Part 2

Fics-III

System Setup

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1: Overview of *Fics* –III System Setup

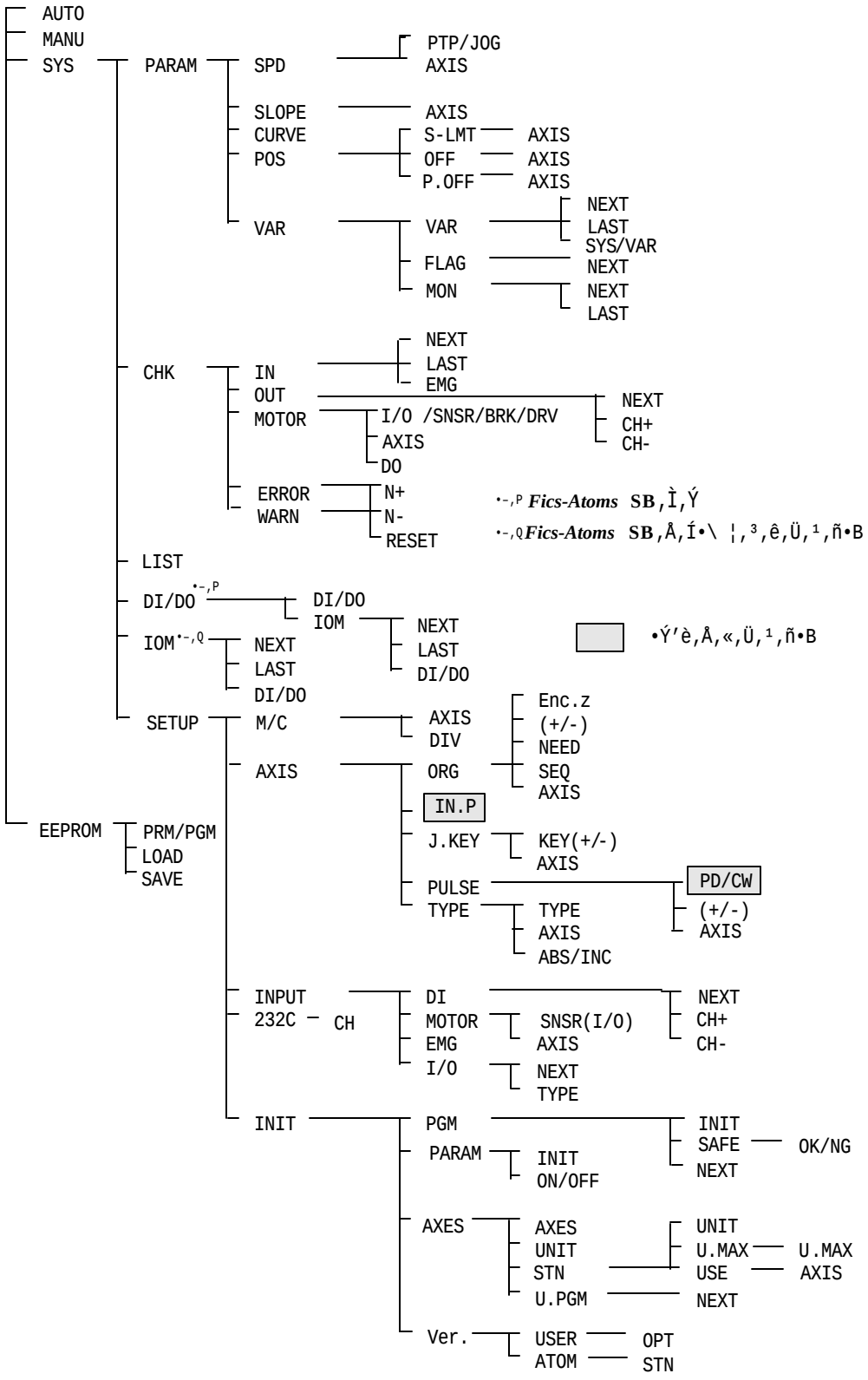
This chapter explains the system setup of ***Fics*-series controllers by using the ***Fics*-RT1**, DYNASERVO universal motion control terminal. DYNASERVO other handheld terminals (e.g. ***Fics*-RT3/PT3**), touch screen controllers/terminals (e.g. ***Fics*-TPC1**), programming software tool ***WinFics*** etc. can also be used for system setup. Since the screen size of each terminal is different, the menu arrangement may be different, but the parameters, which have to be set, are the same.

Before you begin ***Fics*-III** programming, it is strongly recommended that you read through this chapter to fully understand system setup requirements.

In the initial screen (cf. [2-1: Initial Screen], part 1), select [SYS] menu (by pressing <F3> key) to enter the system setup mode (SYS mode). In SYS mode, various electrical, mechanical, and control parameters can be set and their values can be checked. The status of variables, FLAGs, and I/O can also be set or checked.

The available commands for system setup are arranged in a tree structure as shown on the next page. The main sub-menus and their functions are listed below.

Menu	Functions
PARAM	Setting various parameters. Setting maximum speed. Setting acceleration and deceleration time. Setting software limit. Setting OFFSET. Setting/checking variables and FLAGs.
CHK	Checking I/O data. Checking drive status.
LIST	Listing existing and remaining programs steps.
IOM	Setting channel number for each connected I/O module
SETUP	Setting environment. Setting mechanical parameters (gear ratio, lead …). Setting moving direction, homing mechanism etc. Setting bit mask of DI. Initializing program area. Initializing parameters.


AUTO
MANU
SYS
PARAM
SPD
PTP/JOG
AXIS
SLOPE
AXIS
CURVE
S-LMT
AXIS
POS
OFF
AXIS
P.OFF
AXIS
VAR
VAR
NEXT
LAST
SYS/VAR
FLAG
NEXT
MON
NEXT
LAST
CHK
IN
NEXT
LAST
EMG
OUT
NEXT
MOTOR
I/O /SNSR/BRK/DRV
CH+
AXIS
CH-
DO
ERROR
N+
WARN
N-
RESET
LIST
DI/DO
DI/DO
IOM
NEXT
LAST
DI/DO
IOM
NEXT
LAST
DI/DO
SETUP
M/C
AXIS
DIV
Enc.z
(+/-)
NEED
AXIS
ORG
SEQ
AXIS
IN.P
J.KEY
KEY(+/-)
AXIS
PULSE
PD/CW
TYPE
TYPE
(+/-)
AXIS
AXIS
ABS/INC
INPUT
232C
CH
DI
NEXT
MOTOR
SNSR(I/O)
CH+
EMG
AXIS
CH-
I/O
NEXT
TYPE
INIT
PGM
INIT
SAFE
OK/NG
PARAM
INIT
NEXT
ON/OFF
AXES
AXES
UNIT
UNIT
U.MAX
U.MAX
STN
USE
AXIS
U.PGM
NEXT
Ver.
USER
OPT
ATOM
STN
EEPROM
PRM/PGM
LOAD
SAVE

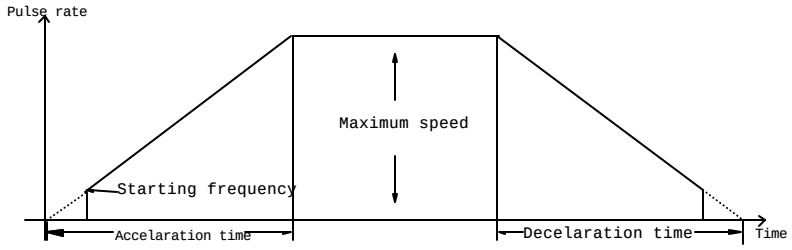
-SYS 4-

2: Setting System Parameters

The [SYS]-[PARAM] menu is designed to set maximum speed for PTP/jog, accelerating and decelerating time etc.

2-1: Position Control Parameters

Position control requires velocity profiles to be specified. ***Fics*-III** supports S-curve as well as trapezoidal velocity profile as shown below. To uniquely define these velocity profiles, it is necessary to specify maximum speed, acceleration/deceleration time, and starting frequency (applies only to stepper motors).



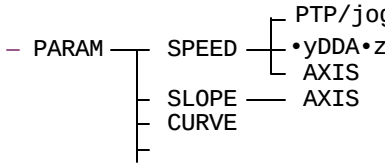
These parameters should be independently set for each axis and for the following different motion:

- Jog (manual)
- Homing
- PTP control (the maximum speed of each axis can be set independently.)
- Interpolation (circular, arc, and linear interpolations, etc.)

2-1-1: Speed Parameters

The [PARAM]-[SPEED] menu: Setting the maximum speed and other parameters related to jog, homing, and PTP control etc.

There are six parameters to be set for each axis. The axis is chosen by selecting [AXIS] menu. For item No.5 of the following table selection of individual axis is meaningless since this item applies to all axis.

