



## Updating of FBs OS V4.62

01/14/2010

- Modify the communication program to improve the format error processing
- Add new instruction (FUN190, STAT) to read the system status  
Please refer to the attached file FUN190-EN.pdf for detailed description



## Updating of FBs OS V4.61

11/12/2009

- MA main unit supports full function of hardware high speed counter
- Modify the detection method for RTC chip, and also read/write access
- Modify FUN140/FUN147 motion instructions, it can display the deceleration speed while M1991=1, and quit the pulse output



## Updating of FBs OS V4.60

06/30/2009

- Modify the linear conversion (FUN33, LCNV) and multiple section linear conversion (FUN34, MLC) instructions by adopting round off method for calculation to eliminate the conversion error causing from calculation by truncation method.
- New in line comparison instructions:
  - Equal to compare (FUN170, =)
  - Greater than compare (FUN171, >)
  - Less than compare (FUN172, <)
  - Not equal to compare (FUN173, <>)
  - Greater than or equal to compare (FUN174, >=)
  - Less than or equal to compare (FUN175, =<)Please refer to the attached file FUN170\_175-EN.pdf for detailed description
- New tracking type ramp instruction (FUN98, RAMP2) for more easy analog output acceleration/deceleration application  
Please refer to the attached file FUN98-EN.pdf for detailed description
- New manual pulse generator instruction (FUN148, MPG) for motion control application  
Please refer to the attached file FUN148-EN.pdf for detailed description
- Enhance the protection of PLC station number



## Updating of FBs OS V4.54

10/01/2008

- Add multiple linear conversion (FUN34, MLC) instruction for more easily used with joining temperature or analog modules

Please refer to the attached file FUN34\_MLC-EN.pdf for detailed description

- PID temperature control (FUN86) instruction supports user defined starting address of temperature reading value for more flexibility in temperature control application
  - R4003=A55AH, starting address of temperature reading value is defined by R4004
    - =Other values, starting address of temperature reading value is defined by temperature configuration screen
  - R4004=10000~13839, it defines R0~R3839 is the starting address of temperature reading value as the process variables for PID control
    - =20000~23999, it defines D0~D3999 is the starting address of temperature reading value as the process variables for PID control
    - =Other values, starting address of temperature reading value is defined by temperature configuration screen
- Supports FBs-NTC6/FBs-NTC16 temperature module for reading negative temperature coefficient of Thermal resistor
- Supports FBs-VOM voice module
- Supports FBs-1LC load cell module
- Supports FBs-BSSI synchronous serial interface board
  - D4072~D4075: Current reading value of synchronous serial interface device
  - D4076: It defines the operation mode (0~15, 16 modes)
- Improve the executing performance of FUN33 instruction
- Improve the execution of DRVZ (In FUN140 instruction, zero return) sticking at MD 0 operation while the parameter 0 of servo parameter table works in machine unit



## Updating of FBs OS V4.53

04/16/2008

- Add new floating point instructions: FUN214 (Napierian logarithm,  $\log_e x$ )、FUN215 (Exponential,  $e^x$ )、FUN216 (Logarithm,  $\log_{10} x$ )、FUN217 (Power,  $x^y$ )、FUN218 (Arc sine,  $\sin^{-1}$ )、FUN219 (Arc cosine,  $\cos^{-1}$ )、FUN220 (Arc tangent,  $\tan^{-1}$ )

Please refer to the attached file FUN214\_220-EN.pdf for detailed description

- Add RUN/STOP indicator

M1926=0, PLC is working at STOP mode

M1926=1, PLC is working at RUN mode

- Add communication indicators

M1970=1, Port 0 received and replied one message packet

M1971=1, Port 1 received and replied one message packet

M1972=1, Port 2 received and replied one message packet

M1950=1, Port 3 received and replied one message packet

M1951=1, Port 4 received and replied one message packet

- Add new address mapping for Modbus slave communication protocol; out of range access, the PLC will reply communication error

Register No.	Value	Description
R3968	=A55AH	New address mapping for Modbus slave communication protocol (Detailed as below)
	=Others	Existed address mapping for Modbus slave comm. protocol
R3969	0 ~ 65535	. Assign the starting address of discrete output of Modbus . 0 ~ 65535 : it means discrete output 000001 ~ 065536 . Apply to function code 01, 05, 15 of Modbus protocol
R3970	0 ~ 2001	. Assign the starting address of internal relay of Fatek . 0 ~ 2001 : it means internal relay M0 ~ M2001 . Apply to function code 01, 05, 15 of Modbus protocol
R3971	1 ~ 2001	. Assign the range of access both for discrete output (Modbus) and internal relay (Fatek) . 1 ~ 2001 : it means access range between 1 ~ 2001 point . It is the group R3969 ~ R3971 for mapping the discrete output (Modbus ) and internal relay (Fatek ) for access (R3968 should be A55AH)
R3972	0 ~ 65535	. Assign the starting address of discrete input of Modbus . 0 ~ 65535 : it means discrete input 100001 ~ 165536 . Apply to function code 02 of Modbus protocol
R3973	0 ~ 2001	. Assign the starting address of internal relay of Fatek . 0 ~ 2001 : it means internal relay M0 ~ M2001 . Apply to function code 02 of Modbus protocol
R3974	1 ~ 2001	. Assign the range of access both for discrete input (Modbus) and internal relay (Fatek) . 1 ~ 2001 : it means access range between 1 ~ 2001 point . It is the group R3972 ~ R3974 for mapping the discrete input (Modbus ) and internal relay (Fatek ) for access (Don't care R3968)

R3975	0 ~ 65535	. Assign the starting address of register input of Modbus . 0 ~ 65535 : it means register input 300001 ~ 365536 . Apply to function code 04 of Modbus protocol
R3976	0 ~ 3839	. Assign the starting address of R register of Fatek . 0 ~ 3839 : it means R register R0 ~ R3839 . Apply to function code 04 of Modbus protocol
R3977	1 ~ 3840	. Assign the range of access both for register input (Modbus) and R register (Fatek) . 1 ~ 3840 : it means access range between 1 ~ 3840 word . It is the group R3975 ~ R3977 for mapping the register input (Modbus ) and R register (Fatek ) for access (Don't care R3968)
R3978	0 ~ 65535	. Assign the starting address of holding register of Modbus . 0 ~ 65535 : it means holding register 400001 ~ 465536 . Apply to function code 03, 06,16 of Modbus protocol
R3979	0 ~ 3839	. Assign the starting address of R register of Fatek . 0 ~ 3839 : it means R register R0 ~ R3839 . Apply to function code 03, 06,16 of Modbus protocol
R3980	1 ~ 3840	. Assign the range of access both for holding register (Modbus) and R register (Fatek) . 1 ~ 3840 : it means access range between 1 ~ 3840 word . It is the group R3978 ~ R3980 for mapping the holding register (Modbus ) and R register (Fatek ) for access (R3968 should be A55AH)

For exa. R3968=A55AH, it means new address mapping for Modbus slave comm. protocol

R3969=0, R3970=1000, R3971=100: Mapping 000001 ~ 000100 (Modbus)  
M1000~M1099 (Fatek)

R3972=10, R3973=1100, R3974=50: Mapping 100011 ~ 100060 (Modbus)  
M1100 ~ M1149 (Fatek)

R3975=50, R3976=1000, R3977=10: Mapping 300051 ~ 300060 (Modbus)  
R1000 ~ R1009 (Fatek)

R3978=100, R3979=2000, R3980=200: Mapping 400101 ~ 400300 (Modbus)  
R2000 ~ R2199 (Fatek)

