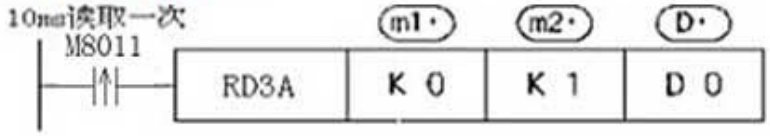
PLC with analog input and output instructions

1、Analog reading instruction



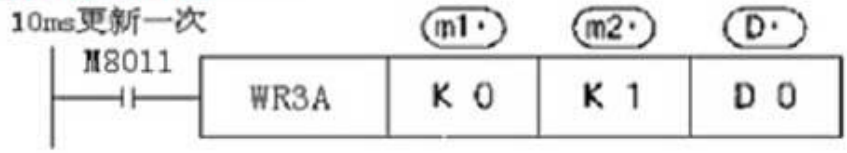
● 模拟量模块的模拟量输入值的读取指令。

m1· : Module number, the host is set to K0

m2· : Analog input channel number.
K0-K5(对应AI1-6)

D· : Read data stored instantaneous value to D0
Save the module to read Zimo nil value

2、Analog Output command



● 用于向模拟量模块写入数字值的指令

m1· : Module number, the host is set to K0

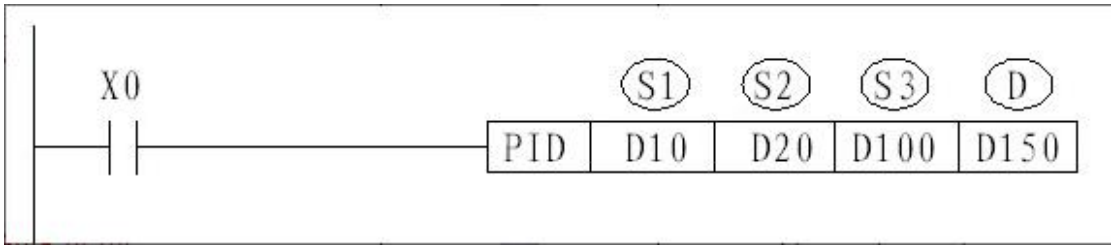
m2· : Analog output channel number
K0-K1

D· : Write data
Value specifies the write analog modules (0-4095)

Clock module description:

Set the clock when the M8015 should be set，Restore run M8015 reset。D8018 for the year, D8017 for the month, D8016 for the day，D8019 for weeks, D8015 for hours, D8014 for minutes, D8013 for seconds.Can use the clock data to read the instruction TRD to read the clock data to the general register，Or use the clock to write to the instruction TWR to modify the clock, using this instruction does not need to set the bit M8015.

PID　rithmetic instructions：



This directive is used to carry out PID control of the PID computing program。
S1: set the target value; S2: the current value (the value of feedback back);
S3:PID control parameters, occupy the S3 start of the 9 consecutive D registers。
S3 channel number for PID；S3+1 ratio coefficient KP；S3+2 for integral coefficient KI；S3+3 is the differential coefficient KD； The error coefficient S3+4 is KE， PID processing is performed only if the error is greater than this value;S3+5 output upper limit value PMAX；S3+6 output lower limit value PMIN； S3+7 backup; S3+8 standby； D: control value output;

Automatic communication between CAN hosts

CAN communication example: LD M8002 The implementation of a power / / said

Station No.	Data exchange area	Station No.	Data exchange area	Station No.	Data exchange area
0	D3500-3515	8		16	
1	D3516-3531	9		17	
2	D3532-3547	10		18	
3	D3548-3563	11		19	
4	D3564-3579	12		20	
5	D3580-D359	13		21	
6		14		22	
7		15		23	

M8181 //CAN SET host communication
MOV K0 D8121 / / station number is 0
Station number 0 PLC as long as the D3500-3515 to write data，Other station number PLC as long as the reading of their own D3500-3515

The data is equal to the D3500-3515 data read station number 0。Station number 0 PLC to read their own D3516-3531 data, etc.

