. Prior to Function Block service, double-click on the item of GMWIN 'Included libraries' to open Include Library window as below. Click on 'Add(A)… ' button to add COMM.7FB library and then press OK button.





- Operate Function Block every 200ms to transmit Frame 0.



- Frame 0 transmits 4 bytes value from %MB0 of master station to slave station.
- If Frame 1 is sent from slave station, the value is saved in %MB10. (Refer to frame setting of Frame 1.) The saved value of %MB10 at this time is output to direct variable, %QB0.0.0 as reversed logically, and the output value to direct variable, %QB0.0.0 is saved again to %MB0.

- Consequently, If 8 LEDs of master station are turned on, 8 LEDs of slave station are turned off. And if 8 LEDs of master station are turned off again, 8 LEDs of slave station are turned on.
- **Surely set both master / slave stations to "Communication Enable" to start communication.**