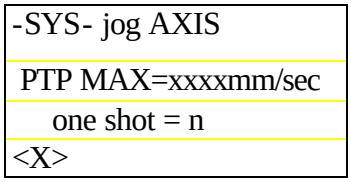


-SYS- PTP AXIS
jog=xxxxmm/sec
[FAST]xxxxmm/sec
<X> org=xxxxmm/sec

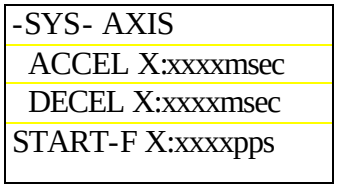
-SYS- jog AXIS
PTP MAX=xxxxmm/sec
jog key timer=xxxms
<X> one shot=xxxum

Speed Parameter
(in mm coordinate)

No.	Name	Description
1	jog	Setting maximum speed for jog operation
2	org	Setting maximum speed for homing
3	[FAST]	Setting maximum speed for jog operation when jog key is pressed and held for longer than 1.5 seconds.
4	MAX	Setting maximum speed for PTP. The SPEED command in program overwrites this parameter. Notice that the speed here refers to the speed of the gear reducer output shaft.
5	jog key	Set one shot time to keep the jog operation. If jog key is pressed and held for longer than the time specified in this field, jog operation continues.
6	one shot	Set moving distance if jog key is released within the time period specified by jog key timer. This must be specified as a pulse number.



Speed Parameter



Accel Parameter

Note: If the coordinate system is set as "pulse", the speed must also be specified by pulse rate in kpps.

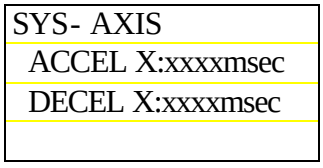
2-1-2: Parameters for Acceleration and Deceleration

The [PARAM]-[SLOPE] menu: Setting acceleration time, deceleration time and starting pulse frequency on PTP operation. These parameters are used for both trapezoidal and ***S***-curve velocity profiles.

The startup frequency (START-F) applies only to ***Atom*-PS(PDS)** and ***Fics*-PDS/3**.

The acceleration and deceleration times in jog operation and homing process are both fixed at 100msec.

In systems with more than 1 axis, select [AXIS] menu to switch to other axes.



Accel Parameter
(Fics-Atom)

2-1-3: PTP Control with S-Curve Velocity Profile

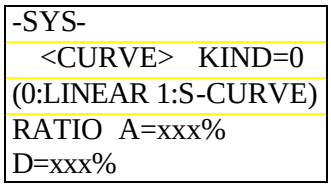
By default, ***Fics*-III** uses S-curve as velocity profile because this usually generates less mechanical vibration.

KIND: Selecting trapezoidal (LINEAR) or ***S***-curve.

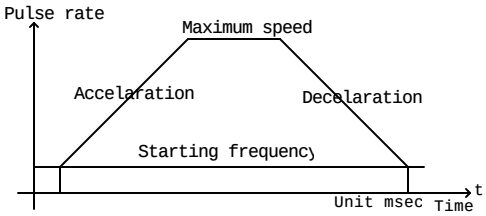
RATIO A (ACCEL): Specifying acceleration rate of ***S***-curve.

RATIO D (DECEL): Specifying deceleration rate of ***S***-curve.

For ***Fics-Atoms,*** the ratio parameter in the forth row is not displayed on the screen because the acceleration rate and the deceleration rate are fixed at 50%.



S-Curve Parameter



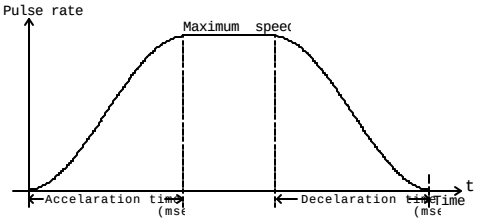
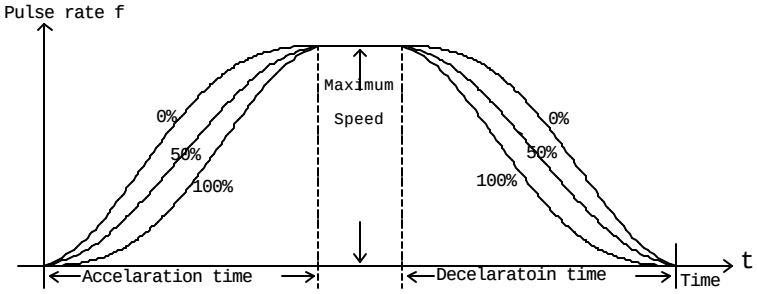


Fig. 1 Trapezoidal Curve **Fig.2 *S*-Curve**

2-1-3-1: Acceleration Rate (ACCEL=aaa%) and Deceleration Rate(DECEL=ddd%) in *S*-Curve

The acceleration and deceleration rates in ***S***-curve velocity profile are specified by percentage.

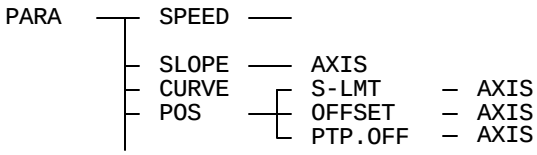
0%	Acceleration: rapid starting and slow stopping.
	Deceleration: slow starting and rapid stopping.
50%	Acceleration: similar starting and stopping.
	Deceleration: similar starting and stopping.
100%	Acceleration: slow starting and rapid stopping.
	Deceleration: rapid starting and slow stopping.



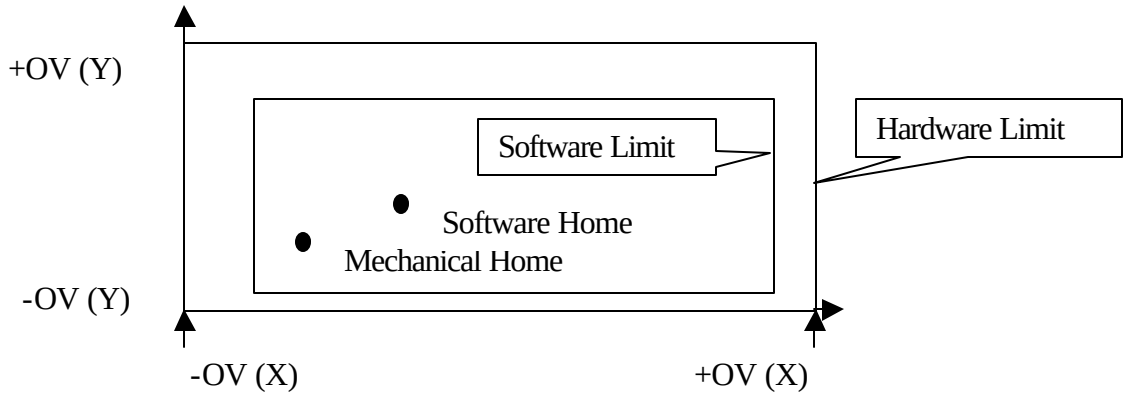
2-2: Setting Soft Limit and Offsets

***Fics*-III** allows user to set software limit for safeguards, and home offset and PTP offset for convenience. Use [PARAM]-[POS] menu to set these parameters.

1. SOFT LIMIT (software limit)
2. HOME OFFSET
3. PTP OFFSET



Parameters 1 and 2 have the relation shown in the figure below and can be set by entering numeric data or by teaching.



- Mechanical home refers to the home position set by the homing process incorporating home sensor. Home offset allows you to change the home position to the **software home** without changing the mechanical home position. All coordinates in ***Fics***-III are referred to software home.
- To set coordinates by teaching, homing must be completed first.

2-2-1: Setting Software Limit

The [POS]-[S-LMT] menu is used to set the **software limit**. Software limit enhances safety by comparing target coordinates with the software limit before starting any move. If the target coordinates in the program are out of the software limit, motion does not start.

If the software limit coordinates are set to 0, the software limit will not be checked.

-POS- AXIS <CLR>
<SOFT LIMIT>
-X = ±xxxx.xxmm
+X = ±xxxx.xxmm

(mm-unit system)

2-2-2: Setting Home Offset

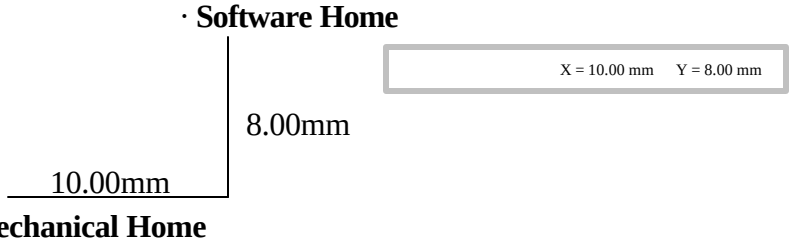
The [POS]-[OFF] menu: Setting the home offset**.** It is set to the coordinate values of the software home.

-POS- AXIS <CLR>
<ORIGIN OFFSET>
X = ±xxxx.xxmm

(mm-unit system)

2-2-2-1: Example of Setting Home Offset

When you want to set the **software home** as follows, the **home offset** reads as (X=10.00mm, Y=8.00mm).



- If the home offset is set as above, the homing triggered by <ORG> key on handheld terminal or by external DI will move the axis first to the mechanical home, then move by the distance of home offset and set that position as home. The current position after homing becomes (X= 0.00mm, Y= 0.00mm). However, the homing command "ORIGIN (***)" in the ***Fics*-III** program only moves the axis to its mechanical home but does not move to the software home. The coordinates after returning to the mechanical home become (X=-10.00mm, Y=-8.00mm). To move the axis to the software home, use the PTP command to move to the position (0, 0).

- To set the software home by teaching, set the home offset as (0,0) at first. Then start homing, and move to the position to be specified as the software home by pressing jog keys and then press <ENT> key.