D3516-3531 data read station No. 1.

CAN communication between the host of the PLC and other CAN_H connected to the CAN_H,CAN_L is connected with other CAN_L PLC, and the transmission distance is far.，To connect the terminal resistance on the PLC board， The corresponding code switch (the upper left corner of the 2) to play in the ON bit。
9、RS232 communication port (S terminal 8 core): default communication protocol：FX3u，38400,7，E，1
The baud rate can be changed via S2 DIP switch # 3：

State Dial switch	OFF	ON
No. 1	SPI extension 16	SPI extension 32
No. 2	SPI extension is valid	CS5532 extension is

No. 3	9600	38400
No. 4	Factory trial	

10、Serial data transmission：

\

Special register	explain	Special relay	explain
White 3 pin RS485 communication port			
D8120	RS485 Communication format definition	M8121	When the data is sent, the data is sent, and the automatic reset is sent.
D8121	RS485 communication station number setting	M8122	Send a request, when the M8122 position, once the communication port is free to start sending data, start the automatic reset
D8122	Send data surplus	M8123	When the data is received, the data can be automatically set after receiving a frame data, and the user should reset the position after receiving the data.
		M8124	The data receiving center, receiving the data reduction
White 3 pin RS232 communication port			
D8126	RS232 communication	M8125	When the data is sent, the data is sent, and the automatic reset is sent.
D8127	RS232 communication station number setting	M8126	Send a request, when the M8126 position, once the communication port is free to start sending data, start the automatic reset
D8128	Send data surplus	M8127	When the data is received, the data can be automatically set after receiving a frame data, and the user should reset the position after receiving the data.
		M8128	The data receiving center, receiving the data reduction
M8129：Communication timeout tag, when the host issued a command, from the time the machine did not respond to the M8029, D8129 will set the bit			

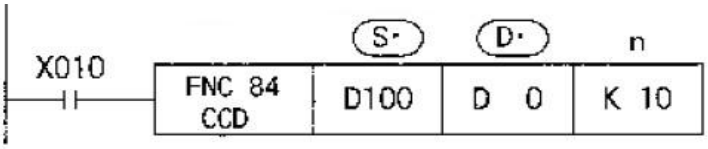
The corresponding communication

No.	name	content	
		0（位 OFF）	1（位 ON）
B0	Data length	7	8
B1 B2	Parity bit	b2 b1 （0，0）：No verification （0，1）：Odd ODD	
B3	Stop bit	1	2
B4 B5 B6 B7	Transfer ratebps	b7 b6 b5 b4 b7 b6 b5 b4 {0，0，1，1}：300 {0，1，1，1}：4800 {0，1，0，0}：600 {1，0，0，0}：9600 {0，1，0，1}：1200 {1，0，0，1}：19200	
B8	Start symbol	nothing	yes（D8124）
B9	Terminator	nothing	yes（D8125）
B10 B11	Do not use		

B12 B13 B14 B15	communication protocol	B15 b14 b13 b12 {0， 0， 0， 0}：MITSUBISHI FX2N protocol (from machine) {0， 1， 0， 0}：MODBUS RTU (from machine) {1， 0， 0， 0}：RTU MODBUS (host, IVRD, IVWR instruction) {1， 1， 0， 0}：Free communication (RS instruction, with CCD check)

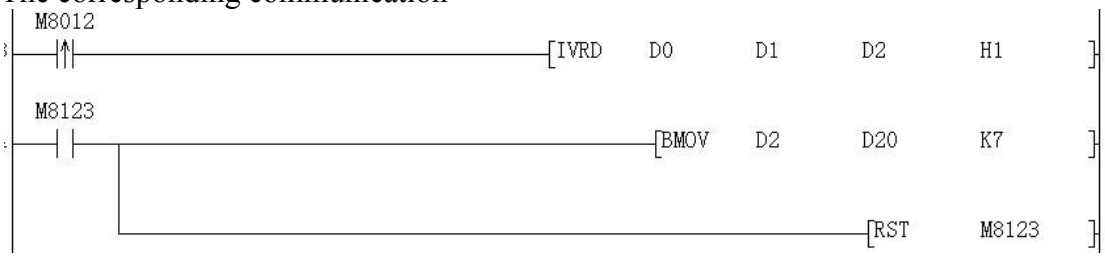
When M8120 reset, the implementation of RS, the parameters are for the RS485 port, when the M8120 set, the implementation of RS, the parameters are for the RS232 port.

