TS3000 series Robot Controller

TS3000 SCARA / LINEAR system
TSL3000 SCARA system

INSTRUCTION MANUAL

TP3000 OPERATOR'S MANUAL

Notice

- Make sure that this instruction manual is delivered to the final user of Toshiba Machine's industrial robot.
- Before operating the industrial robot, read through and completely understand this manual.
- After reading through this manual, keep it nearby for future reference.

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Preface

About the organization of the TS series robot controller instruction manuals
The TS series robot controller instruction manuals have been published in parts according to the application and purpose, and the name and outline of each manual are as follows:

[Safety Manual]
This manual contains the important information to use the robot safety and correctly. Be sure to read through and understand this manual before operating the robot. Also, strictly observe the descriptions made there.

[Startup Manual]
This manual describes the procedures covering from power ON of the robot after installation to robot operation by manual guide. Those who use the TS series robot controller for the first time should read through this manual.

[Operator’s Manual]
This manual describes the TS series robot controller operating procedures. Read through this manual before operating the robot, and refer to it as necessary.

[Robot Language Manual]
This manual describes the robot language called "SCOL". When you have to create a program based on this language, read through the manual.

[Interface Manual]
This manual describes the external signals for the robot. Concerning the interface conditions between the robot and peripheral equipment, specifications, timing, etc., refer to the manual when necessary.

[Installation & Transport Manual]
This manual describes the transport, unpacking and installation of the robot and controller. Be sure to read through this manual before unpacking the shipment containing the robot.

[Maintenance Manual]
This manual deals with the daily and regular inspections to be made on the robot and controller. Read through this manual to use the robot safely over long years to come.

[Communication Manual]

This manual describes the serial communication between the robot controller and other equipment. Refer to this manual when connecting the robot controller with a host computer, optical sensor, etc., via a serial cable.

[User Parameter Manual]

This manual describes the setting procedures of the robot controller. Refer to this manual when you perform the setting of communication, I/O and operating conditions.

[Alarm Manual]

This manual describes the contents, causes, and remedies of alarms. Refer to this manual when an alarm occurs.

This Operator’s Manual describes the operation method for each function for manually guiding the robot, editing programs, editing data, performing automatic operation and so on by using the control panel (front switch on the TS3000 Controller) and the teach pendant.

This manual is intended for the robot operator. Before reading this manual, the operator should read the Safety Manual and Startup Manual.

Cautions on Safety

This manual contains the important information on the robot and controller to prevent injury to the operators and persons nearby, to prevent damage to assets and to assure correct use.
Make sure that the following details (indications and symbols) are well understood before reading the main text. Always observe the information noted here.

[Explanation of indications]

Indication	Meaning of indication
⚠ **DANGER**	This means that "incorrect handling will lead to fatalities or serious injuries."
⚠ **CAUTION**	This means that "incorrect handling may lead to personal injuries*1) or physical damage only*2).

*1) Injuries refer to injuries, burns and electric shocks which do not require hospitalization or long-term medical treatment.

*2) Physical damage refers to damages that concern destruction of assets or resources.

[Explanation of symbols]

Symbol	Meaning of symbol
🛇	This means that the action is prohibited (must not be done). Specific contents of the actions actually prohibited are indicated with pictures or words in or near the symbol.
❗	This means that the action is mandatory (must be done). Specific contents of the actions that must be done are indicated with pictures or words in or near the symbol.
⚠	This means danger. Specific contents of the actual danger are indicated with pictures or words in or near the symbol.
⚠	This means caution. Specific contents of the actual caution are indicated with pictures or words in or near the symbol.

[Operation]

⚠ **DANGER**	
🛇 Prohibited	• During operation, NEVER enter the dangerous area of the robot. Doing so can cause a serious injury. • DO NOT leave in the working range any machinery or materials which will hinder the operation. They can be a cause of an injury to the person nearby or an accident if the equipment goes wrong. • Anyone other than the operator MUST NOT approach the equipment. Should he/she negligently touch the dangerous part of the equipment, he/she may get injured or involved in a serious accident. • NEVER perform an inappropriate operation which is not described in the instruction manual. Doing so can cause the equipment to malfunction, resulting in personal injury or serious accident.
⚠ Danger	• If you feel even a little that you are exposed to danger or that the equipment is operating abnormally, emergency stop the equipment. Using such equipment continually can cause an injury or serious accident. Before such things happen, ask our after-sale service agent for repair. • During operation, be sure to close the equipment cover. Opening the cover during operation can cause an electric shock or personal injury. • Only a well-trained and qualified person is allowed to perform the operation. Operating the equipment improperly can cause it to malfunction, resulting in a personal injury or serious accident. • If the equipment has malfunctioned, turn the power off, identify and remove the cause of the abnormality, maintain the peripheral equipment and completely restore the malfunctioned equipment. Then start the equipment at a slow speed. Starting the equipment without removing the abnormality can cause a serious accident.

⚠ CAUTION

⊘ Prohibited	• DO NOT change the data of the system configuration file. Otherwise, the robot will move abnormally, resulting in damage or an accident.
! Mandatory	• In principle, teaching operation should be performed outside the dangerous area of the robot. If it must be performed inevitably within the dangerous area, strictly observe the following matters. (1) The teaching operation should always be performed by two (2) persons. One person performs the job and the other person watches outside the dangerous area. Also, both persons should try to prevent mis-operation with each other. (2) The operator should do the job in an attitude ready to press the EMERGENCY stop pushbutton switch at any time. Also, he/she should perform the job at a position from which he/she can evacuate immediately at the time of an emergency after confirming the robot working range and shields nearby. (3) The supervisor should keep watch on the job at a position where he/she can see the entire robot system and operate the EMERGENCY stop pushbutton switch at the time of an emergency. Also, he/she should keep anyone from entering the dangerous area. Unless the operator or other person follows the instructions of the supervisor, an accident can be caused. • If an abnormality occurs when the main power switch of the equipment is turned on or if the POWER LED lamp on the control panel remains off after the switch is turned on, turn off the main power immediately and check the wiring. Failure to do so can cause an electric shock or fire. • Unless the robot operates toward a designated direction at manual guide, turn off the servo power. Failure to do so can cause an accident or robot failure. Before such things happen,, call our after-sale service agent. • Pushbutton operations of the control panel and teach pendant should be confirmed visually. Failure to do so can cause an accident due to mis-operation. • When performing an automatic operation after the power is turned on, be sure to reset the current program before starting the automatic operation. If the program is executed continuously, the robot can interfere with the peripheral equipment, resulting in damages or accidents.

CAUTION	
Mandatory	• Before operating the equipment, perform the following inspections. (1) Make sure that there are no abnormalities in the appearance of the robot, controller, peripheral equipment and cables. (2) Make sure that no obstacle stands in or near the working range of the robot and peripheral equipment. (3) Make sure that the emergency stop and other safety devices operate normally. (4) Make sure that no abnormal noise or vibration is generated during robot operation. Failure to conduct these prior inspections can cause an equipment failure or an accident.
Caution	• The speed of test operation is initially set at 25% of the maximum robot speed. • The speed of automatic operation is initially set at 100% of the maximum robot speed.

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Section 1 Before Operating Your Robot

1.1 Overview of Operation Functions

Function	Descriptions	Control panel	Teach pendant	External control signal	HOST commu-nication
Main power ON/OFF	Used to turn on and off the main power.	○			
Servo power ON/OFF	Used to turn on and off the servo driver main circuit power.	○	Δ (ON only)	○	○
Master mode selection	Used to select either the external automatic mode, internal automatic mode or TEACHING mode.	○			
Start and stop	Used to start and stop automatic operation.	○	○	○	○
Cycle stop	Used to stop automatic operation. (When 1-cycle operation has finished)	○	○	○	
Feed hold	Used to temporarily stop automatic operation.		○		○
Emergency stop	Used to immediately stop automatic operation.	○	○	○	○
Teaching operation	Used to manually guide the robot by jogging or inching.		○		○
Auxiliary signal operation	Used to operate the pneumatic drive shaft for grip, etc.		○		Δ
Program editing	Used to teach and edit programs.		○		○
Data editing	Used to teach and edit positions, coordinates and load data.		○		○
Parameter editing	Used to edit parameters.		○		○
File operation	Used to copy files to RAM and USB devices, rename and delete files, and perform other file operations.		○		Δ (RAM only)
Reset	Used to reset output signals and execution environment.		○	○	○
Date setting	Used to set the system date.		○		
Time setting	Used to set the system date.		○		
Error display	Used to display errors which are yet to be reset.	○	○		○
Error reset	Used to reset errors that have been recovered.		○	○	
Error history display	Used to display a historical list of errors which have been recovered.		○		○

Function	Descriptions	Control panel	Teach pendant	External control signal	HOST commu-nication
Work coordinate system selection	Used to select the work coordinate system.		○		
Tool coordinate system selection	Used to select the tool coordinate system.		○		
Present position monitor	Used to display the present position of the robot in each coordinate system.		○		○
External I/O signal monitor	Used to display the status of digital I/O signals.		○		○
Working time monitor	Used to display turn-on time of power supply and operation time.		○		○
File selection	Used to select a file to be executed.		○	○	○
Movement	Used to move the robot to a taught point.		○		○

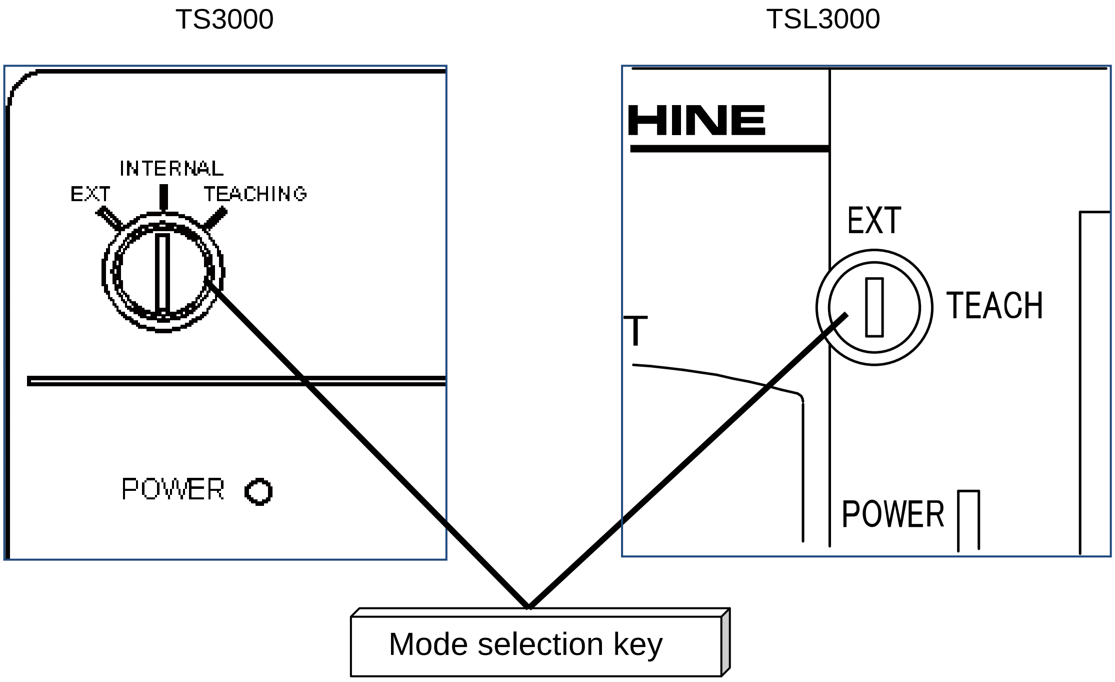
* The TSL3000 neither has a control panel nor the internal automatic operation function.

○: Operation is possible.
Δ: Operation is partly possible.

1.2 Various Modes of Operation

Master mode	External automatic mode (EXTERNAL)	Used to perform automatic programmed operation by means of using external signals or communication.
	Internal automatic mode (INTERNAL)	Used to perform automatic programmed operation through the control panel or teach pendant. * The TSL3000 does not have the internal automatic operation function.
	Teaching mode (TEACHING)	Used to perform such operations as teaching, guiding, file management and program test run, using the teach pendant.

Use the mode selection key on the control panel to select the master mode.



Utility (UTILITY)	Used to perform such operations as coordinate selection, position monitor and signal monitor using the teach pendant, irrespective of the master mode currently selected.
Error display (ERROR)	Used to display and reset an error using the teach pendant, irrespective of the master mode currently selected.

The emergency stop and servo OFF operations are possible irrespective of the mode currently selected.

1.2.1 External Automatic Mode

External automatic mode (EXT)	External control signal mode (SIGNAL)	Used to perform automatic programmed operation by means of external control signals. For details, see the Interface Manual.
	Host mode (RS232C)	Used to perform automatic programmed operation, file uploading and downloading from the host computer through serial communication. For details, see the Communication Manual.
	Host mode (ETHERNET)	Used to perform automatic programmed operation, and file uploading and downloading from the host computer through an Ethernet communication channel. For details, see the Communication Manual.

File selection, run mode selection and speed override setting in the internal automatic operation mode or test operation mode are also valid in the external automatic mode.

1.2.2 Internal Automatic Mode

Internal automatic mode (INTERNAL)

File selection (SEL)	Used to select a file to be executed.
Run mode selection (MODE)	Used to select a run mode.
Start (RUN)	Used to start program execution by operating the control panel.
Speed override (OVRD)	Used to set the speed override.
Stop (STOP, REAK)	Used to stop or interrupt program execution.
Direct run (DO)	Used to directly execute the SCOL command.
Reset (RESET)	Used to reset the program execution step, variables and digital output signals.

* The TSL3000 does not have the internal automatic operation function.

1.2.3 Teaching Mode (Including Test Operation)

Teaching mode (TEACHING)

File selection (SEL)	Used to select a file to be executed.
Run mode selection (MODE)	Used to select a run mode.
Start (RUN)	Used to execute programmed test operation.
Speed override (OVRD)	Used to set the speed override.
Stop (STOP, REAK)	Used to stop or interrupt program execution.
Direct run (DO)	Used to directly execute the SCOL command.
Reset (RESET)	Used to reset the program execution step, variables and digital output signals.
Editor (EDIT)	Used to perform program editing, data editing (positions, coordinates and loads), and parameter editing.
File operation (FILE)	Used to display a file directory, copy, delete and rename files.
Guide	Used to select the guide mode, guide coordinate and guide speed, then move the end effector by means of the guide keys. This mode is ineffective during test operation.

1.2.4 Edit

- Edit
  - Program editor
    - Program editing.

      Used to edit programs and global data by character input, command menu selection and SCOL menu selection.
  - Data editor
    - Positional data editing.

      Used to edit positional data by teaching and numerical value input.
      The work coordinate system is selected.
    - Coordinate data editing.

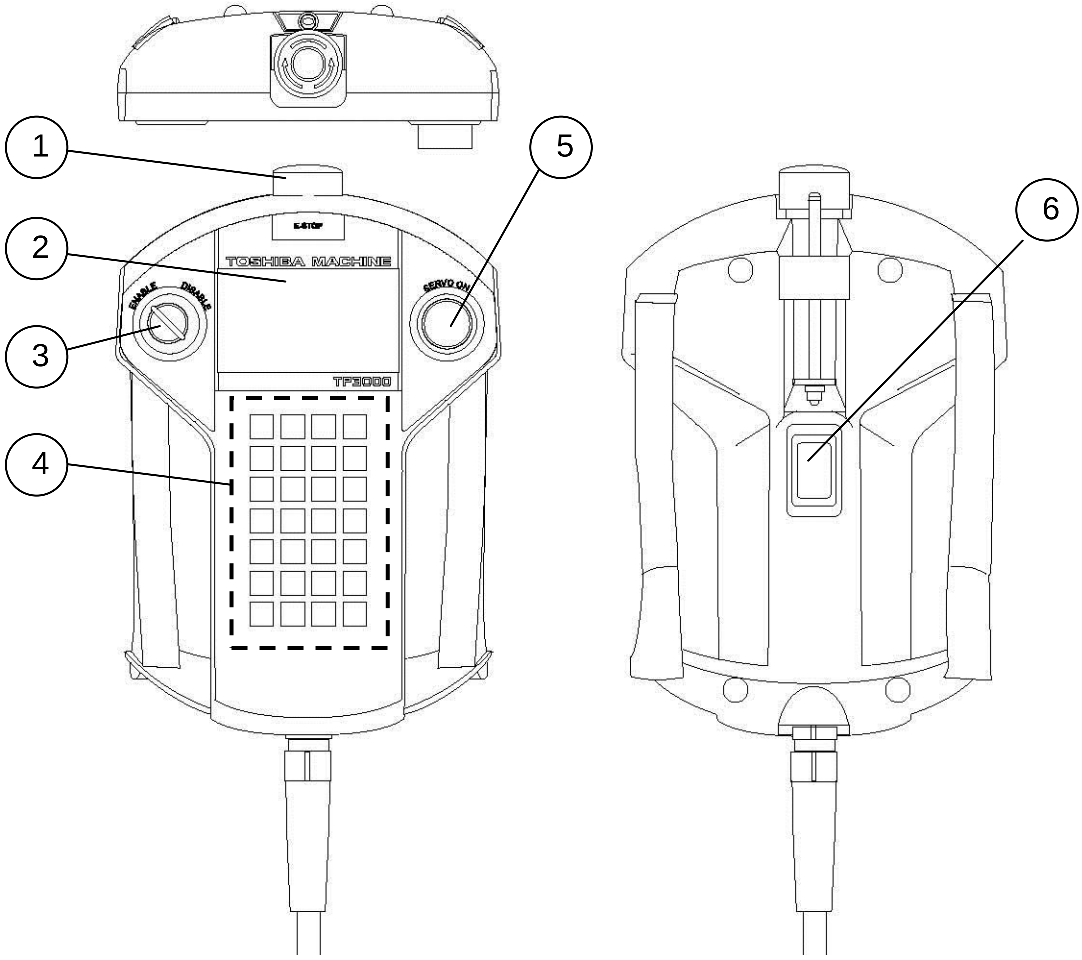
      Used to edit coordinate data by teaching and numerical value input.
      The work coordinate system is selected, and the tool coordinate system is specified.
    - Load data editing

      Used to edit load data by numerical value input.
  - Parameter editor
    - Parameter editing

      Used to edit various parameters.

1.3 TP3000 Operating Procedure

The structure of the TP3000 teach pendant is shown below.



①	Emergency Stop Switch	Immediately stops the robot.
②	LCD Screen	Organic EL color display with a backlight
③	Operation Restriction Key	Partially restricts operation from the TP3000. For details, see Section 1.3.7.
④	Key Sheet	This touch sensitization key sheet has an LCD panel. It displays key icons necessary for operation.
⑤	Servo ON Switch	This button switch is used to turn the servo ON. The LED illuminates when the servo is ON. The servo can also be turned ON when this switch is pressed while the intermediate position is maintained by holding the Enable switch.
⑥	Enable Switch	This is a 3-position enable switch.

1.3.1 About the Handling of the TP3000

The teach pendant TP3000 can be used with the controllers TS3000/TS3100/ TSL3000.

The teach pendant TP3000 has the common connection specification with the TP1000 teach pendant (existing model); if the controller system version supports both of the teach pendant models, these two models are compatible.

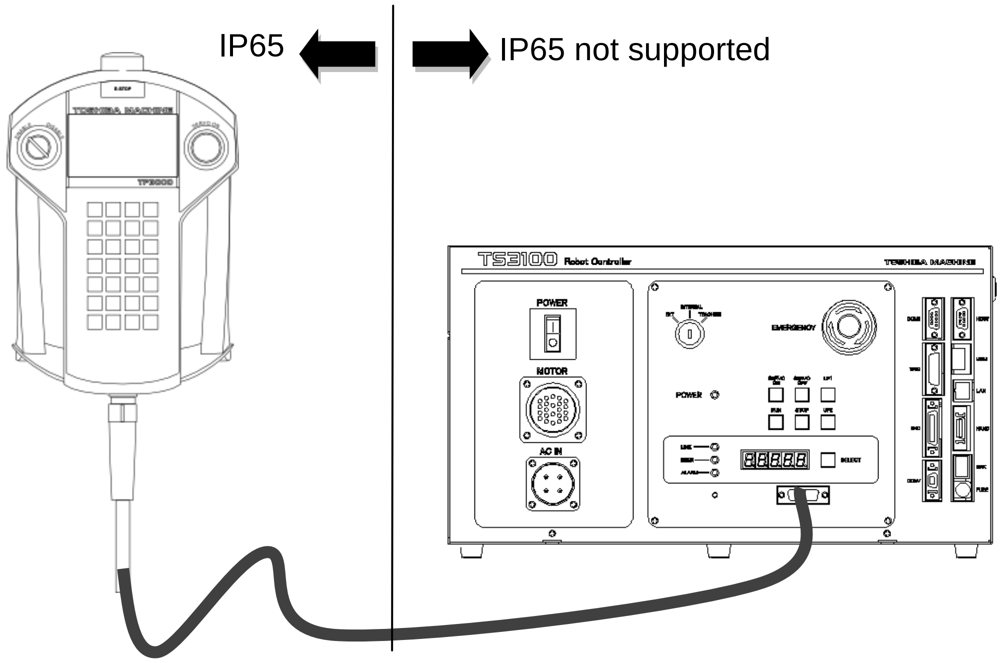
When changing a teach pendant, be sure that the controller power is "OFF".

The operating environment of the TP3000 is shown below.

Operating Environment	Specification
Temperature	0°C to 45°C
At Storage	-20°C to +70°C
Humidity	5% to 95%
Anti-shock	Equivalent to drop height 1.5 m (brochure value)
Protection Class	IP65

CAUTION

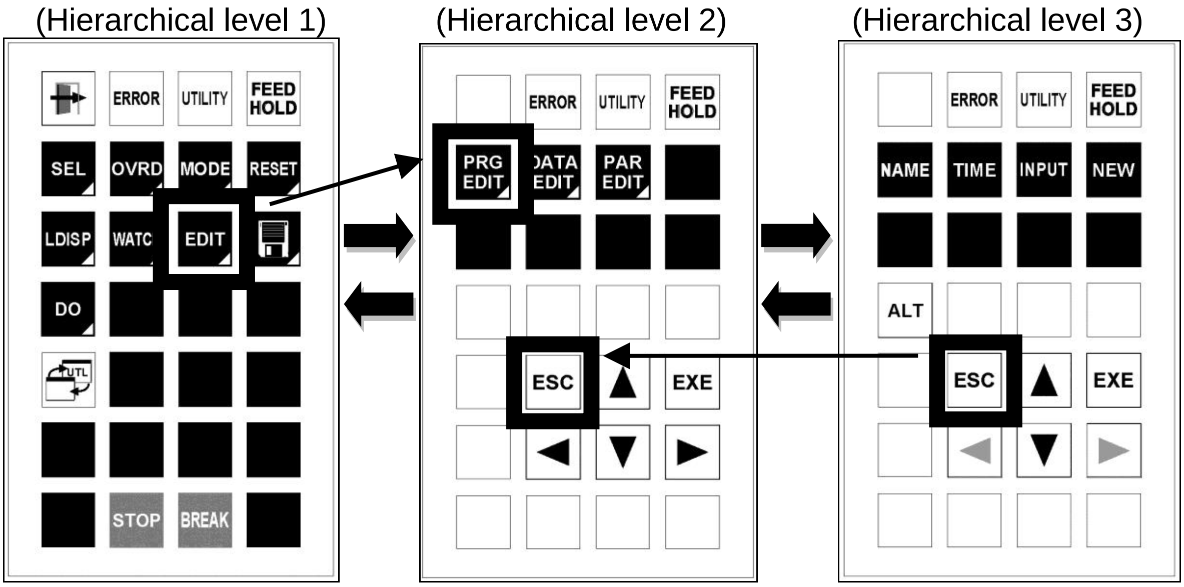
- The TP3000 is structured to have protection class IP65 in its main body only. Neither the controller body nor the TP3000 connector are configured to support IP.


IP65
IP65 not supported
E-STOP
TOSHIBA MACHINE
TP3000
TS3100 Robot Controller
POWER
MOTOR
AC IN
EMERGENCY
SELECT

1.3.2 About Calling the Functions of the TP3000

The display of the key sheet of the TP3000 changes according to the usage situation. The key sheet contains touch sensitization keys and an LCD panel. Function calls have a hierarchical structure and the more a key is pressed, the deeper its hierarchy gets. Pressing the [ESC] key returns the hierarchy to one level lower.

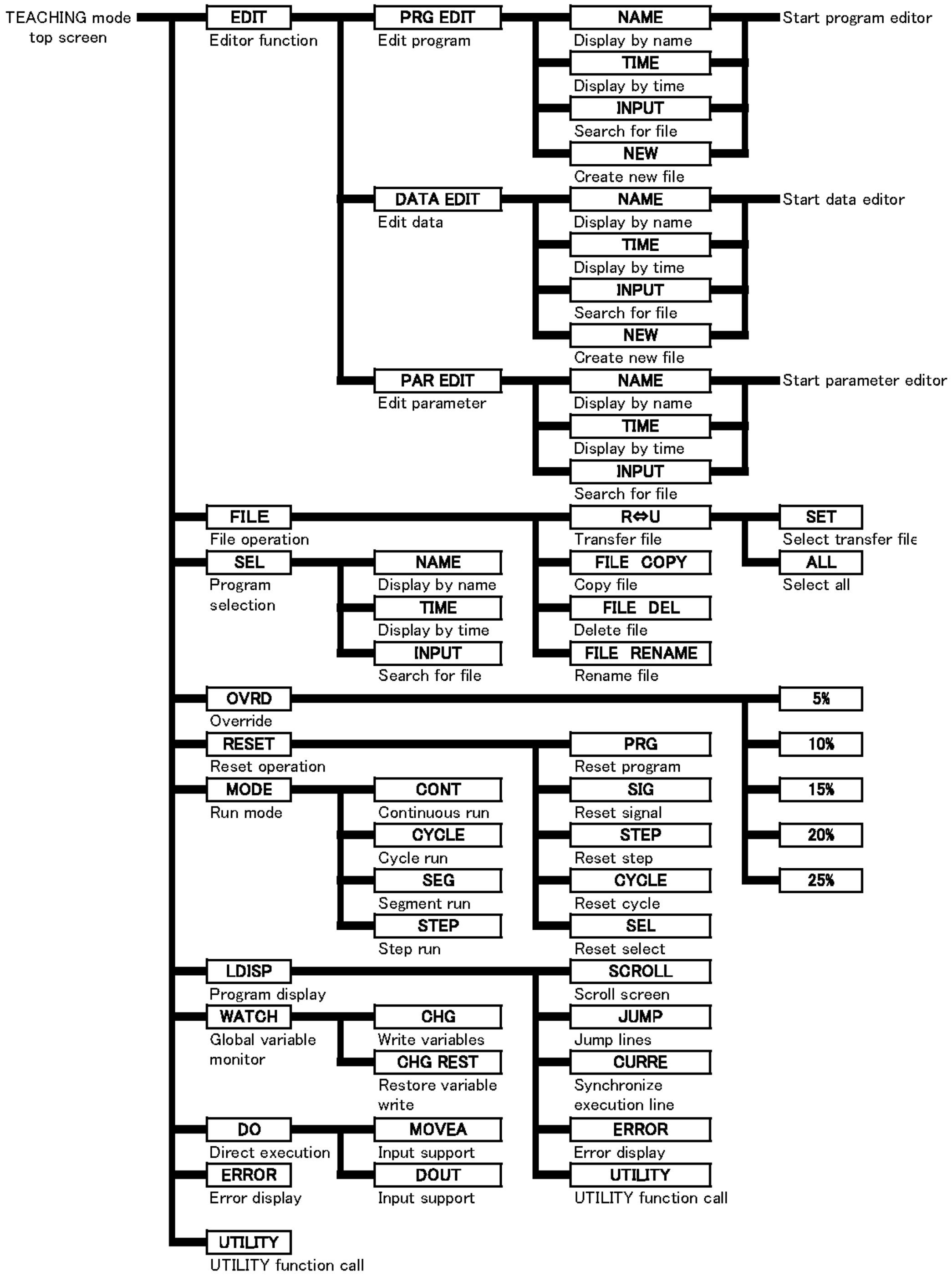
<Example of function hierarchy>
[EDIT] key → [PRG EDIT] key → [ESC] key → [ESC] key


(Hierarchical level 1)
(Hierarchical level 2)
(Hierarchical level 3)
ERROR
UTILITY
FEED HOLD
SEL
OVRD
MODE
RESET
LDISP
WATC
EDIT
DO
UTL
STOP
BREAK
ERROR
UTILITY
FEED HOLD
PRG EDIT
ATA EDIT
PAR EDIT
ESC
EXE
ERROR
UTILITY
FEED HOLD
NAME
TIME
INPUT
NEW
ALT
ESC
EXE

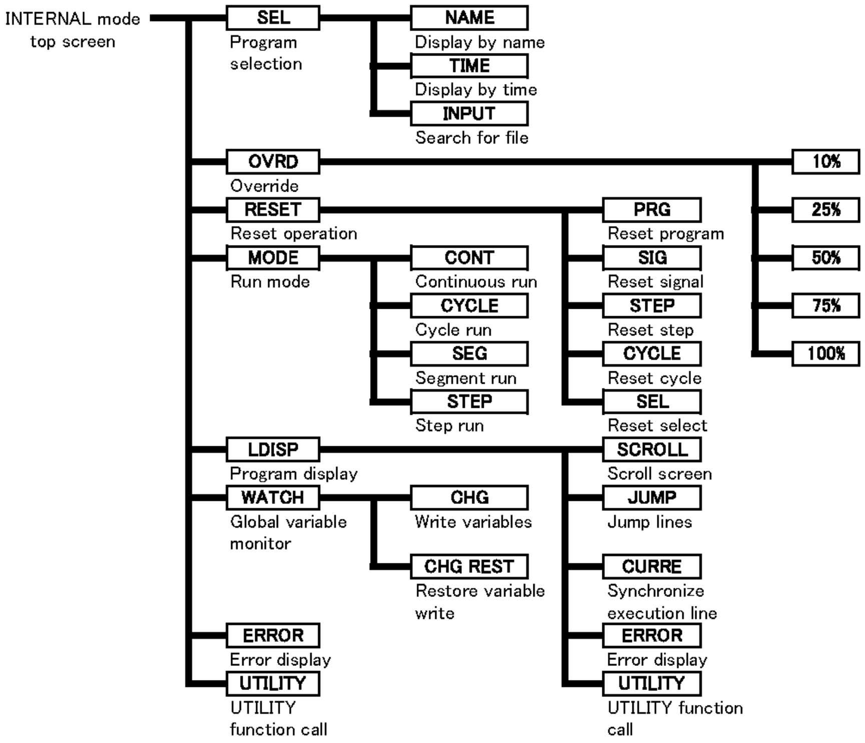
1.3.3 Function Tree of the TP3000

The function tree of the TP3000 is shown below.

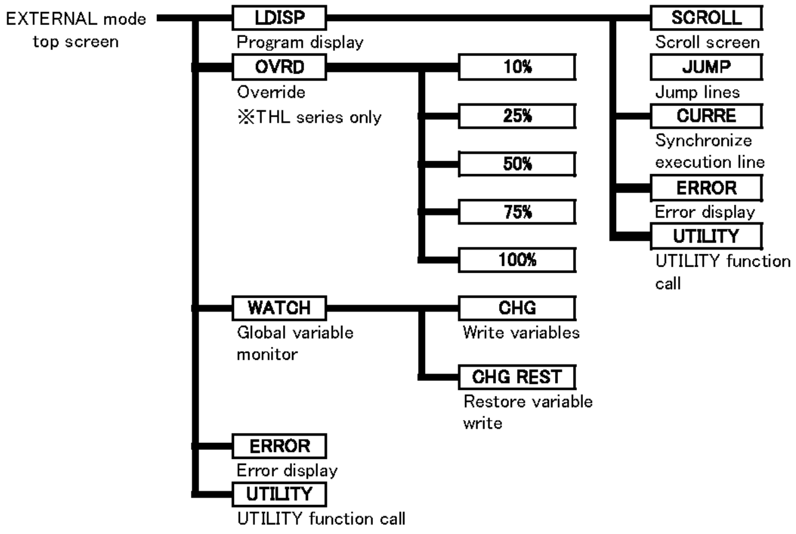
Test Operation Mode Function Tree


TEACHING mode
top screen
EDIT
Editor function
PRG EDIT
Edit program
NAME
Display by name
TIME
Display by time
INPUT
Search for file
NEW
Create new file
Start program editor
DATA EDIT
Edit data
NAME
Display by name
TIME
Display by time
INPUT
Search for file
NEW
Create new file
Start data editor
PAR EDIT
Edit parameter
NAME
Display by name
TIME
Display by time
INPUT
Search for file
Start parameter editor
FILE
File operation
R⇔U
Transfer file
SET
Select transfer file
ALL
Select all
FILE COPY
Copy file
FILE DEL
Delete file
FILE RENAME
Rename file
SEL
Program
selection
NAME
Display by name
TIME
Display by time
INPUT
Search for file
OVRD
Override
5%
10%
15%
20%
25%
RESET
Reset operation
PRG
Reset program
SIG
Reset signal
STEP
Reset step
CYCLE
Reset cycle
SEL
Reset select
MODE
Run mode
CONT
Continuous run
CYCLE
Cycle run
SEG
Segment run
STEP
Step run
LDISP
Program display
SCROLL
Scroll screen
JUMP
Jump lines
CURRE
Synchronize
execution line
ERROR
Error display
UTILITY
UTILITY function call
WATCH
Global variable
monitor
CHG
Write variables
CHG REST
Restore variable
write
DO
Direct execution
MOVEA
Input support
DOUT
Input support
ERROR
Error display
UTILITY
UTILITY function call

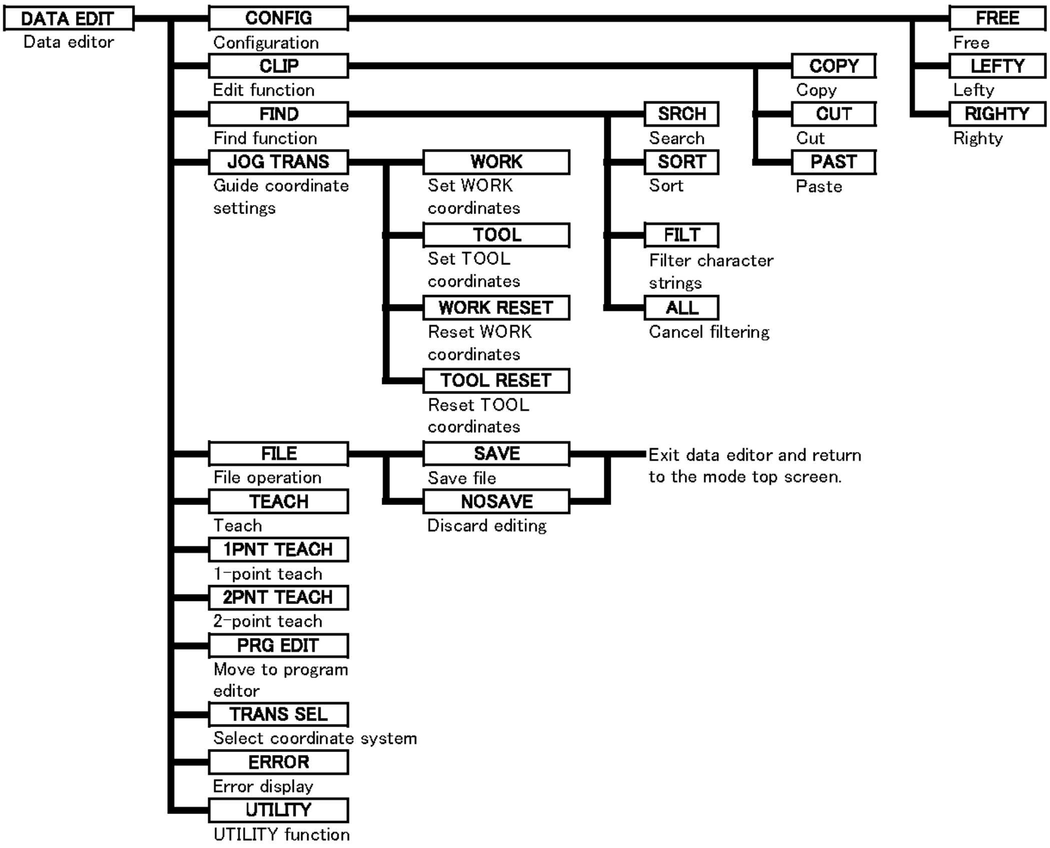
Internal Automatic Mode Function Tree


INTERNAL mode top screen
SEL
Program selection
NAME
Display by name
TIME
Display by time
INPUT
Search for file
OVRD
Override
10%
25%
50%
75%
100%
RESET
Reset operation
PRG
Reset program
SIG
Reset signal
STEP
Reset step
CYCLE
Reset cycle
SEL
Reset select
MODE
Run mode
CONT
Continuous run
CYCLE
Cycle run
SEG
Segment run
STEP
Step run
LDISP
Program display
SCROLL
Scroll screen
JUMP
Jump lines
CURRE
Synchronize execution line
ERROR
Error display
UTILITY
UTILITY function call
WATCH
Global variable monitor
CHG
Write variables
CHG REST
Restore variable write
ERROR
Error display
UTILITY
UTILITY function call

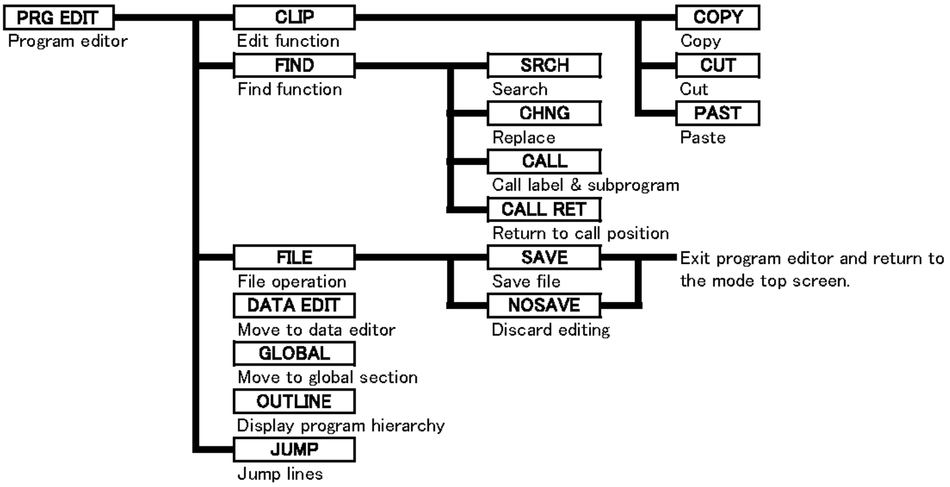
External Operation Mode Function Tree


EXTERNAL mode top screen
LDISP
Program display
SCROLL
Scroll screen
JUMP
Jump lines
CURRE
Synchronize execution line
ERROR
Error display
UTILITY
UTILITY function call
OVRD
Override
※THL series only
10%
25%
50%
75%
100%
WATCH
Global variable monitor
CHG
Write variables
CHG REST
Restore variable write
ERROR
Error display
UTILITY
UTILITY function call

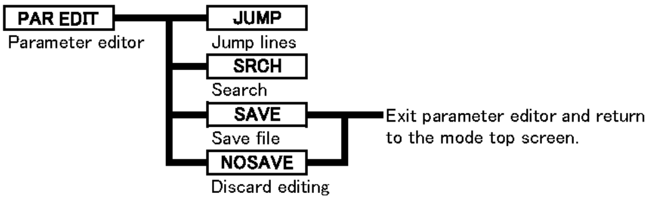
Data Editor Function Tree


DATA EDIT
Data editor
CONFIG
Configuration
FREE
Free
LEFTY
Lefty
RIGHTY
Righty
CLIP
Edit function
COPY
Copy
CUT
Cut
PAST
Paste
FIND
Find function
SRCH
Search
SORT
Sort
FILT
Filter character strings
ALL
Cancel filtering
JOG TRANS
Guide coordinate settings
WORK
Set WORK coordinates
TOOL
Set TOOL coordinates
WORK RESET
Reset WORK coordinates
TOOL RESET
Reset TOOL coordinates
FILE
File operation
SAVE
Save file
NOSAVE
Discard editing
Exit data editor and return to the mode top screen.
TEACH
Teach
1PNT TEACH
1-point teach
2PNT TEACH
2-point teach
PRG EDIT
Move to program editor
TRANS SEL
Select coordinate system
ERROR
Error display
UTILITY
UTILITY function

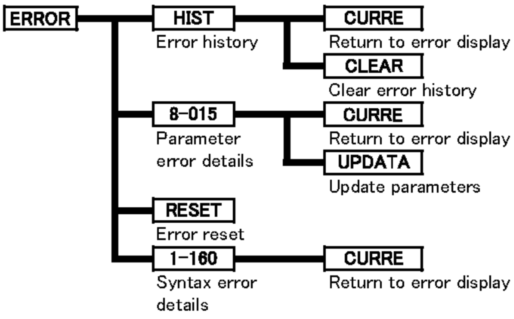
Program Editor Function Tree


PRG EDIT
Program editor
CLIP
Edit function
COPY
Copy
CUT
Cut
PAST
Paste
FIND
Find function
SRCH
Search
CHNG
Replace
CALL
Call label & subprogram
CALL RET
Return to call position
FILE
File operation
SAVE
Save file
NOSAVE
Discard editing
Exit program editor and return to the mode top screen.
DATA EDIT
Move to data editor
GLOBAL
Move to global section
OUTLINE
Display program hierarchy
JUMP
Jump lines

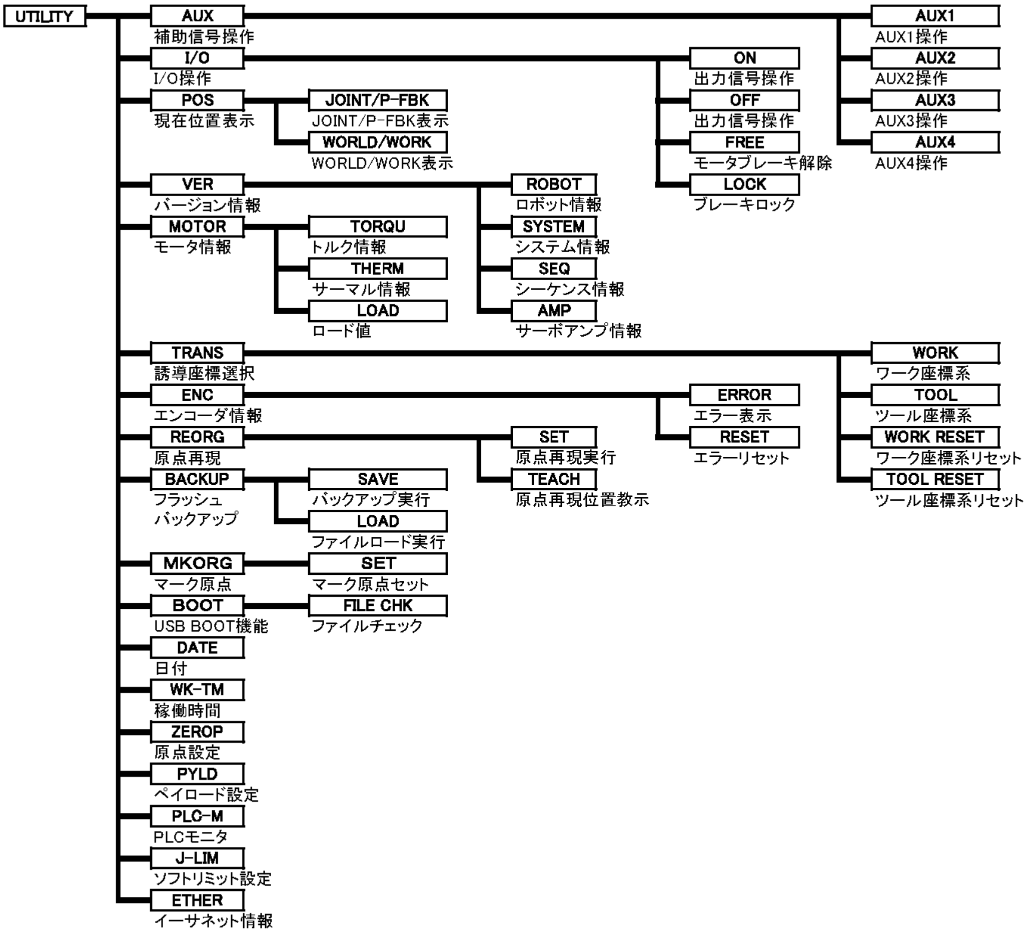
Parameter Editor Function Tree


PAR EDIT
Parameter editor
JUMP
Jump lines
SRCH
Search
SAVE
Save file
NOSAVE
Discard editing
Exit parameter editor and return to the mode top screen.

ERROR Function Tree


ERROR
HIST
Error history
CURRE
Return to error display
CLEAR
Clear error history
8-015
Parameter error details
CURRE
Return to error display
UPDATA
Update parameters
RESET
Error reset
1-160
Syntax error details
CURRE
Return to error display

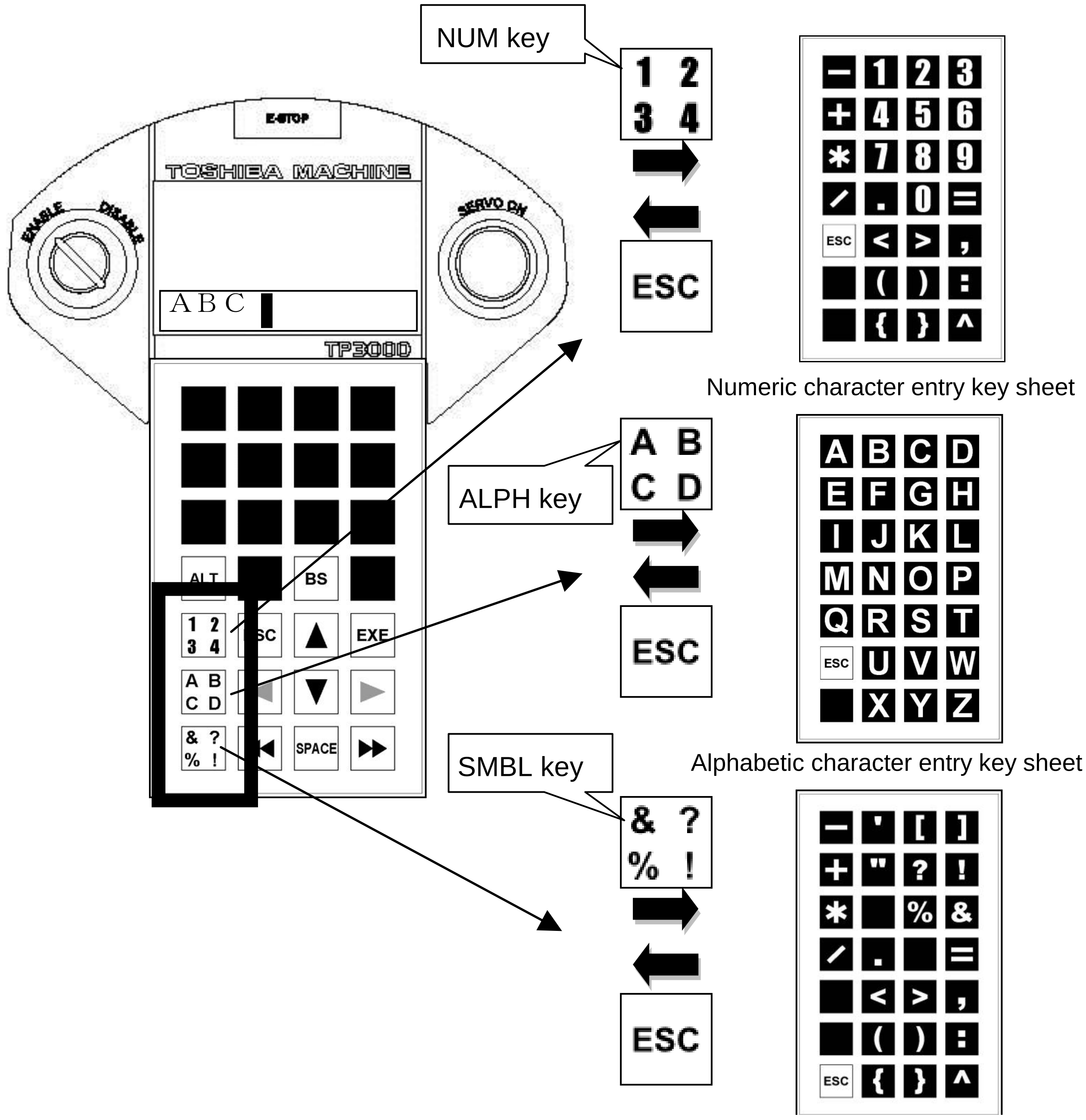
UTILITY Function Tree


UTILITY
AUX
補助信号操作
AUX1
AUX1操作
AUX2
AUX2操作
AUX3
AUX3操作
AUX4
AUX4操作
I/O
I/O操作
ON
出力信号操作
OFF
出力信号操作
FREE
モータブレーキ解除
LOCK
ブレーキロック
POS
現在位置表示
JOINT/P-FBK
JOINT/P-FBK表示
WORLD/WORK
WORLD/WORK表示
VER
バージョン情報
ROBOT
ロボット情報
SYSTEM
システム情報
SEQ
シーケンス情報
AMP
サーボアンプ情報
MOTOR
モータ情報
TORQU
トルク情報
THERM
サーマル情報
LOAD
ロード値
TRANS
誘導座標選択
WORK
ワーク座標系
TOOL
ツール座標系
WORK RESET
ワーク座標系リセット
TOOL RESET
ツール座標系リセット
ENC
エンコーダ情報
ERROR
エラー表示
RESET
エラーリセット
REORG
原点再現
SET
原点再現実行
TEACH
原点再現位置教示
BACKUP
フラッシュ
バックアップ
SAVE
バックアップ実行
LOAD
ファイルロード実行
MKORG
マーク原点
SET
マーク原点セット
BOOT
USB BOOT機能
FILE CHK
ファイルチェック
DATE
日付
WK-TM
稼働時間
ZEROP
原点設定
PYLD
ペイロード設定
PLC-M
PLCモニタ
J-LIM
ソフトリミット設定
ETHER
イーサネット情報

1.3.4 Entry Methods of Alphabetic, Numeric and Special Characters

When the TP3000 is in the text entry enable state, the [ALPH], [NUM] and [SMBL] key icons are displayed on the key sheet. Press the [ALPH] key to enter alphabetic characters, the [NUM] key to enter numeric characters, and [SMBL] key to enter special characters.
Call up the alphabetic, numeric or special character key icons onto the key sheet.
Pressing the [ESC] key returns to the key sheet state before calling the key icons.

Example: When entering a command line


NUM key
1 2 3 4
ESC
ALPH key
A B C D
ESC
SMBL key
& ? % !
ESC
E-STOP
TOSHIBA MACHINE
ENABLE
DISABLE
SERVO ON
ABC
TP3000
ALT
BS
ESC
EXE
SPACE

Numeric character entry key sheet

−	1	2	3
+	4	5	6
*	7	8	9
/	.	0	=
ESC	<	>	,
	(	)	:
	{	}	^

Alphabetic character entry key sheet

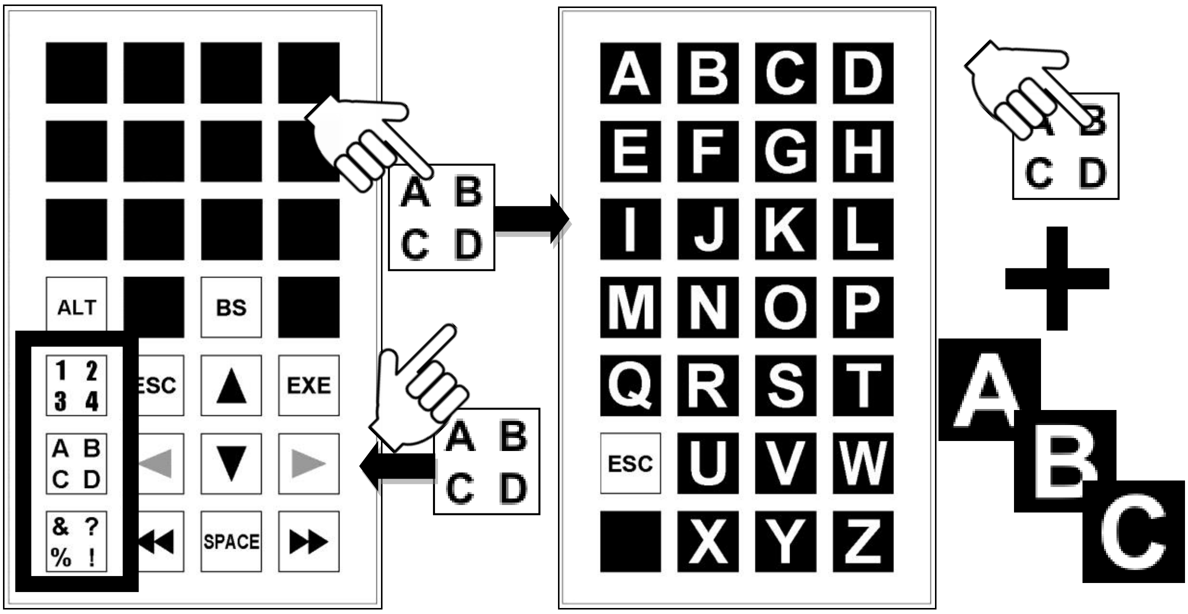
A	B	C	D
E	F	G	H
I	J	K	L
M	N	O	P
Q	R	S	T
ESC	U	V	W
	X	Y	Z

Special character entry key sheet

−	'	[	]
+	"	?	!
*		%	&
/	.		=
	<	>	,
	(	)	:
ESC	{	}	^

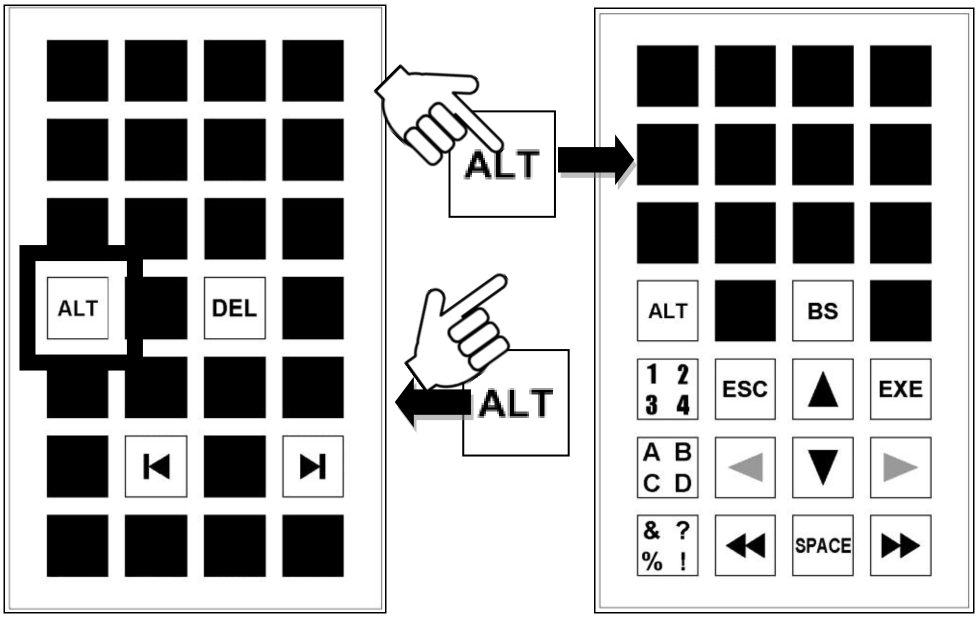
1.3.5 Combination Key Operation

The [ALPH], [NUM], [SMBL] and [ALT] keys can be operated in combination (Ex.: ALPH + other key).
When characters are entered continuously while holding down these keys without releasing your fingers, the key sheet automatically returns to the previous state at the timing when the [ALPH], [NUM] or [SMBL] key is released.


ALT
BS
1 2 3 4
A B C D
& ? % !
ESC
EXE
SPACE
A B C D
A B C D
E F G H
I J K L
M N O P
Q R S T
ESC
U V W
X Y Z
A B C D
A B C

On the other hand, when you press the [ALPH], [NUM] or [SMBL] key and you release your finger from the key you pressed, the key sheet is locked to the [ALPH], [NUM] or [SMBL] key sheet based on which key you pressed. To return the key sheet to the original state, press the [ESC] key.

While the [ALT] key is being held down, the key sheet is switched to the [ALT] key combination key sheet to enable to move to the end of the line, scroll the screen and delete characters.



Command line entry key sheet

Displayed only while the [ALT] Key is being held down

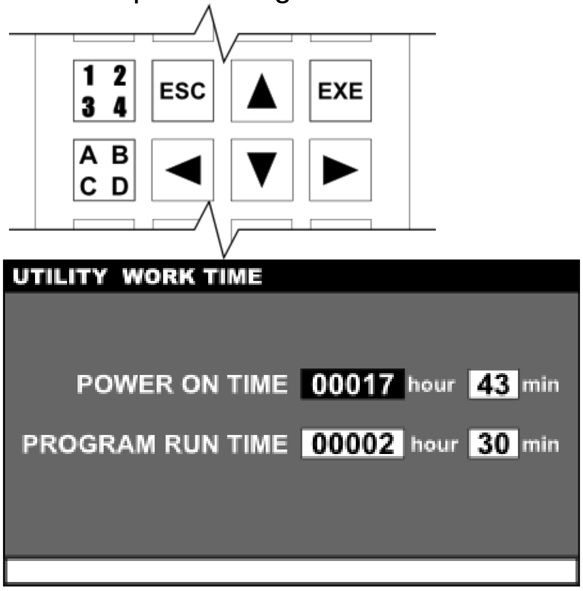
The combination key operations of the [ALT] key are listed below.

Operation Overview	Key Icon	Remarks
Move to End of Line	▶|	Command line entry. This can be used in the various editor functions.
Move to Beginning of Line	|◀	Command line entry. This can be used in the various editor functions.
Screen Scroll Up	▶|	Command line entry. This can be used in the various editor functions.
Screen Scroll Down	⤓	Command line entry. This can be used in the various editor functions.
Delete (DEL)	DEL	Command line entry. This can be used in the various editor functions.
Delete Line	✕	Please see Section 5, Data Editing.

1.3.6 About Command Line Editing

Command lines are used to edit text. The cursor (the colored cell on the screen) moves according to the operation of the crosshair key.

Example: Editing of values in the UTILITY function

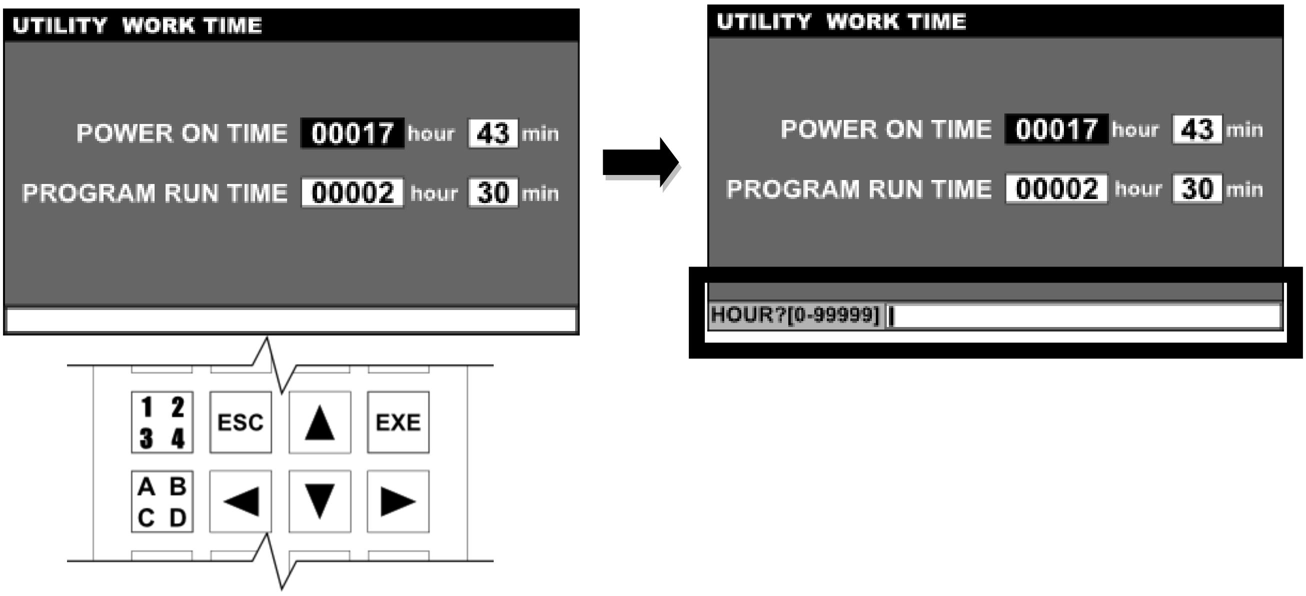


UTILITY WORK TIME

POWER ON TIME 00017 hour 43 min

PROGRAM RUN TIME 00002 hour 30 min

Position the cursor on the item you want to edit and then press the [EXE] key. The operation takes effect in the command line in the lower pat of the screen.



UTILITY WORK TIME

POWER ON TIME 00017 hour 43 min

PROGRAM RUN TIME 00002 hour 30 min

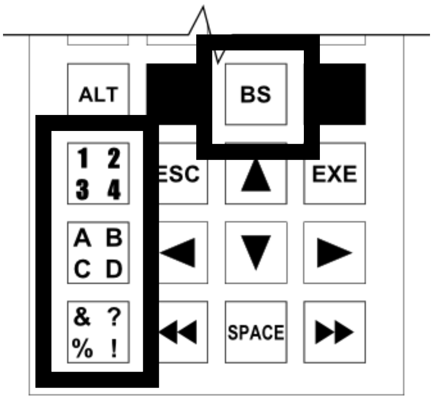
UTILITY WORK TIME

POWER ON TIME 00017 hour 43 min

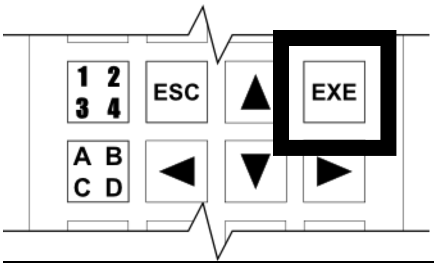
PROGRAM RUN TIME 00002 hour 30 min

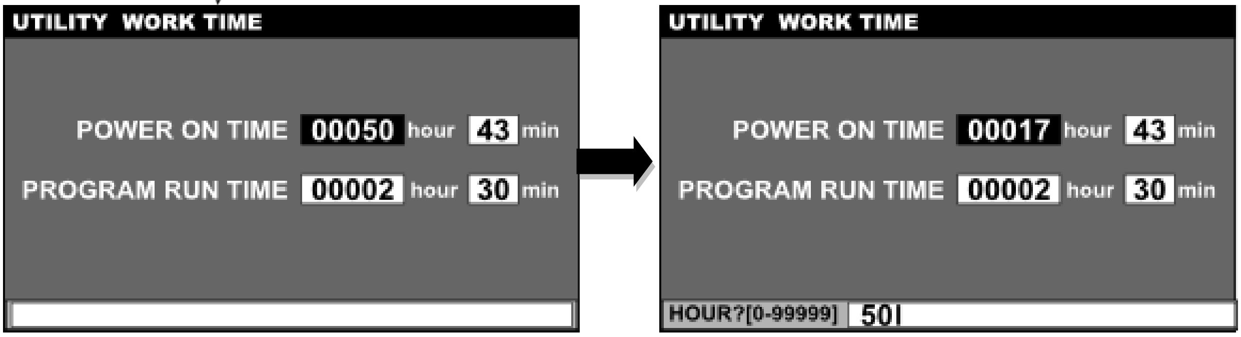
HOUR?[0-99999]

At this time, the key sheet changes to the text editing key sheet.
Using the [ALPH], [NUM] or [SMBL] key, enter text.
The entered text can be deleted with the [BS] key.



Once text editing is finished, press the [EXE] key again. The editing is reflected in the text on the screen.





UTILITY WORK TIME

POWER ON TIME 00050 hour 43 min

PROGRAM RUN TIME 00002 hour 30 min

UTILITY WORK TIME

POWER ON TIME 00017 hour 43 min

PROGRAM RUN TIME 00002 hour 30 min

HOUR?[0-99999] 50

To abort command line editing in halfway, press the [ESC] key.

1.3.7 Repeating Key Entry

Continuously holding down the same key enters that key repeatedly by the repeat function.

The following lists the keys that can be entered repeatedly.

	Operation Overview	Remarks
Crosshair Cursor Key	Fast forwards the cursor.	
Guide Keys	The robots moves continuously while this key is being held down.	This key is used for manual guidance. For details, please see Section 3.
MOVE Key	The robot moves continuously while this key is being held down.	This key is used by the M-TO and BYPASS functions. For details, please see Section 5.

1.3.8 About the TP3000 KEY Function

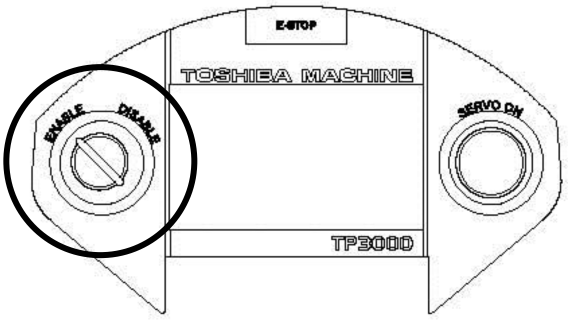
The TP3000's main body is equipped with a key to partially restrict the operations from the teach pendant.

Thus, when the key is set to ENABLE, all the operations from the teach pendant can be performed.

When the key is set to DISABLE, part of the operations from the teach pendant is restricted.

TP3000 KEY Function Table

	ENABLE			DISABLE
Function	TEACHI	INTERNAL	EXT	All Modes
PRG EDIT	○	×	×	×
DATA EDIT	○	×	×	×
PAR EDIT	○	×	×	×
FILE	○	×	×	×
SEL	○	○	×	×
MODE	○	○	×	×
OVRD	○	○	×	×
RESET	○	○	×	×
FEEDHOLD	○	○	○	○
RUN	○	×	×	×
STOP	○	○	○	○
BREAK	○	○	○	○
WATCH	○	○	○	×
LDISP	○	○	○	○
PRINT	○	○	○	○
JOG	○	×	×	×
DO	○	×	×	×
AUX	○	○	○	×
I/O	○	○	○	×
POS	○	○	○	○
PLC	○	○	○	○
MOTOR	○	○	○	○
ETHER	○	○	○	○
ENC	○	○	○	×
REORG	○	○	○	×
DATE	○	○	○	×
WKTM	○	○	○	×
VER	○	○	○	○
ZEROP	○	○	○	×
J-LIM	○	○	○	×
BACKUP	○	○	○	×
ERROR	○	○	○	○



Cautions

- The KEY function takes effect when the key is set to DISABLE and the screen display returns to the top screen or the UTILITY Function Selection screen.
- When in the DISABLE state, the key can be removed from the TP3000's main body.

1.3.9 Format for Operating Instructions

The following format is used in this manual to explain how to use commands.

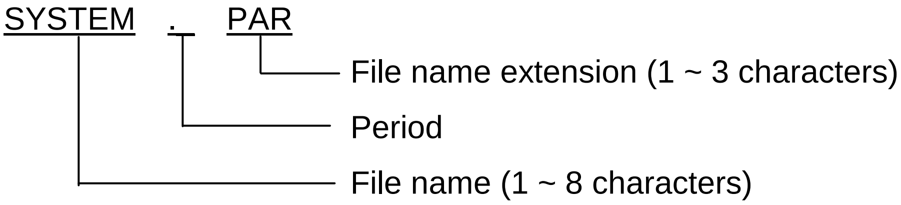
Title [Function Name]

(1)	Function	Explains the function and application.
(2)	Operating procedures	Explains the procedures and system response for various operations.
(3)	Caution	Explains the cautions and restrictions.
(4)	Related functions	Explains the related functions, if any.

1.4 Assigning Names

1.4.1 Assigning a File Name

Every file registered in the RAM drive has its own name. This is called the file name. Generally, the file name has the following format.


SYSTEM
.
PAR
File name extension (1 ~ 3 characters)
Period
File name (1 ~ 8 characters)

The file name consists of a basic file name (SYSTEM), a file name extension (PAR) and a period (.) discriminating them.

The following characters can be used for the file name and its extension.

Alphabetic characters	:	A ~ Z
Numerals	:	0 ~ 9

The file name extension is used to identify the nature (type) of the file. By using different extensions for the same file name, you can express different types of files.

The following extensions are used for this controller.

File name extension	Descriptions
SYS	Signifies a system file.
BAT	Signifies a batch file.
PAR	Signifies a parameter file.
LIB	Signifies a library file.
LOG	Signifies a maintenance file.

The file name extension can be omitted. When this happens, the period is unnecessary.
When specifying a file having a file name extension, you cannot omit that extension. If you do, the controller interprets it as a completely different file.

1.4.2 Assigning a Point Name

When entering positional data for a point, you have to assign a name to that point. This name is used later in the program when teaching the robot where to go.

Generally, the point name has the following format.

```
PNT100
   └──────── Point name (1 ~ 10 characters)
```

The following characters can be used for the point name. The first letter of a point name must be an alphabetical character.

Alphabetic characters	:	A ~ Z
Numerals	:	0 ~ 9

Cautions

- You cannot use an identifier (reserved word) used for the SCOL language to name a point.
- For details, see Appendix B of the Robot Language Manual.
- The point name entered should consist of up ten (10) characters. If it exceeds this limit, the entry is invalid with an error saying "illegal name" displayed.
- If a character other than the alphabetical characters has been entered for the first character of the point name, the entry is invalid with an error saying "illegal name" displayed.

1.4.3 Assigning a Name to Coordinate Data

When entering coordinate data for a the work coordinate system, tool coordinate system or base coordinate system, you have to assign a coordinate name to that data. A coordinate of each coordinate system is specified by the coordinate name.

Generally, the coordinate name has the following format.

TABLE1
└――――Coordinate name (1 ~ 10 characters)

The following characters can be used for the coordinate name. The first letter of a coordinate name must be an alphabetical character.

Alphabetic characters	:	A ~ Z
Numerals	:	0 ~ 9

Cautions

- You cannot use an identifier (reserved word) used for the SCOL language to name a point.
- For details, see Appendix B of the Robot Language Manual.
- The coordinate name entered should consist of up ten (10) characters. If it exceeds this limit, the entry is invalid with an error saying "illegal name" displayed.
- If a character other than the alphabetical characters has been entered for the first character of the coordinate name, the entry is invalid with an error saying "illegal name" displayed.

1.4.4 Assigning a Name to Load Data

When entering load data, you have to assign a load name to that data. A load in the program is specified by the load name.

Generally, the load name has the following format.

SAMPLE1
└──── Load name (1 ~ 10 characters)

The following characters can be used for the load name. The first letter of a load name must be an alphabetical character.

Alphabetic characters : A ~ Z
Numerals : 0 ~ 9

Cautions

- You cannot use an identifier (reserved word) used for the SCOL language to name a point. For details, see Appendix B of the Robot Language Manual.
- The load name entered should consist of up ten (10) characters. If it exceeds this limit, the entry is invalid with an error saying "illegal name" displayed.
- If a character other than the alphabetical characters has been entered for the first character of the load name, the entry is invalid with an error saying "illegal name" displayed.

1.5 File

To move the robot, robot language programs, positional data and parameters should be registered beforehand in the controller RAM drive (memory). All of these programs and data are handled on the basis of a file.

1.5.1 Kind of File

The following files are used in the robot system.

(1) Machine parameter file (MACHINE. PAR)
This file contains parameters used by the maker, such as parameters for robot option setting and axis origin offset.
The user MUST NOT change the values of these parameters.

(2) Servo parameter file (SERVO. PAR)
This file includes servo-related parameters. The user MUST NOT change the values of these parameters.

(3) Robot parameter file (ROBOT. PAR)
This file includes parameters specific to the installed robot such as the number of axes, inching amount, and speed limit for test mode. The user MUST NOT change the values of these parameters.

(4) User parameter file (USER. PAR)
This file includes parameters relating to limit on the working envelope, setting of communication mode, etc., which can be changed by the user.

(5) Library file (SCOL. LIB)
Some instruction words used for the robot language are contained in this file. The instruction words in the library file are written by the robot language. They include the instruction words for operating the robot hand (OPEN, CLOSE, OPENI, CLOSEI, etc.), and these instruction words can be used only when the library file is present. For further information, see the Robot Language Manual.

(6) Palletize library file (PALLET. LIB)
This library file is required when using palletize commands (INITPLT, MOVEPLT) in the program created by the robot language. For further information, see the Robot Language Manual.

(7) Automatic start file (AUTOSTR. BAT)
A kind of batch file, it is automatically executed when the controller power is turned on.

(8) Program file
A file stating the robot motions. It saves positional data and programs created by the robot language. Each file corresponds to one job.

(9) External select file (EXTRNSEL. PAR)
This file is used when you select a program you wish to execute by means of an input signal to the controller. It contains the program names which can be selected by means of the input signal.

(10) Ethernet parameter file (ETHERNET. PAR)
This file includes Ethernet-related parameters.

(11) Conveyor parameter file (CONVEYOR. PAR)
This file includes the conveyor-related parameters.

The following files are mandatory in the RAM drive.

- MACHINE. PAR
- SERVO. PAR
- ROBOT. PAR
- USER. PAR

The following files can be omitted unless necessary.

- AUTOSTR. BAT
- SCOL. LIB
- PALLET. LIB
- EXTRNSEL. PAR
- ETHERNET. PAR
- CONVEYOR. PAR

1.5.2 Batch File

The controller is provided with a function executing a series of commands in the pack, which is called the "batch processing." To execute the batch processing, commands should be written in the file in the order of execution. This file is generally referred to as the "batch file." The batch file extension is ".BAT".

A file executed automatically just after the controller power is turned on is called the "automatic start file." The name of this file is "AUTOSTR. BAT."
The automatic start file can be used for file selection in the external automatic mode.
For the file editing operation, see Para. 4.5.

Example: When executing files to be executed just after the power ON in the external automatic mode:
File names : AUTOSTR. BAT
SELECT PRO1

Save the above automatic start files in the controller RAM drive beforehand. When the controller starts up after its power is turned on, the file PRO1 is selected as the file for execution.

The commands which are effective in the automatic start file are SELECT, OVRD, DATE, TIME, and SVON.

Notes:
- SVON is a command that is effective in internal automatic (INTERNAL) and external automatic (EXT) modes.

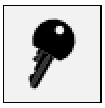
1.5.3 Backup

Though programs using the robot language, positional data, changed user parameters, etc., are saved in the RAM drive, it is recommended to back them up to prepare for the worst. For this purpose, connect the serial port HOST and personal computer and use our personal computer support software. This is also applicable when loading the programs and data in the RAM drive.
For the personal computer support software refer to the separate manual.

1.6 About Unlocking the Password Lock

Some functions of the teach pendant require to unlock password locks in advance for the purpose of preventing erroneous operations. The functions protected by password locks contain a maintenance function; thus, changing their settings will significantly affect the succeeding robot behaviors.
Before unlocking a password lock and changing any settings, please make sure that you fully understand the function to be affected.

<Unlocking a Password Lock>
Press the Password Unlock key on the key sheet.



Password: 1048

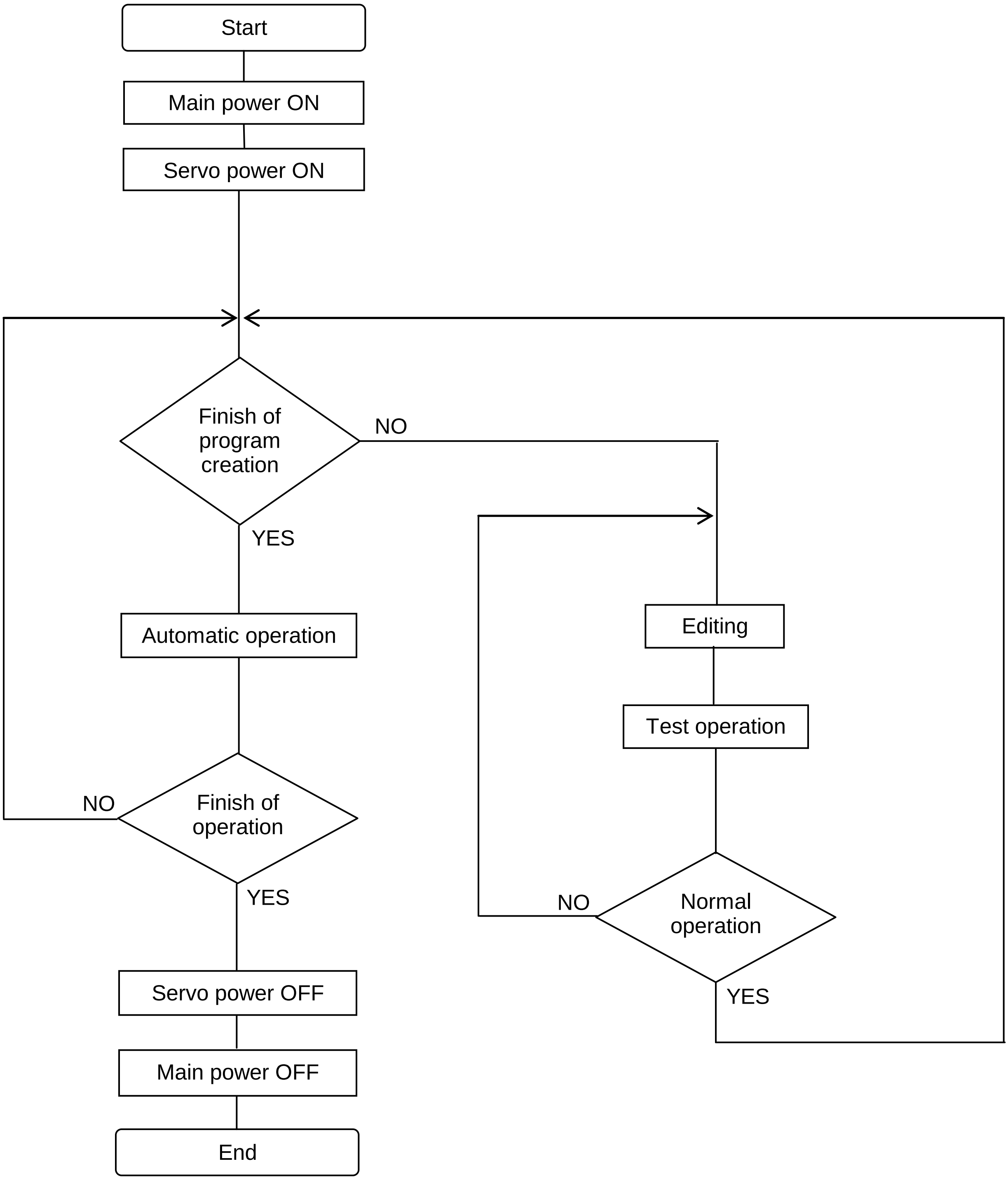
Password Unlock Key

Enter number “1048” on the command line and then press the [EXE] key.
For more information about command line editing, see Section 1.3.6.

Section 2 Basic Operation

2.1 Basic Operating Procedures

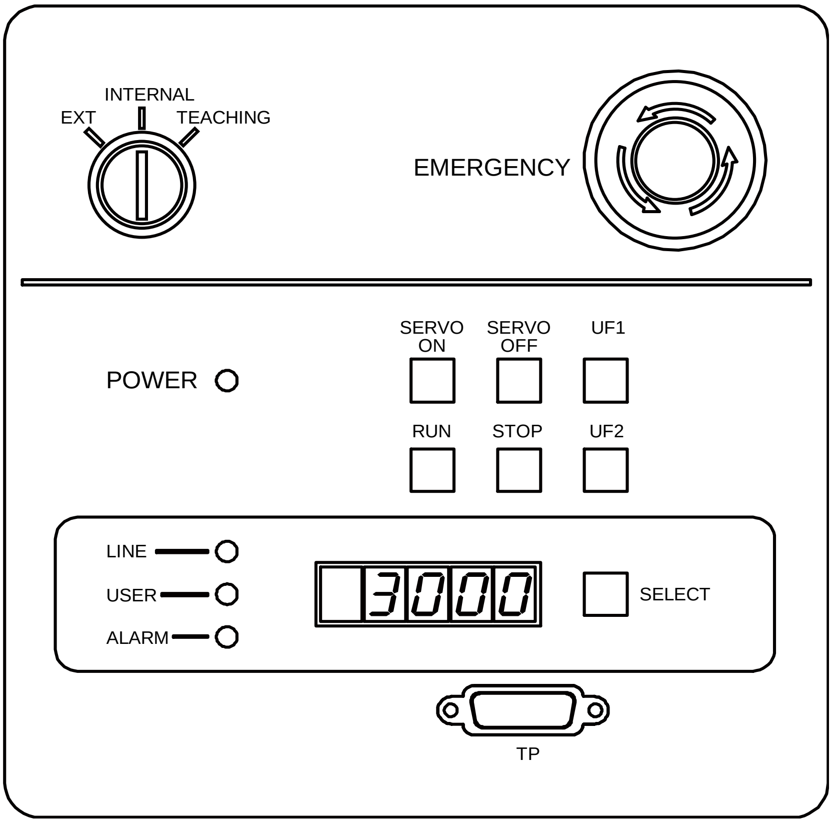
The following flow chart shows the basic operating procedures for automatic operation. It covers all operations from turning on the main power to turning off the main power.


Start
Main power ON
Servo power ON
Finish of program creation
NO
YES
Automatic operation
Finish of operation
NO
YES
Servo power OFF
Main power OFF
End
Editing
Test operation
Normal operation
NO
YES

2.2 Main Power and Servo Power of the TS3000 Controller

2.2.1 Control Panel (TS3000)

The control panel of the TS3000 controller is shown in the figure below.


INTERNAL
EXT
TEACHING
EMERGENCY
SERVO ON
SERVO OFF
UF1
POWER
RUN
STOP
UF2
LINE
USER
ALARM
3000
SELECT
TP

(1) Key switch : Used to select the operation master mode.

(2) SERVO ON switch/LED : Used to turn ON the servo power.

(3) SERVO OFF switch/LED : Used to turn OFF the servo power.

(4) RUN switch/LED : Used to start the internal automatic mode operation.

(5) STOP switch/LED Used to stop the operation after the active block has been executed.

(6) SELECT switch/LED : Every time this switch is pressed, content shown on the display changes.

LINE: No. of program execution steps.

USER: A value set by PLCDATAW1 of the program.

ALARM: Alarm number currently generated in the controller.
If two (2) or more alarms have occurred, such alarm numbers are displayed at intervals of two (2) seconds.
When an alarm occurs, this switch flashes.

(7) UF1 & UF2 switches/LEDs : User function switches.
This switch input can be referred to by DIN and the lamp output by DOUT.

(8) EMERGENCY : EMERGENCY stop pushbutton switch.

2.2.2 Turning ON the Main Power

⚠ **CAUTION**

If an abnormality occurs when the main power switch of the controller is turned on or if the POWER LED lamp on the control panel remains off after the main power switch of the controller is turned on, turn off the main power immediately and check the wiring. Failure to do so can cause an electric shock or fire.

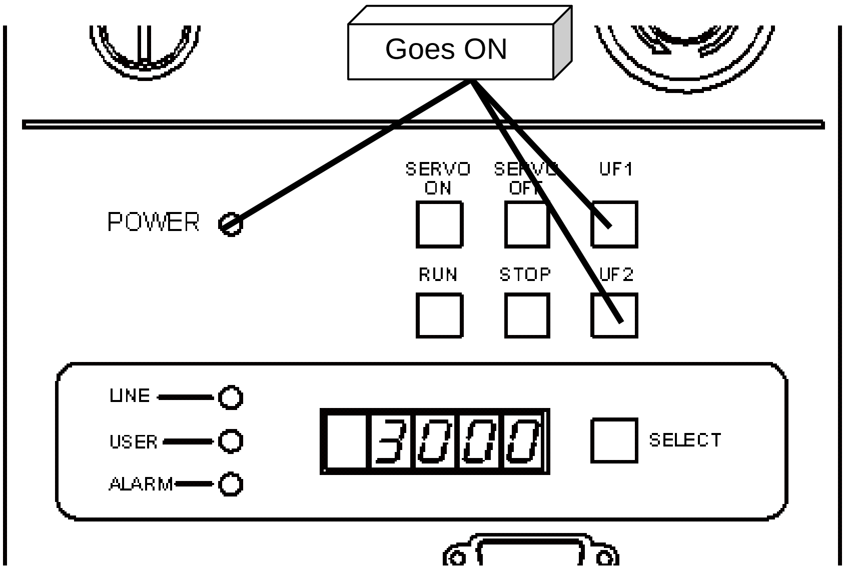
When the power is turned on, the controller enters a program reset status.

Functional Explanation

The controller is started up by the system programs saved in the flash memory.

Operating Procedure

Step 1: Turning on the main power.
Set the MAIN POWER switch on the controller to ON position, and the POWER LED and SERVO OFF LED are illuminated.
The controller starts initializing the system. The STOP LED on the control panel is illuminated and the system is ready for an operation with the initial display of a selected mode called on the teach pendant.


Goes ON
POWER
SERVO ON
SERVO OFF
UF1
RUN
STOP
UF2
LINE
USER
ALARM
3000
SELECT

Cautions

- The following reserved files are required in the RAM drive.

  MACHINE. PAR
  SERVO. PAR
  ROBOT. PAR
  USER. PAR
  SCOL. LIB *
  AUTOSTR. BAT *
  PALLET. LIB *
  EXTRNSEL. PAR*
  ETHERNET. PAR*
  CONVEYOR. PAR*

The asterisk (*)-marked files are not absolutely necessary to run the system. However, an error occurs when you try to execute a function dependent on a missing file.

2.2.3 Turning ON the Servo Power (TS3000)

CAUTION

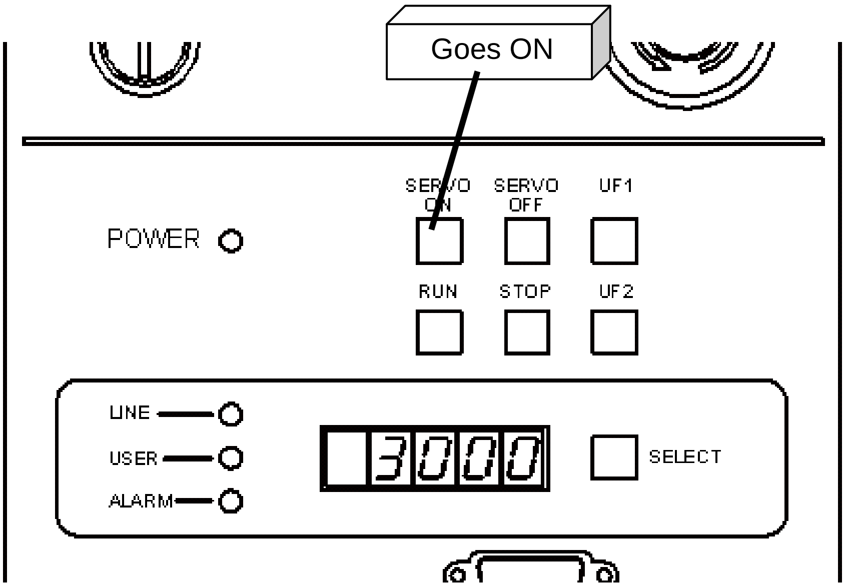
- If the robot moves abnormally at servo power ON, immediately press the EMERGENCY stop pushbutton switch to turn the servo power off.
- If you enter the dangerous area of the robot, turn off the servo power beforehand.

Functional Explanation

Turns on the main circuit power of the servo driver. The servo-controlled axes are locked and any brake is released.