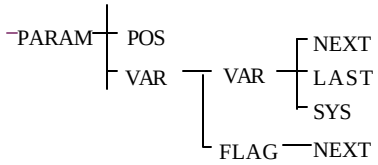
2-2-3: Setting PTP Offset

The [POS]-[P.OFF] menu allows user to set PTP offset. The PTP OFFSET can be used to shift coordinates of absolute PTP command. Because these values are in terms of relative coordinates, they can be set by entering numeric data, but cannot be set by teaching.

- In host control mode, specified absolute coordinates can be changed to other points by changing this parameter.

-POS- AXIS <CLR>
<POS OFFSET>
X =± xxxx.xxmm

Setting PTP Offset



2-3: Setting/Checking Variables and FLAGs

In the [PARAM]-[VAR] menu, the values of variables and FLAGs can be set or checked.

-SYS- NEXT LAST SYS
<VAR> 01:-xxxxxxxxxx
02:-xxxxxxxxxx
03:-xxxxxxxxxx

Setting/Checking Variables

2-3-1: Setting/Checking Variables

There are 96 variables named VAR01~VAR96. These variables can be used for arithmetic operation in application programs.

In the [VAR]-[VAR] menu, the value of variables can be set or checked. Shown in the figure at the right are three variables. The display is scrolled up by the [NEXT] menu and scrolled down by the [LAST] menu.

Do not use VAR96. This variable is reserved for internal use by the PALLET (MATRIX) program

-SYS- NEXT LAST VAR
<SYS> 01:xxxx02:xxxx
03:xxxx04:xxxx
05:xxxx06:xxxx

Setting/Checking
System Variables

2-3-2: Setting/Checking System Variables

There are 96 system variables named SYS01~SYS96. System variables provide flexibility to add custom features to the system. Each system variable has special purpose. For example, SYS21/SYS22 are used to specify the channel number and bit number of Auto/Manual control selector switch of the system. For details, refer to the following table of system variables.

In the [SYS] menu, system variables are set or checked. System variables are updated and saved in EEPROM, different from VARnn, which are saved in RAM. This feature, together with the aid of System Variables 65 and 66, makes it possible to always use program parameters saved in EEPROM instead of using the program parameters in RAM, which is on battery-backup when the power is off. If program parameters are stored in EEPROM, it is necessary to save program parameters to EEPROM every time they have been changed.

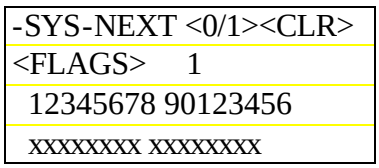
System Variable No	Description	Remark
SYS01/SYS02	DO output channel /bit when running task 998	
SYS03/SYS04	***Atom*** ready input channel/bit	
SYS05/SYS06		
SYS07/SYS08		
SYS09/SYS10		
SYS11/SYS12		
SYS13/SYS14		
SYS15/SYS16		
SYS17/SYS18	Execution suspend channel/bit	
SYS19/SYS20		
SYS21/SYS22	Automatic/Manu mode switching channel/bit	
SYS23/SYS24	Demo operation channel/bit	
SYS25/SYS26	Cycle operation channel/bit	
SYS27/SYS28	Step operation channel/bit	
SYS29/SYS30		
SYS31/SYS32		
SYS33/SYS34		
SYS35/SYS36		
SYS37/SYS38		
SYS39/SYS40		
SYS41/SYS42		
SYS43/SYS44	Manual I/O ignore channel/bit	
SYS45/SYS46	DO output channel/bit in automatic running mode	
SYS47/SYS48	DO output channel/bit when error occurs	Customization
SYS49/SYS50	Power-off verification channel/bit	Customization
SYS51/SYS52	Pressure abnormal verification channel/bit	Customization
SYS53/SYS54	Servo-on channel/bit after power-on	Customization
SYS55/SYS56	Area sensor verification channel/bit	Customization
SYS57/SYS58	CPU status output channel/bit	
SYS59/SYS60	RT1 connected/disconnected check channel/bit	Customization
SYS61	Emergency stop of the same unit when error occurs	
SYS62		
SYS63	Treat<CAN> as emergency stop when homing	
SYS64	Treat <CAN> as immediate stop when homing	Customization
SYS65	Load parameter from EEPROM at power-on	
SYS66	Load program from EEPROM at power-on	
SYS67	Treat emergency stop in the same way as pulse output type	
...		
SYS69	Use (1) or do not use (0) on-board I/O as general input/output	
...		
SYS71/SYS72	Channel/Bit of JOG by external DI	
SYS95/SYS96	Error reset channel/bit	Customization

2-3-3: Setting/Checking FLAGs

In the [PARAM]-[VAR]-[FLAG] menu, FLAGs can be set or checked. FLAG is a variable with values of 0 or 1 only. There are 96 FLAGs.

FLAGs are expressed in programs as FLAGnn, where nn denotes a FLAG number ranging from 01 to 96. FLAG00 is used by the system to indicate the PTP is completed (0) or not (1). FLAG01-08 are reserved for system use in multi-tasking.

Power-on check and EEPROM save are the same as variables.



Setting/Checking FLAGs

2-3-4: Setting/Checking Monitor Variables

In the [MON] menu**,** Monitor Variables can be set or checked.
Monitor variables are used mainly for various production management purposes.

2-3-4-1: Production Management Information

Production management information is stored in the monitor file only in ***WinFics***.

There are 96 monitor variables named MON01~MON96 for production management. These variables can also be used for purposes other than production management, but they are different from VARnn variables as far as the arithmetic operation is concerned.

1 Capable of being uploaded or downloaded by ***WinFics***.
2 No checksum for monitor files.
3 Cannot be saved to EEPROM
4 MON80~MON96 are used by ***Fics*-III** system.

Variable Name	Description	Unit
MON80	(system use: Power-on timer)	**1 sec**
MON81	(system use: Automatic operation timer)	**1 sec**
MON82	(system use: 1 Cycle duct time)	**1 sec**
MON83	(system use: Unused)	
MON84	(system use: Decrement timer)	**10msec**
MON85	(system use: Decrement timer)	**10msec**
MON86	(system use: Decrement timer)	**10msec**
MON87	(system use: Increment timer)	**10msec**
MON88	(system use: Increment timer)	**10msec**
MON89	(system use: Increment timer)	**10msec**
MON90	(system reserved: Unused)	
MON91	(system reserved: Unused)	
MON92	(system reserved: Unused)	
MON93	(system reserved: Unused)	
MON94	(system use: for I/O Wait command)	
MON95	(system use: for I/O Wait command)	
MON96	(system use: for I/O Wait command)	

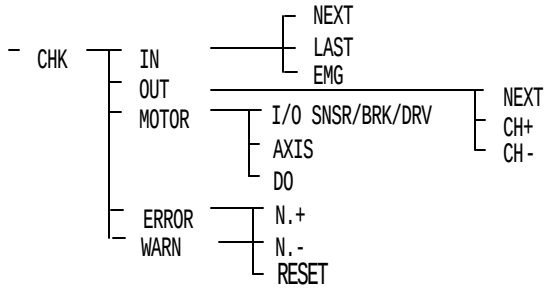
2-3-4-2: Commands Related to Production Management

The following commands are related to production management.

(1) Timer control commands
(2) Monitor variable addition commands
(3) Monitor variable substitution commands
(4) Variable substitution commands
(5) Monitor variable branch commands
(6) I/O wait branch commands

3: I/O Check

In the [SYS]-[CHK] menu, the logical state of input/output port, the status of motor drive, error history and the number of communication errors can be checked.



3-1: Checking DI Status

By selecting the [CHK]-[IN] menu, the logical state of each input port can be checked. ON/OFF state of sensors connected to the input port can be displayed and checked since the display is updated continuously.

The [NEXT], [LAST] menu can be used to display the states of other input ports if available. The relationship between a digital input and its logical state can be inverted by the [INPUT]-[DI] menu to be stated in section [6-3].

-CHECK- NEXT LAST
DI 76543210 76543210
01:xxxxxxxx xxxxxxxx
03:xxxxxxxx xxxxxxxx

Checking DI

3-2: Checking DO Status

In the [CHK]-[OUT] menu, the logical state of each output port is displayed. Each bit can be set as '0' or '1' by entering the digit and then pressing the <ENT> key. This operation turns ON/OFF each corresponding DO port, which makes it easy to check the output port.

The [NEXT] and [LAST] menus can be used to display the states of other remaining output ports if available.

Using the [CH+], [CH-] menus, cursor can be moved to the next or the preceding channel.

-CHECK-NEXT CH+ CH-
<OUT> 76543210
01:xxxxxxxx
02:xxxxxxxx

Checking DO

3-3: Checking Drive Status, General I/O, and Sensors

In the [CHK]-[MOTOR] menu, drive states, general DI/DO, sensor status can be checked (menu may differ for ***Fics-Atoms*** and ***Fics-PDS/3***).

-CHECK-I/O AXIS<CLR>
<MOTOR> STOP=x
ALARM=x READY=x
<X> SERVO READY=x

Checking Drive Status

3-3-1: Checking Drive Status

In this menu, the status of STOP, ALARM, READY, and SERVO READY is displayed. "1" means "yes" and "0" means "no".

-CHECK-DRV AXIS
<MOTOR> ORG:0
+0V: 0
-0V: 0

Checking Home&Limit Sensors

3-3-2: Checking Sensor Status

The [SNSR] screen shows the status of home sensor, +overrun, and –overrun sensors of each axis. "1" means ON, and "0" means OFF.