●数据的传送格式可以通过后面所述的特殊数据寄存器D8120设定。
RS指令驱动时即使改变D8120的设定，实际上也不接受。
●在不进行发送的系统中，请将数据发送点数设定为“KO”。
或在不进行接受的系统中，接收点数设定为“KO”。

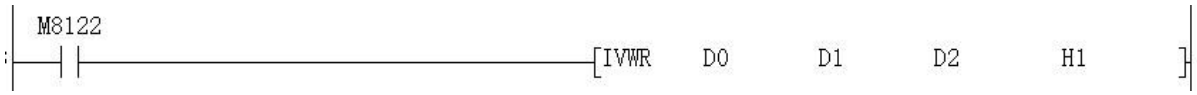


CCD instruction：
S specified by the n components as the starting point of the data, the sum of their data and CRC calibration data Stored in D. with D.+2, D.+3.This example and the check on the D0, CRC check in D3, D2.

十一、Communication with frequency conversion or instrument:：
The corresponding communication



D0 for reading the station number (high 8) and the command code (low 8), such as the value of H103 D0, is the number of stations
1, read the order 3。D1 to read the data address，D2 the first address of the data returned by the receiving frequency conversion or instrument., Receive data, such as channel 0, M8123 will set the bit。H1，High 8 bit channel, low 8 bit read a number。Through the channel 0 (485 channels), read the 1 data. If the bit H101, is through the channel (RS232 channel) 1 to read the 1 data.
write in
D0 to write the number of stations (high 8) and command code (low 8),Such as the value of



H106 is D0, that is, station number 1, write a single data command 6 D1 for the data to be written to the address，D2 to write the first address of the frequency conversion or instrumentation data。H1, high 8 bit for the channel, low 8 bit write a number。Through the channel 0 (485 channels), write 1 data。If it is H101, is through the channel (RS232 channel) 1 to write 1 data。Write complete M8122 automatic reset.
Twelve, high speed count: SPD instruction (support X0-5), if the encoder is a circle of 360 pulses, 2 times the 720 pulse can be obtained, 4 times, then you can get 1440 pulses, thus improving the resolution of the encoder.

Count input	Single phase meter number	Up and down Number direction switch	Count input	Single phase 2 frequency Counter number	Up and down Number direction switch
X0	C235	M8235	X0	C241	M8241
X1	C236	M8236	X1	C242	M8242
X2	C237	M8237	X2	C243	M8243
X3	C238	M8238	X3	C244	M8244
X4	C239	M8239	X4	C245	M8245
X5	C240	M8240	X5	C246	M8246
Count input	Counter		Count input	Dual phase 4	Up and down
		direction (only		Counter number	Read)
		Read)			
X0（A 相）	C250	M8250	X0（A 相）	C253	M8253
X1（B 相）			X1（B 相）		
X2（A 相）	C251	M8251	X2（A 相）	C254	M8254
X3（B 相）			X3（B 相）		
X4（A 相）	C252	M8252	X4（A 相）	C255	M8255
X5（B 相）			X5（B 相）		

C247 (X0, X1), C248 (X2, X3), 249 (X6, X7) for the non double phase counter。

13 、 High speed pulse and pulse width modulation ： Support and 8 pulse rushed out of the Y0-7 (PLSY, PLSV, PLSR, DRVA, DRVI, DSZR, ZRN, DVIT) or 6 way pulse width modulation Y0-5 (PWM), frequency 100K.