Operating Procedure

Step 1: Turning on the servo power.
Press the SERVO ON switch on the control panel or teach pendant while holding the enable switch (position 1) on the teach pendant. When the main circuit power of the servo driver is turned on, the SERVO ON LED on the control panel is illuminated with the SERVO OFF LED turned off. The SERVO ON LED on the teach pendant is also illuminated.



Cautions

- While the EMERGENCY stop switch is pressed, the servo power will not turn on. Be sure to cancel an emergency stop before turning on the servo power.
- The servo power can be turned on through the teach pendant only when the TEACHING mode is selected.
- The servo power does not turn on by an external control signal when the contacts for the emergency stop and servo off external signals are open and when the control panel teach pendant connector is disconnected.
- The teach pendant connector (or dummy connector) should be connected to the TP connector of the control panel. For more information, see the Interface Manual.
- Although the servo power can be turned on continuously up to the second servo unit, a time interval must be set before turning on a third servo unit.

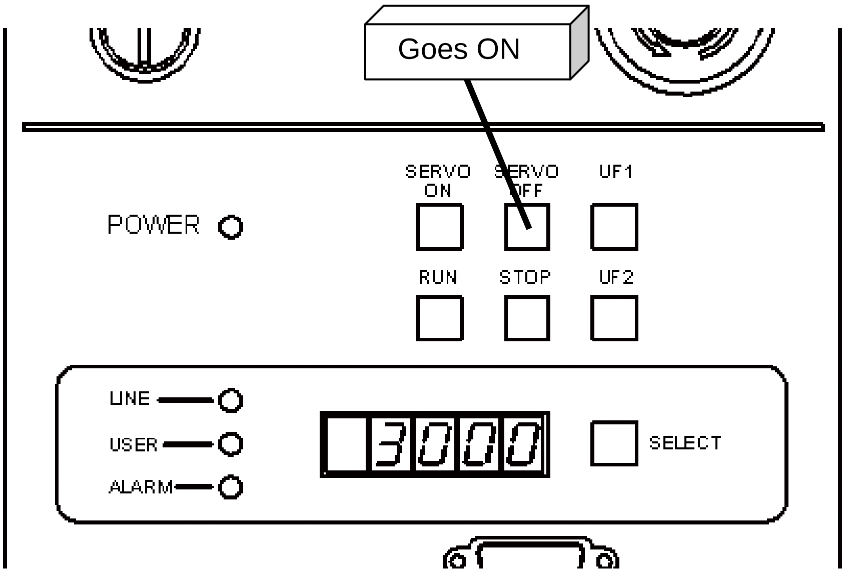
2.2.4 Turning OFF the Servo Power (TS3000)

Functional Explanation

Turns off the main circuit power of the servo driver. The servo-controlled axes are set free and any brake is activated.

Operating Procedure

Step 1: Turning off the servo power.
Press the SERVO OFF switch on the control panel.
When the main circuit power of the servo driver has turned off, the SERVO OFF LED equipped on the control panel is illuminated with the SERVO ON LED turned off. The SERVO ON LED on the teach pendant also goes out.



Cautions

- DO NOT turn off the servo power while the robot is operating. When you have to stop the robot urgently, press the EMERGENCY stop switch instead.
- Before you have to enter the robot working area, or when no operator is to be present at other than automatic operation, turn off the servo power for safety reasons.
- For the servo power OFF by external control signal, see the Interface Manual.

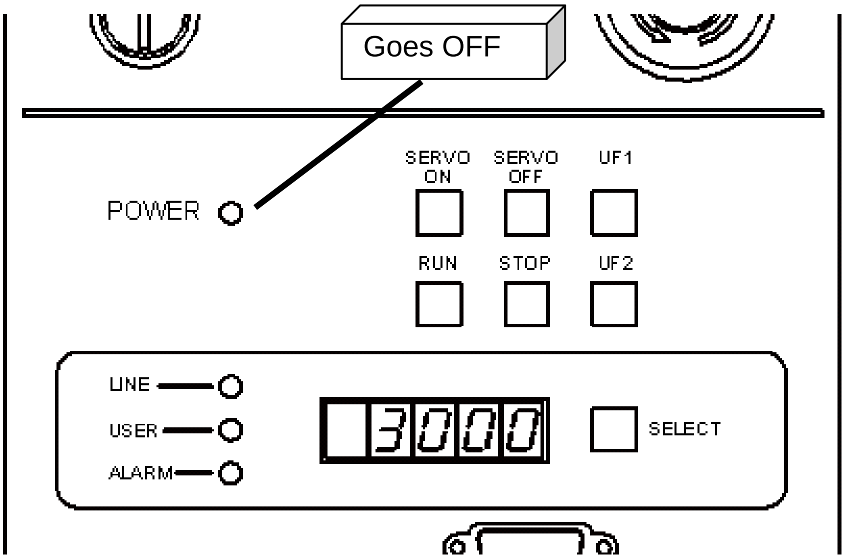
2.2.5 Turning OFF the Main Power (TS3000)

Functional Explanation

Turns off the main power and stops controller processing.

Operating Procedure

Step 1: Turning off the main power.
Set the MAIN POWER switch on the controller to the OFF position, and the "POWER" LED on the control panel goes out.


Goes OFF
POWER
SERVO ON
SERVO OFF
UF1
RUN
STOP
UF2
LINE
USER
ALARM
3000
SELECT

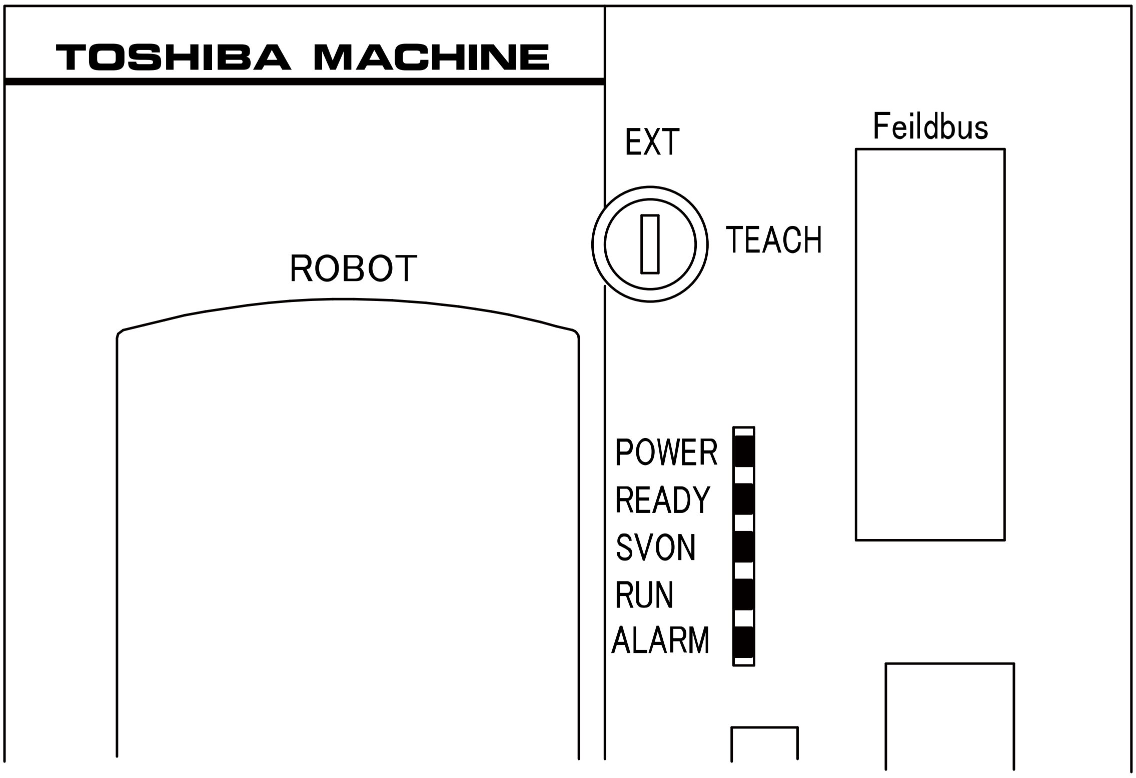
Cautions

- DO NOT turn off the main power while the servo power is on or during file operation or any other processing.
- Before turning off the main power, make sure that the servo power is off and that no active processing is present.

2.3 Main Power and Servo Power of the TSL3000 Controller

2.3.1 Front Panel of the Controller (TSL3000)

The front panel of the TSL3000 controller is shown in the figure below.


TOSHIBA MACHINE
EXT
TEACH
Feildbus
ROBOT
POWER
READY
SVON
RUN
ALARM

(1) Key switch : Used to select the master operation mode.
(2) POWER : Indicates that the main power is ON.
(3) READY : Indicates that the system has been started normally after the main power is turned ON.
(4) SVON : Indicates that the servo power is ON.
(5) RUN : Lit when the program is executing.
(6) ALARM : Indicates that an alarm is being generated.

2.3.2 Main Power ON (TSL3000)

CAUTION

If an abnormality occurs when the main power switch of the controller is turned on or if the POWER LED lamp on the control panel remains off after the main power switch of the controller is turned on, turn off the main power immediately and check the wiring. Failure to do so can cause an electric shock or fire.

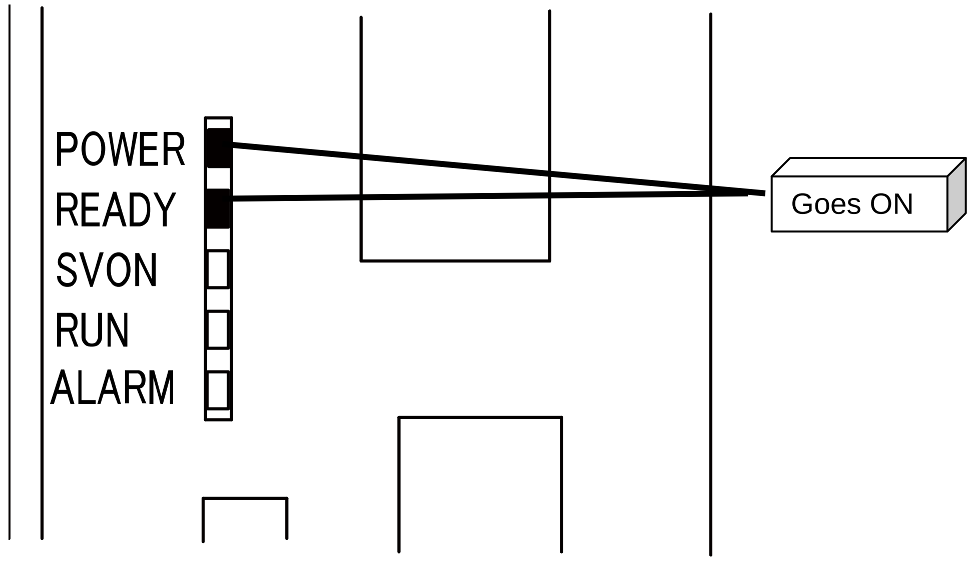
When the power is turned on, the controller enters a program reset status.

Power Switch

The TSL3000 controller is not equipped with a no fuse breaker. The customer is requested to have it ready on your own.
For details, please refer to the Interface manual.

Operating Procedure

Step 1: Main power ON
Switch the no fuse breaker installed at the exterior of the controller to the ON side. The "POWER LED" on the front panel of the controller lights up.
The controller starts the initialization of the system, lights up the "READY LED" on the controller panel, displays the initial screen of the mode selected in the teach pendant and then is placed in the operable state.



Caution

The following reserved files are required on the RAM drive.

MACHINE.PAR
SERVO .PAR
ROBOT .PAR
USER .PAR
SCOL .LIB *
AUTOSTR.BAT *
PALLET .LIB *
EXTRNSEL.PAR*
ETHERNET.PAR*
CONVEYOR.PAR*

Files indicated by * are optional. An error will occur only if a function requiring these optional files is executed.

2.3.3 Main Power ON (TSL3000)

CAUTION

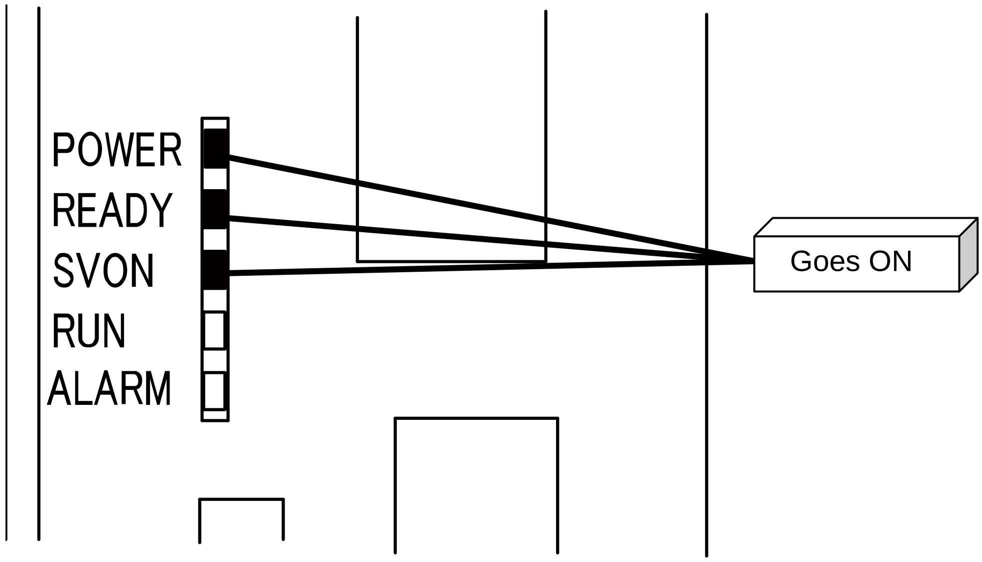
- If the robot moves abnormally at servo power ON, immediately press the EMERGENCY stop pushbutton switch to turn the servo power off.
- If you enter the dangerous area of the robot, turn off the servo power beforehand.

Functional Explanation

Turns on the main circuit power of the servo driver. The servo-controlled axes are locked and any brake is released.

Operating Procedure

Step 1: Turning on the servo power.
In the TEACHING mode, hold the Enable switch of the teach pendant and then press the SERVO ON switch. In the EXT mode, turn ON the external signal (SVON).
Once the power to the main circuit of the servo driver is turned ON, the "SVON LED" on the front panel of the controller lights up. The SERVO ON LED on the teach pendant also lights up.



Cautions

- While the EMERGENCY stop switch is pressed, the servo power will not turn on. Be sure to cancel an emergency stop before turning on the servo power.
- The servo power can be turned on through the teach pendant only when the TEACHING mode is selected.
- The servo power does not turn on by an external control signal when the contacts for the emergency stop and servo off external signals are open and when the control panel teach pendant connector is disconnected.
- The teach pendant connector (or dummy connector) should be connected to the TP connector of the control panel. For more information, see the Interface Manual.
- Servo power ON can be performed continuously twice; however, it is necessary to allocate the designated period of time for the third and succeeding servo power ON in between.

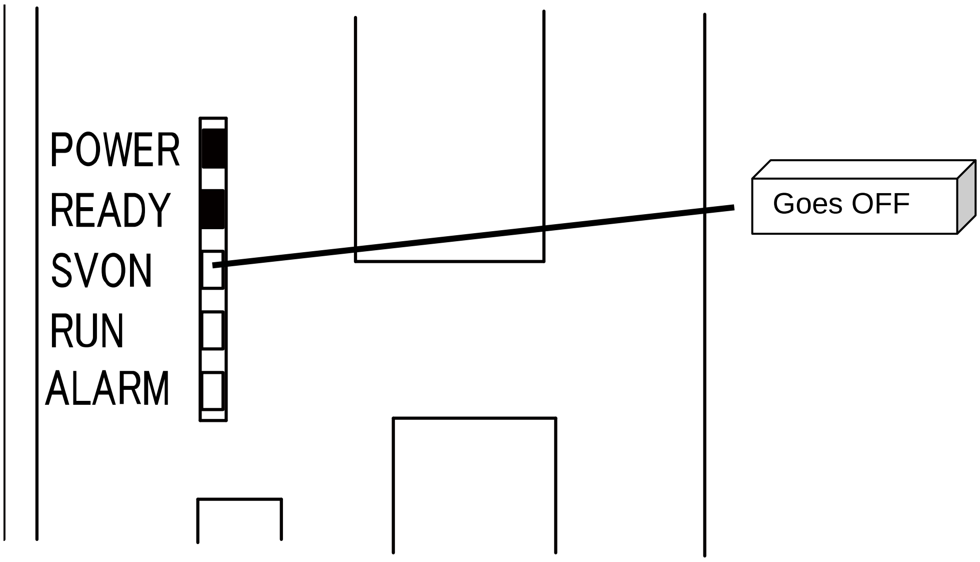
2.3.4 Turning OFF the Servo Power (TSL3000)

Functional Explanation

Turns off the main circuit power of the servo driver. The servo-controlled axes are set free and any brake is activated.

Operating Procedure

Step 1: Turning off the servo power.
In the TEACHING mode, release the Enable switch on the teach pendant. In the EXT mode, turn OFF the external signal (SVOFF).
The "SVON LED" on the front panel of the controller goes off. The SERVO ON LED on the teach pendant also goes off.



Cautions

- DO NOT turn off the servo power while the robot is operating. When you have to stop the robot urgently, press the EMERGENCY stop switch instead.
- Before you have to enter the robot working area, or when no operator is to be present at other than automatic operation, turn off the servo power for safety reasons.
- For the servo power OFF by external control signal, see the Interface Manual.

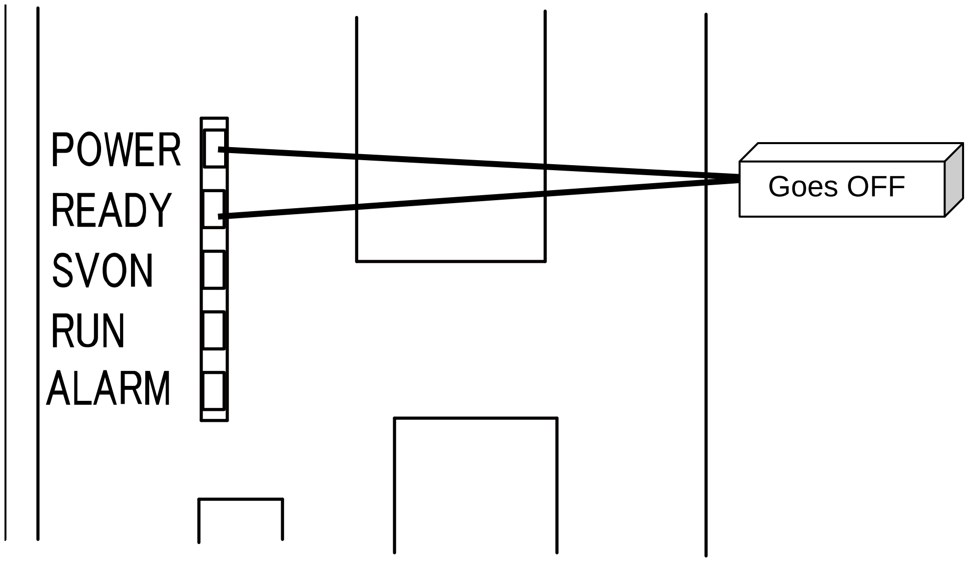
2.3.5 Turning OFF the Main Power (TSL3000)

Functional Explanation

Turns off the main power and stops controller processing.

Operating Procedure

Step 1: Turning off the main power.
Switch the no fuse breaker installed at the exterior of the controller to the OFF side.
The "POWER" and "READY LED" on the front panel of the controller go off.



Cautions

- DO NOT turn off the main power while the servo power is on or during file operation or any other processing.
- Before turning off the main power, make sure that the servo power is off and that no active processing is present.

Section 3 Teaching Operation

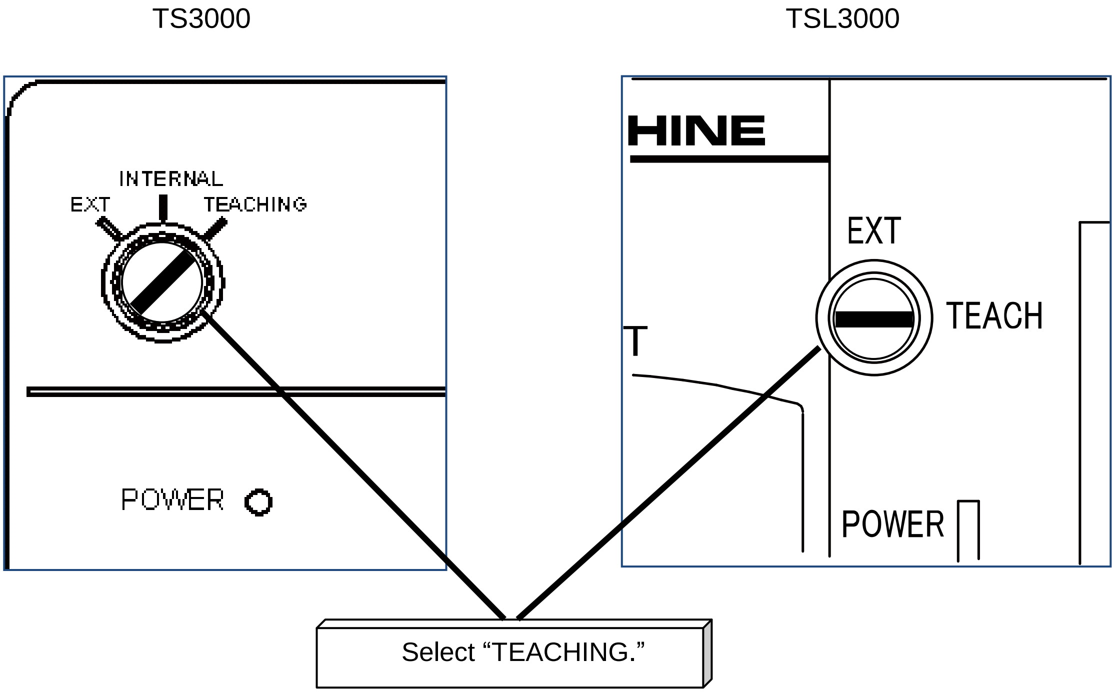
3.1 Selecting the Teaching Mode

Functional Explanation

Changes over to the TEACHING mode in which the robot is manually guided, points are taught, files are operated and the system is controlled.

Operating Procedure

Step 1: Teaching mode selection.
Change over the master mode select switch on the control panel to "TEACHING".


TS3000

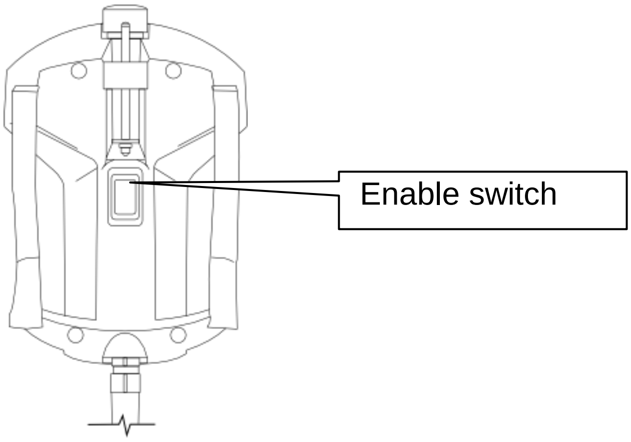
TSL3000

INTERNAL
EXT
TEACHING
POWER
HINE
EXT
TEACH
T
POWER

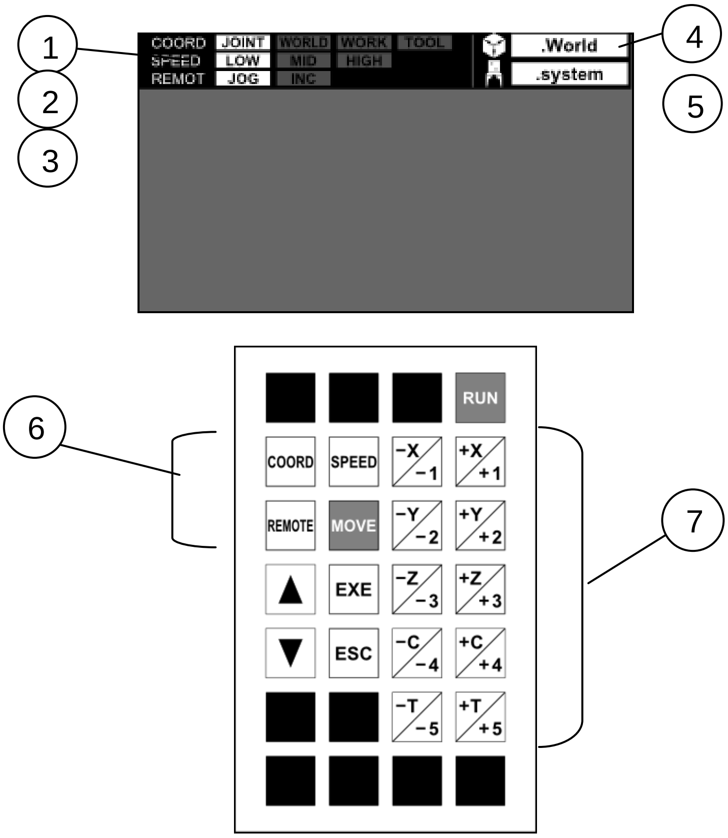
Select “TEACHING.”

Step 2: Calling the JOG key sheet.

Lightly grip the Enable switch on the rear panel of the TP3000 teach pendant and open the contact of the Safety switch. While the safety switch contact is open, the key sheet switches to the manual guidance key sheet (JOG key sheet) and the guide coordinates (COORD), guide speed (SPEED) as well as the work coordinate system and tool coordinate system currently being set up are displayed in the upper part of the screen.


Enable switch

The screen configuration for manual guide operation is shown below.

JOG Screen and Key Sheet	Description of Display
	① Displays the guide coordinate settings. ② Displays the guide speed settings. ③ Displays the guide mode settings. ④ Work coordinates being selected ⑤ Tool coordinates being selected ⑥ Various guide setting switch keys ⑦ Guide keys

1
2
3
4
5
6
7
COORD JOINT WORLD WORK TOOL
SPEED LOW MID HIGH
REMOT JOG INC
.World
.system
RUN
COORD
SPEED
−X −1
+X +1
REMOTE
MOVE
−Y −2
+Y +2
▲
EXE
−Z −3
+Z +3
▼
ESC
−C −4
+C +4
−T −5
+T +5

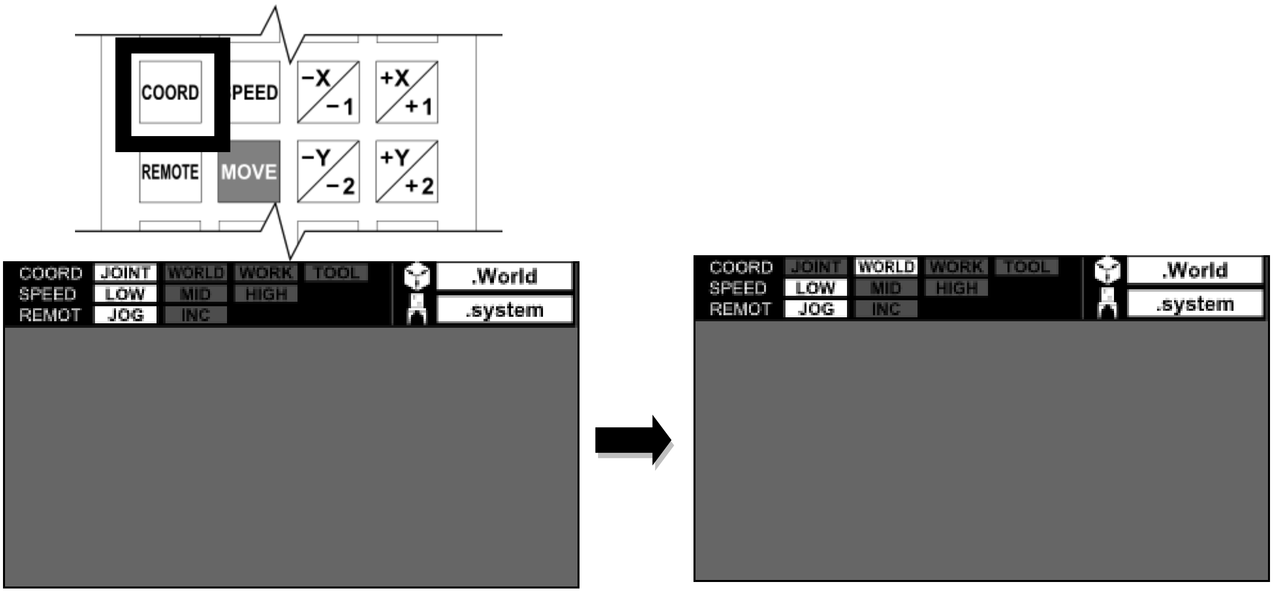
3.2 Setting Up the Guide Coordinates

Functional Explanation

Sets up the coordinate system to be used during manual guide.
You can select from the joint coordinates (JOINT), world coordinates, work coordinates and tool coordinates.

Operating Procedure

Step 1: Coordinate selection.
Press the [COORD] key on the JOG key sheet. Each time this key is pressed, the setting in COORD changes.


COORD
PEED
−X −1
+X +1
REMOTE
MOVE
−Y −2
+Y +2
COORD JOINT WORLD WORK TOOL
SPEED LOW MID HIGH
REMOT JOG INC
.World
.system
COORD JOINT WORLD WORK TOOL
SPEED LOW MID HIGH
REMOT JOG INC
.World
.system

Cautions

- When the tool coordinates are not set up, the tool coordinates of the guide coordinates match the mechanical interface coordinates. For the tool coordinate setting procedure, please see Section 5, "Coordinate Data Editing".
- When the work coordinates are not set up, the work coordinates of the guide coordinates match the base coordinates. If the base coordinates have not been set up, the base coordinates will match the world coordinates. For the work coordinate setting procedure, please see Section 5, "Coordinate Data Editing".

3.3 Setting Up the Guide Mode

The guide mode consists of two modes of jog and inching.

[Jog Guide]
While a guide key is being held down, the robot operates in the direction where the key is being held down (positive or negative direction).
At this time, the robot moves on the guide coordinates being selected. As for the operation speed, the setting of the guide speed is reflected.

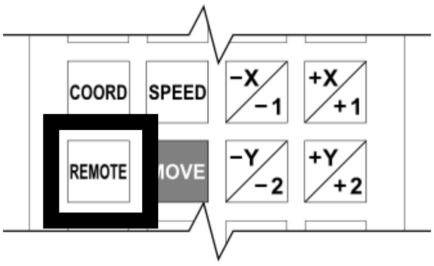
[Inching Guide]
Each time a guide key is pressed, the robot moves in the direction where the key is being held down (positive or negative direction) by the designated distance and then stops.
At this time, the robot moves on the guide coordinates being selected.
Note that the amount of inching is a fixed value set in a parameter. The amount of inching has been preset as LOW, MIDIUM and HIGH in parameters; the amount of movement can be selected from LOW, MIDIUM and HIGH by switching the guide speed.

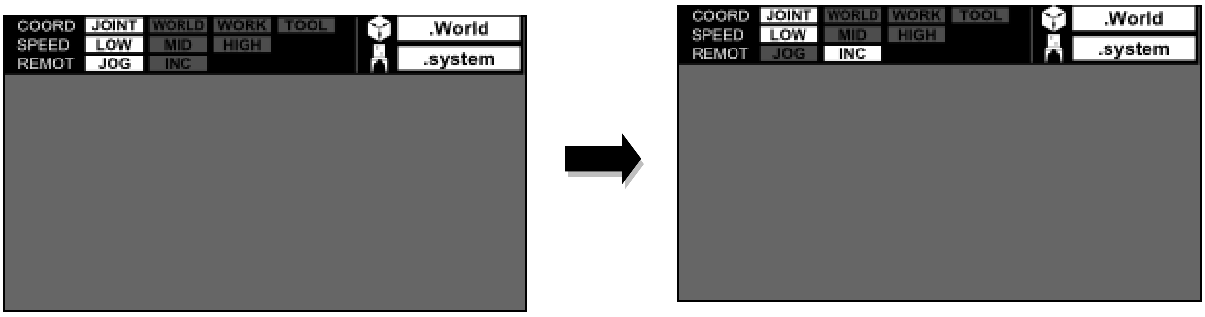
Functional Explanation

Selects the manual guide mode.

Operating Procedure

Step 1: Coordinate selection.
Each time the [REMOTE] key on the JOG key sheet is pressed, the setting changes between JOG and INC in this order.


COORD
SPEED
−X −1
+X +1
REMOTE
MOVE
−Y −2
+Y +2


COORD JOINT WORLD WORK TOOL
SPEED LOW MID HIGH
REMOT JOG INC
.World
.system
COORD JOINT WORLD WORK TOOL
SPEED LOW MID HIGH
REMOT JOG INC
.World
.system

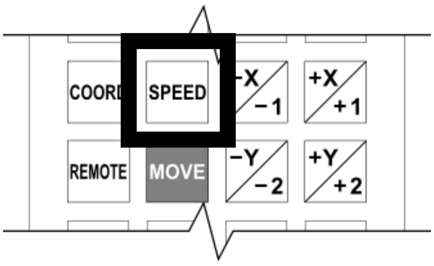
3.4 Guide Mode

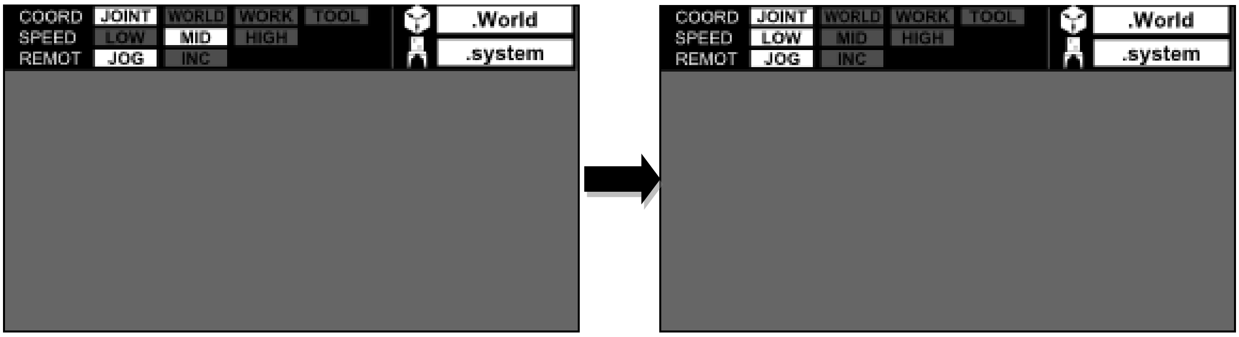
Functional Explanation

Selects the speed or travel distance for manual guide.
When the JOG mode is selected, speed selection becomes effective. When the INCHING mode is selected, travel distance selection prevails.
Select the speed or travel distance according to the distance to the target position.
When the guide mode is JOG, the SPEED key is used to select the seed. When INC, it is used to select the amount of movement.

Operating Procedure

Step 1: Coordinate selection.
Each time the [SPEED] key on the JOG key sheet is pressed, the selection changes among LOW, MIDIUM and HIGH in this order.


COORD
SPEED
−X −1
+X +1
REMOTE
MOVE
−Y −2
+Y +2


COORD JOINT WORLD WORK TOOL
SPEED LOW MID HIGH
REMOT JOG INC
.World
.system
COORD JOINT WORLD WORK TOOL
SPEED LOW MID HIGH
REMOT JOG INC
.World
.system

3.5 Guidance

CAUTION

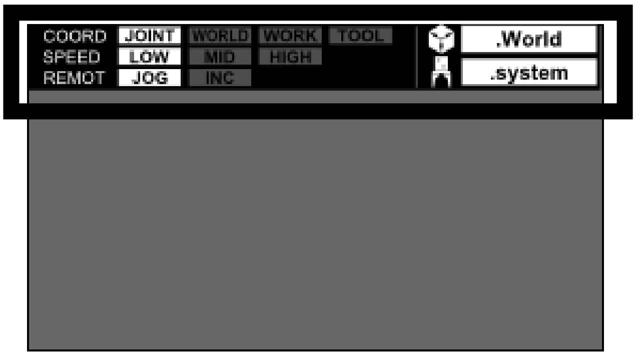
- When guiding the robot manually, DO NOT enter the dangerous area of the robot.
- If the robot moves abnormally, immediately effect an emergency stop.

Functional Explanation

While the JOG or INCHING mode is selected, the robot can be moved in a desired direction by pressing the appropriate guide key.

Operating Procedure

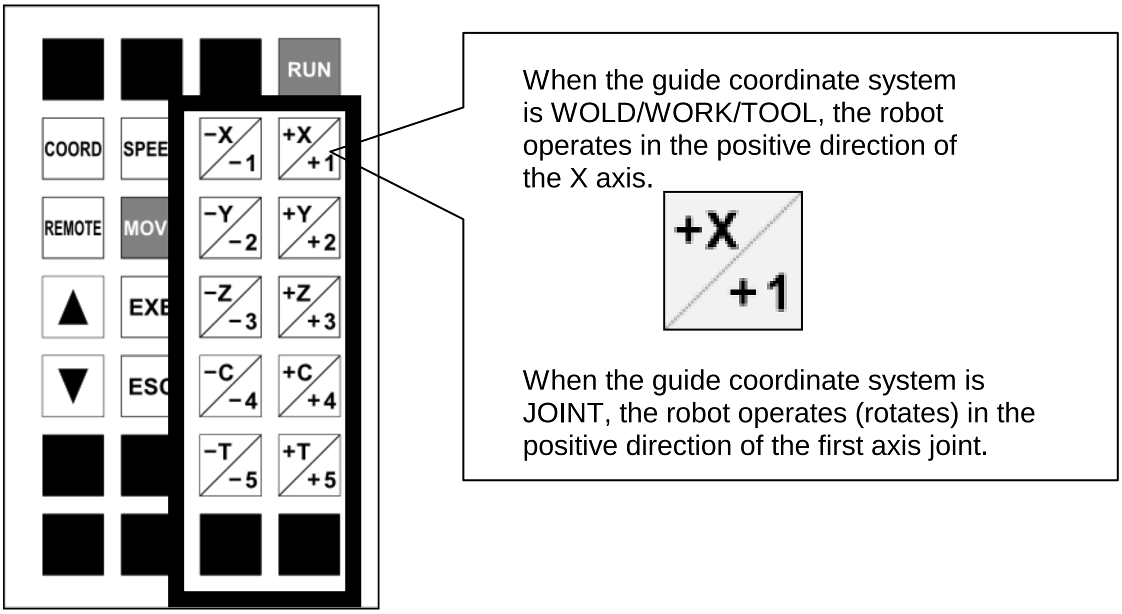
Step 1: Setting of guidance conditions.
Set the guidance conditions (guide coordinates, guide mode, and guide speed) as necessary.
The guide coordinates, guide mode, and guide speed can be selected in any order.
Select them before pressing the guide key.


COORD JOINT WORLD WORK TOOL
SPEED LOW MID HIGH
REMOT JOG INC
.World
.system

Step 2: Guide operation.

Lightly hold the Enable switch to turn ON the servo and then press the guide key (a key indicating the axis and direction) of the desired axis.

The robot operates on the specified coordinates in the direction of the axis you manipulated. Each guide key is labeled with two names whose meanings are different according to the settings of the guide coordinates.



When the guide coordinate system is WOLD/WORK/TOOL, the robot operates in the positive direction of the X axis.

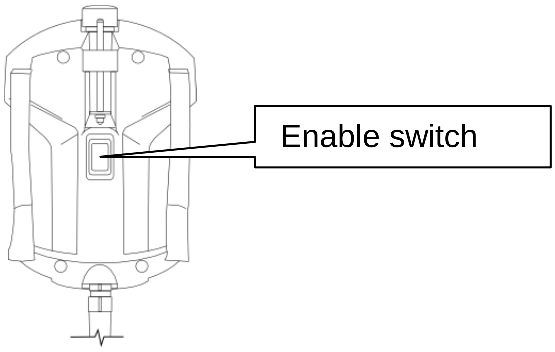
When the guide coordinate system is JOINT, the robot operates (rotates) in the positive direction of the first axis joint.

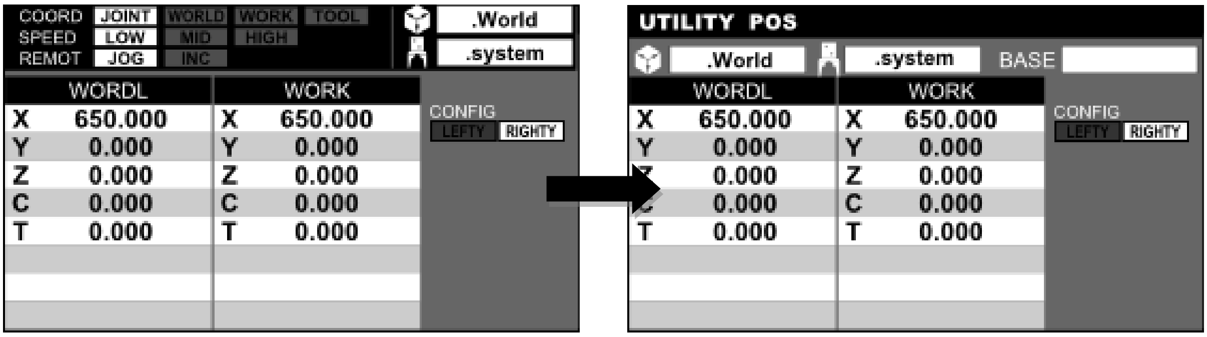
Step 3: Canceling guide operation

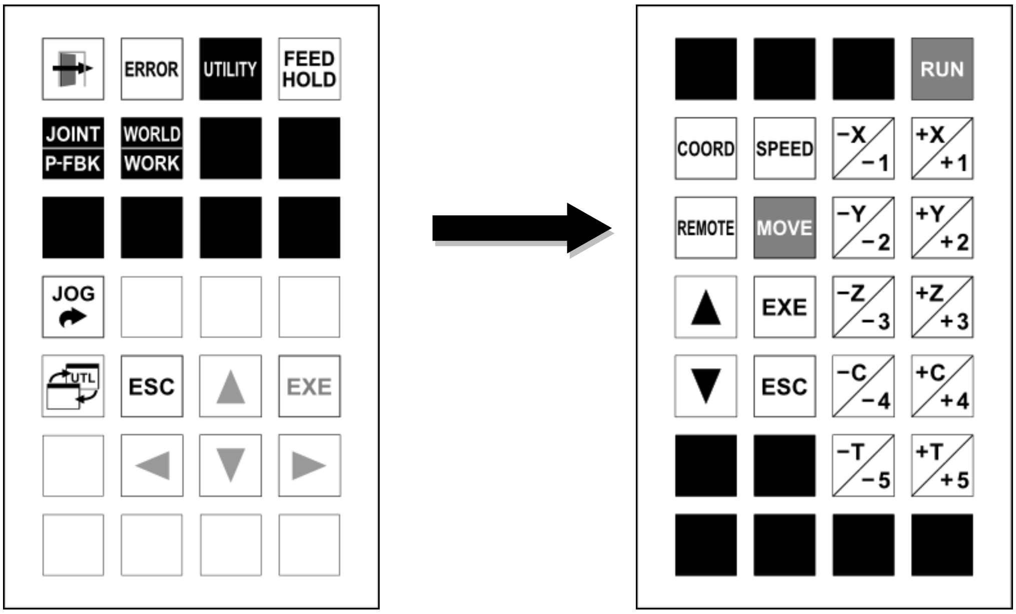
Release the Enable switch or press the [ESC] key. The screen and key sheet displays return to the state before the guide operation.

Related Function

When using the UTILITY function and the guide operation together, call the JOG key sheet first after opening the UTILITY function.




COORD
JOINT
WORLD
WORK
TOOL
SPEED
LOW
MID
HIGH
REMOT
JOG
INC
.World
.system
WORDL
WORK
X 650.000
Y 0.000
Z 0.000
C 0.000
T 0.000
X 650.000
Y 0.000
Z 0.000
C 0.000
T 0.000
CONFIG
LEFTY
RIGHTY
UTILITY POS
.World
.system
BASE
WORDL
WORK
X 650.000
Y 0.000
Z 0.000
C 0.000
T 0.000
X 650.000
Y 0.000
Z 0.000
C 0.000
T 0.000
CONFIG
LEFTY
RIGHTY


ERROR
UTILITY
FEED HOLD
JOINT
P-FBK
WORLD
WORK
JOG
UTL
ESC
EXE
RUN
COORD
SPEED
−X −1
+X +1
REMOTE
MOVE
−Y −2
+Y +2
EXE
−Z −3
+Z +3
ESC
−C −4
+C +4
−T −5
+T +5

Cautions

- The guide keys are operative only when they are pressed with the servo being turned on.
- Pressing the Enable switch two levels down completely sets the same state as releasing the Enable switch.
- Pressing only a guide key does not trigger any operation. This is to prevent malfunction.

Section 4 Program Editing

4.1 Starting Up the Program Editor [EDIT]

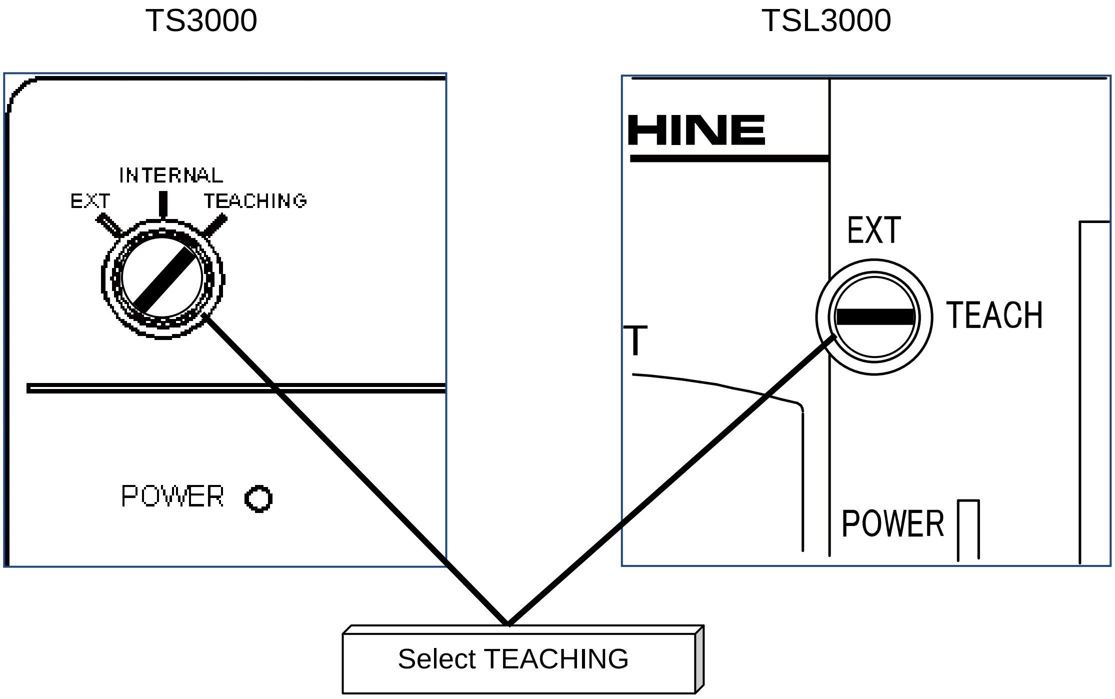
Functional Explanation

Starts the program editor.

Operating Procedure

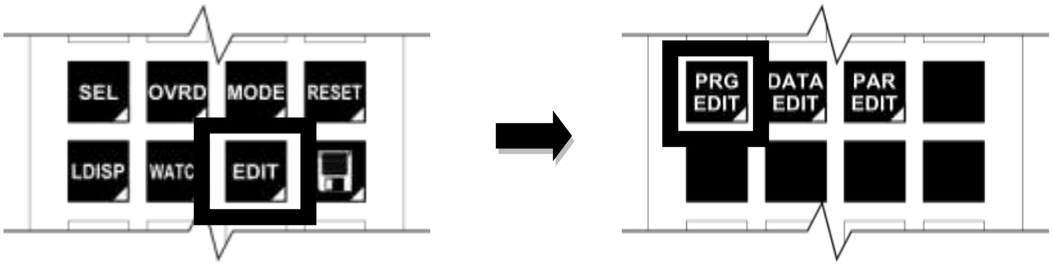
Step 1: Mode selection.

Change over the mode switch equipped on the control panel to "TEACHING".


TS3000
TSL3000
INTERNAL
EXT
TEACHING
POWER
HINE
EXT
TEACH
T
POWER
Select TEACHING

Step 2: Selections in the program editor

Press the [EDIT] key on the top key sheet in the TEACHING mode. The key sheet and screen displays change, and the [PRG EDIT], [DATA EDIT] and [PAR EDIT] keys appear. Next, press the [PRG EDIT] key.

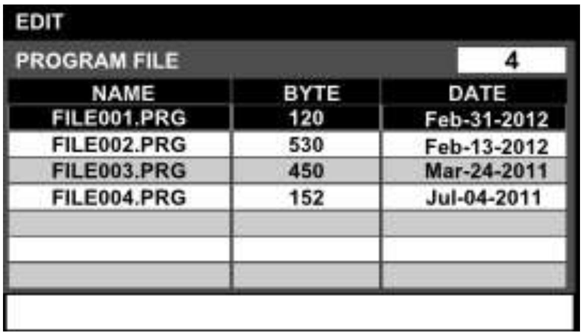

SEL
OVRD
MODE
RESET
LDISP
WATC
EDIT
PRG EDIT
DATA EDIT
PAR EDIT

Step 3: Specify File

A list of the program files in the controller is displayed on the screen.

To select an existing file, select the desired file with the up and down cursor keys and then press the [EXE] key.

The program editor starts.



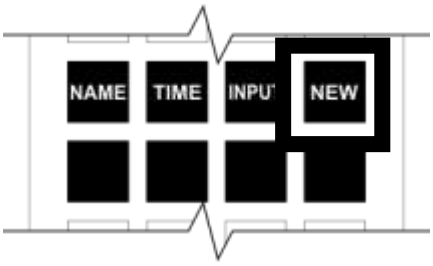
EDIT

PROGRAM FILE 4

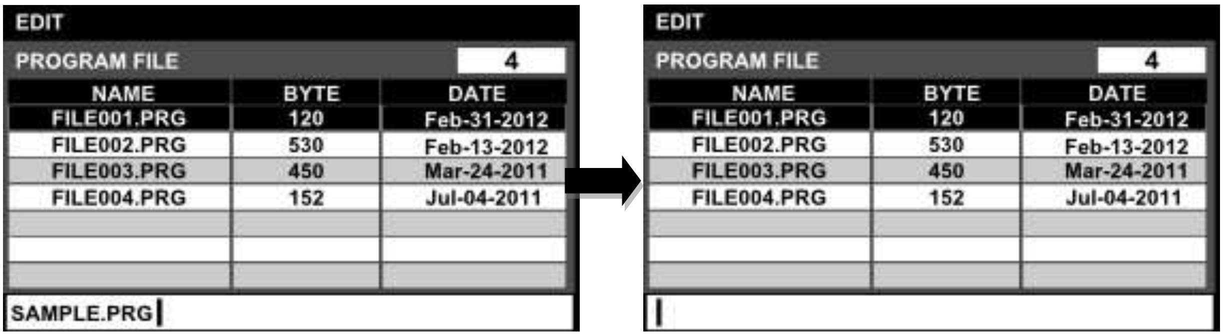
NAME	BYTE	DATE
FILE001.PRG	120	Feb-31-2012
FILE002.PRG	530	Feb-13-2012
FILE003.PRG	450	Mar-24-2011
FILE004.PRG	152	Jul-04-2011

Step 4: Creation of a new file

To create a new file, press the [NEW] key.



Enter the desired file name on the command line.



EDIT

PROGRAM FILE 4

NAME	BYTE	DATE
FILE001.PRG	120	Feb-31-2012
FILE002.PRG	530	Feb-13-2012
FILE003.PRG	450	Mar-24-2011
FILE004.PRG	152	Jul-04-2011

SAMPLE.PRG

EDIT

PROGRAM FILE 4

NAME	BYTE	DATE
FILE001.PRG	120	Feb-31-2012
FILE002.PRG	530	Feb-13-2012
FILE003.PRG	450	Mar-24-2011
FILE004.PRG	152	Jul-04-2011

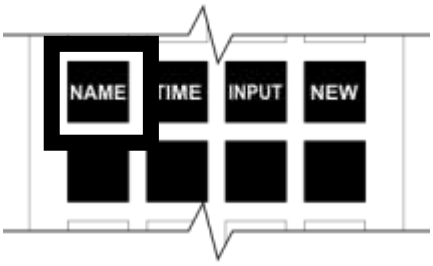
Once the file name has been determined, press the [EXE] key.

The program editor starts.

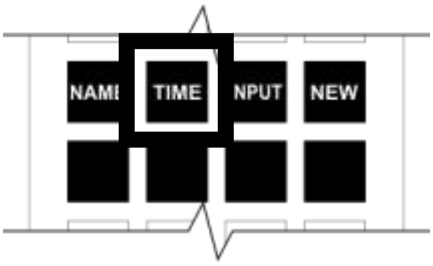
Related Function

The file display sort functions include <display by name>, <display by file creation time> and <file search function>.

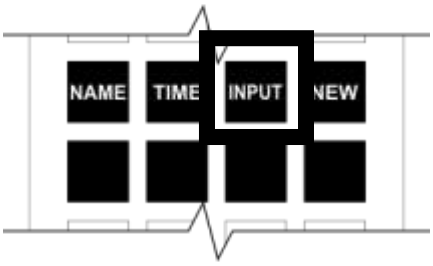
<Display by name>
Press the [NAME] key. The file list is sorted by name. Each time the [NAME] key is pressed, the sorting order changes between ascending order and descending order.



<Display by file creation time>
Press the [TIME] key. The file list is sorted by file creation time. Each time the [TIME] key is pressed, the sorting order changes between ascending order and descending order.



<File search function>
Press the [INPUT] key. After the cursor moves onto the command line, enter the character string you want to search.
Once the character string has been determined, press the [EXE] key. Files starting with the character string you entered are displayed in a list.

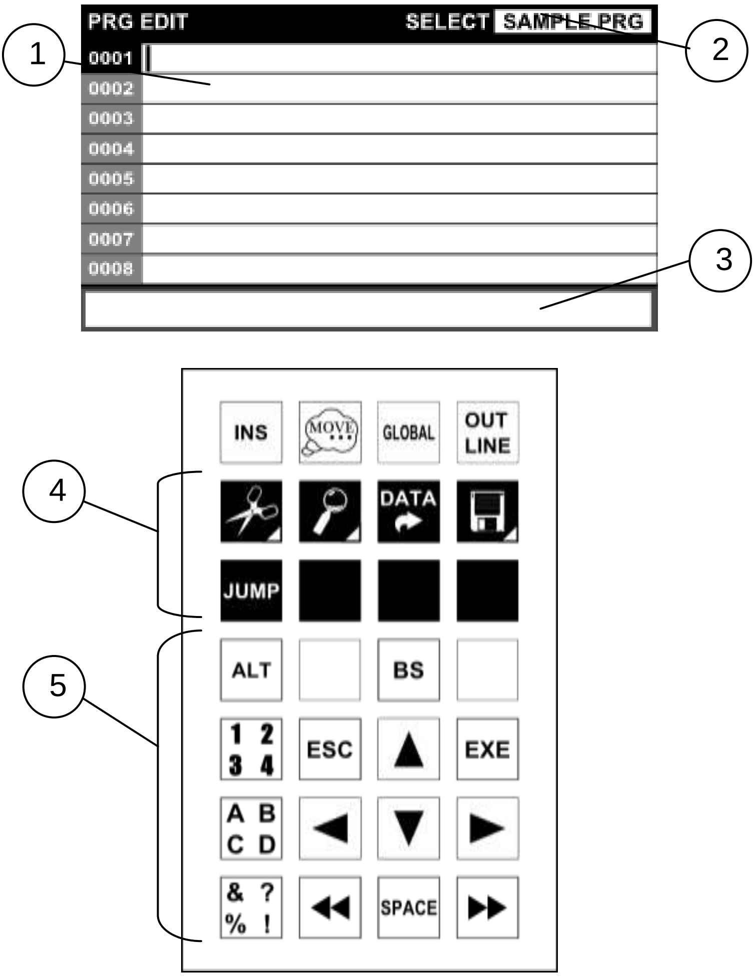


Cautions

- If a file with large memory size is specified, it will take a long time until the progress bar is shown and editing is enabled. Please wait until the progress bar disappears.
- Even if the Master Mode key switch is changed to "TEACHING" during editing, the editing mode does not finish.

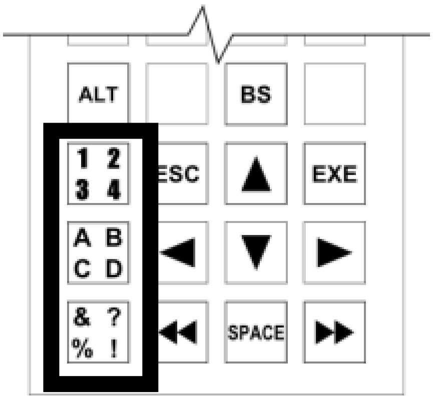
4.2 Structure of the Program Editor

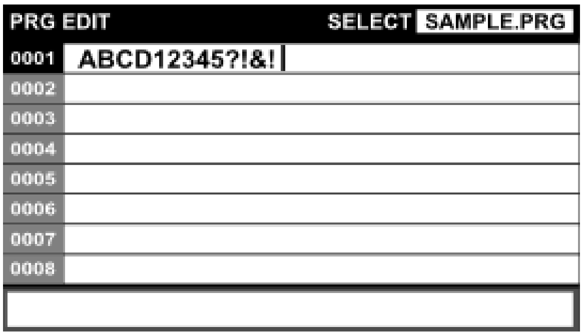
The screen and key sheet of the program editor are shown below.

Program Editor Screen and Key Sheet	Description of Display
 PRG EDIT SELECT SAMPLE.PRG 0001 0002 0003 0004 0005 0006 0007 0008 1 2 3 4 5 INS MOVE GLOBAL OUT LINE DATA JUMP ALT BS 1 2 3 4 ESC EXE A B C D & ? % ! SPACE	① PRG EDIT screen ② Displays the name of the file being edited. ③ Command line ④ Program edit function menus ⑤ Text entry operation keys

The text entered using the [ALPH], [NUM] and [SMBL] keys are positioned at the cursor on the PRO EDIT screen.

For more information about the operation methods of the [ALPH], [NUM] and [SMBL] keys, please see Section 1.


ALT
BS
1 2 3 4
ESC
▲
EXE
A B C D
◀
▼
▶
& ? % !
◀◀
SPACE
▶▶


PRG EDIT
SELECT SAMPLE.PRG
0001
0002
0003
0004
0005
0006
0007
0008

ABCD12345?!&!

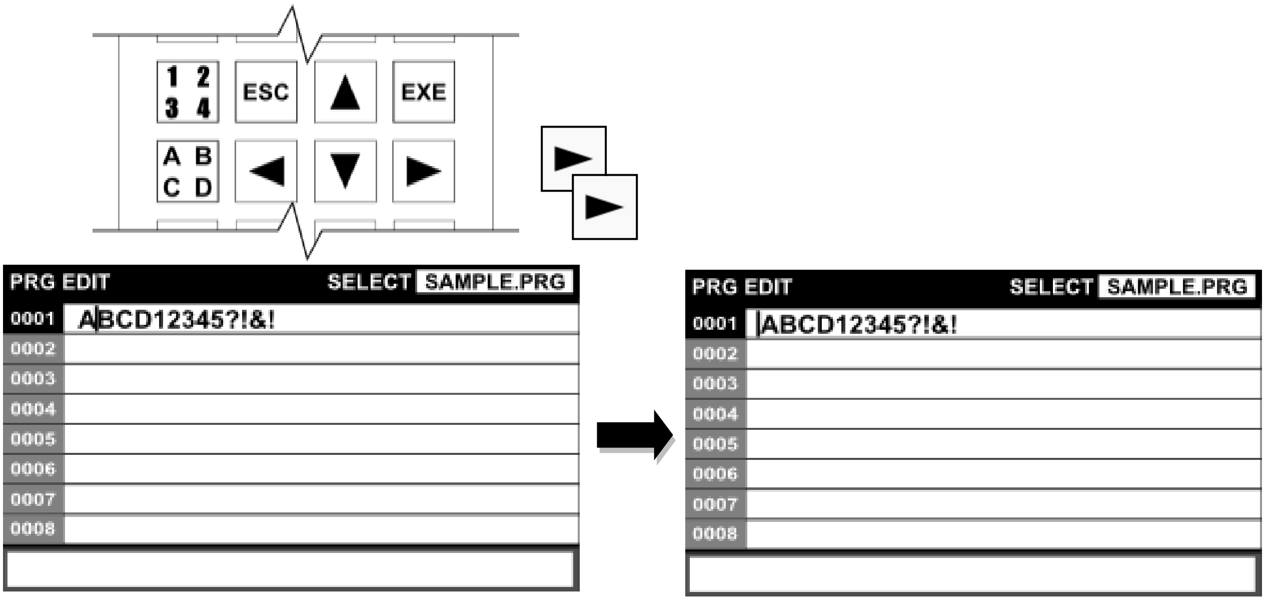
4.3 Move Cursor

Functional Explanation

Moves the cursor by one character in the direction of an arrow key.

Operating Procedure

Step 1: Cursor operation
Among the arrow keys, press the one pointing the direction you want to move the cursor to.


1 2 3 4
ESC
▲
EXE
A B C D
◀
▼
▶
▶
▶
PRG EDIT
SELECT SAMPLE.PRG
0001
0002
0003
0004
0005
0006
0007
0008
PRG EDIT
SELECT SAMPLE.PRG
0001
0002
0003
0004
0005
0006
0007
0008

ABCD12345?!&!

ABCD12345?!&!

Cautions

- Moving the cursor while there is no text on the PRG EDIT screen is invalid.
- Moving the cursor at the beginning and end of lines is invalid.

4.4 Move Cursor in Word Units

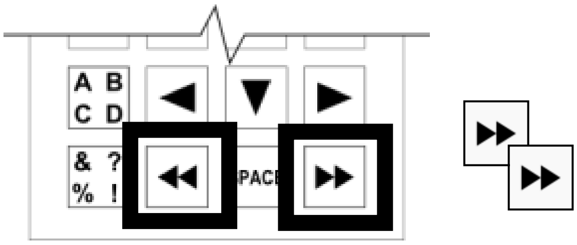
Functional Explanation

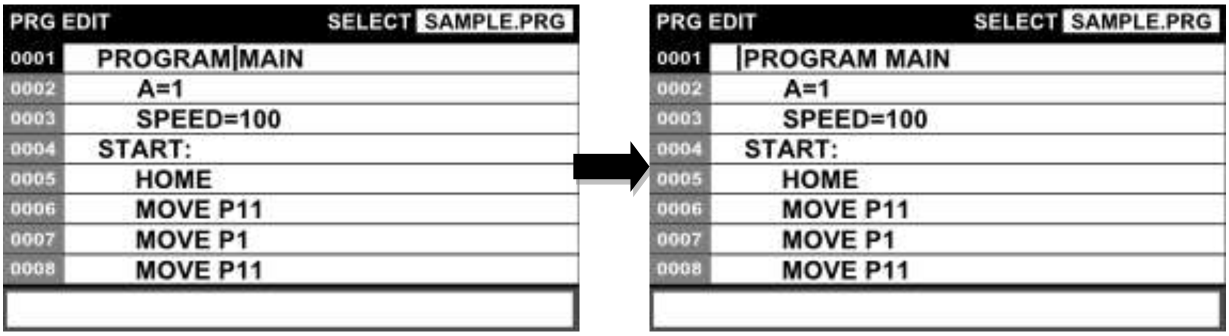
Performs the lateral movement of the cursor in units of words starting with an alphabetic character.

Operating Procedure

Step 1: Move the cursor in word units.

Press the [← ←] or [→ →] key. The cursor can be moved laterally in units of words starting with an alphabetic character.





```
PRG EDIT                SELECT SAMPLE.PRG
0001  PROGRAM|MAIN
0002      A=1
0003      SPEED=100
0004  START:
0005      HOME
0006      MOVE P11
0007      MOVE P1
0008      MOVE P11
```

```
PRG EDIT                SELECT SAMPLE.PRG
0001  |PROGRAM MAIN
0002      A=1
0003      SPEED=100
0004  START:
0005      HOME
0006      MOVE P11
0007      MOVE P1
0008      MOVE P11
```

Cautions

- Moving the cursor in word units continuing to the next line is invalid.

4.5 Move Cursor to End of Line

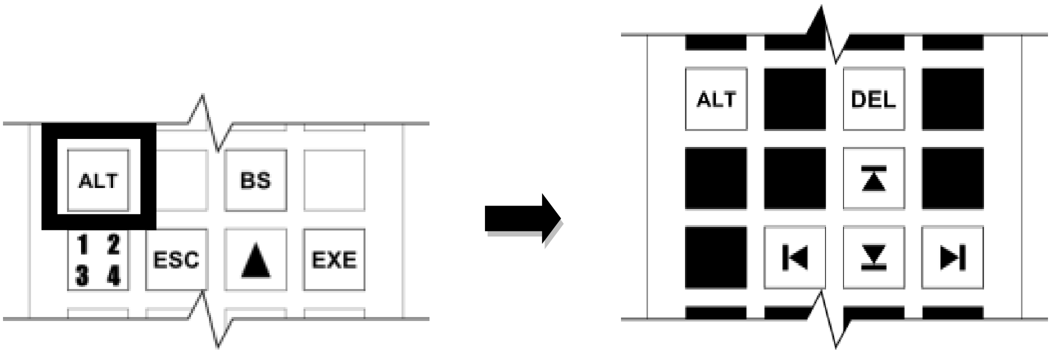
Functional Explanation

Moves the cursor to the beginning and end of the line.

Operating Procedure

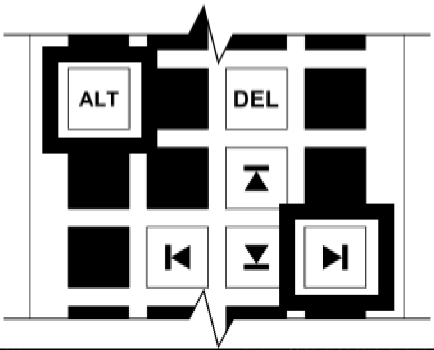
Step 1: Calling the arrow key to move to the end of the line

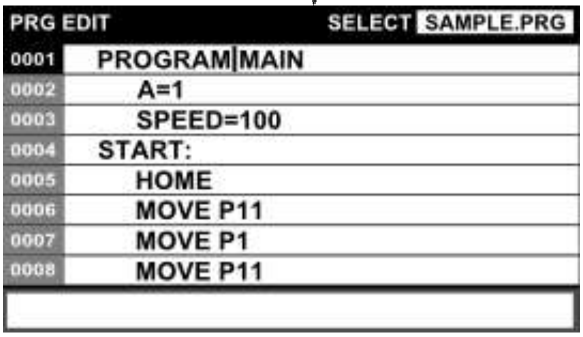
Press the [ALT] key. While the [ALT] key is being held down, the keys to move to the beginning-of-line and end-of-line ([←], [→|]) are displayed.



Step 2: Move the cursor to the beginning of the line.

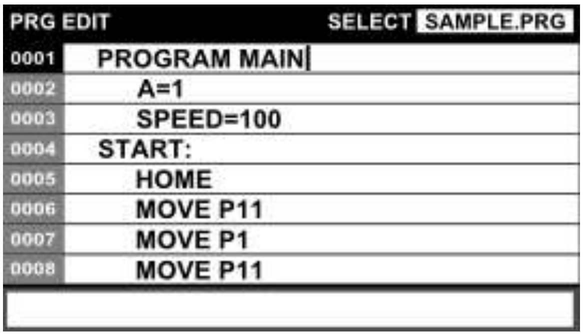
While holding down the [ALT] key, press the move to the beginning-of-line key ([|←]).





PRG EDIT SELECT SAMPLE.PRG

```
0001  PROGRAM MAIN
0002     A=1
0003     SPEED=100
0004  START:
0005     HOME
0006     MOVE P11
0007     MOVE P1
0008     MOVE P11
```

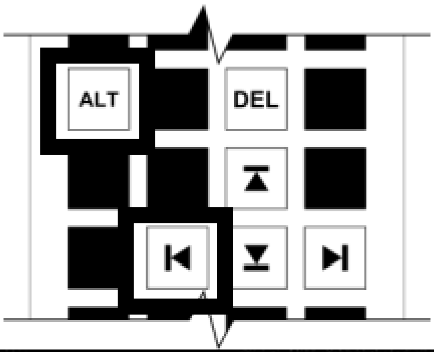


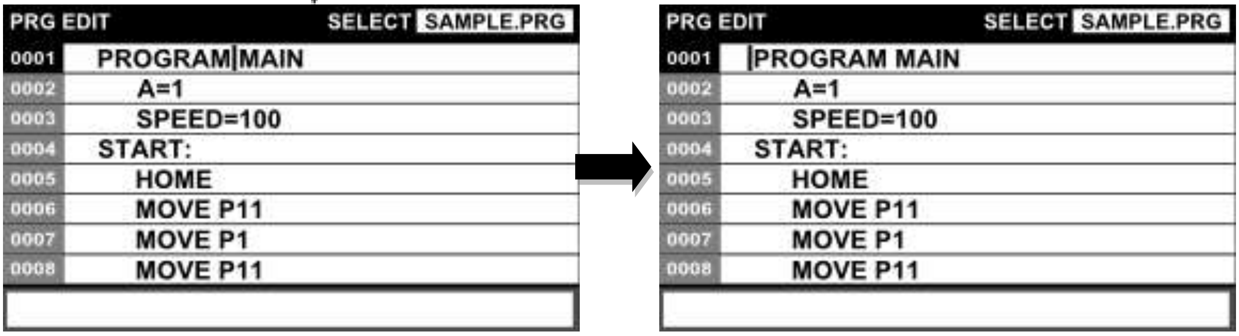
PRG EDIT SELECT SAMPLE.PRG

```
0001  PROGRAM MAIN
0002     A=1
0003     SPEED=100
0004  START:
0005     HOME
0006     MOVE P11
0007     MOVE P1
0008     MOVE P11
```

Step 3: Move the cursor to the end of the line.

While holding down the [ALT] key, press the move to the end-of-line key ([|→]).





```
PRG EDIT                 SELECT SAMPLE.PRG
0001  PROGRAM|MAIN
0002     A=1
0003     SPEED=100
0004  START:
0005     HOME
0006     MOVE P11
0007     MOVE P1
0008     MOVE P11
```

```
PRG EDIT                 SELECT SAMPLE.PRG
0001  |PROGRAM MAIN
0002     A=1
0003     SPEED=100
0004  START:
0005     HOME
0006     MOVE P11
0007     MOVE P1
0008     MOVE P11
```

4.6 Backspace

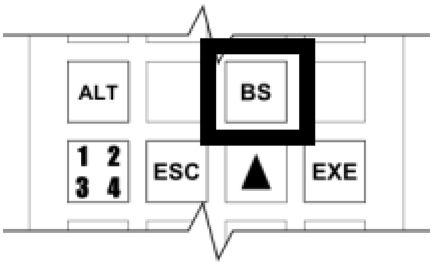
Functional Explanation

Deletes one character in front of the cursor.

Operating Procedure

Step 1: Execution of backspace

Press the [BS] key. Deletes one character in front of the cursor.



Caution

- When a character is deleted at the beginning of the line, a line feed is deleted and the next line connects with the previous line.

4.7 Delete

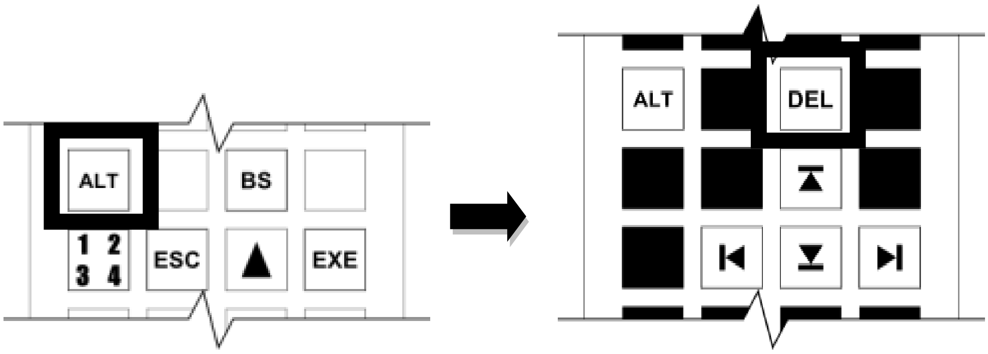
Functional Explanation

Deletes one character behind the cursor.

Operating Procedure

Step 1: Calling the [DEL] key

Press the [ALT] key. While the [ALT] key is being held down, the key sheet changes and the [DEL] key is displayed.



Step 2: Execution of delete

Press the [DEL] key. Deletes one character behind the cursor.

Caution

- When a character is deleted at the beginning of the line, a line feed is deleted and the next line connects with the previous line.

4.8 Space

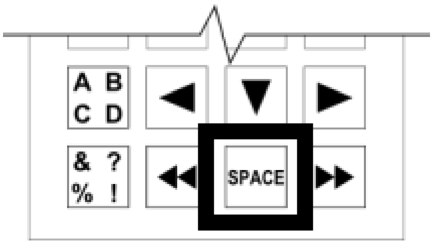
Functional Explanation

Adds a space.

Operating Procedure

Step 1: Adding a space

Press the [SPACE] key. A single byte space is inserted at the cursor position.



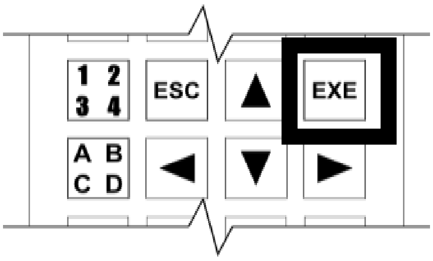
4.9 Line Feed

Functional Explanation

Executes a line feed on the PRG EDIT screen.

Operating Procedure

Step 2: Execution of line feed
Move the cursor to the position where you want to perform line feed and then press the [EXE] key.
(When line feed is executed at the end of the line, a blank line is added.)



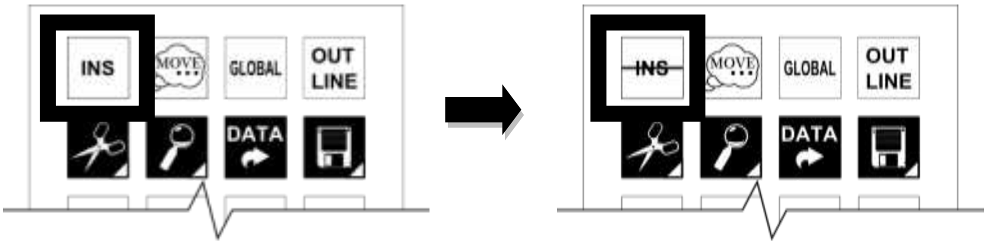
4.10 Switch between Insert Mode and Replace Mode

Functional Explanation

Switches between the insert mode and the replace mode to enter text. When starting the program editor, the insert mode takes effect.

Operating Procedure

Step 1: Switching between the insert mode and the replace mode
Press the [INS] key. Each time the [INS] key is pressed, the mode changes between the insert mode and the replace mode.
When starting the program editor, the insert mode has been selected.

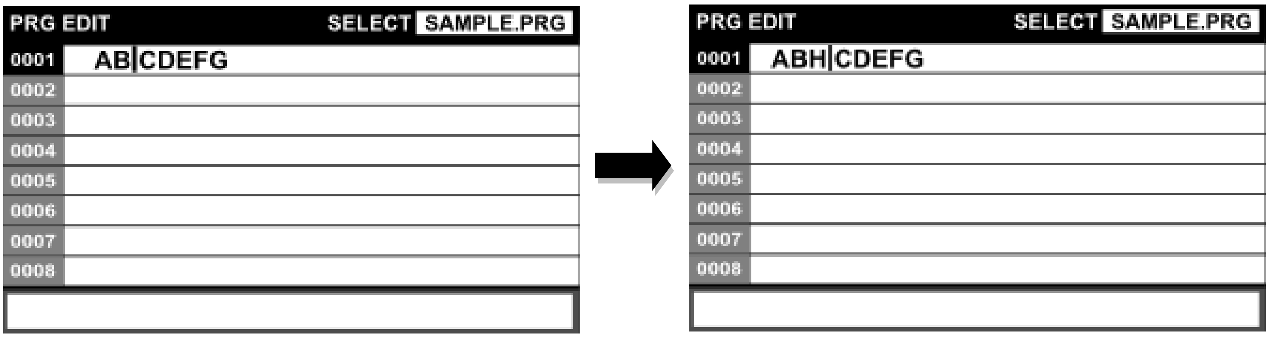

INS
MOVE
GLOBAL
OUT LINE
DATA
~~INS~~
MOVE
GLOBAL
OUT LINE
DATA

Insert Mode

Replace Mode

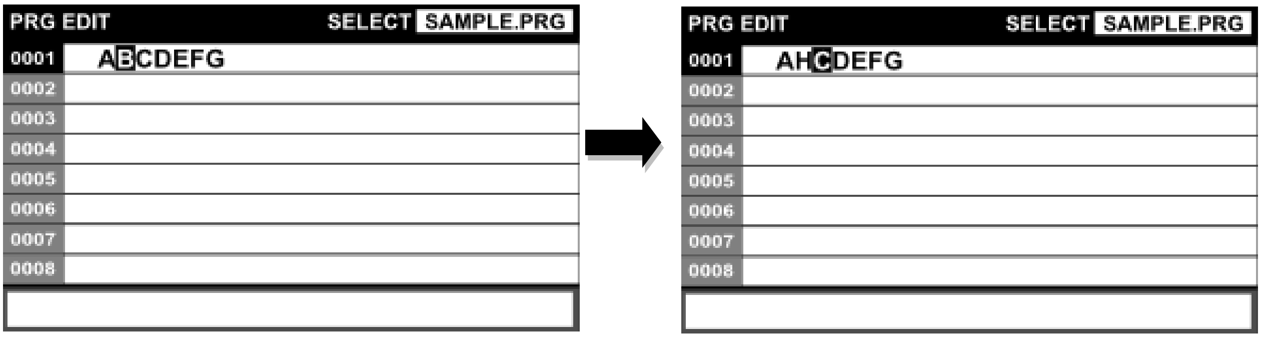
Step 2: Entering text in the insert mode

If text is entered in the insert mode, the entered text will be inserted at the cursor position.


PRG EDIT
SELECT SAMPLE.PRG
0001 AB|CDEFG
0002
0003
0004
0005
0006
0007
0008
PRG EDIT
SELECT SAMPLE.PRG
0001 ABH|CDEFG
0002
0003
0004
0005
0006
0007
0008

Step 3: Entering text in the replace mode

In the replace mode, the text on which the cursor is being placed will be displayed in reverse video. If text is entered, the highlighted text will be replaced by the text entered from the key sheet. Each time one character is replaced, the focus of the cursor moves to the left by one character.


PRG EDIT
SELECT SAMPLE.PRG
0001 ABCDEFG
0002
0003
0004
0005
0006
0007
0008
PRG EDIT
SELECT SAMPLE.PRG
0001 AHCDEFG
0002
0003
0004
0005
0006
0007
0008

4.11 Scroll Screen Vertically

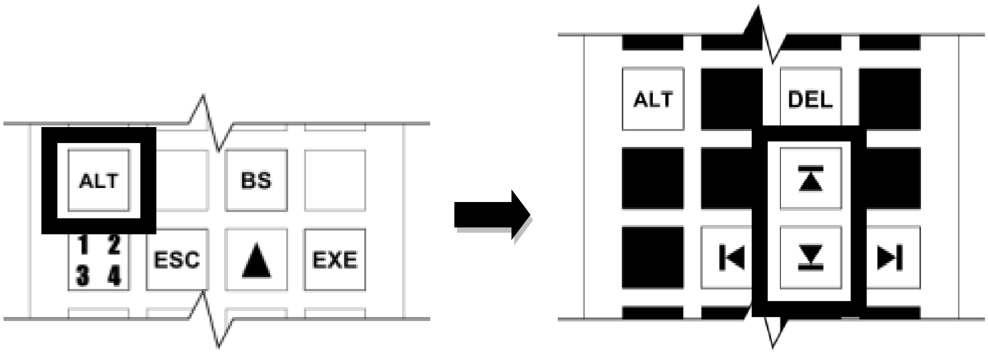
Functional Explanation

Moves the cursor across multiple lines vertically. When the cursor moves exceeding the number of lines displayed on the screen, screen scrolling is performed.

Operating Procedure

Step 1: Calling the vertical screen scroll keys

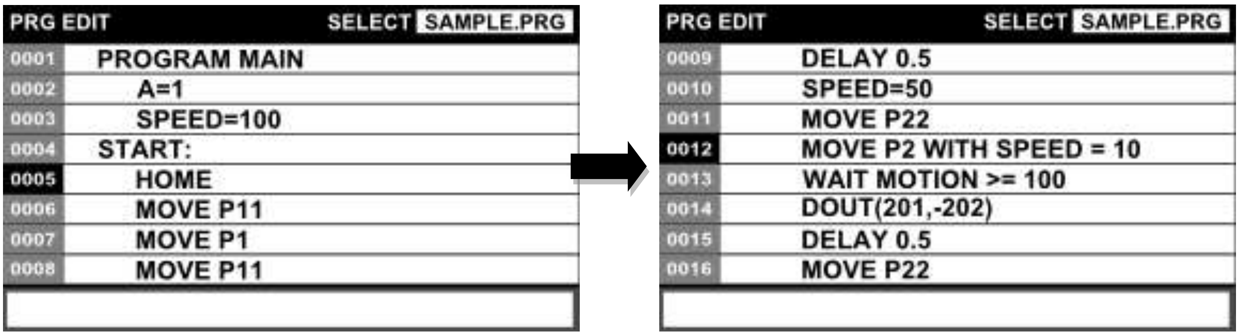
Press the [ALT] key. While the [ALT] key is being held down, the vertical screen scroll keys are displayed.



Step 2: Scrolling up the screen

While holding down the [ALT] key, press the scroll up key.

Scroll up the screen.



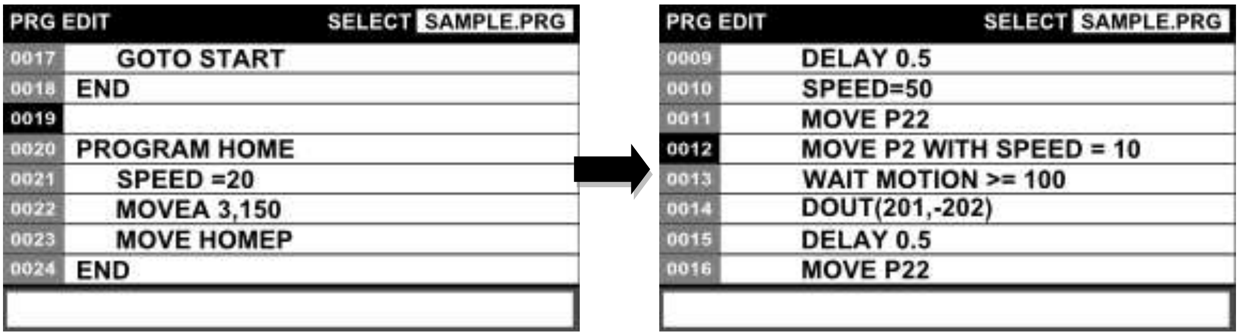
```
PRG EDIT                SELECT SAMPLE.PRG
0001  PROGRAM MAIN
0002      A=1
0003      SPEED=100
0004  START:
0005      HOME
0006      MOVE P11
0007      MOVE P1
0008      MOVE P11
```

```
PRG EDIT                SELECT SAMPLE.PRG
0009      DELAY 0.5
0010      SPEED=50
0011      MOVE P22
0012      MOVE P2 WITH SPEED = 10
0013      WAIT MOTION >= 100
0014      DOUT(201,-202)
0015      DELAY 0.5
0016      MOVE P22
```

Step 3: Scrolling down the screen

While holding down the [ALT] key, press the scroll down key.

Scroll down the screen.



```
PRG EDIT                 SELECT SAMPLE.PRG
0017     GOTO START
0018  END
0019
0020  PROGRAM HOME
0021     SPEED =20
0022     MOVEA 3,150
0023     MOVE HOMEP
0024  END
```

```
PRG EDIT                 SELECT SAMPLE.PRG
0009     DELAY 0.5
0010     SPEED=50
0011     MOVE P22
0012     MOVE P2 WITH SPEED = 10
0013     WAIT MOTION >= 100
0014     DOUT(201,-202)
0015     DELAY 0.5
0016     MOVE P22
```

4.12 Candidate Input Function

Functional Explanation

Displays the reserved words starting with the entered character string in the candidate Entry window when text is entered.

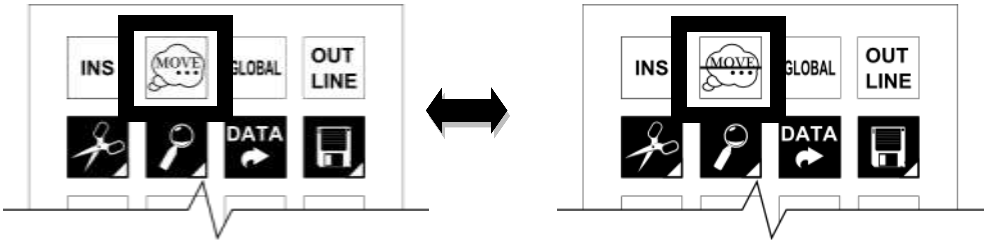
You can directly enter text in the PRG EDIT window by selecting from the reserved words displayed in the candidate enter window.

Operating Procedure

Step 1: Switching to enable or disable the candidate input function

You can set to enable or disable the candidate input function Each time the [IMAGE] key is pressed, you can switch to enable or disable the function.

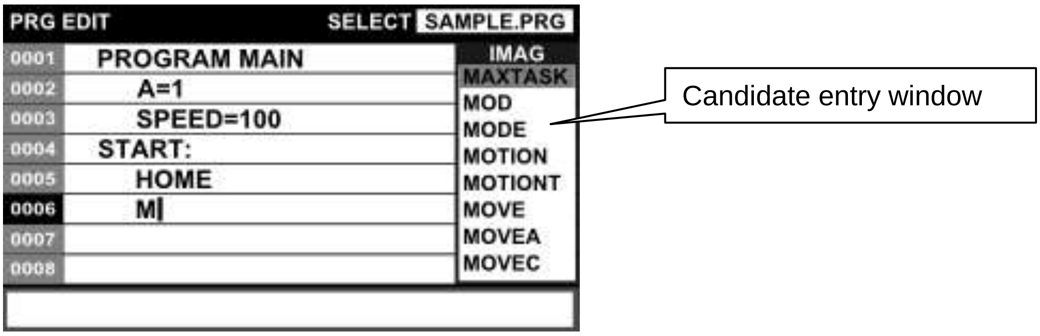
This function is enabled at the time when the editor is started.



Candidate Input Enabled Candidate Input Disabled

Step 2: Displaying the candidate entry window

Enter text. As text is entered, the candidate entry window appears at the right of the screen and the reserved word starting with the entered text string is displayed.