3-3-3: Checking General DI/DO of *Atom*-series Drives

The status of the general I/O of ***Atom***-series drives can be checked by selecting the [I/O] menu. To check an output port, move the cursor to the desired DO bit and enter "0" or "1". The logical state of each DI can easily be inverted by appropriately setting the bit mask. See [6-3] for details.

-CHECK-SNSR AXIS DO
<MOTOR> 76543210
DI: xxxxxxxx
DO: xx

Checking *Atom* General I/O

3-3-4: List of General DI/DO of *Atom*-series drives

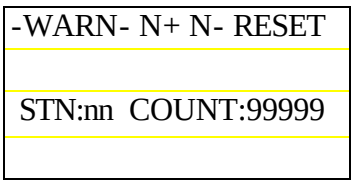
General Input	DI: 7	DI: 6	DI: 5	DI: 4	DI: 3	DI: 2	DI: 1	DI: 0
Atom-SRA/SLA	DI-8	DI-7	DI-6	DI-5	DI-4	DI-3	DI-2	DI-1
Atom-SLIM Ver.3.5							DI-2	DI-1
Atom-mini Ver.3.5								DI-1
Atom-PS Ver.2 *Atom*-PDS				Heat Alarm	TIM	DI-3	DI-2	DI-1
Atom-PDS/3				DI-5*3	DI-4	DI-3	DI-2	DI-1
Others	DI-8	DI-7	DI-6	DI-5	DI-4	DI-3	DI-2	DI-1

General Output	DO:6	DO:5	DO:4	DO:3	DO:2	DO:1	DI:0
Atom-SRA/SLA						STOP*1	READY*1
Atom-SLIM Ver.3.5						STOP*1	DO-1(SVRDY)*1
Atom-mini Ver.3.5							DO-1(Green LED)*1
Atom-PS Ver.2 *Atom*-PDS					Current Down OFF	Hold OFF	DO-1
Atom-PDS/3	DO7*2	DO6	DO5	DO4			
Others						STOP*1	READY*1

*1: Valid only when IO-TYPE parameter =1
*2: Valid only for the 3rd axis of PDS/3
*3: Does not exist for the 3rd axis of PDS/3

3-4: Checking Error History

In the [CHK]-[ERR] menu**,** the error history information can be confirmed. Up to 16 error messages are saved. The latest error message is assigned the smallest number ranging from 01 to 16. By selecting this menu, it is possible to display the error history or to reset the history. The context displayed on the error history screen is exactly the same error message that appeared on ***Fics*-RT1** when an error occurs.

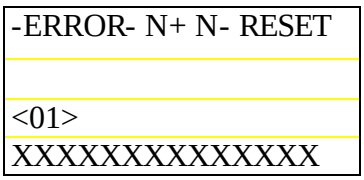


[N+.]	Display previous error message.
[N-.]	Display next error message.
[RESET]	Reset error history.

3-5: Checking Communication Error

In this menu, it is possible to check up to 65535 communication errors of ***Atom*** drives. This feature is extremely useful for troubleshooting system problems related to noise.

To reset the error of all drives, select station number by pressing <F1>(N+)/<F2>(N-) and then pressing the <RESET> key.

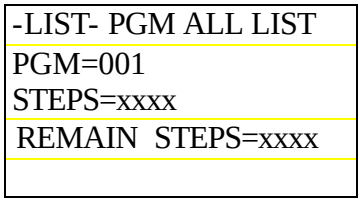


Checking Error History

4: Listing

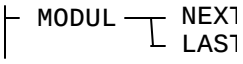
In the [SYS]-[LIST] menu, the program name and number of steps in memory can be checked. As shown in the figure on the right, the program name, the number of steps, and the number of available steps are displayed. To see more, press <ENT> key.

"STEPS" indicates the total number of program steps in the selected program. "REMAIN STEPS" shows how many program steps are available.



Listing Program Steps

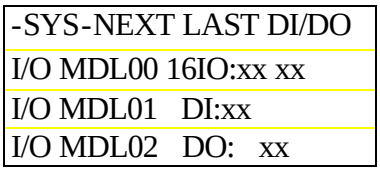
5: Assigning I/O Module Channel Number (*Fics*-IOM)



To activate DYNASERVO I/O modules for I/O control, it is necessary to correctly set each module number by the DIP switch on module and assign the channel number to each module.

If the [SYS]-[IOM] menu is selected; the screen shown on the right is displayed and channel No. for each *Fics*-IOM can be assigned. "MDL00" implies module number "00".

Use [DI/DO] menu to select the type of *Fics*-IOM as either input type (***Fics*-IOM/16** etc.), or input and output type (***Fics*-IOM/16.16CN** etc.). The ***Fics*-III** automatically displays the channel number of the first available channel for the module in "xx" field. 8 bits DI/DO comprises one channel.



Assigning I/O Module (***Fics*-IOM**)

Characters on Screen	Description
DO	Module with 8 DO
8IO	Module with 8 DI and 8 DO
16IO	Module with 16DI and 16DO
16DO	Module with 16DO
DI	Module with 16DI

5-1: *Fics* On-Board I/O

If there are on-board DI/DO on the ***Fics***-series controller board, the on-board DI/DO are assigned channel No. first. The channel No. assignment for DI/DO of ***Fics*-IOM** comes next. In this case, the DI of ***Fics*-IOM** is assigned from channel No.5, and DO is assigned from channel No.3. The DI channel No.1-4 and DO channel No.1-2 are assigned to the on-board DI/DO. If there are no on-board DI/DO, the channel numbers assigned to ***Fics*-IOM** starts from "01". Channel numbers are directly accessed in ***Fics*-III** application program.

***Fics*-Atoms SB Ver.3.5**		***Fics*-Atoms PCI**	**IMC-1X**
24DI/8DO	16DI/16DO		
DI 76543210 76543210	DI 76543210 76543210	DI 76543210 76543210	DI 76543210 76543210
01: cccccccc cccccccc	01: cccccccc cccccccc	01: xxxxxxxc xxxxxxxx	01: cccccccc cccccccc
03: cccccccc xxxxxxxx	03: xxxxxxx xxxxxxxx	03: xxxxxxxx xxxxxxxx	03: cccccccc xxxxxxxx
05: mmmmmmm mmmmmm	05: mmmmmm mmmmmmmm	05: mmmmmm mmmmmmmm	05: mmmmmm mmmmmmm
DO76543210 76543210	DO 76543210 76543210	DO 76543210 76543210	DO 76543210 76543210
01: cccccccc xxxxxxxx	01: cccccccc cccccccc	01: xxxxxxxx xxxxxxxx	01: cccccccc cccccccc
03: mmmmmm mmmmmm	03: mmmmmm mmmmmmmm	03: mmmmmmm mmmmmm	03: mmmmmm mmmmm

cccccccc: Valid bit for on-board DI/DO

mmmmm: Valid bit ***Fics*-IOM**

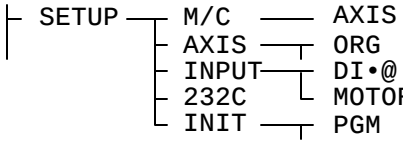
xxxxxxxx: Invalid bit

5-2: Configuring DI/DO of *Fics*-Atoms SB

***Fics*-Atoms SB** has 8 bits of digital inputs/outputs, which can be used either as digital inputs or as digital outputs. Selecting the [SYS]-[SETUP]-[DI/DO] menu allows user to configure the DI/DO of ***Fics*-Atoms SB** as 24DI/08DO or 16DI/16DO.

6: Setting Environmental Parameters

The ***Fics*-III** is extremely flexible software, adaptable to different motion control applications through the setting of specific application parameters. Selecting the [SYS]-[SETUP] menu allows user to set environmental parameters.

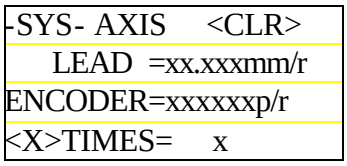


6-1: Setting Coordinate Systems and Mechanical Parameters

6-1-1: Setting Coordinate Systems

***Fics*-III** supports the following four types of coordinate systems. Each axis can be assigned a different coordinate system. By default, all axes are set as “mm”.

mm	X=±xxxx.xxmm
Pulse	X=±xxxxxx
Angle	X=±xxx.x degrees
Tilt	X=±xxx.x degrees



mm Coordinate System

mm:

All coordinates are displayed in “mm”. ***Fics*-III** converts the coordinates on screen to output pulses automatically. The following system parameters are needed for conversion.

LEAD	Moving distance per revolution of motor
ENCODER	Encoder pulse number per revolution of motor
TIMES	Magnification ratio of encoder (1, 2, or 4)

In mm-unit system, set LEAD equal to the pitch if ballscrew is used, or equal to circumference of the pulley for a belt-drive axis. ENCODER is automatically set by ***Fics*-III** and cannot be changed once motor is selected. TIMES specifies the magnification rate multiplied to the encoder pulse number. For example, if using an incremental encoder, which generates 2500 pulses per revolution, and if TIMES is, by default, set as 4, then 10000 pulses correspond to one revolution of motor.

The coordinates (X) on screen and the output pulse number (P) are related as follows:

P X*ENCODER*TIMES/LEAD

The result of divison is rounded off.