ulse	Number of output pulses	Output tag	Pulse disabled	Minimum output frequency	Acceler ation / decelera tion	DSZ R, DVIT direct	The DVIT interrupt inputs	Origin return speed	OPR creep speed	ZRN Number of crawling
Y0	D8132	M8147	M8141	D8144	D8145	M808	D8080	D8220	D8090	D8072
Y1	D8134	M8148	M8142	D8146	D8147	M808	D8081	D8221	D8091	D8073
Y2	D8136	M8149	M8143	D8148	D8149	M808	D8082	D8222	D8092	D8074
Y3	D8138	M8150	M8144	D8150	D8151	M808	D8083	D8223	D8093	D8075
Y4	D8140	M8151	M8145	D8152	D8153	M808	D8084	D8224	D8094	D8076
Y5	D8142	M8152	M8146	D8154	D8155	M808	D8085	D8225	D8095	D8077
Y6	D8166	M8153	M8155	D8156	D8157	M808	D8086	D8226	D8096	D8078
Y7	D8168	M8154	M8156	D8158	D8159	M808	D8087	D8227	D8097	D8079

14、Interrupt description:

1, external interrupt support X0-X5, the interrupt number as follows:

	Rising edge	Falling edge	Interrupt inhibit
X0	I0	I1	M8050
X1	I100	I101	M8051
X2	I200	I201	M8052
X3	I300	I301	M8053
X4	I400	I401	M8054
X5	I500	I501	M8055

2，Timer interrupt pointer to I600, interrupt disable time range I601 (1MS) -I699 (99MS) M8056.。