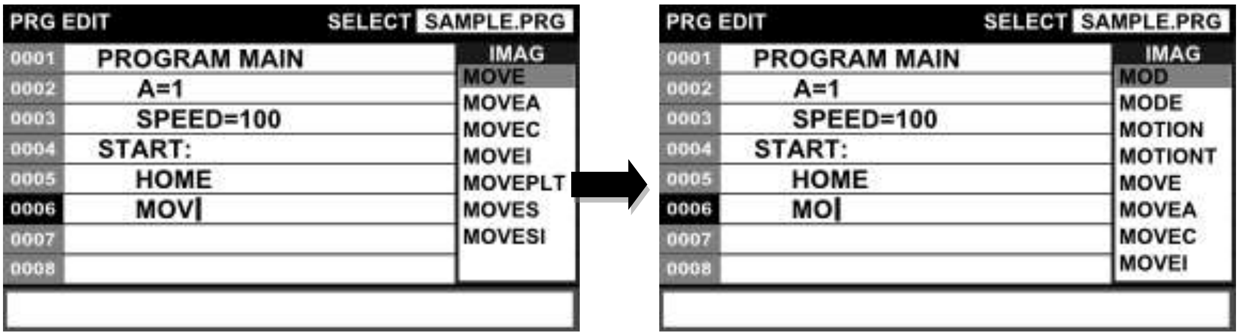


```
PRG EDIT                SELECT SAMPLE.PRG
0001  PROGRAM MAIN        IMAG
0002     A=1              MAXTASK
0003     SPEED=100        MOD
0004  START:              MODE
0005     HOME             MOTION
0006     M|               MOTIONT
0007                      MOVE
0008                      MOVEA
                          MOVEC
```

Candidate entry window

As text input continues, the content of the candidate entry window is filtered further more.

If no candidate exists from the beginning or there are no candidates left, the candidate entry window is not displayed.

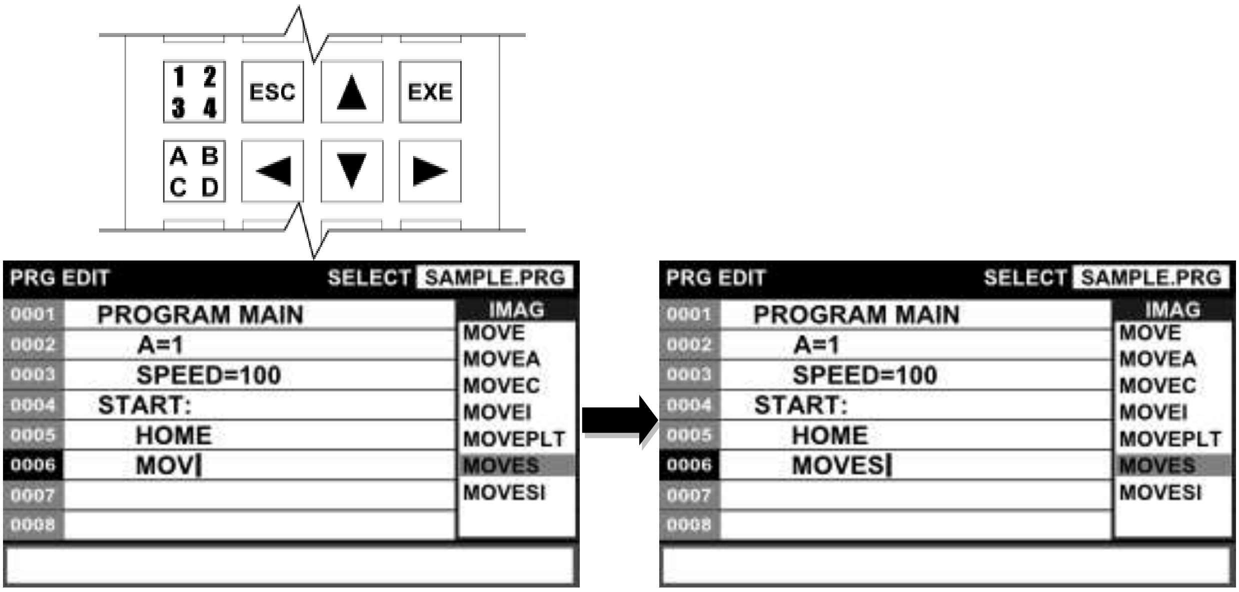


```
PRG EDIT                SELECT SAMPLE.PRG
0001  PROGRAM MAIN        IMAG
0002     A=1              MOVE
0003     SPEED=100        MOVEA
0004  START:              MOVEC
0005     HOME             MOVEI
0006     MOV|             MOVEPLT
0007                      MOVES
0008                      MOVESI
```

```
PRG EDIT                SELECT SAMPLE.PRG
0001  PROGRAM MAIN        IMAG
0002     A=1              MOD
0003     SPEED=100        MODE
0004  START:              MOTION
0005     HOME             MOTIONT
0006     MO|              MOVE
0007                      MOVEA
0008                      MOVEC
                          MOVEI
```

Step 3: Selecting from candidates

Press the up and down cursor keys while the candidate entry window is being displayed. The cursor operation moves to the candidate entry window. The selection focus moves according to the up and down movement of the cursor.

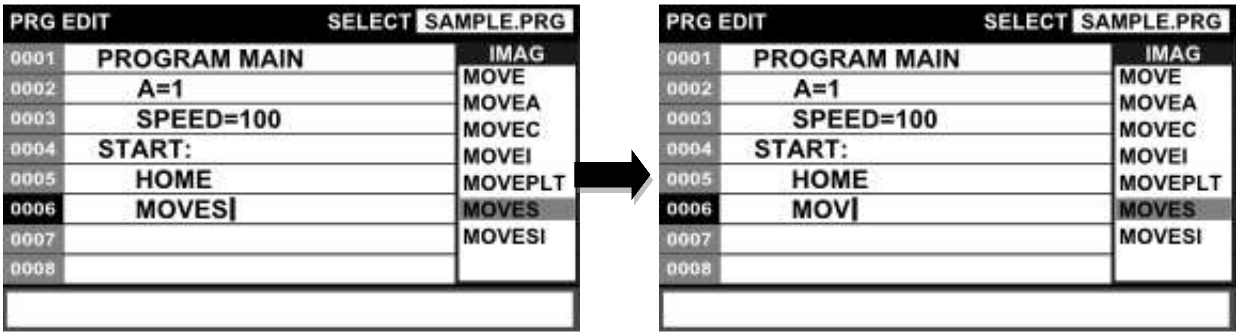


```
PRG EDIT                SELECT SAMPLE.PRG
0001  PROGRAM MAIN        IMAG
0002     A=1              MOVE
0003     SPEED=100        MOVEA
0004  START:              MOVEC
0005     HOME             MOVEI
0006     MOV|             MOVEPLT
0007                      MOVES
0008                      MOVESI
```

```
PRG EDIT                SELECT SAMPLE.PRG
0001  PROGRAM MAIN        IMAG
0002     A=1              MOVE
0003     SPEED=100        MOVEA
0004  START:              MOVEC
0005     HOME             MOVEI
0006     MOVES|           MOVEPLT
0007                      MOVES
0008                      MOVESI
```

Step 4: Execution of direct entry

Press the [EXE] key.



```
0001 PROGRAM MAIN
0002     A=1
0003     SPEED=100
0004 START:
0005     HOME
0006     MOVES
0007
0008
```

```
0001 PROGRAM MAIN
0002     A=1
0003     SPEED=100
0004 START:
0005     HOME
0006     MOV
0007
0008
```

Once direct entry is executed, the candidate entry window closes automatically.

Cautions

- It is not possible to switch to enable or disable the function while the candidate entry window is being displayed.
- When a character string is selected by pressing the [EXE] or [SPACE] key during candidate entry, the candidate entry window closes.

4.13 Program Hierarchy Display

Functional Explanation

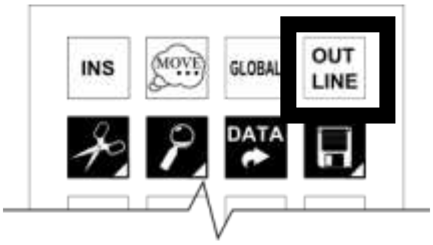
The main program, subprograms and labels are displayed in hierarchy for the program currently being edited.

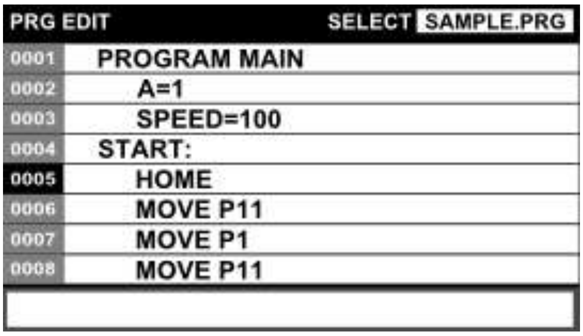
It is possible to move to the beginning of each block from hierarchical display.

Operating Procedure

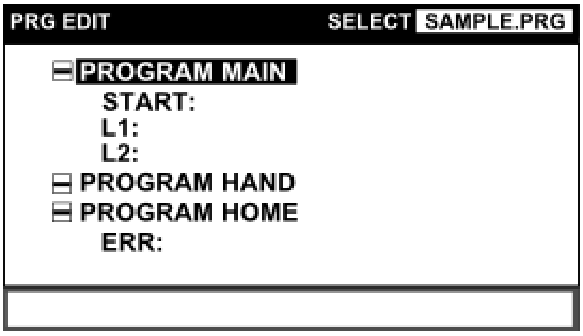
Step 1: Execution of hierarchical display

Press the [OUTLINE] key. The program currently being edited is displayed in hierarchy.



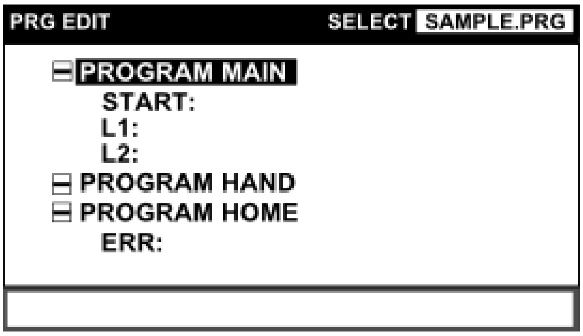


```
PRG EDIT                    SELECT SAMPLE.PRG
0001  PROGRAM MAIN
0002     A=1
0003     SPEED=100
0004  START:
0005     HOME
0006     MOVE P11
0007     MOVE P1
0008     MOVE P11
```

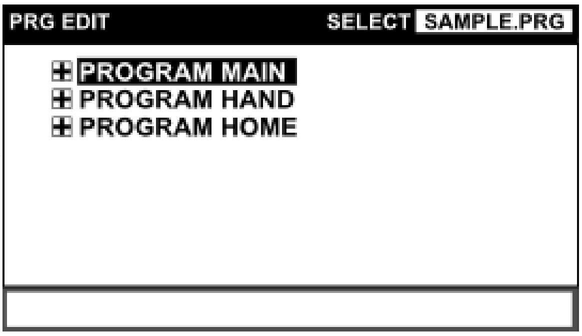


```
PRG EDIT                    SELECT SAMPLE.PRG
⊟PROGRAM MAIN
   START:
   L1:
   L2:
⊟PROGRAM HAND
⊟PROGRAM HOME
   ERR:
```

The hierarchy can be opened and closed with the left and right cursor keys.



```
PRG EDIT                    SELECT SAMPLE.PRG
⊟PROGRAM MAIN
   START:
   L1:
   L2:
⊟PROGRAM HAND
⊟PROGRAM HOME
   ERR:
```

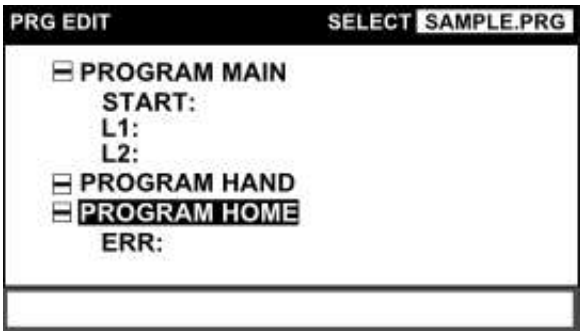


```
PRG EDIT                    SELECT SAMPLE.PRG
⊞PROGRAM MAIN
⊞PROGRAM HAND
⊞PROGRAM HOME
```

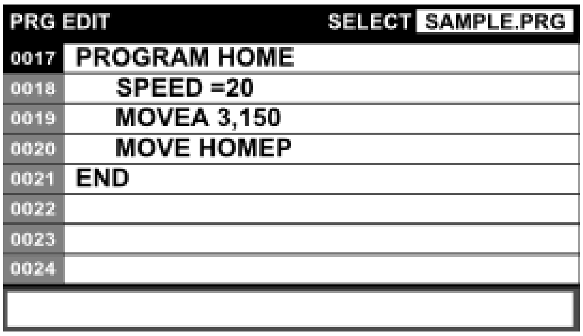
Step 2: Moving to each block from hierarchical display

Select the name of the block you want to move from hierarchical display and then press the [EXE] key.

It is possible to move to the beginning of the block you selected.



```
PRG EDIT                    SELECT SAMPLE.PRG
⊟PROGRAM MAIN
   START:
   L1:
   L2:
⊟PROGRAM HAND
⊟PROGRAM HOME
   ERR:
```



```
PRG EDIT                    SELECT SAMPLE.PRG
0017  PROGRAM HOME
0018     SPEED =20
0019     MOVEA 3,150
0020     MOVE HOMEP
0021  END
0022
0023
0024
```

Step 3: Finishing hierarchical display

Press the [ESC] or [OUTLINE] key.

4.14 Move to Beginning of Program

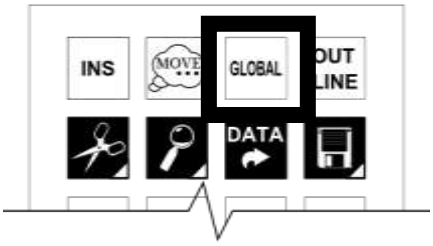
Functional Explanation

Moves the cursor to the beginning (GLOBAL section) of the program being edited.

Operating Procedure

Step 1: Moving to the beginning of the program

Press the [GLOBAL] key. Move to the beginning of the program



Step 2: Returning to the program section

Press the [GLOBAL] key again. It is possible to return to the position of the cursor when the cursor moved to the beginning of the program.

Caution

- If there is no GLOBAL section in the program file, the cursor will move to the beginning of the file.

4.15 Program Edit Functions

The TP3000 has the following program edit functions.
A list of these functions is outlined in the table below.

Menu	Key Icon	Description of Operation
[COPY]	COPY	Copies a character string.
[CUT]	CUT	Cuts a character string.
[PEST]	PAST	Pastes a copied or cut character string to the position immediately after the cursor.
[SRCH]	SRCH	Searches the specified character string.
[CHNG]	CHNG	Searches and replaces the specified character string.
[CALL]	CALL	Moves the cursor to the beginning of a subprogram or label.
[JUMP]	JUMP	Moves the cursor to the beginning of the specified line.
[DATA EDIT]	DATA ➦	Starts the data editor.
[SAVE]	SAVE	Saves data and quits the editor.
[NO SAVE]	NO SAVE	Quits the editor without saving the file. Discards edited data.

4.15.1 Copy

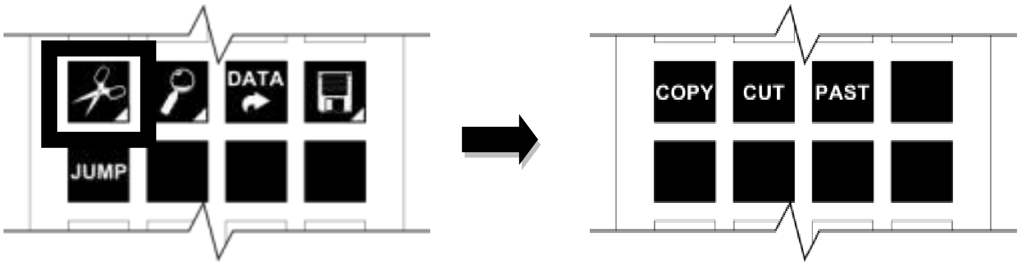
Functional Explanation

Copies a character string.

Operating Procedure

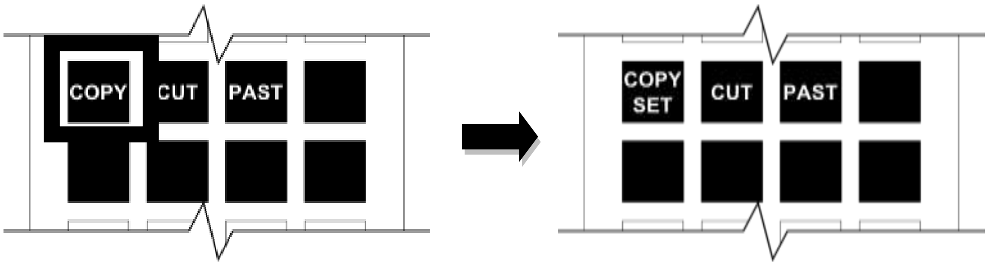
Step 1: Calling the [COPY] key

Press the "Scissors" key. The [COPY], [CUT] and [PAST] keys are displayed on the key sheet.

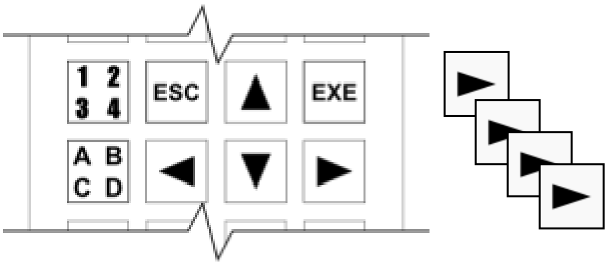

DATA
JUMP
COPY
CUT
PAST

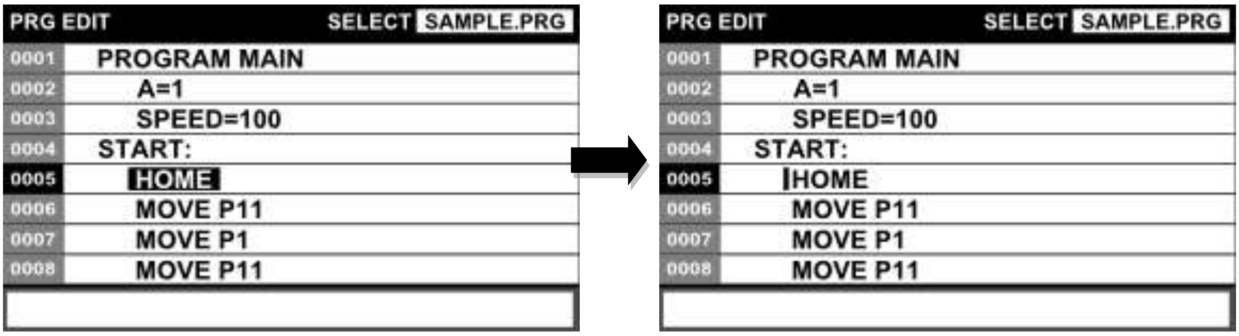
Step 2: Setting up the copy range

Press the [COPY] key. The display of the [COPY] key changes to the [COPY SET] key.


COPY
CUT
PAST
COPY SET
CUT
PAST

When the cursor is manipulated at this time, the range traced with the cursor is displayed in reverse video.



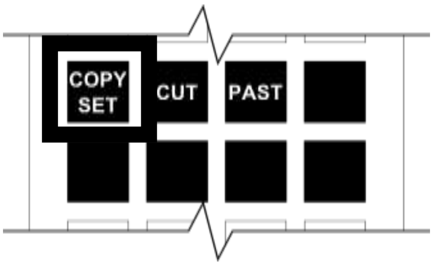


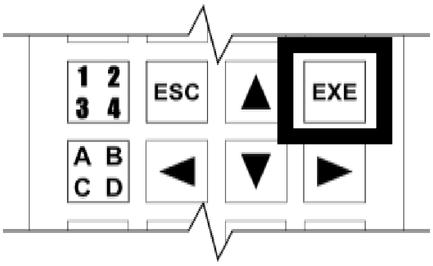
```
PRG EDIT                SELECT SAMPLE.PRG
0001  PROGRAM MAIN
0002     A=1
0003     SPEED=100
0004  START:
0005     HOME
0006     MOVE P11
0007     MOVE P1
0008     MOVE P11
```

```
PRG EDIT                SELECT SAMPLE.PRG
0001  PROGRAM MAIN
0002     A=1
0003     SPEED=100
0004  START:
0005    |HOME
0006     MOVE P11
0007     MOVE P1
0008     MOVE P11
```

Step 3: Execution of copy

After specifying a block of the range you want to copy, press the [COPY SET] or [EXE] key.





Related Functions

- During block specification, the cursor can also be moved in word units and to the end of the line.
- Multiple lines can be copied at the same time.

4.15.2 Cut

Functional Explanation

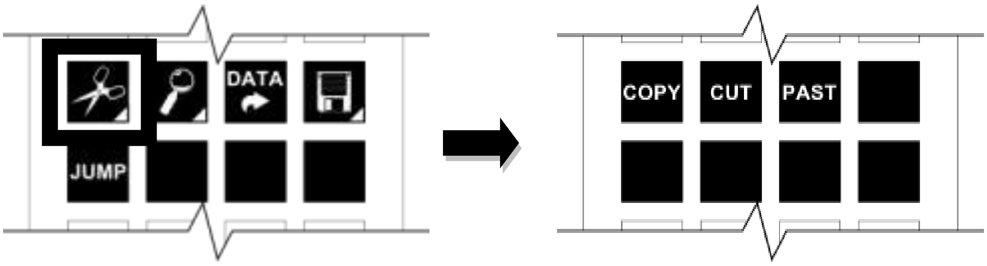
Cuts a character string.

Operating Procedure

Step 1: Calling the [CUT] key

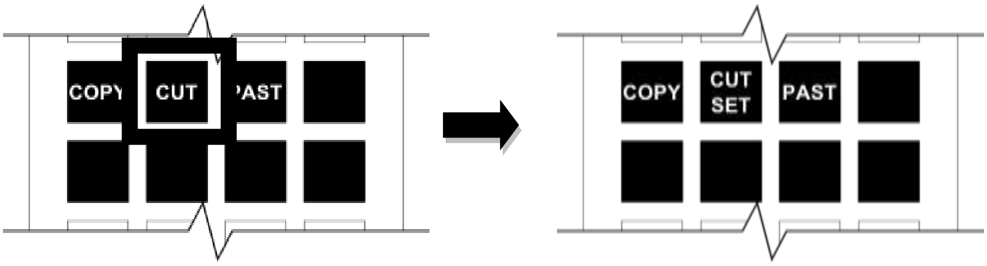
Press the "Scissors" key.

The [COPY], [CUT] and [PAST] keys are displayed on the key sheet.

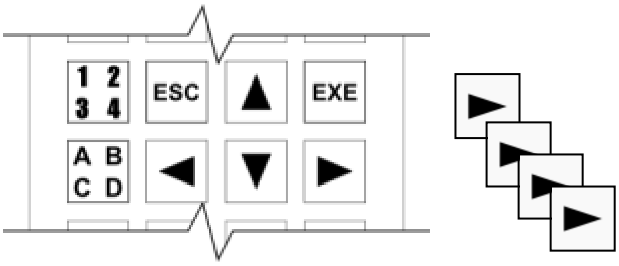

DATA
JUMP
COPY
CUT
PAST

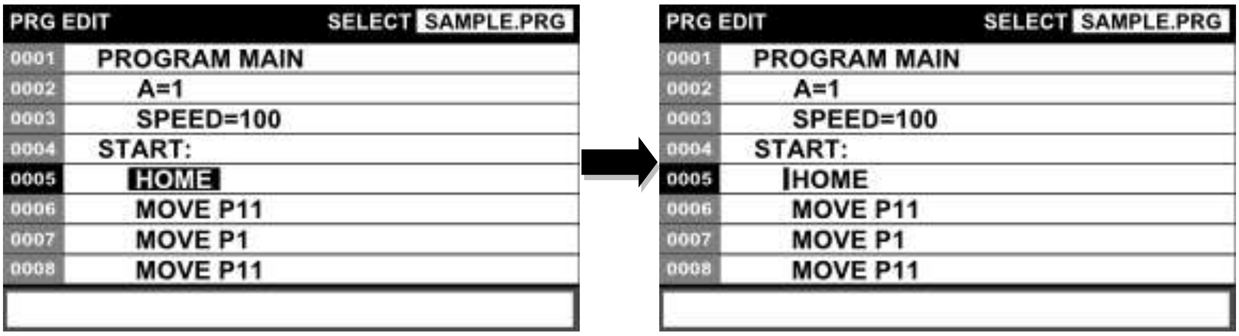
Step 2: Setting up the cut range

Press the [CUT] key. The display of the [CUT] key changes to the [CUT SET] key.


COPY
CUT
PAST
COPY
CUT SET
PAST

When the cursor is manipulated at this time, the range traced with the cursor is displayed in reverse video.



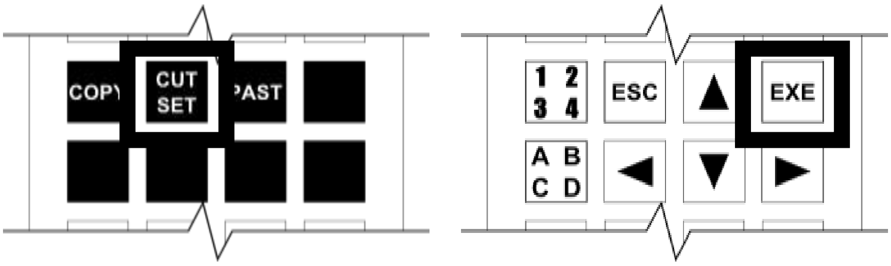


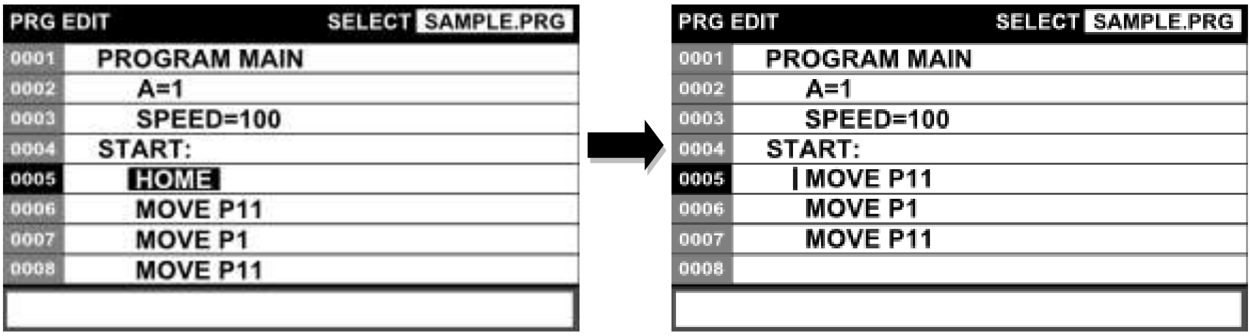
```
PRG EDIT                SELECT SAMPLE.PRG
0001 PROGRAM MAIN
0002      A=1
0003      SPEED=100
0004 START:
0005      HOME
0006      MOVE P11
0007      MOVE P1
0008      MOVE P11
```

```
PRG EDIT                SELECT SAMPLE.PRG
0001 PROGRAM MAIN
0002      A=1
0003      SPEED=100
0004 START:
0005     |HOME
0006      MOVE P11
0007      MOVE P1
0008      MOVE P11
```

Step 3: Execution of cut

After specifying a block of the range you want to cut, press the [CUT SET] or [EXE] key.





```
PRG EDIT                SELECT SAMPLE.PRG
0001 PROGRAM MAIN
0002      A=1
0003      SPEED=100
0004 START:
0005      HOME
0006      MOVE P11
0007      MOVE P1
0008      MOVE P11
```

```
PRG EDIT                SELECT SAMPLE.PRG
0001 PROGRAM MAIN
0002      A=1
0003      SPEED=100
0004 START:
0005     |MOVE P11
0006      MOVE P1
0007      MOVE P11
0008
```

Related Functions

- During block specification, the cursor can also be moved in word units and to the end of the line.
- Multiple lines can be cut at the same time.

4.15.3 Paste

Functional Explanation

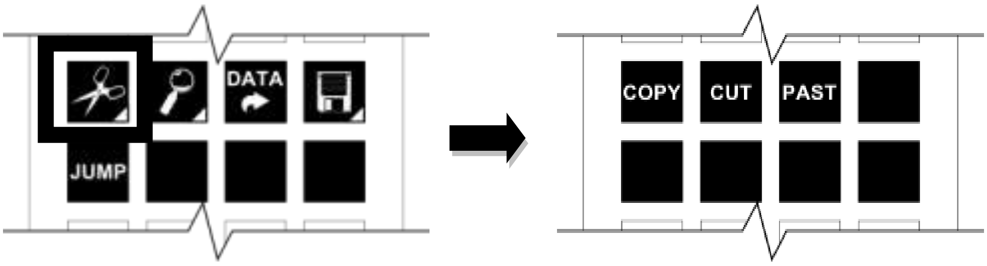
Pastes a copy or cut character string.

Operating Procedure

Step 1: Calling the [PAST] key

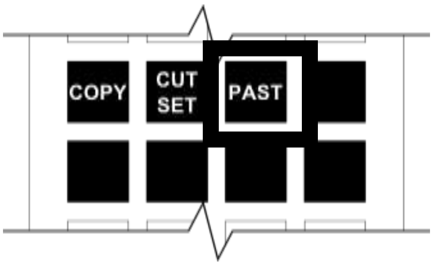
Press the “Scissors” key.

The [COPY], [CUT] and [PAST] keys are displayed on the key sheet.



Step 2: Execution of paste

Move the cursor to the position where you want to paste to and then press the [PAST] key.



Cautions

- If copy is executed after cutting, the cut character string will be lost.
- The data in the paste buffer is maintained while the editor is running.

4.15.4 Search

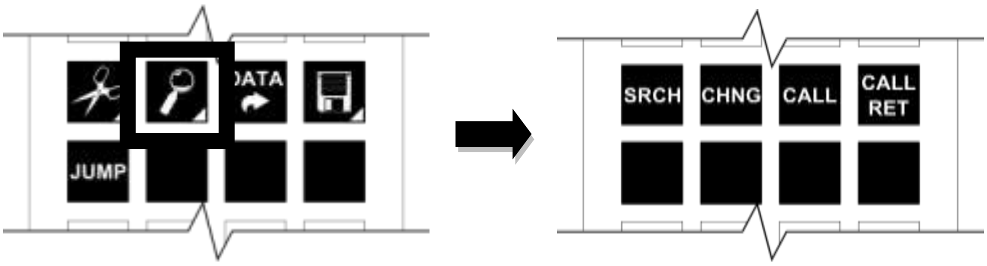
Functional Explanation

Searches for a character string. If there are search candidate character strings, you can move among the candidates using the up and down cursor keys.

Operating Procedure

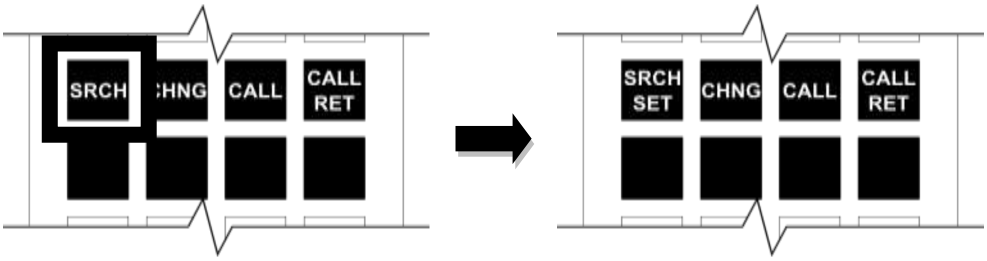
Step 1: Calling the [SRCH] key

Press the “Loupe” key. The [SRCH], [CHNG], [CALL] and [CALL RET] keys are displayed on the key sheet.

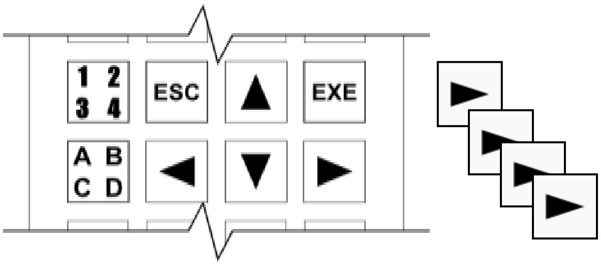

ATA
JUMP
SRCH
CHNG
CALL
CALL RET

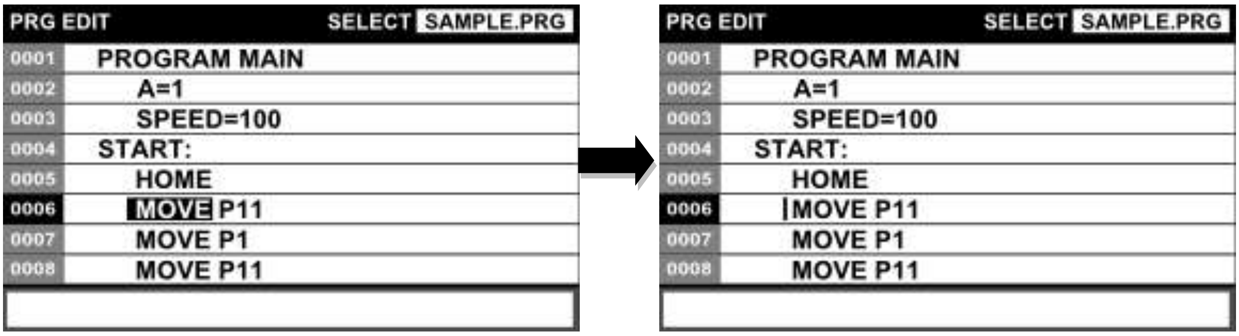
Step 2: Extracting search character strings

Press the [SRCH] key. The display of the [SRCH] key changes to the [SRCH SET] key.


SRCH
HNG
CALL
CALL RET
SRCH SET
CHNG
CALL
CALL RET

When the cursor is manipulated at this time, the range traced with the cursor is displayed in reverse video.


1 2 3 4
ESC
EXE
A B C D

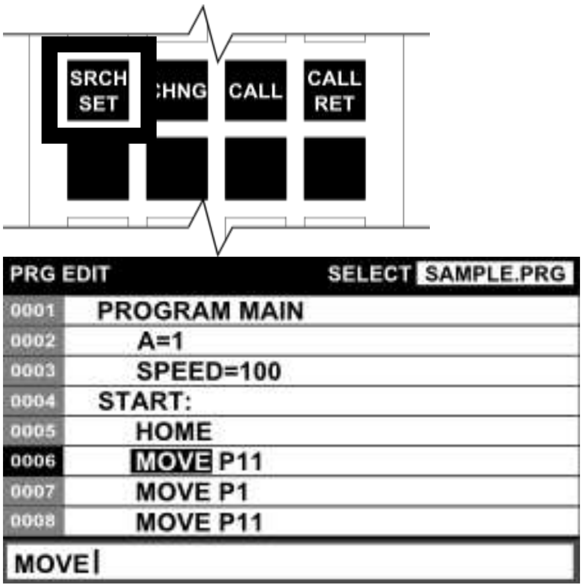


```
0001 PROGRAM MAIN
0002   A=1
0003   SPEED=100
0004 START:
0005   HOME
0006   MOVE P11
0007   MOVE P1
0008   MOVE P11
```

```
0001 PROGRAM MAIN
0002   A=1
0003   SPEED=100
0004 START:
0005   HOME
0006   |MOVE P11
0007   MOVE P1
0008   MOVE P11
```

After specifying a block of the character string you want to search for, press the [SRCH SET] key.

The cursor moves to the command line.



```
0001 PROGRAM MAIN
0002   A=1
0003   SPEED=100
0004 START:
0005   HOME
0006   MOVE P11
0007   MOVE P1
0008   MOVE P11
MOVE|
```

- * If you are not selecting the character string you want to search for in the program, press the [SRCH] key and then immediately press the [SRCH SET] key.

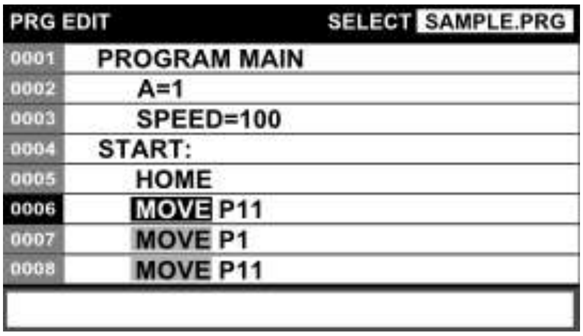
Step 3: Editing a search character string

Edit the search character string by editing the command line. Once the character string you want to search has been determined, press the [EXE] key.

Step 4: Moving search candidates

When search is executed, search candidates are displayed in different colors. (If there is no search character string candidate, the function will be cleared.)

Move the search candidates using the up and down cursor keys.



PRG EDIT SELECT SAMPLE.PRG

```
PROGRAM MAIN
   A=1
   SPEED=100
START:
   HOME
   MOVE P11
   MOVE P1
   MOVE P11
```

Step 5: Quitting the search function
To finish moving search candidates, press a key other than the up and down cursor keys.
The cursor appears and the search function finishes.

Caution

- Neither kanji nor kana characters can be searched for in a file containing kanji and kana characters in a program.

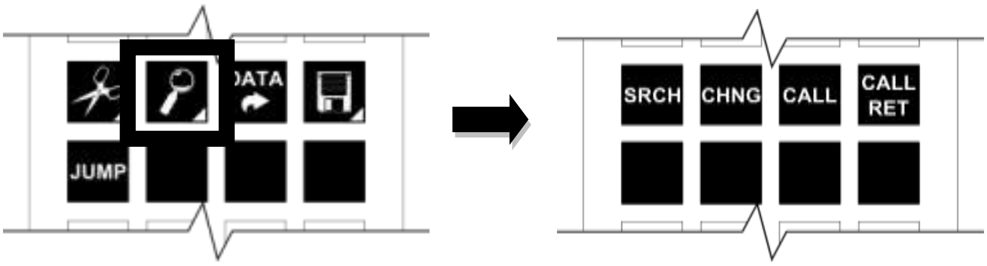
4.15.5 Replace

Functional Explanation

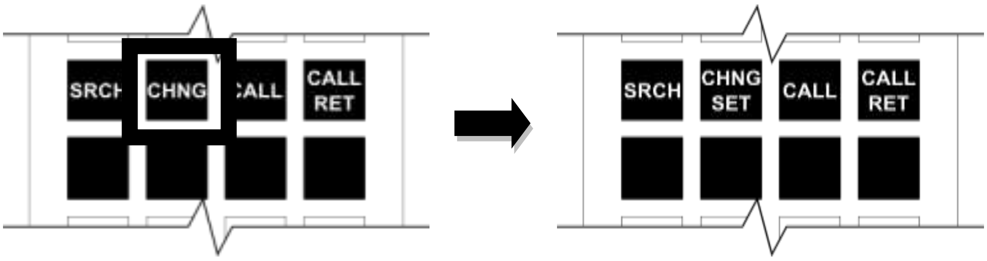
Searches for the specified character string and replaces it with another character string.

Operating Procedure

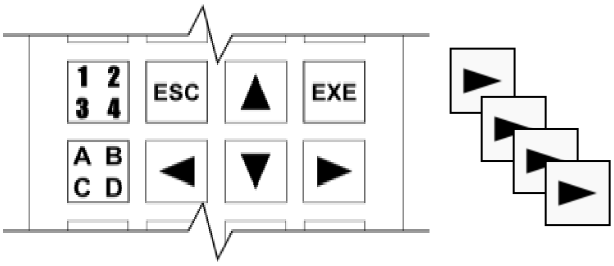
Step 1: Calling the [SRCH] key
Press the “Loupe” key. The [SRCH], [CHNG], [CALL] and [CALL RET] keys are displayed on the key sheet.

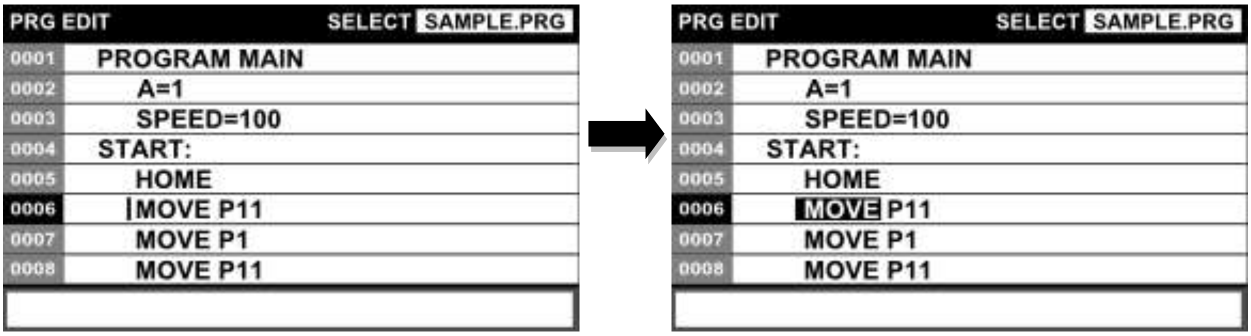


Step 2: Extracting a replacement candidate
Press the [CHNG] key. The display of the [CHNG] key changes to the [CHNG SET] key.


SRCH
CHNG
CALL
CALL RET
SRCH
CHNG SET
CALL
CALL RET

When the cursor is manipulated at this time, the range traced with the cursor is displayed in reverse video.

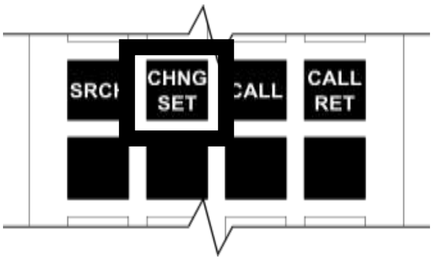

1 2 3 4
ESC
▲
EXE
A B C D
◄
▼
►
►

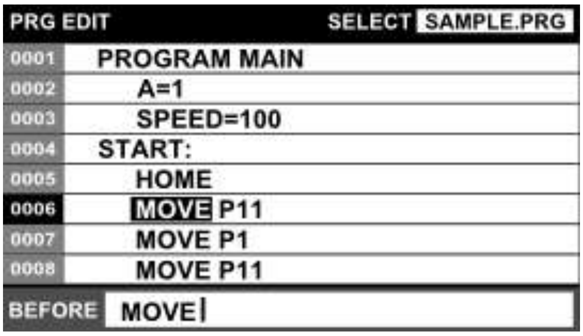


```
PRG EDIT                SELECT SAMPLE.PRG
0001  PROGRAM MAIN
0002     A=1
0003     SPEED=100
0004  START:
0005     HOME
0006     |MOVE P11
0007     MOVE P1
0008     MOVE P11
```

```
PRG EDIT                SELECT SAMPLE.PRG
0001  PROGRAM MAIN
0002     A=1
0003     SPEED=100
0004  START:
0005     HOME
0006     MOVE P11
0007     MOVE P1
0008     MOVE P11
```

After specifying a block of the character string you want to search for, press the [CHNG SET] key.
The cursor moves to the command line (BEFORE).


SRCH
CHNG SET
CALL
CALL RET



```
PRG EDIT                SELECT SAMPLE.PRG
0001  PROGRAM MAIN
0002     A=1
0003     SPEED=100
0004  START:
0005     HOME
0006     MOVE P11
0007     MOVE P1
0008     MOVE P11
BEFORE  MOVE|
```

- ∗ If you are not selecting a replacement candidate in the program, press the [CHNG] key and then immediately press the [CHNG SET] key.

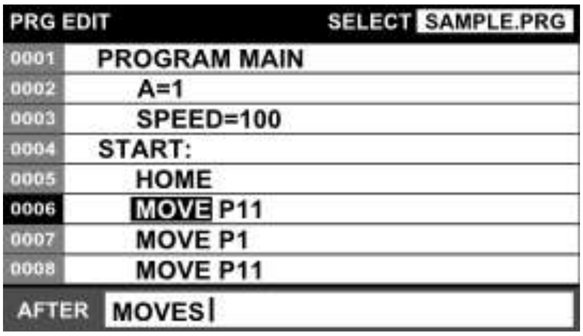
Step 3: Extracting a replacement candidate

Edit the search character string by editing the command line. Once the character string you want to search has been determined, press the [EXE] key.

Step 4: Editing the replacing character string

Press the [BEF/AFT] key on the top key sheet.

The cursor moves to the command line (AFTER). Edit the replacing character string.



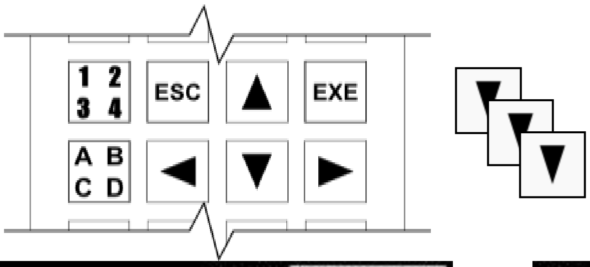
```
PRG EDIT                    SELECT SAMPLE.PRG
0001  PROGRAM MAIN
0002     A=1
0003     SPEED=100
0004  START:
0005     HOME
0006     MOVE P11
0007     MOVE P1
0008     MOVE P11
AFTER  MOVES|
```

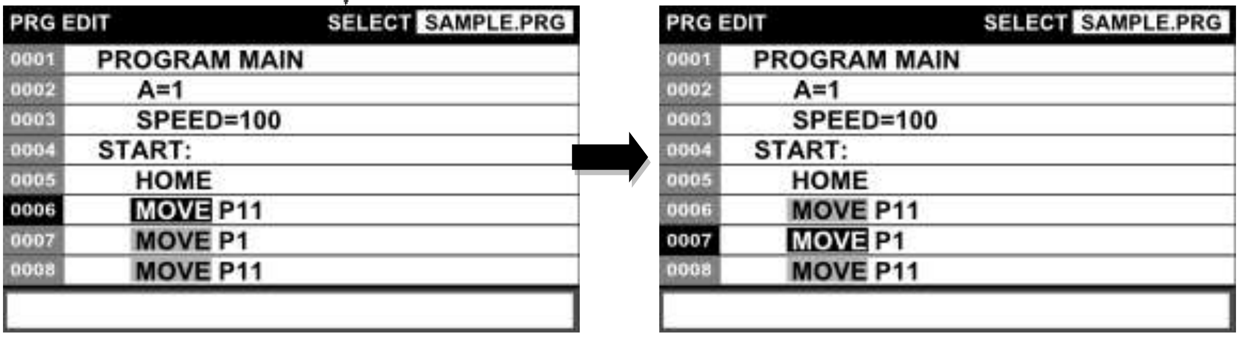
Once the replacement candidate and the replacing character string have been determined, press the [EXE] key.

Step 5: Moving a replacement candidate

When there are replacement candidates, they are displayed in different colors. (If there is no replacement candidate, the function will be cleared.)

Move the replacement candidate using the up and down cursor keys.



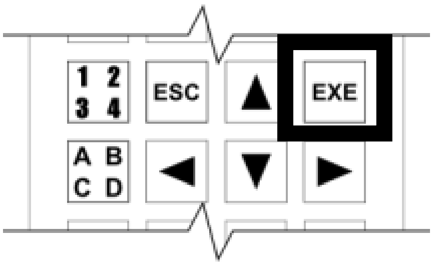


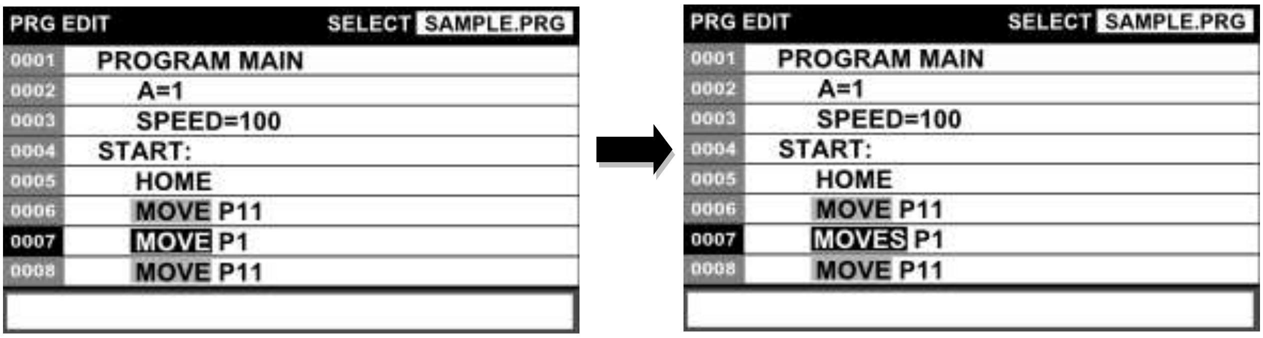
```
PRG EDIT                    SELECT SAMPLE.PRG
0001  PROGRAM MAIN
0002     A=1
0003     SPEED=100
0004  START:
0005     HOME
0006     MOVE P11
0007     MOVE P1
0008     MOVE P11
```

```
PRG EDIT                    SELECT SAMPLE.PRG
0001  PROGRAM MAIN
0002     A=1
0003     SPEED=100
0004  START:
0005     HOME
0006     MOVE P11
0007     MOVE P1
0008     MOVE P11
```

Step 6: Execution of replacement

To execute the replacement of the replacement candidate, press the [EXE] key.




```
PRG EDIT                    SELECT SAMPLE.PRG
0001  PROGRAM MAIN
0002      A=1
0003      SPEED=100
0004  START:
0005      HOME
0006      MOVE P11
0007      MOVE P1
0008      MOVE P11
```

```
PRG EDIT                    SELECT SAMPLE.PRG
0001  PROGRAM MAIN
0002      A=1
0003      SPEED=100
0004  START:
0005      HOME
0006      MOVE P11
0007      MOVES P1
0008      MOVE P11
```

Step 7: Quitting the replace function

To finish moving replacement candidates, press a key other than the up and down cursor keys.

The cursor appears at the left of the replacement candidate and the replace function finishes.

Caution

- Neither kanji nor kana characters can be replaced in a file containing kanji and kana characters in a program.

4.15.6 Calling a Subprogram or Label

Functional Explanation

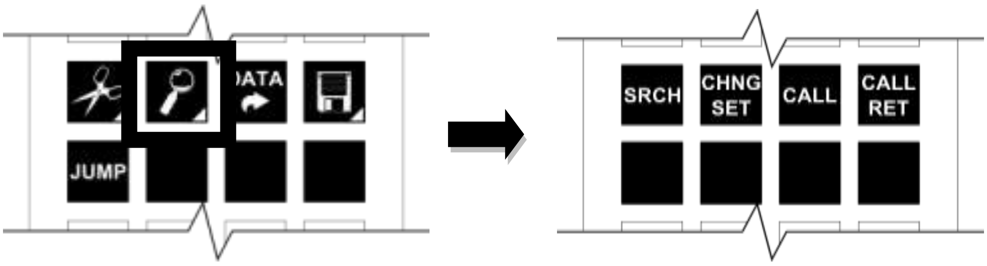
Moves the cursor to the beginning of a subprogram or label in the program.

After moving the cursor to the beginning of a subprogram or label, it is possible to return to the calling source.

Operating Procedure

Step 1: Calling the [CALL] and [CALL RET] keys

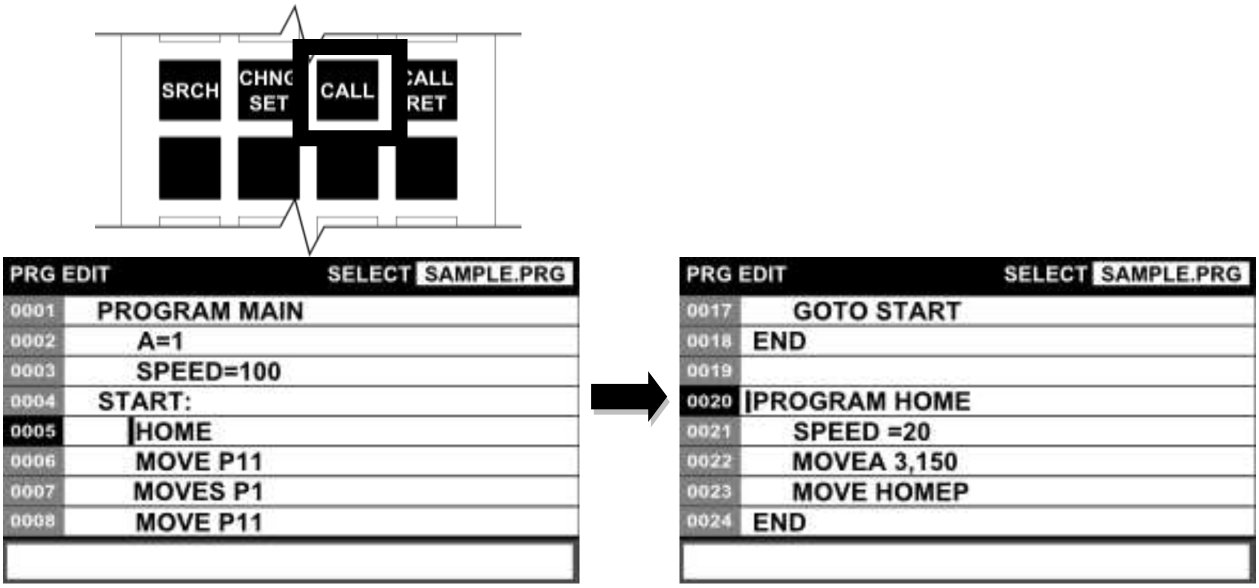
Press the “Loupe” key. The [SRCH], [CHNG], [CALL] and [CALL RET] keys are displayed on the key sheet.



Step 2: Calling a subprogram or label

Position the cursor on a subprogram name or label in the main program, and then press the [CALL] key.

Move the cursor to the beginning of a subprogram or label.

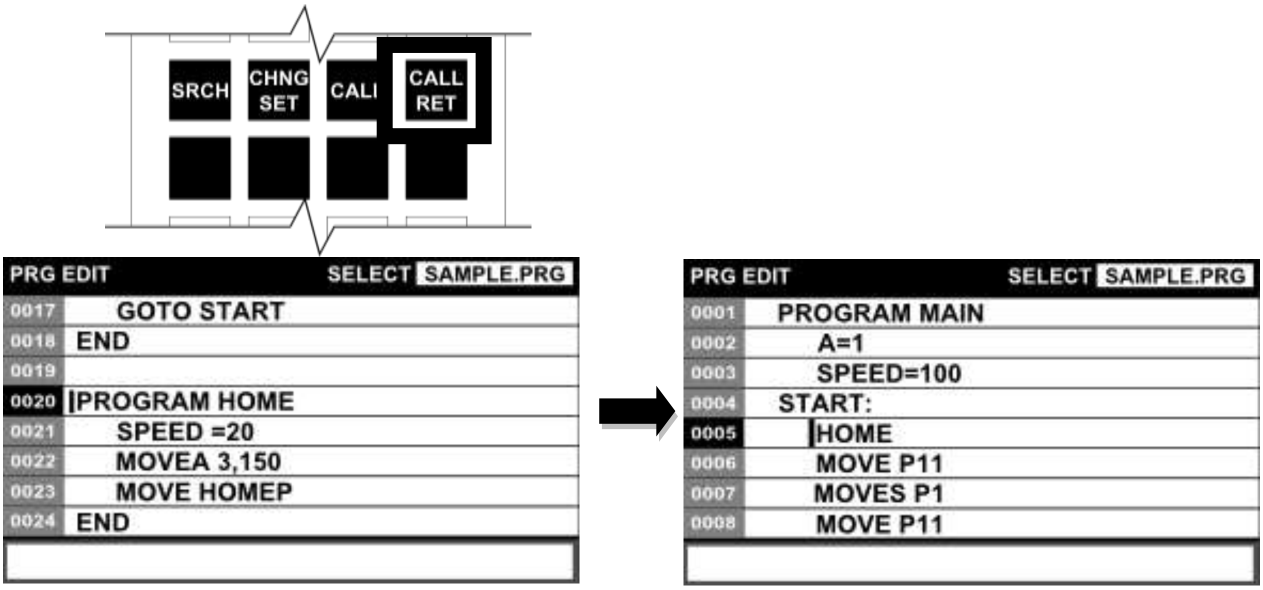


```
PRG EDIT                SELECT SAMPLE.PRG
0001  PROGRAM MAIN
0002      A=1
0003      SPEED=100
0004  START:
0005     |HOME
0006      MOVE P11
0007      MOVES P1
0008      MOVE P11
```

```
PRG EDIT                SELECT SAMPLE.PRG
0017      GOTO START
0018  END
0019
0020 |PROGRAM HOME
0021      SPEED =20
0022      MOVEA 3,150
0023      MOVE HOMEP
0024  END
```

Step 3: Returning from a subprogram or label to the calling source

Press the [CALL RET] key. Return the cursor to the source that called the subprogram or label.



```
PRG EDIT                SELECT SAMPLE.PRG
0017      GOTO START
0018  END
0019
0020 |PROGRAM HOME
0021      SPEED =20
0022      MOVEA 3,150
0023      MOVE HOMEP
0024  END
```

```
PRG EDIT                SELECT SAMPLE.PRG
0001  PROGRAM MAIN
0002      A=1
0003      SPEED=100
0004  START:
0005     |HOME
0006      MOVE P11
0007      MOVES P1
0008      MOVE P11
```

Caution

- If the cursor is not positioned on a subprogram name or label, the [CALL] key does not take effect.

4.15.7 Jump to Specified Line

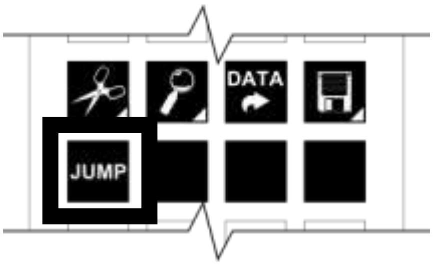
Functional Explanation

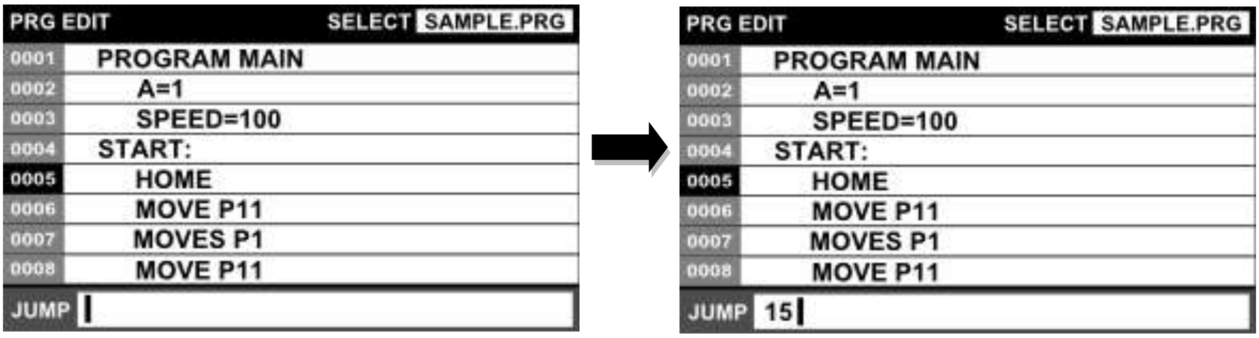
Moves the cursor to the beginning of the specified line.

Operating Procedure

Step 1: Execution of jump

Press the [JUMP] key. The cursor moves to the command line.

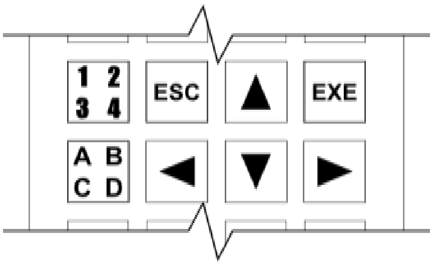


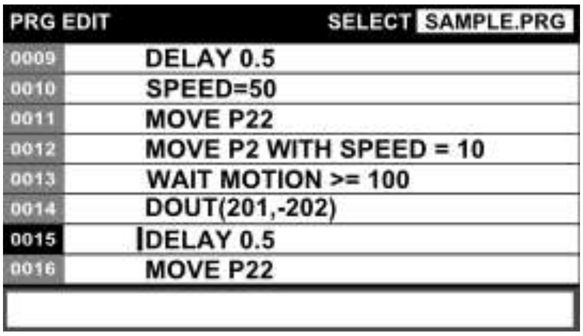


```
PRG EDIT                 SELECT SAMPLE.PRG
0001  PROGRAM MAIN
0002      A=1
0003      SPEED=100
0004  START:
0005      HOME
0006      MOVE P11
0007      MOVES P1
0008      MOVE P11
JUMP |
```

```
PRG EDIT                 SELECT SAMPLE.PRG
0001  PROGRAM MAIN
0002      A=1
0003      SPEED=100
0004  START:
0005      HOME
0006      MOVE P11
0007      MOVES P1
0008      MOVE P11
JUMP 15|
```

Enter the line number and then press the [EXE] key.





```
PRG EDIT                 SELECT SAMPLE.PRG
0009      DELAY 0.5
0010      SPEED=50
0011      MOVE P22
0012      MOVE P2 WITH SPEED = 10
0013      WAIT MOTION >= 100
0014      DOUT(201,-202)
0015     |DELAY 0.5
0016      MOVE P22
```

Related Function

- If a line number exceeding the last line number containing a file is entered, the cursor moves to that last line number.

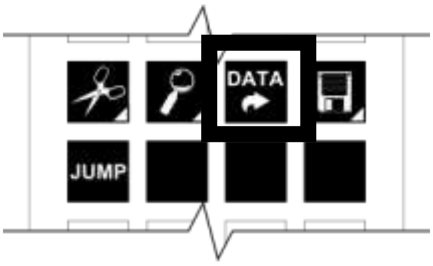
4.15.8 Edit Data

Functional Explanation

Starts the data editor.

Operating Procedure

Step 1: Starting the data editor
Press the [DATA] key. Start the data editor. For details on data editing, please see Section 5.



Related Function

- If the [DATA] key is pressed while the focus of the cursor is on a point name and that point name exists in the data section, point data will be called up to the top row of the table as the data editor is started.

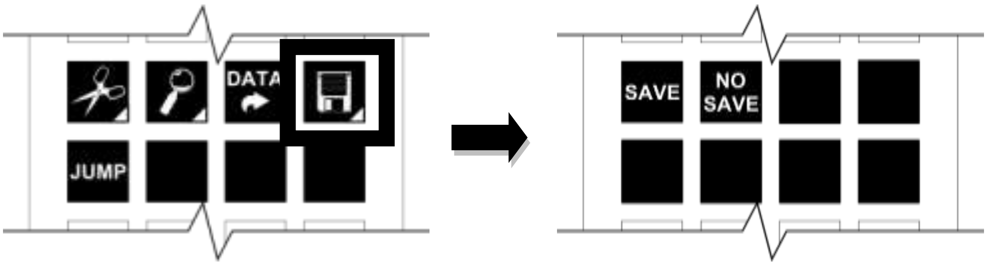
4.15.9 Save and Quit

Functional Explanation

Saves the program data and quits the program editor.

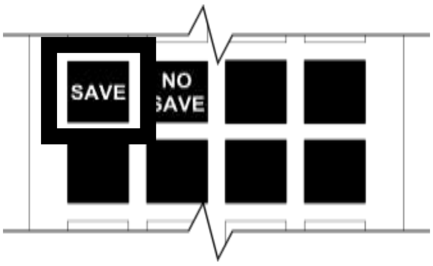
Operating Procedure

Step 1: Calling the [SAVE] key
Press the [File] key. The [SAVE] and [NO SAVE] keys are displayed on the key sheet.

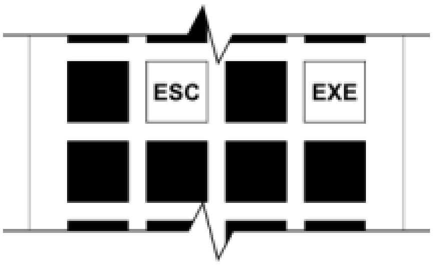


Step 2: Execution of save

Press the [SAVE] key. A save confirmation message appears on the command line.



Next, press the [EXE] key. Save the file to the controller and quit the program editor.
If the [ESC] key is pressed while a confirmation message is being displayed, [SAVE] is canceled and program editing can be continued.



4.15.10 Discard Changes and Quit

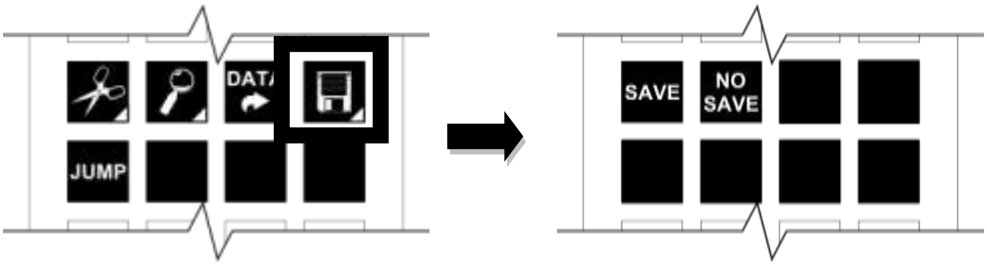
Functional Explanation

Discards the changes made and quits the program editor.

Operating Procedure

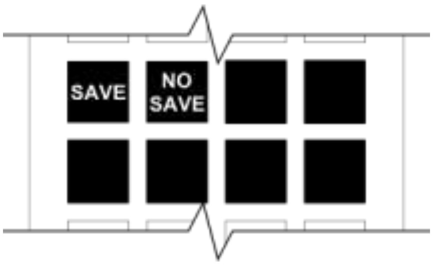
Step 1: Calling the [NOSEVE] key

Press the [File] key. The [SAVE] and [NO SAVE] keys are displayed on the key sheet.



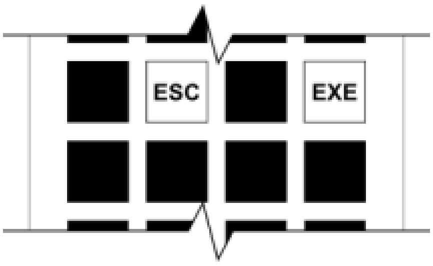
Step 2: Discards the changes made and quits the program editor.

Press the [NO SAVE] key. A no-save confirmation message appears on the command line.



Press the [EXE] key. Discard the changes made and quits the program editor.

If the [ESC] key is pressed while a confirmation message is being displayed, [NO SAVE] is canceled and program editing can be continued.



4.15.11 Automatic Start File

Functional Explanation

Prepare a batch file named "AUTOSTR. BAT" in the controller in advance, and then turn off/on the power to the controller.

When the power is turned on, the batch file "AUTOSTR. BAT" is started.

Creation Procedure

Step 1: Creating a batch file

Create a new batch file "AUTOSTR. BAT" by referring to Section 4.1.

Step 2: Editing a batch file

Edit the batch file in the program editor.

Enter a command that takes effect in batch processing and the name of the file that executes that command line by line.

The following five commands take effect in batch processing.

SELECT <filename>	:	Selects a file.
OVRD <override setting value>	:	Sets override.

DATE	Displays the day.
TIME	Displays the time.
SVON	Servo ON command
RUN	Program RUN command

The SVON command takes effect when the mode of the controller is the internal automatic (INTERNAL) mode or external automatic (EXT) mode.

Step 3: Quitting the program editor
Press the [SAVE] key and quits the program editor.
This creates a batch file for performing batch processing.

Step 4: Execution of a batch file
If the "AUTOSTR. BAT" file is stored in the RAM drive of the controller when the power is turned on, the batch file is automatically executed.

Section 5 Data Editing

The data editing function allows input and editing of positional data, coordinate data and load data. Each data is saved in a file together with a program, and can be edited on the file basis.

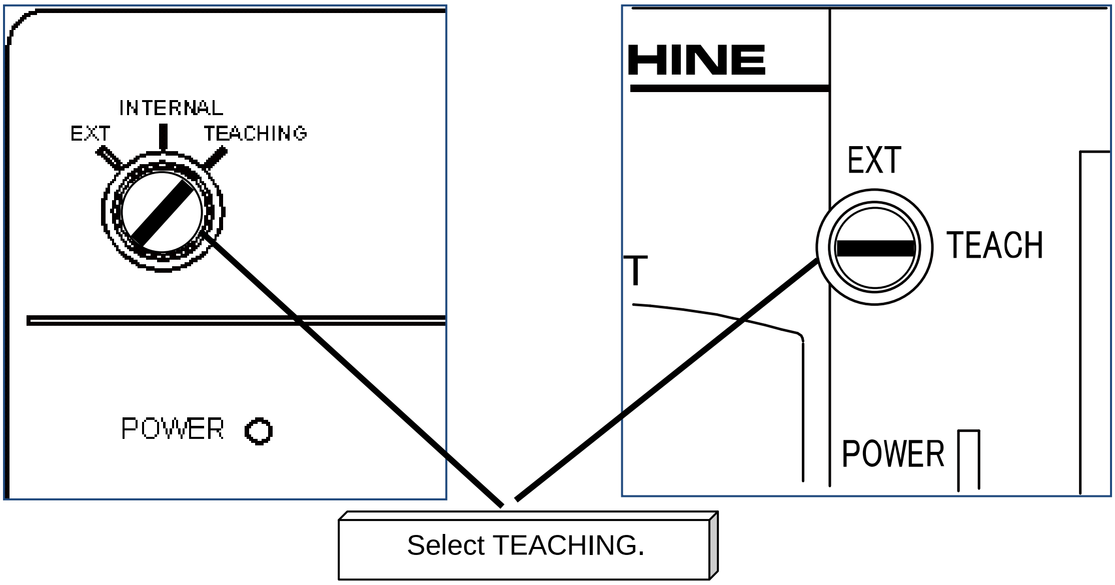
5.1 Starting Up the Data Editor

Functional Explanation

Start the data editor.

Operating Procedure

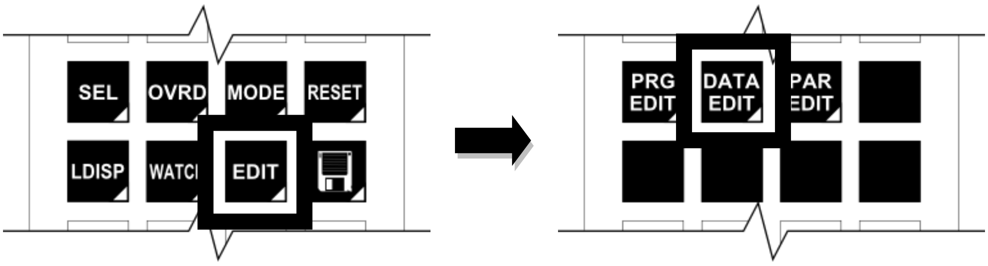
Step 1: Selecting a mode
Set the mode switch on the controller panel to "TEACHING".


TS3000 TSL3000

Select TEACHING.

Step 2: Selecting the data editor

Press the [EDIT] key on the top key sheet in the TEACHING mode. The key sheet and screen displays change, and the [PRG EDIT], [DATA EDIT] and [PAR EDIT] keys appear. Next, press the [DATA EDIT] key.

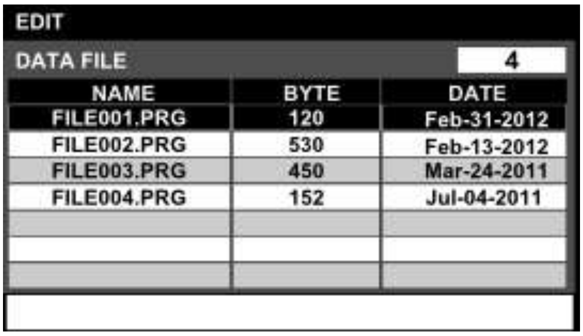


Step 3: Specifying a file

A list of the data files inside the controller appears on the screen.

To select an existing file, select the desired file with the up and down cursor keys and then press the [EXE] key.

The data editor starts.



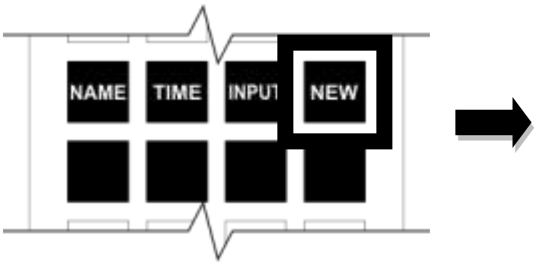
EDIT

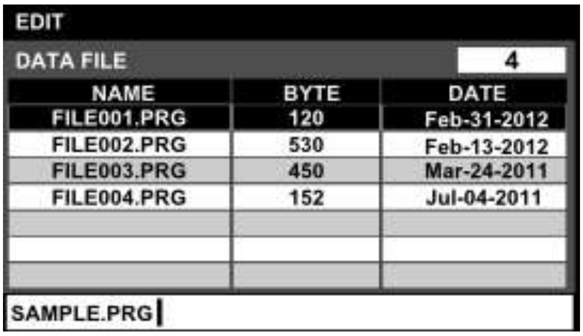
DATA FILE 4

NAME	BYTE	DATE
FILE001.PRG	120	Feb-31-2012
FILE002.PRG	530	Feb-13-2012
FILE003.PRG	450	Mar-24-2011
FILE004.PRG	152	Jul-04-2011

To create a new file, press the [NEW] key.

When the [NEW] key is pressed, the cursor moves to the command line; enter the desired file name.





EDIT

DATA FILE 4

NAME	BYTE	DATE
FILE001.PRG	120	Feb-31-2012
FILE002.PRG	530	Feb-13-2012
FILE003.PRG	450	Mar-24-2011
FILE004.PRG	152	Jul-04-2011

SAMPLE.PRG

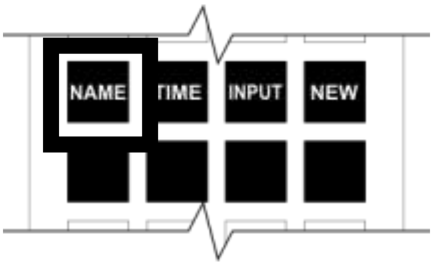
Once the file name has been determined, press the [EXE] key.

The data editor starts.

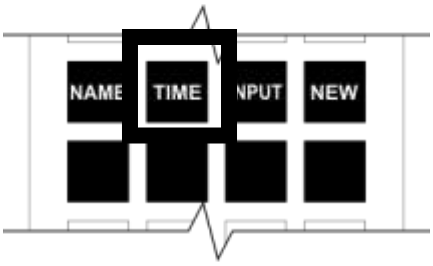
Related Functions

The file display sort functions include <display by name>, <display by file creation time> and <file search function>.

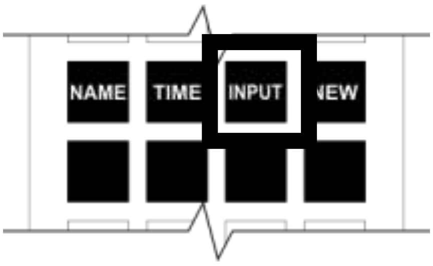
<Display by name>
Press the [NAME] key. The file list is sorted by name. Each time the [NAME] key is pressed, the sorting order changes between ascending order and descending order.



<Display by file creation time>
Press the [TIME] key. The file list is sorted by file creation time.
Each time the [TIME] key is pressed, the sorting order changes between ascending order and descending order.



<File search function>
Press the [INPUT] key.
After the cursor moves onto the command line, enter the character string you want to search for.
Once the character string has been determined, press the [EXE] key. Files staring with the character strings you just entered are displayed in a list.

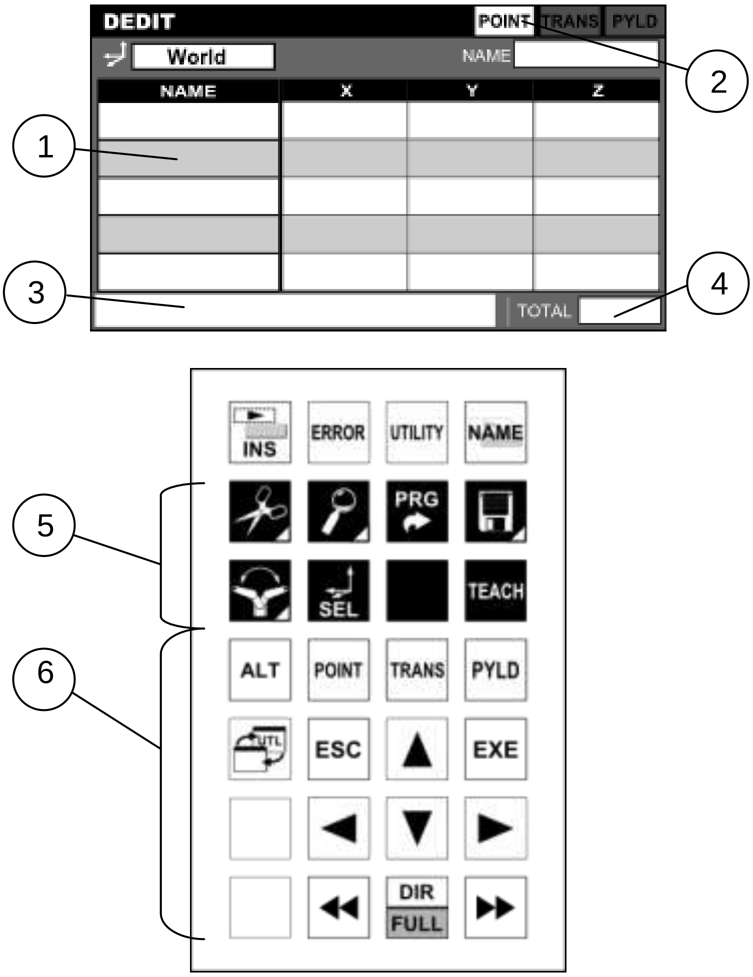


Cautions

- If a file with large memory size is specified, it will take a long time until the progress bar is shown and editing is enabled.
  Please wait until the progress bar disappears.
- Even if the Master Mode key switch is changed to "TEACHING" during editing, the editing mode does not finish.

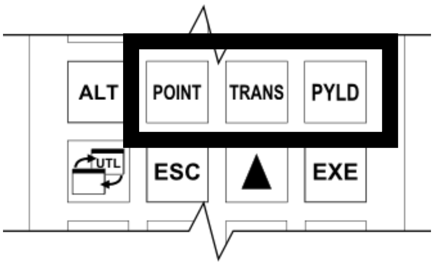
5.2 Configuration of the Data Editor

The configuration of the data editor screen is shown below.

Data Editor Screen and Key Sheet	Description of Display
	① Data Edit screen ② Editing data item POINT: Position data TRANS: Coordinate data PYLD: Load data ③ Command line ④ Data count ⑤ Program editing function menus ⑥ Text entry operation keys

DEDIT
POINT
TRANS
PYLD
World
NAME
NAME
X
Y
Z
TOTAL
1
2
3
4
5
6
INS
ERROR
UTILITY
NAME
PRG
SEL
TEACH
ALT
POINT
TRANS
PYLD
UTL
ESC
EXE
DIR
FULL

The data editor is configured to mainly edit position data, coordinate data, and load data. Press the [POINT] key to edit position data, the [TRANS] key to edit coordinate data, and the [PYLD] key to edit load data.


ALT
POINT
TRANS
PYLD
UTL
ESC
EXE

5.3 Basic Operations of the Data Editor

5.3.1 Add New Data

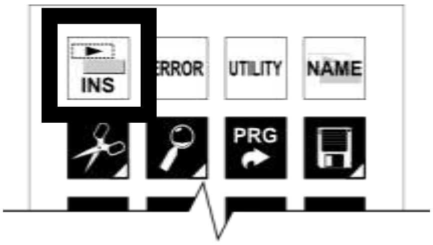
Functional Explanation

Adds new position data, coordinate data, and load data.

Operating Procedure

Step 1: Adding new data

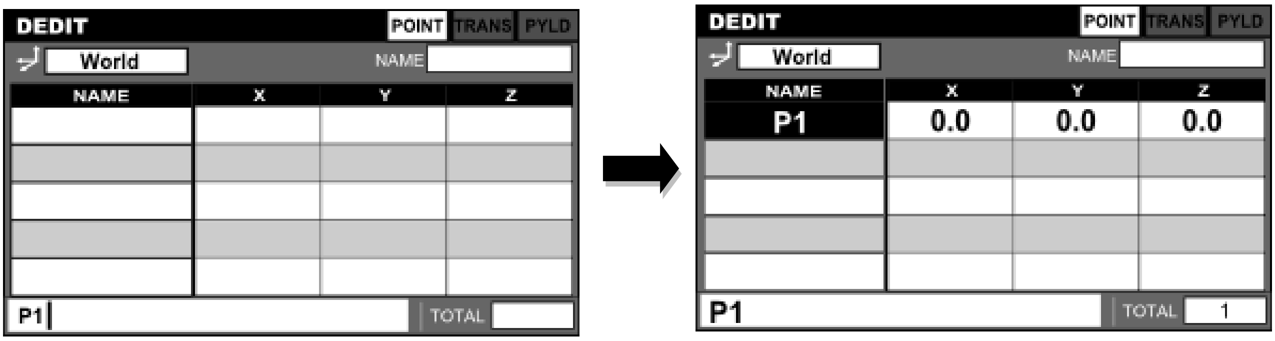
Press the [INS](insert line) key. The cursor moves to the command line.


INS
ERROR
UTILITY
NAME
PRG

Step 2: Entering a new data name

Enter a data name on the command line, and press the [EXE] key.

New data is added. (If there is existing data, new data will be added under the cell being selected.)


DEDIT
POINT
TRANS
PYLD
World
NAME
NAME
X
Y
Z
TOTAL

P1

NAME	X	Y	Z
P1	0.0	0.0	0.0

P1 TOTAL 1

Cautions

- The position data name can consist of up to 10 characters.
  When entering a name on the command line, if "(" is not entered within the first eight characters, no more than eight characters can be entered.
- Array type position data can consist of up to 20 characters.
  When entering a name on the command line, no more than 20 characters can be entered.
- When a coordinate system is set, the work coordinate system is set temporarily.
- If the input name is illegal, a message saying "ILLEGAL NAME" is displayed on the command line and no data is changed. Press any key, and the system returns to the name editing mode.
- If the specified name already exists, a message of "DUPLICATE NAME" is displayed on the command line and no data is changed. Press any key, and the system returns to the name editing mode.

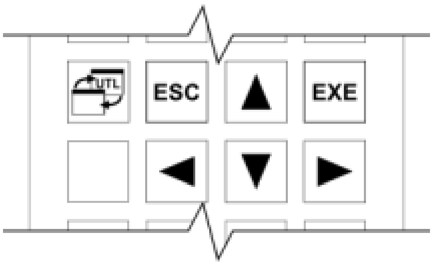
5.3.2 Edit Various Elements

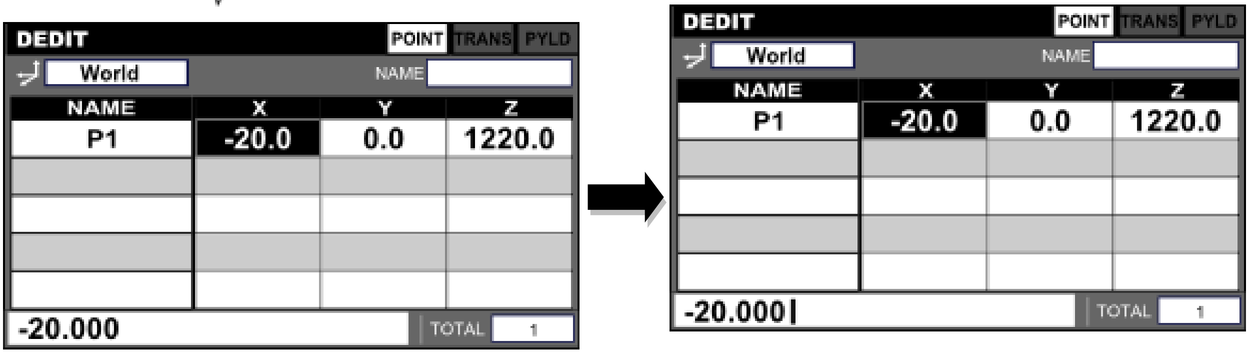
Functional Explanation

Edits various elements.

Operating Procedure

Step 1: Selecting an element
Position the cursor on the element cell you want to edit, and press the [EXE] key.
The cursor moves to the command line. At this time, copy the source data onto the command line.




DEDIT
POINT
TRANS
PYLD
World
NAME
TOTAL

NAME	X	Y	Z
P1	-20.0	0.0	1220.0

-20.000 TOTAL 1

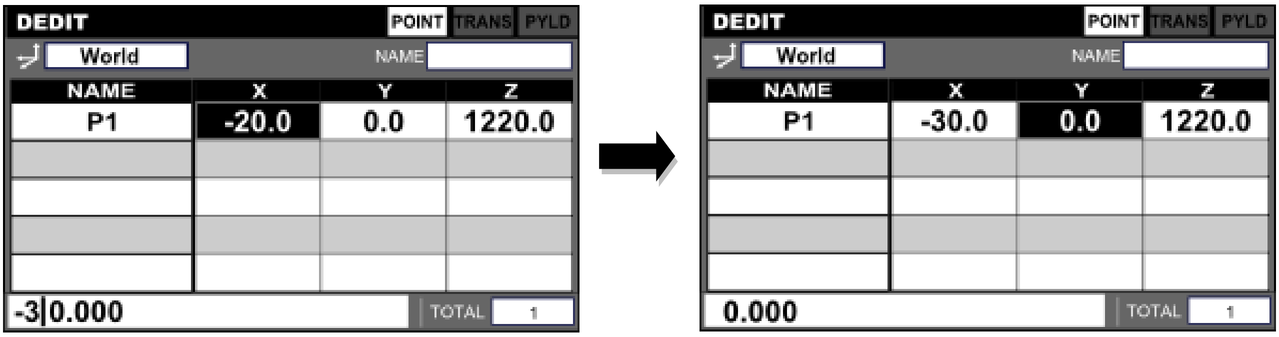
-20.000| TOTAL 1

Step 2: Entering data

Edit a value on the command line.

Press the [EXE] key. The edited value is reflected in the data.

The cursor returns to the data table. The cursor automatically moves to the next item.


DEDIT
POINT
TRANS
PYLD
World
NAME
TOTAL

NAME	X	Y	Z
P1	-20.0	0.0	1220.0

-3|0.000 TOTAL 1

NAME	X	Y	Z
P1	-30.0	0.0	1220.0

0.000 TOTAL 1

5.3.3 Delete Various Elements

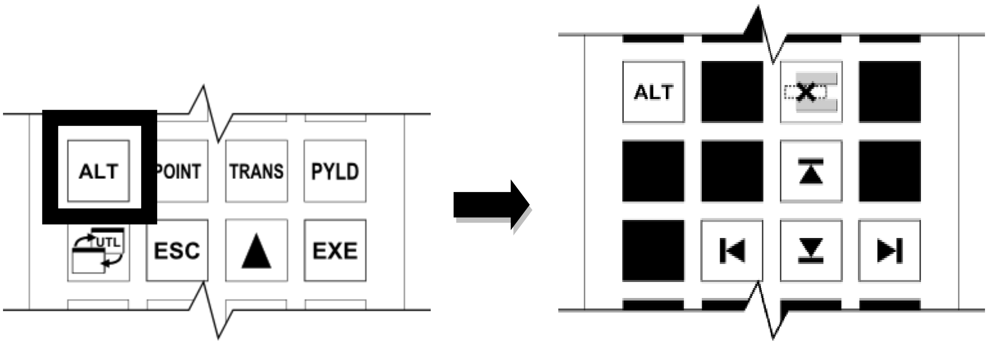
Functional Explanation

Deletes position data.