- Improve on smooth stop while executing DRVC (In FUN140 instruction) command for motion control, which not completes the pulse output and the condition M1991 is ON



## Updating of FBs OS V4.52

01/30/2008

- Station number 255 of the Modbus communication protocol means the slave ignores the station number identification and executes this command packet if no communication error.
- Improve the communication quality of FUN151 MD 3 instruction for high speed CPU link
- Improve the communication processing for on board analog boards -- FBs-B2A1D, FBs-B2DA, FBs-B4AD



## Updating of FBs OS V4.51

09/27/2007

- Modify the FUN86 instruction -- Reset the output value of the corresponding output registers of this instruction while it is not executed.
- Modify the FUN30 instruction -- It can have bumpless transfer while the operation is switched from manual to auto mode at any situation.
  - It can have adaptive output for the PID loop even it exists the offset of the output ( $Bias \neq 0$ ).
- Support bar-code management for production



## Updating of FBs OS V4.50

06/14/2007

- If the main unit detects the ROM PACK to download the application program while every power up, it will do the detailed verification of the program content before download operation; if it passes the verification, then the main unit will download the program from ROM PACK; if it can't pass the verification, it wouldn't download the program, and let bit-12 of R4139 (b0~b15) be ON for indication.
- Supports HT1381 or ISL1208 RTC chip  
Low byte of D4053: =0, without RTC; =1, RTC is HT1381; =2, RTC is ISL1208
- Power on delay can be adjustable from 0.1 ~ 5 seconds, it means  $10 \leq R4150 \leq 500$
- Enhance the communication protection for the main unit with customer identification code (CIC); also, the ROM PACK must match the protection environment with the main unit for operation.
- The communication buffer can be 1024 bytes for FUN151 MD1/MD2 instruction
- The RX time-out span can be in the unit of 0.01 or 0.1 second for communication instructions FUN151 MD0 (Master of FATEK CPU Link), FUN151 MD1 (Master of user defined communication protocol), and FUN150 (Master of MODBUS communication protocol).

RX time-out span : The communication master employs this time-out timer to detect whether the slave station on line or not.

When the master sent out the communication command to the slave, the slave couldn't reply within this period, it had the RX time-out error.

	Port 1	Port 2	Port 3	Port 4
Setting of RX Time-out Span	Low byte of R4147	Low byte of R4159	Low byte of R4045	Low byte of R4048

D4043 : Setting the time unit in 0.01 or 0.1 second for RX time-out detection

High Byte	Low Byte							
56H	b7	b6	b5	b4	b3	b2	b1	b0

High byte of D4043≠56H (Hex), time unit is in 0.01 second

High byte of D4043=56H (Hex), Low byte of D4043 defines the time unit;

b1=0, Time-out timer in 0.01 second (Port 1)

=1, Time-out timer in 0.1 second (Port 1)

b2=0, Time-out timer in 0.01 second (Port 2)

=1, Time-out timer in 0.1 second (Port 2)

b3=0, Time-out timer in 0.01 second (Port 3)

=1, Time-out timer in 0.1 second (Port 3)

b4=0, Time-out timer in 0.01 second (Port 4)

=1, Time-out timer in 0.1 second (Port 4)

For example, D4043=560AH, it means time unit in 0.1 second for Port 1 & 3 ;  
but in 0.01 second for Port 2 & 4

If low byte of R4147=50, it means Port 1 has 5 seconds for RX time-out detection;

if low byte of R4159=50, it means Port 2 has 0.5 second for RX time-out detection

- Enhance the communication efficiency of instructions FUN151 MD0, FUN151 MD1, and FUN150 when it is working one edge trigger to execute one communication transaction.

Low byte of D4044 : Setting to improve communication efficiency

High Byte	Low Byte							
00H	b7	b6	b5	b4	b3	b2	b1	b0

High byte of D4044 =00H (Hex), Low byte of D4044 defines the communication port;

- b1=0, Minimum 3 scan time to execute one communication transaction (Port 1)
- =1, Minimum 2 scan time to execute one communication transaction (Port 1)
- b2=0, same as the description of b1=0 (Port 2)
- =1, same as the description of b1=1 (Port 2)
- b3=0, same as the description of b1=0 (Port 3)
- =1, same as the description of b1=1 (Port 3)
- b4=0, same as the description of b1=0 (Port 4)
- =1, same as the description of b1=1 (Port 4)

For example, D4044=0006H, it means 2 scan time minimum to execute one communication transaction for Port 1 & 2; but 3 scan time minimum for Port 3 & 4.

- Supports one edge trigger to execute one communication transaction or only one edge trigger then make continuous execution of communication transactions for instructions FUN151 MD0 (Master of FATEK CPU Link), FUN151 MD1 (Master of user defined communication protocol), and FUN150 (Master of MODBUS communication protocol).

D4044 : Setting of one edge trigger to execute one communication transaction or only one edge trigger then make continuous execution of communication transactions

High Byte	Low Byte							
56H	b7	b6	b5	b4	b3	b2	b1	b0

High byte of D4044 ≠ 56H, one edge trigger to execute one communication transaction

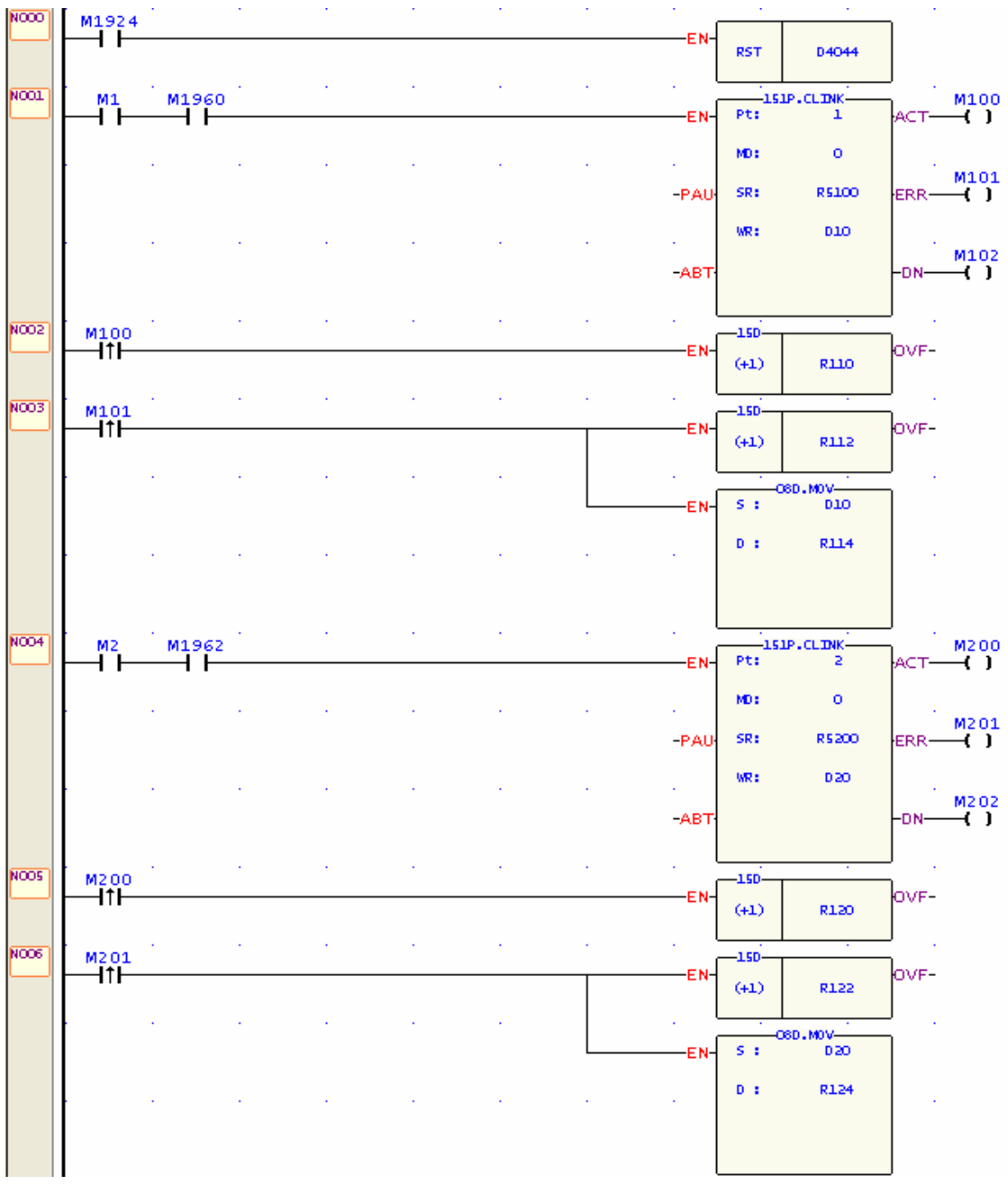
High byte of D4044=56H (Hex), Low byte of D4044 defines the communication port;