3，Counter interrupt pointer

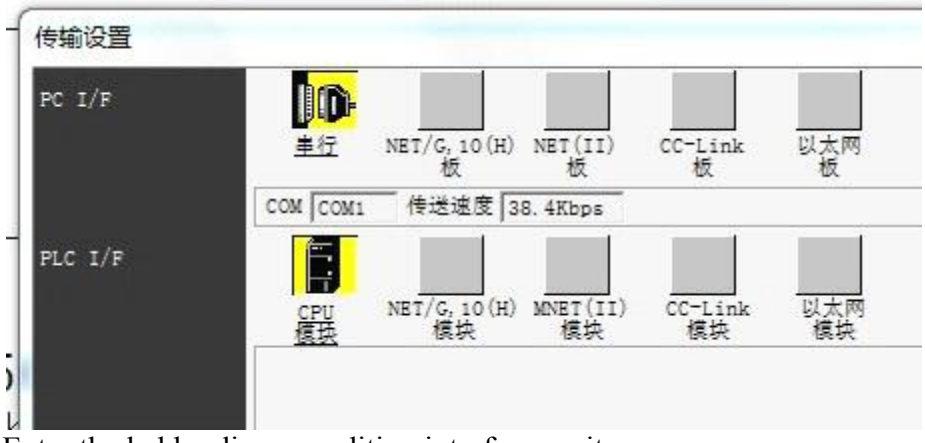
Pointer number	Interrupt inhibit

I10	M8059
I20	
I30	
I40	
I50	
I60	

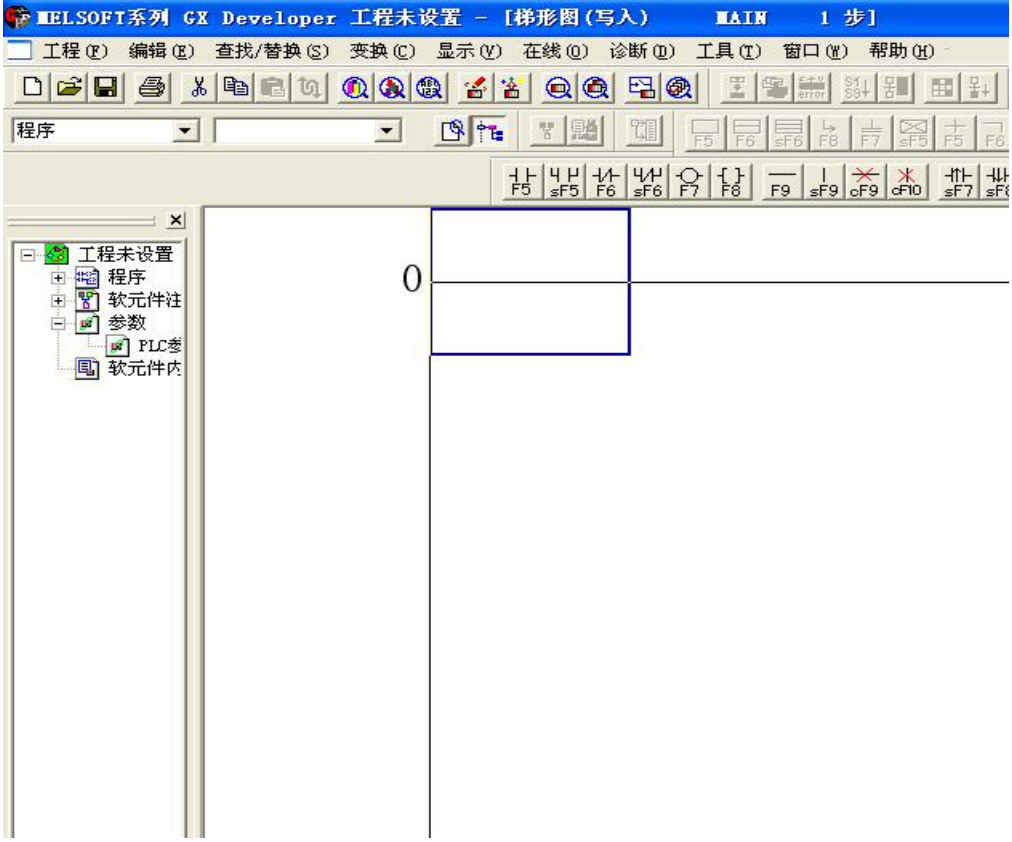
15、Third party Programming Software Description: can be compatible with the programming software Developer7.8 GX or 8.52、8.86 Version, create a new project:

Set the program step to 8000 steps:

Online, transmission settings, set the baud rate and the communication port to download：



Enter the ladder diagram editing interface, write your program:



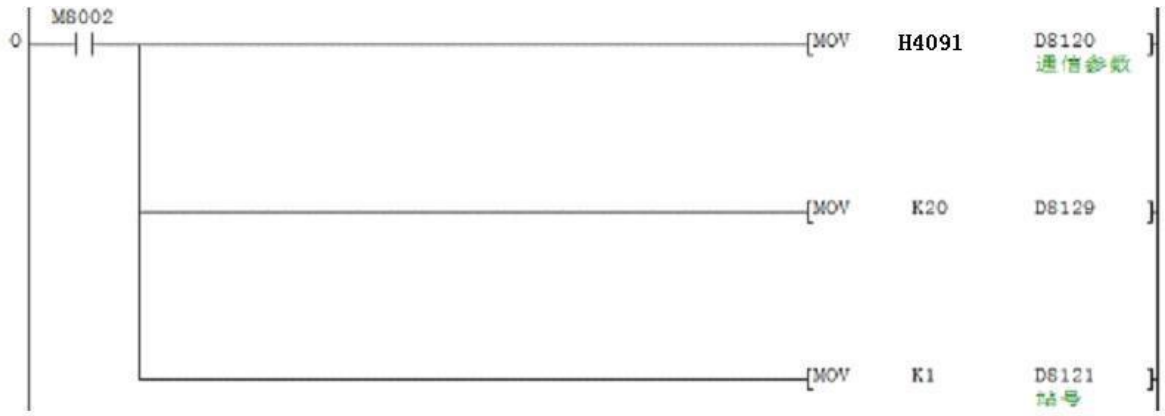
Download the program: select the program, according to the implementation of the start download

(2)