Operating Procedure

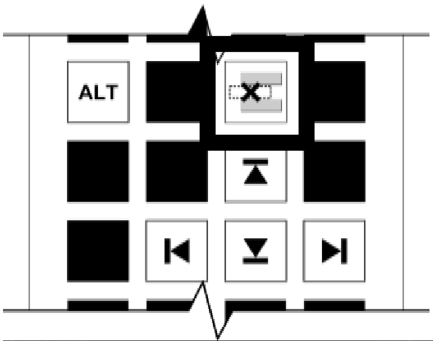
Step 1: Calling the position data delete key

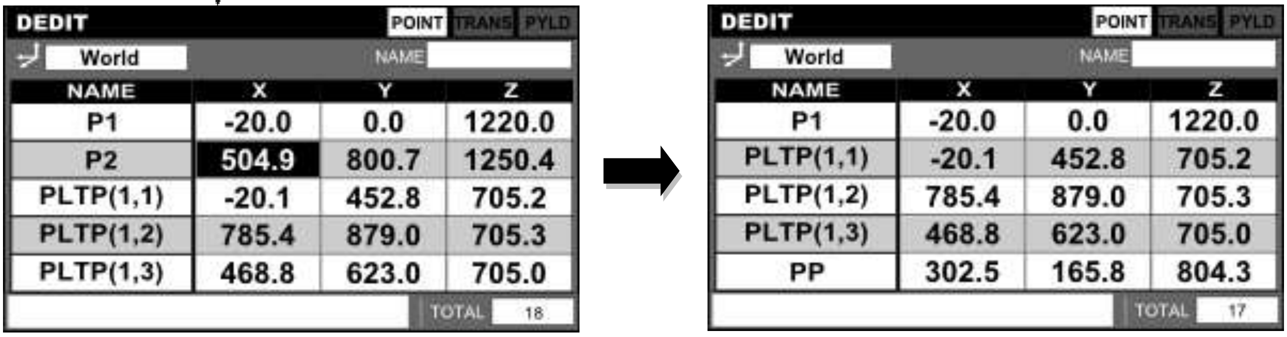
Press the [ALT] key. While the [ALT] key is being held down, the data delete key is displayed on the key sheet.



Step 2: Execution of deletion

While holding down the [ALT] key, press the position data delete key. The line on which the editing is focused is deleted.





NAME	X	Y	Z
P1	-20.0	0.0	1220.0
P2	504.9	800.7	1250.4
PLTP(1,1)	-20.1	452.8	705.2
PLTP(1,2)	785.4	879.0	705.3
PLTP(1,3)	468.8	623.0	705.0

TOTAL 18

NAME	X	Y	Z
P1	-20.0	0.0	1220.0
PLTP(1,1)	-20.1	452.8	705.2
PLTP(1,2)	785.4	879.0	705.3
PLTP(1,3)	468.8	623.0	705.0
PP	302.5	165.8	804.3

TOTAL 17

Cautions

- If coordinate data is deleted, all the position data which has been added to the coordinate data will also be deleted.
- World coordinates cannot be selected. (They cannot be deleted.)

5.3.4 Move Cursor

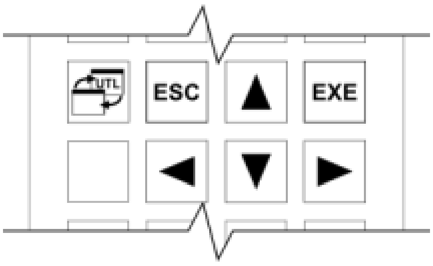
Functional Explanation

Each time any of the horizontal and vertical arrow keys is pressed, the cursor moves.

Operating Procedure

Step 1: Moving the cursor

Press any of the horizontal and vertical arrow keys. The cursor moves to an adjacent cell.



5.3.5 3-Element Scroll

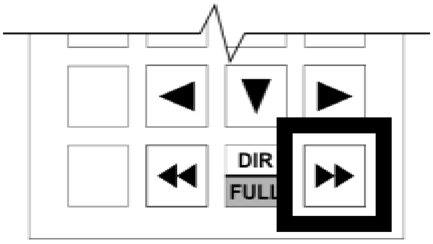
Functional Explanation

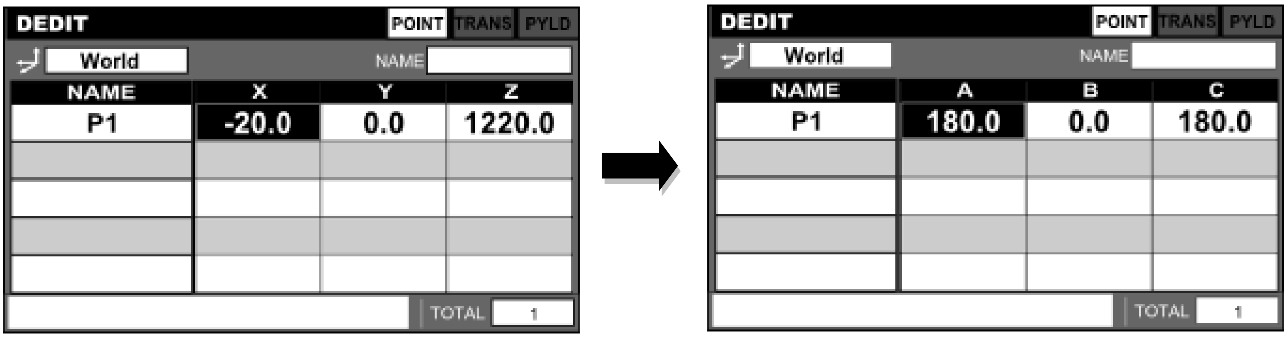
Horizontal scrolling of 3 elements can be performed while a data list is being displayed.

Operating Procedure

Step 1: 3-element scroll

Press one of the double arrow keys. Horizontal scrolling is performed for three elements.





NAME	X	Y	Z
P1	-20.0	0.0	1220.0

NAME	A	B	C
P1	180.0	0.0	180.0

Caution

- To move the cursor to the NAME cell, press the left arrow key at the position of element X.

5.3.6 Move to End-of-Line Cell

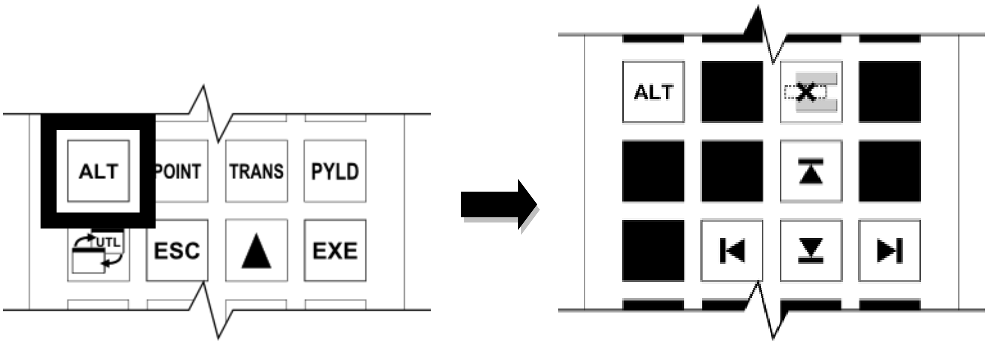
Functional Explanation

The cursor moves to the end of the line of a data element.

Operating Procedure

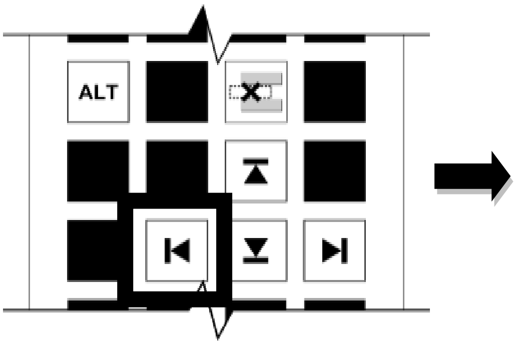
Step 1: Calling the arrow keys to move to the end of the line

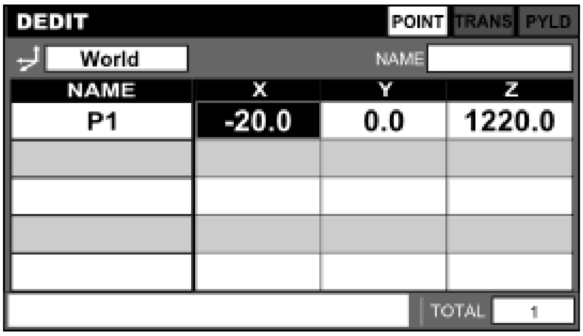
Press the [ALT] key. While the [ALT] key is being held down, the arrow keys to move to the end of the line are displayed on the key sheet.


ALT
POINT
TRANS
PYLD
UTL
ESC
EXE
ALT

Step 2: Moving the cursor to the cell at the end of the line

While holding down the [ALT] key, press the [|←] key. The cursor moves to the beginning of an element.

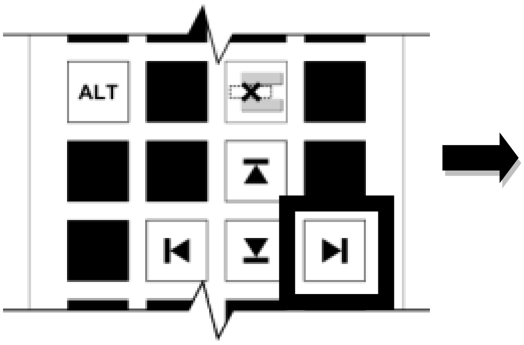


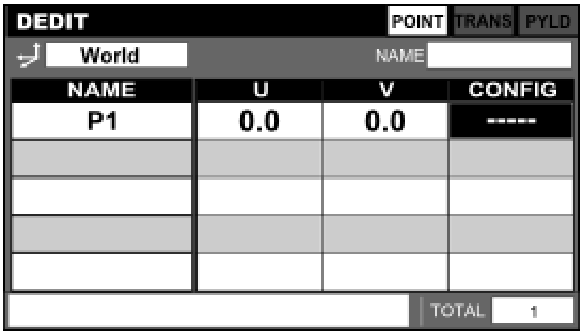

DEDIT
POINT
TRANS
PYLD
World
NAME
TOTAL

NAME	X	Y	Z
P1	-20.0	0.0	1220.0

TOTAL 1

While holding down the [ALT] key, press the [→|] key. The cursor moves to the end of an element.




DEDIT
POINT
TRANS
PYLD
World
NAME
TOTAL
1

NAME	U	V	CONFIG
P1	0.0	0.0	-----

Caution

- To move the cursor to the NAME cell, press the left arrow key at the position of element X.

5.3.7 Scroll Screen Vertically

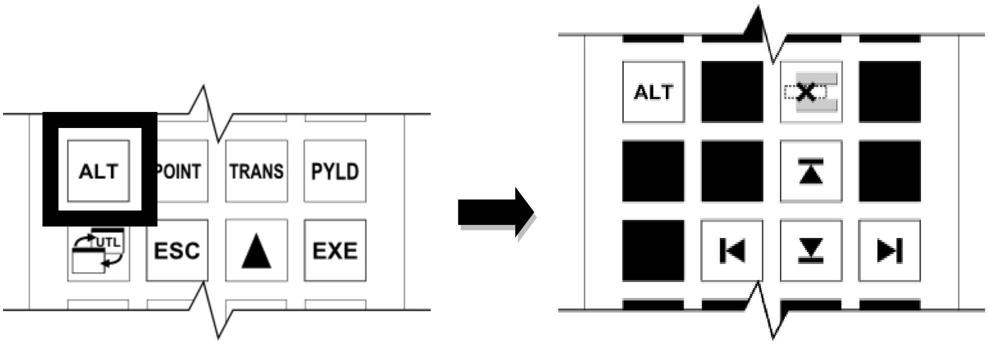
Functional Explanation

Scrolls the screen vertically.

Operating Procedure

Step 1: Calling the vertical screen scroll keys

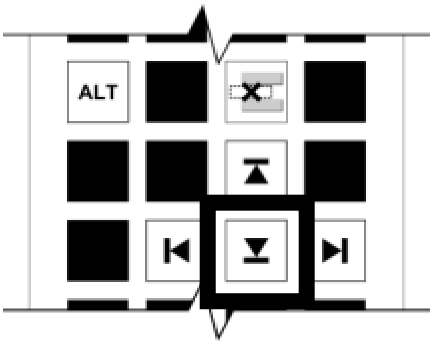
Press the [ALT] key. While the [ALT] key is being held down, the vertical screen scroll keys are displayed on the key sheet.

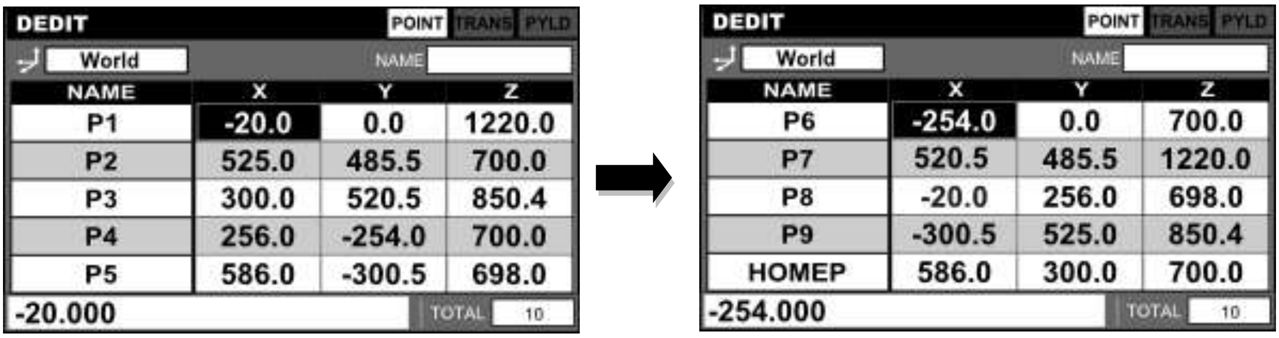

ALT
POINT
TRANS
PYLD
UTL
ESC
EXE
ALT
X

Step 2: Scrolling the screen vertically

While holding down the [ALT] key, press the vertical screen scroll keys.

The cursor moves up and down over multiple elements.





NAME	X	Y	Z
P1	-20.0	0.0	1220.0
P2	525.0	485.5	700.0
P3	300.0	520.5	850.4
P4	256.0	-254.0	700.0
P5	586.0	-300.5	698.0

-20.000 TOTAL 10

NAME	X	Y	Z
P6	-254.0	0.0	700.0
P7	520.5	485.5	1220.0
P8	-20.0	256.0	698.0
P9	-300.5	525.0	850.4
HOMEP	586.0	300.0	700.0

-254.000 TOTAL 10

5.4 Position Data Editing

5.4.1 Position Data List Display

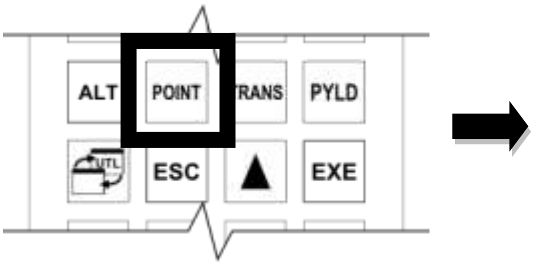
Functional Explanation

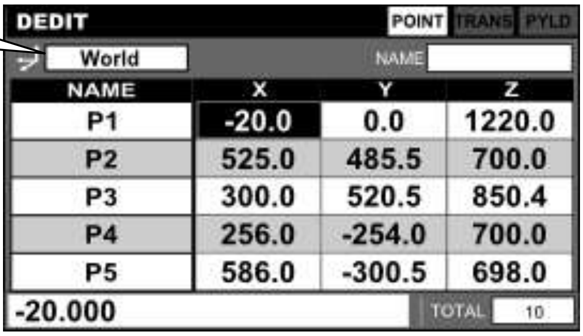
Displays the position data of each coordinate on a single line.
From the position data list display, position data can be added, deleted and edited.
The position data displayed immediately after starting the data editor is the position data on the world coordinates.

Operating Procedure

Step 1: Displaying a position data list
Press the [POINT] key. The position data on the world coordinates is displayed,
The coordinate system of the position data being displayed appears in the upper left of the screen.

Indicates the position data on the world coordinates.

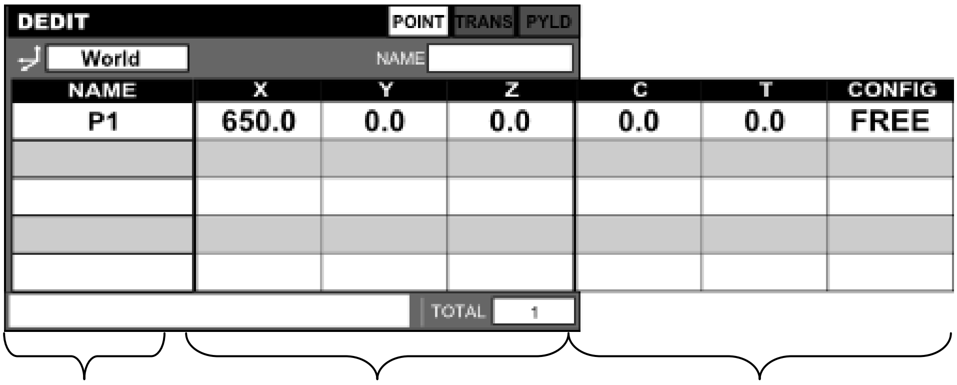

ALT
POINT
TRANS
PYLD
UTL
ESC
▲
EXE


DEDIT
POINT
TRANS
PYLD
World
NAME
TOTAL 10

NAME	X	Y	Z
P1	-20.0	0.0	1220.0
P2	525.0	485.5	700.0
P3	300.0	520.5	850.4
P4	256.0	-254.0	700.0
P5	586.0	-300.5	698.0

-20.000

Elements in list display are arranged in the following order.


DEDIT
POINT
TRANS
PYLD
World
NAME
TOTAL 1

NAME	X	Y	Z	C	T	CONFIG
P1	650.0	0.0	0.0	0.0	0.0	FREE

Data name

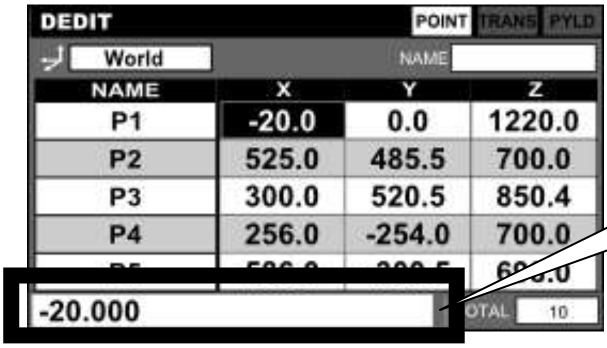
Element X: X-axis coordinate
Element Y: Y-axis coordinate
Element Z: Z-axis coordinate

Element C: Rotation angle around the Z axis
Element T: Expanding axis

CONFIG: Configuration and orientation

Related Functions

- Values displayed in element cells of position data list display show down to the first decimal point.
- Detailed information is displayed on the command line at the bottom of the screen for the cell where the cursor is positioned.


DEDIT
POINT
TRANS
PYLD
World
NAME
TOTAL 10

NAME	X	Y	Z
P1	-20.0	0.0	1220.0
P2	525.0	485.5	700.0
P3	300.0	520.5	850.4
P4	256.0	-254.0	700.0

-20.000

Displays the detailed information of the cell pointed by the cursor.

5.4.2 Editing Form Data

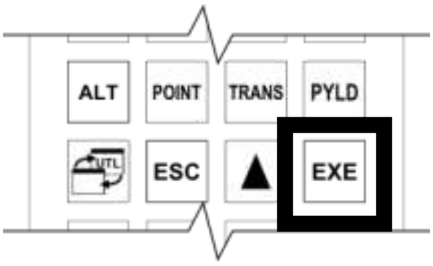
Functional Explanation

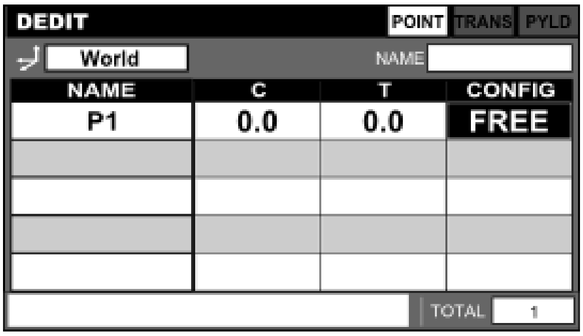
Edits the CONFIG (configuration) data of each joint.

Operating Procedure

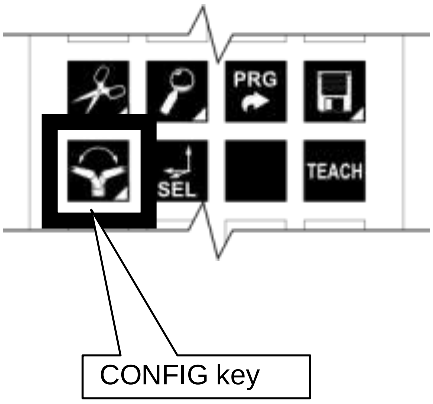
Step 1: Editing CONFIG data

Position the cursor on a CONFIG data cell and press the [EXE] key, or press the [CONFIG] key on the key sheet.

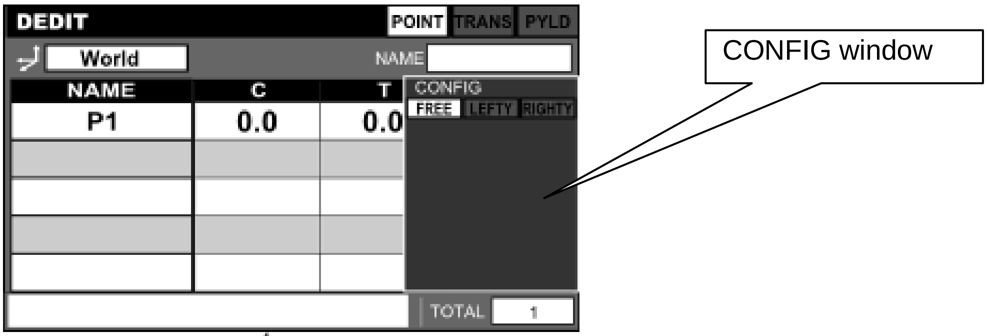

ALT
POINT
TRANS
PYLD
UTL
ESC
▲
EXE


DEDIT
POINT
TRANS
PYLD
World
NAME
TOTAL 1

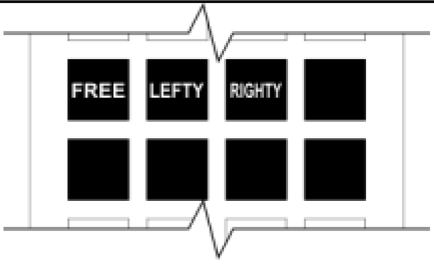
NAME	C	T	CONFIG
P1	0.0	0.0	FREE


PRG
SEL
TEACH
CONFIG key

The current CONFIG data is displayed in the right side of the screen, and the CONFIG Edit keys ([FREE], [LEFTY] and [RIGHTY]) of each joint appear on the key sheet.


DEDIT
POINT
TRANS
PYLD
World
NAME
CONFIG
FREE
LEFTY
RIGHTY
TOTAL 1
CONFIG window

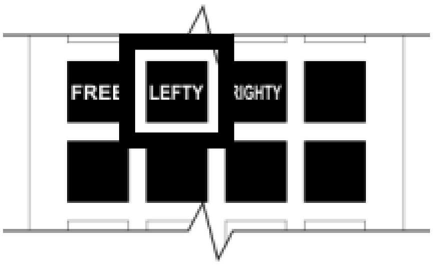
NAME	C	T
P1	0.0	0.0

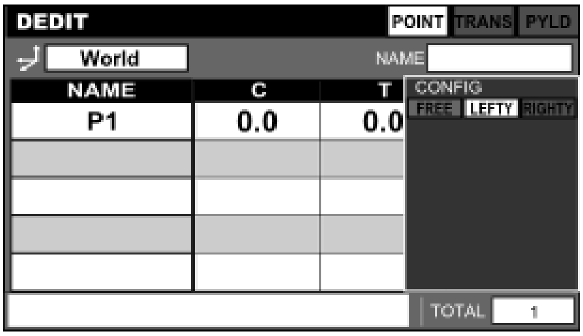

FREE
LEFTY
RIGHTY

Step 2: Editing each joint

Press any of the CONFIG edit keys of the joint you want to change. Each time the key is pressed, the CONFIG data switches.

Changes to CONFIG data is executed and reflected at the timing when these keys are pressed.


FREE
LEFTY
RIGHTY


DEDIT
POINT
TRANS
PYLD
World
NAME
CONFIG
FREE
LEFTY
RIGHTY
TOTAL

NAME	C	T
P1	0.0	0.0

TOTAL 1

Step 3: Closing the CONFIG data edit keys

Press the [ESC], [EXE] or [CONFIG] key. Close the CONFIG edit key on the key sheet.

5.4.3 Adding Position Data to Coordinate Data

Functional Explanation

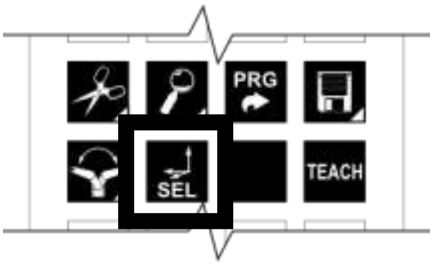
Adds position data to a specific coordinate system.

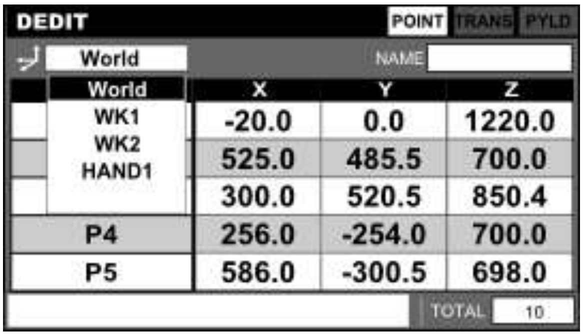
∗ For more information about adding and editing coordinate data itself, please see Section 5.5, "Editing Coordinate Data".

Operating Procedure

Step 1: Displaying coordinate systems

Press the [TRANS SEL] key. The list box in the upper left of the screen opens, and selectable coordinate data appears.


PRG
SEL
TEACH

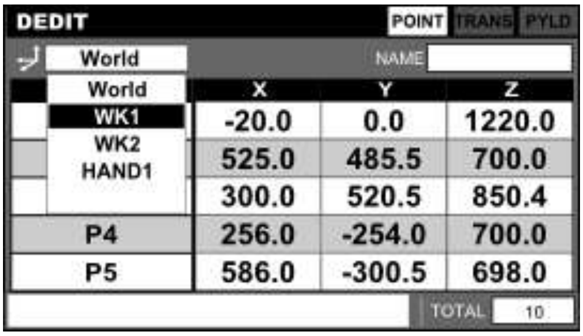

DEDIT
POINT
TRANS
PYLD
World
NAME
World
WK1
WK2
HAND1
TOTAL

	X	Y	Z
	-20.0	0.0	1220.0
	525.0	485.5	700.0
	300.0	520.5	850.4
P4	256.0	-254.0	700.0
P5	586.0	-300.5	698.0

TOTAL 10

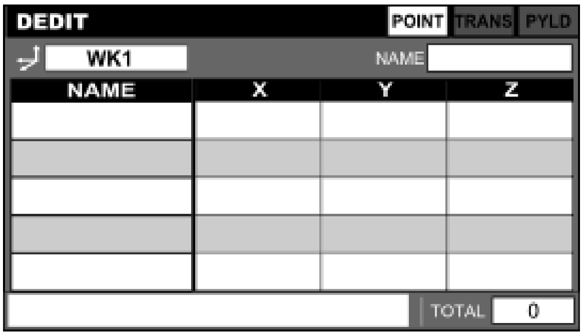
Step 2: Selecting a coordinate system

Select coordinate data with the up and down keys, and press the [EXE] key. The selected coordinate data name appears in the upper left of the screen.


DEDIT
POINT
TRANS
PYLD
World
NAME
World
WK1
WK2
HAND1
TOTAL

	X	Y	Z
	-20.0	0.0	1220.0
	525.0	485.5	700.0
	300.0	520.5	850.4
P4	256.0	-254.0	700.0
P5	586.0	-300.5	698.0

TOTAL 10


DEDIT
POINT
TRANS
PYLD
WK1
NAME

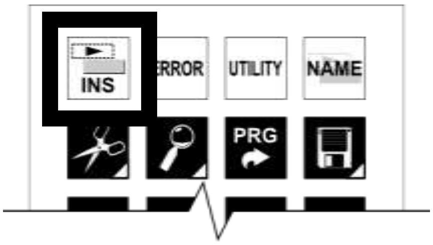
NAME	X	Y	Z

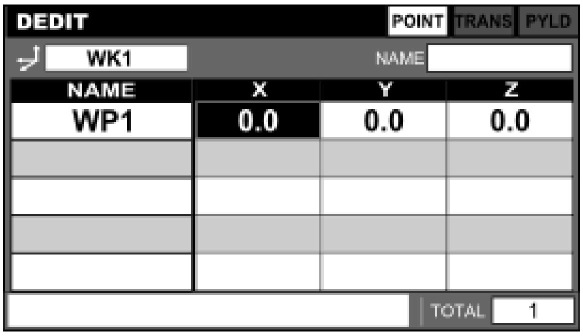
TOTAL 0

Step 3: Adding position data

Press the [INS] key and add position data.

At this point, the values in the elements indicate the position, angle and configuration for the coordinate origin being selected.


INS
RROR
UTILITY
NAME
PRG


DEDIT
POINT
TRANS
PYLD
WK1
NAME

NAME	X	Y	Z
WP1	0.0	0.0	0.0

TOTAL 1

Caution

- When a coordinate system is selected with the [TRANS SEL] key, the work coordinate system during JOG operation is set.

5.4.4 Teaching Position Data

⚠ **CAUTION**

In principle, the teaching operation should be performed outside the dangerous area of the robot. If it must be performed inevitably within the dangerous area, strictly observe the following matters.

(1) The teaching operation should always be performed by two (2) persons. One person performs the job and the other person watches outside the dangerous area. Also, both persons should try to prevent mis-operation with each other.

(2) The operator should do the job in an attitude ready to press the EMERGENCY stop pushbutton switch at any time. Also, he/she should perform the job at a position from which he/she can evacuate immediately at the time of emergency after confirming the robot working range and shields nearby.

(3) The supervisor should keep watch on the job at a position where he/she can see the entire robot system and operate the EMERGENCY stop pushbutton switch at the time of an emergency. Also, he/she should keep anyone from entering the dangerous area.

Functional Explanation

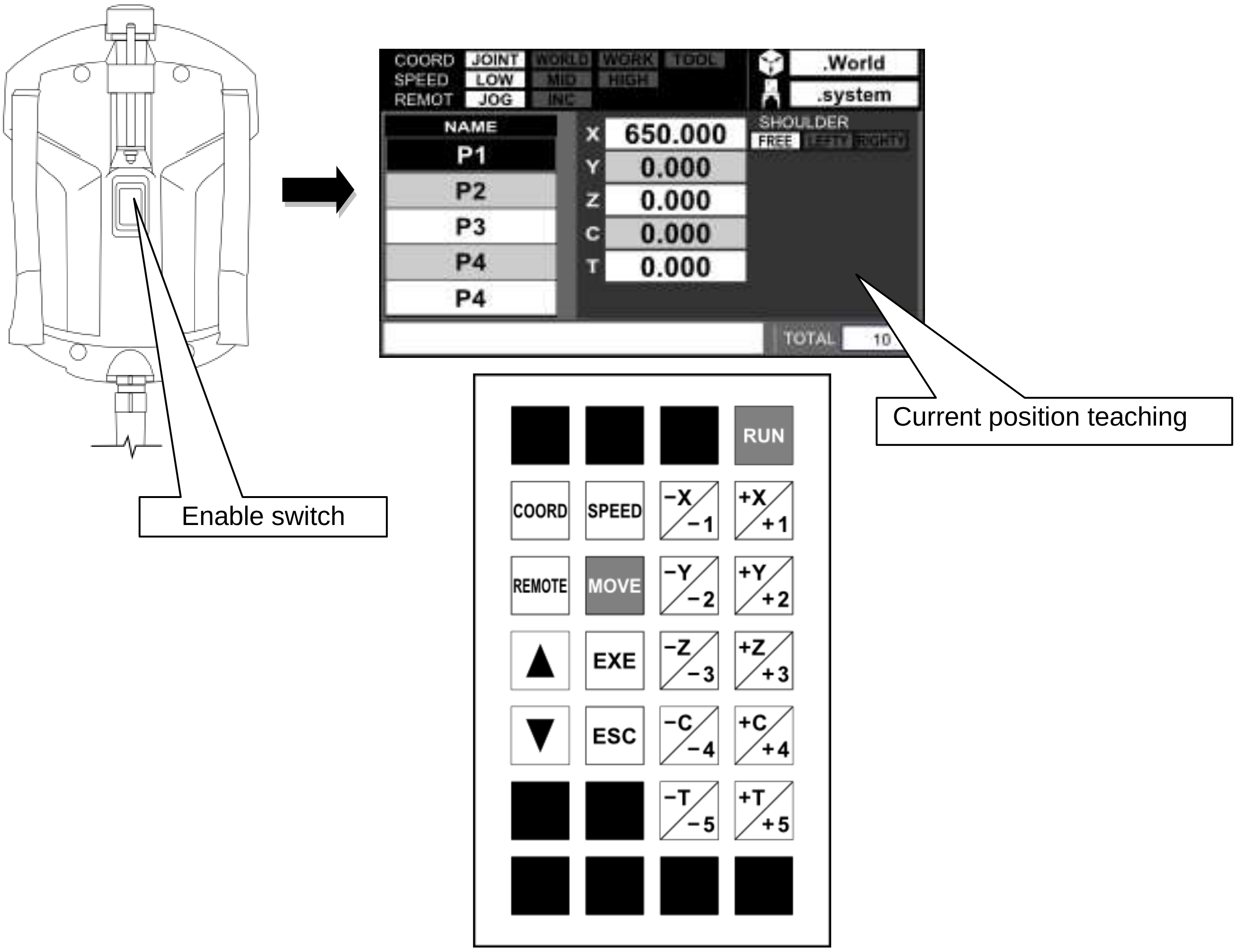
Guide the tool tip of the robot to a teach point, and then register (overwrite) the current position of the robot to the position data where the cursor is positioned.

Operating Procedure

Step 1: Calling the [TEACH] key

Lightly grip the Enable switch when editing position data in order to open the contact of the Safety switch.

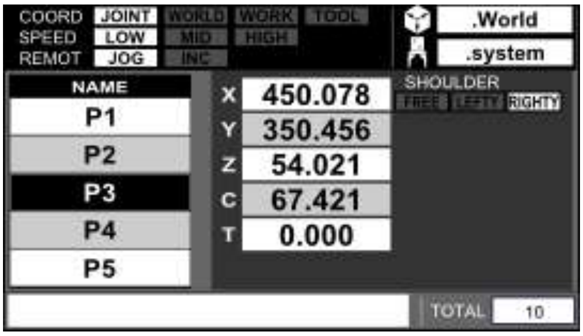
The screen changes to show the current position (World coordinates). Also, the key sheet changes to the one for manual operation.


COORD JOINT WORLD WORK TOOL
SPEED LOW MID HIGH
REMOT JOG INC
.World
.system
NAME
P1
P2
P3
P4
P4
X 650.000
Y 0.000
Z 0.000
C 0.000
T 0.000
SHOULDER
FREE LEFTY RIGHTY
TOTAL 10
Current position teaching
Enable switch
RUN
COORD
SPEED
−X −1
+X +1
REMOTE
MOVE
−Y −2
+Y +2
▲
EXE
−Z −3
+Z +3
▼
ESC
−C −4
+C +4
−T −5
+T +5

Step 2: Execution of teaching

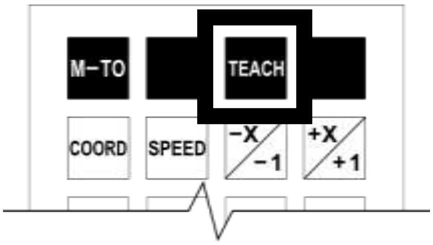
Guiding manually, move the tool tip of the robot to the position you want to teach.

Position the cursor on the position data you want to teach, and press the [TEACH] key.


COORD JOINT
SPEED LOW
REMOT JOG
.World
.system
SHOULDER RIGHTY

NAME		
P1	X	450.078
P2	Y	350.456
P3	Z	54.021
P4	C	67.421
P5	T	0.000

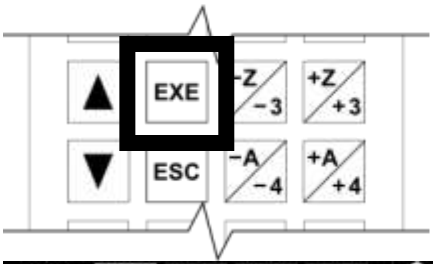
TOTAL 10

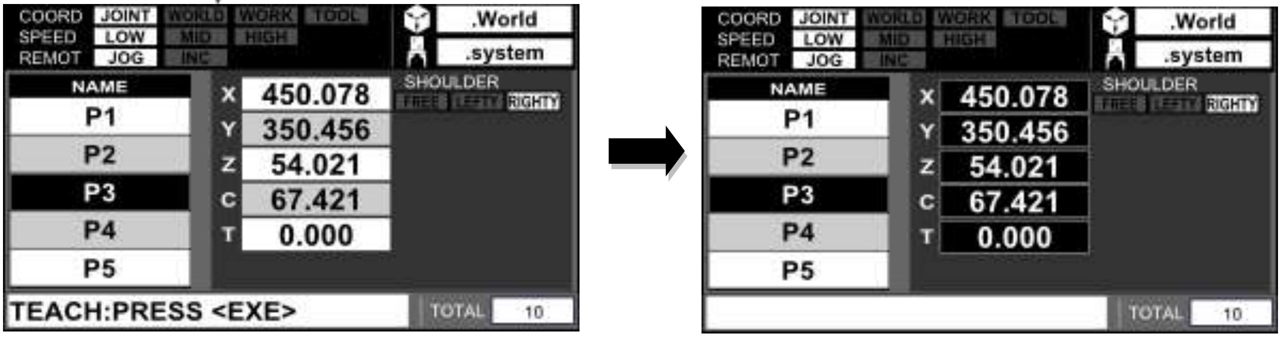


When the [TEACH] key is pressed, a confirmation message appears on the command line.

To execute teaching, press the [EXE] key.

When the current position and the position data of the point currently being selected match, the current position display is highlighted in reverse video.




COORD JOINT
SPEED LOW
REMOT JOG
.World
.system
SHOULDER RIGHTY

NAME		
P1	X	450.078
P2	Y	350.456
P3	Z	54.021
P4	C	67.421
P5	T	0.000

TEACH:PRESS <EXE>
TOTAL 10

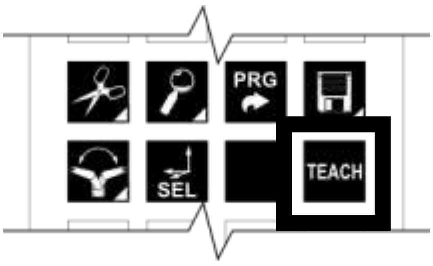
To cancel teaching, press the [ESC] key.

Step 3: Returning to data editing

Release the Enable switch or press the [ESC] key. The data editor returns to the editing of position data.

Related Function

Teaching can also be performed with the [TEACH] key on the Edit Function menu which is displayed on the key sheet during position data editing.



5.4.5 Moving to Teach Point

Functional Explanation

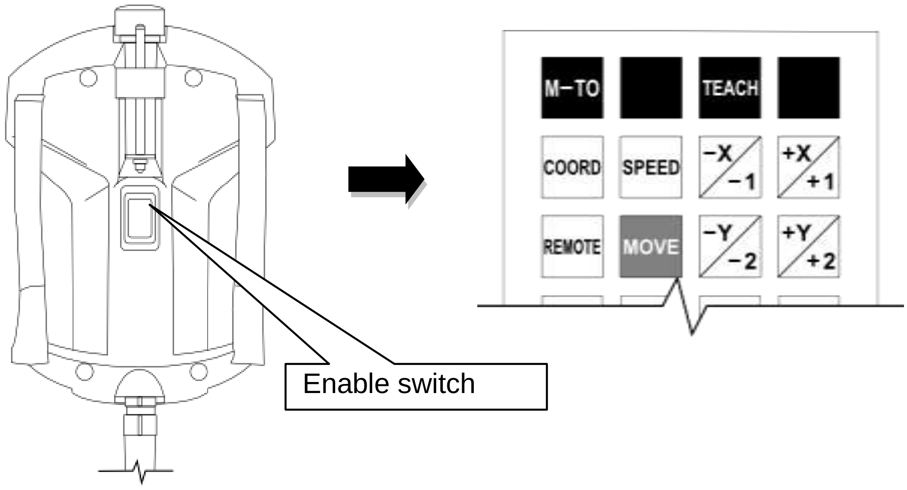
Moves the robot position to the position data pointed by the cursor in synchronous operation.

Operating Procedure

Step 1: Calling the [M-TO] key

Lightly grip the Enable switch when editing position data in order to open the contact of the Safety switch.

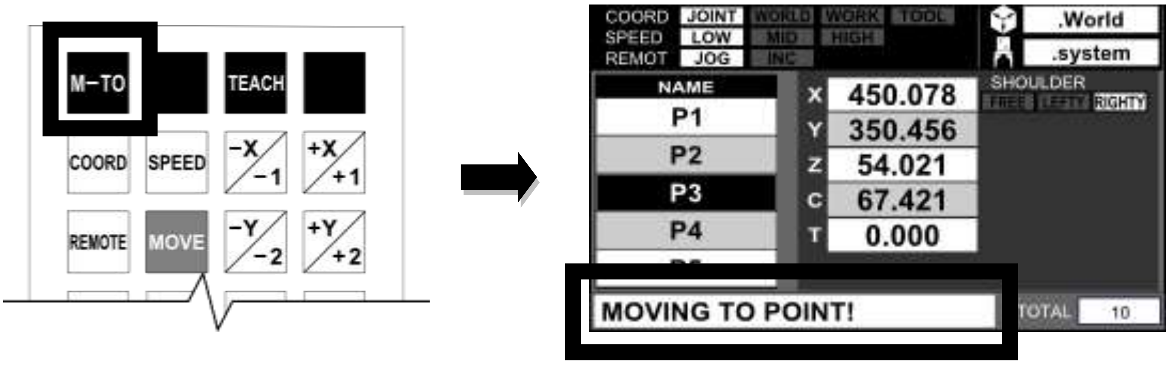
The screen changes to show the current position (World coordinates), and the [M-TO] key and [MOVE] key are displayed on the key sheet.



Step 2: Selecting the move to teach point function

Select the target position data by moving the cursor up and down, and press the [M-TO] key.

The "MOVING TO POINT!" message appears on the command line.

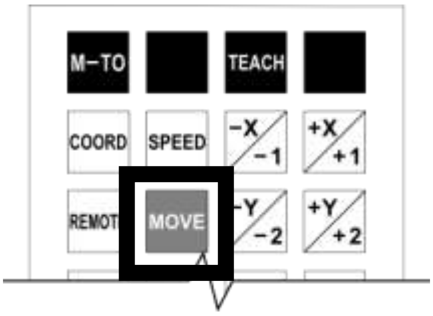

M−TO
TEACH
COORD
SPEED
−X −1
+X +1
REMOTE
MOVE
−Y −2
+Y +2
COORD JOINT WORLD WORK TOOL
SPEED LOW MID HIGH
REMOT JOG INC
.World
.system
NAME
P1
P2
P3
P4
SHOULDER
FREE LEFTY RIGHTY
TOTAL 10

X 450.078
Y 350.456
Z 54.021
C 67.421
T 0.000

MOVING TO POINT!

Step 3: Starting to move to a teach point

In the servo ON state, keep holding down the [MOVE] key. The robot moves toward the teach point while performing synchronous operation. When the [MOVE] key is released, movement to the teach point stops.


M−TO
TEACH
COORD
SPEED
−X −1
+X +1
REMOT
MOVE
−Y −2
+Y +2

Step 4: Finishing movement to a teach point

Once the movement to the teach point is completed, the message on the command line disappears and the move to teach point function finishes.

When the [ESC] key is pressed while moving to the teach point, the move to teach point function finishes.

Caution

- As for the speed for moving to the teach point, the setting of the [SPEED] key is reflected.

5.4.6 Move to Teach Point Function [BYPAS]

Functional Explanation

When moving to the target position, the robot hand bypasses in the Z-axis direction set up in a parameter file.

∗ This function is a dedicated function of SCARA robots.

Preparation

In order to use the bypass function, it is necessary to enable the bypass function and set the bypass distance in the Z-axis direction in [U23] Bypass function parameter of the user parameter file in advance.
The meanings of the user parameters and sample settings are shown below.

∗ For details on parameter editing procedures, please see Section 6.

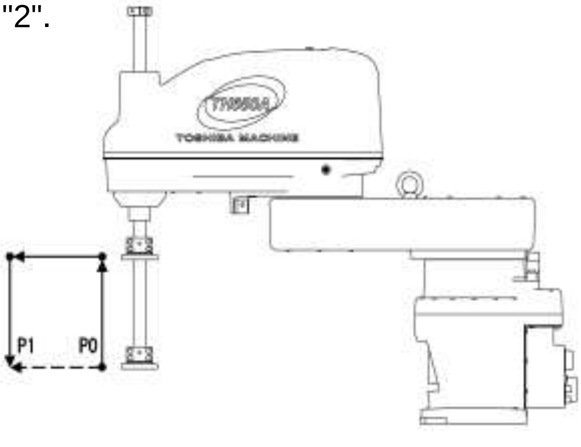
User parameter file

```
[U23] Bypass function parameter
{ Function enable SW (0:Disable, 1:M-to & Bypass,
2:Bypass ) ←①
= 1
{ Retract position } ←②
= 0.0      0.0      200.0      0.0      0.0      0.0
{ Z Axis offset parameter } ←③
= 0.0      0.0
```

① BYPASS function   Enable/Disable setting
{ Function enable SW }
= 1
When using the TP3000, set either "1" or "2".

② Retract position parameter
(for SCARA robot)
{ Retract position }
= 0.0 0.0 200.0 0.0 0.0 0.0

Enter the bypass distance in a numeric value (absolute position) in Item 3 (Z axis).
Other items are not used by SCARA robots. Even if numeric values are defined, they will not take effect.

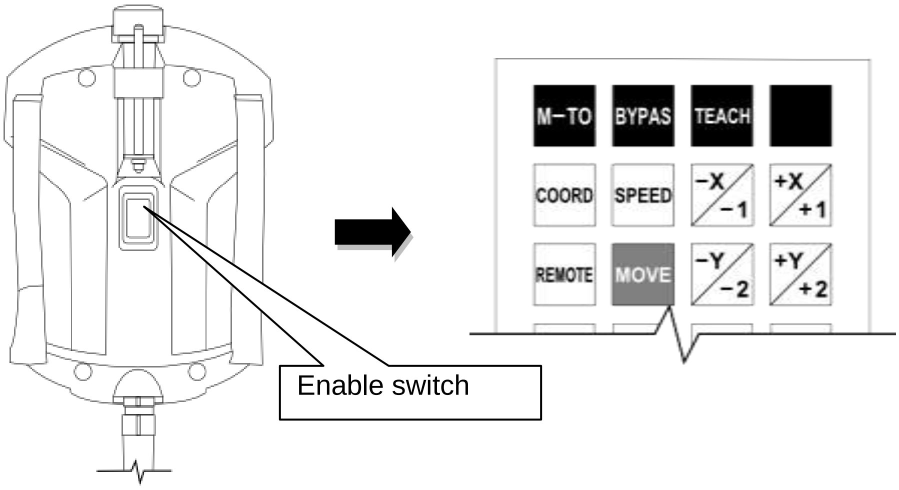


③ Z axis offset parameter (parameter dedicated to the LCDR)
{ Z Axis offset parameter }
= 0.0 0.0
This is a parameter dedicated to the LCDR (glass transport robot). It is not used by SCARA robots,

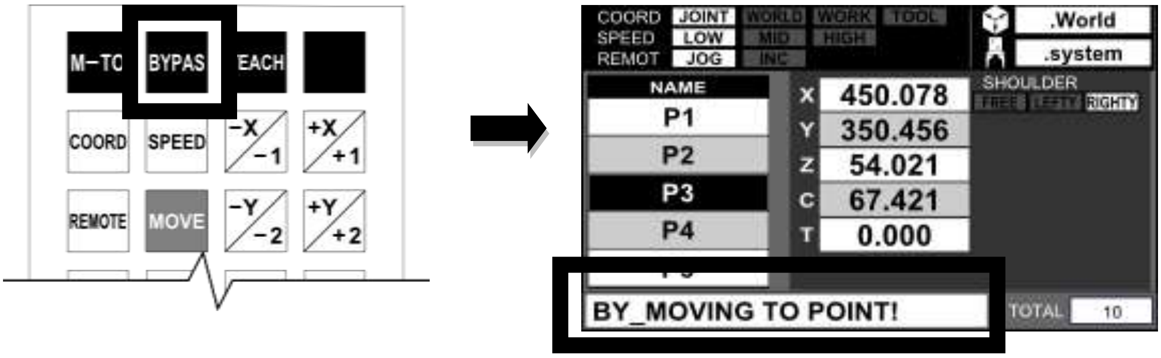
When parameter editing is finished, save the file and then turn the power to the controller off/on.

Operating Procedure

Step 1: Calling the [BYPAS] key
Lightly grip the Enable switch when editing position data in order to open the contact of the Safety switch.
The screen changes to show the current position (World coordinates), and the [BYPAS] key and [MOVE] key are displayed on the key sheet.


Enable switch
M–TO
BYPAS
TEACH
COORD
SPEED
–X –1
+X +1
REMOTE
MOVE
–Y –2
+Y +2

Step 2: Selecting the bypass function
Select the target position data by moving the cursor up and down, and press the [BBYPAS] key.
The "BY_MOVING TO POINT!" message appears on the command line.

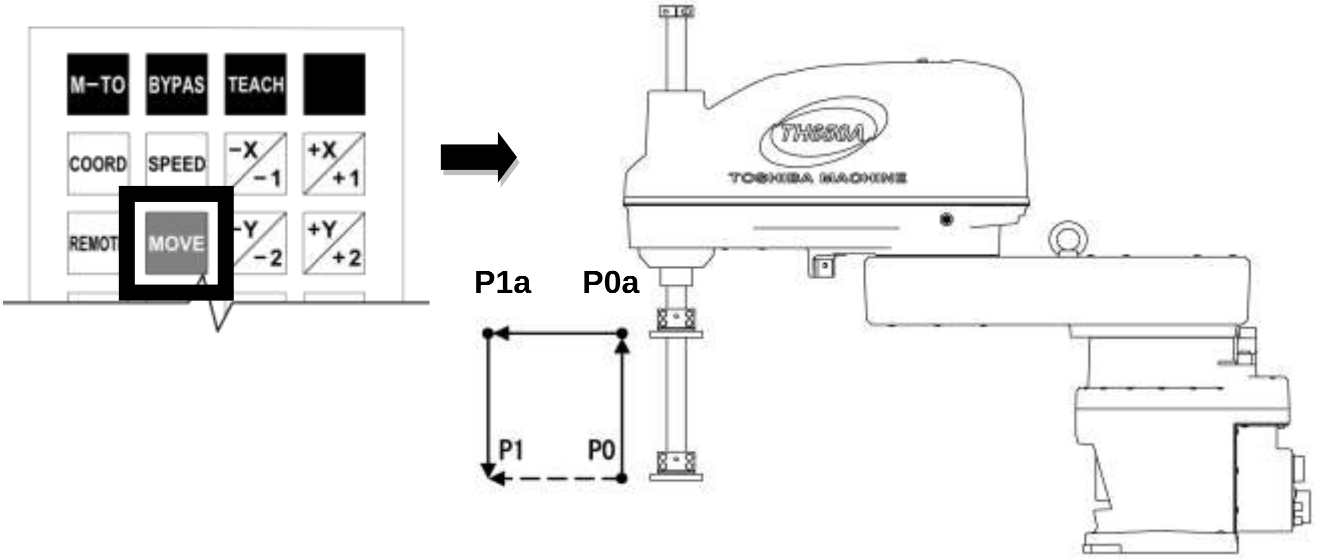

M–TO
BYPAS
EACH
COORD
SPEED
–X –1
+X +1
REMOTE
MOVE
–Y –2
+Y +2
COORD JOINT WORLD WORK TOOL
SPEED LOW MID HIGH
REMOT JOG INC
.World
.system
NAME
P1
P2
P3
P4
X 450.078
Y 350.456
Z 54.021
C 67.421
T 0.000
SHOULDER
FREE LEFTY RIGHTY
TOTAL 10

BY_MOVING TO POINT!

Step 3: Starting bypass movement

In the servo ON state, keep holding down the [MOVE] key. The robot moves toward the teach point while performing bypass operation. As shown in the figure below, the robot operates (P0)→(P0a)→(P1b)→(P1).

When the [MOVE] key is released, movement to the teach point stops. (No bypass operation is performed in each operation segment).



A) Retraction movement from current position P0 to P0a:
Moves in the orientation of P0 (CONFIG).

B) Parallel and rotating movements from position P0a to P1a:
Moves in the orientation of P1 (CONFIG).

C) Projecting movement from position P1a to P1:
Moves in the orientation of P1 (CONFIG).

Step 4: Finishing bypass movement

Once the movement to the target position is completed, the message on the command line disappears and the bypass function finishes.

When the [ESC] key is pressed while moving, the move to teach point function finishes.

Caution

- When the robot operation is stopped by releasing the [MOVE] key while the robot hand is moving from P1a to P1 in Step 3, the robot initiates the bypass operation in the Z axis next time the [MOVE] key is pressed.

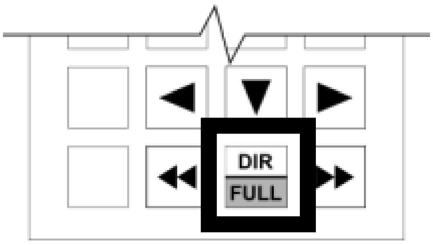
5.4.7 Detailed Position Data Display

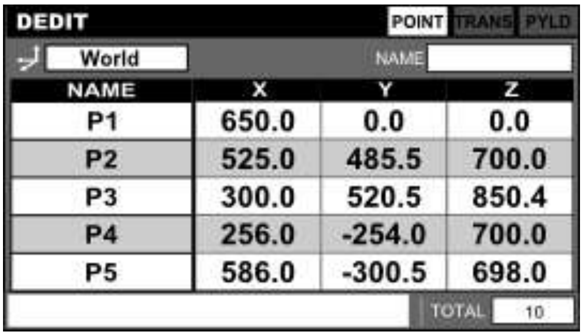
Functional Explanation

The detailed positional data display mode displays one positional data element on the full screen.
In this mode, position data can be added, deleted and edited.

Operating Procedure

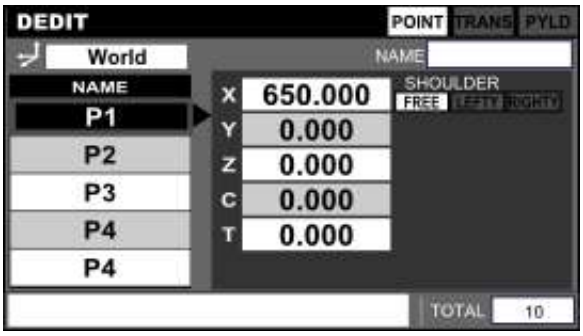
Step 1: Switching detailed position data display
Press the [DIR/FULL] key.
Each time the [DIR/FULL] key is pressed, the display switches between directory display and detailed display.




DEDIT
POINT
TRANS
PYLD
World
NAME
TOTAL
10

NAME	X	Y	Z
P1	650.0	0.0	0.0
P2	525.0	485.5	700.0
P3	300.0	520.5	850.4
P4	256.0	-254.0	700.0
P5	586.0	-300.5	698.0

DIR Display


DEDIT
POINT
TRANS
PYLD
World
NAME
NAME
P1
P2
P3
P4
P4
SHOULDER
FREE
LEFTY
RIGHTY
TOTAL
10

X	650.000
Y	0.000
Z	0.000
C	0.000
T	0.000

FULL Display

Cautions

- The procedures to add, delete and edit position data in the detailed position data display mode are the same as those in the list display mode.
- The editing of CONFIG in the detailed position data display can be performed with the [CONFIG] key.
- The "3-element scroll", "move to end of line" and "vertical screen scroll" operations do not take effect in the detailed position data display mode.

5.5 Coordinate Data Editing

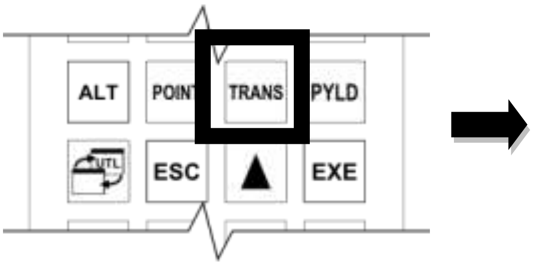
5.5.1 Coordinate Data List Display

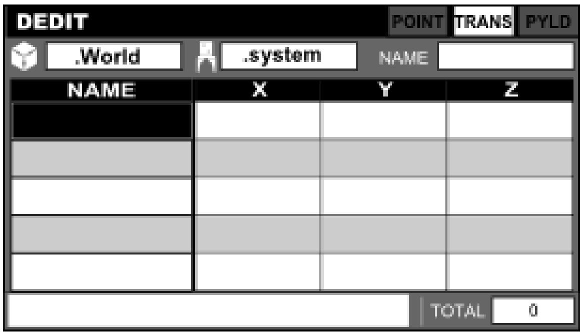
Functional Explanation

Displays coordinate data in a list. Coordinate data is classified into work coordinates and tool coordinates in terms of usage. Whether coordinate data added in this operation will be used as work coordinates or tool coordinates needs to be determined by the user.

Operating Procedure

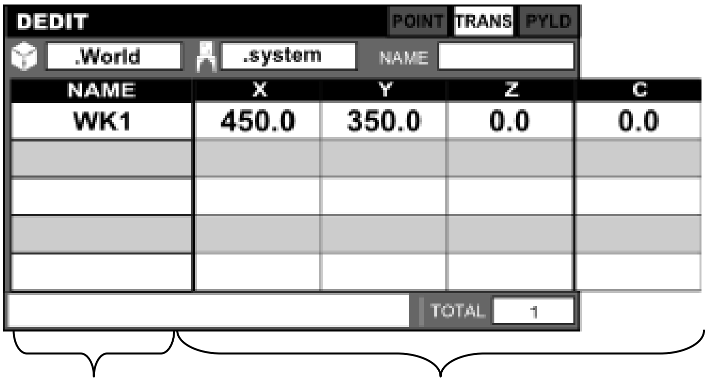
Step 1: Displaying a coordinate data list
Press the [TRANS] key. Coordinate data is displayed.


ALT
POINT
TRANS
PYLD
UTL
ESC
▲
EXE


DEDIT
POINT
TRANS
PYLD
.World
.system
NAME
TOTAL
0

NAME	X	Y	Z

Elements in list display are arranged in the following order.


DEDIT
POINT
TRANS
PYLD
.World
.system
NAME
TOTAL
1

NAME	X	Y	Z	C
WK1	450.0	350.0	0.0	0.0

Data name

Element X: Origin offset in the X direction
Element Y: Origin offset in the Y direction
Element Z: Origin offset in the Z direction
Element C: Rotation offset around the Z axis

Step 2: Using coordinate data as the work coordinate system

When using coordinate data as the work coordinate system, enter setting values in elements as if viewed from the world coordinate system.

Teaching can be performed to the work coordinate system using functions such as in Section 5.5.4, "Coordinate Data 1-Point Teaching", Section 5.5.5, "Coordinate Data 2-Point Teaching (SCARA), and Section 5.5.6, "Coordinate Data 3-Point Teaching (6 axes).

Also, when using coordinate data as the work coordinate system, please add position data as necessary.

(For information about the position data addition procedure, please see Section 5.4.6, "Adding Position Data to the Coordinate System".)

Step 3: Using coordinate data as the tool coordinate system

When using coordinate data as the tool coordinate system, enter setting values in elements when viewed from the mechanical interface coordinate system. When using coordinate data as the tool coordinate system, unlike the work coordinate system, various teaching functions cannot be used.

Directly enter a numeric value in each element according to the hand design.

Caution

- If the base coordinates have not been set up, the base coordinates and the world coordinates overlap.

5.5.2 Setting Up and Clearing Work Coordinates

Functional Explanation

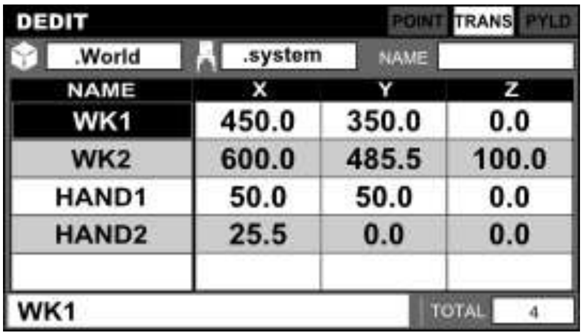
Sets up the specified coordinates as the work coordinates. Also clears the work coordinates that have been set up.

Operating Procedure

Step 1: Call the Work Coordinate Setup key.

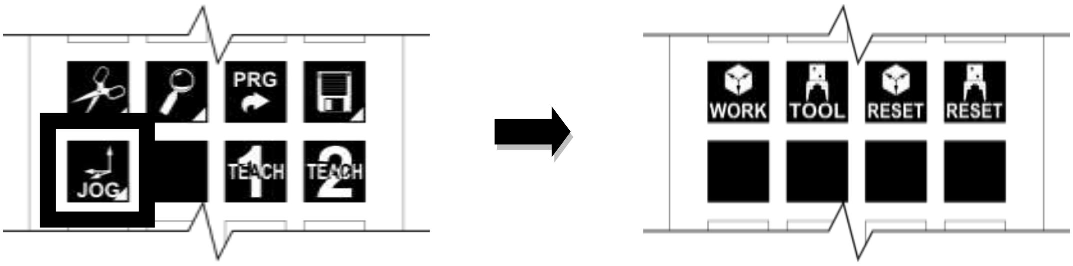
Press the [JOG TRANS] key which is displayed on the Function menu during coordinate data editing.

The [WORK] key is displayed on the key sheet.


DEDIT
POINT
TRANS
PYLD
.World
.system
NAME

NAME	X	Y	Z
WK1	450.0	350.0	0.0
WK2	600.0	485.5	100.0
HAND1	50.0	50.0	0.0
HAND2	25.5	0.0	0.0

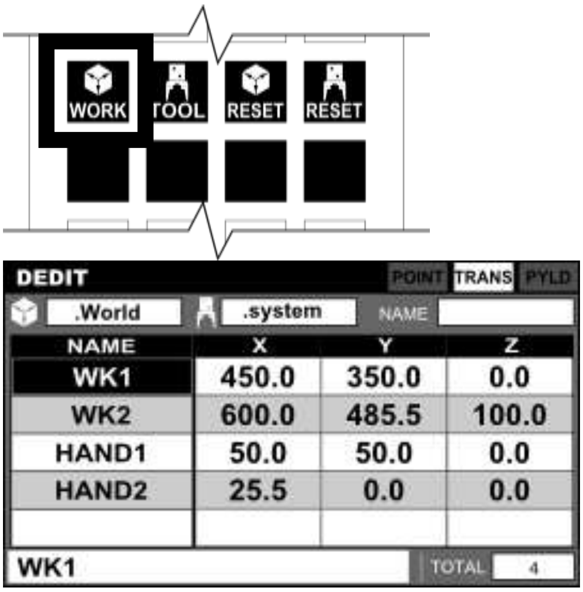
WK1 TOTAL 4


PRG
JOG
TEACH 1
TEACH 2
WORK
TOOL
RESET
RESET

Step 2: Setting Up and Clearing Work Coordinates

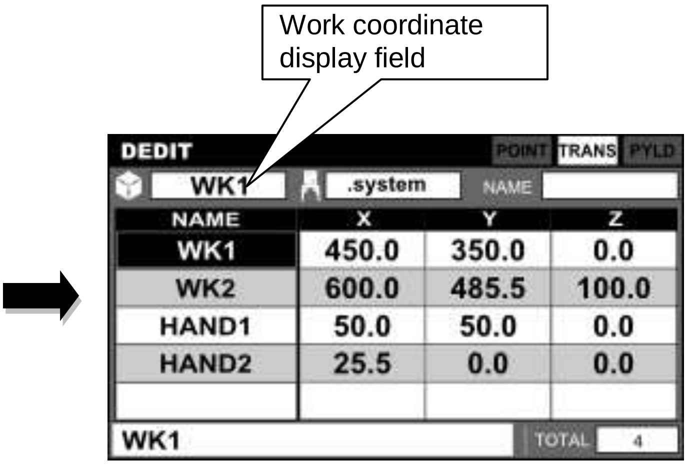
Position the cursor on the coordinate data you want to use as work coordinates, and press the [WORK] key.

The selected coordinate name appears in the work coordinate display field on the screen.


WORK
TOOL
RESET
RESET
DEDIT
POINT
TRANS
PYLD
.World
.system
NAME

NAME	X	Y	Z
WK1	450.0	350.0	0.0
WK2	600.0	485.5	100.0
HAND1	50.0	50.0	0.0
HAND2	25.5	0.0	0.0

WK1 TOTAL 4


Work coordinate display field
DEDIT
POINT
TRANS
PYLD
WK1
.system
NAME

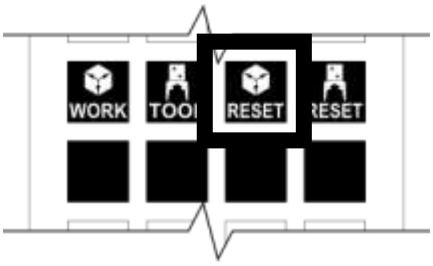
NAME	X	Y	Z
WK1	450.0	350.0	0.0
WK2	600.0	485.5	100.0
HAND1	50.0	50.0	0.0
HAND2	25.5	0.0	0.0

WK1 TOTAL 4

Step 3: Resetting the work coordinates

Press the [WORK RESET] key. The work coordinates are reset forcibly.

The work coordinate display field on the screen returns to the default setting.



Cautions

- When coordinates are selected during position data editing, these coordinates will automatically be set as work coordinates.
- The work coordinates which have been set up are maintained regardless of the execution of [SAVE] or [NO SAVE] to files.
- If the data editor is closed and then started, work coordinates will be cleared.
- If a program is selected in the test operation mode, work coordinates will automatically be cleared.

5.5.3 Selecting and Clearing Tool Coordinates

Functional Explanation

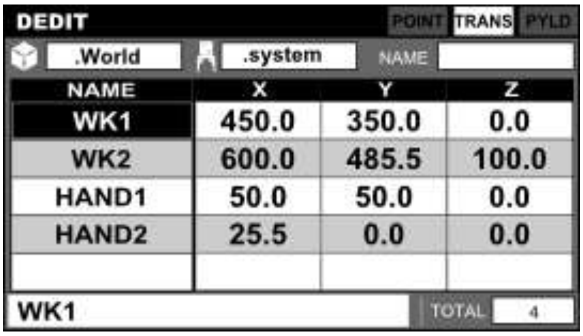
Sets up the specified coordinates as the tool coordinates. Also clears the tool coordinates that have been set up.

Operating Procedure

Step 1: Call the Tool Coordinate Setup key.

Press the [JOG TRANS] key which is displayed on the Function menu during coordinate data editing.

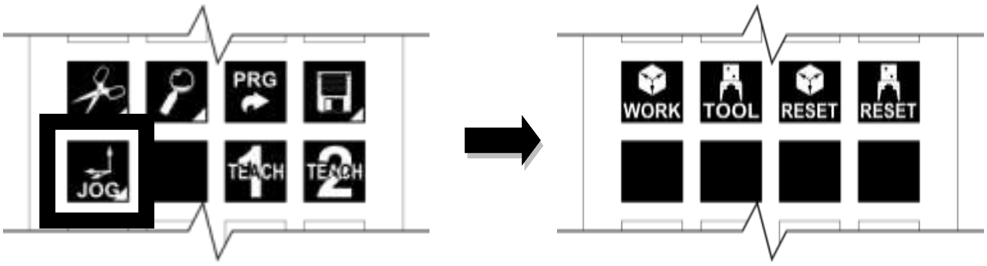
The [TOOL] key is displayed on the key sheet.



.World .system NAME

NAME	X	Y	Z
WK1	450.0	350.0	0.0
WK2	600.0	485.5	100.0
HAND1	50.0	50.0	0.0
HAND2	25.5	0.0	0.0

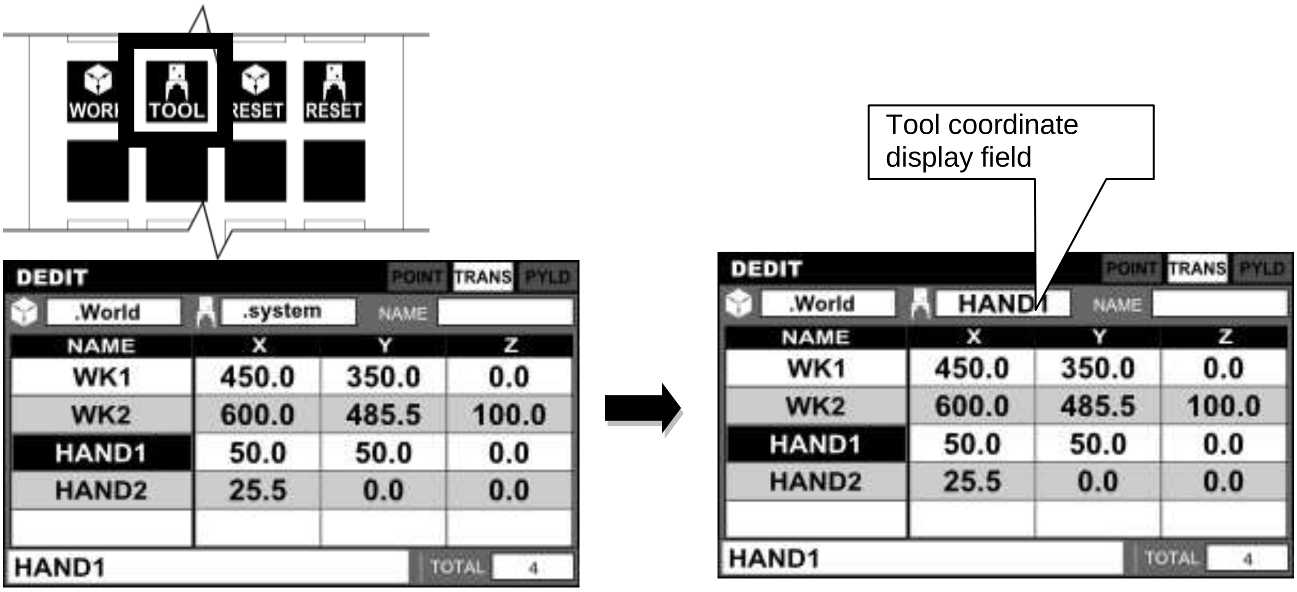
WK1 TOTAL 4


PRG
JOG
TEACH
TEACH
WORK
TOOL
RESET
RESET

Step 2: Setting up the tool coordinates

Position the cursor on the coordinate data you want to use as tool coordinates, and press the [TOOL] key.

The selected coordinate name appears in the tool coordinate display field on the screen.


WORK
TOOL
RESET
RESET
Tool coordinate display field
DEDIT
POINT
TRANS
PYLD
NAME
TOTAL

DEDIT

.World .system

NAME	X	Y	Z
WK1	450.0	350.0	0.0
WK2	600.0	485.5	100.0
HAND1	50.0	50.0	0.0
HAND2	25.5	0.0	0.0

HAND1 TOTAL 4

DEDIT

.World HAND1

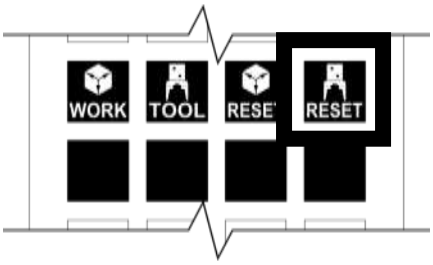
NAME	X	Y	Z
WK1	450.0	350.0	0.0
WK2	600.0	485.5	100.0
HAND1	50.0	50.0	0.0
HAND2	25.5	0.0	0.0

HAND1 TOTAL 4

Step 3: Resetting the tool coordinates

Press the "Tool Coordinate Reset" key. The tool coordinates are reset forcibly.

The tool coordinate display field on the screen returns to the default setting.


WORK
TOOL
RESET
RESET

Cautions

- The tool coordinates which have been set up are maintained regardless of the execution of [SAVE] or [NO SAVE] to files.

- Once set up, the tool coordinates will not be cleared until the tool coordinates are cleared (see the next item) or a program is selected in the test operation mode.

5.5.4 Coordinate Data 1-Point Teaching

CAUTION

In principle, the teaching operation should be performed outside the dangerous area of the robot. If it must be performed inevitably within the dangerous area, strictly observe the following matters.

(1) The teaching operation should always be performed by two (2) persons. One person performs the job and the other person watches outside the dangerous area. Also, both persons should try to prevent mis-operation with each other.

(2) The operator should do the job in an attitude ready to press the EMERGENCY stop pushbutton switch at any time. Also, he/she should perform the job at a position from which he/she can evacuate immediately at the time of emergency after confirming the robot working range and shields nearby.

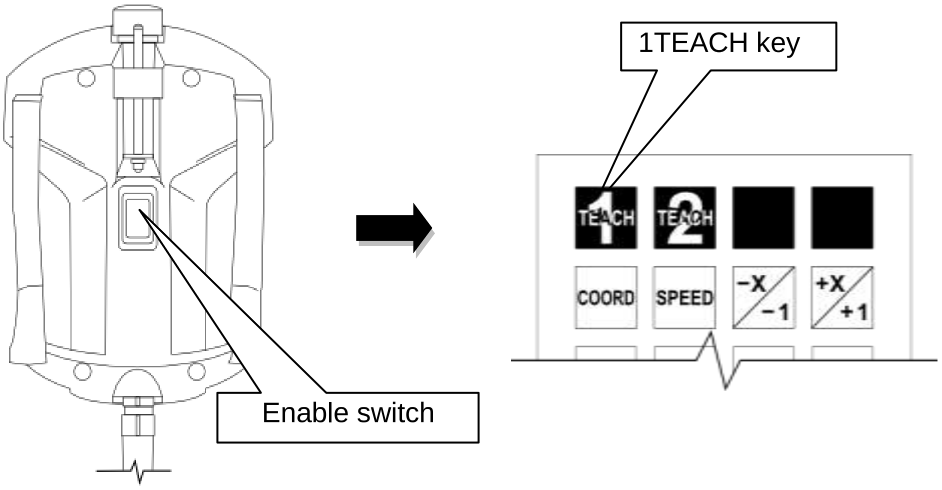
(3) The supervisor should keep watch on the job at a position where he/she can see the entire robot system and operate the EMERGENCY stop pushbutton switch at the time of an emergency. Also, he/she should keep anyone from entering the dangerous area.

Functional Explanation

Guide the tool tip of the robot to a teach point, generate coordinate data from one point, and then register it to the coordinate data where the cursor is positioned.

Operating Procedure

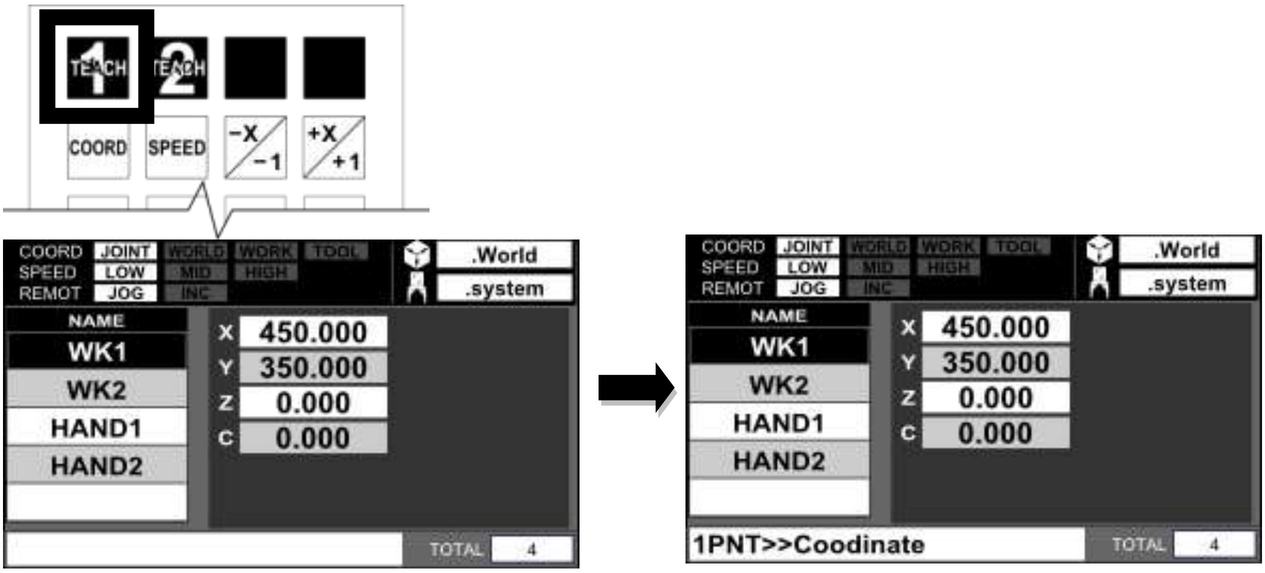
Step 1: Calling the [1TEACH] key
Lightly grip the Enable switch when editing coordinate data in order to open the contact of the Safety switch.
The screen changes to show the current position (World coordinates), and the [1TEACH] key is displayed on the key sheet.


1TEACH key
Enable switch
1 TEACH
2 TEACH
COORD
SPEED
−X −1
+X +1

Step 2: Selecting the bypass function

Select the coordinate data you want to teach by moving the cursor up and down, and press the [1TEACH] key.

The "1PNT>>Coordinate" message appears on the command line.


1 TEACH
2 TEACH
COORD
SPEED
−X −1
+X +1
WORLD
WORK
TOOL
MID
HIGH
INC

COORD JOINT
SPEED LOW
REMOT JOG
.World
.system

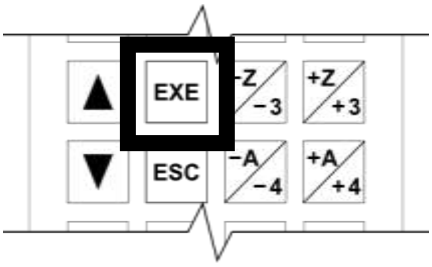
NAME		
WK1	X	450.000
WK2	Y	350.000
HAND1	Z	0.000
HAND2	C	0.000

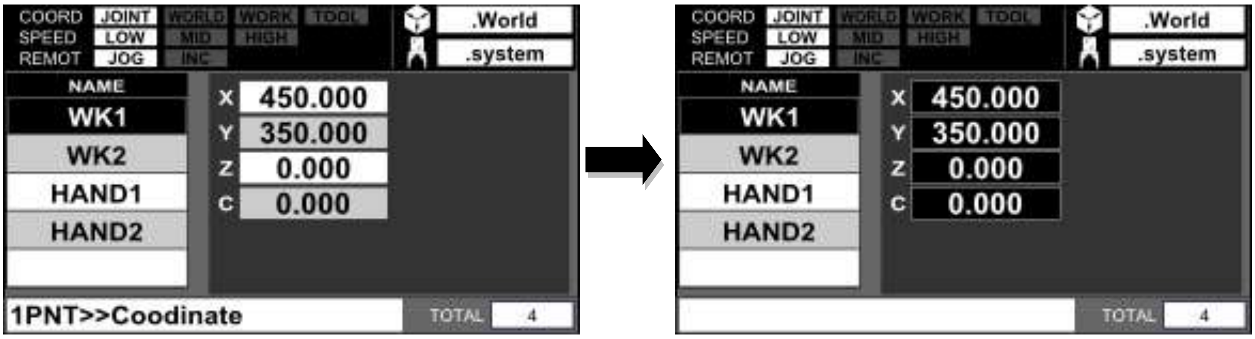
TOTAL 4

1PNT>>Coodinate

Step 3: Execution of 1-point teaching

Guiding manually, move the tool tip of the robot to the coordinate position you want to teach, and press the [EXE] key.


▲
EXE
−Z −3
+Z +3
▼
ESC
−A −4
+A +4


COORD JOINT WORLD WORK TOOL
SPEED LOW MID HIGH
REMOT JOG INC
NAME
TOTAL

.World .system

NAME
WK1
WK2
HAND1
HAND2

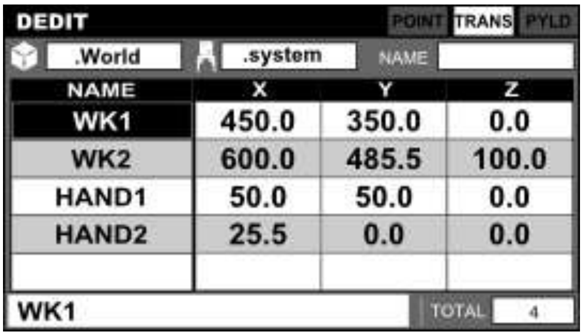
X 450.000
Y 350.000
Z 0.000
C 0.000

1PNT>>Coodinate

TOTAL 4

To cancel teaching halfway, press the [ESC] key.

Step 4: Returning to data editing
Release the Enable switch or press the [ESC] key. The data editor returns to the editing of coordinate data.


DEDIT
POINT TRANS PYLD
NAME
TOTAL

.World .system

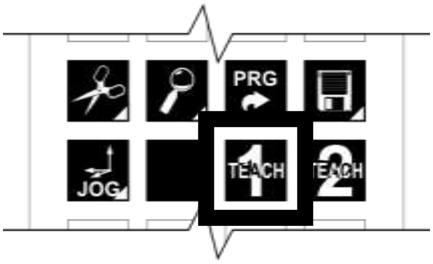
NAME	X	Y	Z
WK1	450.0	350.0	0.0
WK2	600.0	485.5	100.0
HAND1	50.0	50.0	0.0
HAND2	25.5	0.0	0.0

WK1

TOTAL 4

Related Function

Teaching can also be performed with the [1TEACH] key on the Edit Function menu which is displayed on the key sheet during coordinate data editing.


PRG
JOG
TEACH 1
TEACH 2

5.5.5 Coordinate Data 2-Point Teaching

⚠ CAUTION

In principle, the teaching operation should be performed outside the dangerous area of the robot. If it must be performed inevitably within the dangerous area, strictly observe the following matters.

(1) The teaching operation should always be performed by two (2) persons. One person performs the job and the other person watches outside the dangerous area. Also, both persons should try to prevent mis-operation with each other.

(2) The operator should do the job in an attitude ready to press the EMERGENCY stop pushbutton switch at any time. Also, he/she should perform the job at a position from which he/she can evacuate immediately at the time of emergency after confirming the robot working range and shields nearby.

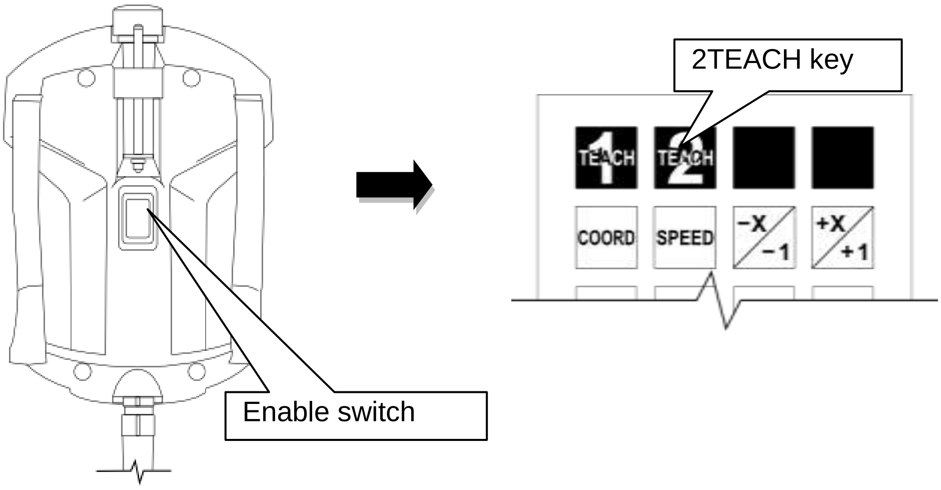
(3) The supervisor should keep watch on the job at a position where he/she can see the entire robot system and operate the EMERGENCY stop pushbutton switch at the time of an emergency. Also, he/she should keep anyone from entering the dangerous area.

Functional Explanation

Guide the tool tip of the robot to a teach point, generate coordinate data from two points, and then register it to the coordinate data where the cursor is positioned.

Operating Procedure

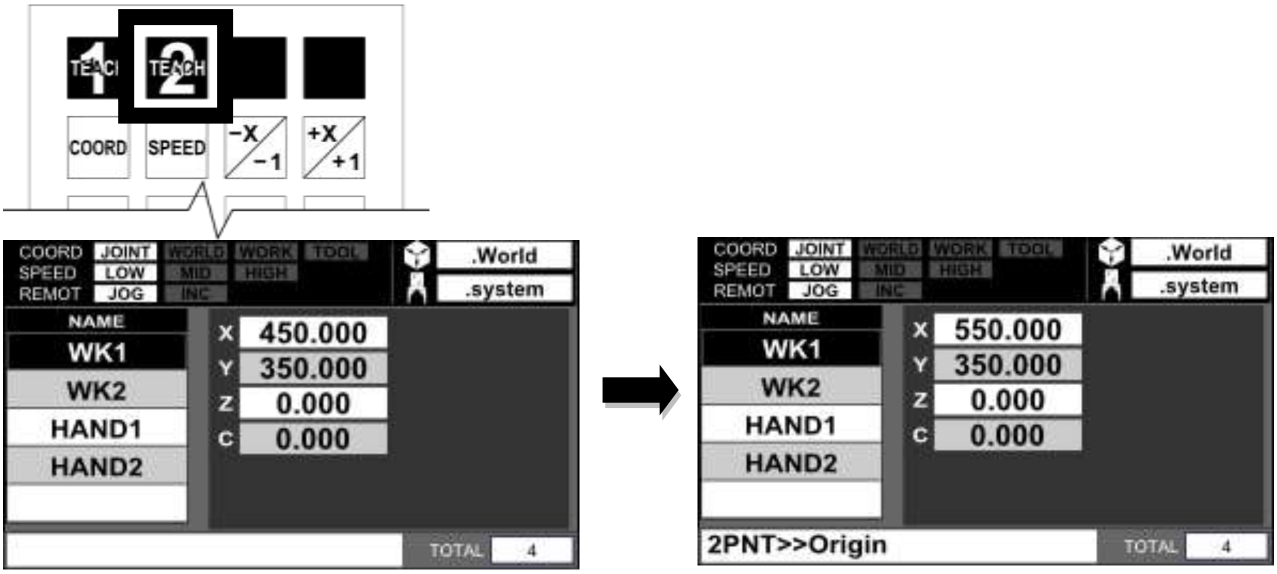
Step 1: Calling the [2TEACH] key
Lightly grip the Enable switch when editing coordinate data in order to open the contact of the Safety switch.
The screen changes to show the current position (World coordinates), and the [2TEACH] key is displayed on the key sheet.



Step 2: Selecting the 2-point teach function

Select the coordinate data you want to teach by moving the cursor up and down, and press the [2TEACH] key.

The "2PNT>>Origin" message appears on the command line.