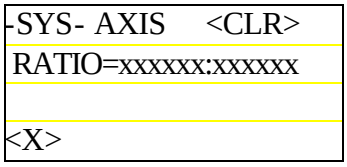
Pulse:

All displayed values on screen are results of multiplying the number of pulses by the system parameter RATIO. Conversion to output pulses is made by ***Fics*-III** automatically by making use of the system parameter:

RATIO = R1:R2

To display the actual pulse number, set RATIO as 1 : 1.

Assume one revolution of motor generates 1000 pulses. Then the minimum unit of the on-screen value is 0.1 deg if the ratio is set as 3600 : 1000 or 36 : 10. The minimum unit of the on-screen value is 1.0 deg if the ratio is set as 360 : 1000 or 36 : 100.



Pulse Coordinate System

The coordinates (X) on screen and the output pulse number (P) are related as follows:

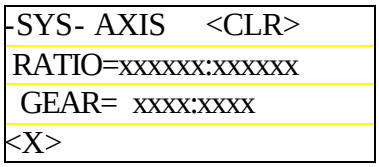
P = X*R2/R1

The result of division is rounded off.

Angle:

Coordinates are displayed in degrees.

The sign of the coordinates indicates the rotation direction of the motor shaft, and the value represents the target position expressed in absolute coordinate. In other words, the rotation range of the motor is 360 degree (one rotation), and the coordinates can take possible values between –360 ~360 degree. For instance, if –45 is specified, motor rotates 45 degrees from current position in the minus direction. There are more examples to illustrate this concept.



Angle & Tilt Coordinate System

Assume one revolution of the motor generates 1000 pulses. Then the minimum unit of the on-screen value is 0.1 deg if the ratio is set as 3600 : 1000 or 36 : 10.

Conversion to output pulses is made by ***Fics***-III automatically by making use of system parameters RATIO = R1:R2 and GEAR = G1:G2.

If using mechanical gear with gear reduction ratio equal to 40, GEAR should be set as GEAR=40:1.

The coordinates (X) on screen and the output pulse number (P) are related as follows:

P X*R2*G1/(R1*G2)

The result of division is rounded off.

Tilt:

Coordinates are expressed in degrees, but how many degrees to move is determined from both the target position and the current position. For instance, if the current position is 45 degrees, and the target position is specified as –30 degrees, pulses corresponding to 75 degrees are outputted in the minus direction. There are more examples to illustrate this concept.

Conversion to output pulses is made by ***Fics***-III automatically by utilizing system parameters RATIO=R1:R2 and GEAR = G1:G2.

The coordinates (X) on screen and the output pulse number (P) are related as follows:

P X*R2*G1/(R1*G2)

The result of division is rounded off.

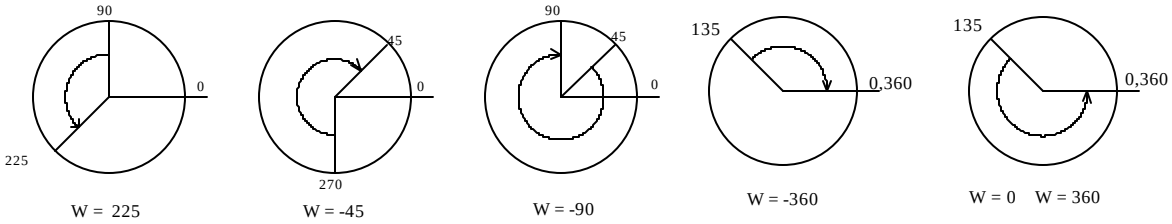
<<**Examples of Rotational Coordinates**>>

In the following example, it is assumed that RATIO=3600:1000 GEAR=1:1 (1000pulse/per rotation, 0.1 degree).

Absolute PTP Command:

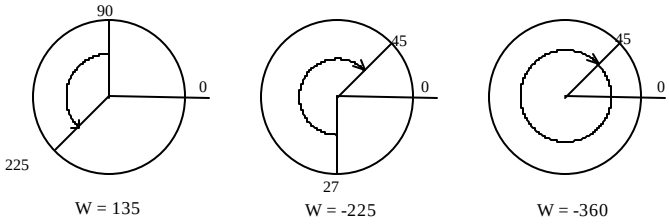
The sign of coordinates indicates the rotation direction of motor shaft, and the value represents the target position expressed in an absolute coordinate. In other words, the rotation range of motor is 360 degree (one rotation), and the coordinates can take possible values between –360 degrees ~ +360 degrees. To rotate to 0 degree in minus direction, specify W=-360.0; To rotate to 0 degree in the plus direction, specify W=0.0, or W=360.0.

For instance, if –45 is specified, motor rotates 45 degrees from current position in the minus direction.



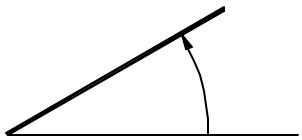
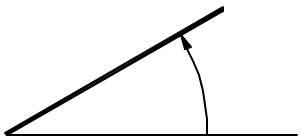
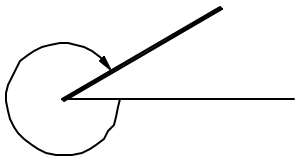
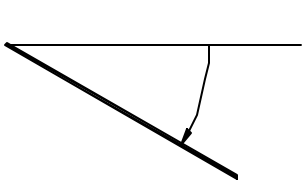
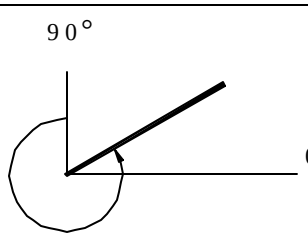
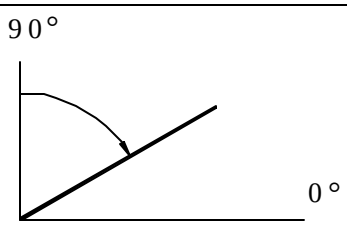
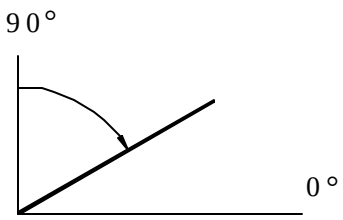
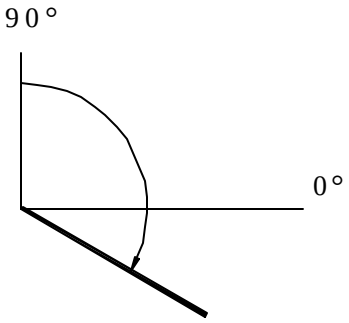
Relative PTP Command:

The signed coordinates, taking values between –360.0 and 360.0, denote the relative value with respect to the current position.



<<**Examples of Tilt Coordinate**>>

Coordinates are expressed in degrees, but how many degrees to move is determined from both the target position and current position. For instance, if current position is 45 degrees, and target position is specified as –30 degrees, pulses corresponding to 75 degrees are output in the minus direction. Coordinates take values between –999.9 and 999.9.

Current Position	Target Position	Angle Coordinate		Tilt Coordinate	
0°	+30°		Amount to Move 30°		Amount to Move 30°
	-30°		330°		30°
90°	+30°		300°		60°
	-30°		60°		120°

6-1-2 Automatic update of program data

Once mechanical parameters have been changed, programs in memory should be changed correspondingly. When being asked whether program data should be automatically converted, press <ENT> key for yes. If unnecessary, press any other key.

6-1-3: Setting Micro Step

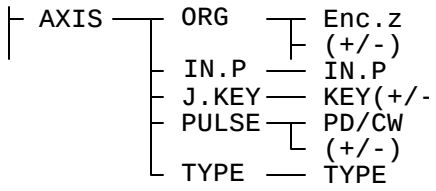
For ***Fics*-PDS/3**, micro steps can be set. Selectable micro steps are shown below. By default, micro step is set as 50, which means the number of pulses generated by step motor per one revolution equals the basic number of pulses (e.g. 200 pulses) times 50. Therefore, one revolution will generate 10000 pulses.

1	1.5	2	2.5	3	4	5	6
8	10	12	12.5	16	20	24	
30	32	40	48	50	60	64	
100	125	150	160	200	250	400	

6-2: Setting Homing, Moving Direction, and Coordinate System

6-2-1: Home Mechanism

Homing process differs for different systems. ***Fics*-III** allows user to select one of the following homing mechanism by selecting [Enc.z] menu.



Enc	Use encoder Z-phase
No	Do not use encoder Z-phase
Enc SENSOR	Use encoder Z-phase, but do not make a U-turn at sensor position
No SENSOR	Do not use encoder Z-phase and do not make a U-turn at sensor position
Enc LIMIT	Use encoder Z-phase and use the limit sensor as the home sensor
No LIMIT	Do not use encoder Z-phase, but use the limit sensor as the home sensor

-SYS-Enc.Z(+/-) NEED
<ORIGIN> X:Enc(-)
NEEDLESS PGM=999

The [(+/-)] menu: Selecting rotation direction of homing.

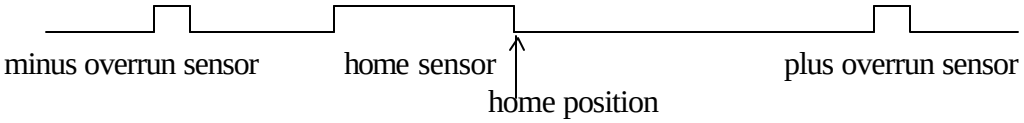
The [NEED] menu: Selecting whether homing is needed before automatic operation. If home offset is set, all axes move to the offset position after returning to the mechanical home.