PLC Communication port definition

The corresponding communication parameters of the D8120：

item	name	content	
		0（位 OFF）	1（位 ON）
B0	Data length	7 bit	8 bit
B1 B2	parity bit	b2 b1 （0，0）：No check （0，1）：odd number ODD （1，1）：even parity check EVEN	
B3	stop bit	1 位	2 位
B4 B5 B6 B7	transfer rate bps	b7 b6 b5 b4 {0，0，1，1}：300 {0，1，0，0}：600 {0，1，0，1}：1200 {0，1，1，0}：2400	b7 b6 b5 b4 {0，1，1，1}：4800 {1，0，0，0}：9600 {1，0，0，1}：19200 {1，0，1，0}：38400
B8	start symbol	no	yes（D8124）
B9	terminator	no	yes（D8125）
B10 B11	null		
B12 B13 B14 B15	communicating protocol	B15b14b13b12 {0，0，0，0}：Mitsubishi FX2N Agreement (slave) {0，1，0，0}：MODBUS RTU （Slave machine） {1，1，0，0}：Free communication (with RS instruction)	



example:Set PLC as MODBUS RTU slave, station number 1,19200,8,N,1

5、PLC Station number setting

The special register D8121 is the address at which PLC485 communicates, with a range of: 0-31. This setting is associated with

The D8120 PLC can do this when it is powered on.。

6、frame structure

8Bit address	8Bit function code	nX8Bit data	6BitCRC check code

Modbus protocol using the RTU(Remote Terminal unit mode, each byte in 2 hexadecimal numbers, valid data range of 0, AANF。

address

Refers to the address of a

PLC module，rang：0~31

function code

PLC support function Code 01 (read M Intermediate Relay No03)05 (setting up a single M relay)。

Data

The reported or set data is sent by register (data address), each register consists of two bytes, for the definition of register number, see Appendix A.

CRC check code

CRC(Cyclical Redundancy check is used to check the address, function code and data, which consists of two bytes, which is generated by the transmission device and attached to the data frame, if the checksum calculated by the received data is inconsistent with the checksum added to the data, Errors occur. About

CRC generating function, see attached B。

7. command interpretation

7.1 Read D register, function code 03

When the PLC module receives the correct query command, it responds to the command and sends the data back to the host computer. The format is as follows：

Read D register command frame format in 8 bytes)

Field Value	Field description
01	address 1
03	function code 3
00	Start address high byte
00	Starting address 0
00	High number of bytes

03	Low number of bytes, read 3 data
CRCHi	CRC high byte
CRCLo	CRC lower byte

PLC Module response frame format

Field value	Field description
01	address 1
03	function code 3
06	Response data bytes
D0Hi	The first high byte of data
D0Lo	The first low byte of data

D1Hi	The second high byte of data
D1Lo	Second data low byte

D2Hi	3rd Data High Byte
D2Lo	Third data low bytes
CRCHi	CRC high byte
CRCLo	CRC [计] lower byte

Set up a single D register, function code 06

After receiving the correct setting command, the PC sends the set data query command and the setting data PLC module, sets the specified data as the data carried in the command frame, and returns the data as it is to respond. If the setting is not successful, it will not answer. The format is as follows：

Set command frame format

Field value	Field description
01	address 01
06	function code 06
00	Set data address high bytes
02	Set data address low byte, address 02
00	Set data high bytes
03	Set the data to a low byte with a data value of 03
CRCHi	CRC high byte
CRCLo	CRC lower byte

PLC module response frame format

Field value	Field description
01	address 01
06	function code 06
00	Set data address high bytesSet data
02	address low byte, address 2
00	Set data high bytes
03	Set data low bytes, data 3

CRCHi	CRC high byte
CRCLo	CRC [计] lower byte

Read M intermediate relay, function code 01

Read the M command frame format, here's the read M0-M7

Field value	Field description
01	address 01
01	function code 01
00	Read data address high byte
00	Read data address low byte, address 00
00	High number of bytes read
08	Low number of bytes read with a data value of 08
CRCHi	CRC high byte
CRCLo	CRC lower byte