NAME		
WK1	X	450.000
WK2	Y	350.000
HAND1	Z	0.000
HAND2	C	0.000

COORD JOINT WORLD WORK TOOL
SPEED LOW MID HIGH
REMOT JOG INC
.World
.system
TOTAL 4

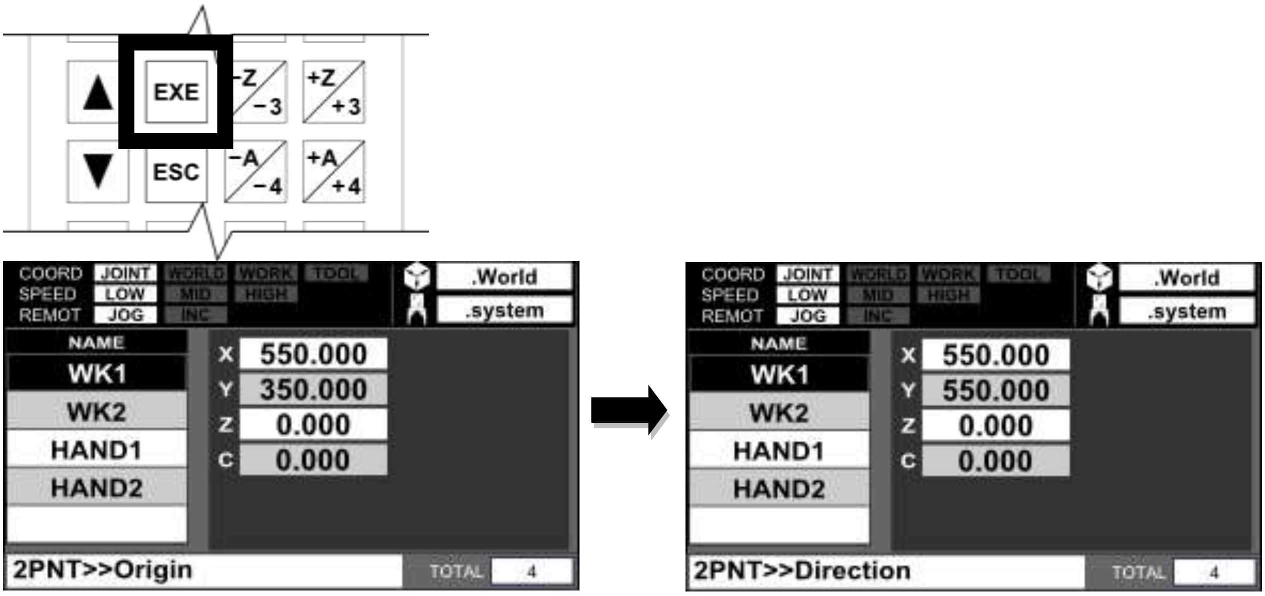
NAME		
WK1	X	550.000
WK2	Y	350.000
HAND1	Z	0.000
HAND2	C	0.000

COORD JOINT WORLD WORK TOOL
SPEED LOW MID HIGH
REMOT JOG INC
.World
.system
2PNT>>Origin
TOTAL 4

Step 3: Execution of teaching (Origin)

Guiding manually, move the tool tip of the robot to the position you want to set as the origin of the coordinates.

Once the position has been determined, press the [EXE] key. The origin is set and the message on the command line changes to "2PNT>>Direction".


EXE
ESC
−Z −3
+Z +3
−A −4
+A +4
COORD JOINT WORLD WORK TOOL
SPEED LOW MID HIGH
REMOT JOG INC
.World
.system
NAME
WK1
WK2
HAND1
HAND2
TOTAL 4

X 550.000
Y 350.000
Z 0.000
C 0.000

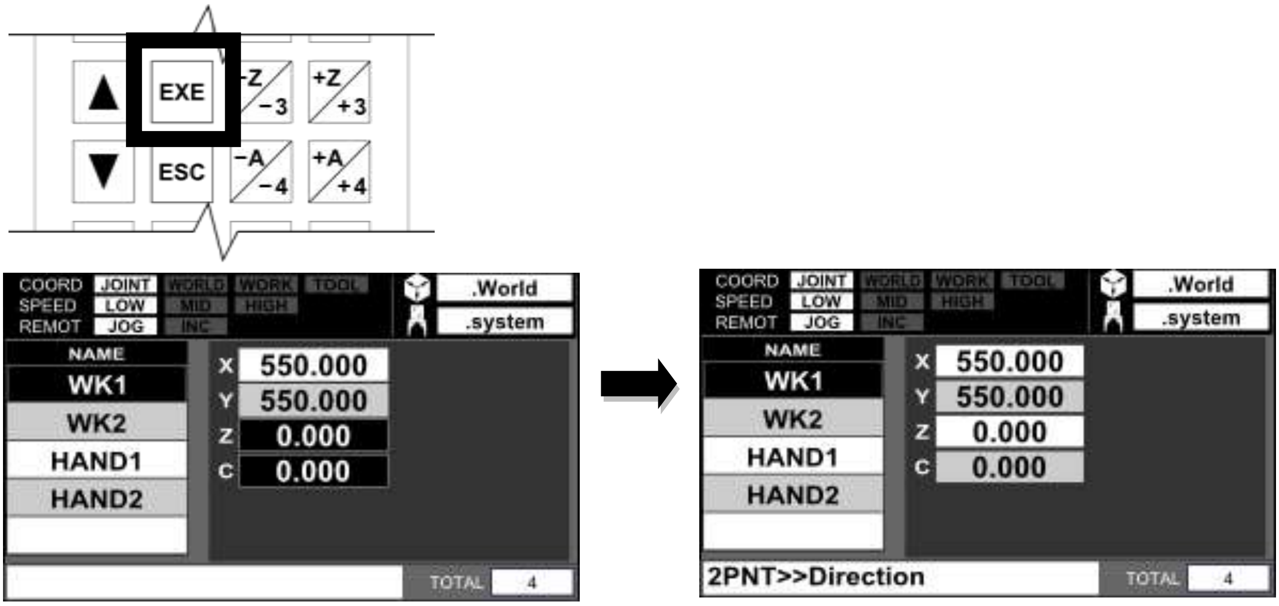
2PNT>>Origin

X 550.000
Y 550.000
Z 0.000
C 0.000

2PNT>>Direction

Step 4: Execution of teaching (Direction)

Guiding manually, move the tool tip of the robot to the point where you want to set as the direction (positive X direction) of the coordinates. Once the position has been determined, press the [EXE] key. Once the direction (positive X direction) has been set, the message on the command line disappears, and the coordinates in which the straight line connecting from the two points (origin) to the direction (positive X direction) indicates the positive X axis will be registered in the coordinate data being selected.


EXE
ESC
−Z −3
+Z +3
−A −4
+A +4
COORD JOINT WORLD WORK TOOL
SPEED LOW MID HIGH
REMOT JOG INC
.World
.system
NAME
WK1
WK2
HAND1
HAND2
TOTAL 4

X 550.000
Y 550.000
Z 0.000
C 0.000

X 550.000
Y 550.000
Z 0.000
C 0.000

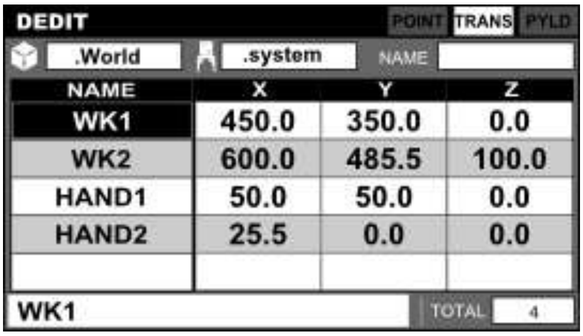
2PNT>>Direction

To cancel 2-point teaching in progress, press the [ESC] key.

The message appears on the command line disappears, and the 2-point teach function is cleared.

Step 5: Returning to data editing

Release the Enable switch or press the [ESC] key. The data editor returns to the editing of coordinate data.



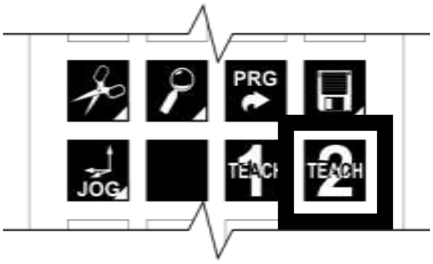
NAME	X	Y	Z
WK1	450.0	350.0	0.0
WK2	600.0	485.5	100.0
HAND1	50.0	50.0	0.0
HAND2	25.5	0.0	0.0

WK1

TOTAL 4

Related Function

Teaching can also be performed with the [2TEACH] key on the Edit Function menu which is displayed on the key sheet during coordinate data editing.



5.5.6 Detailed Coordinate Data Display

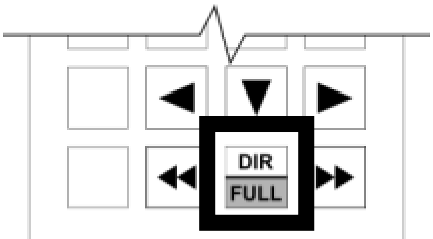
Functional Explanation

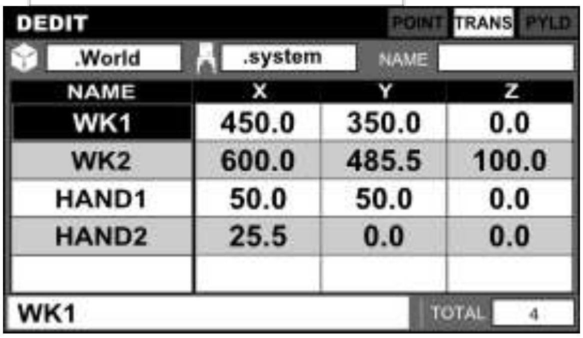
The detailed coordinate data display mode displays one coordinate data element on the full screen.
In this mode, coordinate data can be added, deleted and edited.

Operating Procedure

Step 1: Switching detailed coordinate data display

Press the [DIR/FULL] key. Each time the [DIR/FULL] key is pressed, the display switches between directory display and detailed display.



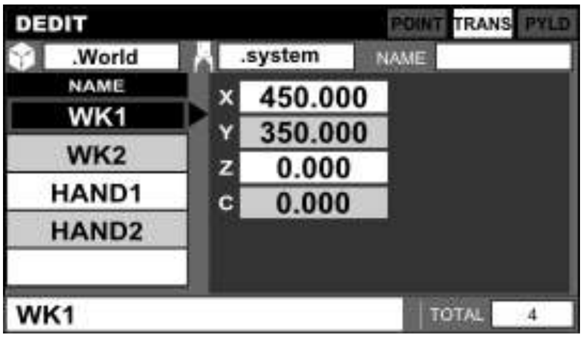


.World .system NAME

NAME	X	Y	Z
WK1	450.0	350.0	0.0
WK2	600.0	485.5	100.0
HAND1	50.0	50.0	0.0
HAND2	25.5	0.0	0.0

WK1 TOTAL 4

DIR Display



.World .system NAME

NAME: WK1, WK2, HAND1, HAND2

X 450.000
Y 350.000
Z 0.000
C 0.000

WK1 TOTAL 4

FULL Display

Cautions

- The procedures to add, delete and edit coordinate data in the detailed coordinate data display mode are the same as those in the coordinate data list display mode.
- The "3-element scroll", "move to end of line" and "vertical screen scroll" operations do not take effect in the detailed coordinate data display mode.

5.6 Load Data Editing

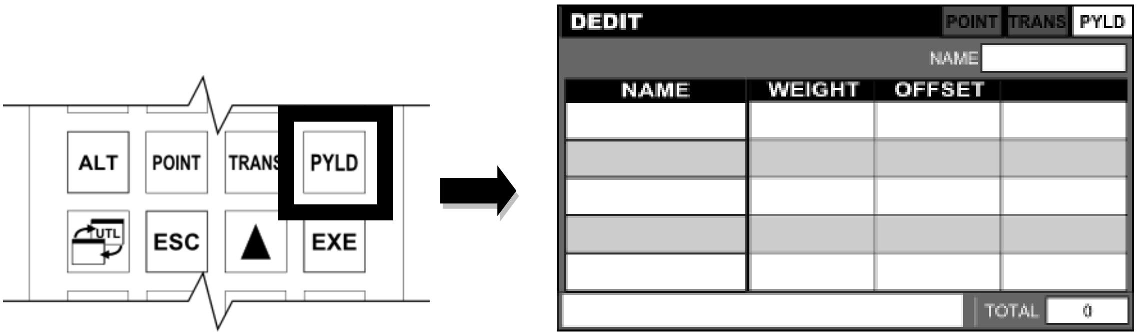
5.6.1 Load Data List Display

Functional Explanation

The load data list display mode is the mode that displays the load data of the weight and center of gravity offset of a load used to control the gain and acceleration. In this mode, it is possible to add, edit and delete load data.

Operating Procedure

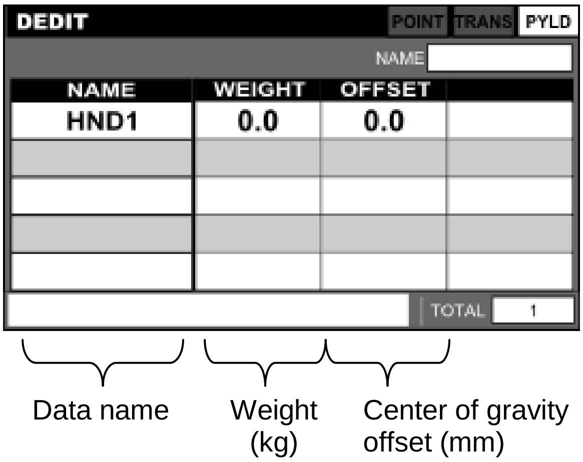
Step 1: Displaying a load data list
Press the [PYLD] key.


ALT
POINT
TRANS
PYLD
UTL
ESC
▲
EXE
DEDIT
POINT
TRANS
PYLD
NAME

NAME	WEIGHT	OFFSET	

TOTAL 0

Elements in list display are arranged in the following order.


DEDIT
POINT
TRANS
PYLD
NAME
Data name
Weight (kg)
Center of gravity offset (mm)

NAME	WEIGHT	OFFSET	
HND1	0.0	0.0	

TOTAL 1

Caution

- The basic operations of adding, editing and deleting load data are the same as those in position data editing.

5.6.2 Detailed Load Data Display

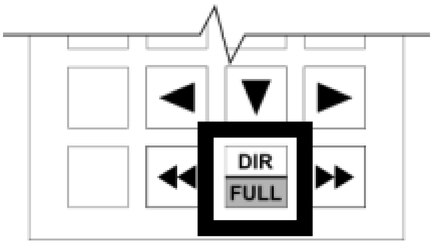
Functional Explanation

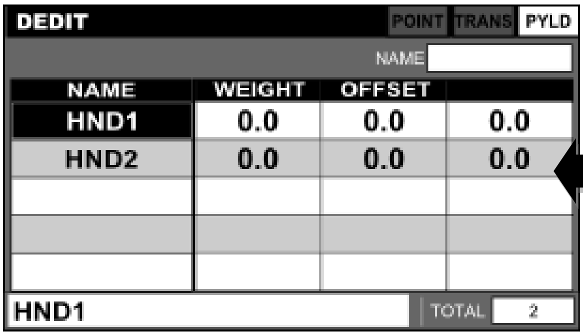
The detailed load data display mode displays one load data element on the full screen. In this mode, load data can be added, deleted and edited.

Operating Procedure

Step 1: Switching detailed load data display

Press the [DIR/FULL] key. Each time the [DIR/FULL] key is pressed, the display switches between directory display and detailed display.

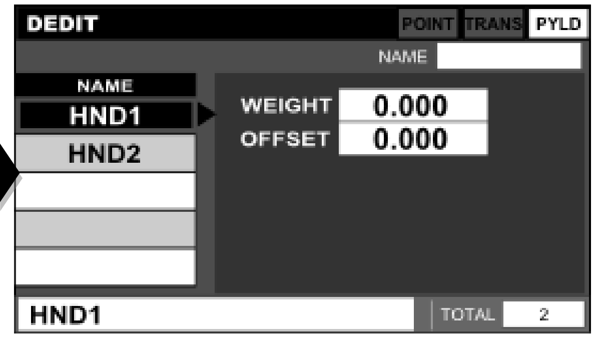



DEDIT
POINT
TRANS
PYLD
NAME

NAME	WEIGHT	OFFSET	
HND1	0.0	0.0	0.0
HND2	0.0	0.0	0.0

HND1 TOTAL 2

DIR Display


DEDIT
POINT
TRANS
PYLD
NAME

NAME
HND1
HND2

WEIGHT 0.000
OFFSET 0.000

HND1 TOTAL 2

FULL Display

Cautions

- The procedures to add, delete and edit load data in the detailed load data display mode are the same as those in the load data list display mode.
- The "3-element scroll", "move to end of line" and "vertical screen scroll" operations do not take effect in the detailed load data display mode.

5.7 Data Editing Functions

The editing functions common to position data, coordinate data and load data are outlined in the table below.

Menu	Key Icon	Description of Operation
[INS NAME]	NAME	Inserts lines with specified names by assigning sequential numbers when adding lines.
[COPY]	COPY	Copies a numeric value.
[CUT]	CUT	Cuts data (one line).
[PEST]	PAST	Pastes the data on a copied or cut line to the line below the cursor.
[SRCH]	SRCH	Searches for a character string.
[SORT]	SORT	Sorts data in a table.
[FILT]	FILT	Filters and displays data names according to the specified character string.
[ALL]	ALL	Clears filtering operation.
[PRG EDIT]	PRG ↪	Starts the data editor.
[SAVE]	SAVE	Saves data and quits the data editor.
[NO SAVE]	NO SAVE	Quits the data editor without saving the data to a file. Discards edited data.

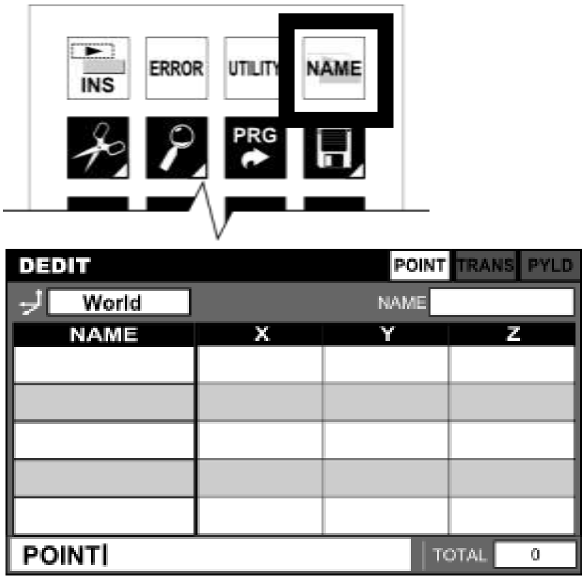
5.7.1 Insert Sequential Lines

Functional Explanation

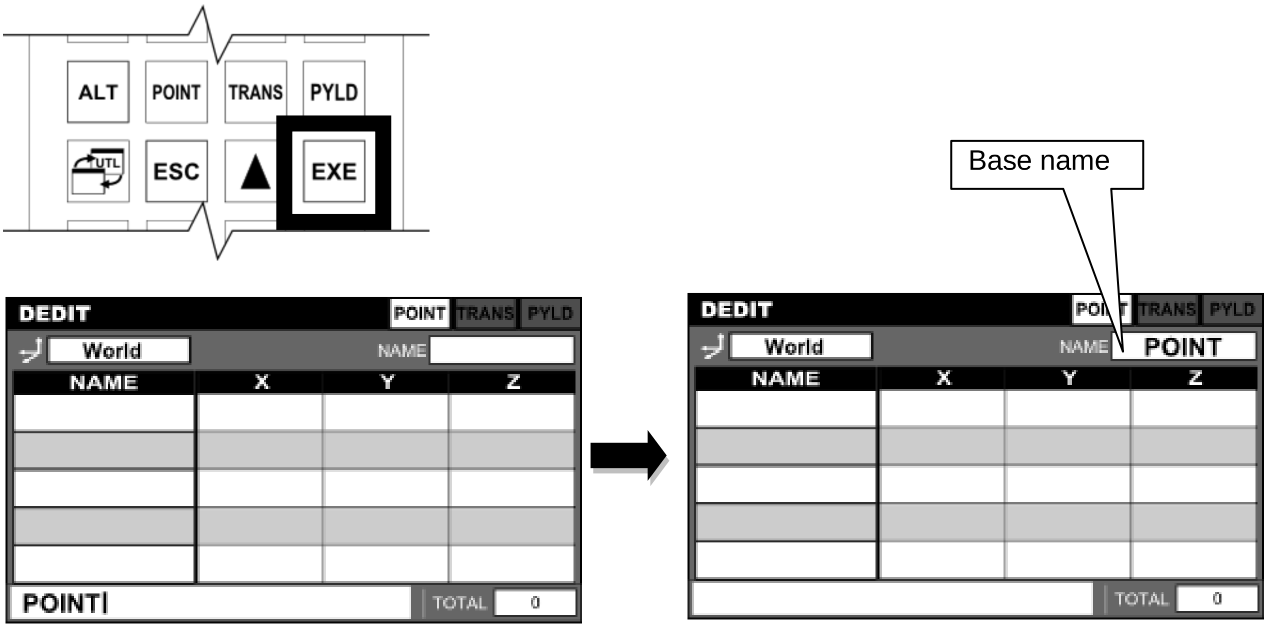
Inserts lines by assigning sequential numbers according to the name registered in the base name field.

Operating Procedure

Step 1: Registering the base name
Press the [NAME] key.
Enter the base name when entering sequentially numbered lines on the command line.


INS
ERROR
UTILITY
NAME
PRG
DEDIT
POINT
TRANS
PYLD
World
NAME
NAME
X
Y
Z
POINT|
TOTAL
0

Once the base name has been determined, press the [EXE] key. The base name is displayed on the NAME field.


ALT
POINT
TRANS
PYLD
UTL
ESC
▲
EXE
Base name
DEDIT
POINT
TRANS
PYLD
World
NAME

NAME	X	Y	Z

POINT|

TOTAL 0

→

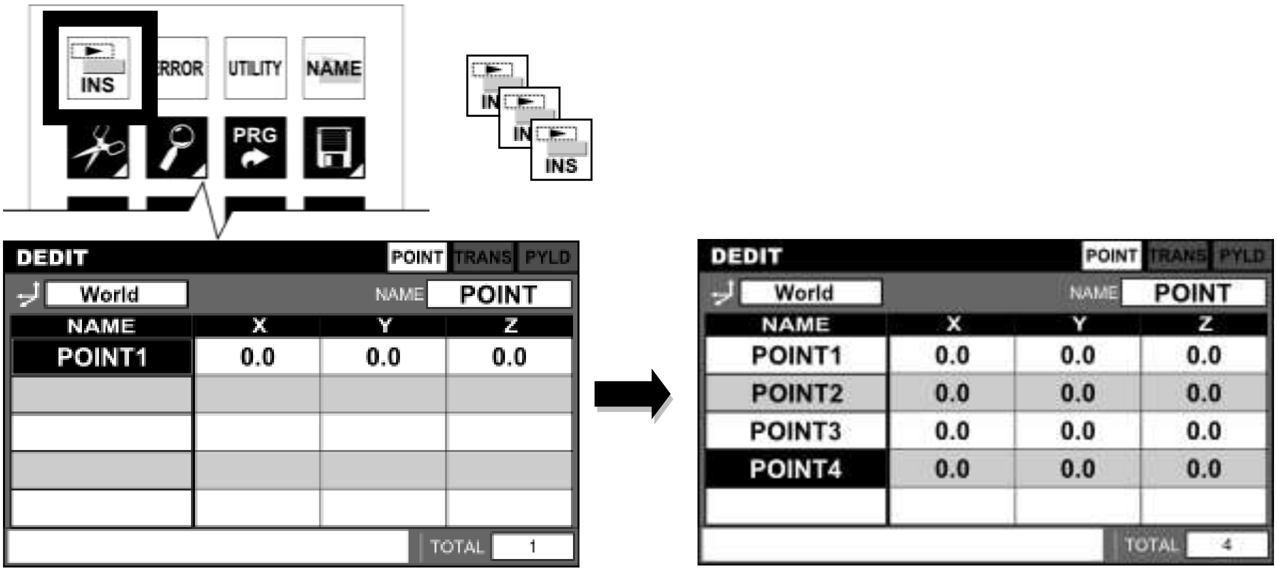
NAME POINT

NAME	X	Y	Z

TOTAL 0

Step 2: Execution of sequentially numbered line insertion

Press the [INS] key. Each time the [INS] key is pressed, a line having a name consisting of the base name and a sequential number is added.


INS
ERROR
UTILITY
NAME
PRG
INS
INS
INS
DEDIT
POINT
TRANS
PYLD
World
NAME

NAME POINT

NAME	X	Y	Z
POINT1	0.0	0.0	0.0

TOTAL 1

→

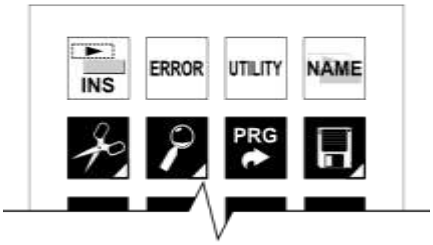
NAME POINT

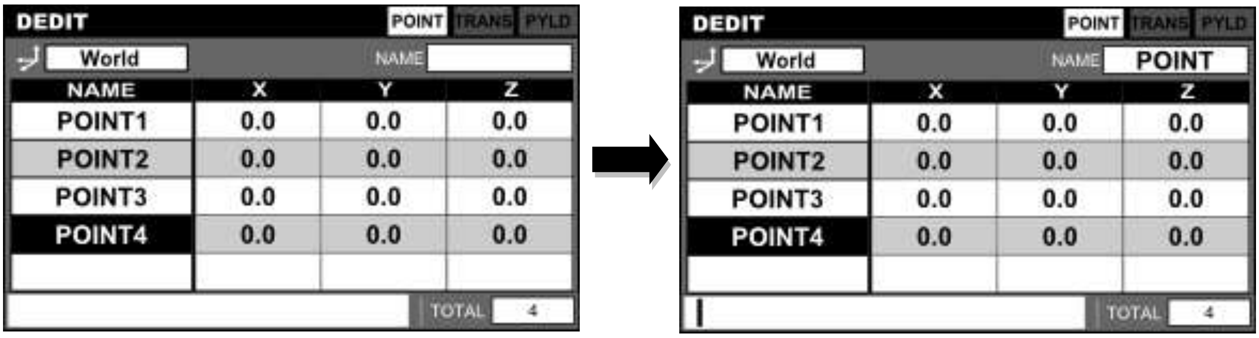
NAME	X	Y	Z
POINT1	0.0	0.0	0.0
POINT2	0.0	0.0	0.0
POINT3	0.0	0.0	0.0
POINT4	0.0	0.0	0.0

TOTAL 4

Step 3: Clearing the insertion of sequentially numbered lines

To return the insertion of sequentially numbered lines back to regular line insertion, press the [NAME] key again and delete the NAME field to make it blank.


INS
ERROR
UTILITY
NAME
PRG


DEDIT
POINT
TRANS
PYLD
World
NAME
TOTAL
4

NAME	X	Y	Z
POINT1	0.0	0.0	0.0
POINT2	0.0	0.0	0.0
POINT3	0.0	0.0	0.0
POINT4	0.0	0.0	0.0

NAME: POINT

Cautions

- If data to be added by sequentially numbered line insertion already exists, sequential numbers will be assigned beginning with its maximum value.
- The base name for sequentially numbered line insertion can be set individually for position data, coordinate data, and load data.
- As long as the base name is displayed in the NAME field, use the [INS] key to insert lines by assigning sequential numbers.

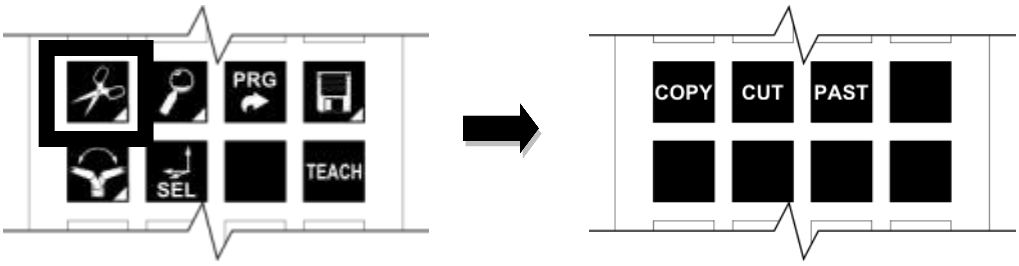
5.7.2 Copy

Functional Explanation

Copies a numeric value. Data names cannot be copied.

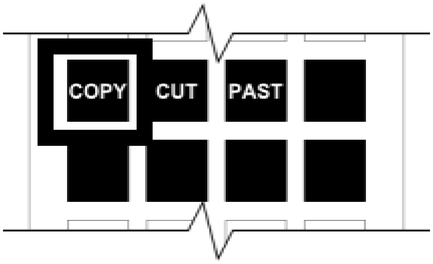
Operating Procedure

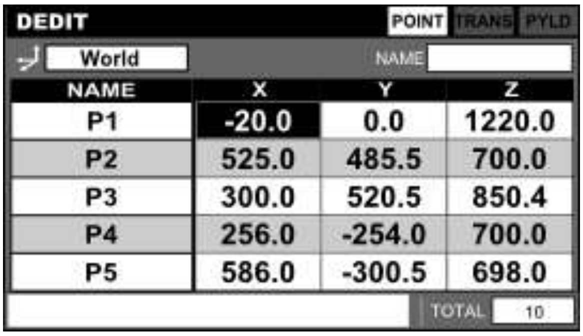
Step 1: Calling the [COPY] key
Press the “Scissors” key. The [COPY], [CUT] and [PAST] keys are displayed on the key sheet.


PRG
SEL
TEACH
COPY
CUT
PAST

Step 2: Execution of copy

Position the cursor on the numeric value you want to copy, and press the [COPY] key.


COPY
CUT
PAST


DEDIT
POINT
TRANS
PYLD
World
NAME
TOTAL 10

NAME	X	Y	Z
P1	-20.0	0.0	1220.0
P2	525.0	485.5	700.0
P3	300.0	520.5	850.4
P4	256.0	-254.0	700.0
P5	586.0	-300.5	698.0

Cautions

- Data names cannot be copied.
- Copies crossing over different data types (POINT, TRANS, PYLD) cannot be performed.

5.7.3 Cut

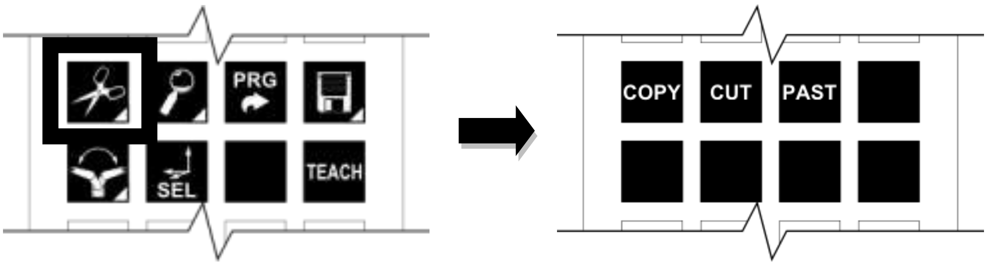
Functional Explanation

Cuts position data, coordinate data, and load data. Multiple lines can be cut together.

Operating Procedure

Step 1: Calling the [CUT] key

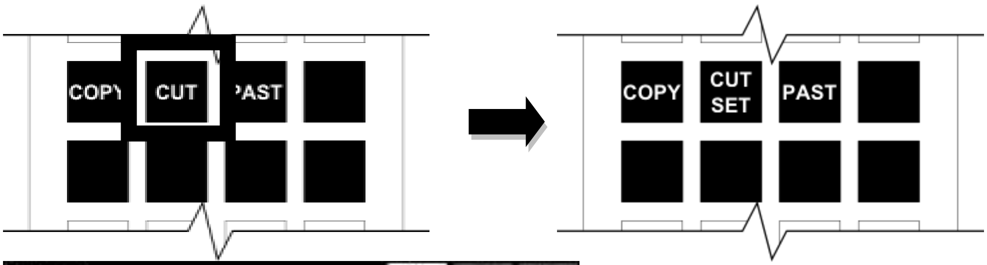
Press the "Scissors" key. The [COPY], [CUT] and [PAST] keys are displayed on the key sheet.

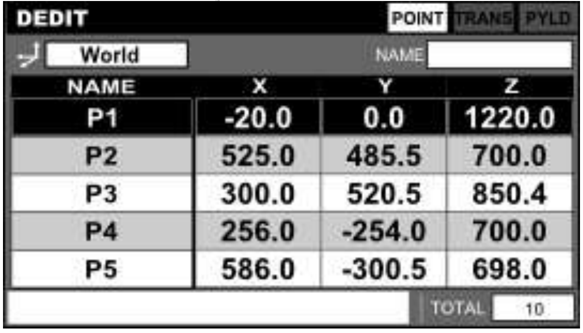

PRG
SEL
TEACH
COPY
CUT
PAST

Step 2: Setting up the cut range

Press the [CUT] key. The display of the [CUT] key changes to the [CUT SET] key.

The elements on the line on which the cursor is positioned are all highlighted in reverse video.



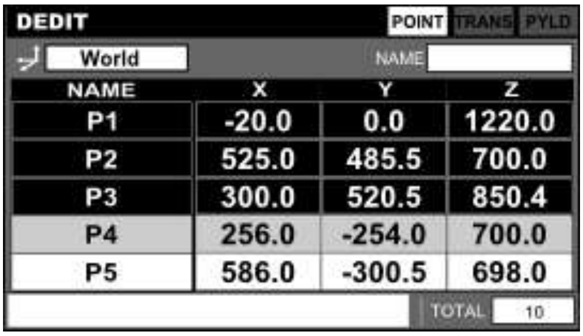

DEDIT POINT TRANS PYLD

World NAME

NAME	X	Y	Z
P1	-20.0	0.0	1220.0
P2	525.0	485.5	700.0
P3	300.0	520.5	850.4
P4	256.0	-254.0	700.0
P5	586.0	-300.5	698.0

TOTAL 10

By moving the cursor up and down, multiple lines can be selected at a time.


DEDIT POINT TRANS PYLD

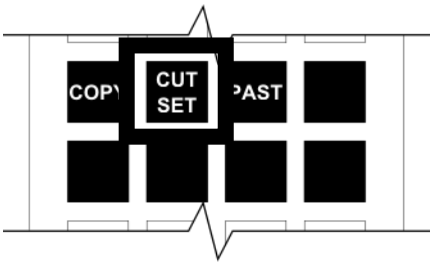
World NAME

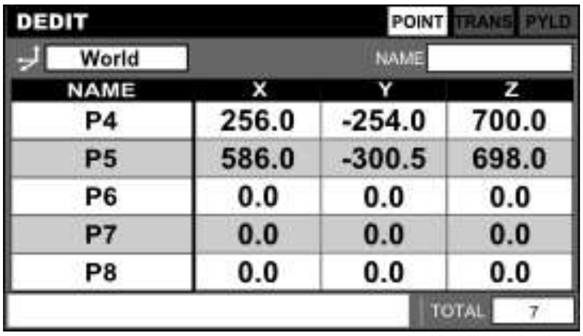
NAME	X	Y	Z
P1	-20.0	0.0	1220.0
P2	525.0	485.5	700.0
P3	300.0	520.5	850.4
P4	256.0	-254.0	700.0
P5	586.0	-300.5	698.0

TOTAL 10

Step 3: Execution of cut

Press the [CUT SET] or [EXE] key. Line cut is executed.





NAME	X	Y	Z
P4	256.0	-254.0	700.0
P5	586.0	-300.5	698.0
P6	0.0	0.0	0.0
P7	0.0	0.0	0.0
P8	0.0	0.0	0.0

TOTAL 7

Cautions

- The position data belonging to each coordinate will all be deleted.
- World coordinates cannot be selected. (They cannot be deleted.)

5.7.4 Paste

Functional Explanation

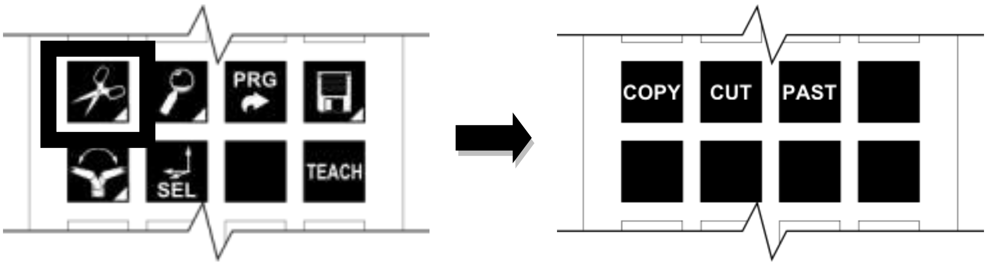
Pastes data on a multiple number of copied or cut lines.

Operating Procedure

Step 1: Calling the [PAST] key

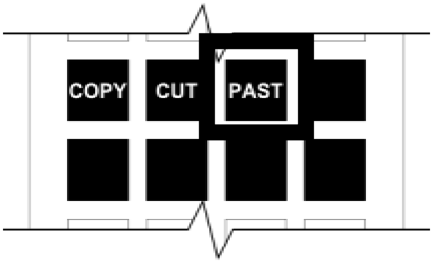
Press the "Scissors" key.

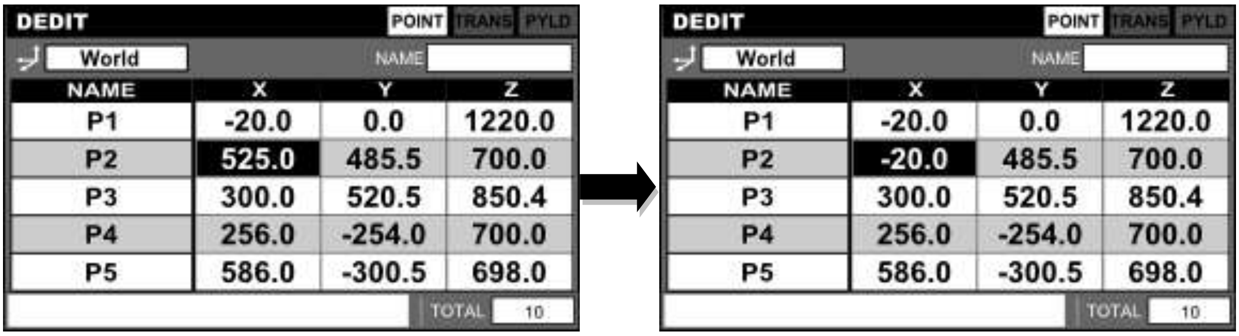
The [COPY], [CUT] and [PAST] keys are displayed on the key sheet.



Step 2: Execution of pasting copied data

Position the cursor on the element cell you want to paste to, and press the [PAST] key.





DEDIT POINT TRANS PYLD

World NAME

NAME	X	Y	Z
P1	-20.0	0.0	1220.0
P2	525.0	485.5	700.0
P3	300.0	520.5	850.4
P4	256.0	-254.0	700.0
P5	586.0	-300.5	698.0

TOTAL 10

DEDIT POINT TRANS PYLD

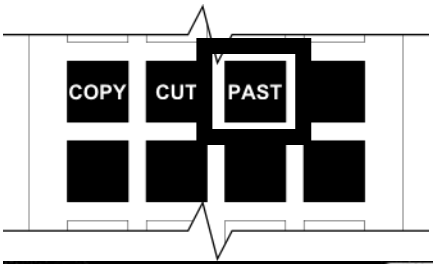
World NAME

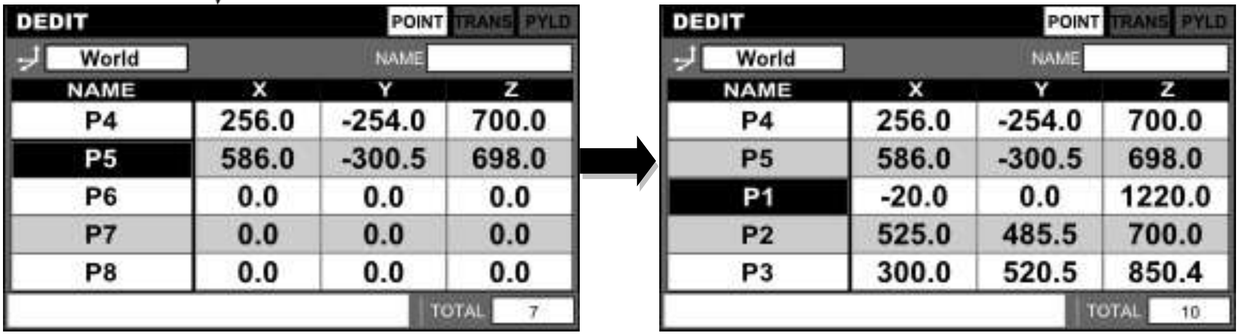
NAME	X	Y	Z
P1	-20.0	0.0	1220.0
P2	-20.0	485.5	700.0
P3	300.0	520.5	850.4
P4	256.0	-254.0	700.0
P5	586.0	-300.5	698.0

TOTAL 10

Step 3: Execution of pasting cut data

Press the [PAST] key. The line you have cut is inserted under the line on which the cursor is positioned.





DEDIT POINT TRANS PYLD

World NAME

NAME	X	Y	Z
P4	256.0	-254.0	700.0
P5	586.0	-300.5	698.0
P6	0.0	0.0	0.0
P7	0.0	0.0	0.0
P8	0.0	0.0	0.0

TOTAL 7

DEDIT POINT TRANS PYLD

World NAME

NAME	X	Y	Z
P4	256.0	-254.0	700.0
P5	586.0	-300.5	698.0
P1	-20.0	0.0	1220.0
P2	525.0	485.5	700.0
P3	300.0	520.5	850.4

TOTAL 10

5.7.5 Search

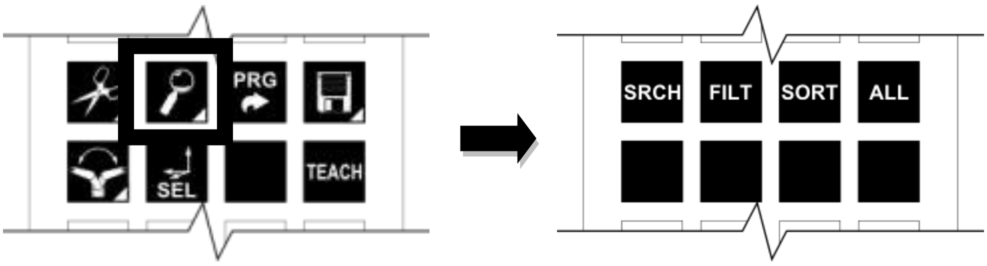
Functional Explanation

Searches for character strings corresponding to position data names, coordinate data names, and load data names.

Operating Procedure

Step 1: Calling the [SRCH] key

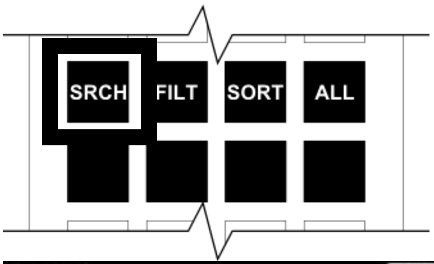
Press the “Loupe” key. The [SRCH], [FILT], [SORT] and [ALL] keys are displayed on the key sheet.

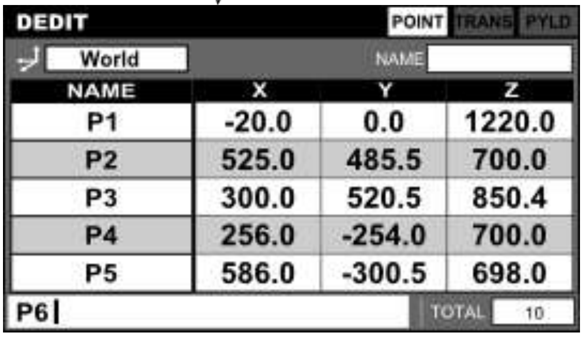


Step 2: Specifying a search character string

Press the [SRCH] key. The cursor moves to the command line.

Enter a search character string on the command line.





DEDIT POINT TRANS PYLD

World NAME

NAME	X	Y	Z
P1	-20.0	0.0	1220.0
P2	525.0	485.5	700.0
P3	300.0	520.5	850.4
P4	256.0	-254.0	700.0
P5	586.0	-300.5	698.0

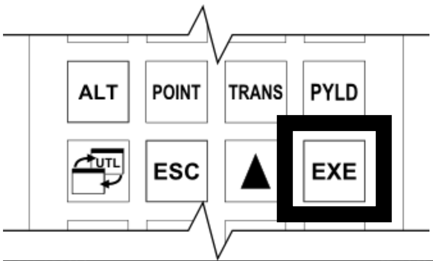
P6

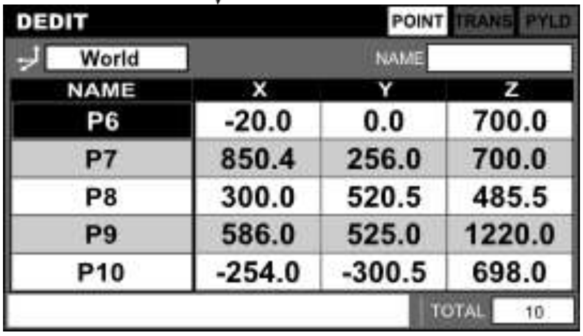
TOTAL 10

Step 3: Execution of search

Press the [EXE] key. The cursor moves to the search name.

If no search candidate is found, the function is closed.


ALT
POINT
TRANS
PYLD
UTL
ESC
▲
EXE


DEDIT
POINT
TRANS
PYLD

World

NAME

NAME	X	Y	Z
P6	-20.0	0.0	700.0
P7	850.4	256.0	700.0
P8	300.0	520.5	485.5
P9	586.0	525.0	1220.0
P10	-254.0	-300.5	698.0

TOTAL 10

Cautions

- If search is performed in the character string filtering function, search will only be performed to a group of data whose display is restricted with a character string filter.
- If no search name is found, the message "NOT FOUND" is displayed on the command line, and the function is closed.

5.7.6 Character String Filter

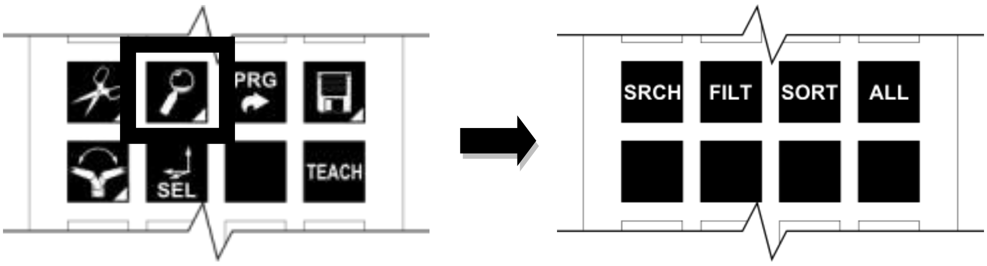
Functional Explanation

A character string filter is applied to a group of data being displayed.

Operating Procedure

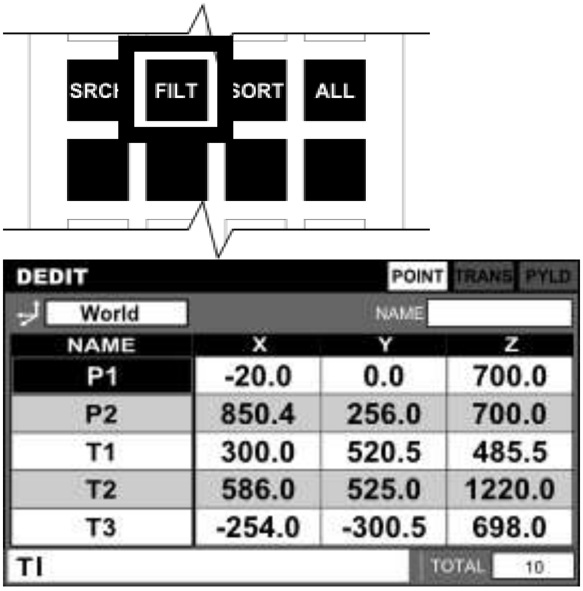
Step 1: Calling the [FILT] key

Press the "Loupe" key. The [SRCH], [FILT], [SORT] and [ALL] keys are displayed on the key sheet.


PRG
TEACH
SEL
SRCH
FILT
SORT
ALL

Step 2: Entering a filtering character string

Press the [FILT] key. Enter a filtering character string on the command line.


SRCH
FILT
SORT
ALL
DEDIT
POINT
TRANS
PYLD
World
NAME
TOTAL

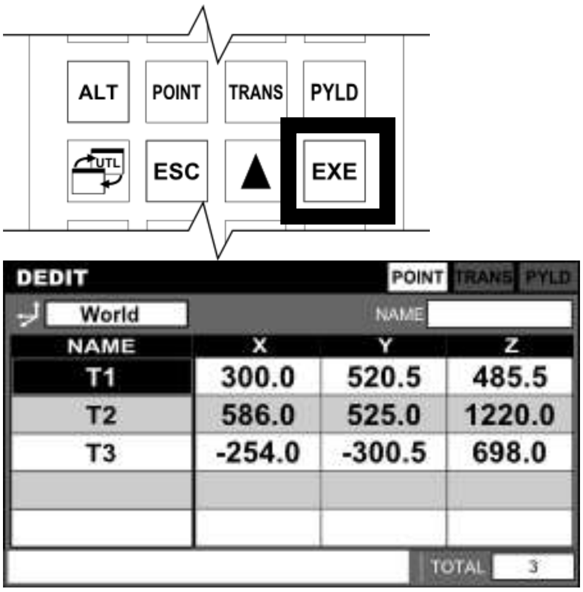
NAME	X	Y	Z
P1	-20.0	0.0	700.0
P2	850.4	256.0	700.0
T1	300.0	520.5	485.5
T2	586.0	525.0	1220.0
T3	-254.0	-300.5	698.0

TI

TOTAL 10

Step 3: Execution of character string filtering

Once the filtering character string has been determined, press the [EXE] key. Only the data starting with the filtering character string is displayed.

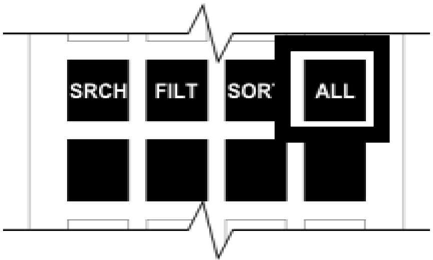

ALT
POINT
TRANS
PYLD
UTL
ESC
▲
EXE
DEDIT
POINT
TRANS
PYLD
World
NAME
TOTAL

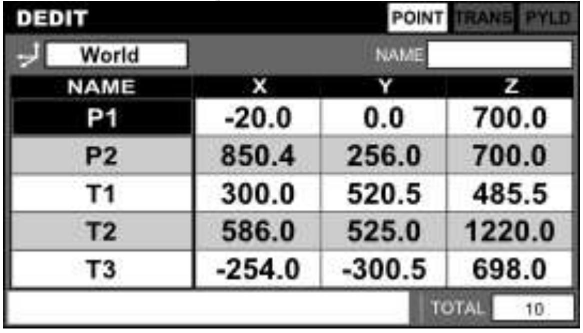
NAME	X	Y	Z
T1	300.0	520.5	485.5
T2	586.0	525.0	1220.0
T3	-254.0	-300.5	698.0

TOTAL 3

Step 4: Clearing character string filtering

Press the [ALL] key. Character string filtering is cleared and all applicable filtered data is displayed.


SRCH
FILT
SOR
ALL


DEDIT
POINT
TRANS
PYLD
World
NAME
TOTAL
10

NAME	X	Y	Z
P1	-20.0	0.0	700.0
P2	850.4	256.0	700.0
T1	300.0	520.5	485.5
T2	586.0	525.0	1220.0
T3	-254.0	-300.5	698.0

Caution

- If data that is not applicable to the display is newly added during the execution of character string filtering, character string filtering will be canceled.

5.7.7 Table Sorting

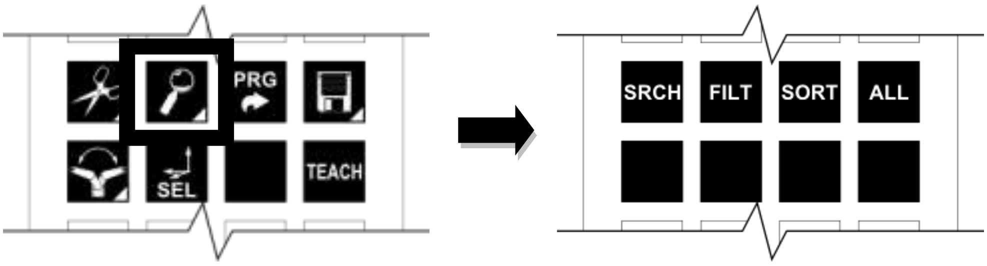
Functional Explanation

Sorts data in a table in ascending or descending order.

Operating Procedure

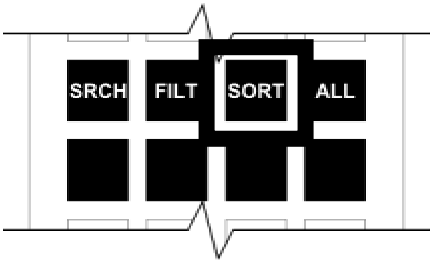
Step 1: Calling the [SORT] key

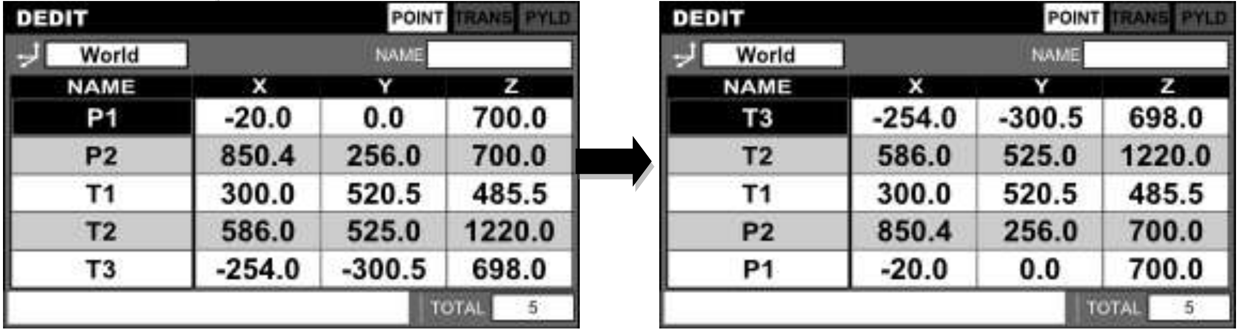
Press the “Loupe” key. The [SRCH], [FILT], [SORT] and [ALL] keys are displayed on the key sheet.


PRG
SEL
TEACH
SRCH
FILT
SORT
ALL

Step 2: Execution of table sorting

Press the [SORT] key. Each time the [SORT] key is pressed, the data in a table is sorted in ascending or descending order.


SRCH
FILT
SORT
ALL


DEDIT
POINT
TRANS
PYLD
World
NAME
TOTAL

NAME	X	Y	Z
P1	-20.0	0.0	700.0
P2	850.4	256.0	700.0
T1	300.0	520.5	485.5
T2	586.0	525.0	1220.0
T3	-254.0	-300.5	698.0

TOTAL 5

NAME	X	Y	Z
T3	-254.0	-300.5	698.0
T2	586.0	525.0	1220.0
T1	300.0	520.5	485.5
P2	850.4	256.0	700.0
P1	-20.0	0.0	700.0

TOTAL 5

Caution

- Table sorting is performed to data hidden by a character string filter.

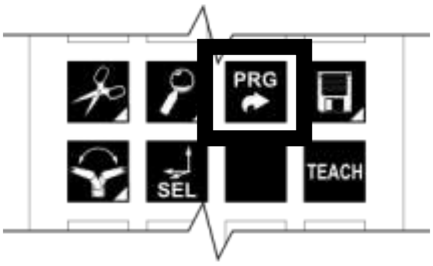
5.7.8 Program Editing

Functional Explanation

Starts the program editor.

Operating Procedure

Step 1: Starting the program editor
Press the [PRG→] key and start the program editor.
For details on program editing, please see Section 4, "Program Editing".


PRG
SEL
TEACH

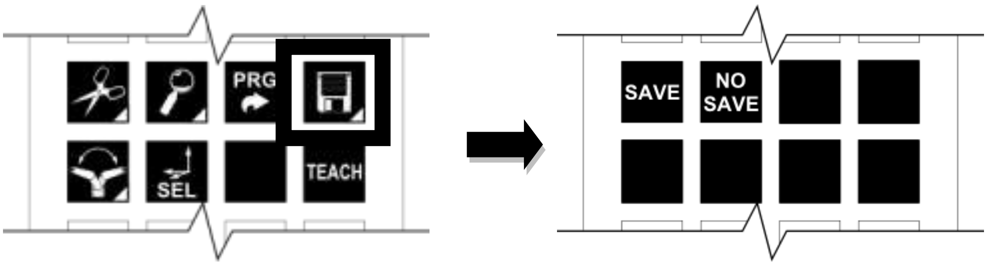
5.7.9 Save and Quit

Functional Explanation

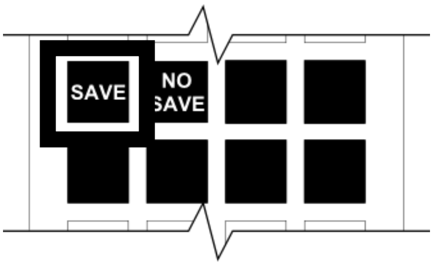
Saves data and quits the program editor.

Operating Procedure

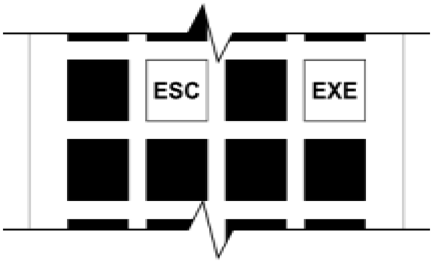
Step 1: Calling the [SAVE] key
Press the [FILE] key. The [SAVE] and [NO SAVE] keys are displayed on the key sheet.



Step 2: Execution of save
Press the [SAVE] key. A save confirmation message appears.



To execute save, press the [EXE] key. The data is saved in a file and data editor quits. If the [ESC] key is pressed while a confirmation message is being displayed, [SAVE] is canceled and data editing can be continued.



Caution

- In case the data editing function was started from the program editing function, the program editor will also quit after saving the program in a file.

5.7.10 Discard Changes and Quit

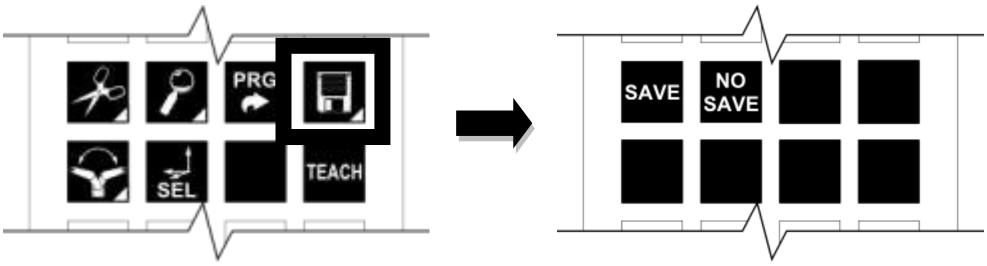
Functional Explanation

Discards edited data and quits the program editor.

Operating Procedure

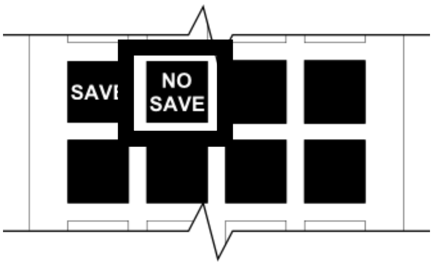
Step 1: Calling the [NO SAVE] key

Press the [FILE] key. The [SAVE] and [NO SAVE] keys are displayed on the key sheet.



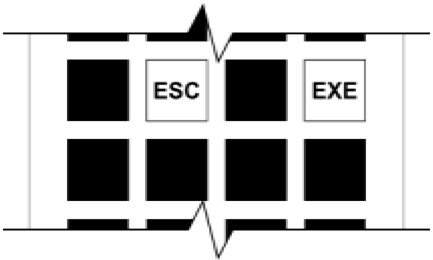
Step 2: Discarding edited data and quitting the program editor

Press the [NO SAVE] key. A confirmation message for discarding edited data appears on the command line.



To execute [NO SAVE], press the [EXE] key. Edited data is discarded and the program editor quits.

If the [ESC] key is pressed while a confirmation message is being displayed, [NO SAVE] is canceled and data editing can be continued.



Caution

- In case the data editing function was started from the program editing function, the program editor will also quit after saving the program in a file.

Section 6 Parameter Editing

The parameter editing function edits the parameter files inside the controller.
After editing the parameter files, turn the power to the controller on/off in order to make the changes effective.

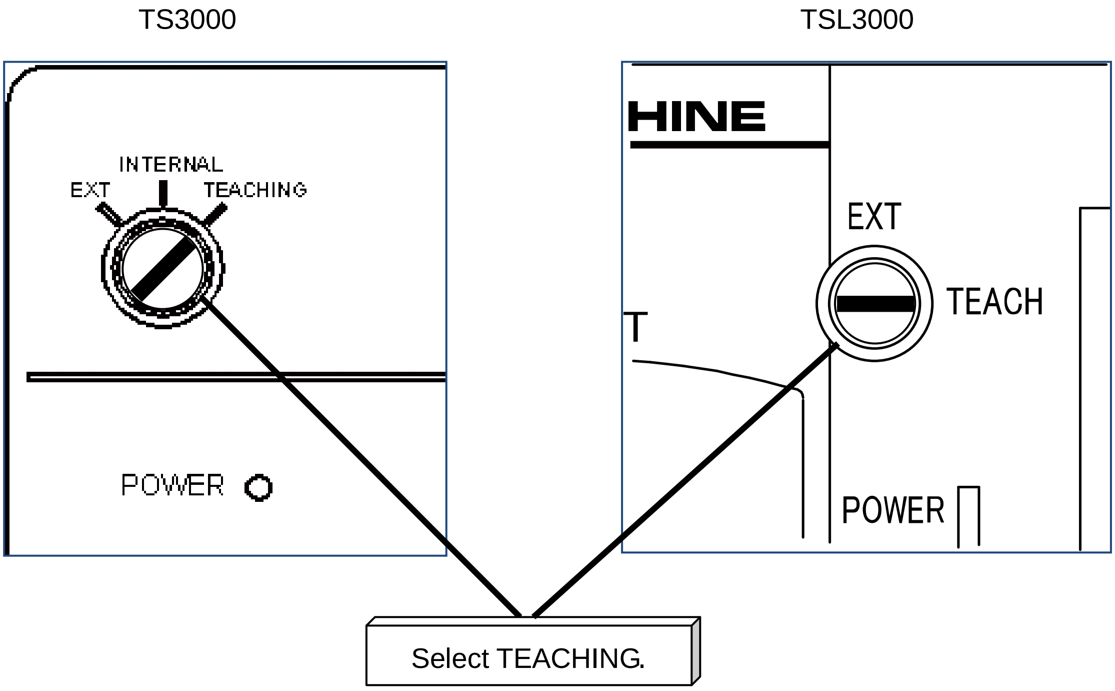
6.1 Starting the Parameter Editor

Functional Explanation

Starts the parameter editor.

Operating Procedure

Step 1: Selecting a mode
Set the master mode switch on the controller panel to "TEACHING".

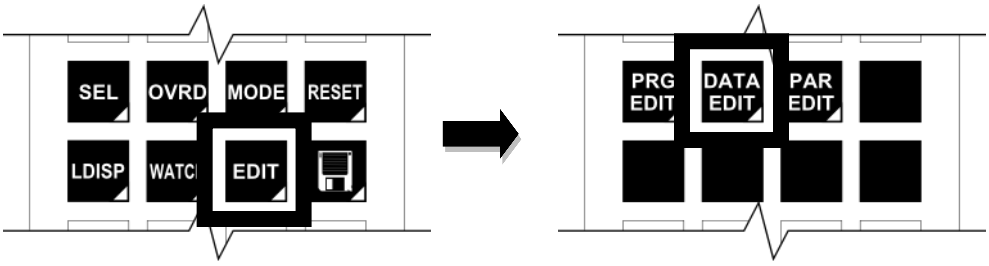

TS3000

TSL3000

Select TEACHING.

Step 2: Selecting the parameter editor

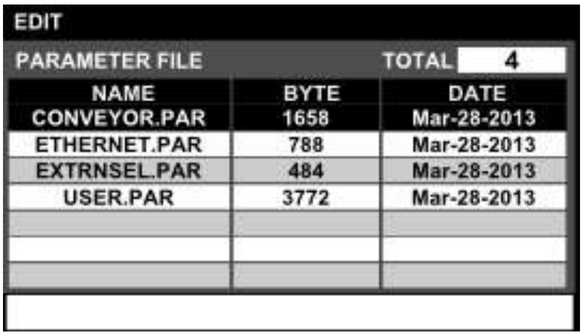
Press the [EDIT] key on the top key sheet in the TEACHING mode. The key sheet and screen displays change, and the [PRG EDIT], [DATA EDIT] and [PAR EDIT] keys appear. Next, press the [DATA EDIT] key.



Step 3: Specifying a file

A list of the parameter files inside the controller appears on the screen.

Select a file with the up and down cursor keys, and then press the [EXE] key. The parameter editor starts.



EDIT

PARAMETER FILE TOTAL 4

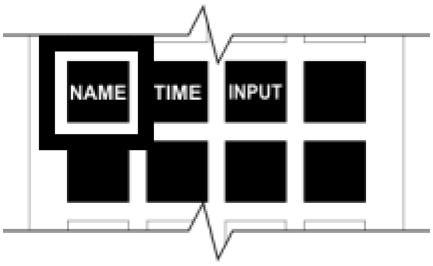
NAME	BYTE	DATE
CONVEYOR.PAR	1658	Mar-28-2013
ETHERNET.PAR	788	Mar-28-2013
EXTRNSEL.PAR	484	Mar-28-2013
USER.PAR	3772	Mar-28-2013

Related Functions

The file display sort functions include <display by name>, <display by file creation time> and <file search function>.

<Display by name>

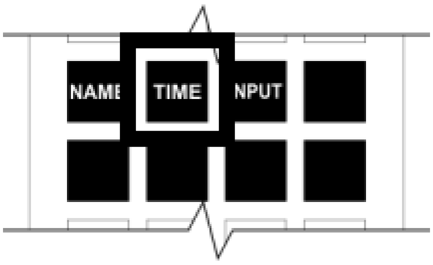
Press the [NAME] key. The file list is sorted by name. Each time the [NAME] key is pressed, the sorting order changes between ascending order and descending order.



<Display by file creation time>

Press the [TIME] key. The file list is sorted by file creation time.

Each time the [TIME] key is pressed, the sorting order changes between ascending order and descending order.

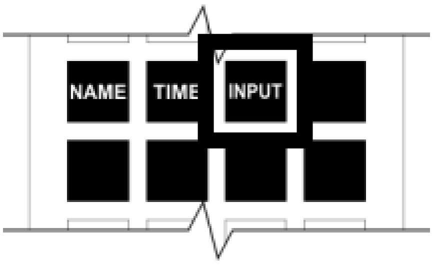


<File search function>

Press the [INPUT] key.

After the cursor moves onto the command line, enter the character string you want to search for.

Once the character string has been determined, press the [EXE] key. Files staring with the character strings you just entered are displayed in a list.

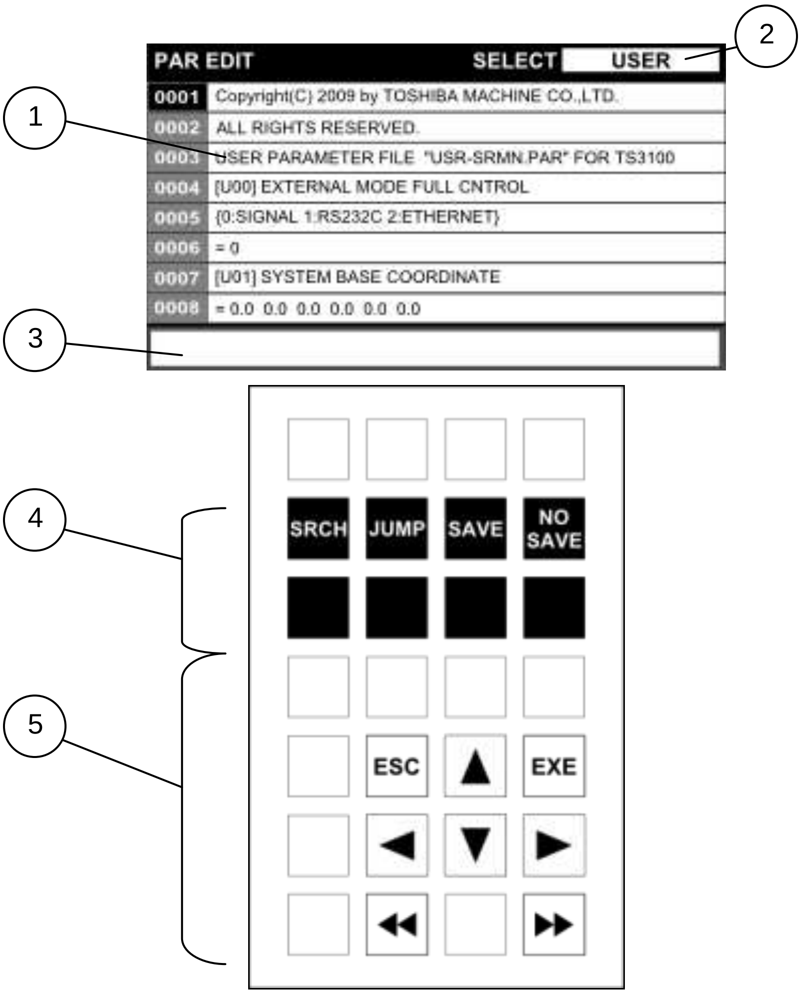


Caution

- The [PASSWORD] key on the keyboard is provided for maintenance: thus, it is not used during regular operation.

6.2 Overview of the Parameter Editor

The screen structure of the parameter editor is shown below.

Parameter Editor Screen and Key Sheet	Description of Display
 1 2 3 4 5 PAR EDIT SELECT USER SRCH JUMP SAVE NO SAVE ESC EXE 0001 Copyright(C) 2009 by TOSHIBA MACHINE CO.,LTD. 0002 ALL RIGHTS RESERVED. 0003 USER PARAMETER FILE "USR-SRMN.PAR" FOR TS3100 0004 [U00] EXTERNAL MODE FULL CNTROL 0005 {0:SIGNAL 1:RS232C 2:ETHERNET} 0006 = 0 0007 [U01] SYSTEM BASE COORDINATE 0008 = 0.0 0.0 0.0 0.0 0.0 0.0	① Data editing screen ② Displays the name of the file being selected. ③ Command line ④ Program edit function menus ⑤ Text entry operation keys

Caution

- No lines can be added to or deleted from the parameter file.

6.3 Move Cursor

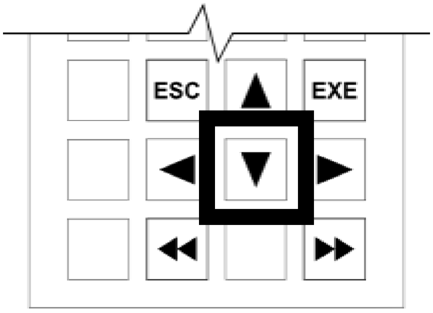
Functional Explanation

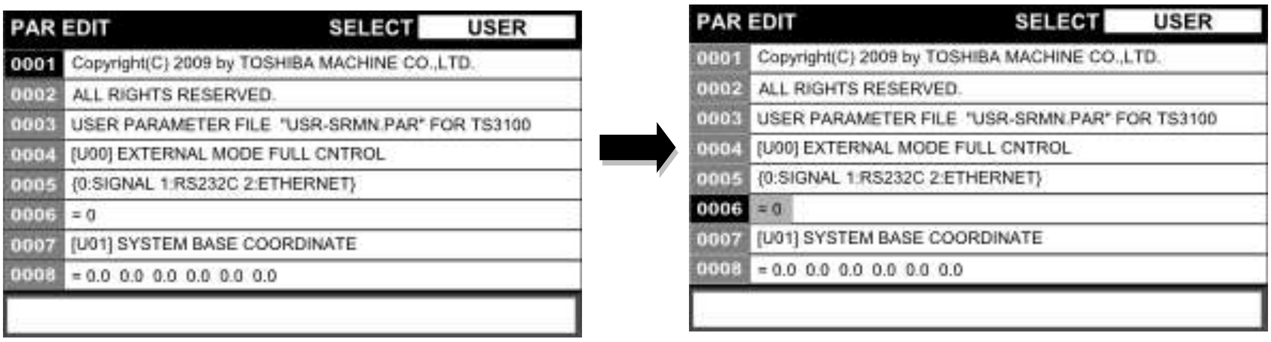
When the cursor is manipulated, the cursor moves only to the applicable editing area.

Operating Procedure

Step 1: Cursor operation

Press the arrow key pointing the direction you want to move the cursor to. The cursor moves to the applicable editing area.

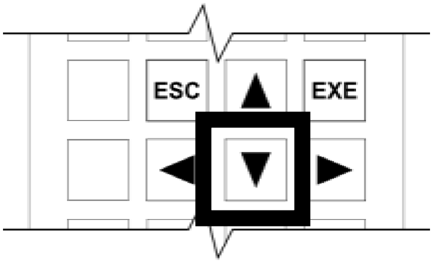


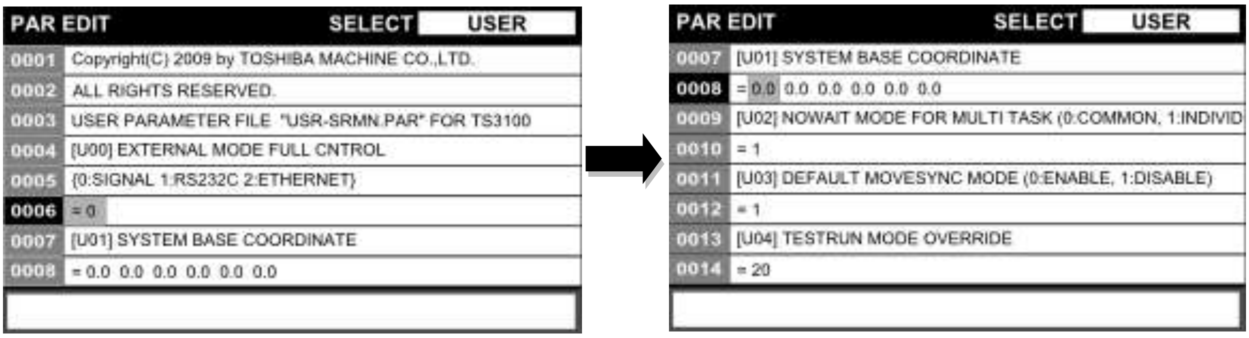


```
PAR EDIT                    SELECT   USER
0001 Copyright(C) 2009 by TOSHIBA MACHINE CO.,LTD.
0002 ALL RIGHTS RESERVED.
0003 USER PARAMETER FILE  "USR-SRMN.PAR" FOR TS3100
0004 [U00] EXTERNAL MODE FULL CNTROL
0005 {0:SIGNAL 1:RS232C 2:ETHERNET}
0006 = 0
0007 [U01] SYSTEM BASE COORDINATE
0008 = 0.0  0.0  0.0  0.0  0.0  0.0
```

```
PAR EDIT                    SELECT   USER
0001 Copyright(C) 2009 by TOSHIBA MACHINE CO.,LTD.
0002 ALL RIGHTS RESERVED.
0003 USER PARAMETER FILE  "USR-SRMN.PAR" FOR TS3100
0004 [U00] EXTERNAL MODE FULL CNTROL
0005 {0:SIGNAL 1:RS232C 2:ETHERNET}
0006 = 0
0007 [U01] SYSTEM BASE COORDINATE
0008 = 0.0  0.0  0.0  0.0  0.0  0.0
```

When moving the cursor to the applicable editing areas of the following items using the up and down cursor keys, screen scroll occurs so as to display the item line ([U**]) in the upper row of the screen.





PAR EDIT SELECT USER
0001 Copyright(C) 2009 by TOSHIBA MACHINE CO.,LTD.
0002 ALL RIGHTS RESERVED.
0003 USER PARAMETER FILE "USR-SRMN.PAR" FOR TS3100
0004 [U00] EXTERNAL MODE FULL CNTROL
0005 {0:SIGNAL 1:RS232C 2:ETHERNET}
0006 = 0
0007 [U01] SYSTEM BASE COORDINATE
0008 = 0.0 0.0 0.0 0.0 0.0 0.0

PAR EDIT SELECT USER
0007 [U01] SYSTEM BASE COORDINATE
0008 = 0.0 0.0 0.0 0.0 0.0 0.0
0009 [U02] NOWAIT MODE FOR MULTI TASK (0:COMMON, 1:INDIVID
0010 = 1
0011 [U03] DEFAULT MOVESYNC MODE (0:ENABLE, 1:DISABLE)
0012 = 1
0013 [U04] TESTRUN MODE OVERRIDE
0014 = 20

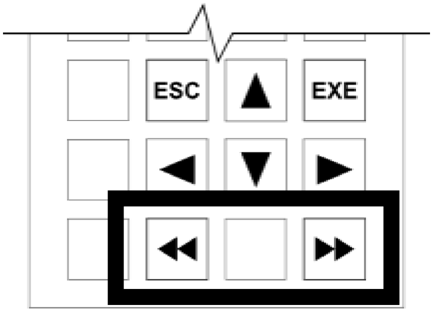
6.4 Horizontal Scroll

Functional Explanation

Scrolls the screen horizontally.

Operating Procedure

Step 1: Cursor operation
Press the [<<] or [>>] key. The screen scrolls horizontally.



6.5 Editing Parameter Elements

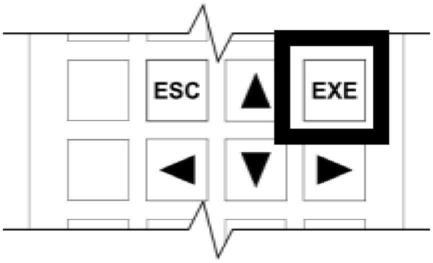
Functional Explanation

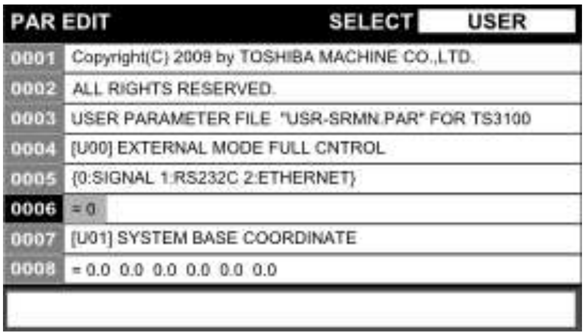
Edit parameter elements.

Operating Procedure

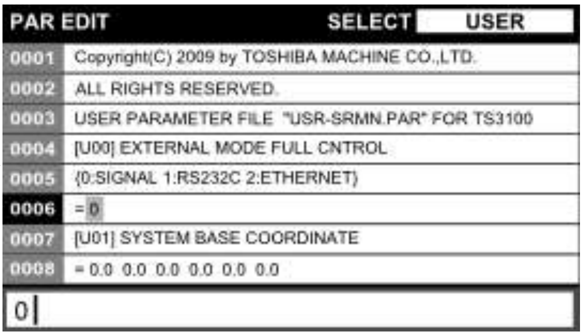
Step 1: Starting to edit

Select the parameter element you want to edit with the cursor, and then press the [EXE] key. Edit the parameter element on the command line.





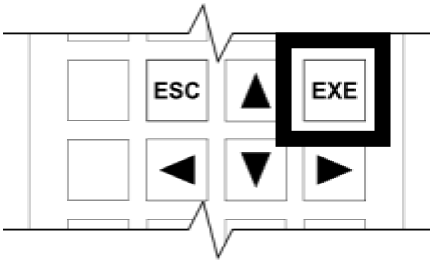
```
PAR EDIT                SELECT  USER
0001 Copyright(C) 2009 by TOSHIBA MACHINE CO.,LTD.
0002 ALL RIGHTS RESERVED.
0003 USER PARAMETER FILE "USR-SRMN.PAR" FOR TS3100
0004 [U00] EXTERNAL MODE FULL CNTROL
0005 {0:SIGNAL 1:RS232C 2:ETHERNET}
0006 = 0
0007 [U01] SYSTEM BASE COORDINATE
0008 = 0.0 0.0 0.0 0.0 0.0 0.0
```

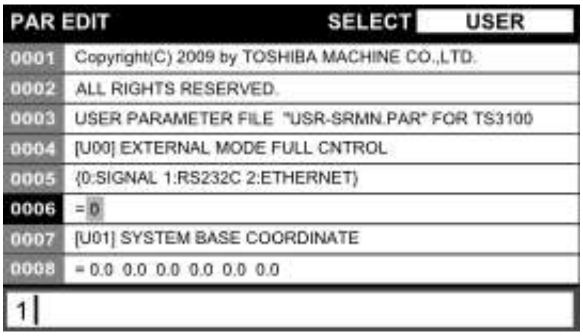


```
PAR EDIT                SELECT  USER
0001 Copyright(C) 2009 by TOSHIBA MACHINE CO.,LTD.
0002 ALL RIGHTS RESERVED.
0003 USER PARAMETER FILE "USR-SRMN.PAR" FOR TS3100
0004 [U00] EXTERNAL MODE FULL CNTROL
0005 {0:SIGNAL 1:RS232C 2:ETHERNET}
0006 = 0
0007 [U01] SYSTEM BASE COORDINATE
0008 = 0.0 0.0 0.0 0.0 0.0 0.0
0
```

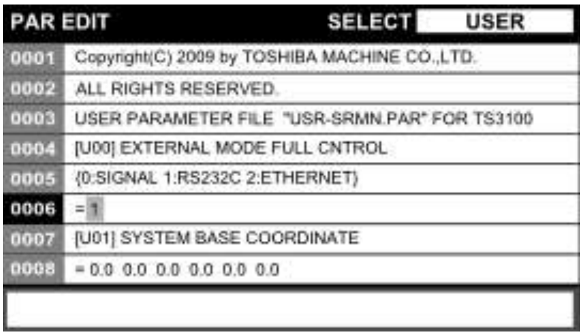
Step 2: Reflecting changes made

Once the changes have been determined, press the [EXE] key. The value is reflected in the parameter element.





```
PAR EDIT                SELECT  USER
0001 Copyright(C) 2009 by TOSHIBA MACHINE CO.,LTD.
0002 ALL RIGHTS RESERVED.
0003 USER PARAMETER FILE "USR-SRMN.PAR" FOR TS3100
0004 [U00] EXTERNAL MODE FULL CNTROL
0005 {0:SIGNAL 1:RS232C 2:ETHERNET}
0006 = 0
0007 [U01] SYSTEM BASE COORDINATE
0008 = 0.0 0.0 0.0 0.0 0.0 0.0
1
```



```
PAR EDIT                SELECT  USER
0001 Copyright(C) 2009 by TOSHIBA MACHINE CO.,LTD.
0002 ALL RIGHTS RESERVED.
0003 USER PARAMETER FILE "USR-SRMN.PAR" FOR TS3100
0004 [U00] EXTERNAL MODE FULL CNTROL
0005 {0:SIGNAL 1:RS232C 2:ETHERNET}
0006 = 1
0007 [U01] SYSTEM BASE COORDINATE
0008 = 0.0 0.0 0.0 0.0 0.0 0.0
```

To abort, press the [ESC] key.

6.6 Parameter Editing Function

The editing functions of the parameter editor are outlined in the table below.

Menu	Key Icon	Description of Operation
[SRCH]	SRCH	Searches the specified character string.
[JUMP]	JUMP	Moves the cursor to the beginning of the specified line.
[SAVE]	SAVE	Saves data and quits the editor.
[NO SAVE]	NO SAVE	Quits the editor without saving the file. Discards edited data.

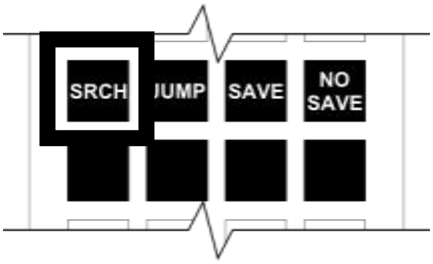
6.6.1 Search

Functional Explanation

Searches for a character string.

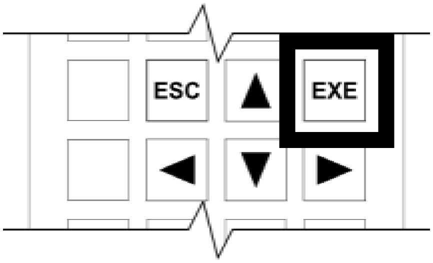
Operating Procedure

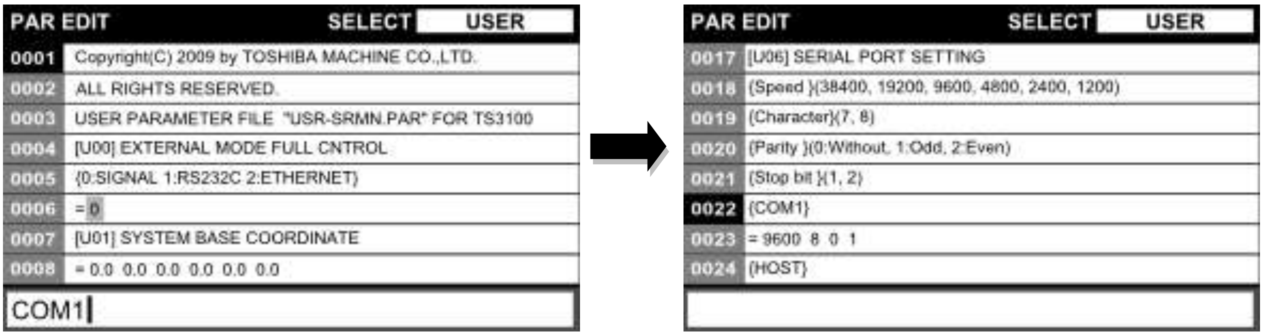
Step 1: Specifying a search character string
Press the [SRCH] key. Enter the desired character string you want to search for on the command line.



Step 2: Execution of search
Once the character string to be searched for has been determined, press the [EXE] key.

The specified character string is searched from the beginning of the file being edited, and the cursor moves to the beginning of the first line where the specified character string exists.




```
PAR EDIT                SELECT  USER
0001 Copyright(C) 2009 by TOSHIBA MACHINE CO.,LTD.
0002 ALL RIGHTS RESERVED.
0003 USER PARAMETER FILE  "USR-SRMN.PAR" FOR TS3100
0004 [U00] EXTERNAL MODE FULL CNTROL
0005 {0:SIGNAL 1:RS232C 2:ETHERNET}
0006 = 0
0007 [U01] SYSTEM BASE COORDINATE
0008 = 0.0  0.0  0.0  0.0  0.0  0.0
COM1
```

```
PAR EDIT                SELECT  USER
0017 [U06] SERIAL PORT SETTING
0018 {Speed }{38400, 19200, 9600, 4800, 2400, 1200}
0019 {Character}{7, 8}
0020 {Parity }{0:Without, 1:Odd, 2:Even}
0021 {Stop bit }{1, 2}
0022 {COM1}
0023 = 9600  8  0  1
0024 {HOST}
```

If no search candidate is found, the function is canceled.

Caution

- Search is performed to the parts other than the editing target.

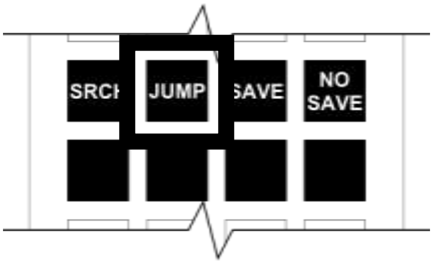
6.6.2 Jump to Specified Line

Functional Explanation

Moves the cursor to the beginning of the specified line.

Operating Procedure

Step 1: Execution of jump
Press the [JUMP] key. Enter a line number on the command line, and then press the [EXE] key.