- b1=0, One edge trigger to execute one communication transaction (Port 1)
- =1, Only one edge trigger then make continuous execution of communication transactions (Port 1)
- b2=0, same as the description of b1=0 (Port 2)
- =1, same as the description of b1=1 (Port 2)
- b3=0, same as the description of b1=0 (Port 3)
- =1, same as the description of b1=1 (Port 3)
- b4=0, same as the description of b1=0 (Port 4)
- =1, same as the description of b1=1 (Port 4)

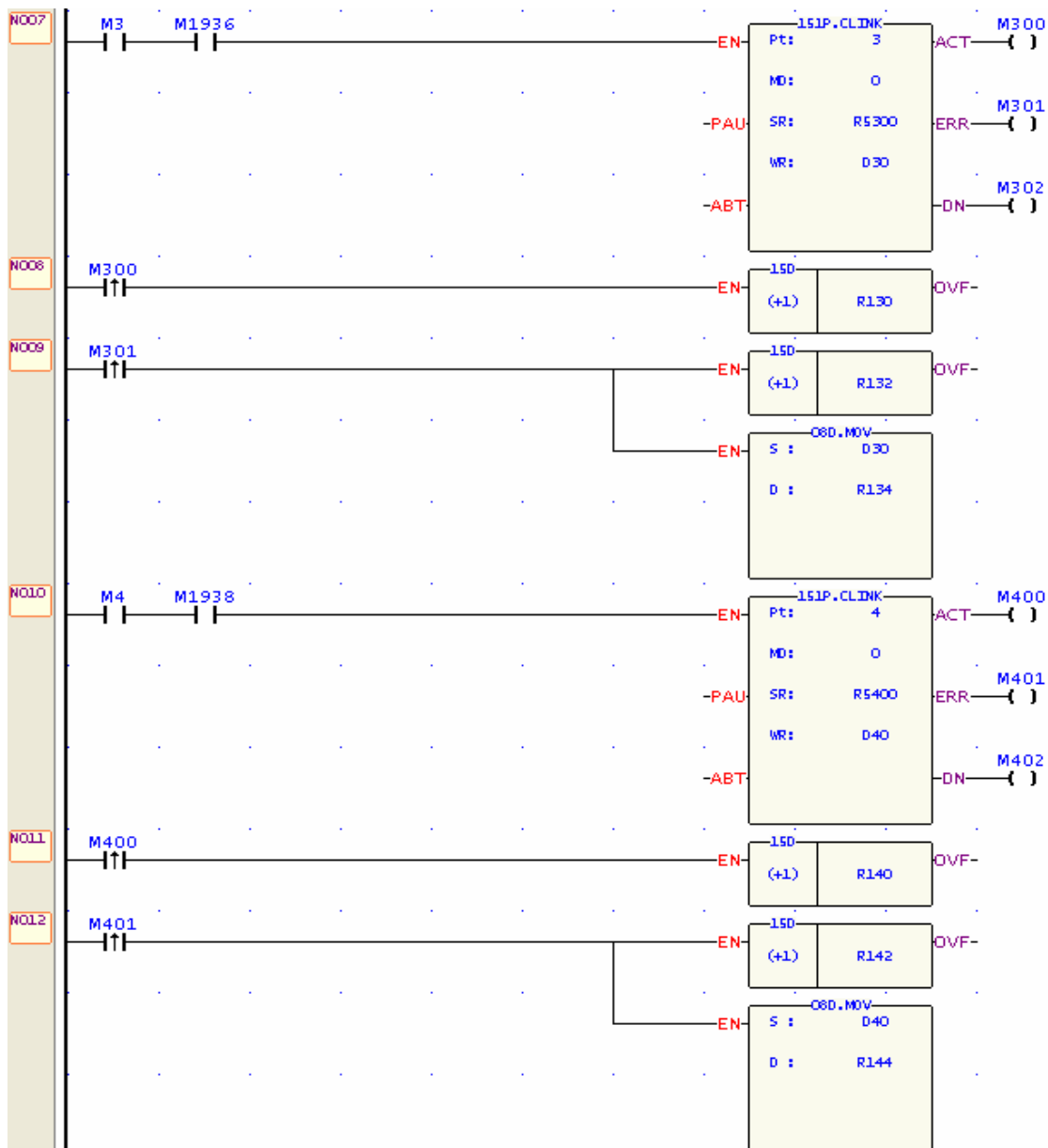
For example, D4044=5618H, it means one edge trigger to execute one communication transaction for Port 1 & 2; but only one edge trigger then make continuous execution of communication transactions for Port 3 & 4

- WR+0 & WR+1 of communication instruction will tell the communication result for each communication transaction if it is one edge trigger to execute one communication transaction
- If it is only one edge trigger then make continuous execution of communication transactions, the following registers will tell the communication result:
  - D4045 & D4046 : Communication result of Port 1 (Same with above WR+0 & WR+1)
  - D4047 & D4048 : Communication result of Port 2 (Same with above WR+0 & WR+1)
  - D4049 & D4050 : Communication result of Port 3 (Same with above WR+0 & WR+1)
  - D4051 & D4052 : Communication result of Port 4 (Same with above WR+0 & WR+1)
- Let the control input ABT be ON if it wants to stop the communication transaction

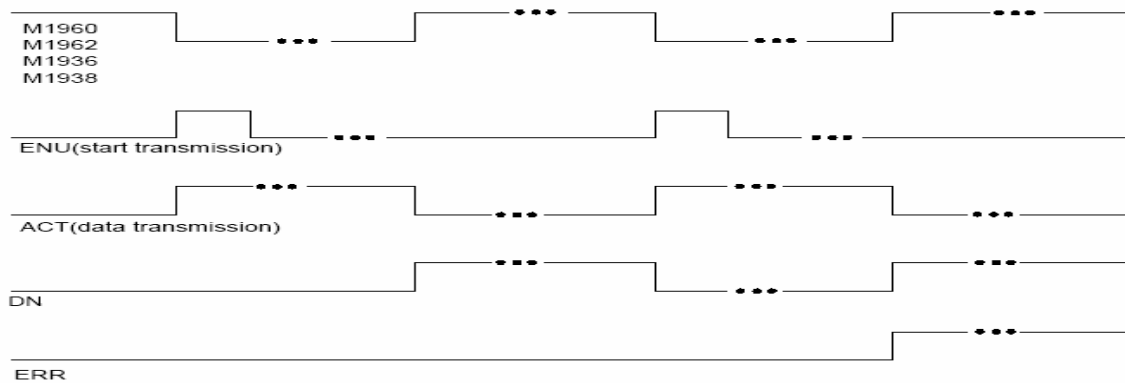
• Sample program for one edge trigger to execute one communication transaction