If, for example, homing is not needed, select NEEDLESS for home. Special care must be taken during operation since home is automatically set to the position when power was turned on.

The [SEQ] menu: Selecting **starting homing simultaneously for all axes** or following the homing sequence as specified in program **999 (PGM=999)**. Program 999 is executed by homing command or <ORG> switch (on ***Fics*-RT1** etc.).

6-2-1-1: Home Mechanism for Step Motor

If no Z-phase signal is available as in step motor, the arising edge of the home sensor is taken as the home position.



There are three ways for returning to home depending on the starting point.

(1) Starting point is between the minus overrun and home sensor.

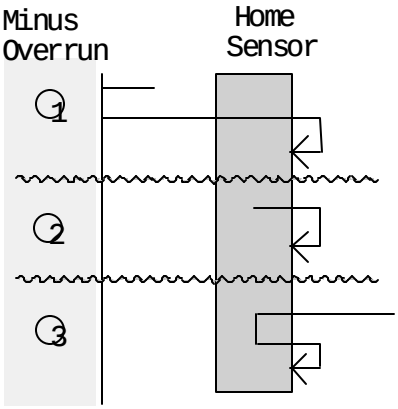
(2) Starting point is on home sensor.

(3) Starting point is between home and plus overrun sensors.

Case (1): Move towards the minus direction. When the minus overrun sensor turns ON, move in the plus direction. When home sensor turns ON/OFF, move in the minus direction. When home sensor turns ON, stop.

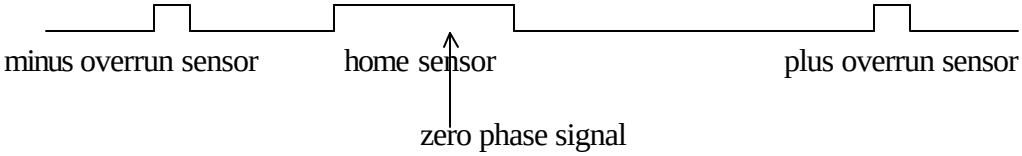
Case (2): Move towards the plus direction. When home sensor turns OFF, move in the minus direction. When home sensor turns ON, stop.

Case (3): Move towards the minus direction. When home sensor turns ON, move in the plus direction. When home sensor turns OFF, move in the minus direction. When home sensor turns ON, stop.



6-2-1-2: Home Mechanism for Motor with Encoder

When Z-phase (zero phase) signal is available, the home position is determined by the first Z-phase signal after the first time home sensor is ON, as described in the previous section.



6-2-1-3: Home Mechanism with no Sensor U-Turn

If [Enc.Z] is set to "No.SENSOR" in case 3, the first sensor ON position is the home.

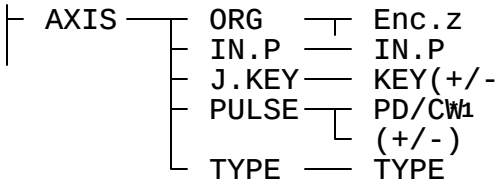
If [Enc.Z] is set to "Enc.SENSOR" in case 3, the detected encoder Z-phase position after the first time sensor is ON is the home.

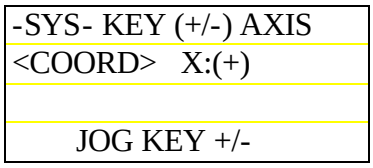
6-2-1-4: Home Mechanism Using Limit Sensors

If [Enc.Z] is set to "No Limit", or "Enc.Limit", it is possible to search for home using limit sensor as home sensor. In this case, since the limit sensor is ON after homing is completed, it is necessary to move away from the limit sensor at the beginning of application program.

6-2-2: Setting JOG-KEY Parameter

When pressing jog keys on *Fics*-RT1, motor rotates clockwise or counterclockwise. If, for example, when [X->] is pressed, motor rotates clockwise, but if the movement in the opposite direction is desired, change the sign by selecting [KEY (+/-)]. Notice that this operation only changes the correspondence between the JOG label and the moving direction, but does not change pulse direction (PTP move direction) itself.





JOG-KEY Menu

6-2-3: Setting PULSE Parameter

The [(+/-)] menu: Changing the sign of output pulse of each axis. This operation will change the JOG and PTP move direction. If, for example, the coordinate value displayed on *Fics*-RT1 is negative when motor is rotating clockwise, which is opposite to the desired direction, change the sign by selecting [(+/-)].

-SYS- (+/-) AXIS
<PULSE> X:(+)

Setting PULSE Parameter

6-2-4: Setting Coordinates System

The [TYPE] menu: Setting coordinates system as **mm**, **pulse, angular, or tilt**. The displayed coordinate system on screen is changed cyclically by clicking [TYPE](<F1>) menu.

'mm'-> <F1> -> 'PULSE' -> <F1> ->'ANGLE'-> <F1> 'TILT'

-SYS-TYPE AXIS <CLR>
<COORD> X:mm

Setting Coordinates System

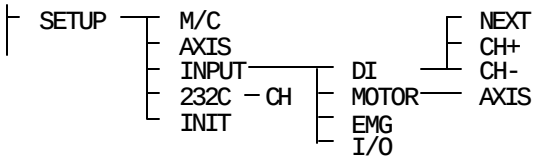
mm unit for linear coordinate	All coordinates are expressed and displayed in “mm”
Pulse unit	All coordinates are expressed and displayed in number of pulses
Degree unit for angular coordinate	All coordinates are expressed and displayed in degrees. Notice that 1). Coordinates are displayed with value from 0 to 360 and the sign indicates the direction of rotation. 2). Coordinates greater than 360 are displayed with the remainder after divided by the number of pulses per revolution. 3). In PTP operation, up to one revolution can be specified in both absolute and relative coordinates.
Degree unit for tilt coordinate	All coordinates are expressed and displayed in degrees, but the movement measure depends on the current and target coordinates. For details, refer to the programming guide (part 3 of this manual)

6-2-5: Setting Encoder Type

By selecting [ABS/INC] menu, the encoder type (absolute or incremental) can be specified for each axis. In a multi-axis system, it is possible that some axes are using ABS motors while others ENC motors. In such case, it is necessary to home before any automatic operation. For how to reset ABS encoder, etc. refer to DYNASERVO *Atom*-series drive manual.

6-3: Setting Bit Mask for Digital Inputs

In ***Fics*-III**, sensor ON is represented by “1” and OFF by “0”. The relationship between an input signal and its logical state can be changed by setting the corresponding bit mask with [INPUT]-[DI] menu.



6-3-1: Setting Bit Mask for DI

Menu	Function
[INPUT]-[DI]	Setting bit mask as “0” or “1”. By default, all bit masks are “0”.
[NEXT]	Selecting other channels if available
[CH+],[CH-]	Moving cursor to the next or preceding channel

-INPUT- NEXT CH+ CH-
DI 76543210 76543210
01:xxxxxxxx xxxxxxxx
02:xxxxxxxx xxxxxxxx

Setting Bit Mask for DI

The actual DI status is determined by XORing the sensor status and the bit mask. For example, if some DI is of “normally closed” type, then ***Fics*-III** sees the DI is ON if the corresponding bit mask is set as “0”. If, however, the corresponding bit mask is set as “1”, then in ***Fics*-III**, the status of the DI is OFF because the status is determined by “1 XOR 1” which is “0”.

6-3-2: Setting Bit Mask for General Inputs and Sensor Inputs (*Fics*-Atoms only)

By selecting the [INPUT]-[MOTOR] menu, it is possible to invert the general inputs/outputs of ***Atom*-**series drives by setting the bit mask for these inputs. If the ON/OFF is opposite to the desired state, it can be inverted.

-INPUT-DRV AXIS
<MOTOR> 76543210
DI:xxxxxxxx
<X>

Setting Bit Mask for ***Atoms*** General DI

-INPUT-IO AXIS <CLR>
<MOTOR> ORG: 0
+OV: 0
<X> -OV: 0

Setting Bit Mask for Sensors

In [SNSR] menu, the states of the home sensor (ORG) and overrun sensors (+OV and –OV) can be inverted by properly setting their bit masks. Press <F2> to select specific axis. In most applications, +OV and –OV sensors are of “normally closed” type, so the bit mask for these sensors should be set as “1”. This way, under normal conditions (+OV and –OV are OFF), the logic state of overrun sensors in ***Fics*-III** is “0” (= 1 XOR 1). If this is not set, jog error occurs when trying to jog because ***Fics*-III** sees that both overrun sensors are ON at the same time.

6-3-3: Setting Continuous Monitoring for Emergency Stop and Motor Error

The [INPUT]-[EMG] menu: Setting bit mask for emergency stop switch and conditions for continuous monitoring of emergency stop and motor error. To reverse the logic state of emergency switch, set the “0” in the second line of the screen on the right as “1” or “0”. When TIMER and INPUT are set as “0”, the emergency stop and motor error are unconditionally and continuously monitored. When the TIMER is not “0”, the emergency stop and motor error are not monitored for the set time period beginning from the moment of power-on. When the INPUT is not set to “0”, the system does not monitor while DI:nn-m is “0” (OFF).