Caution

If a line number exceeding the last line number containing a file is entered, the cursor moves to that last line number.

6.6.3 Save and Quit

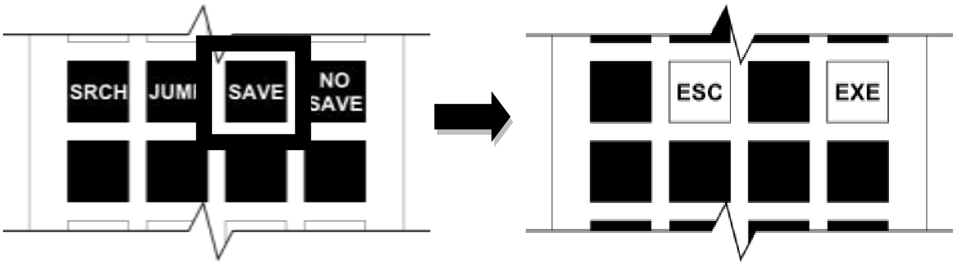
Functional Explanation

Saves the program data and quits the parameter editor.

Operating Procedure

Step 1: Execution of save

Press the [SAVE] key. A save confirmation message appears.



Next, press the [EXE] key. Saves the file and quits the parameter editor.

If the [ESC] key is pressed while a confirmation message is being displayed, [SAVE] is canceled and parameter editing can be continued.

Caution

- Turn the power to the controller on/off in order to make the parameter changes effective.

6.6.4 Discard Changes and Quit

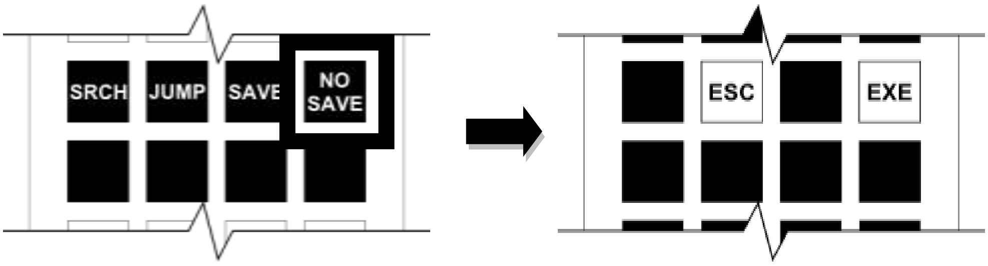
Functional Explanation

Discards the changes made and quit the parameter editor.

Operating Procedure

Step 1: Discards the changes made and quit the parameter editor.

Press the [NO SAVE] key. A no-save confirmation message appears in the command line.



Press the [EXE] key. Discards the changes made and quit the parameter editor.
If the [ESC] key is pressed while a confirmation message is being displayed, [NO SAVE] is canceled and parameter editing can be continued.

Section 7 Test Operation

DANGER

NEVER enter the dangerous area of the robot during automatic operation. If you still have to enter the dangerous area, be sure to terminate the automatic operation and turn the servo power off beforehand.

CAUTION

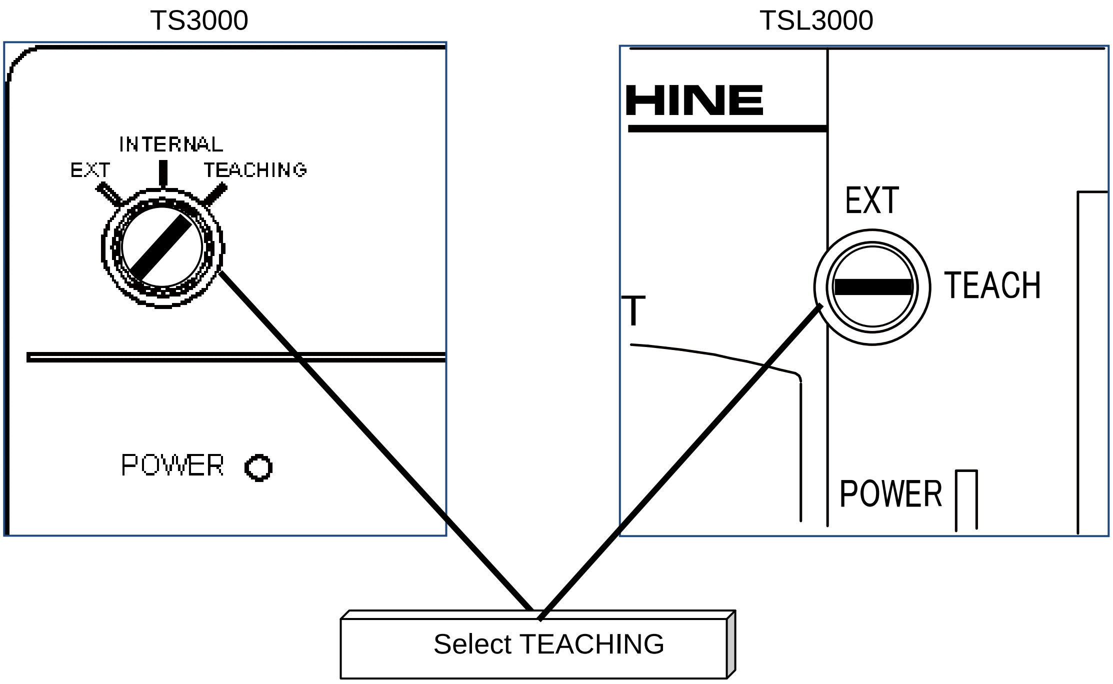
1. Make sure that no obstacle stands in the robot working range. If any obstacle exists, perform automatic operation at a slow speed and make sure that the robot will not collide with the obstacle at all.
2. If the robot motion becomes abnormal during program execution, press the EMERGENCY stop pushbutton switch immediately to stop the robot. NEVER restart the automatic operation until the cause of the abnormality is identified.
3. The speed of automatic operation is initially set at 100% of the maximum robot speed.
4. When performing automatic operation after power ON, reset the program for the automatic operation in advance. If the program is executed continuously, the robot will collide with the peripheral equipment, resulting in damage of the equipment and an accident.

7.1 Selecting Internal Automatic Operation Mode

The functions that can be used in the test operation are listed in the table below.

Functional Explanation

Step 1: Selection of internal automatic mode.
Set the master mode switch on the controller panel to "TEACHING".

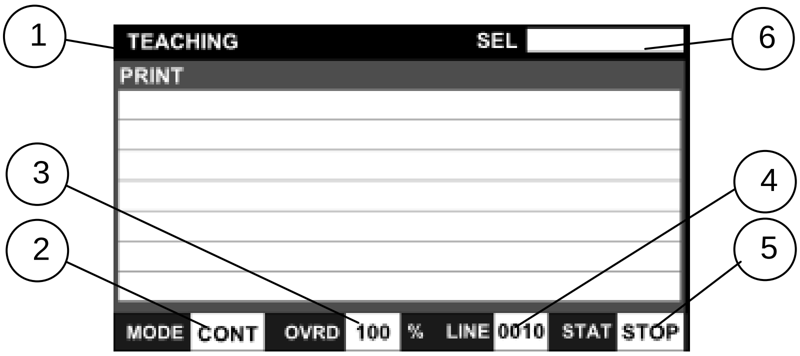
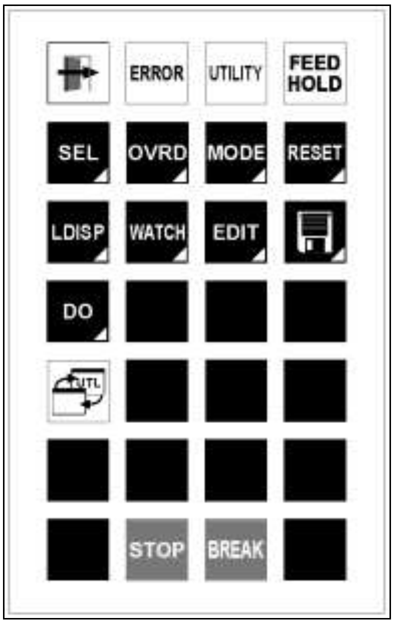

TS3000
TSL3000
INTERNAL
EXT
TEACHING
POWER
HINE
EXT
TEACH
T
POWER
Select TEACHING

The functions available in the test operation mode are shown below.

Menu	Description of Operation
[SEL]	Selects an execution program.
[OVRD]	Performs override settings.
[MODE]	Selects a run mode.
[RESET]	Performs reset.
[LDISP]	Displays an execution line.
[WATCH]	Global variable monitor
[EDIT]	Calls the editor functions.
[FILE]	Performs file operation.
[DO]	Performs direct execution.
[STOP]	Stops a program.
[BREAK]	Halts a program.

Step 2: Selecting a test operation mode

The screen and key sheet in the TEACHING mode are shown below.

Test Operation Mode Screen and Key Sheet	Description of Display
 TEACHING SEL PRINT MODE CONT OVRD 100 % LINE 0010 STAT STOP  ERROR UTILITY FEED HOLD SEL OVRD MODE RESET LDISP WATCH EDIT DO UTL STOP BREAK	① Displays the mode of the controller. TEACHING: Test operation mode ② Displays the master mode and run mode currently being selected. CONT: Continuous operation CYCLE: Cycle operation SEG: Segment operation STEP: Step operation ③ Displays the speed override. ④ Displays the number of execution steps. ⑤ Displays the execution status. RUN: A program is in execution. STOP: The execution of a program is stopped. ⑥ Displays the name of the execution file currently being selected.

7.2 File Selection

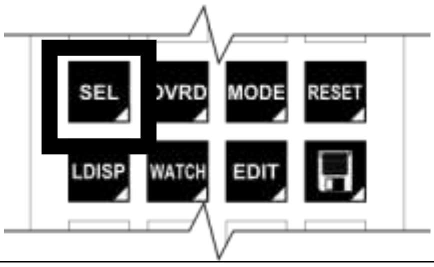
Functional Explanation

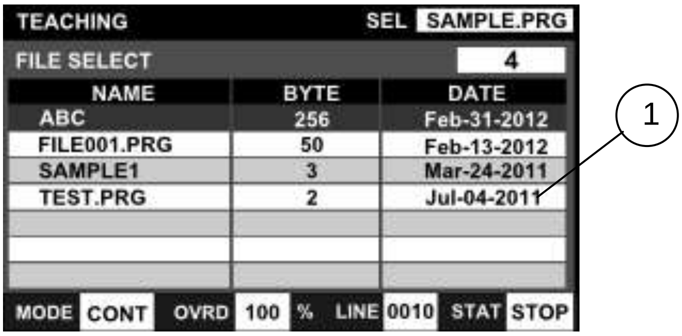
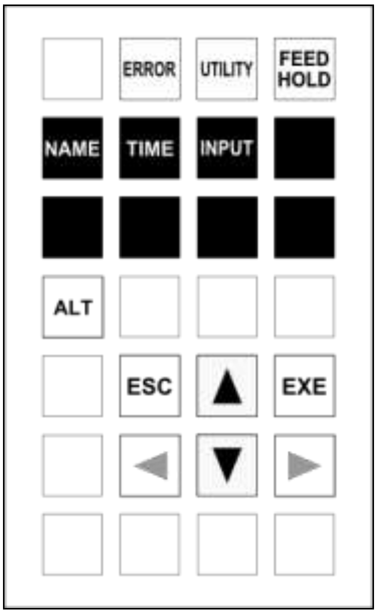
Select a file (or program) to be executed.

Operating Procedure

Step 1: Displaying files

Press the [SEL] key. A list of the program files in the controller is displayed.


SEL
OVRD
MODE
RESET
LDISP
WATCH
EDIT

[SEL] Screen and Key Sheet	Description of Display
 TEACHING SEL SAMPLE.PRG FILE SELECT 4 NAME BYTE DATE ABC 256 Feb-31-2012 FILE001.PRG 50 Feb-13-2012 SAMPLE1 3 Mar-24-2011 TEST.PRG 2 Jul-04-2011 MODE CONT OVRD 100 % LINE 0010 STAT STOP  ERROR UTILITY FEED HOLD NAME TIME INPUT ALT ESC ▲ EXE ◀ ▼ ▶	① Displays program files.

Step 2: Selecting a file

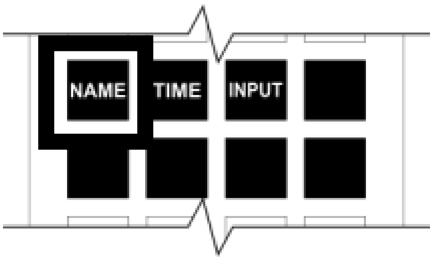
Select a file with the up and down cursor keys, and then press the [EXE] key. When an execution file is selected, its file name appears in the SEL field on the screen.

Related Function

The file display sort functions include <display by name>, <display by file creation time> and <file search function>.

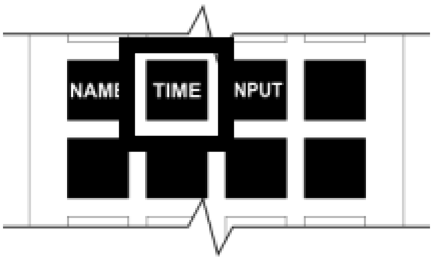
<Display by name>

Press the [NAME] key. The file list is sorted by name. Each time the [NAME] key is pressed, the sorting order changes between ascending order and descending order.



<Display by file creation time>

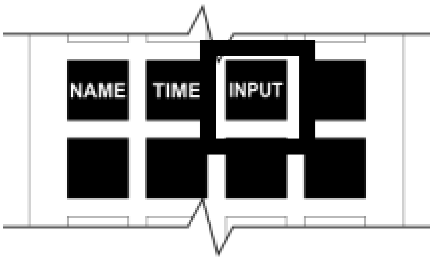
Press the [TIME] key. The file list is sorted by file creation time. Each time the [TIME] key is pressed, the sorting order changes between ascending order and descending order.



<File search function>

Press the [INPUT] key. Enter the head character string of the file you want to search on the command line.

Once the character string has been determined, press the [EXE] key. Only the files staring with the character strings you just entered are displayed in a list.



Cautions

- Once the execution file has been selected, it remains effective until another file is selected. If a compile error has occurred, however, selection of the execution file is canceled.
- To reset the execution environment without changing the execution file, execute [RESET] and [PROG].
- This operation cannot be performed while running a program.

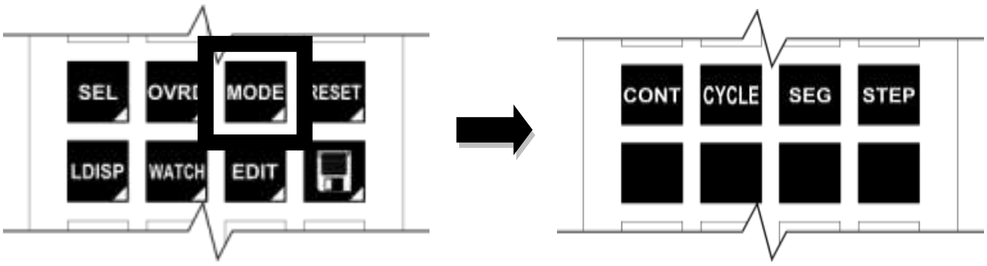
7.3 Selecting Run Mode

Functional Explanation

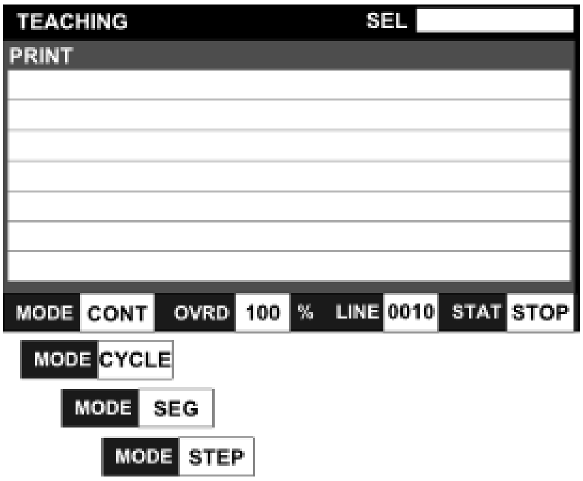
Changes over the run mode of automatic operation.

Operating Procedure

Step 1: Calling the Mode Setting keys
Press the [MODE] key. The [CONT], [CYCLE], [SEG] and [STEP] keys are displayed on the menu of the key sheet.



Step 2: Selecting a mode to switch
Select a mode to switch from the [CONT], [CYCLE], [SEG] and [STEP] keys, and then press the [EXE] key.
When a mode is switched, it is displayed in the MODE field on the status bar at the bottom of the screen.



MODE CONT OVRD 100 % LINE 0010 STAT STOP

MODE CYCLE

MODE SEG

MODE STEP

Cautions

- The run mode can be selected even while the program is being executed.
- The selected run mode also takes effect in test operation and external automatic operation.
- The selected run mode remains valid until another run mode is selected.
- If the stop command is executed in the program, program execution stops, irrespective of the run mode currently selected.
- The STEP mode cannot be set while running a program.

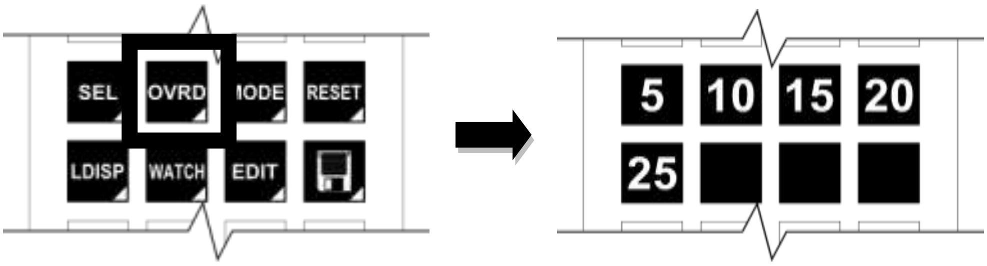
7.4 Speed Override

Functional Explanation

Sets the speed override for automatic operation.
This function is useful to effect an additional override, taking the programmed speed as 100%.

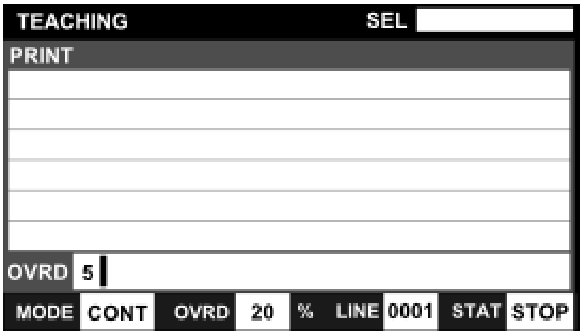
Operating Procedure

Step 1: Selection of the speed override function
Press the [OVRD] key. The [5], [10], [15], [20] and [25] keys are displayed on the keyboard.


SEL
OVRD
MODE
RESET
LDISP
WATCH
EDIT
5
10
15
20
25

Step 2: Entering the speed override rate

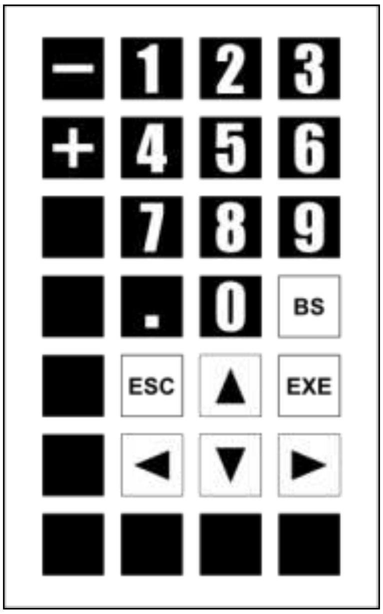
Press one of the [5], [10], [15], [20] and [25] keys on the keyboard. The value of the key you pressed is copied to the command line, and the key sheet changes to number input. A fine value can be set on the command line.


TEACHING SEL

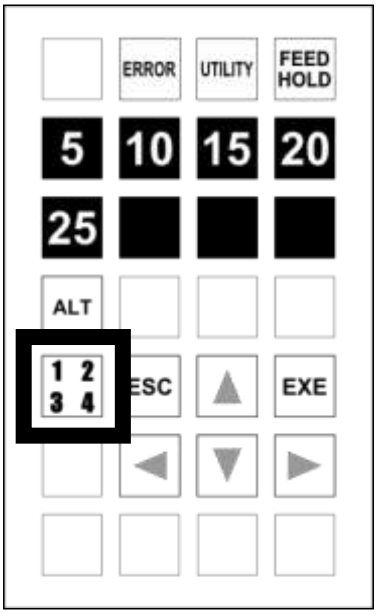
PRINT

OVRD 5

MODE CONT OVRD 20 % LINE 0001 STAT STOP


−
1
2
3
+
4
5
6
7
8
9
.
0
BS
ESC
▲
EXE
◀
▼
▶

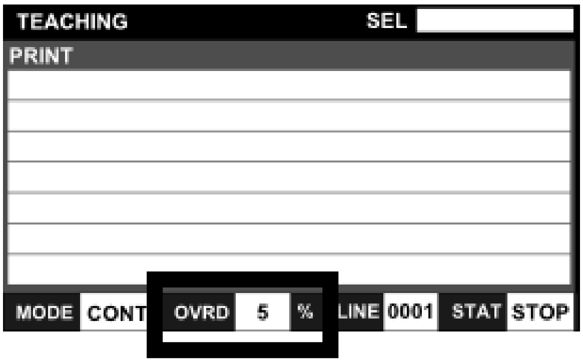
If you want to directly enter a numeric value from the beginning without using the [5], [10], [15], [20] and [25] keys on the keyboard, press the [NUM] key. Directly enter a value of the override rate on the command line.


ERROR
UTILITY
FEED HOLD
5
10
15
20
25
ALT
1 2 3 4
ESC
EXE

Step 3: Execution of changing of the speed override rate

Press the [EXE] key.

When changing of the speed override rate is executed, the changed override rate is displayed in the OVRD field on the status bar at the bottom of the screen.


TEACHING
SEL
PRINT
MODE
CONT
OVRD
5
%
LINE
0001
STAT
STOP

Caution

- The specified speed override rate also takes effect in test operation and external automatic operation. Unless it is changed, the previous state is maintained.

Related Function

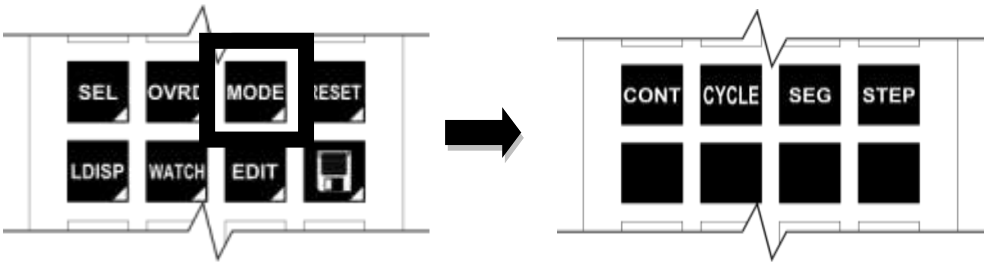
The speed can be limited by the external signal ("low speed command"). When this happens, the motion speed can be specified by the user parameter. If the override speed set exceeds this low speed, it is clamped there. The external signal (low speed command) also takes effect in both the internal automatic mode and external automatic mode.

7.5 Step Execution

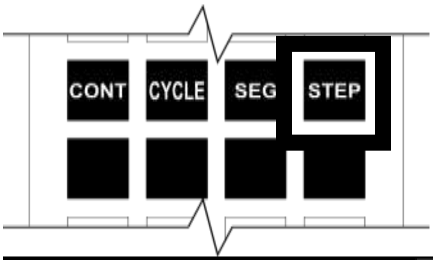
Functional Explanation

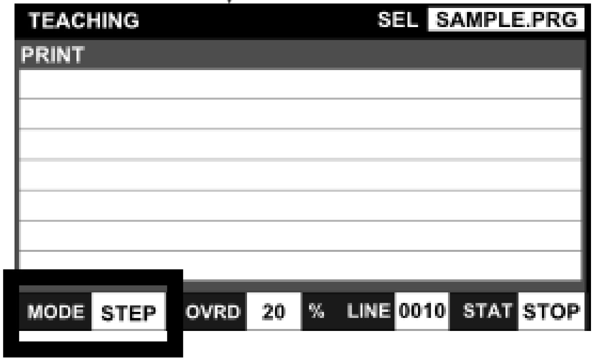
Starts a test operation in the Step mode where the program stops on a per-instruction basis.

Step 1: Calling the Mode Setting keys
Press the [MODE] key. The [CONT], [CYCLE], [SEG] and [STEP] keys are displayed on the keyboard.


SEL
OVRD
MODE
RESET
LDISP
WATCH
EDIT
CONT
CYCLE
SEG
STEP

Step 2: Selecting step execution
After pressing the [STEP] key, press the [EXE] key in succession.
When a mode is switched, STEP is displayed in the MODE field on the status bar at the bottom of the screen.


CONT
CYCLE
SEG
STEP



TEACHING SEL SAMPLE.PRG

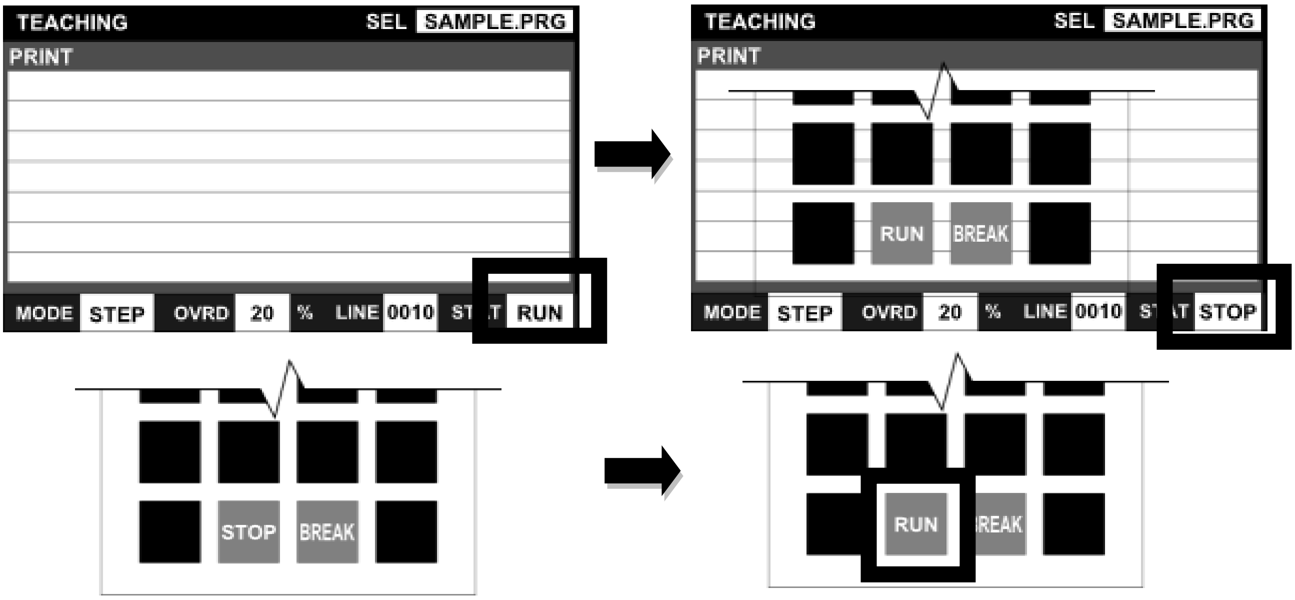
PRINT

MODE STEP OVRD 20 % LINE 0010 STAT STOP

Step 3: Step execution

Press the [RUN] key in the Servo ON state. After the program is executed for one instruction, it stops.

The [STOP] key of the TP3000 switches to the [RUN] key, and the operation to wait for the next step (waiting for the [RUN] key) is activated.



TEACHING SEL SAMPLE.PRG

PRINT

MODE STEP OVRD 20 % LINE 0010 STAT RUN

TEACHING SEL SAMPLE.PRG

PRINT

MODE STEP OVRD 20 % LINE 0010 STAT STOP

Cautions

- To stop the step operation, press the ESC key to quit.
- To execute a step in another run mode, select the run mode again.
- During step execution, a step to be executed is displayed in the command filed of the teach pendant.
- If a step operation is executed against a multitask program, tasks are not changed over. In addition, the TASK command, SWITCH command or any other command related to the multitask is not executed, either.

7.6 Startup [RUN]

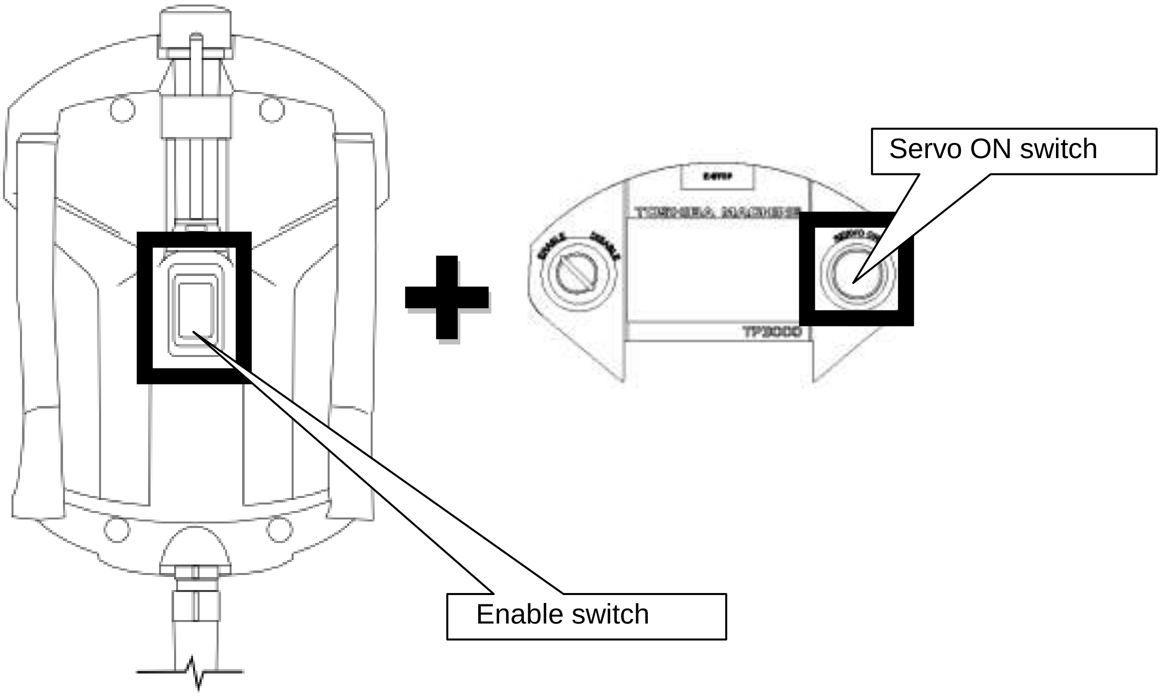
Functional Explanation

Starts a test operation under the predetermined conditions. It is used for program verification operation.
It is also used for resuming an operation after the stop.

Operating Procedure

Step 1: Setting of running conditions.
Set the conditions for executing the file selection, run mode selection speed override setting.

Step 2: Servo ON
Lightly grip the Enable switch of the TP3000 teach pendant and open the contact of the Safety switch. (When the Safety switched is lightly gripped, the TP3000's screen and key sheet switch to the JOG key sheet.)
The servo turns on when the Servo ON switch on the TP3000's main body is pressed when there is no error.

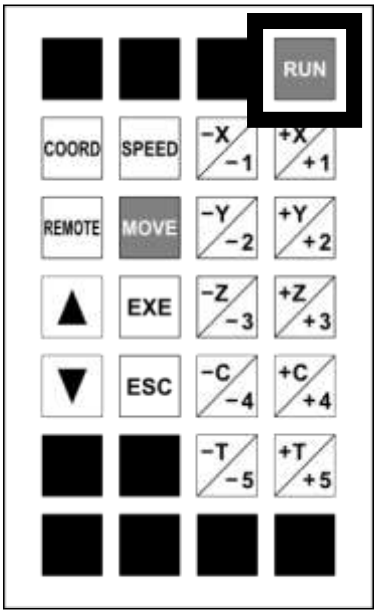


TP3000's Rear View

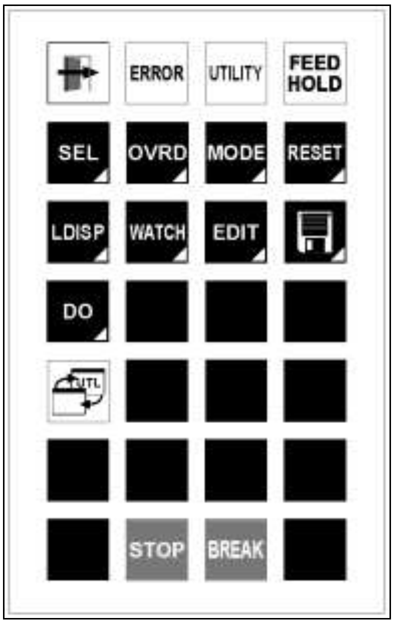
Step 3: Execution of RUN

Press the [RUN] key on the key sheet.

When the [RUN] key is pressed, the key sheet changes to the top key sheet of the TEACHING mode.


RUN
COORD
SPEED
-X -1
+X +1
REMOTE
MOVE
-Y -2
+Y +2
▲
EXE
-Z -3
+Z +3
▼
ESC
-C -4
+C +4
-T -5
+T +5

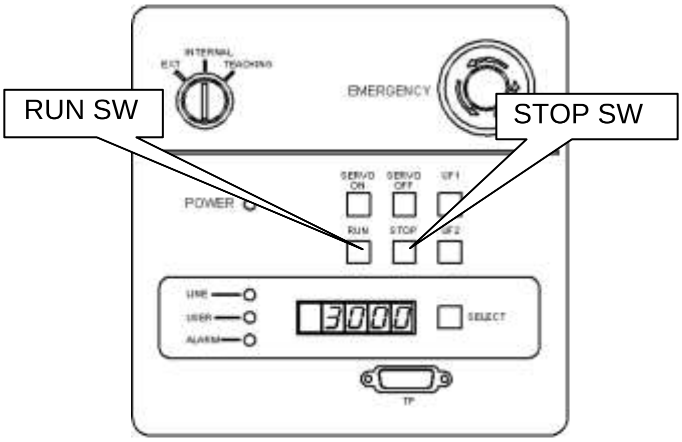
JOG Key Sheet

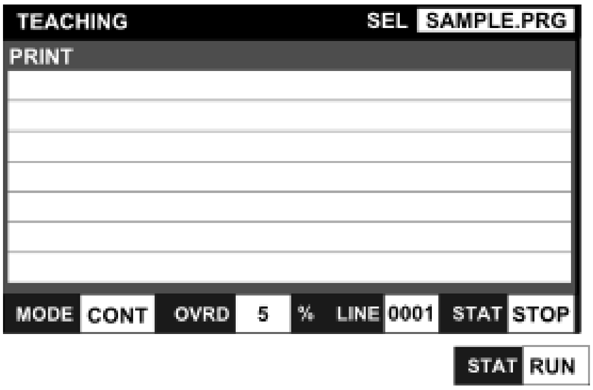

ERROR
UTILITY
FEED HOLD
SEL
OVRD
MODE
RESET
LDISP
WATCH
EDIT
DO
UTL
STOP
BREAK

TEACHING Mode Top Key Sheet

Press the EXE key. When program execution has started, the STOP switch LED on the control panel goes out and the RUN switch LED goes on.

During execution, "RUN" is displayed in the STAT field on the status bar.


RUN SW
STOP SW
INTERNAL
EXT
TEACHING
EMERGENCY
SERVO ON
SERVO OFF
UF1
POWER
RUN
STOP
UF2
LINE
USER
ALARM
3000
SELECT
TP



TEACHING SEL SAMPLE.PRG

PRINT

MODE CONT OVRD 5 % LINE 0001 STAT STOP

STAT RUN

TS3000/TS3100 Control Panel
* The TSL3000 does not have a control panel.

Cautions

- The RUN switch equipped on the control panel and "startup command" external control signal are inoperative in the test operation mode.
- To execute a program from the top, execute [RESET] and [PROG] followed by [RUN].

7.7 Stop

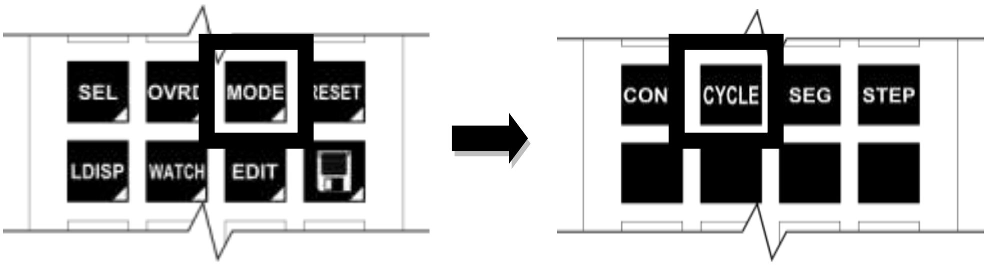
7.7.1 CYCLE Stop

Functional Explanation

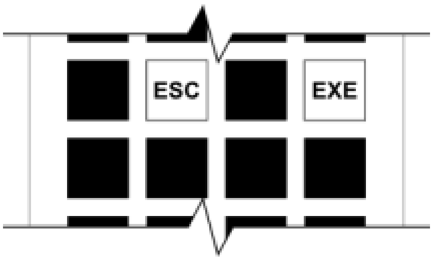
Selects "CYCLE" for the run mode and stops an automatic operation at the program end. This function is used to stop the robot after the end of an operation.

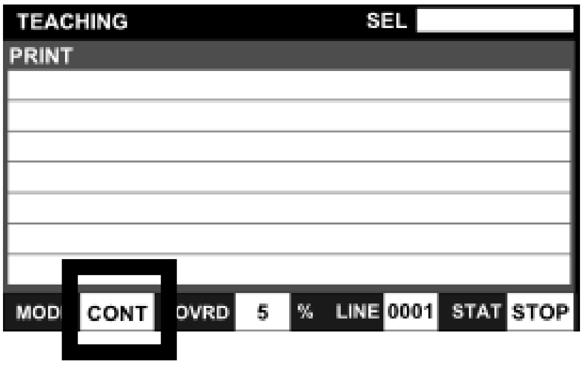
Operating Procedure

Step 1: Selection of the [CYCLE] key
Press the [MODE] key. The [CONT], [CYCLE], [SEG] and [STEP] keys are displayed on the keyboard.
Press the [CYCLE] key in succession.



Step 2: Entering the [EXE] key
Press the [EXE] key. When mode changing is executed, "CYCLE" is displayed in the M: field on the status bar at the bottom of the screen. When executed up to the program end, automatic operation stops.





When the program has been executed to the end, the automatic operation stops at the same time that the RUN switch LED on the control panel goes out and the STOP switch LED goes on. Also, the display of the [STOP] key on the teach pendant changes to the [RUN] key.

Related Functions

There are four types of mode settings.

[CONT]:	Repeats the execution of the program continuously.
[CYCLE]:	Stops execution at the end of the program.
[SEG]:	Stops execution immediately after the next operation instruction.
[STEP]:	Executes one step of the program at a time.

Cautions

- The "cycle stop" external control signal is inoperative in the test operation mode.
- The SCOL program execution unit pre-reads up to four (4) motion commands. Therefore, the program may be executed successively by up to three (3) cycles according to the cycle stop timing or the active program contents.

7.7.2 STOP

Functional Explanation

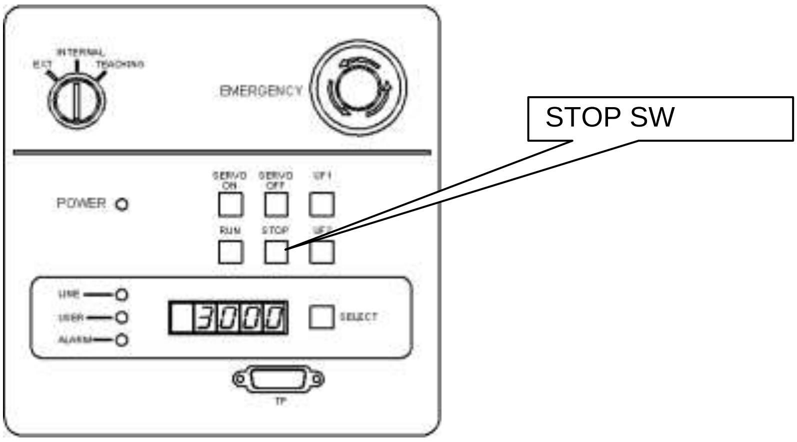
Stops an automatic operation when the execution of the instruction currently being executed is completed. This function is used for normal stop operations.

Operating Procedures

Step 1: Stop execution ①

Press the STOP switch in the case of the controller panel.

Then the STOP switch LED on the control panel goes on, and when the execution of the instruction currently being executed is completed, the automatic operation stops. When automatic operation is stopped, the RUN switch LED on the control panel goes off.

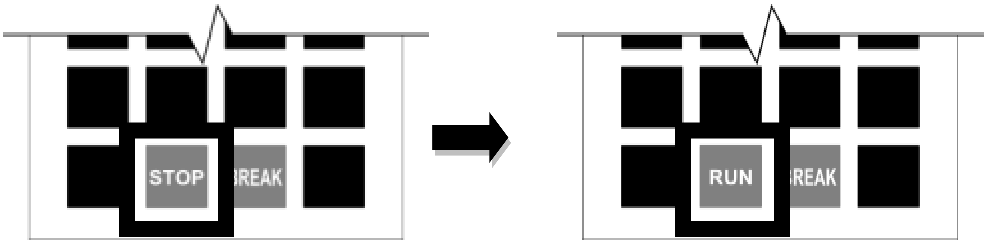

INTERNAL
EXT
TEACHING
EMERGENCY
POWER
SERVO ON
SERVO OFF
UF1
RUN
STOP
UF2
LINE
USER
ALARM
3000
SELECT
TP
STOP SW

Step 2: Stop execution ②

Press the [STOP] key in the case of the teach pendant.

"STOP" is displayed in the STAT: field on the status bar of the teach pendant screen.

The display of the [STOP] key on the key board changes to the [RUN] key.


STOP
REAK
RUN
REAK

Cautions

- In the test operation mode, the "stop" external control signal is inoperative.
- To restart execution, press the [RUN] key.

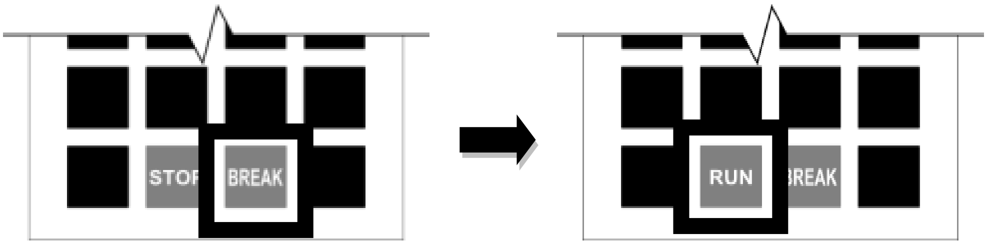
7.7.3 BREAK

Functional Explanation

Immediately decelerates and stops the robot, and stops an automatic operation. This function is used to interrupt the automatic operation.

Operating Procedures

Step 1: Entering BREAK
Press the [BREAK] key.
The robot in operation immediately decelerates and stops, and the automatic operation stops.
When the automatic operation stops, the RUN switch LED on the control panel goes out and the STOP switch LED goes on.
"STOP" is displayed in the STAT: field on the status bar of the teach pendant screen.
The display of the [STOP] key on the key board changes to the [RUN] key.



Cautions

- During program execution in the step mode, the BREAK function is inoperative.
- To stop the step operation, press the EMERGENCY stop key or FEED HOLD key.
- To restart execution after BREAK, press the [RUN] key.

7.7.4 FEED HOLD

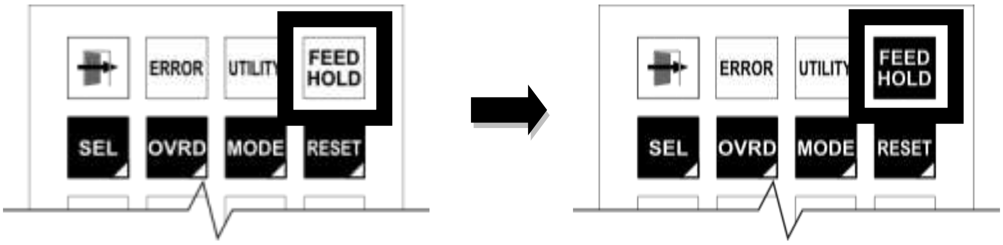
Functional Explanation

Holds robot motion and program execution. When this function is specified during robot operation, the robot immediately slows down and stops. The feed hold function is used to stop the robot temporarily.

Operating Procedures

Step 1: Entering FEED HOLD

Press the [FEED HOLD] key. If the robot is in operation, it decelerates and stops.



When the robot has stopped, the RUN switch LED on the control panel goes out and the STOP switch LED goes on.

"STOP" is displayed in the STAT: field on the status bar of the teach pendant screen.

Step 2: Clearing FEED HOLD

Press the [FEED HOLD] key again. Automatic operation, step execution, direct execution and manual guide take effect. The feed hold state cannot be cleared with the [RUN] key. If the feed hold was commanded during program execution, program execution can be restarted by canceling the feed hold. When program execution has started, the STOP switch LED on the control panel goes out and the RUN switch LED goes on. "RUN" is displayed in the STAT: field on the status bar of the teach pendant screen.

Cautions

- In the feed hold mode, automatic operation, step execution, direct execution, home return and manual guidance are invalid.
- When the FEED HOLD switch is pressed again, feed hold is canceled.
  If the feed hold was commanded during program execution, program execution can be restarted by canceling the feed hold. When the test operation has finished, program execution will not restart.

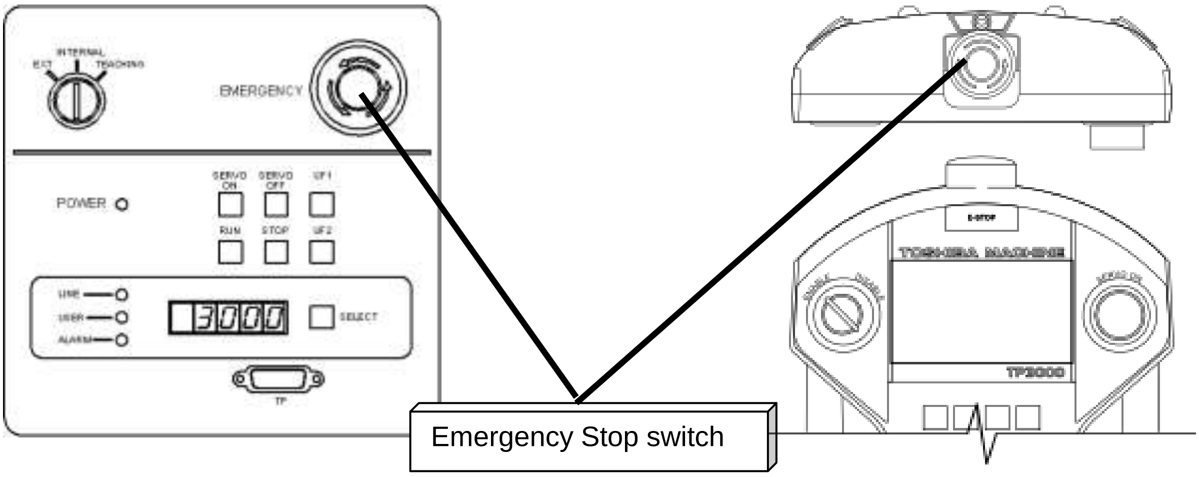
7.7.5 Emergency Stop

Functional Explanation

Turns off the servo power and stops an automatic operation. This function is useful to stop the robot system at the time of an emergency.

Operating Procedures

Press the EMERGENCY stop pushbutton switch equipped on the control panel or teach pendant, or use the "emergency stop" external control signal.
The servo power is turned off and the SERVO ON switch LED on the control panel goes out and the SERVO OFF switch LED goes on.
The SERVO ON switch LED on the teach pendant goes out.


INTERNAL
EXT
TEACHING
EMERGENCY
POWER
SERVO ON
SERVO OFF
UF1
RUN
STOP
UF2
LINE
USER
ALARM
3000
SELECT
TP
E-STOP
TOSHIBA MACHINE
TP3000
Emergency Stop switch

Cautions

- All of the EMERGENCY stop switches on the control panel and teach pendant, and "emergency stop" external control signal are operative.
- At the time of an emergency, use whichever key you can get at quickest.
- The EMERGENCY stop switches on the control panel and teach pendant are of a lock type.
- When pressed, they remain depressed and locked. To reset, turn and unlock the switch.
- While the EMERGENCY stop switch is ON, the servo power cannot be turned on.

7.8 Reset

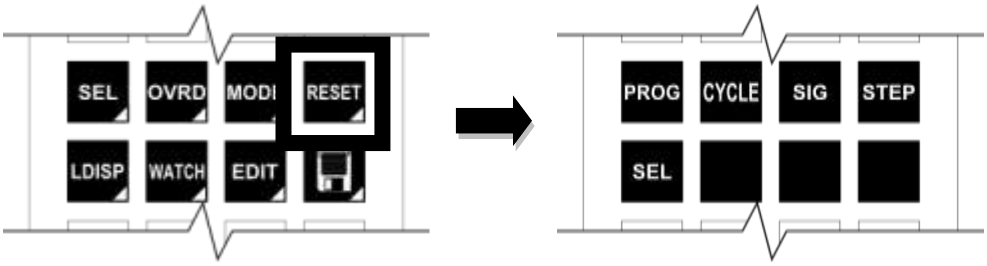
Functional Explanation

Program reset, step reset, cycle reset, output signal reset and execution file reset can be performed.
The resets other than the output signal reset cannot be performed unless a file is selected.

Operating Procedure

Step 1: Calling the various reset keys

Press the [RESET] key. The [PROG], [CYCLE], [STEP], [SIG] and [SEL keys are displayed on the key sheet.



7.8.1 Program Reset

Functional Explanation

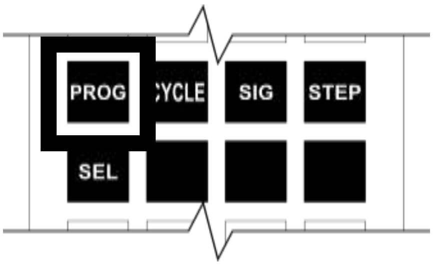
Resets all execution conditions (execution steps, variables) for a current file and allows execution of that program from the top.

This function is useful to execute a current file from the top of the program.

Operating Procedure

Step 1: Selecting a program reset

Press the [PROG] key.



Step 2: Execution of reset

To reset, press the [EXE] key in succession. To cancel reset, press the [ESC] key.

Cautions

- All variables used in the program are reset.
- If you do not wish to reset the variables, use the step reset function instead.

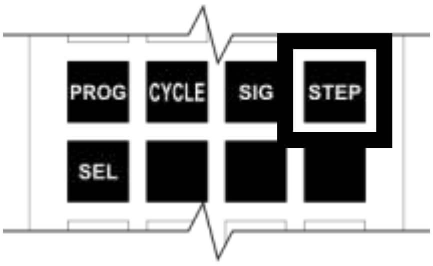
7.8.2 Step Reset

Functional Explanation

Resets all execution conditions (excluding variables) for a current file and allows execution of that program from the top.
This function is useful to set the repetitive counts in a variable and execute the remaining counts.

Operating Procedure

Step 1: Selecting step reset
Press the [STEP] key.



Step 2: Execution of step reset
To reset, press the [EXE] key in succession. To cancel reset, press the [ESC] key.

Cautions

- When you do not wish to execute the setting of initial conditions at the head of the program, use the cycle reset instead.

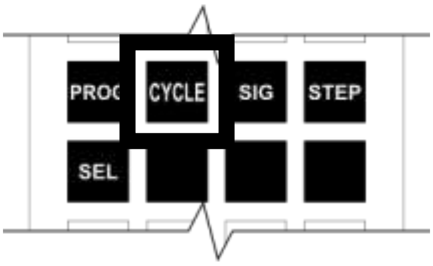
7.8.3 Cycle Reset

Functional Explanation

Resets all execution conditions (excluding global variables) for a current file and allows execution of the main program from the step indicated by label RCYCLE. This function is useful when you do not wish to execute the setting of the initial condition.

Operating Procedure

Step 1: Selecting cycle reset
Press the [CYCLE] key.



Step 2: Execution of cycle reset
To reset, press the [EXE] key in succession. To cancel reset, press the [ESC] key.

Cautions

- Use label RCYCLE in a desired step of the main program. Also, specify the GOTO RCYCLE command just before the END command so that the END command of the main program will not be executed.

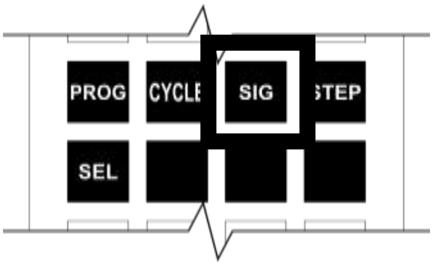
7.8.4 Output Signal Reset

Functional Explanation

Turns off all of the user external output signals (DOUT(1) to DOUT(164)). The hand signals (201 to 204) are not turned off.

Operating Procedure

Step 1: Selecting output signal reset
Press the [SIG] key.



Step 2: Execution of output signal reset
To reset, press the [EXE] key in succession. To cancel reset, press the [ESC] key.

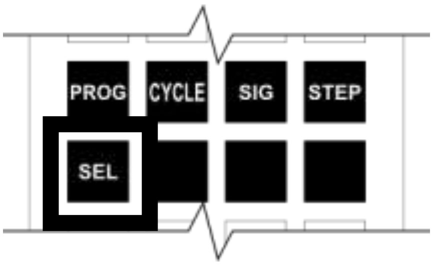
7.8.5 Execution File Reset

Functional Explanation

Resets an execution file. This function is used to re-select an execution file and to terminate the test operation mode.

Operating Procedure

Step 1: Selecting execution file reset
Press the [SEL] key.



Step 2: Execution of execution file reset
Press the [SEL] key.
The execution file is reset, and the SELECT field in the upper right of the screen is emptied.

Cautions

- All variables being used in the program will be reset.
- To start an operation, select the execution file again.

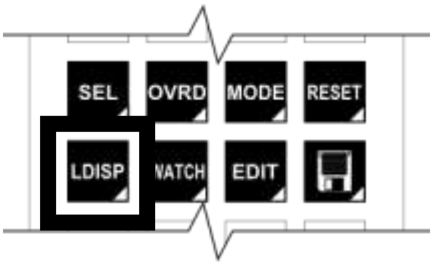
7.9 Execution Line Display [LDISP]

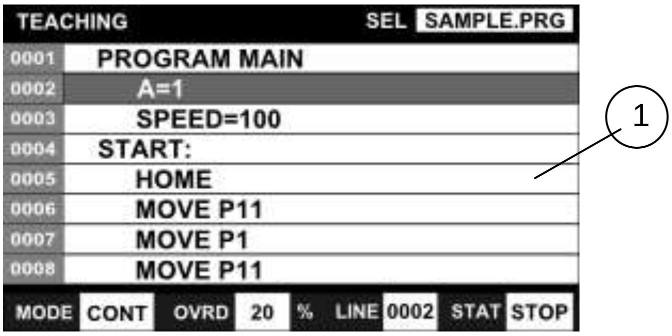
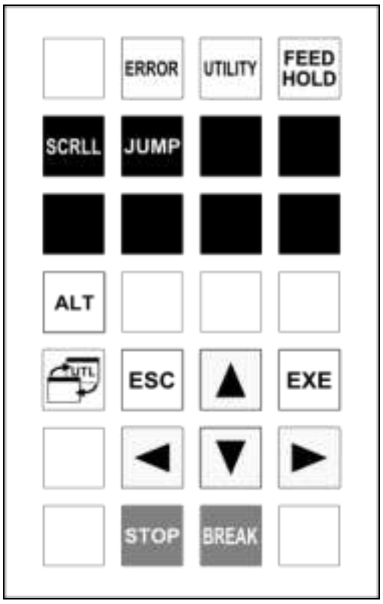
Functional Explanation

Displays the execution program.

Operating Procedure

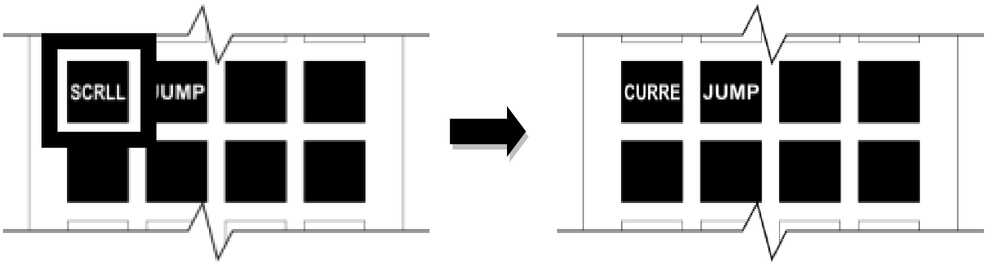
Step 1: Displaying the execution line
Press the [LDISP] key. The [SCRLL] and [JUMP] keys are displayed on the keyboard.
During program execution, screen scroll synchronizes according to the execution line.



[LDISP] Screen and Key Sheet	Description of Display
 TEACHING SEL SAMPLE.PRG 0001 PROGRAM MAIN 0002 A=1 0003 SPEED=100 0004 START: 0005 HOME 0006 MOVE P11 0007 MOVE P1 0008 MOVE P11 MODE CONT OVRD 20 % LINE 0002 STAT STOP  ERROR UTILITY FEED HOLD SCRLL JUMP ALT UTL ESC ▲ EXE ◀ ▼ ▶ STOP BREAK	① Displays the execution program.

Step 2: Asynchronous display of the execution line

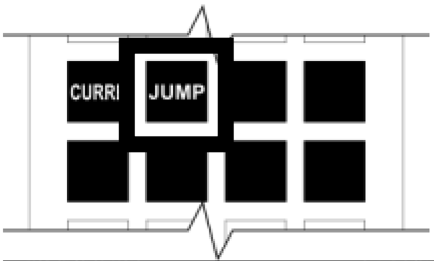
Press the [SCRLL] key. The synchronization between the execution line and screen scroll is cleared, and the screen can now be scrolled using the up and down cursor keys. The display of the [SCRLL] key changes to the [CURRE] key.

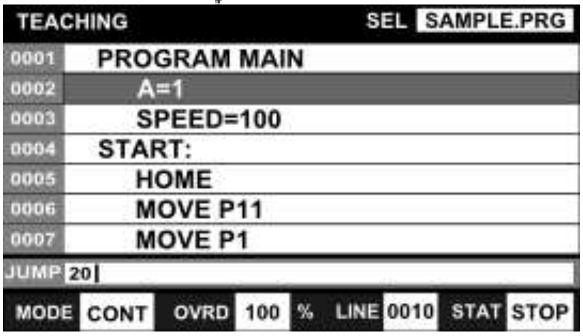


Step 3: Jumping during asynchronous display of the execution line

Press the [JUMP] key during asynchronous display of the execution line.

Enter the line number you want to jump to on the command line, and press the [EXE] key.

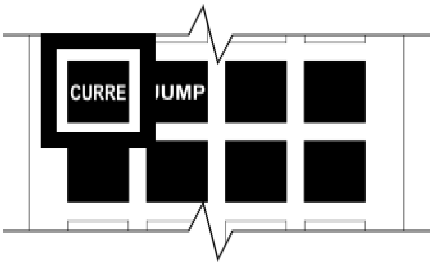




```
TEACHING                    SEL SAMPLE.PRG
0001  PROGRAM MAIN
0002     A=1
0003     SPEED=100
0004  START:
0005     HOME
0006     MOVE P11
0007     MOVE P1
JUMP 20
MODE CONT  OVRD 100 %  LINE 0010  STAT STOP
```

Step 4: Returning to execution line display (synchronization)

Press the [CURRE] key. Screen scroll synchronizes according to the execution line.



Cautions

- RUN, STOP and BREAK operations can be performed even during execution line display.

7.10 Variable Monitor [WATCH]

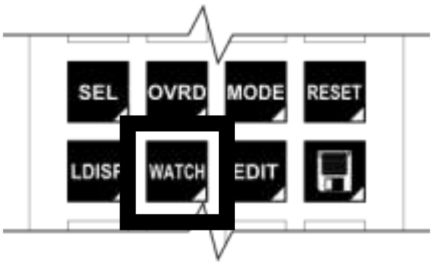
Functional Explanation

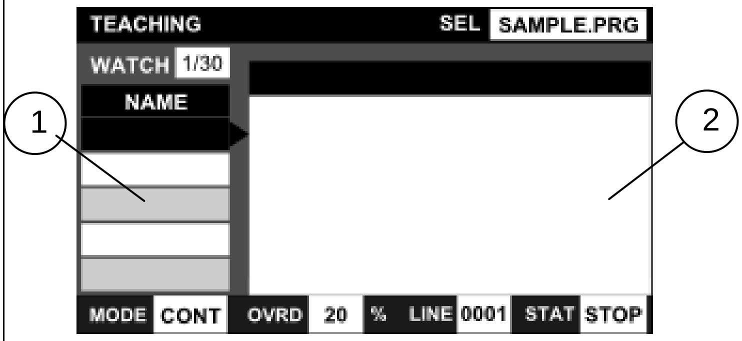
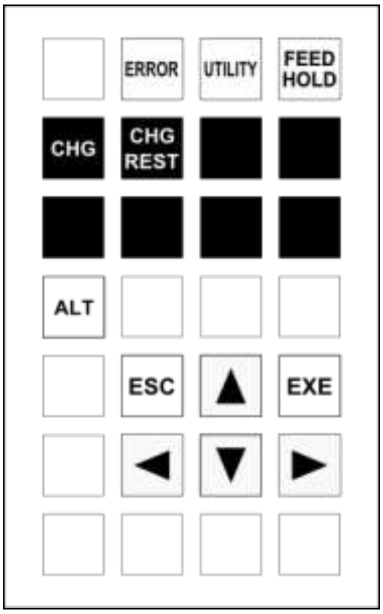
Displays the values of a desired global variable.

Operating Procedure

Step 1: Calling the WATCH function

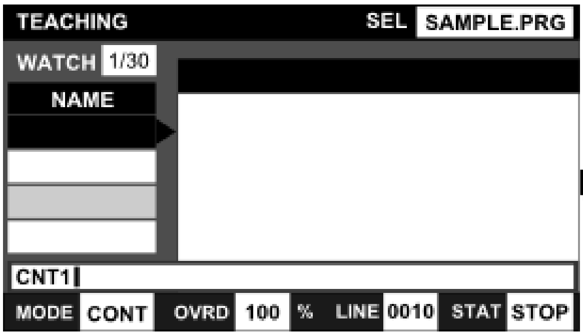
Press the [WATCH] key. The WATCH screen and key sheet are displayed.


SEL
OVRD
MODE
RESET
LDISP
WATCH
EDIT

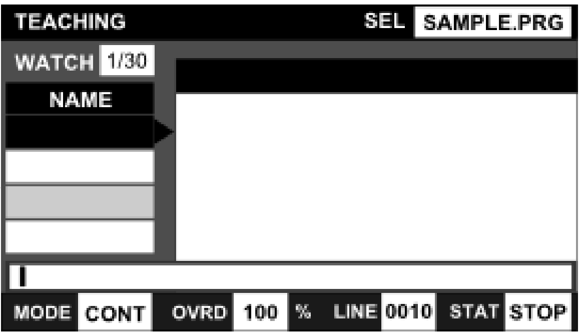
[WATCH] Screen and Key Sheet	Description of Display
 TEACHING SEL SAMPLE.PRG WATCH 1/30 NAME MODE CONT OVRD 20 % LINE 0001 STAT STOP 1 2  ERROR UTILITY FEED HOLD CHG CHG REST ALT ESC ▲ EXE ◀ ▼ ▶	① Enter the global variable names you want to reference. ② The values of global variables are displayed.

Step 2: Registering global variables

Press the [EXE] key on the desired NAME cell. The command line appears to allow you to enter a global variable name.

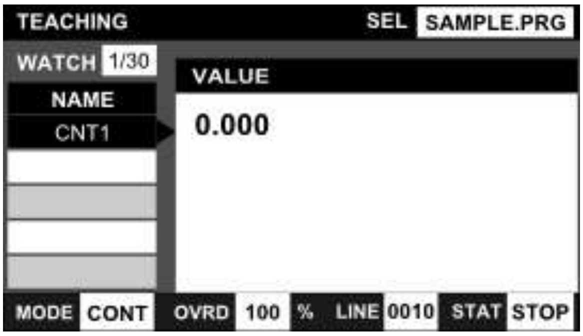


SEL SAMPLE.PRG
WATCH 1/30
CNT1
MODE CONT OVRD 100 % LINE 0010 STAT STOP



SEL SAMPLE.PRG
WATCH 1/30
MODE CONT OVRD 100 % LINE 0010 STAT STOP

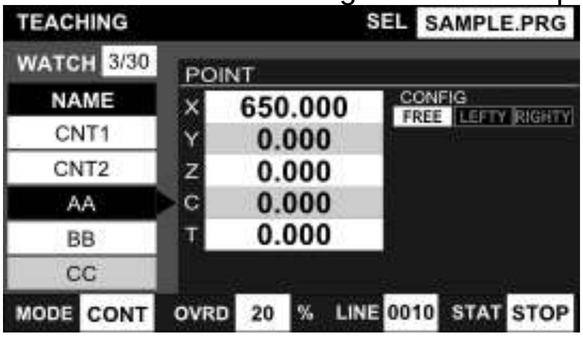
Once the variable name you want to monitor has been determined, press the [EXE] key. The current variable value is displayed according to the variable type.



SEL SAMPLE.PRG
WATCH 1/30
CNT1 0.000
MODE CONT OVRD 100 % LINE 0010 STAT STOP

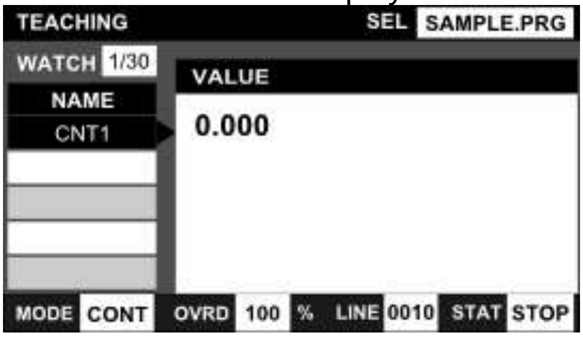
The global variable signifies the variable (real number type, integer type, position type, coordinate type or load type) as defined in the area flanked by GLOBAL-END, or by DATA-END (for the variable which can be edited by the DEDIT function) in the program

- Real number and integer variable display



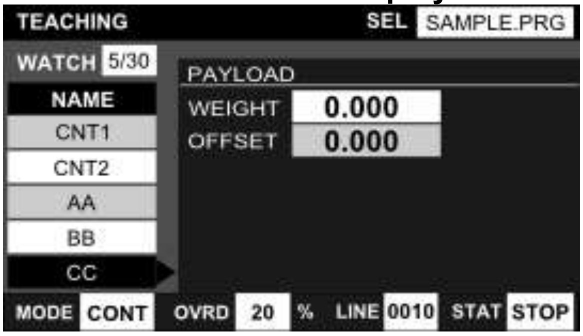
SEL SAMPLE.PRG
WATCH 3/30
CNT1
CNT2
AA
BB
CC
X 650.000
Y 0.000
Z 0.000
C 0.000
T 0.000
MODE CONT OVRD 20 % LINE 0010 STAT STOP

- Positional variable display



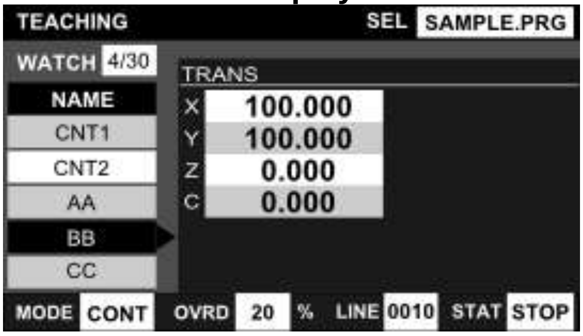
SEL SAMPLE.PRG
WATCH 1/30
CNT1 0.000
MODE CONT OVRD 100 % LINE 0010 STAT STOP

- **Coordinate variable display**



TEACHING SEL SAMPLE.PRG
WATCH 5/30
PAYLOAD
WEIGHT 0.000
OFFSET 0.000
NAME: CNT1, CNT2, AA, BB, CC
MODE CONT OVRD 20 % LINE 0010 STAT STOP

- **Load variable display**

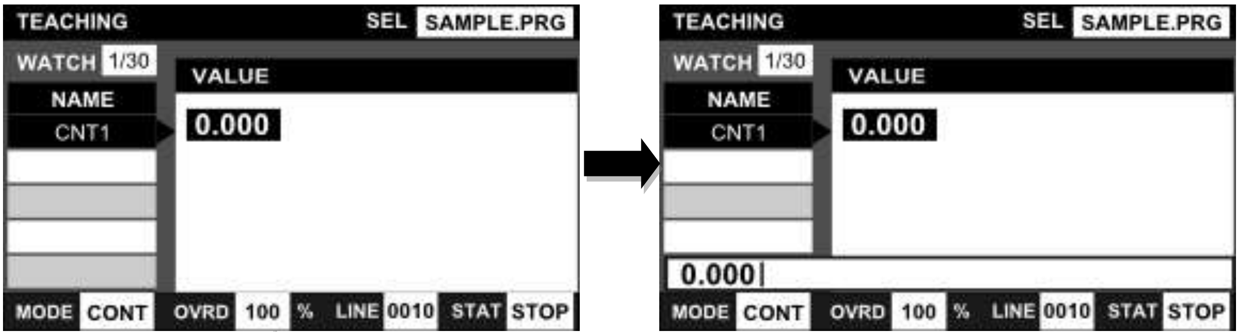


TEACHING SEL SAMPLE.PRG
WATCH 4/30
TRANS
X 100.000
Y 100.000
Z 0.000
C 0.000
NAME: CNT1, CNT2, AA, BB, CC
MODE CONT OVRD 20 % LINE 0010 STAT STOP

Step 3: Changing a variable value [CHG]

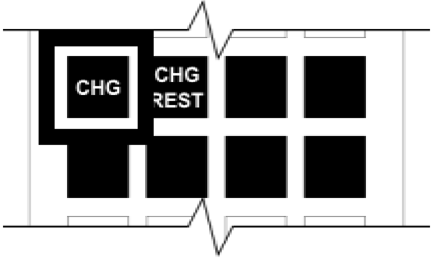
Program values can be changed temporarily.

Position the cursor on a variable value, and press the [CHG] key.

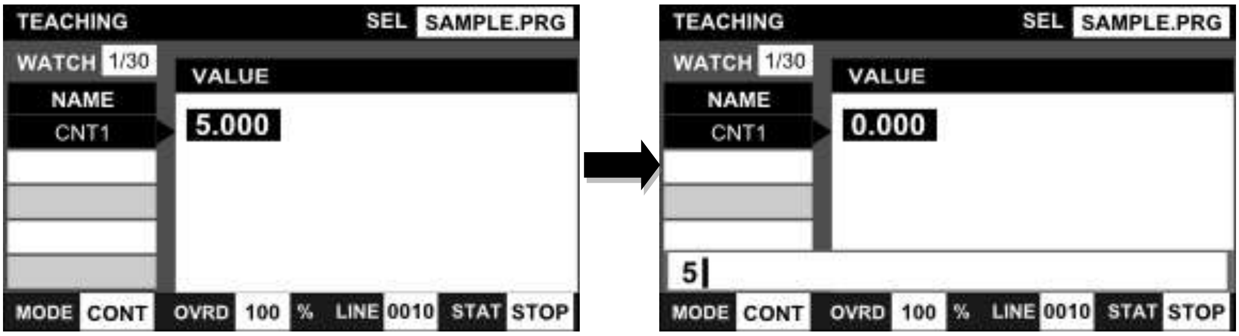


TEACHING SEL SAMPLE.PRG
WATCH 1/30
NAME CNT1
VALUE 0.000
MODE CONT OVRD 100 % LINE 0010 STAT STOP

TEACHING SEL SAMPLE.PRG
WATCH 1/30
NAME CNT1
VALUE 0.000
0.000
MODE CONT OVRD 100 % LINE 0010 STAT STOP



Change the value on the command line, and execute to overwrite the value by pressing the [EXE] key.



TEACHING SEL SAMPLE.PRG
WATCH 1/30
NAME CNT1
VALUE 5.000
MODE CONT OVRD 100 % LINE 0010 STAT STOP

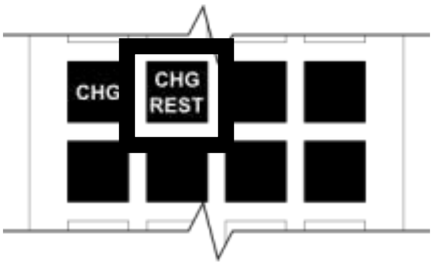
TEACHING SEL SAMPLE.PRG
WATCH 1/30
NAME CNT1
VALUE 0.000
5
MODE CONT OVRD 100 % LINE 0010 STAT STOP

Step 4: Changing a variable value [CHG REST]

Overwrite the program file values.

Position the cursor on a variable value, and press the [CHG REST] key.

(The value input procedure is the same as that in Step 3.)



Cautions

- If the specified variable does not exist (has not been selected) in the program, "------.---" is displayed.
- Up to thirty (30) variable names can be registered.
- If no program is being selected, displayed value may not be correct.
- The [CHG+R] function cannot be executed for the global variable yet to be initialized (such as position type array variable which is not taught the robot).
  - The position type data can be changed in the range of ±3 mm or ±3 deg.

7.11 Direct Execution [DO]

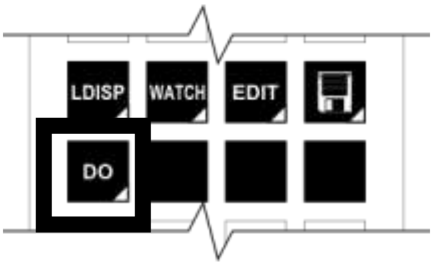
Functional Explanation

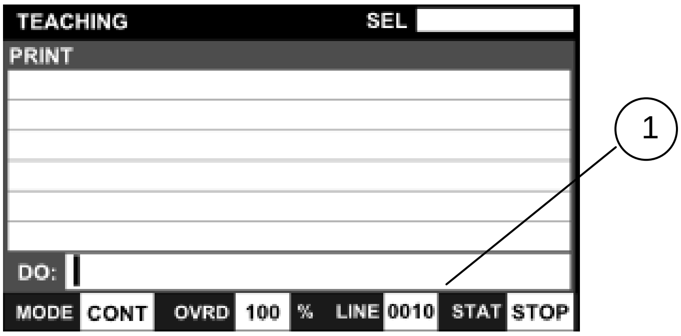
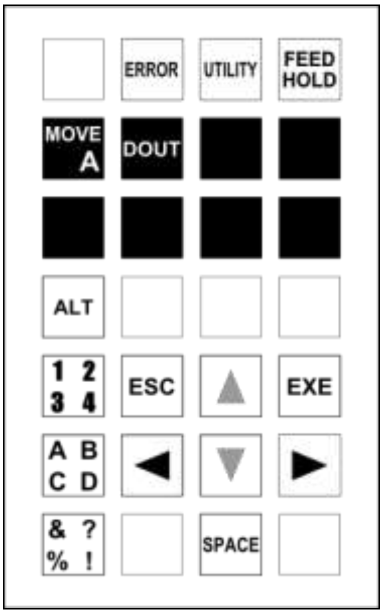
Directly executes a SCOL command by entering it through the teach pendant. This function is used to establish the conditions leading to a specified step when you wish to execute a program from midway. The global variables in the program cannot be used, however.

Operating Procedure

Step 1: Calling the direct execution function

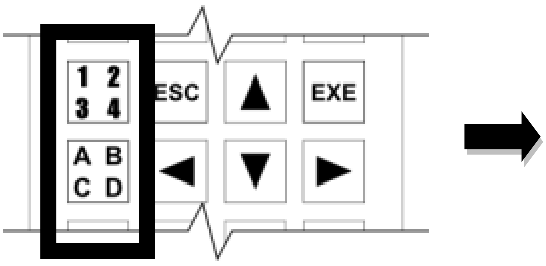
Press the [DO] key on the top key sheet in the TEACHING mode.

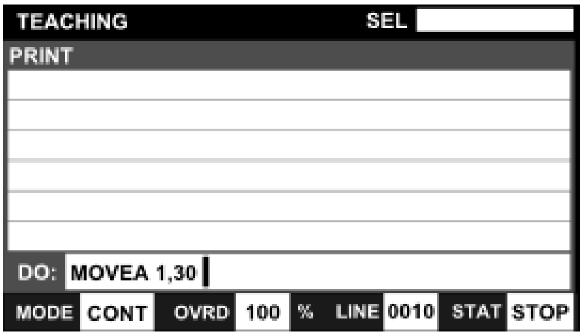


Direct Execution Screen and Key Sheet	Description of Display
 TEACHING SEL PRINT DO: MODE CONT OVRD 100 % LINE 0010 STAT STOP  ERROR UTILITY FEED HOLD MOVE A DOUT ALT 1 2 3 4 ESC EXE A B C D & ? % ! SPACE	① Command line for direct execution

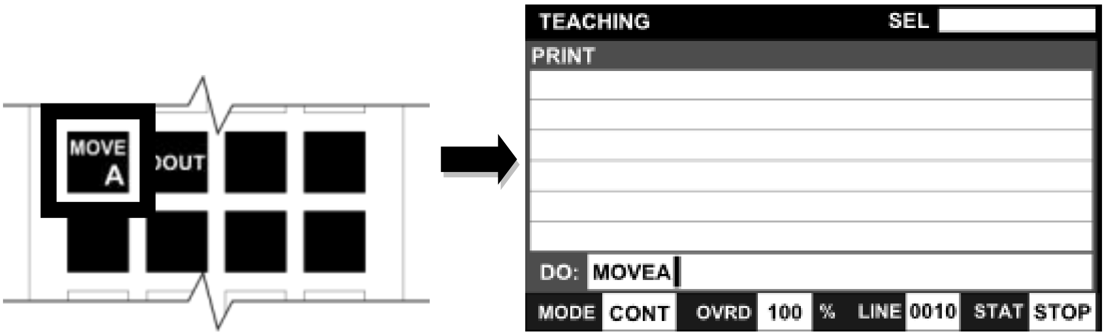
Step 2: Entering an SCOL program

Using the [NUM], [ALPH], [SYMBOL] and other keys, enter an SCOL program on the command line.


1 2
3 4
A B
C D
ESC
EXE


TEACHING SEL
PRINT
DO: MOVEA 1,30
MODE CONT OVRD 100 % LINE 0010 STAT STOP

Also, by pressing the [MOVEA] or [DOUT] key, a character string can be copied onto the command line.



TEACHING SEL

PRINT

DO: MOVEA

MODE CONT OVRD 100 % LINE 0010 STAT STOP

Step 3: Execution of the program

While the SCOL program is being entered on the command line, turn on the servo, and then press the [EXE] key in succession.

Step 4: Clearing the direct execution function

When direct execution is performed, the display on the command line is reset, and the command line entry wait state is activated.

To quit the direct execution function, press the [ESC] key.

Caution

- This function is inoperative in the feed hold or servo power OFF status.

Section 8 Internal Automatic Operation

The internal automatic operation is a function of the TS3000 robot controller. The internal automatic operation function is not supported for the TSL3000.

DANGER

NEVER enter the dangerous area of the robot during automatic operation. If you still have to enter the dangerous area, be sure to terminate the automatic operation and turn the servo power off beforehand. At that time, set the master mode to TEACHING with the mode select switch.

CAUTION

1. Make sure that no obstacle stands in the robot working range. If any obstacle exists, perform automatic operation at a slow speed and make sure that the robot will not collide with the obstacle at all.
2. If the robot motion becomes abnormal during program execution, press the EMERGENCY stop pushbutton switch immediately to stop the robot. NEVER restart the automatic operation until the cause of the abnormality is identified.
3. The speed of automatic operation is initially set at 100% of the maximum robot speed.

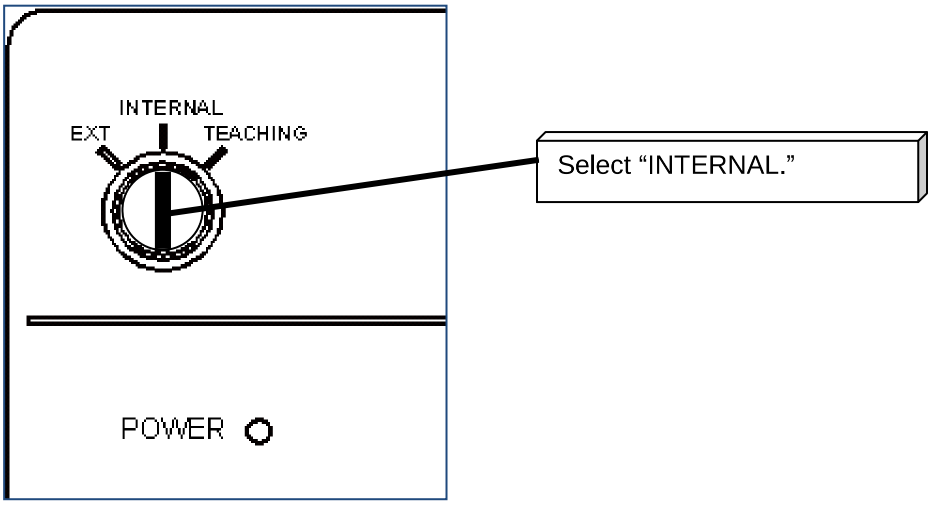
8.1 Selecting Internal Automatic Operation Mode

Selects the internal automatic mode where you can execute a program by a start command given through the control panel.

Operating Procedure

Step 1: Selection of internal automatic mode.

Change over the master mode switch on the control panel to "INTERNAL"



Select “INTERNAL.”

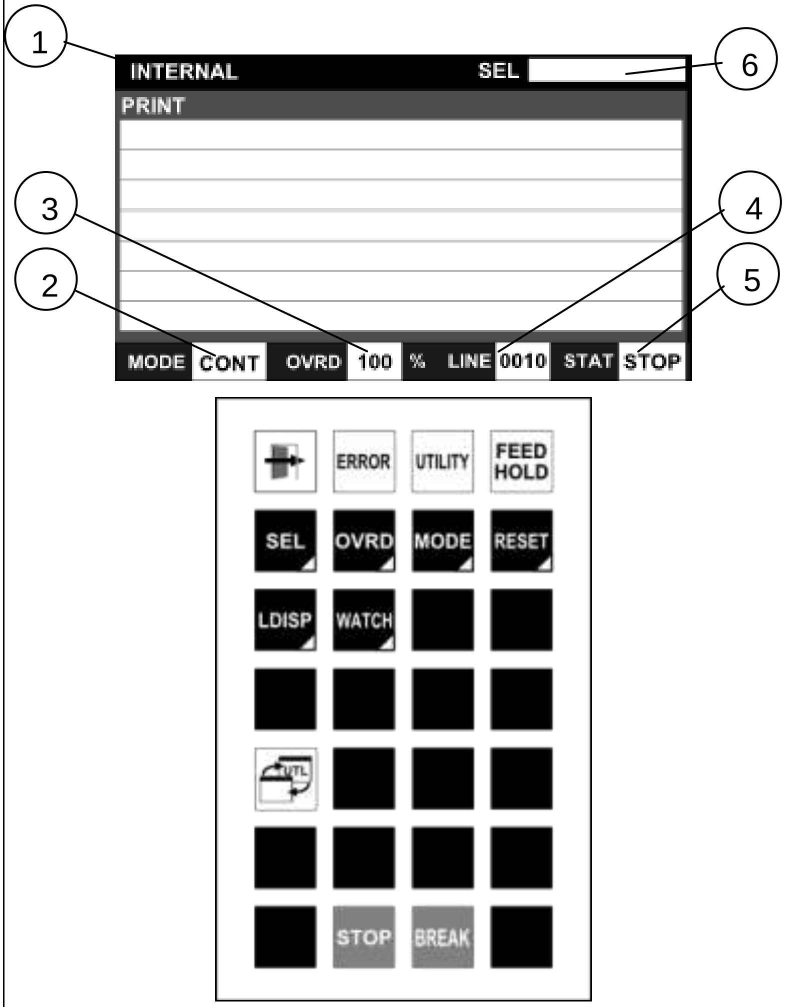
The functions that can be used in the internal automatic mode are listed in the table below.

The basic operation of each of these functions is the same as those in the test operation mode. In this section, only the differences from the test operation mode are explained.

For more detailed operation procedure of each function, please see Section 7, "Test Operation".

Menu	Description of Operation
[SEL]	Selects an execution program.
[OVRD]	Performs override settings.
[MODE]	Selects a run mode.
[RESET]	Performs reset.
[LDISP]	Displays an execution line.
[WATCH]	Global variable monitor
[STOP]	Stops a program.
[BREAK]	Halts a program.

The screen and key sheet when the internal automatic mode is being selected are shown below.

Internal Automatic Mode Screen and Key Sheet	Description of Display
 INTERNAL SEL PRINT MODE CONT OVRD 100 % LINE 0010 STAT STOP 1 2 3 4 5 6 ERROR UTILITY FEED HOLD SEL OVRD MODE RESET LDISP WATCH UTL STOP BREAK	① Displays the mode of the controller. INTERNAL: Internal operation mode ② Displays the master mode and run mode currently being selected. CONT: Continuous operation CYCLE: Cycle operation SEG: Segment operation STEP: Step operation ③ Displays the speed override. ④ Displays the number of execution steps. ⑤ Displays the execution status. RUN: A program is in execution. STOP: The execution of a program is stopped. ⑥ Displays the name of the execution file currently being selected.

8.2 Start [RUN]

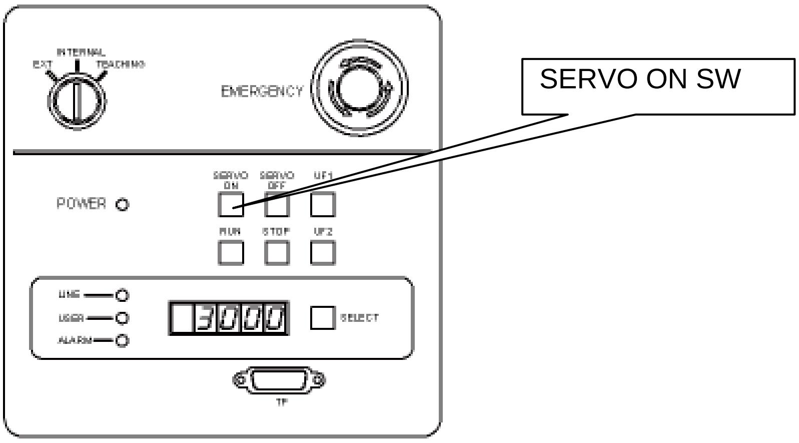
Functional Explanation

Starts an automatic operation under the predetermined conditions.
While in the internal automatic operation mode, it is not possible to execute [RUN] from the teach pendant

Operating Procedure

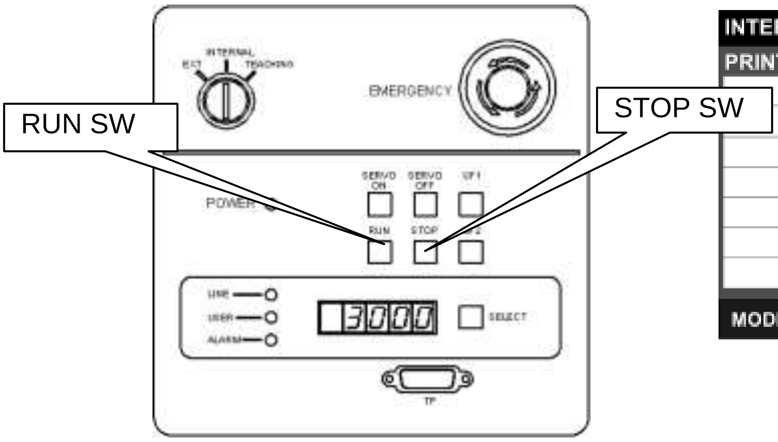
Step 1: Selecting step execution
Set the running conditions for file selection, run mode selection, and speed override.