PLC Module response frame format

Field value	Field description
01	address 01
01	function code 01
01	Number of bytes returned
00	Data returned, byte low corresponding to M0, maximum bit corresponding to M7 / 0 for contact disconnect 1 for contact on。
CRCHi	CRC high byte
CRCLo	CRC lower byte

Write M intermediate relay, function code 05

Setting M command frame format, below is an example of setting M0

Field value	Field description
01	address 01
05	function code 05
00	The address high byte of the position M
00	Address low byte of bit M, address M0
FF	Set M0, the data is：FF00
00	When M0 is reset, the value is：0000
CRCHi	CRC high byte
CRCLo	CRC lower byte

PLC Module response frame format

Field value	Field description
01	address 01
05	function code 05
00	The address high byte of the position M

00	Address low byte of bit M, address M0
FF	Set M0, the data is： FF00
00	When M0 is reset, the value is： 0000
CRCHi	CRC high byte
CRCLo	CRC [计] lower byte

Appendix A data address definition

data type	Address range
register D	0~4095
switching value M	0-1023

the upper computer does not respond if the data address or the non - existent data address is not supported by the reading device . If the upper computer does not support the data address or the data address that does not exist , the device does not respond . if the upper computer does not support the function code which is not supported by the device , the device does not respond .

Appendix B：Calculation method of CRC16 check

CRC（Cyclical Redundancy Check）Consisting of two bytes, the generation function is as follows：

1、CRC Computing function

```
WORD ModbusCRC(BYTE * pData, BYTE len)
{
BYTE    byCRCHi  =    0xff; BYTE
byCRCLo = 0xff; BYTE
byIdx; WORD crc;
while(len--)
{
        byIdx = byCRCHi ^* pData++;
        byCRCHi = byCRCLo ^ gabyCRCHi[byIdx];
        byCRCLo = gabyCRCLo[byIdx];
}
    crc = byCRCHi; crc <<= 8;
    crc +=byCRCLo; returncrc;
}
```

CRC Code

table high

byte BYTE

gabyCRCHi[]

=

{

0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,

0x80,0x41,0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,

0x00,0xc1,0x81,0x40,0x00,0xc1,0x81,0x40,0x01,0xc0,

0x80,0x41,0x01,0xc0,0x80,0x41,0x00,0xc1,0x81,0x40,

0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x00,0xc1,

0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,0x80,0x41,

0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x00,0xc1,

0x81,0x40,0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,

0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,

0x80,0x41,0x00,0xc1,0x81,0x40,0x00,0xc1,0x81,0x40,

0x01,0xc0,0x80,0x41,0x01,0xc0,0x80,0x41,0x00,0xc1,

0x81,0x40,0x01,0xc0,0x80,0x41,0x00,0xc1,0x81,0x40,

0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,

0x80,0x41,0x00,0xc1,0x81,0x40,0x00,0xc1,0x81,0x40,

0x01, 0xc0, 0x80, 0x41, 0x00, 0xc1, 0x81, 0x40, 0x01, 0xc0,
0x80, 0x41, 0x01, 0xc0, 0x80, 0x41, 0x00, 0xc1, 0x81, 0x40,
0x00, 0xc1, 0x81, 0x40, 0x01, 0xc0, 0x80, 0x41, 0x01, 0xc0,
0x80, 0x41, 0x00, 0xc1, 0x81, 0x40, 0x01, 0xc0, 0x80, 0x41,
0x00, 0xc1, 0x81, 0x40, 0x00, 0xc1, 0x81, 0x40, 0x01, 0xc0,
0x80, 0x41, 0x00, 0xc1, 0x81, 0x40, 0x01, 0xc0, 0x80, 0x41,
0x01, 0xc0, 0x80, 0x41, 0x00, 0xc1, 0x81, 0x40, 0x01, 0xc0,
0x80, 0x41, 0x00, 0xc1, 0x81, 0x40, 0x00, 0xc1, 0x81, 0x40,

```
0x01, 0xc0, 0x80, 0x41, 0x01, 0xc0, 0x80, 0x41, 0x00, 0xc1,
0x81, 0x40, 0x00, 0xc1, 0x81, 0x40, 0x01, 0xc0, 0x80, 0x41,
0x00, 0xc1, 0x81, 0x40, 0x01, 0xc0, 0x80, 0x41, 0x01, 0xc0,
0x80, 0x41, 0x00, 0xc1, 0x81, 0x40 };
```