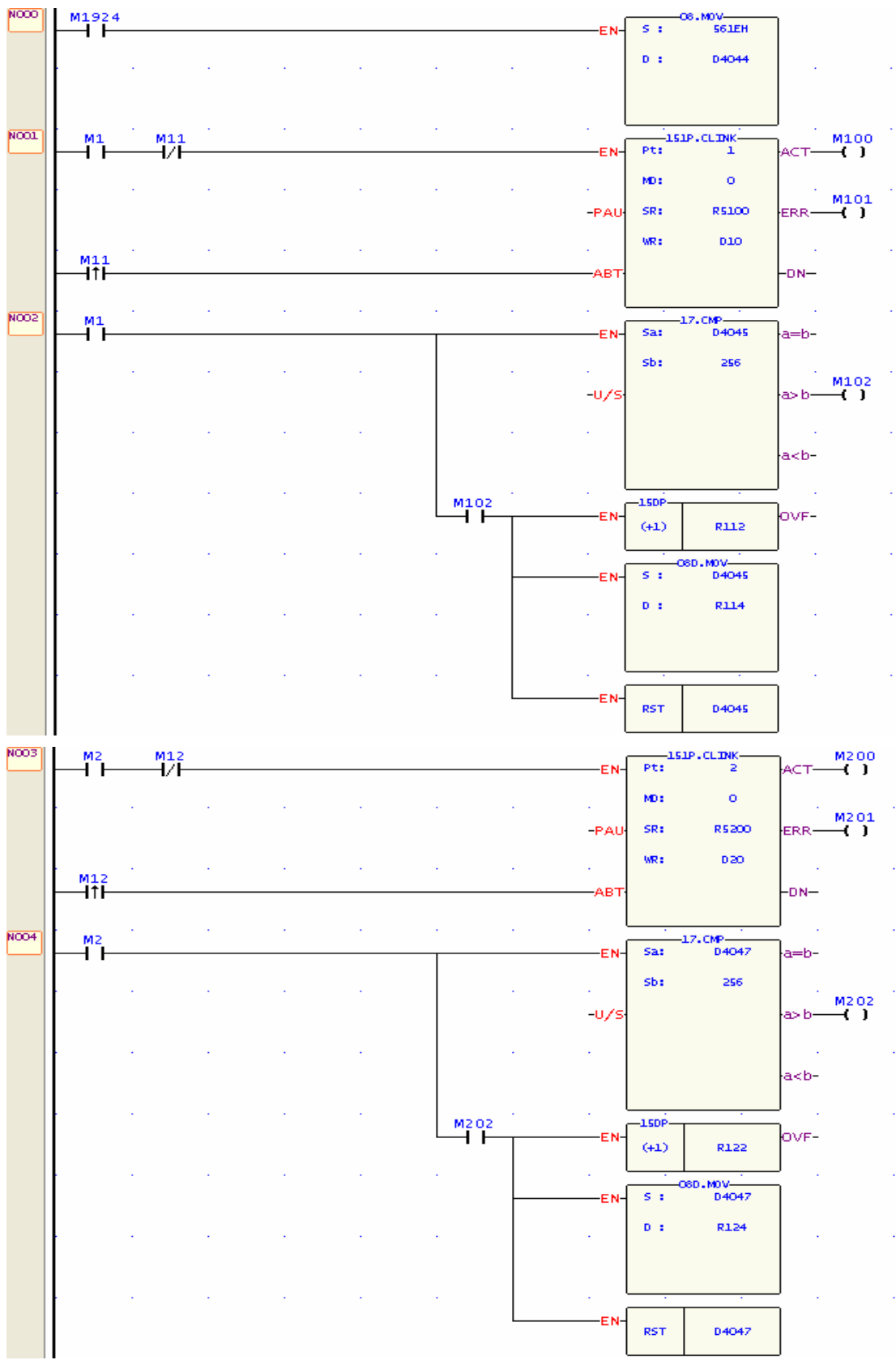


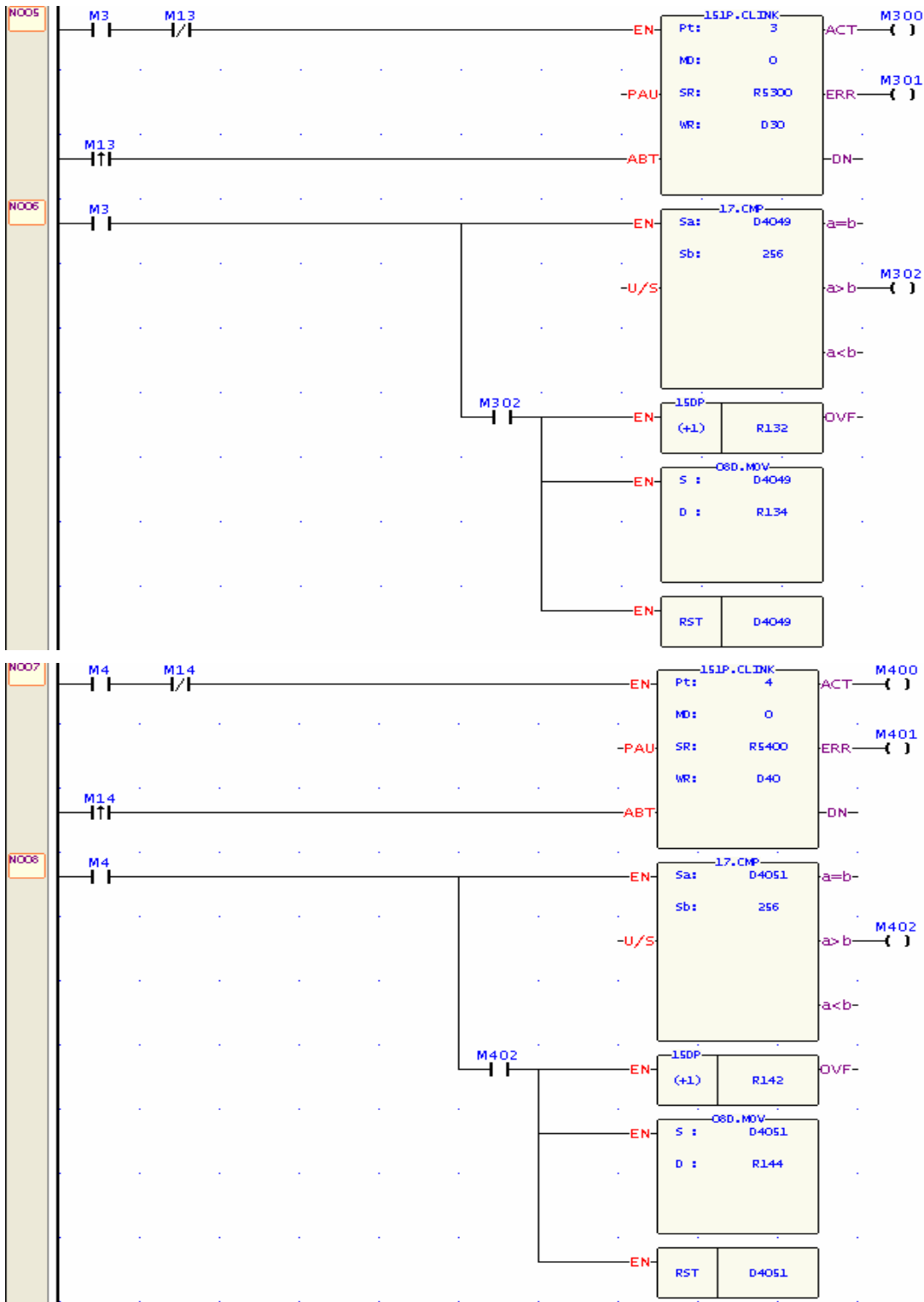
Waveform of Input and Output signals



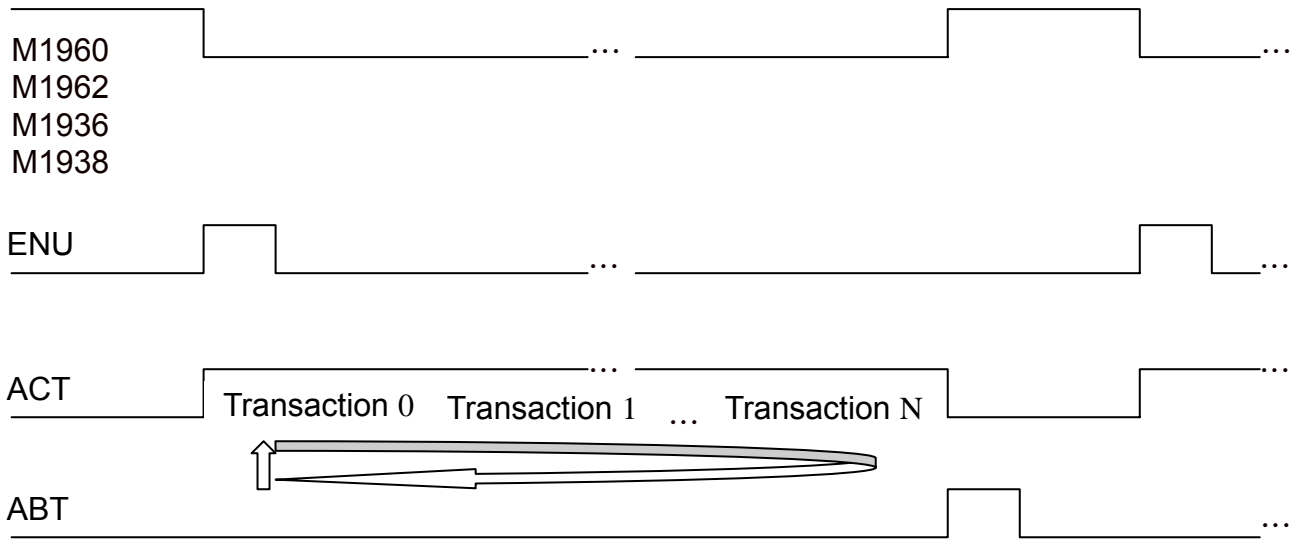
- Note :
1. Only "DN" will be ON if one transaction finished without error.
  2. "ERR" & "DN" will be ON at the same time if one transaction finished with error.
  3. M1961/M1963/M1937/M1939 will be ON one scan time while the last packet of transaction finished.

- Sample program for only one edge trigger then make continuous execution of communication transactions





Waveform of input control and output indication





## Updating of FBs OS V4.49

03/22/2007

- Supports FBs-4A2D on-board analog expansion; the interfaces are shown as below :

- . D4071 : This register tells the installation information
  - High Byte = 5AH, main unit equips intelligent board
    - = Other values, main unit without intelligent board
  - Low Byte = 2, on-board is FBs-B2A1D
    - = 3, on-board is FBs-B2DA
    - = 4, on-board is FBs-B4AD
    - = 15, on-board is FBs-B4A2D (Custom-made)
- .Port 1 : This port is used as the communication interface between main unit and on-board expansion; communication settings are fixed as below:
  - . FATEK communication protocol
  - . Communication parameters
    - .Baud Rate : 104727 bps
    - .Data Bit : 7-bit
    - .Parity : Even
    - .Stop Bit : 1-bit
  - .M1960=0, Port 1 is busy
  - .R4040 High Byte=0, Non delay for reply

Name	Value of D4071	Analog Input	Analog Output	Specification
FBs-B2A1D	5A02H	2 channels D4072 : AI_0 D4073 : AI_1	1 channel D4076: AO_0	.Resolution : 12-bit .Data Format : 14-bit, but valid12-bit (0~16380) .Type of Signal : Voltage: 0~10V or Current: 0~20mA .Without isolation between channels
FBs-B2DA	5A03H	None	2 channels D4076: AO_0 D4077: AO_1	
FBs-B4AD	5A04H	4 channels D4072 : AI_0 D4073 : AI_1 D4074 : AI_2 D4075 : AI_3	None	
FBs-B4A2D	5A0FH	4 channels D4072 : AI_0 D4073 : AI_1 D4074 : AI_2 D4075 : AI_3	2 channels D4076: AO_0 D4077: AO_1	

.Data format of 14-bit, but valid 12-bit representation (0~16380) :

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0	0

- Modify the system OS firmware to match the new power supply board (Power failure detection by detecting the AC power source)



## Updating of FBs OS V4.48

12/12/2006

- FUN151 instruction supports the option for error reception while working at mode 1 & 2