Step 2: Servo ON
Press the SERVO ON switch on the front panel of the controller.


INTERNAL
EXT
TEACHING
EMERGENCY
POWER
SERVO ON
SERVO OFF
UF1
RUN
STOP
UF2
LINE
USER
ALARM
3000
SELECT
TP

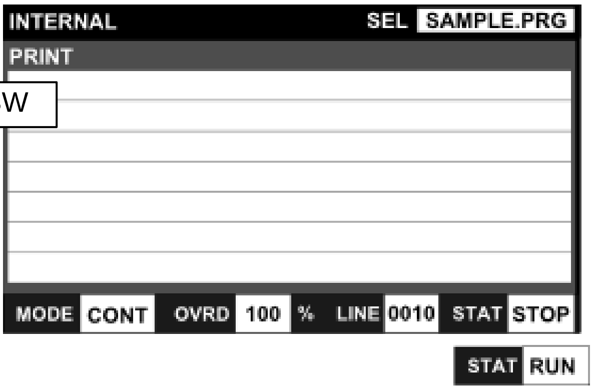
SERVO ON SW

Step 3: Execution of RUN
Press the RUN switch on the front panel of the controller. When the execution of the program starts, the RUN LED goes on and the STOP LED goes off.
Also, the execution status of the teach pendant changes to [RUN].


INTERNAL
EXT
TEACHING
EMERGENCY
POWER
SERVO ON
SERVO OFF
UF1
RUN
STOP
UF2
LINE
USER
ALARM
3000
SELECT
TP

RUN SW

STOP SW



INTERNAL SEL SAMPLE.PRG

PRINT

MODE CONT OVRD 100 % LINE 0010 STAT STOP

STAT RUN

Caution

- The "startup command" external control signal is inoperative in the internal automatic operation mode.
- While in the internal automatic operation mode, it is not possible to execute [RUN] from the teach pendant

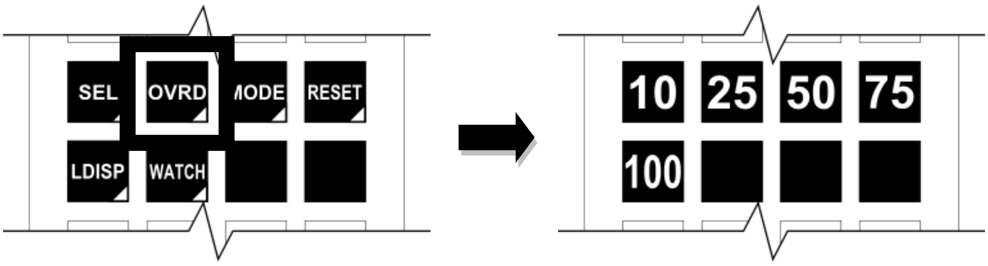
8.3 Speed Override

Functional Explanation

Sets the speed override for automatic operation.
When setting the programmed speed as 100%, this function is used to apply an additional override.
The selections on the override key sheet are changed to the [10], [25], [50], [75] and [100] keys at the time of internal automatic operation.

Operating Procedure

Step 1: Selection of the speed override function
Press the [OVRD] key. The [10], [25], [50], [75] and [100] keys are displayed on the keyboard.



The succeeding operation is the same as that of the test operation (Section 7).

Section 9 External Automatic Operation

DANGER

NEVER enter the dangerous area of the robot during automatic operation. If you still have to enter the dangerous area, be sure to terminate the automatic operation and turn the servo power off beforehand. At that time, set the master mode to TEACHING with the mode select switch.

CAUTION

1. Make sure that no obstacle stands in the robot working range. If any obstacle exists, perform automatic operation at a slow speed and make sure that the robot will not collide with the obstacle at all.
2. If the robot motion becomes abnormal during program execution, press the EMERGENCY stop pushbutton switch immediately to stop the robot. NEVER restart the automatic operation until the cause of the abnormality is identified.
3. The speed of automatic operation is initially set at 100% of the maximum robot speed.

9.1 Selecting External Automatic Operation Mode

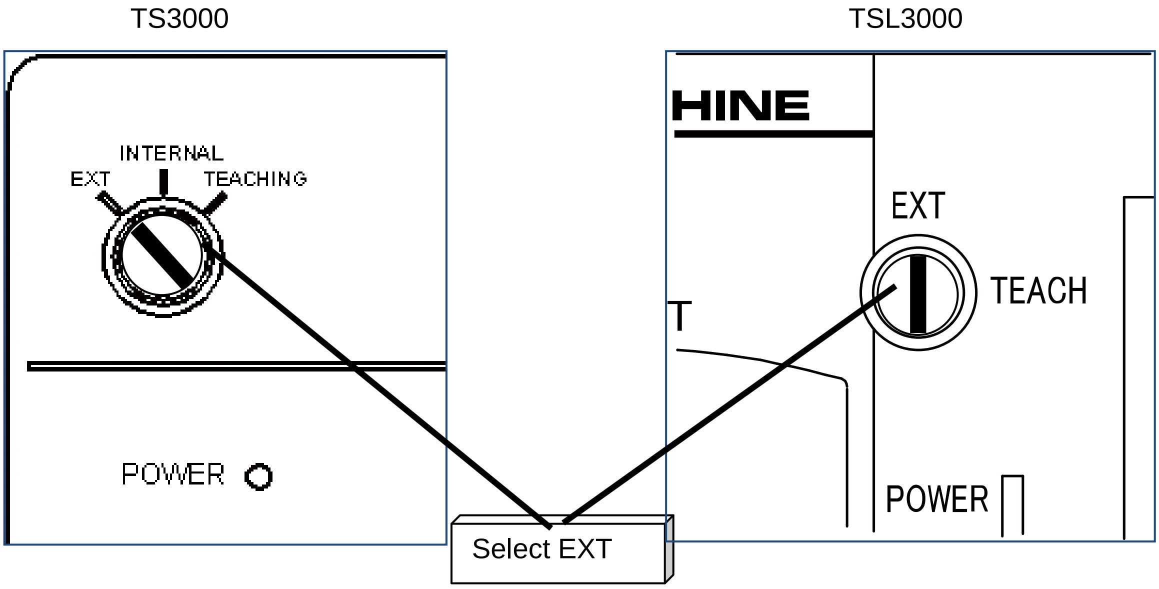
Functional Explanation

Selects the external automatic mode where you can execute a program by external control signals or commands given from the host computer.

Operating Procedure

Step 1: Selection of external automatic mode.

Change over the master mode switch on the control panel to “EXT”.



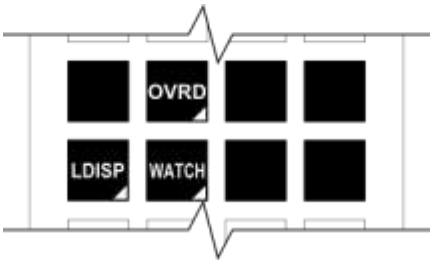
The functions that can be used from the teaching pendant in the external automatic mode are listed in the table below.

The basic operation of each of these functions is the same as those in the test operation mode. In this section, only the differences from the test operation mode are explained.

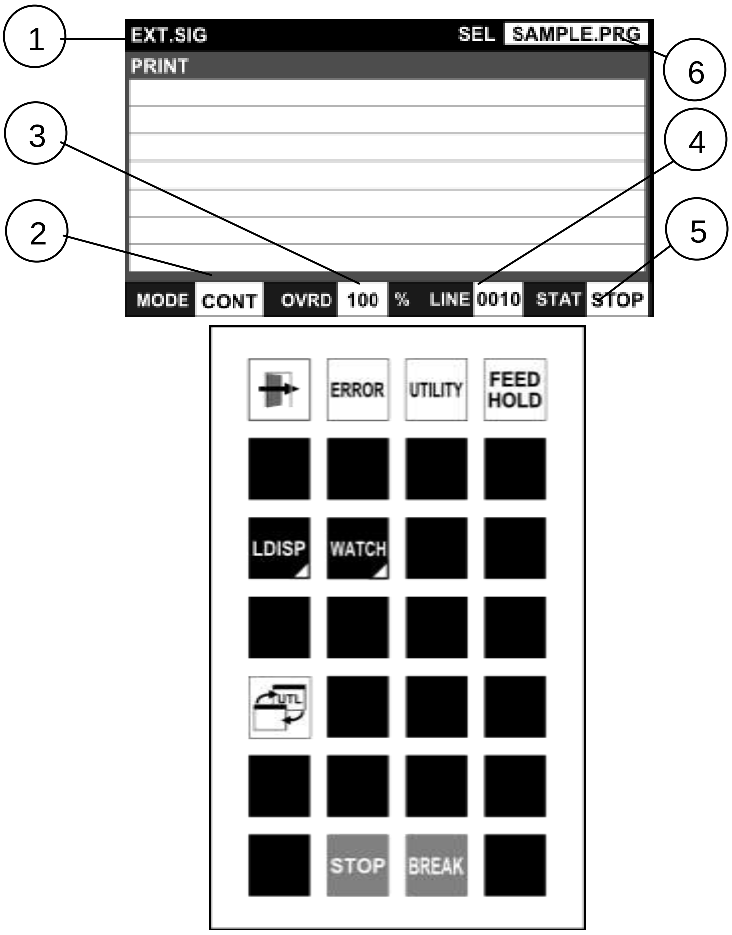
For more detailed operation procedure of each function, please see Section 7, "Test Operation".

Menu	Description of Operation
* [OVRD]	Performs override settings.
[LDISP]	Displays an execution line.
[WATCH]	Global variable monitor
[STOP]	Stops a program.
[BREAK]	Halts a program.

* Regarding the TSL3000 controller, the speed override can be set from the teach pendant in the external automatic operation mode.


OVRD
LDISP
WATCH

The screen and key sheet of the TP3000 when the external automatic operation mode is being selected are outlined in the table below.

External Automatic Mode Screen and Key Sheet	Description of Display
 1 EXT.SIG SEL SAMPLE.PRG 6 PRINT 3 4 2 5 MODE CONT OVRD 100 % LINE 0010 STAT STOP ERROR UTILITY FEED HOLD LDISP WATCH UTL STOP BREAK	① Displays the mode of the controller. EXE.SIG: External control signal mode EXE.232C: Host mode (Control by host computer) EXE.ETHER: Host mode (Control by host computer) ② Displays the master mode and run mode currently being selected. CONT : Continuous operation CYCLE: Cycle operation SEG : Segment operation STEP : Step operation ③ Displays the speed override. ④ Displays the number of execution steps. ⑤ Displays the execution status. RUN: A program is in execution. STOP: The execution of a program is stopped. ⑥ Displays active file name.

Cautions

- For the functions and use of the external control signals, see the Interface Manual.
- For the data communication function with the host computer, see the Communication Manual.
- In the external automatic mode, only the MODE select switch, STOP switch, SERVO ON switch, SERVO OFF switch and EMERGENCY stop pushbutton switch provided on the control panel are operative.
- The mode can be changed through "USER. PAR".
  "EX. 232C" and "EX. ETHER" are controlled by the host computer. Enter [U00] to change over to either mode. For details, see the User Parameter Manual.

9.2 Selecting File

Functional Explanation

Selects or resets an execution file.

Operating Procedure

Observe one of the following manners to select a file.

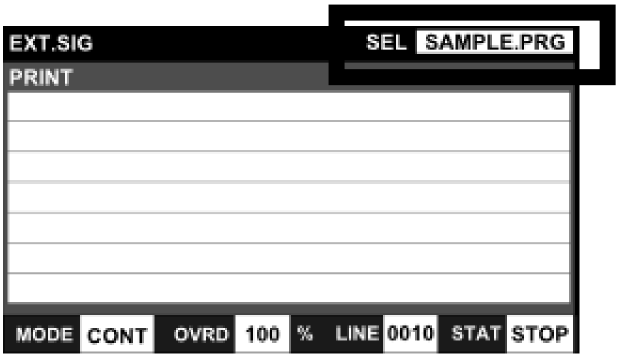
(a) File selection by automatic start file
Create an "automatic start file" having the name specified by a SELECT command in the controller in advance, and then turn "ON" the power to the controller. For more details on automatic start files, please see Section 4, "Program Editing".

(b) File selection by external signal
Specify a file to be selected externally in the user parameter beforehand. While the external signal mode is selected, an execution file can be selected by the external signal.
For the externally selected file and external signals, see the User Parameter Manual and Interface Manual, respectively.

(c) File selection by internal automatic mode or test operation mode (TS3000)
Select in advance a file you wish to execute in the internal automatic mode or test operation mode. Select the either mode by means of the MODE select switch on the control panel.

(d) File selection via data transmission.
A file can be selected by data transmission in either "EX. 232C" or "EX. ETHER" mode. For details, see the Communication Manual.

When the execution file is selected, the following display appears on the screen.



SAMPLE.PRG

CONT

100

0010

STOP

Cautions

- In the external control mode, an execution file cannot be selected through the teach pendant, using a command.
- The internal automatic operation is a function of the TS3000 robot controller.

9.3 Selecting Run Mode

Functional Explanation

Changes over the run mode of automatic operation.

Operating Procedure

(a) External control signal mode:
When the cycle operation mode signal is turned on, the cycle operation mode is selected. When the same signal is turned off, the continuous operation mode takes effect.
For the cycle operation mode signal, see the Interface Manual.

(b) Starting via data communication
Select a run mode via data communication when in the "EX. 232C" or "EX. ETHER" mode.
For details, refer to the Communication Manual.

Cautions

- In the external control signal mode, the run mode is selected by the cycle operation mode signal.
- In the "EX. 232C" mode and "EX. ETHER" mode, the cycle operation mode signal is ineffective.
- When in the "EX. 232C" or "EX. ETHER" mode, if internal automatic operation is switched to external automatic operation, the settings of the internal automatic operation mode will be maintained.

9.4 Speed Override

Functional Explanation

Sets the speed override for automatic operation. This function is useful to effect an additional override, taking the programmed speed as 100%.

Operating Procedure

(a) When specifying speed override in the internal automatic mode:
Specify a desired speed override beforehand in the internal automatic mode. Then change over the MODE select switch.

(b) When using an automatic start file:
Create an "automatic start file" having the name specified by a SELECT command in the controller in advance, and then turn "ON" the power to the controller. For more details on automatic start files, please see Section 4, "Program Editing".

(c) File selection via data transmission
When in the "EX. 232C" or "EX. ETHER" mode, set up override via data communication. For details, refer to the Communication Manual.

Cautions

- A speed override which was set in the internal automatic mode or test operation mode remains effective as it is. Just after the controller power is turned on, the override is 100%.
- You can specify the speed override valid at power ON by using the OVRD command in the automatic start file.

9.5 Startup

Functional Explanation

Starts an automatic operation under the predetermined conditions.

Operating Procedure

(a) Startup by using the start signal in the external signal mode:
Input the start signal.
For the start signal, see the Interface Manual.

(b) Starting via data communication
When in the "EX. 232C" or "EX. ETHER" mode, ETHER" mode.
For details, refer to the Communication Manual.

Cautions

- Startup can be performed, using the "startup" signal or data communication.
- In the external control signal mode, only the "startup" signal is effective. In the host mode, only the startup by data communication takes effect.
- The RUN switch at the front of the TS3000 is inoperative.

9.6 Stop

9.6.1 Cycle Stop

Functional Explanation

Selects "CYCLE" for the run mode and stops an automatic operation at the program end.

Operating Procedure

Step 1: Input of "cycle operation mode" signal.
Input the "cycle operation mode" signal, and the cycle operation mode is selected, where an automatic operation stops at the end of the program. With the stop of the automatic operation, the "cycle end" signal is output.
For the "cycle operation mode" signal and "cycle end" signal, see the Interface Manual.

Cautions

- In the external control signal mode, the cycle operation mode is selected by the input of "cycle operation mode" signal. When the program has been executed to the end in the cycle operation mode, the automatic operation stops with the "cycle end" signal output.
- In the "EX. 232C" mode and "EX. ETHER" mode, the operation mode cannot be changed over by the external control signal. For this reason, if the program is started in the continuous operation mode, cycle stop cannot be effected.
- The SCOL program execution unit pre-reads up to four (4) motion commands. Therefore, the program may be executed successively by up to three (3) cycles according to the cycle stop timing or the active program contents.

9.6.2 STOP

Functional Explanation

Stops an automatic operation when the execution of the instruction currently being executed is completed. This function is used for normal stop operation.

Operating Procedure

Step 1: Input of STOP.
(a) "Stop" signal (only in the external control signal mode):
Input the "stop" signal. (For details, see the Interface Manual.)

(b) Stopping via data communication
When in the "EX. 232C" or "EX. ETHER" mode, automatic operation can be stopped via data communication.
For details, refer to the Communication Manual.

(c) In the case of the operation panel of the controller
Press the STOP switch on the front panel of the controller.

(d) In the case of the TP3000
Press the [STOP] key.

When STOP is input, automatic operation stops upon completion of the instruction currently being executed.

(On the TS3000, the STOP LED on the front panel of the controller goes on when STOP is input.)
When automatic operation stops, the RUN LED on the front panel of the controller goes off. (On the TS3000, the STOP LED goes on at the same time.)
The execution status of the teach pendant changes to "STOP".

Cautions

- In the "EX. 232C" mode and "EX. ETHER" mode, the "stop" signal is invalid.
- In the external control signal mode, stop by data communication is ineffective.
- For the "stop" signal and data communication, see the Interface Manual and Communication Manual, respectively.

9.6.3 BREAK

Functional Explanation

Immediately decelerates and stops the robot, and stops an automatic operation. This function is used to interrupt the automatic operation.

Operating Procedure

(a) Step 1: Input of BREAK.
"Stop" signal (only in the external control signal mode):
Input the "break" signal. (For details, see the Interface Manual.)

(b) In the case of the TP3000
Press the [BREAK] key.

When BREAK is input, the robot currently in operation immediately decelerates and stops, and then automatic operation stops.
(On the TS3000, the STOP LED on the front panel of the controller goes on when BREAK is input.)
When automatic operation stops, the RUN LED on the front panel of the controller goes off.
The execution status of the teach pendant changes to "STOP".

Caution

- To restart the operation after the stop by the BREAK command, perform the startup operation.

9.6.4 FEED HOLD

Functional Explanation

Holds robot motion and program execution. When this function is specified during robot operation, the robot immediately slows down and stops. The feed hold function is used to stop the robot temporarily.

Operating Procedure

Step 1: Input of FEED HOLD.
(a) In the case of the TP3000
Press the FEED HOLD key on the teach pendant.
The FEED HOLD LED goes on and if the robot is in operation, it decelerates and stops.
(On the TS3000, when FEED HOLD is input, the STOP LED on the front of the controller goes on.)

(b) Feed hold via data communication
When in the "EX. 232C" or "EX. ETHER" mode, feed hold can be performed via data communication.
For details, refer to the Communication Manual.

When automatic operation stops, the RUN LED on the front panel of the controller goes off.
The execution status of the teach pendant changes to "STOP" when automatic operation stops.

Step 2: Cancel of feed hold.
While the FEED HOLD switch LED is turned on, press the FEED HOLD switch again.
The FEED HOLD switch LED turns off and the automatic operation restarts.
If feed hold is commanded during program execution, program execution can be restarted by canceling the feed hold.
When execution is restarted, the RUN LED on the front panel of the controller goes on.

(On the TS3000, when FEED HOLD is cleared, the STOP LED on the front of the controller goes off.)
When execution is restarted, the execution status of the teach pendant changes to "RUN".

Cautions

- If the feed hold is commanded during program execution, program execution can be restarted by canceling the feed hold.
- If you should change the master mode, select a file or reset the execution conditions, the program will not restart.

9.6.5 EMERGENCY Stop

Functional Explanation

Turns off the servo power and stops an automatic operation. This function is useful to stop the robot system at the time of an emergency.

Operating Procedure

Turn on the Emergency Stop switch on the teach pendant or the emergency stop external control signal.
(The TS3000 can also be stopped using the Emergency Stop switch on the front panel of the controller.)
When Emergency Stop is input, the servo power is turned off and the SERVO ON LED on the teach pendant goes off.
Additionally, the SERVO ON (SVON for the TSL3000) LED on the front panel of the controller goes off.
(On the TS3000, the SERVO OFF LED goes on at the same time.)

Cautions

- All of the EMERGENCY stop switches on the control panel and teach pendant, and "emergency stop" external control signal are operative. At the time of an emergency, use whichever key you can get at quickest.
- The EMERGENCY stop switches on the control panel and teach pendant are of a lock type. When pressed, they remain depressed and locked. To reset, turn and unlock the switch.

- While the EMERGENCY stop switch is ON, the servo power cannot be turned on.

9.7 Reset

Functional Explanation

(1-1) Program reset
Resets all execution conditions (execution steps, variables) for a current file and allows execution of that program from the top.
This function is useful to execute a current file again from the top of the program.

(1-2) Step reset
Resets all execution conditions (excluding global variables) for a current file and allows execution of that program from the top.

(1-3) Cycle reset
Resets all execution conditions (excluding global variables) for a current file and allows execution of the main program from the step indicated by label RCYCLE. This function is useful when you do not wish to execute the setting of the initial condition.
Also, specify the GOTO RCYCLE command just before the END command not to execute the END command of the main program.

(1-4) Output signal reset
Sets off all user external output signals (DOUT (1) ~ DOUT (164)). The hand signals (201 ~ 204) will not turn off.

Operating Procedure

(a) External control signal mode:
Turn on the input signal corresponding to the program reset, step reset, cycle reset, or output signal reset.
In the external control signal mode, reset by data communication is not possible. For details, see the Interface Manual.

(b) Reset via data communication
When in the "EX. 232C" or "EX. ETHER" mode, various reset operations can be performed via data communication.
Send the command corresponding to the reset operation you wish to perform through data communication. If the command is accepted by the controller, an "acknowledge" signal is sent back from the controller.

In the host mode, reset by external control signal is not possible. For details, see the Communication Manual.

Cautions

- In the program reset mode, all variables used in the program are reset. If you do not wish to reset the variables, use the step reset function instead.
- If you do not wish to execute the setting of initial conditions at the head of the program, use the cycle reset instead.
- In the cycle reset mode, use label RCYCLE in a desired step of the main program.

Section 10 File Operation

With the File Operation function, it is possible to display, copy, delete and rename files in the RAM drive and the USB drive (inside a TS3000 folder).
Files can be copied between RAM and USB drives.

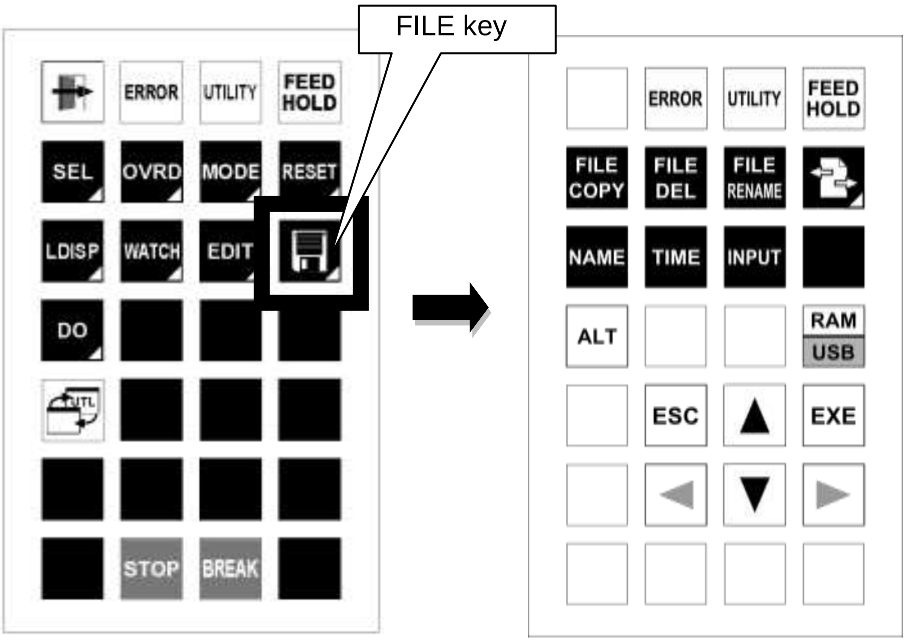
10.1 Calling the File Operation Function

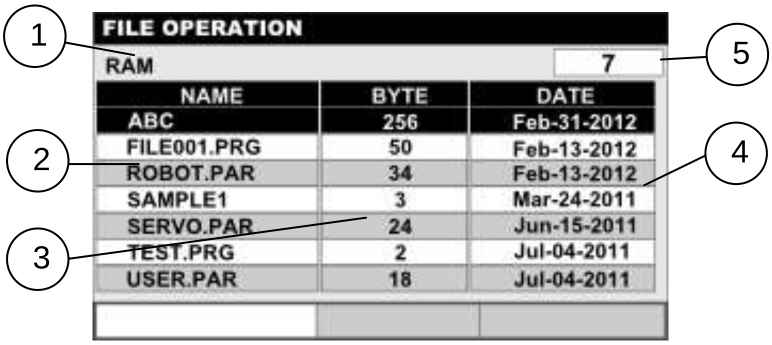
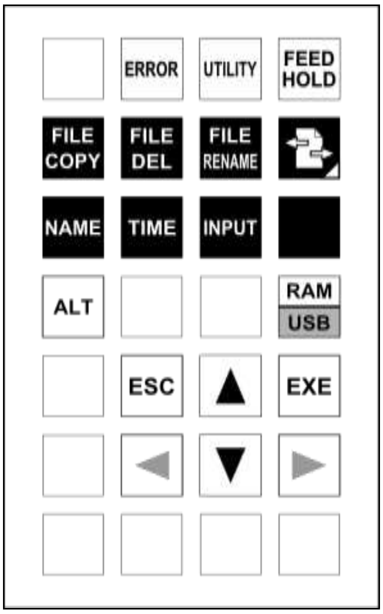
Functional Explanation

Calls the File Operation function.

Operating Procedure

Step 1: Calling the File Operation function
Press the [FILE] key on the top key sheet in the TEACHING mode.


FILE key
ERROR
UTILITY
FEED HOLD
SEL
OVRD
MODE
RESET
LDISP
WATCH
EDIT
DO
UTL
STOP
BREAK
ERROR
UTILITY
FEED HOLD
FILE COPY
FILE DEL
FILE RENAME
NAME
TIME
INPUT
ALT
RAM
USB
ESC
EXE

File Operation Screen and Key Sheet	Description of Display
  ERROR UTILITY FEED HOLD FILE COPY FILE DEL FILE RENAME NAME TIME INPUT ALT RAM USB ESC EXE	① Displays the drive. ② Displays file names. ③ Displays file sizes. ④ Displays dates of creation. ⑤ Displays the number of files.

FILE OPERATION

RAM 7

NAME	BYTE	DATE
ABC	256	Feb-31-2012
FILE001.PRG	50	Feb-13-2012
ROBOT.PAR	34	Feb-13-2012
SAMPLE1	3	Mar-24-2011
SERVO.PAR	24	Jun-15-2011
TEST.PRG	2	Jul-04-2011
USER.PAR	18	Jul-04-2011

Caution

- The File Operation function takes effect only in the TEACHING mode.

10.2 File List Display

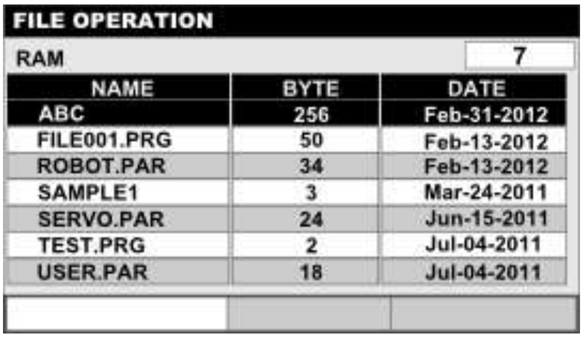
Functional Explanation

Displays a list of files registered in the RAM drive or USB drive (TS3000 folder).

Operating Procedure

Step 1: Displaying files in RAM

Press the [FILE] key on the top screen in the TEACHING mode (Section 10.1). A list of files registered in the RAM drives displayed.



FILE OPERATION

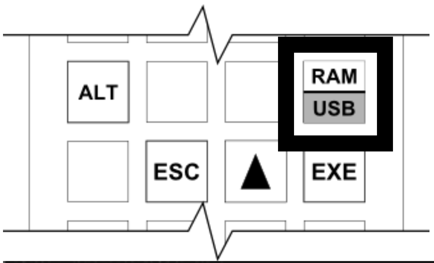
RAM 7

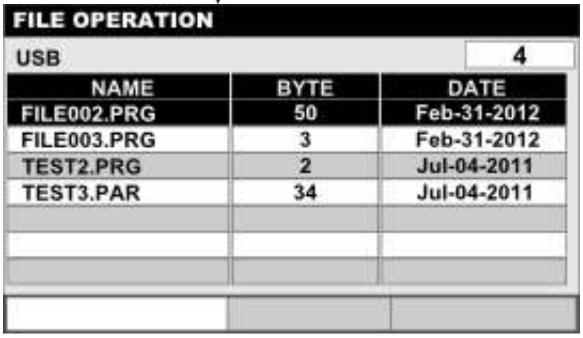
NAME	BYTE	DATE
ABC	256	Feb-31-2012
FILE001.PRG	50	Feb-13-2012
ROBOT.PAR	34	Feb-13-2012
SAMPLE1	3	Mar-24-2011
SERVO.PAR	24	Jun-15-2011
TEST.PRG	2	Jul-04-2011
USER.PAR	18	Jul-04-2011

Step 2: Displaying files in USB

While a list of files in RAM is being displayed, press the [RAM/USB] key.

A list of files registered in the USB drive is displayed.





FILE OPERATION

USB 4

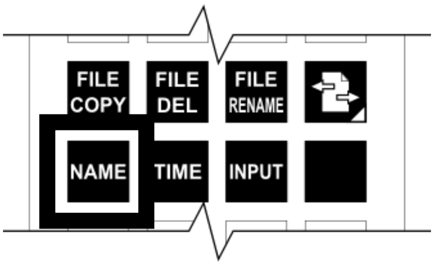
NAME	BYTE	DATE
FILE002.PRG	50	Feb-31-2012
FILE003.PRG	3	Feb-31-2012
TEST2.PRG	2	Jul-04-2011
TEST3.PAR	34	Jul-04-2011

Each time the [RAM/USB] key is pressed, display switches between a list of files in RAM and that in USB.

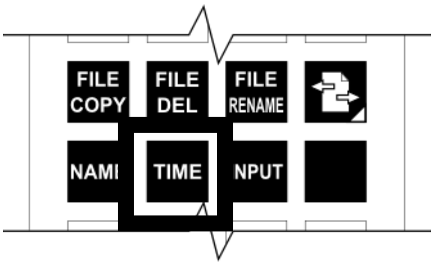
Related Functions

The file list sort functions include <display by name>, <display by file creation time> and <file search function>.

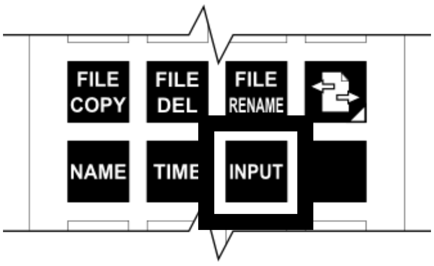
<Display by name>
Press the [NAME] key. The file list is sorted by name.
Each time the [NAME] key is pressed, the sorting order changes between ascending order and descending order.


FILE COPY
FILE DEL
FILE RENAME
NAME
TIME
INPUT

<Display by file creation time>
Press the [TIME] key. The file list is sorted by file creation time.
Each time the [TIME] key is pressed, the sorting order changes between ascending order and descending order.


FILE COPY
FILE DEL
FILE RENAME
NAMI
TIME
NPUT

<File search function>
Press the [INPUT] key. The cursor moves to the command line. Enter the desired character string you want to search for on the command line.


FILE COPY
FILE DEL
FILE RENAME
NAME
TIME
INPUT

Once the search character string has been determined, press the [EXE] key. Files staring with the character string you just entered are displayed in a list.

Caution

- If the "TS3000" folder (directory) does not exist when the USB drive is selected in each operation, the error message "USB not found" appears and any succeeding operation for the USB drive is disabled.
  If there is no TS3000 folder (directory) in the USB drive, create one.

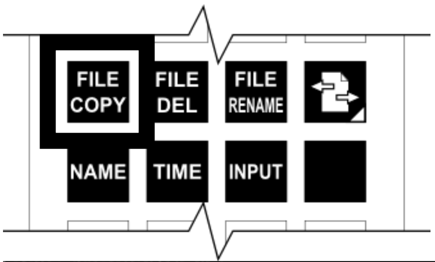
10.3 File Copy

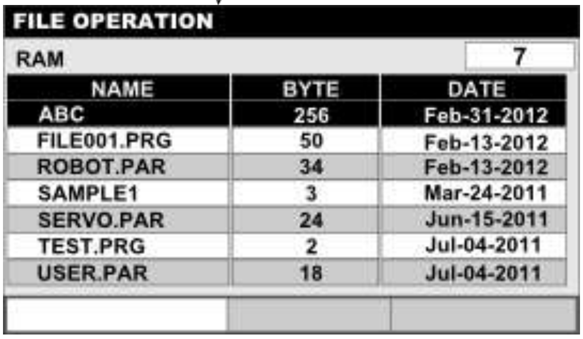
Functional Explanation

Copies files in RAM to another RAM.
Copies files in USB to another USB.

Operating Procedure

Step 1: Selecting a file
Select the file you want to copy by moving the cursor up and down while a list of files in either the RAM or USB drive is being selected. Once the file has been determined, press the [FILE COPY] key.



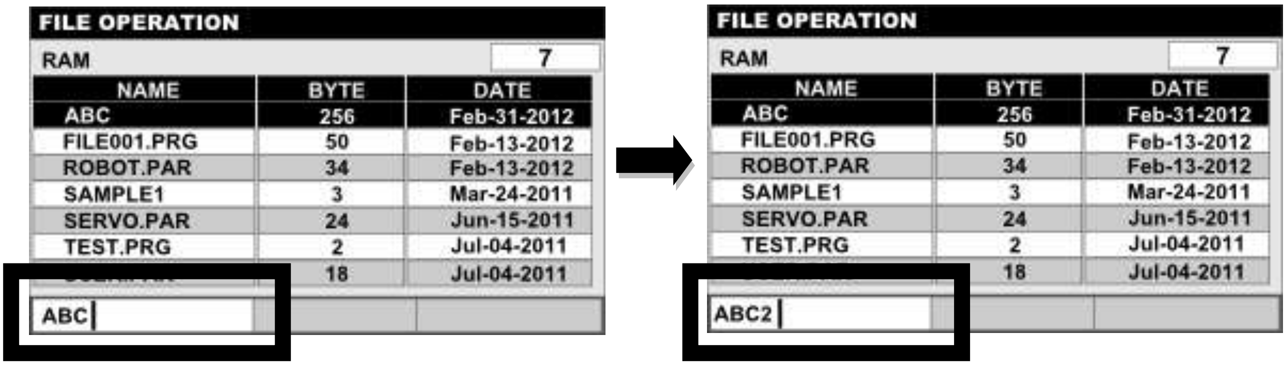


FILE OPERATION

RAM 7

NAME	BYTE	DATE
ABC	256	Feb-31-2012
FILE001.PRG	50	Feb-13-2012
ROBOT.PAR	34	Feb-13-2012
SAMPLE1	3	Mar-24-2011
SERVO.PAR	24	Jun-15-2011
TEST.PRG	2	Jul-04-2011
USER.PAR	18	Jul-04-2011

Step 2: Entering the file name after copying
The cursor moves to the command line. Enter the desired copy destination file name on the command line.



FILE OPERATION

RAM 7

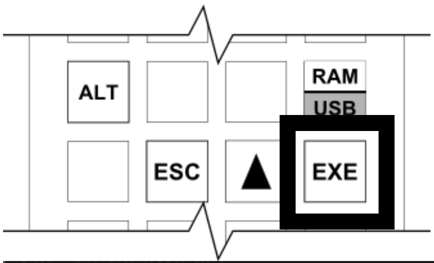
NAME	BYTE	DATE
ABC	256	Feb-31-2012
FILE001.PRG	50	Feb-13-2012
ROBOT.PAR	34	Feb-13-2012
SAMPLE1	3	Mar-24-2011
SERVO.PAR	24	Jun-15-2011
TEST.PRG	2	Jul-04-2011
[illegible]	18	Jul-04-2011

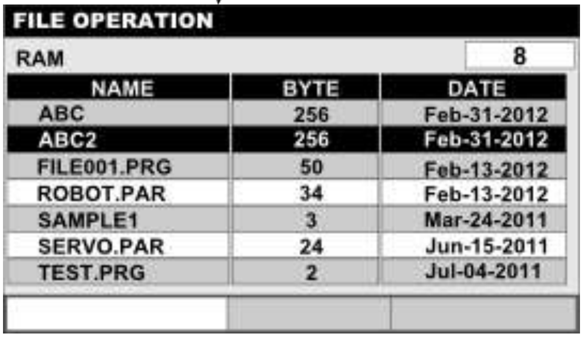
ABC → ABC2

Step 3: Execution of copy

Once the file name has been determined, press the [EXE] key.

Copy is executed and the file is copied to the same directory (from RAM to RAM, from USB to USB) as that of the original file.





FILE OPERATION

RAM 8

NAME	BYTE	DATE
ABC	256	Feb-31-2012
ABC2	256	Feb-31-2012
FILE001.PRG	50	Feb-13-2012
ROBOT.PAR	34	Feb-13-2012
SAMPLE1	3	Mar-24-2011
SERVO.PAR	24	Jun-15-2011
TEST.PRG	2	Jul-04-2011

To cancel copying in progress, press the [ESC] key.

Cautions

- If there is no "TS3000" folder (directory) in the USB drive, the USB drive selected in each operation will not be recognized. Before performing file operation, be sure that there is a "TS3000" folder (directory) in the USB drive. If there is no "TS3000" folder (directory) in the USB drive, create a "TS3000" folder.
- If the size of the copying data exceeds the memory capacity as a result of the copy operation, an error message of "RAM file I/O error" is displayed.

- If the copied file size exceeds the capacity of the RAM drive, an error message "RAM file I/O error" is displayed, and copying ends. In such a case, delete unnecessary files to make space and then copy again.
- It is not possible to copy a file to the file being selected as the execution file. If this happens, the error message "File already selected" is displayed and then copying ends.

10.4 File Delete

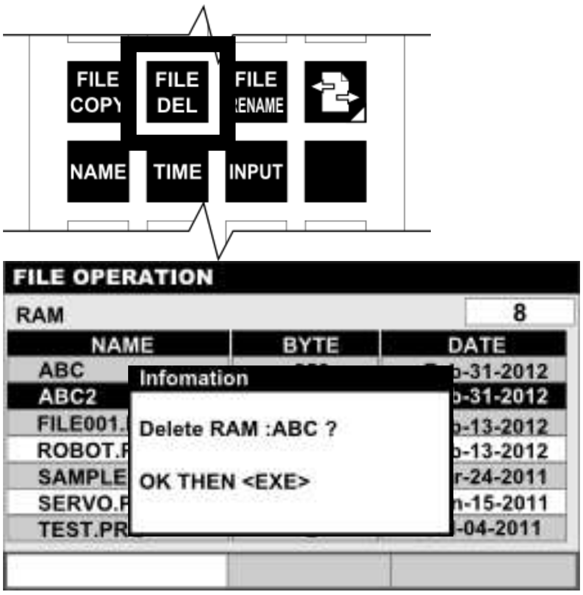
Functional Explanation

Deletes files in the RAM drive and files in the USB drive (inside a TS3000 folder). This function is used to delete unnecessary files when no free area is left in the RAM drive.

Operating Procedure

Step 1: Selecting a file to delete

Select the file you want to copy by moving the cursor up and down while a list of files in either the RAM or USB drive is being displayed. Once the file has been determined, press the [FILE DEL] key. A delete confirmation message appears.


FILE COPY
FILE DEL
FILE RENAME
NAME
TIME
INPUT
FILE OPERATION
RAM
8
NAME
BYTE
DATE
ABC
ABC2
FILE001.
ROBOT.P
SAMPLE
SERVO.P
TEST.PR
b-31-2012
b-31-2012
b-13-2012
b-13-2012
r-24-2011
n-15-2011
-04-2011
Infomation

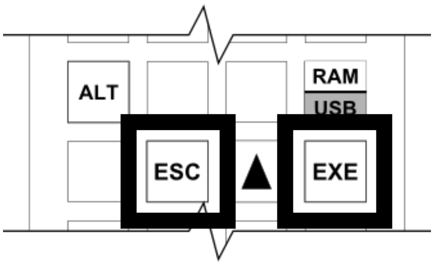
Delete RAM :ABC ?

OK THEN <EXE>

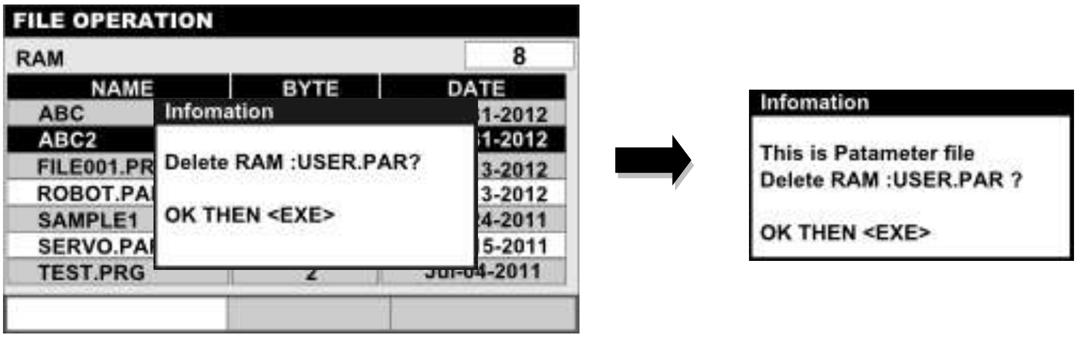
Step 2: Execution of file deletion

To execute file deletion, press the [EXE] key.

To cancel file deletion, press the [ESC] key.


ALT
RAM
USB
ESC
▲
EXE

Step 3: Execution of parameter file deletion
When the file to be deleted is a parameter file, a confirmation message appears again after the [EXE] key for executing deletion.


FILE OPERATION
RAM
8
NAME
BYTE
DATE
ABC
ABC2
FILE001.PR
ROBOT.PA
SAMPLE1
SERVO.PA
TEST.PRG

Infomation
Delete RAM :USER.PAR?
OK THEN <EXE>

Infomation
This is Patameter file
Delete RAM :USER.PAR ?
OK THEN <EXE>

To execute parameter file deletion, press the [EXE] key.
To cancel parameter file deletion, press the [ESC] key.

Cautions

- It is not possible to erase a file being selected as the execution file.
- If this happens, the error message "File already selected" is displayed.

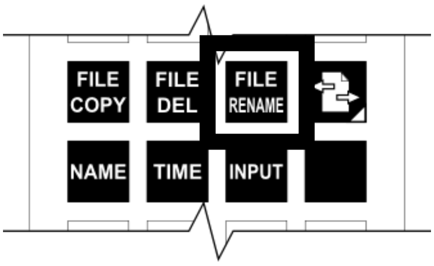
10.5 File Rename

Functional Explanation

Changes the name of a file in the RAM or USB.

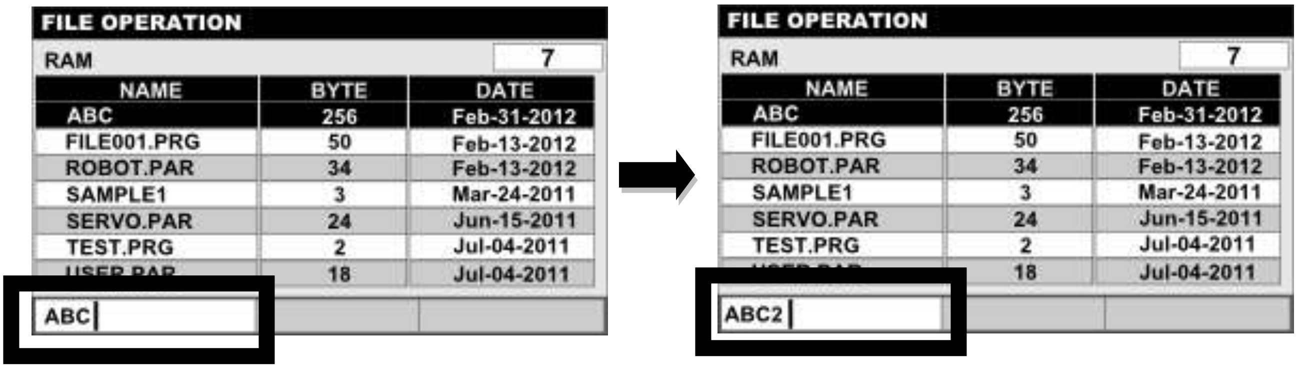
Operating Procedure

Step 1: Selecting a file to rename
Select the file you want to rename by moving the cursor up and down while a list of files in either the RAM or USB drive is being displayed. Once the file has been determined, press the [FILE RENAME] key.



Step 2: Entering the file name after renaming

The cursor moves to the command line. Enter the desired file name to rename on the command line.



FILE OPERATION

RAM 7

NAME	BYTE	DATE
ABC	256	Feb-31-2012
FILE001.PRG	50	Feb-13-2012
ROBOT.PAR	34	Feb-13-2012
SAMPLE1	3	Mar-24-2011
SERVO.PAR	24	Jun-15-2011
TEST.PRG	2	Jul-04-2011
USER.PAR	18	Jul-04-2011

ABC

FILE OPERATION

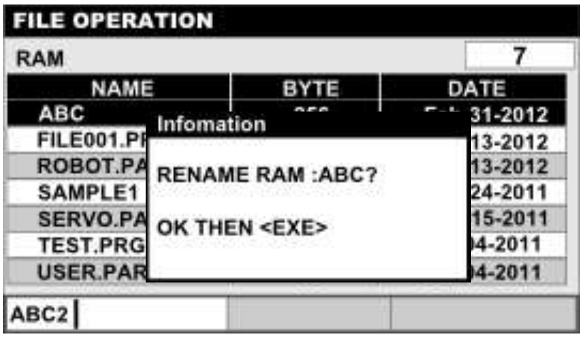
RAM 7

NAME	BYTE	DATE
ABC	256	Feb-31-2012
FILE001.PRG	50	Feb-13-2012
ROBOT.PAR	34	Feb-13-2012
SAMPLE1	3	Mar-24-2011
SERVO.PAR	24	Jun-15-2011
TEST.PRG	2	Jul-04-2011
USER.PAR	18	Jul-04-2011

ABC2

Once the file name has been determined, press the [EXE] key.

A rename confirmation message appears.



FILE OPERATION

RAM 7

Infomation

RENAME RAM :ABC?

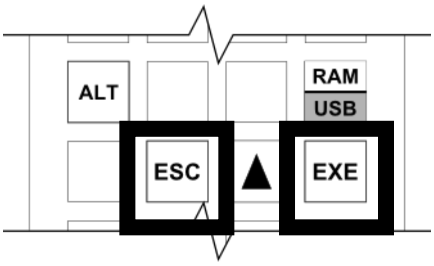
OK THEN <EXE>

ABC2

Step 3: Execution of file renaming

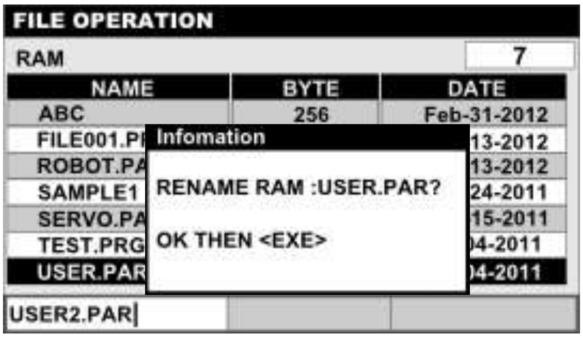
To execute file renaming, press the [EXE] key.

To cancel file renaming in progress, press the [ESC] key.



Step 4: Renaming a parameter file

When the file to be renamed is a parameter file, a confirmation message appears again after the [EXE] key operation in Step 3.



FILE OPERATION

RAM 7

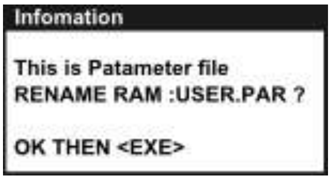
NAME	BYTE	DATE
ABC	256	Feb-31-2012
FILE001.P		13-2012
ROBOT.PA		13-2012
SAMPLE1		24-2011
SERVO.PA		15-2011
TEST.PRG		04-2011
USER.PAR		04-2011

Infomation

RENAME RAM :USER.PAR?

OK THEN <EXE>

USER2.PAR



Infomation

This is Patameter file

RENAME RAM :USER.PAR ?

OK THEN <EXE>

To execute parameter file renaming, press the [EXE] key.

To cancel file renaming, press the [ESC] key.

Cautions

- It is not possible to rename the file being selected as the execution file.
- If this happens, the error message "File already selected" is displayed and key entry is prompted.
- It is not possible to rename a file to the file name being selected as the execution file.
- If this happens, the error message "File already selected" is displayed and key entry is prompted.

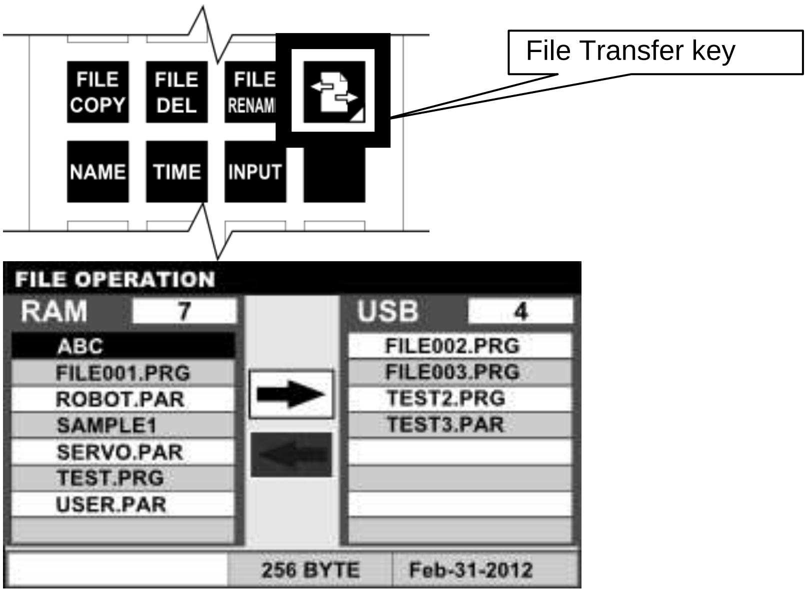
10.6 File Copy between RAM and USB

Functional Explanation

Copies files between the RAM drive and the USB drive (TS3000 folder).

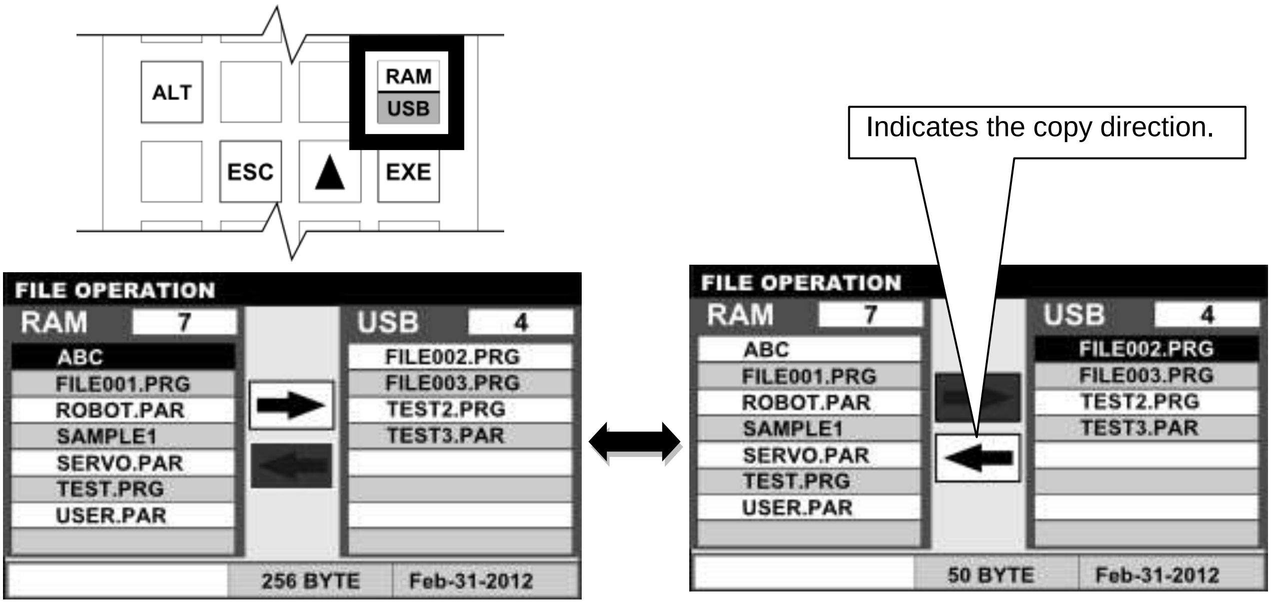
Operating Procedure

Step 1: Press the [File Transfer] key. The screen is split into two and a list of files in the RAM driver and that in the USB drive are displayed. The [⇔ SET] and [ALL] keys are displayed on the key sheet.


File Transfer key
FILE COPY
FILE DEL
FILE RENAM
NAME
TIME
INPUT
FILE OPERATION
RAM 7
ABC
FILE001.PRG
ROBOT.PAR
SAMPLE1
SERVO.PAR
TEST.PRG
USER.PAR
USB 4
FILE002.PRG
FILE003.PRG
TEST2.PRG
TEST3.PAR
256 BYTE
Feb-31-2012

Step 2: Setting up the copy direction

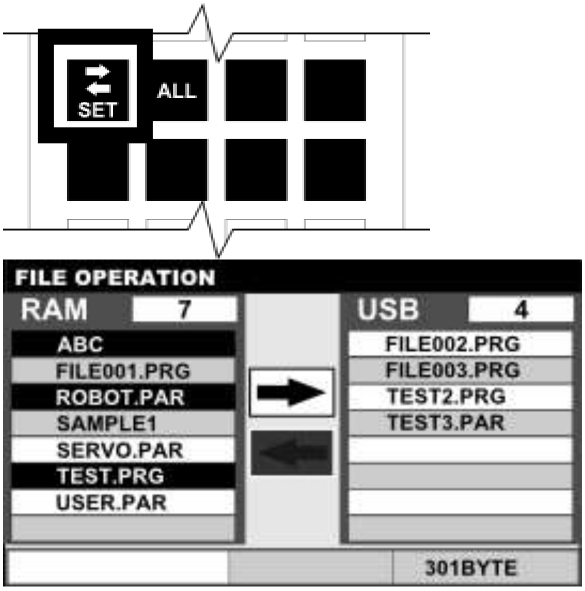
Press the [RAM/USB] key. Every time the key is pressed, the arrow symbol at the center of the screen switches to set up the desired copy direction.


ALT
RAM
USB
ESC
▲
EXE
Indicates the copy direction.
FILE OPERATION
RAM 7
ABC
FILE001.PRG
ROBOT.PAR
SAMPLE1
SERVO.PAR
TEST.PRG
USER.PAR
USB 4
FILE002.PRG
FILE003.PRG
TEST2.PRG
TEST3.PAR
256 BYTE
Feb-31-2012
FILE OPERATION
RAM 7
ABC
FILE001.PRG
ROBOT.PAR
SAMPLE1
SERVO.PAR
TEST.PRG
USER.PAR
USB 4
FILE002.PRG
FILE003.PRG
TEST2.PRG
TEST3.PAR
50 BYTE
Feb-31-2012

Step 3: Selecting a file to copy

Press the [⇔ SET] key. The file name is displayed in reverse video and set as a copy candidate.

Multiple files can be set as copy files.



FILE OPERATION

RAM 7

ABC
FILE001.PRG
ROBOT.PAR
SAMPLE1
SERVO.PAR
TEST.PRG
USER.PAR

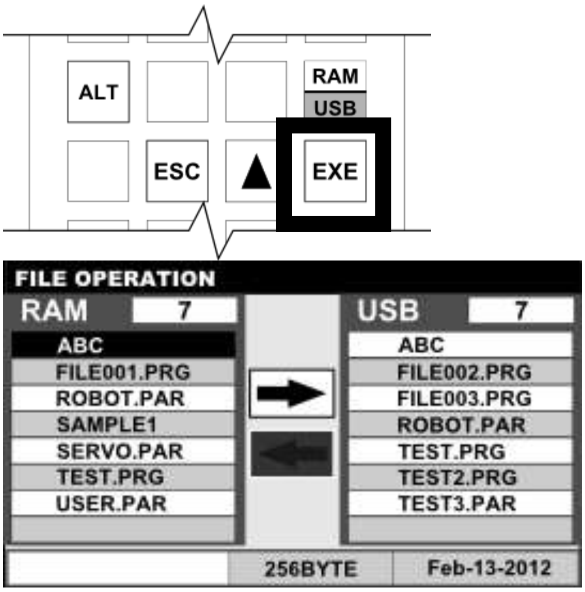
USB 4

FILE002.PRG
FILE003.PRG
TEST2.PRG
TEST3.PAR

301BYTE

Step 4: Execution of copy

Press the [EXE] key. File copy is executed according to the direction of the arrow symbol at the center of the screen.



FILE OPERATION

RAM 7

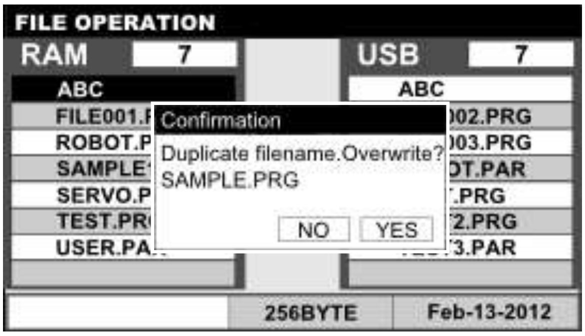
ABC
FILE001.PRG
ROBOT.PAR
SAMPLE1
SERVO.PAR
TEST.PRG
USER.PAR

USB 7

ABC
FILE002.PRG
FILE003.PRG
ROBOT.PAR
TEST.PRG
TEST2.PRG
TEST3.PAR

256BYTE Feb-13-2012

If a file having the same name already exists at the copy destination, a message stating such will be displayed.



FILE OPERATION

RAM 7 USB 7

Confirmation

Duplicate filename.Overwrite?
SAMPLE.PRG

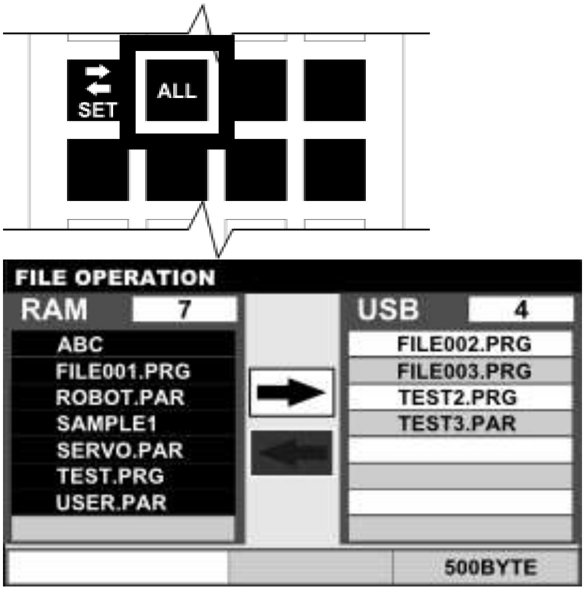
NO YES

256BYTE Feb-13-2012

To overwrite the file, press the [EXE] key. To not overwrite the file, press the [ESC] key. When copying multiple files and files having the same names already exist at the copy destination, a message stating such will be displayed for each of duplicate file names.

Related Function

<Select directory files collectively>
Press the [ALL] key. All the files at the copy source are selected.
To copy all the files at a time, press the [EXE] key.



RAM 7

ABC
FILE001.PRG
ROBOT.PAR
SAMPLE1
SERVO.PAR
TEST.PRG
USER.PAR

USB 4

FILE002.PRG
FILE003.PRG
TEST2.PRG
TEST3.PAR

500BYTE

Cautions

- If there is no "TS3000" folder in the USB drive when the USB drive is selected in each operation, the error message "USB NOT FOUND" is displayed and it is not possible to move to the File Transfer screen.
- If the [RAM ⇔ USB] key is pressed when a USB flash memory is not inserted into the controller, a list of files in the USB drive cannot be displayed. Even if a USB flash memory is inserted into the controller in this state, a list of files in the USB drive will not be displayed. To display it, press the [ESC] key once to cancel the File Copy function between RAM and USB, and then press the [RAM ⇔ USB] again.

Section 11 Utility

The utility functions are made up of the various monitoring functions and maintenance functions. The utility functions can be used regardless of the controller's mode (teaching, internal automatic operation and external automatic operation).

11.1 Calling the Utility Functions

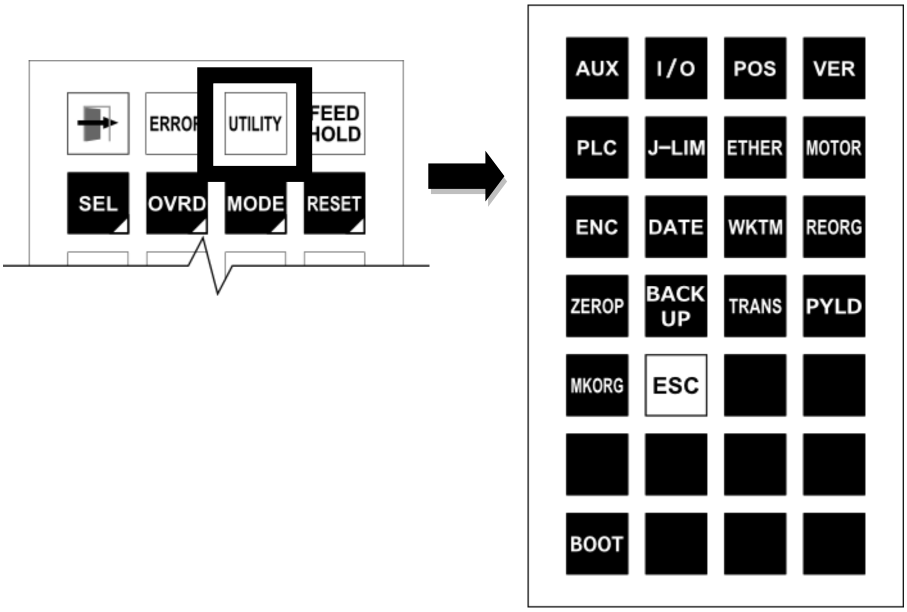
Functional Explanation

Calls the utility functions.

Operating Procedure

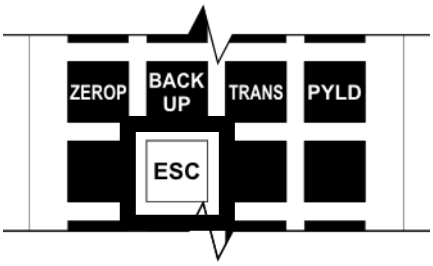
Step 1: Calling the utility functions

Press the [UTILITY] key. The display of the key sheet changes to the utility function selection keys.


ERROR
UTILITY
FEED HOLD
SEL
OVRD
MODE
RESET
AUX
I/O
POS
VER
PLC
J–LIM
ETHER
MOTOR
ENC
DATE
WKTM
REORG
ZEROP
BACK UP
TRANS
PYLD
MKORG
ESC
BOOT

Step 2: Clearing utility function call

Press the [ESC] key. The utility function selection key display closes and the utility function selection quits.


ZEROP
BACK UP
TRANS
PYLD
ESC

The operations of the utility function menu items are shown below.

Menu	Descriptions
[AUX]	Used to display the auxiliary signals.
[I/O]	Used to display the external input/output signals.
[POS]	Used to display the robot positions.
[TRANS]	Used to select the work coordinate system or tool coordinate system.
[WK–TM]	Used to display and set the robot working time.
[REORG]	Used to reproduce the origin (or home point). Note: This function is for maintenance use. For details, see the Maintenance Manual provided separately.
[J–LIM]	Used to display the joint limit set values and set a joint limit value as necessary.
[DATE]	Used to display and set the current date and time.
[MOTOR]	Used to display the servo motor torque, electronic thermal total value and load factor.
[ENC]	Used to display the servo encoder data. For details, see the Maintenance Manual provided separately.
[PLC–M]	Used to display the PLC data.
[ZEROP]	Used to set the origin (or home point). Note: This function is for maintenance use. For details, see the Maintenance Manual provided separately.
[VER]	Used to display the system version.
[ETHER]	Used to display the Ethernet status. Note: For details, see the Communication Manual provided separately. ETHER is equipped to the TS3000 as standard and to the TSL3000 as an optional function.
[PAYLOAD]	Used to display PAYLOAD set values for manual operation and set a PAYLOAD value as necessary.
[BACKUP]	Used to display backup operation to the flash memory.
[MKORG]	Used to set up the mark origin. Note: This function is for maintenance use. For details, see the Maintenance Manual provided separately.
[BOOT]	Used for version update of the main system. Note: This function is for maintenance use. For details, see the Maintenance Manual provided separately.

Cautions

- This function can be used in the teaching, internal automatic and external automatic modes.
- The utility functions cannot be started while the program editor or parameter editor is running.

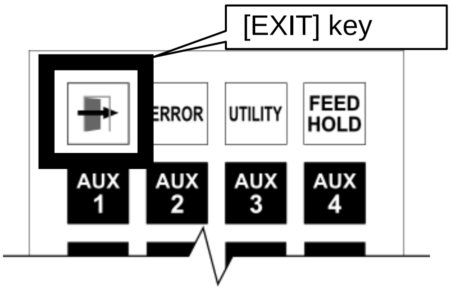
11.2 EXIT Key

Functional Explanation

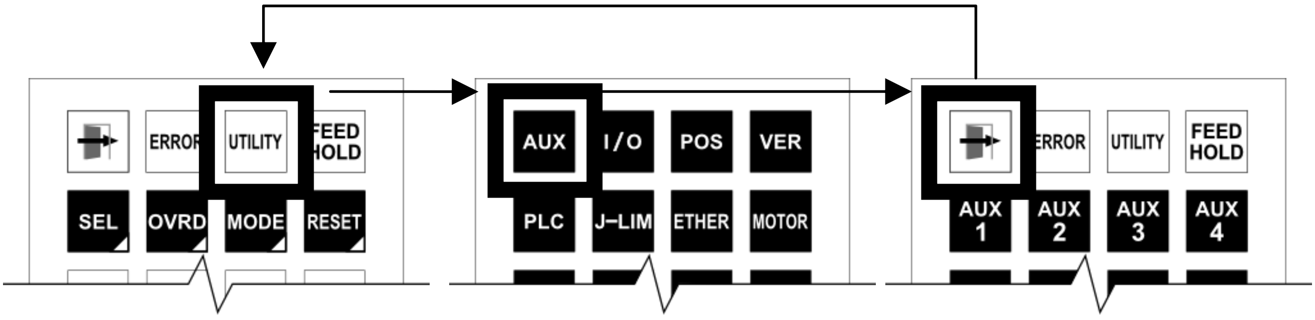
Immediately quits each of the utility functions, and moves to the top mode screen.

Operating Procedure

Step 1: Press the [EXIT] key while executing a utility function.
Example: Press the [EXIT] key on the key sheet in the AUX function.


[EXIT] key
ERROR
UTILITY
FEED HOLD
AUX 1
AUX 2
AUX 3
AUX 4

<Flow from utility function call to the EXIT key>


ERROR
UTILITY
FEED HOLD
SEL
OVRD
MODE
RESET
AUX
I/O
POS
VER
PLC
J–LIM
ETHER
MOTOR
ERROR
UTILITY
FEED HOLD
AUX 1
AUX 2
AUX 3
AUX 4

TEACHING Mode Top Key Sheet

Utility Function Selection Key Sheet

AUX Function Key Sheet

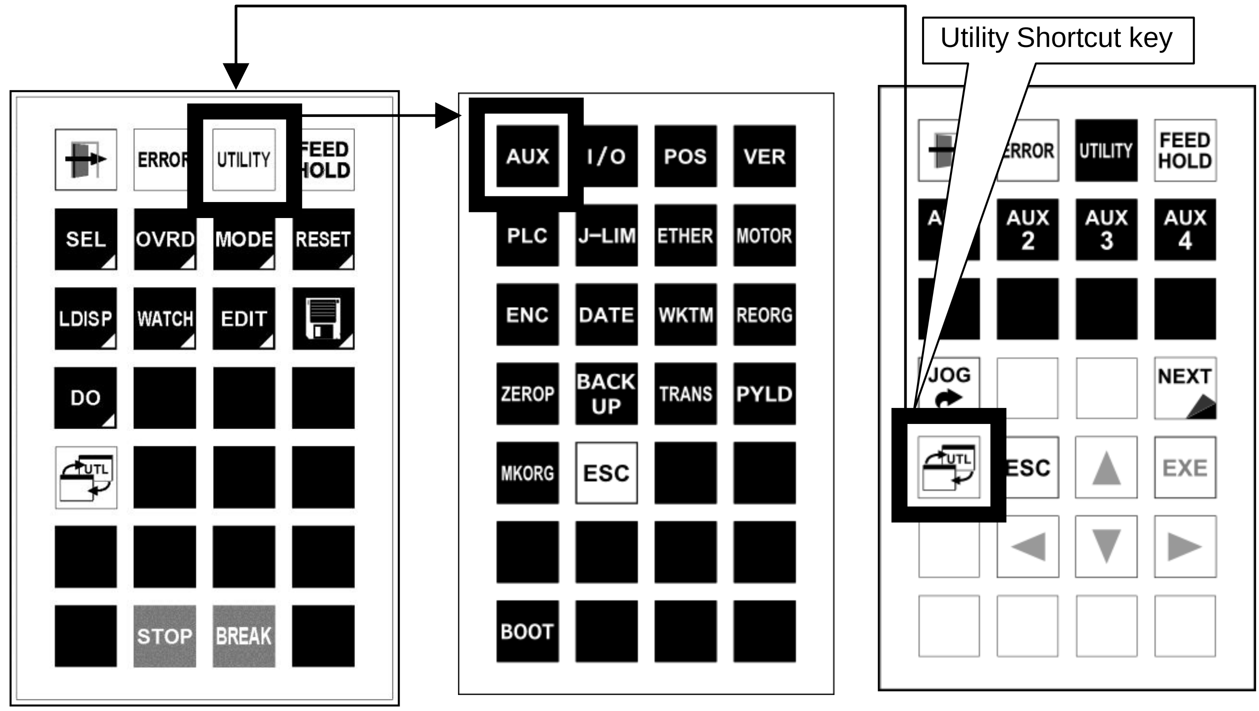
11.3 Utility Function Shortcut

Functional Explanation

Each of the utility functions and the top mode screen can be shortcut.
When the utility functions are closed by pressing the [ESC] or [EXIT] key, the shortcut function is cleared.

Operating Procedure

Step 1: Moving from the utility functions to the top mode screen
Press the "Utility Shortcut" key on the key sheet of each utility function.
The operation moves to the top mode screen without exiting the utility functions.

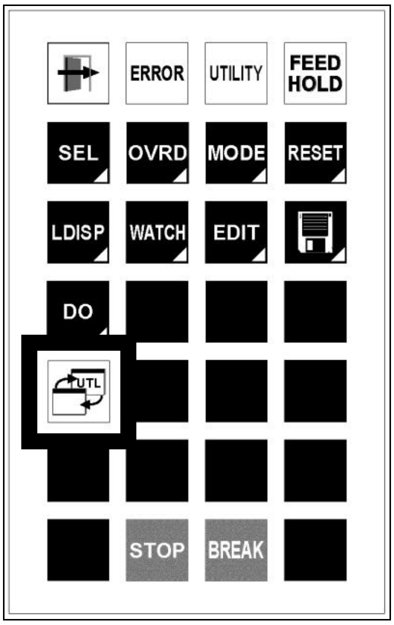

Utility Shortcut key
ERROR
UTILITY
FEED HOLD
SEL
OVRD
MODE
RESET
LDISP
WATCH
EDIT
DO
UTL
STOP
BREAK
AUX
I/O
POS
VER
PLC
J-LIM
ETHER
MOTOR
ENC
DATE
WKTM
REORG
ZEROP
BACK UP
TRANS
PYLD
MKORG
ESC
BOOT
AUX 2
AUX 3
AUX 4
JOG
NEXT
EXE

TEACHING Mode Top Key Sheet

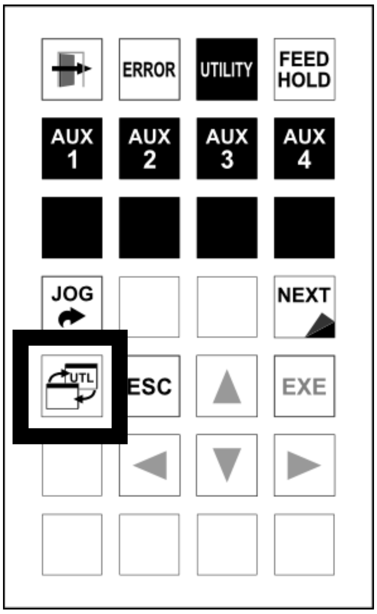
Utility Function Selection Key Sheet

AUX Function Key Sheet

Step 2: Moving from the top mode screen to the utility functions
Press the "Utility Shortcut" key on the key sheet of the top mode screen.
The operation moves to the preselected utility function.


ERROR
UTILITY
FEED HOLD
SEL
OVRD
MODE
RESET
LDISP
WATCH
EDIT
DO
UTL
STOP
BREAK

TEACHING Mode Top Key Sheet


ERROR
UTILITY
FEED HOLD
AUX 1
AUX 2
AUX 3
AUX 4
JOG
NEXT
UTL
ESC
EXE

AUX Key Sheet

Step 3: Finishing shortcut
While executing a utility function, when that utility function is closed by pressing the [ESC] or [EXIT] key, the shortcut function is cleared.

Caution

- If a utility function is not being selected, the Shortcut key on the top mode key sheet does not take effect.

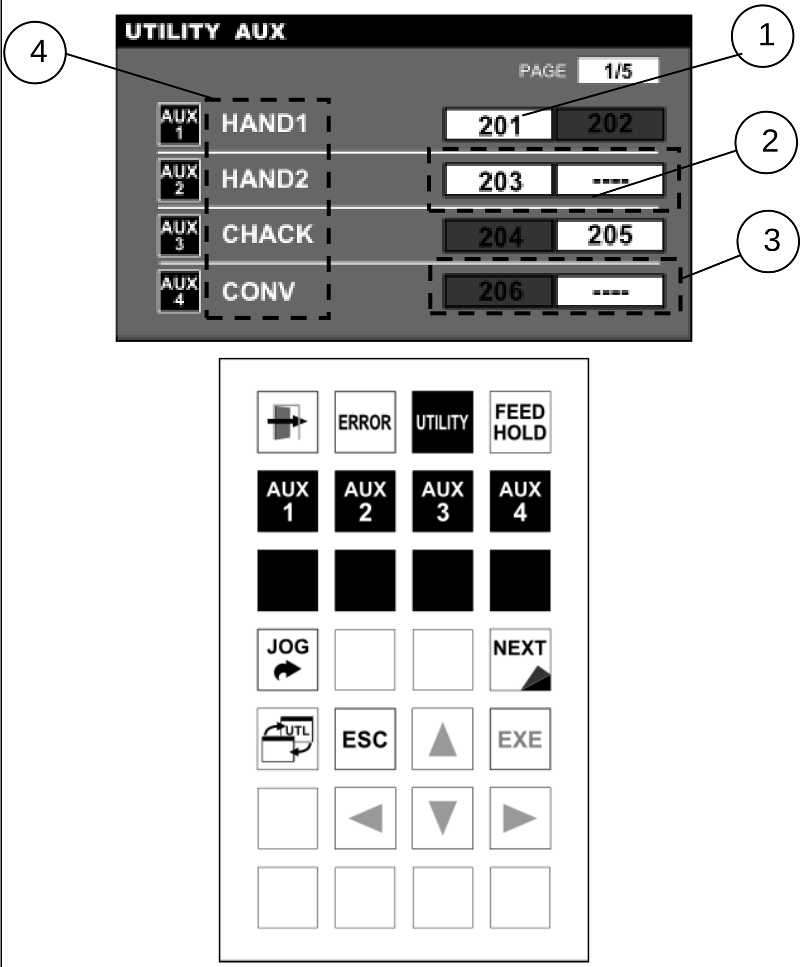
11.4 Auxiliary Signal Display [AUX]

Functional Explanation

Displays the status of the signal (auxiliary signal) set in the user parameter [U09] AUXILIARY SIGNAL, and enables output operation.

Operating Procedure

Step 1: Calling the [AUX] function
Press the [AUX] key among the utility function selection keys.
The auxiliary signal display screen and key sheet are displayed.

[AUX] Screen and Key Sheet	Description of Display
 UTILITY AUX PAGE 1/5 AUX 1 HAND1 201 202 AUX 2 HAND2 203 ---- AUX 3 CHACK 204 205 AUX 4 CONV 206 ---- 1 2 3 4 ERROR UTILITY FEED HOLD AUX 1 AUX 2 AUX 3 AUX 4 JOG NEXT UTL ESC EXE	① Displays the port of the output signal. ② Two output signal ports indicate double solenoids. ③ One output signal port indicates a single solenoid. ④ Displays arbitrary signal names described in user parameter [U09].

Example: Content of USER. PAR file

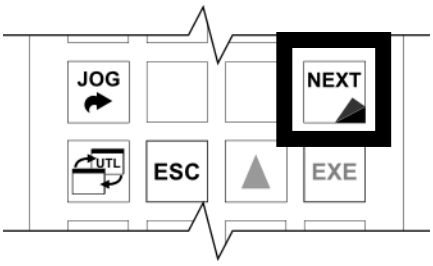
```
・
=□0□□201□□“Hand□out□1”
・(19 lines will continue below.)
・
```

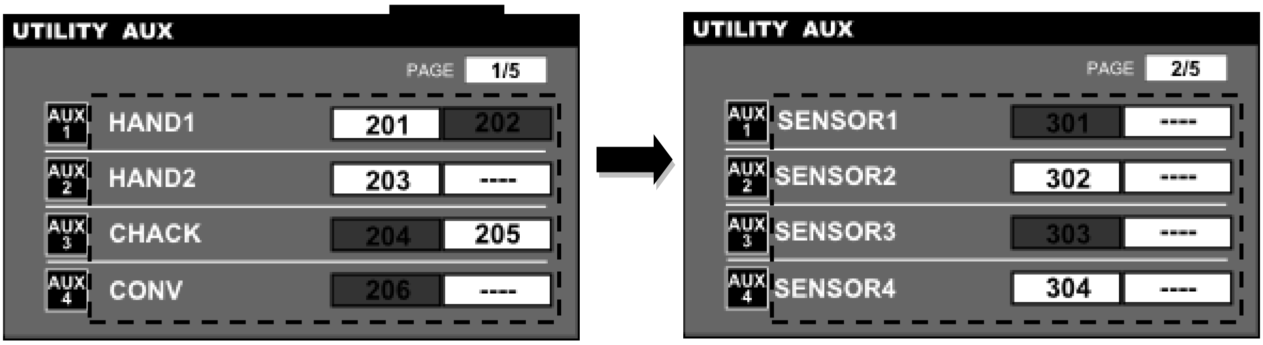
Note
□: Space (Insert spaces in blank lines.)

(For details, see the User Parameter Manual.)

Step 2: Switching auxiliary signal display

Press the [NEXT] key. Auxiliary signals that can be operated switch.





UTILITY AUX

PAGE 1/5

AUX 1 HAND1 201 202
AUX 2 HAND2 203 ----
AUX 3 CHACK 204 205
AUX 4 CONV 206 ----

UTILITY AUX

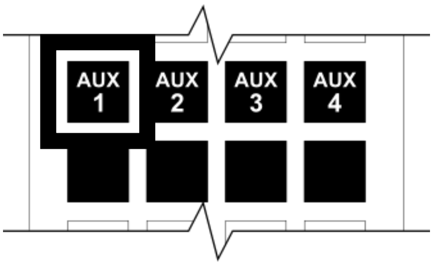
PAGE 2/5

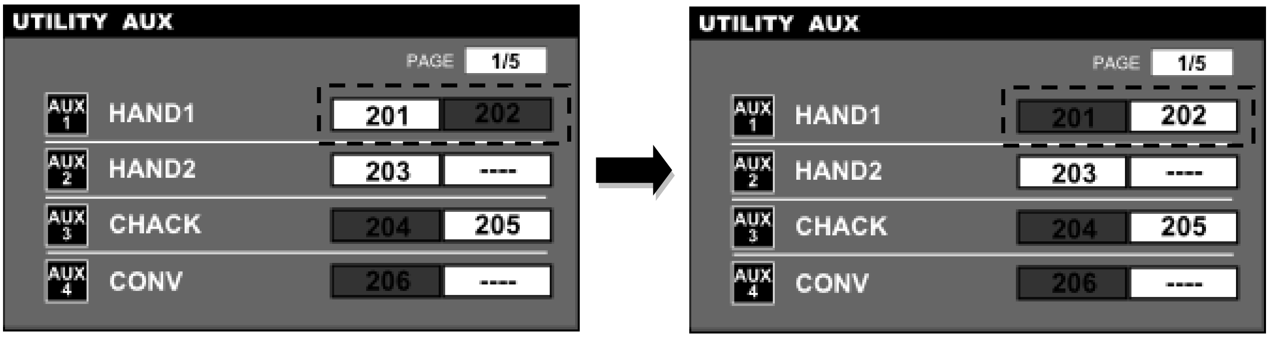
AUX 1 SENSOR1 301 ----
AUX 2 SENSOR2 302 ----
AUX 3 SENSOR3 303 ----
AUX 4 SENSOR4 304 ----

Step 3: Auxiliary signal operation

Press the [AUX "#"] key assigned to the auxiliary signal you want to operate.

Each time the [AUX "#"] key is pressed, ON/OFF of the auxiliary signal switches.





UTILITY AUX

PAGE 1/5

AUX 1 HAND1 201 202
AUX 2 HAND2 203 ----
AUX 3 CHACK 204 205
AUX 4 CONV 206 ----

UTILITY AUX

PAGE 1/5

AUX 1 HAND1 201 202
AUX 2 HAND2 203 ----
AUX 3 CHACK 204 205
AUX 4 CONV 206 ----

Step 4: Quitting the [AUX] function

Press the [ESC] key. The [AUX] function quits and the display returns to the utility function selection screen.

Cautions

- The output signal port and solenoid type corresponding to each command menu should be defined in the user parameter file in advance. For more information, see the User Parameter Manual.
- During emergency stop, auxiliary signals can be turned on and off.
  The initial state at power ON, including signals which are set for the double solenoid, is OFF.

11.5 External Input/Output Signal Display [I/O]

Functional Explanation

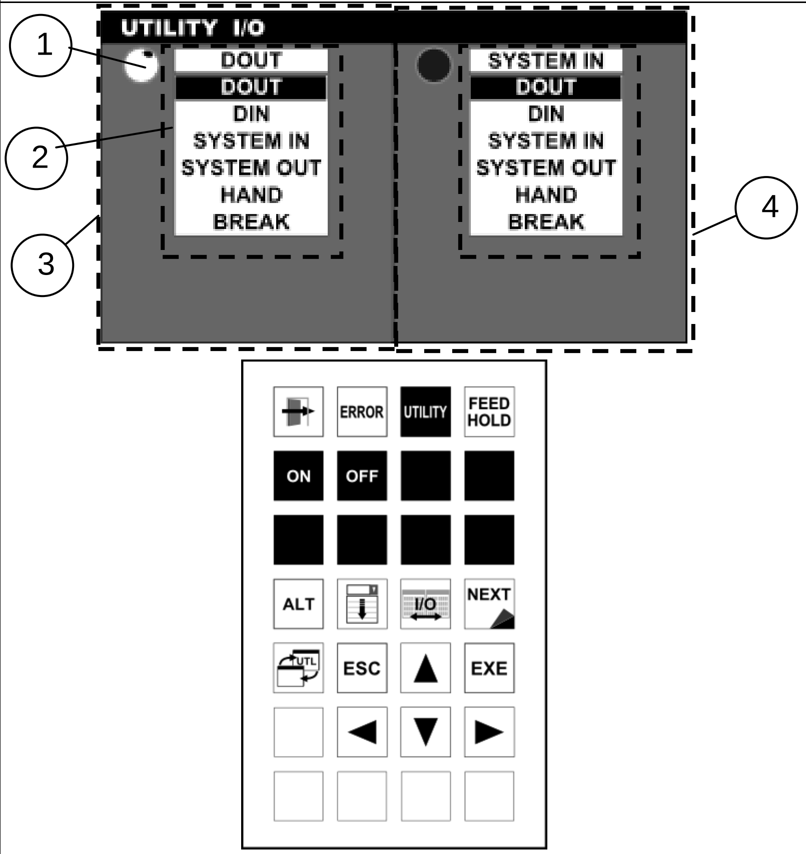
Displays the status of external input/output signals.

Operating Procedure

Step 1: Calling the [I/O] function

Press the [I/O] key among the utility function selection keys.

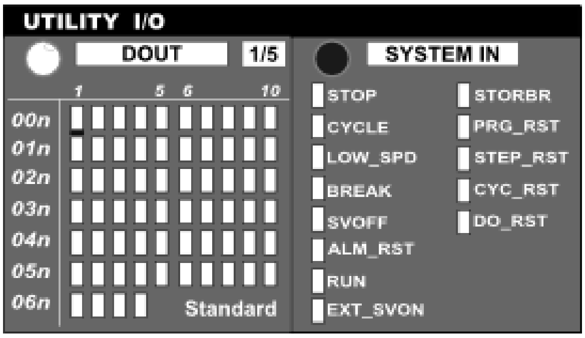
The external input/output signal display screen and key sheet are displayed.

[I/O] Screen and Key Sheet	Description of Display
 UTILITY I/O 1 2 3 4 DOUT DOUT DIN SYSTEM IN SYSTEM OUT HAND BREAK SYSTEM IN DOUT DIN SYSTEM IN SYSTEM OUT HAND BREAK ERROR UTILITY FEED HOLD ON OFF ALT I/O NEXT UTL ESC EXE	① Indicates the focus of editing. ② Indicates the display list. ③ Indicates the display window 1. ④ Indicates the display window 2.