CRC Code table high byte

```
BYTE gabyCRCLo[] =

{ 0x00, 0xc0, 0xc1, 0x01, 0xc3, 0x03, 0x02, 0xc2, 0xc6, 0x06,
0x07, 0xc7, 0x05, 0xc5, 0xc4, 0x04, 0xcc, 0x0c, 0x0d, 0xcd,
0x0f, 0xcf, 0xce, 0x0e, 0x0a, 0xca, 0xcb, 0x0b, 0xc9, 0x09,
0x08, 0xc8, 0xd8, 0x18, 0x19, 0xd9, 0x1b, 0xdb, 0xda, 0x1a,
0x1e, 0xde, 0xdf, 0x1f, 0xdd, 0x1d, 0x1c, 0xdc, 0x14, 0xd4,
0xd5, 0x15, 0xd7, 0x17, 0x16, 0xd6, 0xd2, 0x12, 0x13, 0xd3,
0x11, 0xd1, 0xd0, 0x10, 0xf0, 0x30, 0x31, 0xf1, 0x33, 0xf3,
0xf2, 0x32, 0x36, 0xf6, 0xf7, 0x37, 0xf5, 0x35, 0x34, 0xf4,
0x3c, 0xfc, 0xfd, 0x3d, 0xff, 0x3f, 0x3e, 0xfe, 0xfa, 0x3a,
0x3b, 0xfb, 0x39, 0xf9, 0xf8, 0x38, 0x28, 0xe8, 0xe9, 0x29,
0xeb, 0x2b, 0x2a, 0xea, 0xee, 0x2e, 0x2f, 0xef, 0x2d, 0xed,
0xec, 0x2c, 0xe4, 0x24, 0x25, 0xe5, 0x27, 0xe7, 0xe6, 0x26,
0x22, 0xe2, 0xe3, 0x23, 0xe1, 0x21, 0x20, 0xe0, 0xa0, 0x60,
0x61, 0xa1, 0x63, 0xa3, 0xa2, 0x62, 0x66, 0xa6, 0xa7, 0x67,
0xa5, 0x65, 0x64, 0xa4, 0x6c, 0xac, 0xad, 0x6d, 0xaf, 0x6f,
0x6e, 0xae, 0xaa, 0x6a, 0x6b, 0xab, 0x69, 0xa9, 0xa8, 0x68,
0x78, 0xb8, 0xb9, 0x79, 0xbb, 0x7b, 0x7a, 0xba, 0xbe, 0x7e,
0x7f, 0xbf, 0x7d, 0xbd, 0xbc, 0x7c, 0xb4, 0x74, 0x75, 0xb5,
0x77, 0xb7, 0xb6, 0x76, 0x72, 0xb2, 0xb3, 0x73, 0xb1, 0x71,
0x70, 0xb0, 0x50, 0x90, 0x91, 0x51, 0x93, 0x53, 0x52, 0x92,
0x96, 0x56, 0x57, 0x97, 0x55, 0x95, 0x94, 0x54, 0x9c, 0x5c,
0x5d, 0x9d, 0x5f, 0x9f, 0x9e, 0x5e, 0x5a, 0x9a, 0x9b, 0x5b,
0x99, 0x59, 0x58, 0x98, 0x88, 0x48, 0x49, 0x89, 0x4b, 0x8b,
0x8a, 0x4a, 0x4e, 0x8e, 0x8f, 0x4f, 0x8d, 0x4d, 0x4c, 0x8c,
0x44, 0x84, 0x85, 0x45, 0x87, 0x47, 0x46, 0x86, 0x82, 0x42,
0x43, 0x83, 0x41, 0x81, 0x80, 0x40
```