TIMER: Delay time for starting monitoring after power-on.

INPUT: External DI for monitoring.

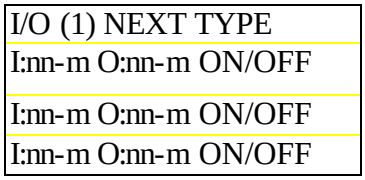
-INPUT- <CLR>
<EMERGENCY>:0
TIMER:000sec
INPUT:00-0

Setting Continuous Monitoring for Emergency Stop and Motor Error

6-3-4: Setting Manual Input and Output

It is possible to control DO output by DI input in manual and programming modes.

The maximum number of assignable points is 15. On each screen, 3 points can be assigned. Inside the parenthesis of I/O (1), the group number of the 3 points is displayed as shown on the screen on the right where "nn" and "m" represents channel and bit numbers, respectively.



Setting Input and Output Signals

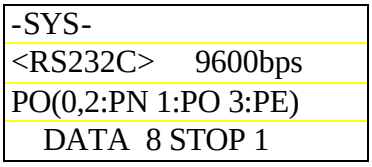
In the [TYPE] menu, output mode can be selected.

Mode	Function
ON/OFF	The state of DI is directly outputted to DO.
ON	DO is enabled ON if DI is ON.
OFF	DO is enabled OFF if DI is ON.

For example, if I:01-3 O:01-5 ON/OFF is set, the ON/OFF of the DI bit 3, channel 01 is directly outputted to DO bit 5. This is like software wiring, allowing for some specific DO to be directly controlled by some specific DI.

6-4: Setting Parameters for RS232C Communication

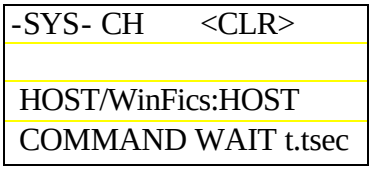
Fics*-III** communicates with ***WinFics and HOST option for PC-based control via RS232C. The initial parameters such as baud rate, etc. in ***Fics*-III** are shown in the figure on the right.



Parameters for RS232C

Available baud rates: 19200, 9600, 4800, 2400, 1200, 600, 300. In controllers such as ***Fics-Atoms*** SB, there are two RS232C channels (connectors): HOST and RT1. HOST is used for host communication and RT1 is used for connecting to ***Fics*-RT1** handheld terminal.

The HOST channel can also be used for ***Fics*-RT1** connection if selecting [CH] on the screen to change "HOST/*WinFics*: RT1" (the screen on the right shows the default setting: HOST is used for host communication).



Setting HOST/WinFics CH

Parameters can only be changed for HOST channel. But when the HOST channel is used for ***Fics*-RT1** connection and if the baud rate, etc. are changed, it is necessary to change correspondingly the setting in ***Fics*-RT1** to match the speed, etc. When the setting does not match, unrecognizable characters will appear on the screen of ***Fics*-RT1**. Once the communication settings are changed, reset the power to ***Fics*-RT1**. To change the baud rate, etc. of ***Fics*-RT1**, press SHIFT+CLR+MODE switches on ***Fics*-RT1** keypad at the same time.

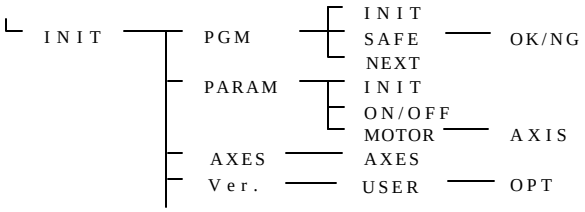
For ***Fics*-RT1** channel, parameters: 9600bps, PN(No Parity), DATA =8bit, Stop=1bit are **fixed** and cannot be changed.

For multi-unit option, the COMMAND WAIT parameter can be set. This command is designed for host communication of ***Fics*-Atoms**. Specifically, if the ENQ command is sent out, and no ACK command is received after waiting for a period of COMMAND WAIT time, the ENQ command is resent. If specified as 0.0sec, the ENQ command will not be resent. For details of host communication, refer to DYNASERVO host communication user's manual.

6-5: Initialization

The [SETUP]-[INIT] menu allows user to initialize the program and parameter areas in memory and to set the number of axes, etc.

6-5-1: Initializing Program Area



***Fics*-III** allows the use of up to 999 programs. By default, PGM=001~100 are designated as main programs, and the remaining are designated as sub-programs.

6-5-1-1: Setting Range of Sub-Program Number

Set the specified program numbers as **sub-program** numbers. Other numbers are used in the **main program**. The relationship between the first and last program numbers is as follows.

SUB PGM:000->000: Sub-program does not exist.
SUB PGM:001->099: Sub-program are from PGM=002 to PGM=099.
SUB PGM: 900->099: Sub-program are from PGM=900 to PGM=999 and PGM=002 to PGM=099.

PGM=001 is always a main program

-SYS- INIT SAFE NEXT
<PROGRAM>
SUB PGM:sss->eee

Setting Range of Sub-Program Numbers

6-5-1-2: Initializing Program

The [INIT]-[PGM]-[INIT] menu is used to initialize the program area. When this menu is selected, the screen on the right is shown to confirm the initialization. To initialize, press <DEL> key. To cancel the initialization, press any other key. When a program is PROTECTED, the program area cannot be initialized.

-SYS- INIT SAFE
<PROGRAM>
initialize OK ?
(OK: DEL)

Initializing Program

6-5-1-3: Protecting program

This function enables user to protect programs from being accidentally erased.

The [INIT]-[PGM]-[SAFE] menu: Setting protection for programs from being changed and from being copied. Program changing protection is set by specifying the range of program numbers. Copy protection is set by selecting [OK]/[NG] menu. Initial values are 000->000 and OK.

PROTECT: 000->000: No programs are protected.
PROTECT: 100->999: Programs from PGM=100 to PGM=999 are protected.

PROTECT: 900->100: Programs from PGM=900 to PGM=999 and from PGM=001 to PGM=100 are protected.

-SYS- NG
<PROGRAM>
PROTECT:sss->eee
COPY:OK

Protecting Program

-SYS- INIT ON
<PROGRAM>
PROTECT:OFF

6-5-1-4: Setting Startup and Emergency Programs

In the [INIT]-[PGM]-[NEXT] menu, the user can set the startup program to be executed at the time of power-on and the program to be executed in an emergency.

If the value is set as "000", the last "current program" is executed at the time when power-on and the emergency stop error occurs in an emergency.

-SYS- NG
<PROGRAM>
POWER ON:000
EMERGENCY:000

Setting Startup Program

POWER ON:	The program to be executed as current program at the time of power-on.
EMERGENCY:	The program to be executed in an emergency. The emergency program is special program and has several restrictions.

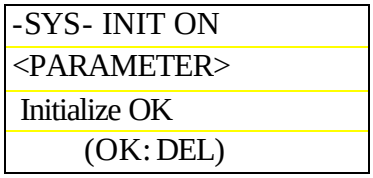
(1) In an emergency, the emergency program is started after turning on the error stop indicator output bit.
(2) The commands, which can be used in the emergency program, are restricted to the same class of commands that can be used in task programs except PTP commands.
(3) While emergency program is being executed, the emergency stop switch is not monitored.
(4) When the emergency program is registered, nothing is done for DO after the error reset. The DO can be processed in the emergency program.
(5) When no emergency program is registered, all outputs of DO are turned OFF when error is reset.

6-5-2: Initializing Parameters

The [INIT]-[PARAM] menu allows the user to protect and initialize parameters.

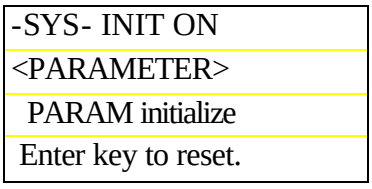
6-5-2-1: Protecting Parameters

This function enables the user to protect parameters from being accidentally erased. If PROTECT is set to ON, parameters can be viewed, but cannot be changed.



6-5-2-2: Initializing Parameters

The [INIT]-[PARAM]-[INIT] menu is used to initialize the parameter area. When this menu is selected, the screen on the right is displayed to confirm the initialization. To initialize, press <DEL> key. To cancel the initialization, press any other key. When parameters are protected, the parameter area cannot be initialized.



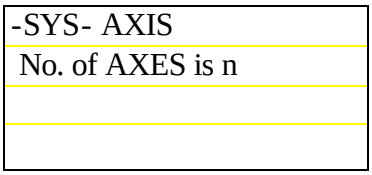
Initializing Parameter

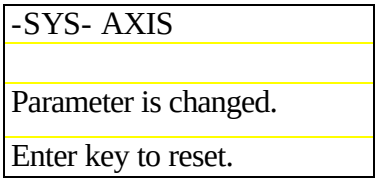
Once initialized, the message is displayed as shown on the screen. Press any key to return to the initial screen.

6-5-3: Setting Number of Axes and Unused Axes

The [INIT]-[AXIS] menu is used to set the total number of axes in the system configuration and to specify unused axes.

When the number of axes is changed and the <ENT> key is pressed, the message is displayed as shown on the screen on the right.



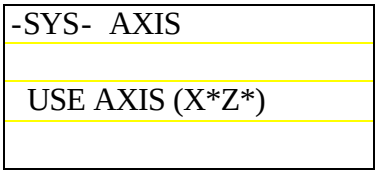


Setting Number of Axis

In ***Fics*-III,** once the number of axes has been changed, the system returns to the initial screen by pressing <ENT> key.