FUN151 MD 1 : Lower byte of starting register of data transmission table SR+0

=00H, transmit only, no response from the slave device

=01H, transmit then receive the responding data (Receive only without error)

=81H, transmit then receive the responding data (Receive even with error)

FUN151 MD 2 : Lower byte of starting register of data reply table SR+0

=00H, Receive only without error, no response from the PLC

=01H, Receive only without error, then reply from the PLC

=80H, Receive even with error, no response from the PLC

=81H, Receive even with error, then reply from the PLC

.Please refer to chapter 12 of User's Manual II for detailed description about FUN151

- The communication parameters will stay unchanged after the update of OS firmware



## Updating of FBs OS V4.47

11/21/2006

- Remove the bug – The current value of hardware high speed counter will be reset to zero while the main unit stays at STOP mode and turns the power off
- Remove the bug – When the hardware high speed timer (HST0~3) has been configured for working, too early starts the timer, there may cause the undesired interrupt processing
- Modify the communication processing to enhance the intellectual protection for both password & ID methodology



- Modify the  $\pm 30$  second adjustment control signal M1953, let it work at the positive edge (Perform the  $\pm 30$  second adjustment while the status changing from 0 $\rightarrow$ 1)
- While writing the ROM PACK with system backup, the motion parameter table (Assigned by FUN141) will also be included; it means the motion parameters will remain the settings even the system initialization being executed
- It can support “Only read one time” function for ROM PACK accessing while writing the ROM PACK and selecting the item “After initial system, read back the data one time” for both data backup or system backup.
- There are two kinds of system back for ROM PACK writing as below:
  - System backup with PLC ID
  - System backup without PLC ID

.While selecting the “System backup with PLC ID” for ROM PACK writing, the PLC main unit will read the PLC ID and ladder program from ROM PACK every power up if the ROM PACK has been installed for working; but all data registers and discrete status will read only once (Selecting “After initial system, read back the data one time”) or every time (Selecting “When power on, read back the data every time”) depending on the selective item.

It can make the ID (PLC ID and PROGRAM ID) copy for the main unit needing ID protection through this kind of ROM PACK without the intervention of programming tool.

This kind of ROM PACK can't be installed for working to have intellectual ID protection.

.While selecting the “System backup without PLC ID” for ROM PACK writing, the PLC main unit will read the ladder program from ROM PACK every power up if the ROM PACK has been installed for working; but all data registers and discrete status will read only once (Selecting “After initial system, read back the data one time”) or every time (Selecting “When power on, read back the data every time”) depending on the selective item.

It needs to have correct PLC ID setting for the PLC main unit to enter RUN mode if being installed ROM PACK with program ID protection; it means the PLC ID of the main unit must be same with the program ID of the ROM PACK, then the PLC main unit can work without problem.

This kind of ROM PACK can be installed for working to have intellectual ID protection; it is very suitable for mass production and long term maintenance with intellectual property protection.

- ※ "After initial system, read back the data one time" means the PLC main unit will read the data register and discrete status from the ROM PACK only one time at the first power up, and then the main unit doesn't read the data register and discrete status again from the ROM PACK at the following power up. It is very useful to have the default settings for the data registers from the ROM PACK, and after the default initialization, the data register can remain the new setting without loss at the next power up.
- ※ "When power on, read back the data every time" means the PLC main unit will read the data register and discrete status from the ROM PACK every power up. It is very useful to have the default settings for the data registers from the ROM PACK at every power up, the PLC main unit being equipped with this kind of ROM PACK can work properly even the battery low.
- ※ While changing the PLC ID, the PLC ID will be written into the internal system FLASH ROM once at the next power up; it will keep the ID information even battery low.
- ※ While executing system initialization, the PLC ID will be erased from the internal system FLASH ROM once at the next power up if it exists.





## Updating of FBs OS V4.45

09/01/2006

- Modify the multi-axis motion instruction FUN147(MHSPO) to get correct current value of pulse for the active axes
- Remove the detection for system error code 11



## Updating of FBs OS V4.44

08/14/2006

- Modify the motion instruction FUN140(HSPO) to remove the bug -- while the motion parameter 9-0 (Rotation direction) was setting by 1 (while in forward pulse output, the current pulse value is deducting down; while in backward pulse output, the current pulse value is adding up), and the motion program worked in absolute coordinate, there existed the inconsistency between the target position and the current value of pulse
- Enhance the error detection about the serial port communication processing



## Updating of FBs OS V4.43

07/17/2006

- Add new instruction FUN147(MHSPO) to support linear interpolation for multi-axis positioning control
- Please refer to files F147\_DOC & F141\_DOC for detailed description



## Updating of FBs OS V4.41

06/08/2006

- To meet the RoHS Compliant with non-Pb solder devices, this version or later of OS firmware supports the writing of Flash ROM SST29SF020 (Non-Pb device) for storing the OS firmware; it also supports the writing of Flash ROM W29C020 through the automatic identification.
- Modify the floating point to integer instruction (F→ I, FUN201), it adopts the round-off method for conversion.
- Modify the 32-bit square root instruction (SQRT, FUN26D), it wouldn't have the calculation error while the very big value to evaluate the square root.
- Initialize and start the Real Time Clock again while changing the date or time of RTC; the RTC chip will be alive from the unknown stopping when doing the change of time or date.



## Updating of FBs OS V4.32

11/18/2005

- Remove the OS V4.31's bug – The FUN140 instruction can't correctly execute the successive speed change (DRVC) command for motion control.



## Updating of FBs OS V4.31

10/26/2005

- FUN140 instruction supports the new command DRVZ for machine zero return; it can have 3 operation modes for application's choice.
- FUN141 instruction supports the new motion parameter's settings to work with the machine zero return operation
  - . Parameter 6 : Creep speed for machine zero return
  - . Parameter 9-1 : Zero return direction
  - . Parameter 13 : Linear interpolation time constant
  - . Parameter 15-0 : DOG input
  - . Parameter 15-1 : Stroke limit input
  - . Parameter 15-2 : PG0 (Zero point signal) input
  - . Parameter 15-3 : Clear output
  - . Parameter 16 : Machine zero point address
  - . Parameter 17 : Number of zero point signals
- Enhance the password protection
  - . The PLC main unit verifies the password while being on line connected with the WinProladder software if the ladder program existing the password protection; only passing the correct password, it can allow to have the connection for programming tool.
- It needs WinProladder software V2.34 or later version to support above functions
- Remove the bug - while M1913=1 (Turn off outputs), it had incorrect input status reading from expansion I/O module(s).
- Only passing correct password to allow the ROM PACK operation if the ladder program existing the password protection
- Remove the OS V4.30's bug – The FUN140 instruction can't correctly execute the endless pulse output function for motion control

## .Description of machine zero return command (DRVZ)

Please refer to Chapter 13 (The NC positioning control of FBs-PLC) of Manual II for detailed information about FUN140 instruction; here we only focus the subject on the new command DRVZ for machine zero return application.

The DRVZ command supports three modes of operation for different application requirement; conjoining the FUN141 motion parameter's setting of machine zero return related, it can be listed as below:

	DRVZ MD0	DRVZ MD1	DRVZ MD2
Parameter 6 (Creep speed)	Must be	Must be	Must be
Parameter 9-1 (Return direction)	Must be	Must be	Must be
Parameter 15-0 (DOG input)	Must be	Must be	Must be
Parameter 15-1 (Limit input)	Optional	Optional	Optional
Parameter 15-2 (PG0 input)	No need	No need	Must be
Parameter 15-3 (CLR output)	Optional	Optional	Optional
Parameter 16 (Zero point address)	Must be	Must be	Must be
Parameter 17 (No. of PG0 signal)	No need	No need	Must be

The FUN140 instruction can't be executed for machine zero return while encountering the following situations with the error indications:

Error indication	Error code
R4060 (Ps 0)	42 : DRVZ can't follow DRVC
R4061 (Ps 1)	50 : Illegal operation mod of DRVZ
R4062 (Ps 2)	51 : Illegal DOG input
R4063 (Ps 3)	52 : Illegal PG0 input
	53 : Illegal CLR output

### . Example program 1 for DRVZ

```
SPD   R1000
DRVZ  MD0
MEND
```

### . Example program 2 for DRVZ

```
SPD   R1000
DRVZ  MD1
WAIT  M0 GOTO NEXT
```

.Description in diagram for machine zero return operation, please refer to attached file DRVZ\_FIG.pdf

## .Description of machine zero return related parameters

Please refer to Chapter 13 (The NC positioning control of FBs-PLC) of Manual II for detailed information about FUN141 instruction; here we only focus the subject on the new parameters working with command DRVZ for machine zero return application.