6-5-3-1: Setting In-Use and Unused Axes

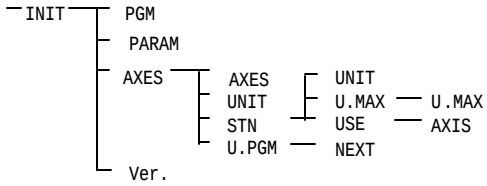
When a system is still under construction, it might be necessary to test only the running part of the system. In that case, it is possible to specify the unused axes. After moving the cursor to the axis you want to set, pressing the [AXIS] key enables you to set the in-use axes (with axis names displayed) and unused axes (with * displayed). The screen on the right shows that currently X-axis and Z-axis are used; others are not used (even if connected, they are not recognized by ***Fics*** controllers).



Setting In-Use and Unused Axes

6-5-4: Setting Unit Information

In ***Fics*-III**, a system comprised of up to 16 axes can be divided into 5 units with a maximum of 6 axes in each unit. By selecting the [INIT]-[AXES] menu, the following unit information can be set.



- Number of unit
- Number of axes in each unit
- Setting in-use/unused axes for each unit
- Program number for each unit

Once all this information is set, ***Fics*-III** assigns each axis a unique station number.

6-5-4-1: Setting/Checking Unit Information

By selecting [INIT]-[AXES] menu, the information for each unit can be set or checked.

[AXES]	Setting the number of axes for the displayed unit
[UNIT]	Changing unit numbers. "x/x" stands for "Unit Number/Total Number of Units".
[STN]	Displaying station number for confirmation
[U.PGM]	Displaying program number for use by the unit

-SYS- AXES UNIT STN
UNIT No.=x/x
No. of AXIS is n

Setting No. of Axes for Each Unit

6-5-4-2: Checking Station Number for Each Unit

Selecting the [INIT]-[AXES]-[STN] menu enables user to confirm the station number of each axis in each unit. The station number is automatically assigned by ***Fics*-III** according to the total number of axes in each unit. A station number will be displayed for axis in use; "-" is displayed for axes not in use; Axes not assigned to the system are displayed with "**".

-SYS- UNIT U.MAX USE
UNIT No.=1/1
<STN X:01 Y:-- Z:03
No.> W:-- U:** V:**

Station No. Confirmation

[UNIT]	Changing unit number
[U.MAX]	Setting maximum unit
[USE]	Setting in-use/unused axes

-SYS- U.MAX <CLR>
UNIT MAX : m

Setting Unit Number

6-5-4-3: Setting Unit Number

Set the total number of units to be used in a specific system. A maximum of 5 units can be set. A maximum of 6 axes can be set in each unit.

-SYS- AXIS
UNIT No=x/x
USE AXIS(X*Z*)

Setting In-Use/Unused Axes

6-5-4-4: Setting In-Use/Unused Axes

When a system is still under construction, it might be necessary to test part of the system. In that case, it is possible to specify the uninstalled axes as unused axes. Moving the cursor to each axis and pressing [AXIS] menu enables the setting of in-use (with axes No. displayed) axes/unused axes(with * displayed).

6-5-4-5: Setting Program Number for Each Unit

By selecting the [INIT]-[AXES]-[U.PGM] menu, the range of program numbers for each unit can be set.

The programs for each unit use the program number specified here. If there is a PTP command in programs specified by the program number, it is only valid within the unit. Any program number not included in the specified range is considered as a program of Unit 1.

-SYS- NEXT
UNIT 2 PGM:200->299
3 PGM:300->399
4 PGM:400->499

Program No. Setting for Each Unit

6-5-5: Version Information

By selecting the [INIT]-[Ver.] menu, the software version of ***Fics*-III** as well as the installed options can be confirmed. Make sure to check this information for your software package.

Ver.-USER ATOM<CLR>
DBGR= DbgATL0
SOFT= 2.30 : R01
(MASK V01.03)

Version Check Menu

DBGR = Name of System Loader
SOFT = Software Version: Revision No.
(MASK ROM Version)

*MASK ROM Version and Revision No. are for software management.

In the version menu, pressing [USER] menu switches to user information menu. Select [OPT] menu to confirm what kind of optional software is installed.

USER: System ID for user identification
DATE: Date of production of loaded ROM

By repeatedly pressing [OPT] menu, the installed option software names are displayed sequentially.

-USER- OPT <CLR>
USER:DYNAX001
DATE:2000/2/08
OPT:xxxxxxxxxxx

User Info Menu

Software Option	Name on Screen
High Speed Linear Interpolation	H-DDA
Host	HOST
Host Text	HOST-TEXT
Table	Table
JOG by External DI	DI-JOG
Fics-PT Option	PT
SVAL	SVAL
3000 Step	3000
Fics DPRAM BIOS	DPBIOS
Fics CAM BIOS	CAMBIOS
Touch Terminal Operation	TT*
Multi Condition Jump Option	IF2

6-5-5-1: *Atom* Version Info

In the version menu, selecting [ATOM] menu displays the version information of ***Atom***. By selecting the [STN] menu, the version information of the next ***Atom*** station is displayed**.** If ***Atom*** does not have any version information, NO VERSION is displayed.

-Atom- STN <CLR>
STN:01 VER: 3.30
NAME:SADDA02B
DATE:2000-02-10

Atom Version Menu

7: Loading and Saving of Data to EEPROM

Program and parameter data produced in ***Fics*-III** can be saved in EEPROM (flash memory) and the saved data can be re-used.

Selecting the [EEPROM] menu in the initial screen switches to EEPROM processing mode.
In the [PAR]/[PGM] menu, modes are selected so as to load/save program <PGM> or parameter <PARAM>.
By selecting [LOAD] menu, the message below is displayed.

Load from EEPROM?

By selecting [SAVE] menu, the message below is displayed.

Save to EEPROM?

In either case, action will take place by pressing <ENT> key.

-SYS- PAR LOAD SAVE
<LD/SV>
<PGM>
Select the process.

Selecting Load/Save

8: Communication with *WinFics*

Program and parameter data can be transferred between ***Fics*** controllers and the programming tool ***WinFics***. Using this function, data can be stored in PC, or a program written on PC can be loaded to ***Fics.*** Communication with the ***WinFics*** is carried out through RS232C, or SRing-LAN using DYNASERVO CBIC-MFC card. For details, refer to "***WinFics*** user's manual."

Appendix 1: **More Information About Homing of *Fics-Atoms* Series**

Home positioning (homing) is a procedure performed to set motor reference position. If using incremental encoders, precise positioning becomes possible in an automatic operation only after homing has been completed. The following supplementary information should help better understand the issues related to homing.

Homing:

Forces axes movement to the mechanical home. All axes in a system can go home at the same time, or the homing sequence can be determined by program PGM=999. Program PGM=999 usually contains homing commands for each axis, but it could also be a program consisting of a NOP command only. The start of homing is triggered in following ways:

(1) DI:01-3 (external homing DI bit) is ON.
(2) The <ORG> key on ***Fics*-RT1** was pressed.
(3) In the host communication, a C5OG command has been received.

Mechanical Home:

Home using sensors attached to machines. This is accomplished by sending a homing command to each axis.

Home Needed/Not Needed:

Choose whether to use the mechanical home or not. It is specified for each axis. In the case of ABS encoder, "NEEDLESS" should be chosen.

Home Completed:

Indicates that the homing has been completed successfully.

Determination of Coordinates:

This indicates that coordinates are determined. If homing is needed for an axis, then before the completion of homing, the coordinates are not determined. If homing is not needed for an axis, the position at power-on is taken as the home position.

Home Offset:

Sets the software home position for axes with determined coordinates.

Software Limit:

The moving range of the axis can be limited by software to axes with determined coordinates.

Automatic Operation Mode:

Mode for automatic execution of programs.

Jog mode:

Mode for jog operation.

Appendix 1-1: Error Messages for Homing

For axes whose coordinates have not yet been determined, if PTP commands, interpolation commands, or coil winding commands are executed, 'ORIGIN ERROR X' (X denotes axis name) will occur. In the following cases, the coordinates are determined, so there is no error.

(1) When homing is set as "NEEDLESS" home position determined at power-on .
(2) When homing is set as "NEED", but homing has been successfully completed.

Appendix 1-2: Axes Subject to Software Limit

The following axes whose coordinates are determined are subject to software limits. If the coordinates are not determined, software limit will not be checked. In old versions, even in the homing program, software limit were checked unconditionally for each axis. In the future, software limits will not be checked for those axes whose coordinates are not yet determined.

(1) Axes in jog operation (including teaching)
(2) Axes in PTP operation
(3) Transverse axes in coil winding

Appendix 1-3: Switching to Automatic Mode

Setting	Switching to Automatic Mode
Home 'NEED'	OK if homing process is completed
Home 'NEEDLESS'	OK if all axes are set to NEEDLESS (regardless of 'ALL'/'PGM=999')

Appendix 1-4: Home Completion Indicator

ON	OFF
Home completed	o Power-on o Parameter initialization o Servo drive adjustment o Parameter loading (EEPROM, ***WinFics***) o Changing homing Parameters o The following errors occurred 'MOTOR ERROR (08)' 'MOTOR ERROR (14)' 'COMM ERR (STNxx)'