FUN141 Motion parameter table

SR+0	0~2	Parameter 0	Default =1
SR+1	1~65535 Ps/Rev	Parameter 1	Default =2000
SR+2	1~999999 uM/Rev	Parameter 2	Default =2000
	1~999999 mDeg/Rev		
	1~999999×0.1 mInch/Rev		
SR+4	0~3	Parameter 3	Default =2
SR+5	1~921600 Ps/Sec	Parameter 4	Default =460000
	1~153000		
SR+7	1~921600 Ps/Sec	Parameter 5	Default =141
	1~153000		
SR+9	1~65535 Ps/Sec	Parameter 6	Default =1000
SR+10	0~32767	Parameter 7	Default =0
SR+11	0~30000	Parameter 8	Default =5000
SR+12	0~1	Parameter 9	Default =0100H
SR+13	-32768~32767	Parameter 10	Default =0
SR+14	-32768~32767	Parameter 11	Default =0
SR+15	0~30000	Parameter 12	Default =0
SR+16	0~30000	Parameter 13	Default =500
SR+17	0~4294967295	Parameter 14	Default =0
SR+19	00H~FFH	Parameter 15	Default =FFFFFFFFH
SR+20	00H~FFH		
SR+21	-999999~999999	Parameter 16	Default =0
SR+23	0~255	Parameter 17	Default =1

- Parameter 6 : Creep speed for machine zero return; the default is 1000  
Motor and compound unit : 1~65535 Ps/Sec  
Machine unit : 1~15300 (Cm/Min, ×10 Deg/Min, Inch/Min)
- Parameter 9 : Rotation and zero return direction; the default is 0100H

	b15	b8 b7	b0
SR+12	Para 9-1		Para 9-0

- Parameter 9-0 : Rotation direction setting; the default is 0  
Setting value=0, the present value increases while in forward pulse output; the present value decreases while in backward pulse output  
Setting value=1, the present value decreases while in forward pulse output; the present value increases while in backward pulse output
- Parameter 9-1 : Zero return direction setting; the default is 1  
Setting value=0, direction in which the present value increases  
Setting value=1, direction in which the present value decreases

- Parameter 13 : Interpolation time constant; the default is 500  
.Setting range : 0~30000 mS  
.Set the time required to achieve the speed specified by the program. (The initiate speed is always regarded as "0".)  
This parameter is valid while interpolation control
- Parameter 15 : I/O control interface for DRVZ; the default is FFFFFFFFH

	b15	b8 b7	b0
SR+19	Para 15-1		Para 15-0
SR+20	Para 15-3		Para 15-2

- Parameter 15-0 : Setting of DOG input; it must be the input of the main unit (SR+19)  
b6~b0 : Reference number of DOG input  
(0~15, it means X0~X15)  
b7 = 0 : Contact A or Normal Open  
= 1 : Contact B or Normal Close  
b7~b0=FFH, Without DOG input
- Parameter 15-1 : Setting of stroke limit input (SR+19)  
b14~b8 : Reference number of limit input  
(0~125, it means X0~X125)  
b15 = 0 : Contact A or Normal Open  
= 1 : Contact B or Normal Close  
b15~b8=FFH, Without limit input

- Parameter 15-2 : Setting of PG0 signal input; it must be the input of the main unit (SR+20)
  - b6~b0 : Reference number of PG0 input  
( 0~15, it means X0~X15 )
  - b7 = 0 : Start counting at front end of sensing DOG input
  - b7 = 1 : Start counting at rear end of sensing DOG input
  - b7~b0 = FFH, Without PG0 input
- Parameter 15-3 : Setting of CLR signal output; it must be the output of the main unit (SR+20)
  - b15~b8 : Reference number of CLR output  
( 0~23, it means Y0~Y23 )
  - b15~b8=FFH, Without CLR output
- Parameter 16 : Machine zero point address; the default is 0  
Setting range : -999999~999999 Ps
- Parameter 17 : Number of zero point signals (Sensing of PG0 input);  
the default is 1.  
Setting range : 0~255 Count



## Updating of FBs OS V4.24

8/31/2005

- Port 1~4 support Modbus RTU/ASCII (Slave) communication protocol

. Method 1 (All OS versions of FBs PLC can support this method)

R4047 : Upper Byte = 55H, configure the communication port of Modbus RTU protocol

= Other values, Port 1~4 don't support Modbus RTU protocol  
(FATEK as the default)

Lower Byte : Port assignment for Modbus RTU protocol

Format as below :

Upper Byte	Lower Byte							
55	b7	b6	b5	b4	b3	b2	b1	b0

b0, Reserved ;

b1=0, Port 1 acts as FATEK protocol

=1, Port 1 acts as Modbus RTU protocol

b2=0, Port 2 acts as FATEK protocol

=1, Port 2 acts as Modbus RTU protocol

b3=0, Port 3 acts as FATEK protocol

=1, Port 3 acts as Modbus RTU protocol

b4=0, Port 4 acts as FATEK protocol

=1, Port 4 acts as Modbus RTU protocol

.  
.  
.

b7~b5, Reserved

- ※ It allows to assign multiple ports for Modbus RTU protocol, where the corresponding bit must be 1.

For example:

R4047=5502H, Assign Port 1 as Modbus RTU protocol ;

R4047=5504H, Assign Port 2 as Modbus RTU protocol ;

R4047=5506H, Assign both Port 1 & Port 2 as Modbus RTU protocol .



. Method 2 (FBs PLC OS V4.24 or later can support this method)

R4047 : Upper Byte = 56H , configure the communication port of FATEK or Modbus RTU/ASCII communication protocol

= Other values , it doesn't work above function

Lower Byte : Port assignment for communication protocols

Format as below :

Upper Byte	Lower Byte							
56	b7	b6	b5	b4	b3	b2	b1	b0

Bits	Value	Description
b1b0	0 or 1	Port 1 works FATEK protocol
	2	Port 1 works Modbus RTU protocol
	3	Port 1 works Modbus ASCII protocol
b3b2	0 or 1	Port 2 works FATEK protocol
	2	Port 2 works Modbus RTU protocol
	3	Port 2 works Modbus ASCII protocol
b5b4	0 or 1	Port 3 works FATEK protocol
	2	Port 3 works Modbus RTU protocol
	3	Port 3 works Modbus ASCII protocol
b7b6	0 or 1	Port 4 works FATEK protocol
	2	Port 4 works Modbus RTU protocol
	3	Port 4 works Modbus ASCII protocol

- Port 1~4 work the master of Modbus RTU/ASCII communication protocol
  - . Enable the FUN150(M-BUS) instruction, let A/R input of instruction be 0, the assigned communication port performs the master of Modbus RTU communication protocol
  - . Enable the FUN150(M-BUS) instruction, let A/R input of instruction be 1, the assigned communication port performs the master of Modbus ASCII communication protocol
- Assign the "FORCE to RUN" input of the PLC main unit
- . If the PLC main unit has been assigned with the on-board input to work the "Force to RUN" function, turning on this input more than 3 seconds while PLC stays at STOP mode, the PLC main unit will reset and restart the execution like the power off then power up; the main unit will enter into the RUN mode if it doesn't find any error; the main unit will still stay at the STOP mode if it finds the error

- Enlarge the ladder program capacity up to 20223 Words (19967 W before)
- Remove the bug - while the system contains the maximum digital inputs (256 points in total), it causes the malfunction of Y0~Y7
- Debug the wrong transfer treatment while executing the simultaneous convergence in step ladder programming



- Supporting the working interface for FBs-2A1D/FBs-2DA on-board analog modules, the related interface registers are as below :

. D4071 : This register shows the installation information

- High Byte = 5AH, main unit with intelligent board
- = Other values, main unit without intelligent board
- Low Byte = 1, on-board is FBs-CBE
- = 2, on-board is FBs-B2A1D
- = 3, on-board is FBs-B2DA

Value of D4071	Port 1 Comm. Interface	Analog Interface
<p><b>5A01H</b> (Main unit with FBs-CBE)</p>	<p>.FATEK protocol only</p> <p>.Comm. parameters</p> <p>.Baud Rate : 115200 bps</p> <p>.Data Bit : 7-bit</p> <p>.Parity : Even</p> <p>.Stop Bit : 1-bit</p> <p>.M1960=0, Port 1 is busy</p> <p>.R4040 High Byte=0, Non delay for reply</p>	<p style="text-align: center;"><b>None</b></p>
<p><b>5A02H</b> (Main unit with FBs-B2A1D)</p>	<p>. FATEK protocol only</p> <p>. Comm. parameters</p> <p>.Baud Rate : 104727 bps</p> <p>.Data Bit : 7-bit</p> <p>.Parity : Even</p> <p>.Stop Bit : 1-bit</p> <p>.M1960=0, Port 1 is busy</p> <p>.R4040 High Byte=0, Non delay for reply</p>	<p>.Analog Input : 2 channels</p> <p>.Analog Output : 1 channel</p> <p>.Resolution : 12-bit</p> <p>.Data Format : 14-bit, but valid12-bit</p> <p>.Type of Signal :</p> <p style="padding-left: 2em;">Voltage: 0~10V / Current: 0~20mA</p> <p>.Without isolation between channels</p> <p>.D4072 : 1<sup>ST</sup> Analog Input Register (0~16380)</p> <p>.D4073 : 2<sup>nd</sup> Analog Input Register (0~16380)</p> <p>.D4076 : 1<sup>ST</sup> Analog Output Register (0~16380)</p>
<p><b>5A03H</b> (Main unit with FBs-B2DA)</p>	<p>. FATEK protocol only</p> <p>. Comm. parameters</p> <p>.Baud Rate : 104727 bps</p> <p>.Data Bit : 7-bit</p> <p>.Parity : Even</p> <p>.Stop Bit : 1-bit</p> <p>.M1960=0, Port 1 is busy</p> <p>.R4040 High Byte=0, Non delay for reply</p>	<p>.Analog Output : 2 channels</p> <p>.Resolution : 12-bit t</p> <p>.Data Format : 14-bit, but valid12-bit</p> <p>. Type of Signal :</p> <p style="padding-left: 2em;">Voltage: 0~10V / Current: 0~20mA</p> <p>. Without isolation between channels</p> <p>.D4076 : 1<sup>ST</sup> Analog Output Register (0~16380)</p> <p>.D4077 : 2<sup>nd</sup> Analog Output Register (0~16380)</p>

.Data format of 14-bit, but valid 12-bit representation (0~16380) :

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0	0

- Floating point instructions (FUN200~FUN213) may combine with V、Z、P0~P9 to serve indirect addressing application.
- Adding the malfunction detection for main unit power failure detection circuit and force entering STOP operation mode while the execution of illegal system reset. If under such situation, the ERR indicator flickers in 1 Hz frequency, and the corresponding indications are as below:
  - . The output indicators Y3=ON, Y2=OFF, Y1=ON, Y0=ON
  - . The register R4049 will contain the value 11
- Modify the internal display mode for Input/Output、RUN、ERR indicators while PLC main unit stays at STOP or ERROR mode.
- When upgrading the PLC OS firmware version V4.20 or later, it needs version V1.03 of the update utility Os\_update.exe for working.



## Updating of FBs OS V4.22

5/23/2005

- Modbus communication convenient instruction (FUN150) supports new function code as below :
  - . Function code 02 : Read Input Status (1xxxxx, 100001~165535)
  - . Function code 04 : Read Input Registers (3xxxxx, 300001~365535)
- Clear the input registers (R3840~R3903) while the power up or changing operation from STOP to RUN mode.
- Revise the writing procedure for ROM PACK manipulation while only the program backup.
- When upgrading the PLC OS firmware version V4.20 or later, it needs version V1.03 of the update utility Os\_update.exe for working.



## Updating of FBs OS V4.21

3/11/2005

- Revise the Linear Conversion instruction (FUN33)
- Revise the Communication convenient instruction (FUN151 MD2)
- Revise the Read instruction to get 0.1mS high speed timer (FUN92 CN=4)
- When upgrading the PLC OS firmware version V4.20 or later, it needs version V1.03 of the update utility Os\_update.exe for working.



## Updating of FBs OS V4.20

2/4/2005

- Support floating point instructions FUN200 ~ FUN213
- Revise the hex-key input (FUN77) instruction
- Revise the write (FUN161,WR-DP) instruction for ROM PACK manipulation
- Revise the read (FUN162,RD-DP) instruction for ROM PACK manipulation
- While working in RUN mode, the RUN indicator of the PLC main unit flickers in 10 Hz frequency (Fast blink).
- The manufacturing default is 3 mS as the communication reply delay time  
R4040=0303H ; the defaults are 3 mS for Port 0 & Port 1 reply delay time  
R4041=0303H ; the defaults are 3 mS for Port 2 & Port 3 reply delay time  
R4042=0003H ; the default is 3 mS for Port 4 reply delay time
- When upgrading the PLC OS firmware version V4.20 or later, it needs version V1.03 of the update utility Os\_update.exe for working.



## Updating of FBs OS V4.10

11/23/2004

- Revise the FUN5 (DIFD, Differential Down) instruction.
- Revise the FUN141 (MPARA, Motion Parameter) instruction, the default value of limited speed setting (Parameter 4) is initialized by 460 KHz.



## Updating of FBs OS V4.09

10/27/2004

- Remove the data update bug of FUN150 (Let the Comm. port of the main unit work as the master of the Modbus RTU communication protocol) instruction while reading the slave's discrete status (Fun\_code=01h).
- Remove the pulse output bug of FUN140 (High speed pulse output) instruction while the endless motion (The moving stroke setting value = 0, and the unit is in Ut) or successive speed changing control by using the external trigger (EXT) as the transfer condition to forward the next motion step.



- Support the installation detection for main unit On-Board intelligent module, for exa. FBs-CBE...
- Support FBs-2ARTD4/FBs-2ATC4 both analog and temperature input modules
- Provide linear conversion instruction FUN33(LCNV) for below applications:
  - Convert the raw reading value of the analog input into the engineering range for display or for proceeding control operation
  - Making the linear compensation for the temperature measurement, the measurement value from the PLC's temperature module can be corrected by the value from the standard temperature meter through this instruction
- Provide the write (FUN161,WR-DP) and read (FUN162,RD-DP) instructions for ROM PACK manipulation, where through these instructions, the ROM PACK can be worked as the portable Data Pack for machine working parameters's saving and loading
- Register R4135 provides the information of Hour & Minute from RTC



## Updating of FBs OS V4.07

7/23/2004

- Support RUN time On-Line program editing
- Support 30 seconds adjustment for Real Time Clock



## Updating of FBs OS V4.06

7/2/2004

- Support 12-bit or 14-bit resolution and number of average for analog inputs
- Support FUN84(TDSP) instruction for 7-segment / 16-segment display pattern conversion
- Support M2000=1, high speed pulse output(FUN140) can work
- Modify the OS firmware, the immediate stop of the high speed pulse output (FUN140) wouldn't have the delay
- FUN32(ADCNV) supports the 14-bit raw reading value conversion for the 4~20mA analog inputs
- FUN30(PID) instruction works on 14-bit calculation
- Support special PLC's protection



## Updating of FBs OS V4.05

4/10/2004

- Support the reading of FBs-6AD analog inputs, the resolution are 12-bit.
- Support the reading of FBs-TC2/6/16 and FBs-RTD6/16 temperature inputs, the resolution are 0.1 degree.
- Support the FUN86 PID temperature control.
- Support the FUN30 general purpose PID loop control.