Step 2: Determining display items

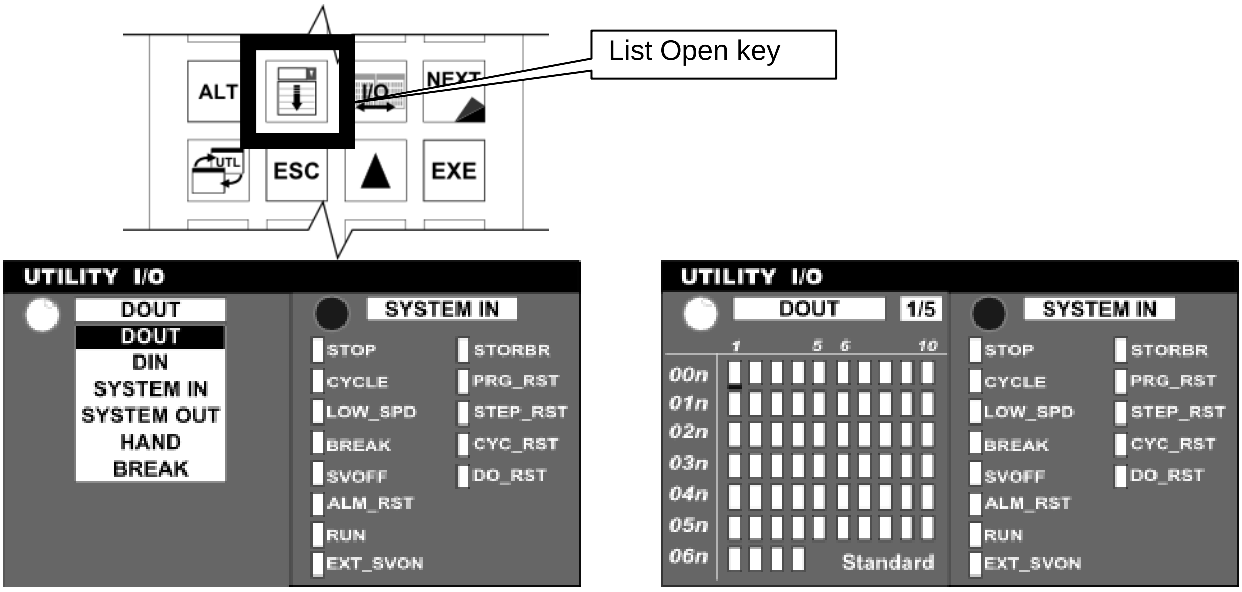
Position the cursor on the item you want to display from the display list, and press the [EXE] key.

In the [I/O] function, the screen is split into two so that different items can be displayed in the left and right windows.


UTILITY I/O
DOUT
1/5
SYSTEM IN
1
5
6
10
00n
01n
02n
03n
04n
05n
06n
Standard
STOP
CYCLE
LOW_SPD
BREAK
SVOFF
ALM_RST
RUN
EXT_SVON
STORBR
PRG_RST
STEP_RST
CYC_RST
DO_RST

Step 3: Switching display items

To switch display, press the List Open key.

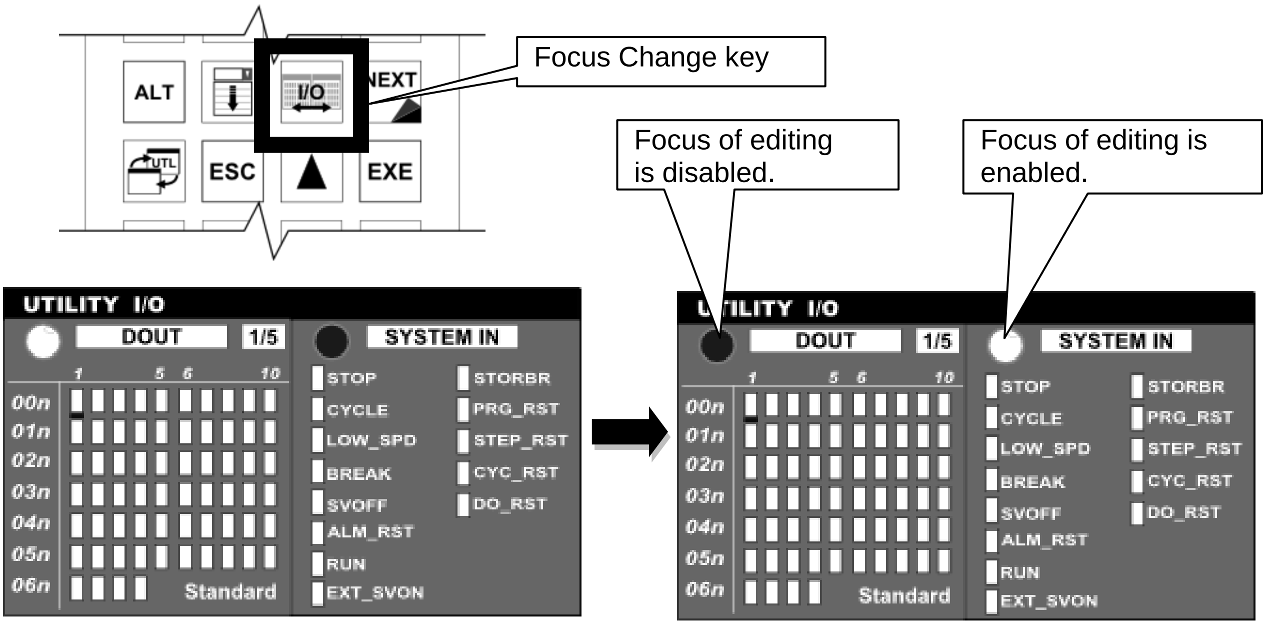

List Open key
ALT
I/O
NEXT
ESC
EXE
UTL
UTILITY I/O
DOUT
DOUT
DIN
SYSTEM IN
SYSTEM OUT
HAND
BREAK
SYSTEM IN
STOP
CYCLE
LOW_SPD
BREAK
SVOFF
ALM_RST
RUN
EXT_SVON
STORBR
PRG_RST
STEP_RST
CYC_RST
DO_RST
UTILITY I/O
DOUT
1/5
SYSTEM IN
1
5
6
10
00n
01n
02n
03n
04n
05n
06n
Standard
STOP
CYCLE
LOW_SPD
BREAK
SVOFF
ALM_RST
RUN
EXT_SVON
STORBR
PRG_RST
STEP_RST
CYC_RST
DO_RST

Step 4: Switching the focus of editing

To switch the focus of editing, press the Focus Change key.

This key operation takes effect for the window where there is the focus.

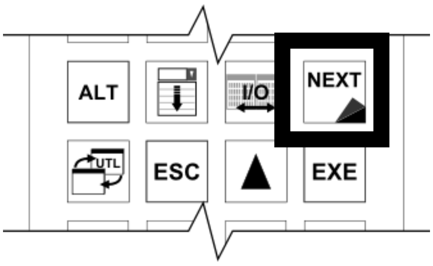
The light marks at the upper parts of the left and right windows indicate whether or not there is the focus of key operation.

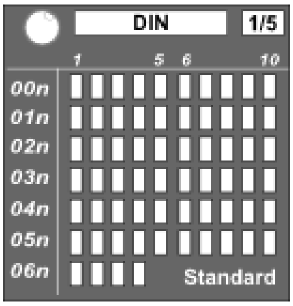

Focus Change key
Focus of editing is disabled.
Focus of editing is enabled.
ALT
I/O
NEXT
UTL
ESC
EXE
UTILITY I/O
DOUT
1/5
SYSTEM IN
1 5 6 10
00n
01n
02n
03n
04n
05n
06n
Standard
STOP
CYCLE
LOW_SPD
BREAK
SVOFF
ALM_RST
RUN
EXT_SVON
STORBR
PRG_RST
STEP_RST
CYC_RST
DO_RST

Step 5: DIN (user external input)

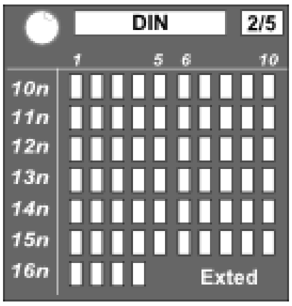
The DIN signal consists of five pages. Pages are switched with the [NEXT] key.

Each time the [NEXT] key is pressed, display switches.

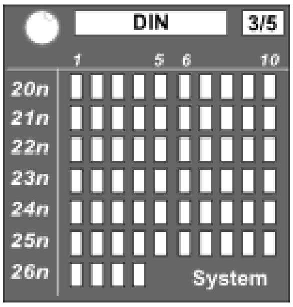

ALT
I/O
NEXT
UTL
ESC
EXE


DIN
1/5
1 5 6 10
00n
01n
02n
03n
04n
05n
06n
Standard

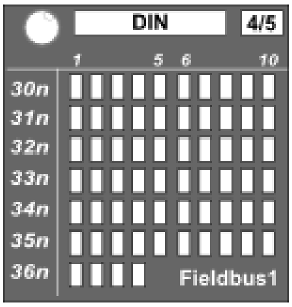
1st page (general-purpose output)


DIN
2/5
1 5 6 10
10n
11n
12n
13n
14n
15n
16n
Exted

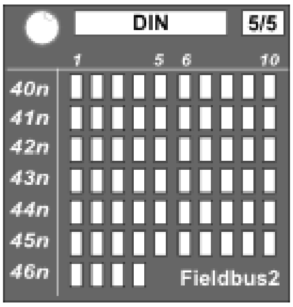
2nd page (extended output)


DIN
3/5
1 5 6 10
20n
21n
22n
23n
24n
25n
26n
System

3rd page (system output)


DIN
4/5
1 5 6 10
30n
31n
32n
33n
34n
35n
36n
Fieldbus1

4th page (field bus output 1)

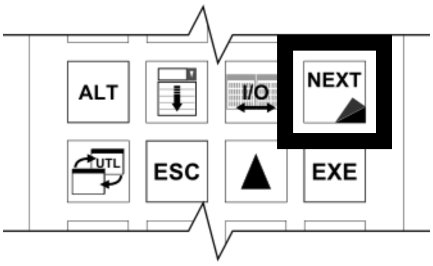

DIN
5/5
1 5 6 10
40n
41n
42n
43n
44n
45n
46n
Fieldbus2

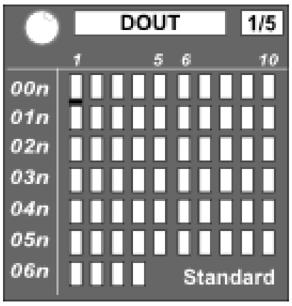
5th page (field bus output 2)

Step 6: DOUT (user external output)

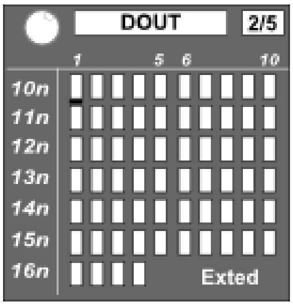
The DOUT signal consists of five pages. Pages are switched with the [NEXT] key.

Each time the [NEXT] key is pressed, display switches.

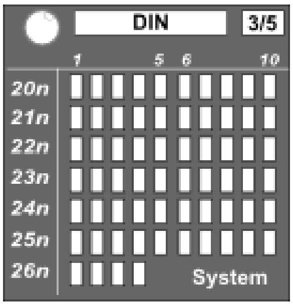

ALT
I/O
NEXT
UTL
ESC
EXE


DOUT
1/5
1 5 6 10
00n
01n
02n
03n
04n
05n
06n
Standard

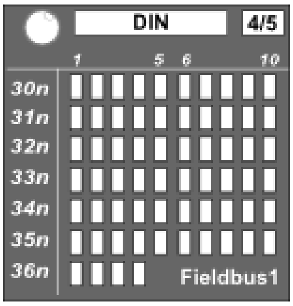
1st page (general-purpose output)


DOUT
2/5
1 5 6 10
10n
11n
12n
13n
14n
15n
16n
Exted

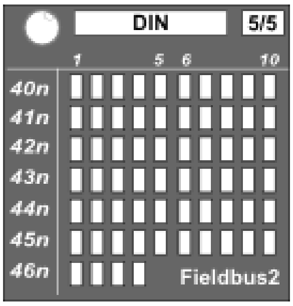
2nd page (extended output)


DIN
3/5
1 5 6 10
20n
21n
22n
23n
24n
25n
26n
System

3rd page (system output)


DIN
4/5
1 5 6 10
30n
31n
32n
33n
34n
35n
36n
Fieldbus1

4th page (fieldbus output 1)

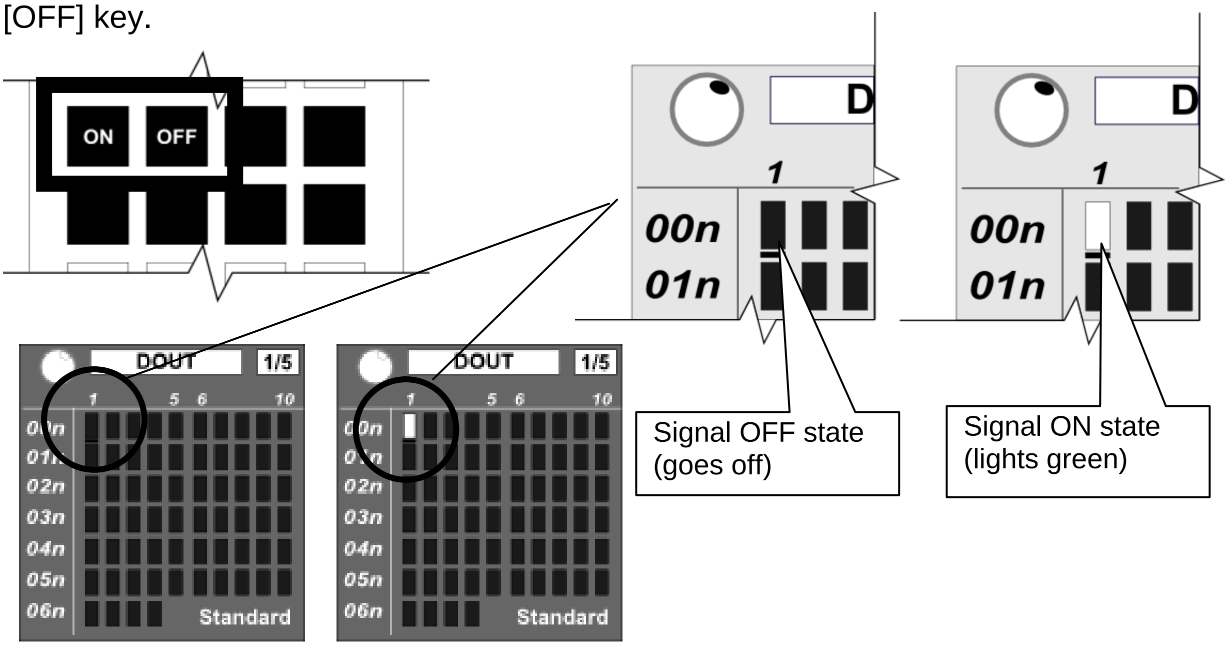

DIN
5/5
1 5 6 10
40n
41n
42n
43n
44n
45n
46n
Fieldbus2

5th page (fieldbus output 2)

Step 7: Operation of the DOUT signal

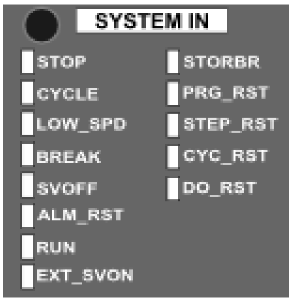
ON/OFF operation can be performed for the DOUT signal.

Position the cursor on the output signal you want to operate, and press the [ON] or [OFF] key.


ON
OFF
DOUT
1/5
1 5 6 10
00n
01n
02n
03n
04n
05n
06n
Standard
D
1
00n
01n
Signal OFF state (goes off)
Signal ON state (lights green)

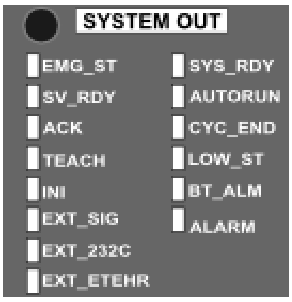
Step 8: SYSTEM IN (system input)

The display content of the system input signal is shown below.


SYSTEM IN
STOP
CYCLE
LOW_SPD
BREAK
SVOFF
ALM_RST
RUN
EXT_SVON
STORBR
PRG_RST
STEP_RST
CYC_RST
DO_RST

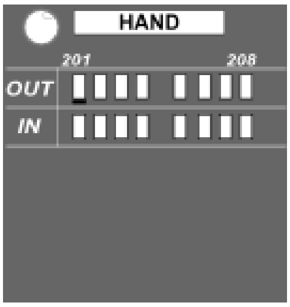
Step 9: SYSTEM OUT (system output)

The display content of the system output signal is shown below.


SYSTEM OUT
EMG_ST
SV_RDY
ACK
TEACH
INI
EXT_SIG
EXT_232C
EXT_ETEHR
SYS_RDY
AUTORUN
CYC_END
LOW_ST
BT_ALM
ALARM

Step 10: HAND (hand I/O signal)

ON/OFF operation can be performed for the hand output signal. Position the cursor on the hand output signal you want to operate, and press the [ON] or [OFF] key.


HAND
201
208
OUT
IN

Step 11: MOTOR BREAK

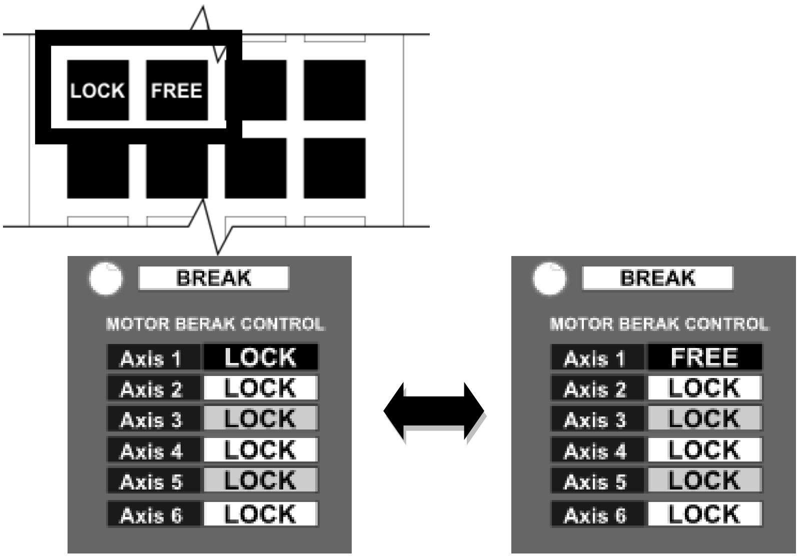
The motor of each axis can be released.

The motor brake operation takes effect in the following states.

- The controller is in the TEACHING mode.
- All axes are in the brake lock state when the MOTOR BREAK function is selected.
- Servo OFF state

- The Enable switch is released (lightly grip the Enable switch).

Position the cursor on the axis you want to release the brake, and control the motor brake.
The motor brake at the axis specified in [LOCK] mode is locked.
The motor brake at the axis specified in [FREE] mode is released.



Axis 1 LOCK
Axis 2 LOCK
Axis 3 LOCK
Axis 4 LOCK
Axis 5 LOCK
Axis 6 LOCK

Axis 1 FREE
Axis 2 LOCK
Axis 3 LOCK
Axis 4 LOCK
Axis 5 LOCK
Axis 6 LOCK

Cautions

- The I/O signal status is indicated by illuminated green lamps for closed contacts (ON) and by unlit green lamps for open contacts (OFF).
- The DIN and DOUT signals are shown 10 points on each line, delimited by groups of five points, and the number of the signal at the head of the signal string is displayed at the left end of the line.
- The number of DIN and DOUT signal points displayed per page is 64 points.
- The edited motor brake information is enabled when the [MOTOR BRAKE CONTROL screen] is displayed and the conditions are satisfied.
- When exiting the [MOTOR BRAKE CONTROL screen], the motor brakes of each axis are locked when the servo is turned off.
- When the servo is turned on, the motor brake is applied for the current axes.

11.6 Current Position Display [POS]

Functional Explanation

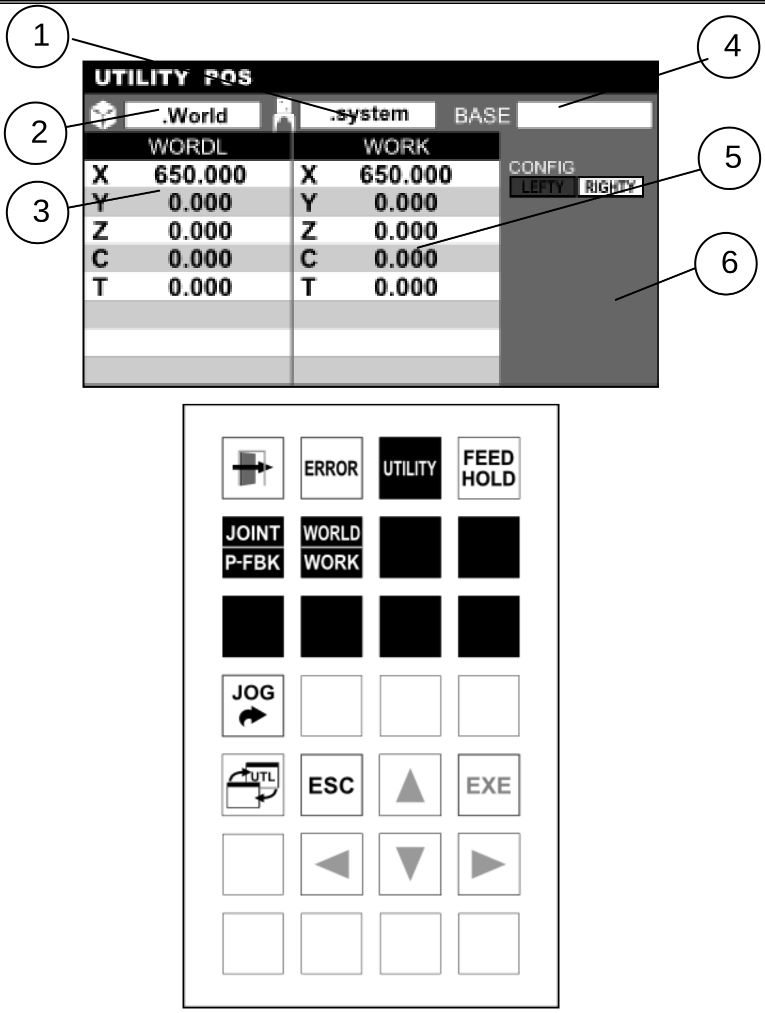
Displays the robot position in the joint, world or work coordinate system.

Procedures

Step 1: Calling the [POS] function

Press the [POS] key among the utility function selection keys.

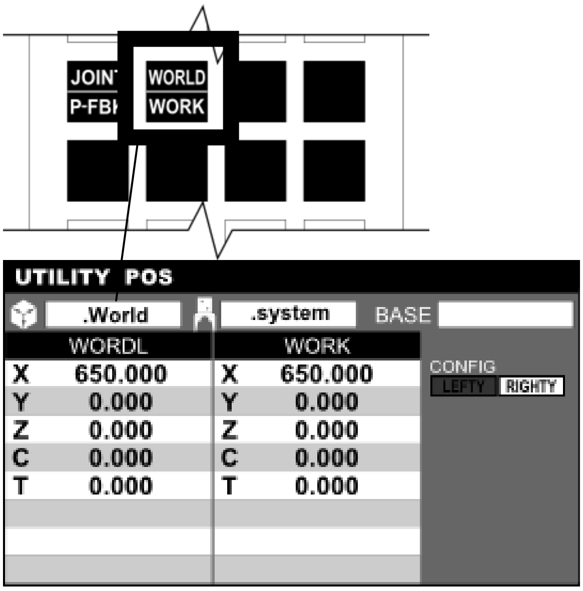
The current position (current work and tool positions) and the key sheet are displayed.

[POS] Screen and Key Sheet	Description of Display
 UTILITY POS .World .system BASE WORDL: X 650.000, Y 0.000, Z 0.000, C 0.000, T 0.000 WORK: X 650.000, Y 0.000, Z 0.000, C 0.000, T 0.000 CONFIG: LEFTY RIGHTY 1 2 3 4 5 6 ERROR UTILITY FEED HOLD JOINT P-FBK WORLD WORK JOG UTL ESC EXE	① Indicates the tool coordinate system being selected. ② Indicates the work coordinate system being selected. ③ Indicates the current world position. ④ Indicates the base coordinate system. ⑤ Indicates the current work position. ⑥ Indicates the configuration of the robot.

Step 2: Switching display items

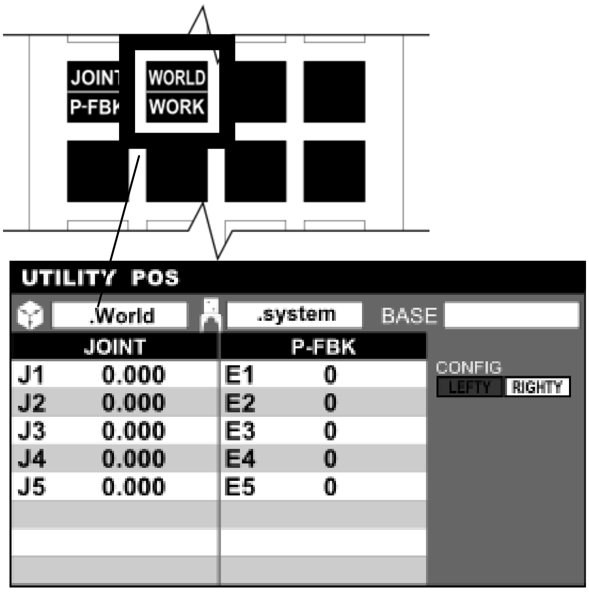
Press the [JOINT/P-FBK] key on the key sheet.

The display changes to joint/position feedback display.


JOINT
P-FBK
WORLD
WORK
UTILITY POS
.World
.system
BASE
CONFIG
LEFTY
RIGHTY

WORDL		WORK	
X	650.000	X	650.000
Y	0.000	Y	0.000
Z	0.000	Z	0.000
C	0.000	C	0.000
T	0.000	T	0.000

Joint Position and Position Feedback Display Screen


JOINT
P-FBK
WORLD
WORK
UTILITY POS
.World
.system
BASE
CONFIG
LEFTY
RIGHTY

JOINT		P-FBK	
J1	0.000	E1	0
J2	0.000	E2	0
J3	0.000	E3	0
J4	0.000	E4	0
J5	0.000	E5	0

Current World/Work Position Display Screen

Caution

- These items can be displayed even during automatic operation.

11.7 Selecting and Clearing Work/Tool Coordinates [TRANS]

Functional Explanation

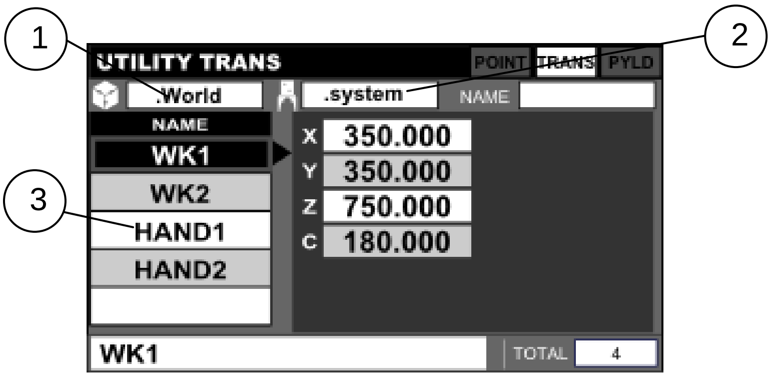
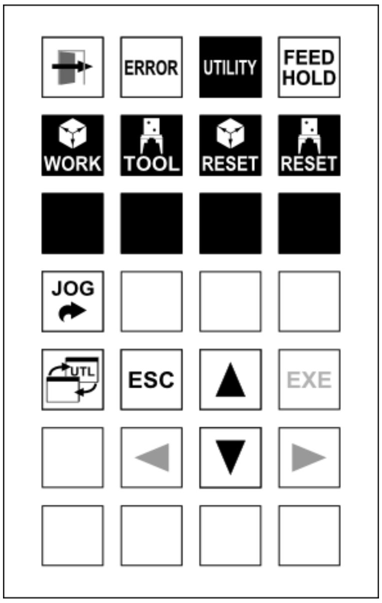
Selects and clears the work and tool coordinates from the coordinate data in the program file being selected.

Operating Procedure

Step 1: Calling the [TRANS] function

Press the [TRANS] key among the utility function selection keys.

The coordinate data in the program file being selected is displayed.

[TRANS] Screen and Key Sheet	Description of Display
 1 2 3 UTILITY TRANS POINT TRANS PYLD .World .system NAME NAME WK1 WK2 HAND1 HAND2 X 350.000 Y 350.000 Z 750.000 C 180.000 WK1 TOTAL 4  ERROR UTILITY FEED HOLD WORK TOOL RESET RESET JOG UTL ESC EXE	① Indicates the current work coordinate system. ② Indicates the current tool coordinate system. ③ Displays a list of the coordinate data in the program file being selected.

Step 2: Setting up and clearing work/tool coordinates

* For more information about operating procedures, see "Setting Up and Clearing Work and Coordinates" (Section 5.5.2) and "Selecting and Clearing Tool Coordinates" (Section 5.5.3) in Section 5, "Data Editing".

Caution

- This function is disabled unless a program is selected.

11.8 Work Time Display [WK-TM]

Functional Explanation

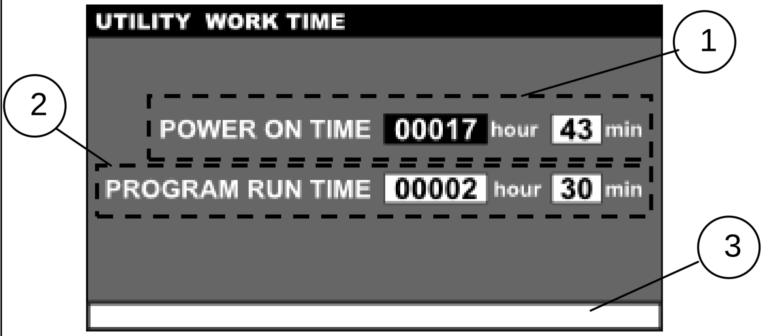
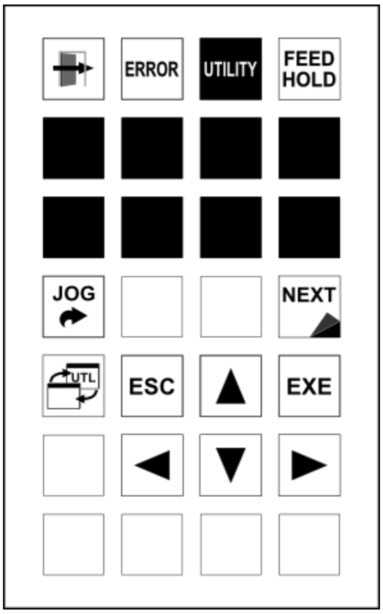
Displays the work time of the robot.

Operating Procedure

Step 1: Calling the [WK-TM] function

Press the [WK-TM] key among the utility function selection keys.

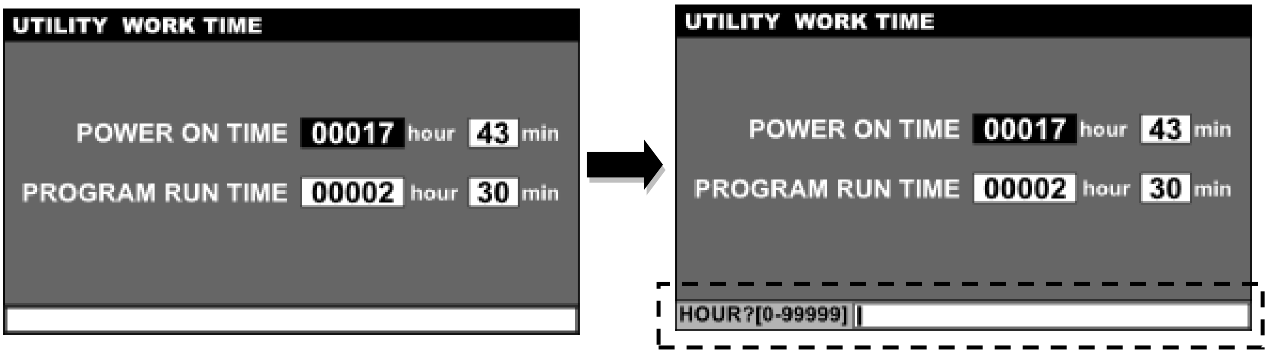
The current controller power ON time and program run time are displayed on the screen.

[WK-TM] Screen and Key Sheet	Description of Display
 UTILITY WORK TIME POWER ON TIME 00017 hour 43 min PROGRAM RUN TIME 00002 hour 30 min  ERROR UTILITY FEED HOLD JOG NEXT UTL ESC EXE	① Displays the power ON time of the controller. ② Displays the program run time. ③ Indicates the command line for editing values.

Step 2: Editing the work time

Position the cursor on the item you want to change, and press the [EXE] key.

Edit its value on the command line.



UTILITY WORK TIME

POWER ON TIME 00017 hour 43 min

PROGRAM RUN TIME 00002 hour 30 min

UTILITY WORK TIME

POWER ON TIME 00017 hour 43 min

PROGRAM RUN TIME 00002 hour 30 min

HOUR?[0-99999]

Once the change has been determined, press the [EXE] key.

Caution

- Edit each data within the following input ranges.

  Hour: 0 to 99999

  Minute: 0 to 59

11.9 Setting Up Date and Time [DATE]

Functional Explanation

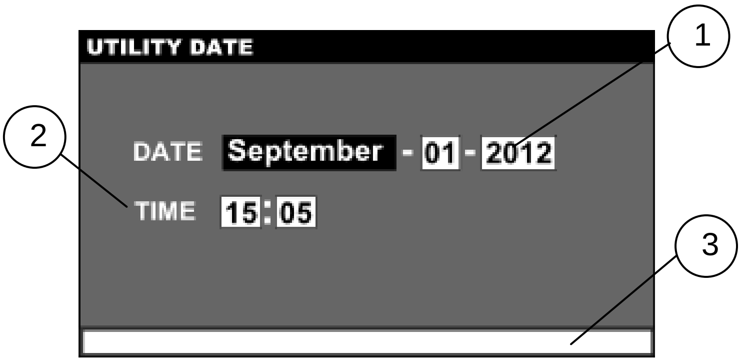
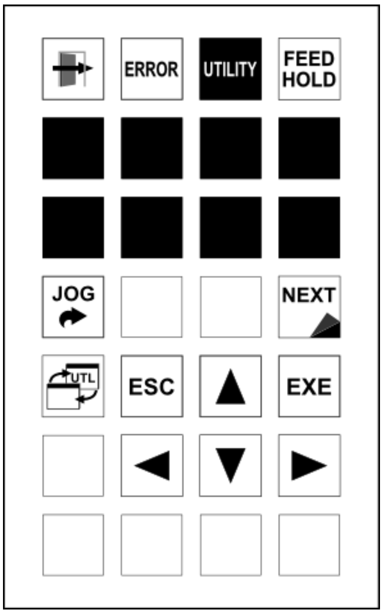
Displays and sets up the current date and time.

Operating Procedure

Step 1: Calling the [DATE] function

Press the [DATE] key among the utility function selection keys.

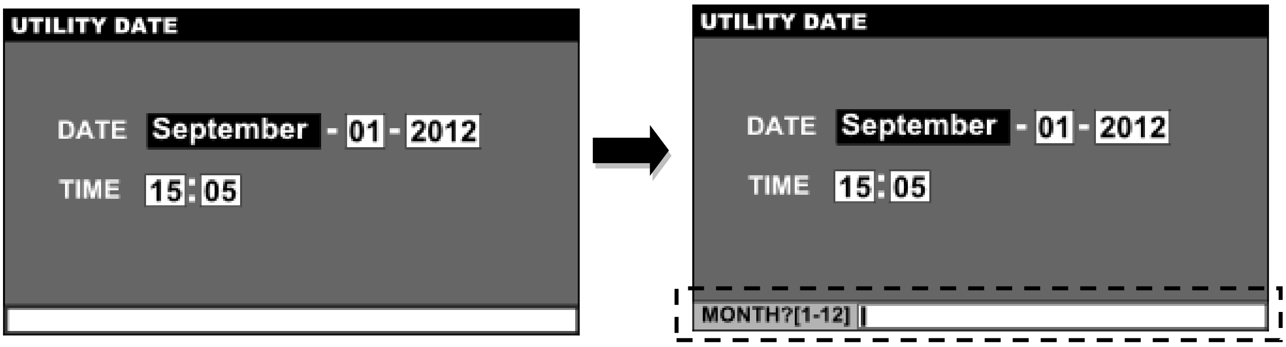
The current date and time are displayed on the DATE screen.

[DATE] Screen and Key Sheet	Description of Display
 UTILITY DATE 1 2 3 DATE September - 01 - 2012 TIME 15:05  ERROR UTILITY FEED HOLD JOG NEXT UTL ESC ▲ EXE ◀ ▼ ▶	① Displays the date. ② Displays the time. ③ Indicates the command line for editing values.

Step 2: Editing the date and time

Position the cursor on the item you want to change, and press the [EXE] key.

Edit its value on the command line.


UTILITY DATE
UTILITY DATE

DATE September - 01 - 2012
TIME 15:05

DATE September - 01 - 2012
TIME 15:05
MONTH?[1-12]

To confirm changes, press the [EXE] key.

Cautions

- Because the internal calendar of the controller is battery backed-up, its setting is normally not required.
  Reset the calendar only if the date is incorrect.
- The input range of each data is as shown below.

Year:	0 to 99 (2000 to 2099)
Month:	1 to 12
Day:	1 to 31
Hour:	0 to 23
Minute:	0 to 59

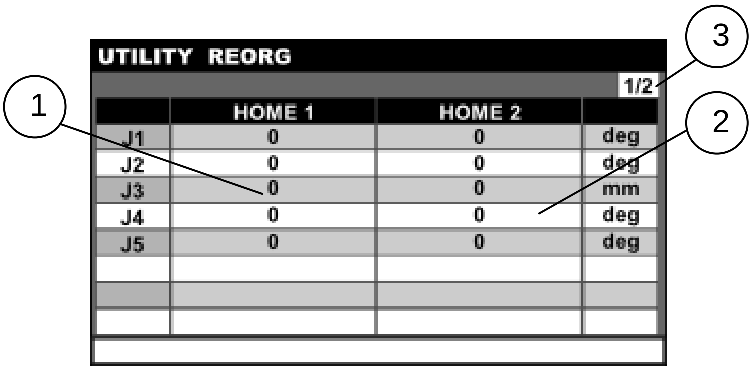
11.10 Reproducing the Origin [REORG]

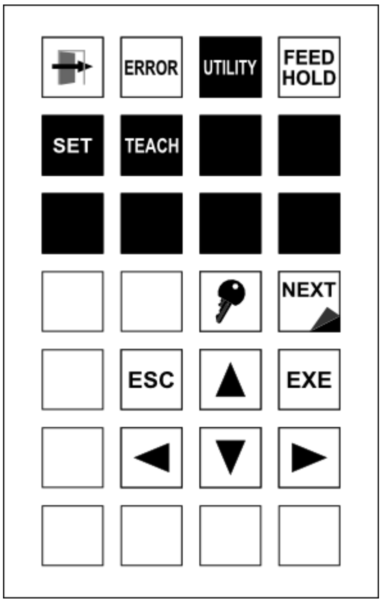
Functional Explanation

This is the maintenance function to reproduce the origin using the position information registered in advance in case the origin has been deviated.
For details, refer to the Maintenance Manual.

Operating Procedure

Step 1: Calling the [REORG] function
Press the [REORG] key among the utility function selection keys in the servo OFF state. The REORG screen is displayed.

<table>
<tr><th>[REORG] Screen and Key Sheet</th><th>Description of Display</th></tr>
<tr><td>


UTILITY REORG
1/2
<table>
<tr><th></th><th>HOME 1</th><th>HOME 2</th><th></th></tr>
<tr><td>J1</td><td>0</td><td>0</td><td>deg</td></tr>
<tr><td>J2</td><td>0</td><td>0</td><td>deg</td></tr>
<tr><td>J3</td><td>0</td><td>0</td><td>mm</td></tr>
<tr><td>J4</td><td>0</td><td>0</td><td>deg</td></tr>
<tr><td>J5</td><td>0</td><td>0</td><td>deg</td></tr>
</table>


</td><td>
① Indicates the origin reproducing position HOME1.
② Indicates the origin reproducing position HOME2.
③ Indicates the page number.
∗ When the [NEXT] key is pressed, the origin reproducing positions HOME3 and HOME4 are displayed.
Because HOME3 and HOME4 are the initial values which are set when shipped from the factory, they cannot be edited in principle.
If they must be edited, it is necessary to unlock the password.
</td></tr>
</table>

Cautions

- For details of the display contents and setting, see the Maintenance Manual.
- To change the values of HOME3 and HOME4, it is necessary to unlock the password (see Section 1.6).
- Servo ON and JOG operation are disabled during this function.

11.11 Joint Limit Setting [J–LIM]

Functional Explanation

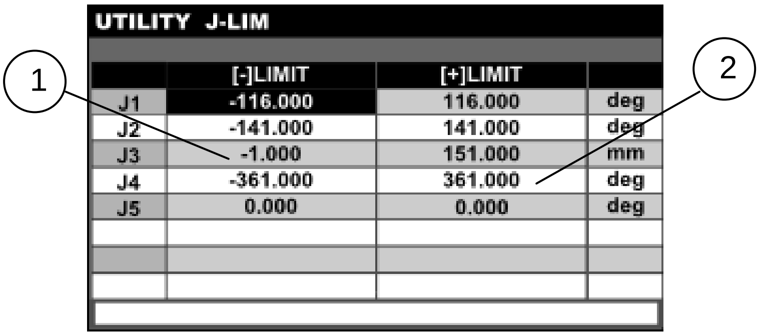
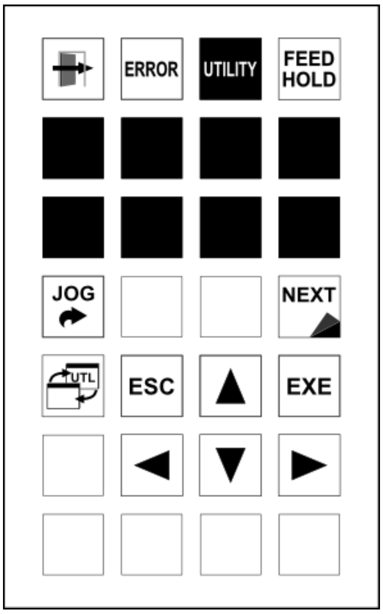
Displays the joint limit setting values and sets up the joint limit values.

Operating Procedure

Step 1: Calling the [J-LIM] function

Press the [J-LIM] key among the utility function selection keys.

The current joint limit setting values are displayed on the screen.

[J-LIM] Screen and Key Sheet	Description of Display
  ERROR UTILITY FEED HOLD JOG NEXT UTL ESC EXE	① Joint limit value in negative direction ② Joint limit value in positive direction

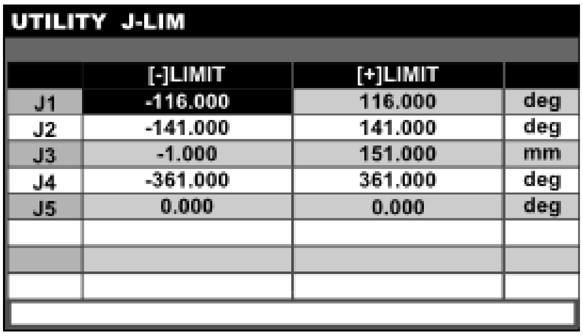
UTILITY J-LIM

	[-]LIMIT	[+]LIMIT	
J1	-116.000	116.000	deg
J2	-141.000	141.000	deg
J3	-1.000	151.000	mm
J4	-361.000	361.000	deg
J5	0.000	0.000	deg

Step 2: Entering data

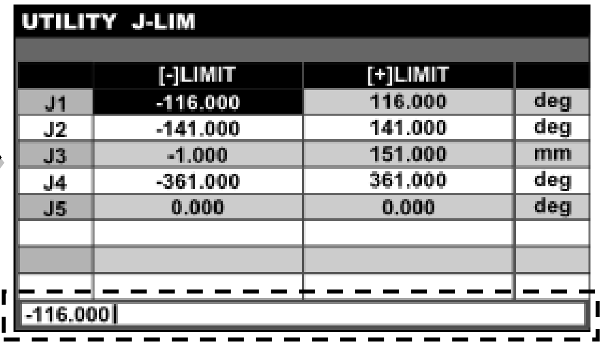
Position the cursor on the item you want to edit, and press the [EXE] key.

The cursor moves onto the command line and you can edit its value.



UTILITY J-LIM

	[-]LIMIT	[+]LIMIT	
J1	-116.000	116.000	deg
J2	-141.000	141.000	deg
J3	-1.000	151.000	mm
J4	-361.000	361.000	deg
J5	0.000	0.000	deg



UTILITY J-LIM

	[-]LIMIT	[+]LIMIT	
J1	-116.000	116.000	deg
J2	-141.000	141.000	deg
J3	-1.000	151.000	mm
J4	-361.000	361.000	deg
J5	0.000	0.000	deg

-116.000

To confirm changes, press the [EXE] key.

To cancel editing of the command line, press the [ESC] key.

Cautions

- The rotary joint is input in units of degrees (°) and the linear joint in units of mm.
- These limit values are used to limit the automatic operation range and teaching range of the robot for each joint. They are factory-set to the maximum working range for each axis.
- Each joint set value is registered in the user parameter file (file name: USER. PAR). If any set value has been changed, relevant data in the user parameter file in the RAM drive is also updated automatically.
- It is not possible to widen the limit values preset in the machine parameters.

11.12 Motor Load Display [MOTOR]

Functional Explanation

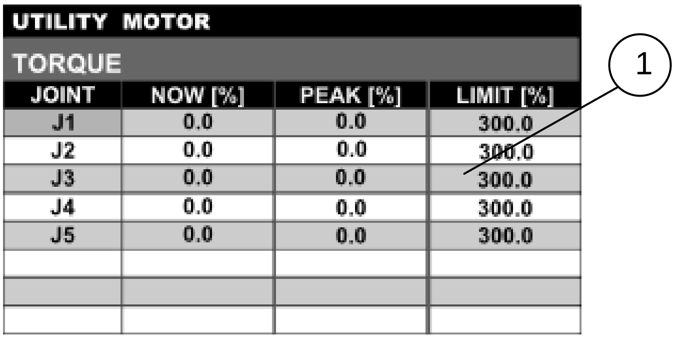
Displays the torque, electronic thermal and load factor of each servo motor.

Operating Procedure

Step 1: Calling the [MOTOR] function

Press the [MOTOR] key among the utility function selection keys.

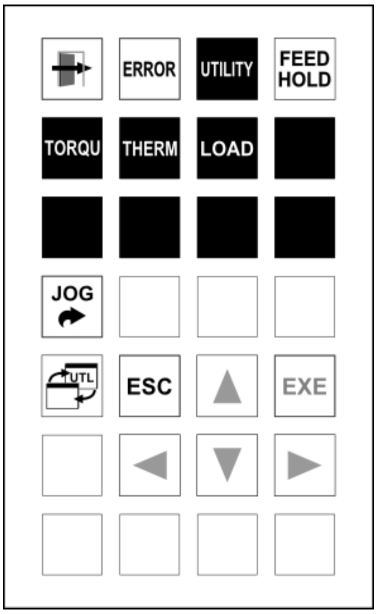
The torque values of the motors are displayed first.

<table>
<tr><th>[MOTOR] Screen and Key Sheet</th><th>Description of Display</th></tr>
<tr><td>


UTILITY MOTOR

TORQUE

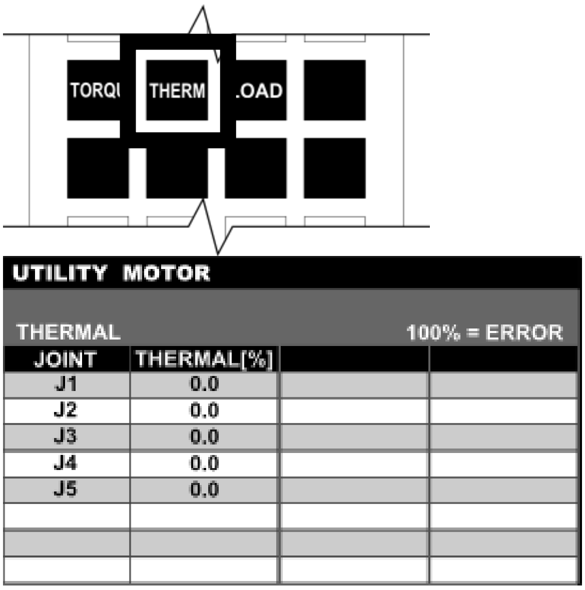
<table>
<tr><th>JOINT</th><th>NOW [%]</th><th>PEAK [%]</th><th>LIMIT [%]</th></tr>
<tr><td>J1</td><td>0.0</td><td>0.0</td><td>300.0</td></tr>
<tr><td>J2</td><td>0.0</td><td>0.0</td><td>300.0</td></tr>
<tr><td>J3</td><td>0.0</td><td>0.0</td><td>300.0</td></tr>
<tr><td>J4</td><td>0.0</td><td>0.0</td><td>300.0</td></tr>
<tr><td>J5</td><td>0.0</td><td>0.0</td><td>300.0</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>



</td><td>① Displays the servo motor information.</td></tr>
</table>

Step 2: Displaying the integrated thermal value of each motor.

Press the [THERM] key. The integrated thermal value of each motor is displayed.



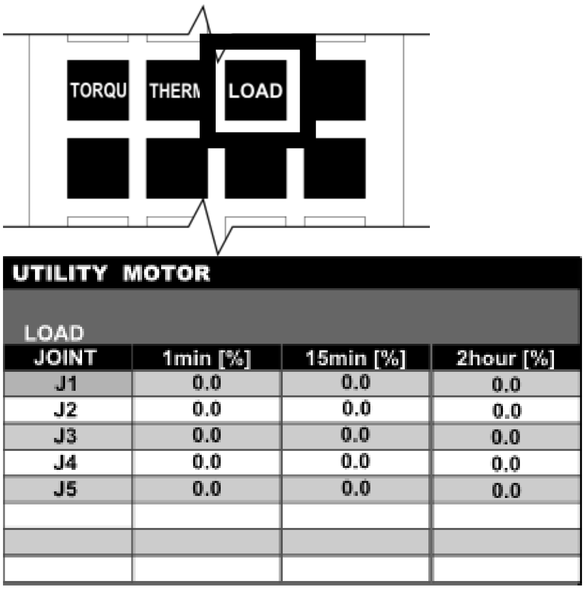
UTILITY MOTOR

THERMAL 100% = ERROR

JOINT	THERMAL[%]		
J1	0.0		
J2	0.0		
J3	0.0		
J4	0.0		
J5	0.0		

Step 3: Displaying the load factor of each motor.

Press the [LOAD] key. The load factor of each motor is displayed.



UTILITY MOTOR

LOAD

JOINT	1min [%]	15min [%]	2hour [%]
J1	0.0	0.0	0.0
J2	0.0	0.0	0.0
J3	0.0	0.0	0.0
J4	0.0	0.0	0.0
J5	0.0	0.0	0.0

Step 4: Displaying the torque value of each motor (MOTOR Function Default Screen)

Press the [TORQU] key. The torque value of each motor is displayed.

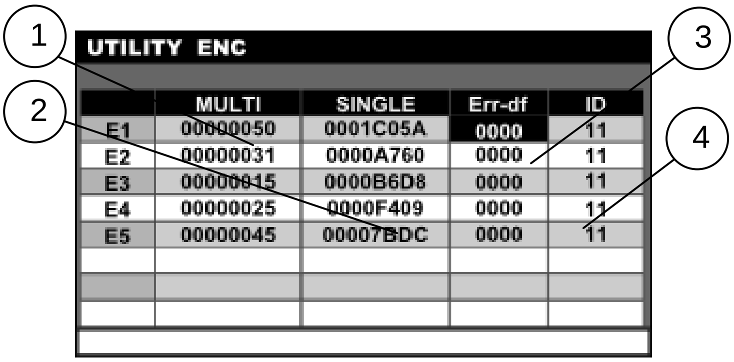
11.13 Servo Encoder Data Display [ENC]

Functional Explanation

Displays the servo encoder data and the encoder errors currently occurring.
Encoder error reset and multi-turn reset can also be performed on this screen.
This function is a maintenance function. For details, refer to the Maintenance Manual.

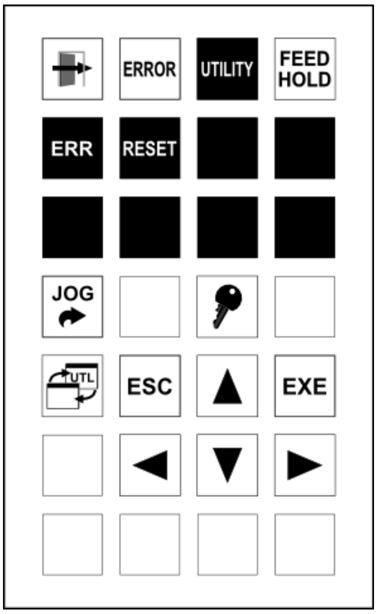
Operating Procedure

Step 1: Calling the [ENC] function
Press the [ENC] key among the utility function selection keys.
The servo encoder information and key sheet are displayed.

<table>
<tr><th>[ENC] Screen and Key Sheet</th><th>Description of Display</th></tr>
<tr><td>


UTILITY ENC

<table>
<tr><th></th><th>MULTI</th><th>SINGLE</th><th>Err-df</th><th>ID</th></tr>
<tr><td>E1</td><td>00000050</td><td>0001C05A</td><td>0000</td><td>11</td></tr>
<tr><td>E2</td><td>00000031</td><td>0000A760</td><td>0000</td><td>11</td></tr>
<tr><td>E3</td><td>00000015</td><td>0000B6D8</td><td>0000</td><td>11</td></tr>
<tr><td>E4</td><td>00000025</td><td>0000F409</td><td>0000</td><td>11</td></tr>
<tr><td>E5</td><td>00000045</td><td>00007BDC</td><td>0000</td><td>11</td></tr>
</table>

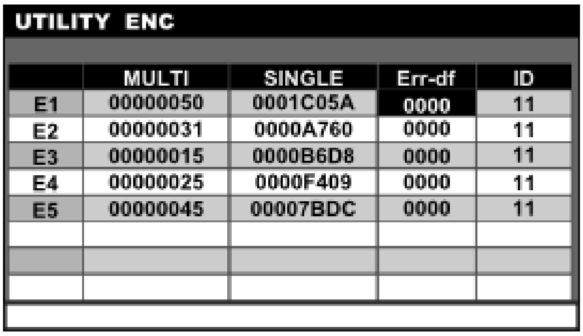


</td><td>
① Displays the multi-turn information.
② Displays the single turn information.
③ Displays the encoder error information.
④ Displays the servo motor ID.
</td></tr>
</table>

Step 2: Displaying error history

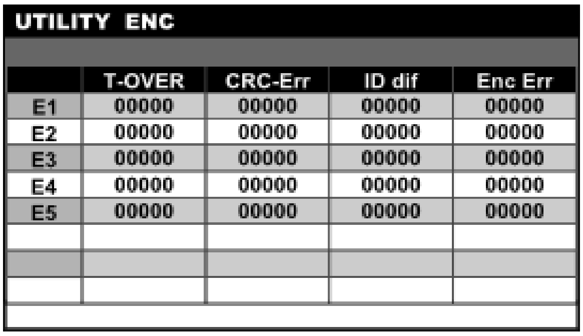
Press the [ERR] key. The information of the encoder errors occurred so far (number of errors) is displayed.

The function menu on the key sheet changes.



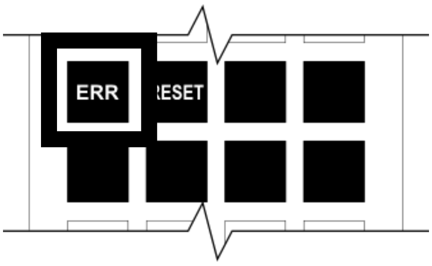
UTILITY ENC

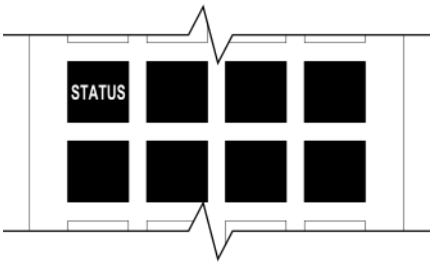
	MULTI	SINGLE	Err-df	ID
E1	00000050	0001C05A	0000	11
E2	00000031	0000A760	0000	11
E3	00000015	0000B6D8	0000	11
E4	00000025	0000F409	0000	11
E5	00000045	00007BDC	0000	11



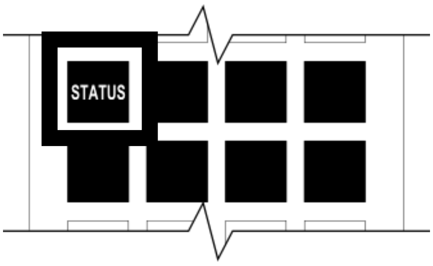
UTILITY ENC

	T-OVER	CRC-Err	ID dif	Enc Err
E1	00000	00000	00000	00000
E2	00000	00000	00000	00000
E3	00000	00000	00000	00000
E4	00000	00000	00000	00000
E5	00000	00000	00000	00000





To display the servo motor information again, press the [STATUS] key.



Cautions

- For details on displayed information, refer to the Maintenance Manual.
- The multi-return reset operation requires password unlock (see Section 1.6).

11.14 PLC Monitor [PLC–M]

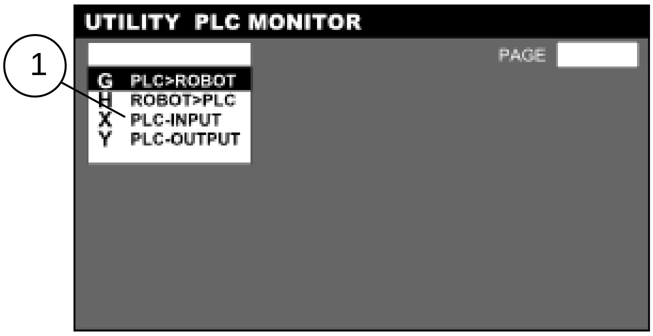
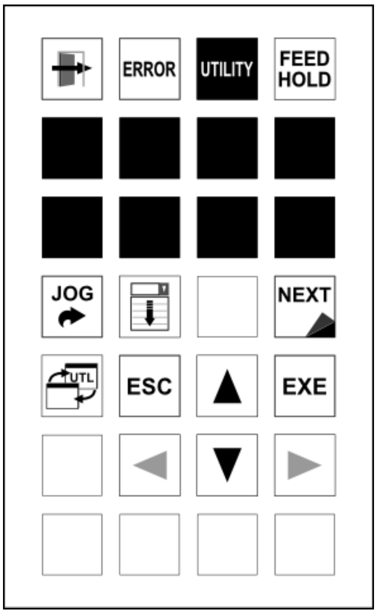
Functional Explanation

Displays the PLC data.

Operating Procedure

Step 1: Calling the [PLC－M] function

Press the [PLC－M] key among the utility function selection keys.

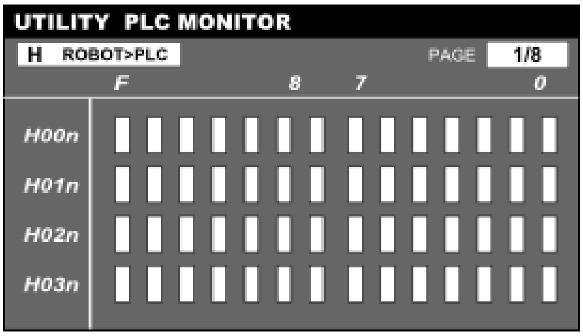
[PLC－M] Screen and Key Sheet	Description of Display
 1 UTILITY PLC MONITOR PAGE G PLC>ROBOT H ROBOT>PLC X PLC-INPUT Y PLC-OUTPUT  ERROR UTILITY FEED HOLD JOG NEXT UTL ESC EXE	① Indicates the display list.

Step 2: Selecting display items

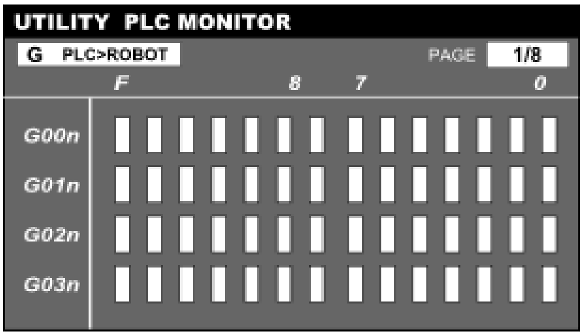
Position the cursor on the item you want to display, and press the [EXE] key.

The displayed information is outlined below.

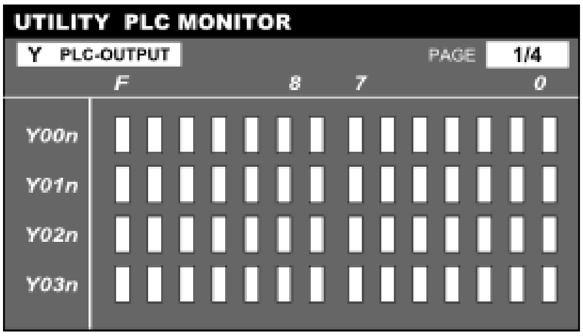
G PLC＞ROBOT


UTILITY PLC MONITOR
H ROBOT>PLC
PAGE 1/8
F
8
7
0
H00n
H01n
H02n
H03n

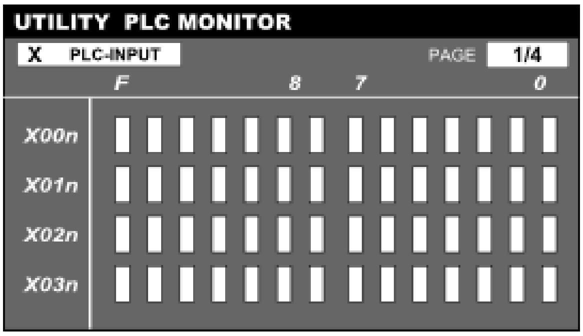
H ROBOT＞PLC


UTILITY PLC MONITOR
G PLC>ROBOT
PAGE 1/8
F
8
7
0
G00n
G01n
G02n
G03n

X PLC－INPUT

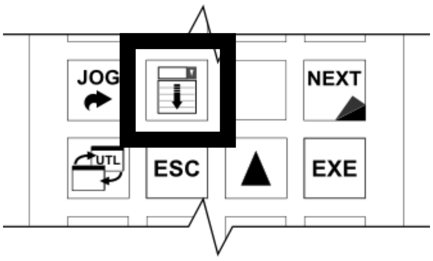

UTILITY PLC MONITOR
Y PLC-OUTPUT
PAGE 1/4
F
8
7
0
Y00n
Y01n
Y02n
Y03n

Y PLC－OUTPUT


UTILITY PLC MONITOR
X PLC-INPUT
PAGE 1/4
F
8
7
0
X00n
X01n
X02n
X03n

List Menu	Description of Display
G PLC>ROBOT	Input from TCmini to the robot main section (G000 to G27F)
H ROBOT>PLC	Output from the robot main section to TCmini (H000 to H27F)
X PLC-INPUT	Input from the external source to TCmini (X000 to X07F, X200 to X27F)
Y PLC-OUTPUT	Output from TCmini to the external source (Y100 to Y17F, Y300 to Y37F)

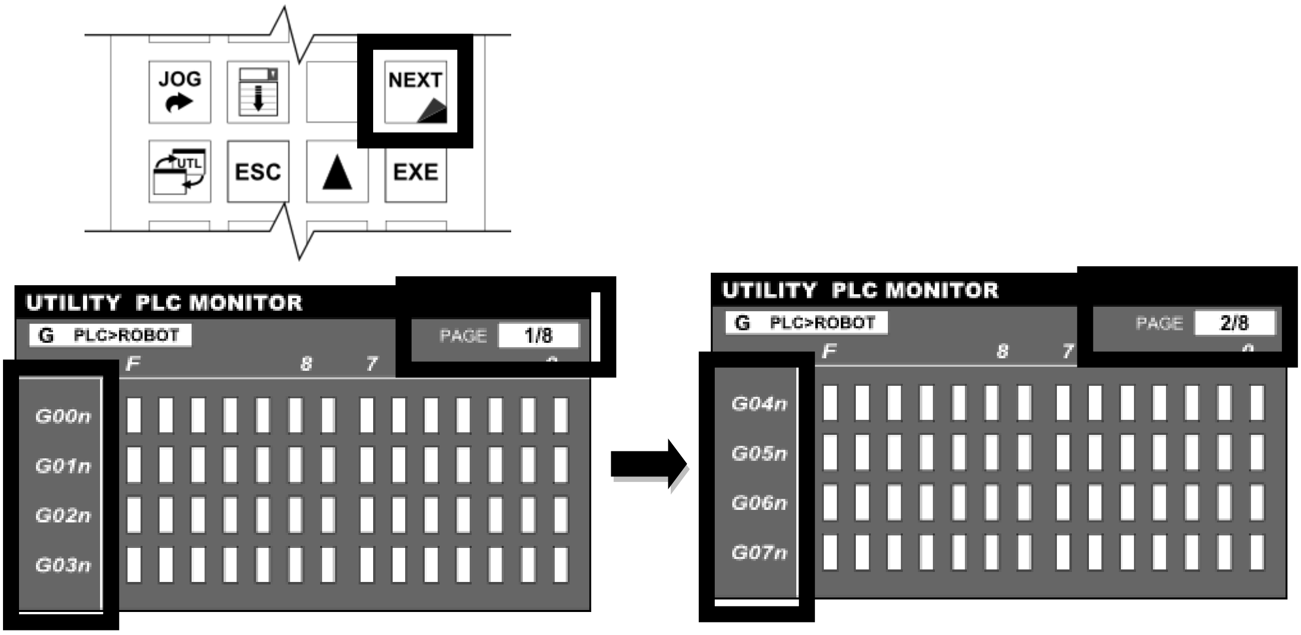
To change the displayed information, press the [LIST OPEN] key.


JOG
NEXT
UTL
ESC
EXE

Step 3: Displaying the next page

Press the [NEXT] key. The displayed information changes.

The page number is shown in the upper right of the screen.


JOG
UTL
ESC
NEXT
EXE
UTILITY PLC MONITOR
G PLC>ROBOT
PAGE 1/8
F 8 7
G00n
G01n
G02n
G03n
UTILITY PLC MONITOR
G PLC>ROBOT
PAGE 2/8
F 8 7
G04n
G05n
G06n
G07n

Caution

- For details on displayed information, refer to the Simplified PLC Manual.

11.15 Zero Position Setting [ZEROP]

Functional Explanation

Sets the zero position (or origin).

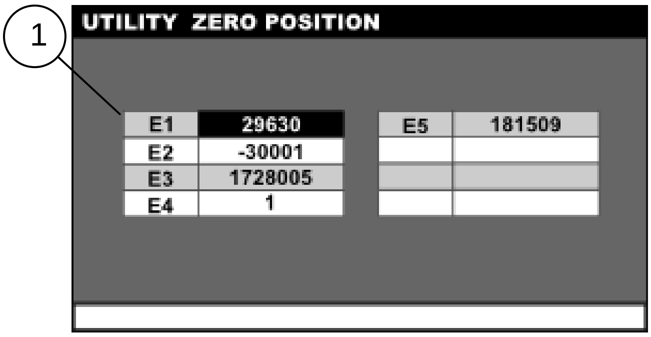
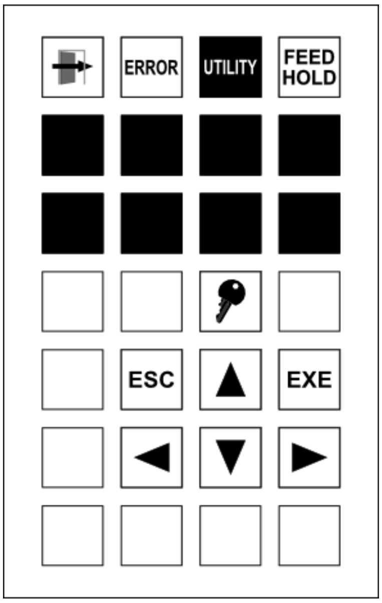
This function is a maintenance function. For details, refer to the Maintenance Manual.

Operating Procedure

Step 1: Calling the [ZEROP] function

Press the [ZEROP] key among the utility function selection keys in the servo OFF state.

The ZERO POSITION screen is displayed.

[ZEROP] Screen and Key Sheet	Description of Display
 UTILITY ZERO POSITION E1 29630 E2 -30001 E3 1728005 E4 1 E5 181509  	① Displays the encoder origin value of each axis.

Cautions

- To edit the origin values, it is necessary to unlock the password (see Section 1.6).
- For details on displayed information, refer to the Maintenance Manual.
- Servo ON and JOG operation are disabled during this function.

11.16 Version Display [VER]

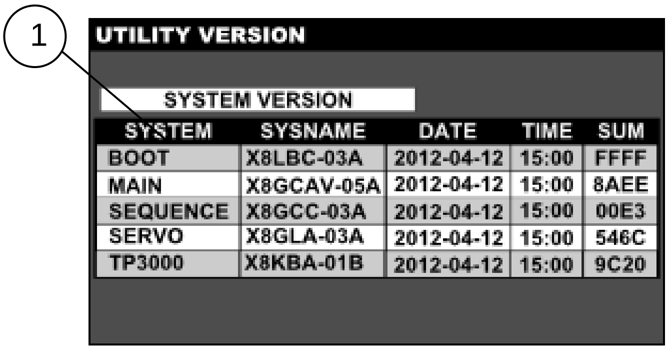
Functional Explanation

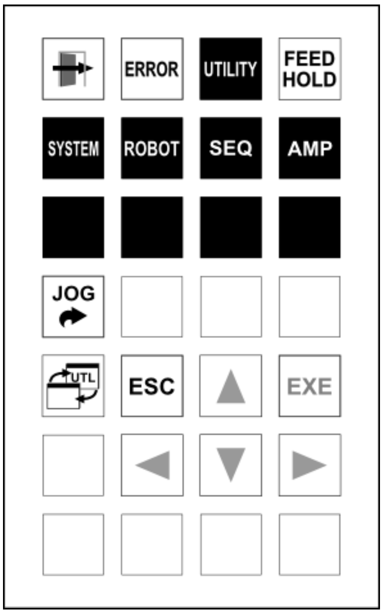
Displays the system version.

Operating Procedure

Step 1: Calling the [VER] function

Press the [VER] key among the utility function selection keys.

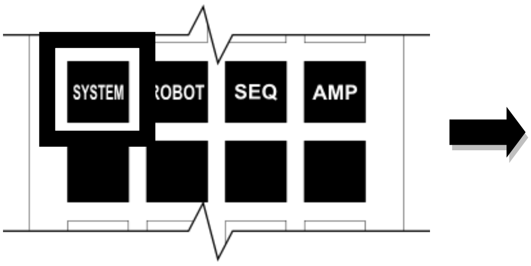
<table>
<tr><th>[VER] Screen and Key Sheet</th><th>Description of Display</th></tr>
<tr><td>


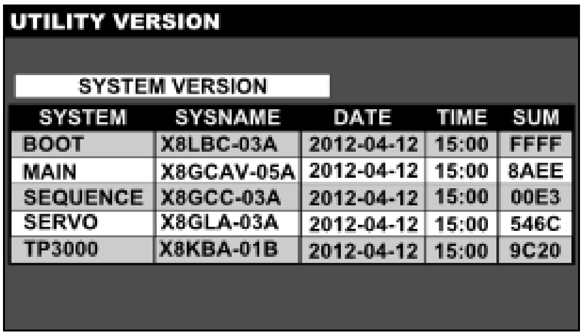
UTILITY VERSION
SYSTEM VERSION
<table>
<tr><th>SYSTEM</th><th>SYSNAME</th><th>DATE</th><th>TIME</th><th>SUM</th></tr>
<tr><td>BOOT</td><td>X8LBC-03A</td><td>2012-04-12</td><td>15:00</td><td>FFFF</td></tr>
<tr><td>MAIN</td><td>X8GCAV-05A</td><td>2012-04-12</td><td>15:00</td><td>8AEE</td></tr>
<tr><td>SEQUENCE</td><td>X8GCC-03A</td><td>2012-04-12</td><td>15:00</td><td>00E3</td></tr>
<tr><td>SERVO</td><td>X8GLA-03A</td><td>2012-04-12</td><td>15:00</td><td>546C</td></tr>
<tr><td>TP3000</td><td>X8KBA-01B</td><td>2012-04-12</td><td>15:00</td><td>9C20</td></tr>
</table>


</td><td>① Displays the system information.</td></tr>
</table>

Step 2: Displaying the system version

Press the [SYSTEM] key.





UTILITY VERSION

SYSTEM VERSION

SYSTEM	SYSNAME	DATE	TIME	SUM
BOOT	X8LBC-03A	2012-04-12	15:00	FFFF
MAIN	X8GCAV-05A	2012-04-12	15:00	8AEE
SEQUENCE	X8GCC-03A	2012-04-12	15:00	00E3
SERVO	X8GLA-03A	2012-04-12	15:00	546C
TP3000	X8KBA-01B	2012-04-12	15:00	9C20

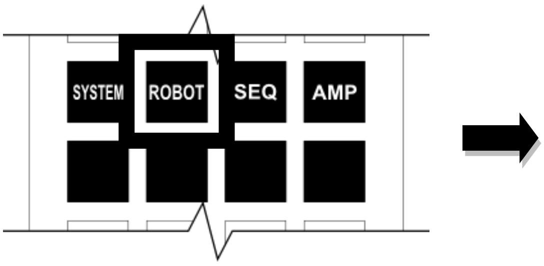
Display Item	Description
BOOT	Displays the version information of the boot system.
MAIN	Displays the version information of the main system.
SEQUENCE	Displays the version information of the sequence system.
SERVO	Displays the version information of the servo system.
TP3000	Displays the application version information of the TP3000.

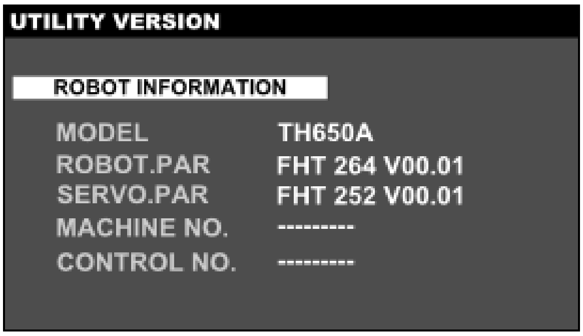
* Each display item shows the system version name, date and time of creation and checksum value from the left.

* The date and time of creation is shown in the order of "year, month, day, hour and minute."
A check sum value is expressed in the hexadecimal notation.

Step 3: Displaying the robot information

Press the [ROBOT] key.





UTILITY VERSION

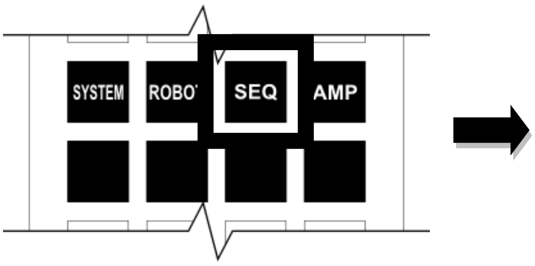
ROBOT INFORMATION

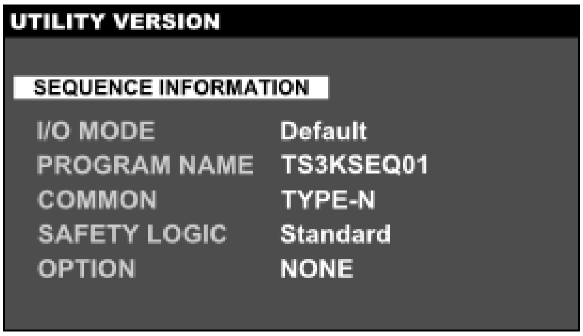
MODEL TH650A
ROBOT.PAR FHT 264 V00.01
SERVO.PAR FHT 252 V00.01
MACHINE NO. ---------
CONTROL NO. ---------

Display Item	Description
MODEL	Displays the type of the [R01] robot specified in ROBOT. PAR.
ROBOT.PAR	Displays [R02] FHT number and [R03] FHT version specified in ROBOT. PAR.
SERVO.PAR	Displays [S02] FHT number and [S03] FHT version specified in SERVO. PAR.
MACHINE NO	Displays [M02] robot number specified in MACHINE. PAR.
CONTROL NO.	Displays [M01] controller number specified in MACHINE. PAR.

Step 4: Displaying the sequencer information

Press the [SEQ] key.





UTILITY VERSION

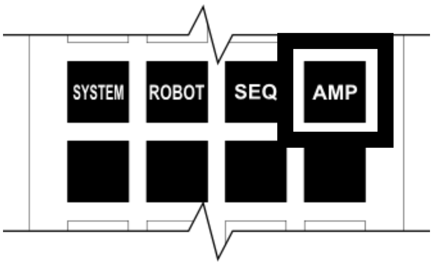
SEQUENCE INFORMATION

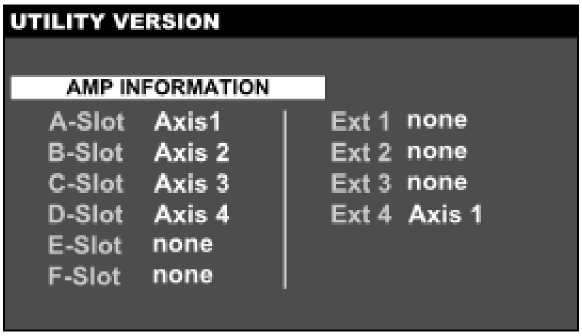
I/O MODE Default
PROGRAM NAME TS3KSEQ01
COMMON TYPE-N
SAFETY LOGIC Standard
OPTION NONE

Display Item	Description
I/O MODE	Displays [U11] startup sequence specified in USER. PAR.
PROGRAM NAME	Displays a sequence file name during run.
COMMON	Displays the common type "TYPE-N" or "TYPE-P".
SAFETY LOGIC	Displays the safety category of the controller.
OPTION	Displays the name of the FIELDBUS board mounted on the robot controller.

Step 5: Displaying the servo amplifier information

Press the [AMP] key.





UTILITY VERSION

AMP INFORMATION

A-Slot Axis1
B-Slot Axis 2
C-Slot Axis 3
D-Slot Axis 4
E-Slot none
F-Slot none

Ext 1 none
Ext 2 none
Ext 3 none
Ext 4 Axis 1

Item	Description	Item	Description
A-slot	Displays the axis-setting rotary SW on the slot A.	Ext1	Displays the axis-setting rotary SW.
B-slot	Displays the axis-setting rotary SW on the slot B.	Ext2	
C-slot	Displays the axis-setting rotary SW on the slot C.	Ext3	
D-slot	Displays the axis-setting rotary SW on the slot D.	Ext4	
E-slot	Displays the axis-setting rotary SW on the slot E.		
F-slot	Displays the axis-setting rotary SW on the slot F.		

11.17 Ethernet Status Display [ETHER]

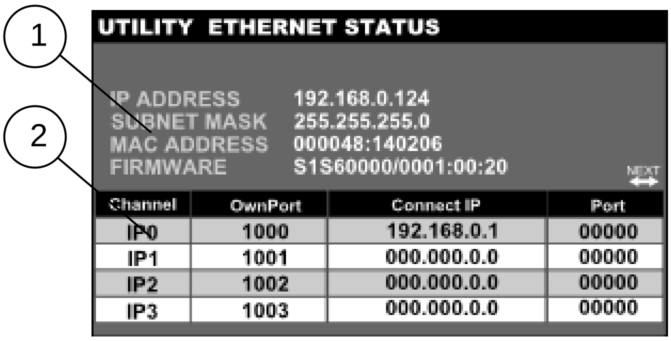
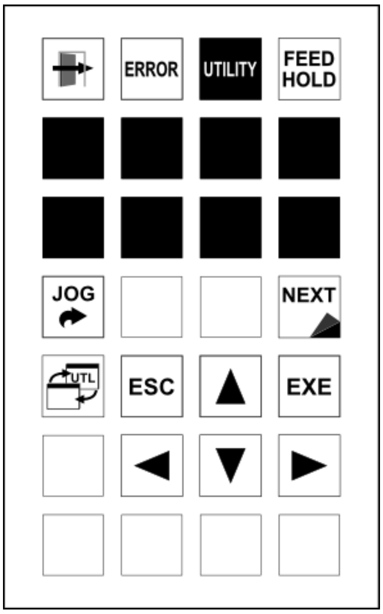
Functional Explanation

Displays the Ethernet information and status.

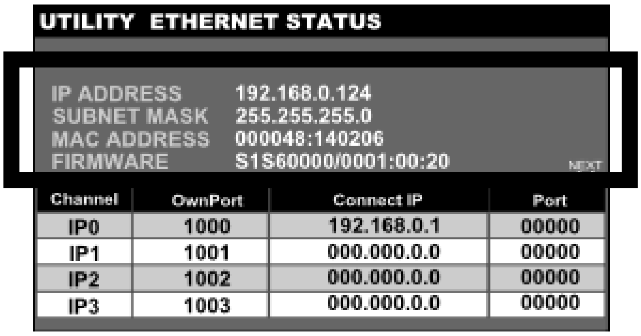
Operating Procedure

Step 1: Calling the [ETHER] function

Press the [ETHER] key among the utility function selection keys.

[ETHER] Screen and Key Sheet	Description of Display
  ERROR UTILITY FEED HOLD JOG NEXT UTL ESC EXE	① Displays the Ethernet setting values of the controller's main body. ② Displays the connection port information.

Displayed Data (1)



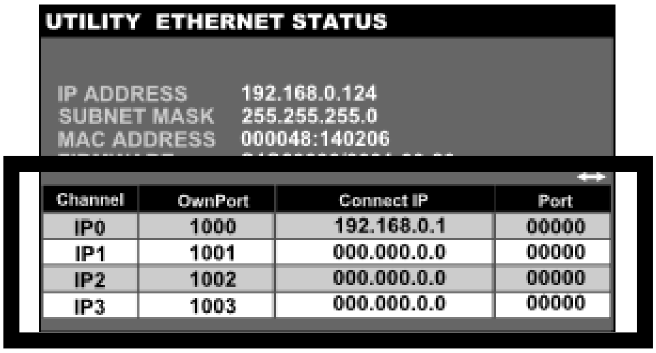
UTILITY ETHERNET STATUS

IP ADDRESS 192.168.0.124
SUBNET MASK 255.255.255.0
MAC ADDRESS 000048:140206
FIRMWARE S1S60000/0001:00:20

Channel	OwnPort	Connect IP	Port
IP0	1000	192.168.0.1	00000
IP1	1001	000.000.0.0	00000
IP2	1002	000.000.0.0	00000
IP3	1003	000.000.0.0	00000

Display Item	Description
IP ADDRESS	IP address of the robot controller itself that is written in the "ETHERNET. PAR" [E01] file
SUBNET MASK	Subnet mask of the network that is written in the "ETHERNET. PAR" [E03] file
MAC ADDRESS	MAC address of the robot controller itself that is written in the "ETHERNET. PAR" [E03] file
FIRMWARE	Version of the Ethernet unit firmware

Displayed Data (2)



UTILITY ETHERNET STATUS

IP ADDRESS 192.168.0.124
SUBNET MASK 255.255.255.0
MAC ADDRESS 000048:140206

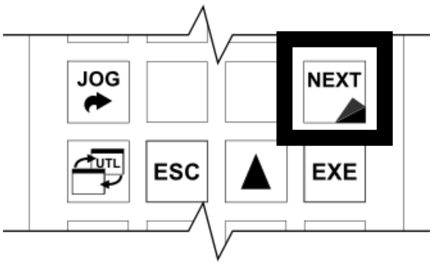
Channel	OwnPort	Connect IP	Port
IP0	1000	192.168.0.1	00000
IP1	1001	000.000.0.0	00000
IP2	1002	000.000.0.0	00000
IP3	1003	000.000.0.0	00000

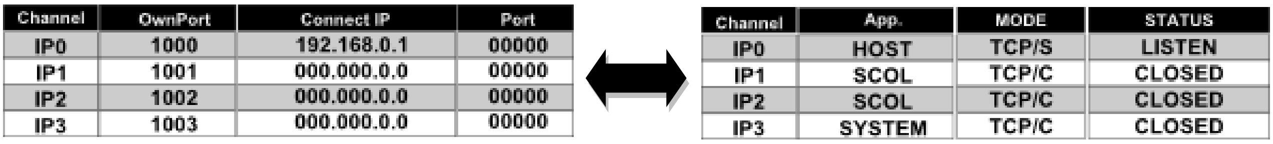
Item	Description
Channel	Indicates the Ethernet channel numbers from IP0 to IP3.
OwnPort	Robot port number
Connect IP	IP address of the other connected device
Port	Port number of the other connected device

Step 2: Switching the Ethernet information at the connection destination

Press the [←L/R →] or [NEXT] key.

Each time the key is pressed, the Ethernet information display items at the connection destination change.

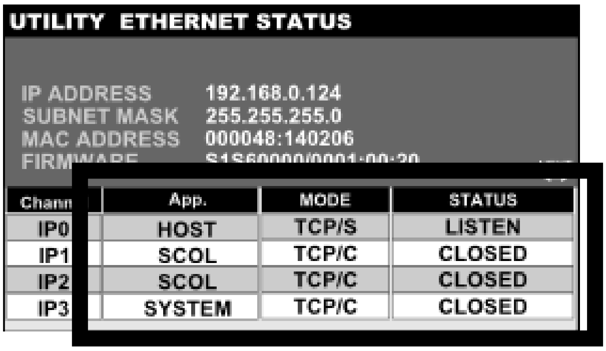




Channel	OwnPort	Connect IP	Port
IP0	1000	192.168.0.1	00000
IP1	1001	000.000.0.0	00000
IP2	1002	000.000.0.0	00000
IP3	1003	000.000.0.0	00000

Channel	App.	MODE	STATUS
IP0	HOST	TCP/S	LISTEN
IP1	SCOL	TCP/C	CLOSED
IP2	SCOL	TCP/C	CLOSED
IP3	SYSTEM	TCP/C	CLOSED

Displayed Data (3)



UTILITY ETHERNET STATUS

IP ADDRESS 192.168.0.124
SUBNET MASK 255.255.255.0
MAC ADDRESS 000048:140206
FIRM

Chann	App.	MODE	STATUS
IP0	HOST	TCP/S	LISTEN
IP1	SCOL	TCP/C	CLOSED
IP2	SCOL	TCP/C	CLOSED
IP3	SYSTEM	TCP/C	CLOSED

Item	Description
App.	Displays the names of the applications using the channels. HOST indicates the connection using a simplified protocol, and SCOL indicates the connection in the state in which control is performed with the robot language using a non-procedure protocol.
Mode	Displays the protocol type and open state. TCP/S indicates the server connection using the TCP protocol, and TCP/C indicates the client connection using the TCP protocol.
Status	Displays the status of the following Ethernet port state transitions. Closed Listen Syn-Sent Syn-Received Established Fin-Wait1 Fin-Wait2 Close wait Closing Last ACK Time Wait * For more details on the meaning of each status, refer to the TCP/IP guidebooks available in market.

Cautions

- Check that the Ethernet cable between the controller and external device is connected correctly.

- Use a cross connect cable if connecting the robot controller directly to the external device, and use a straight cable if the connection passes through a hub.

11.18 Setting Up Payload for Manual Guide [PYLD]

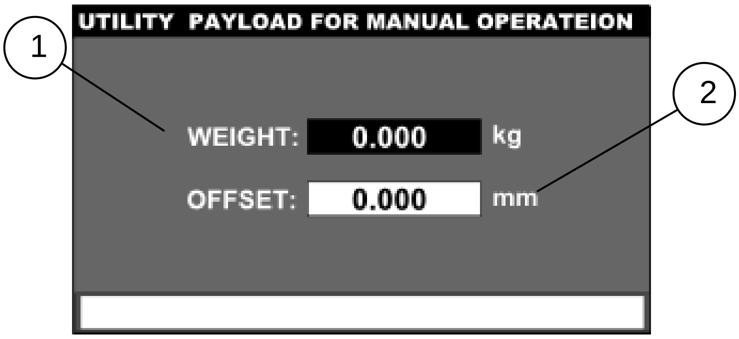
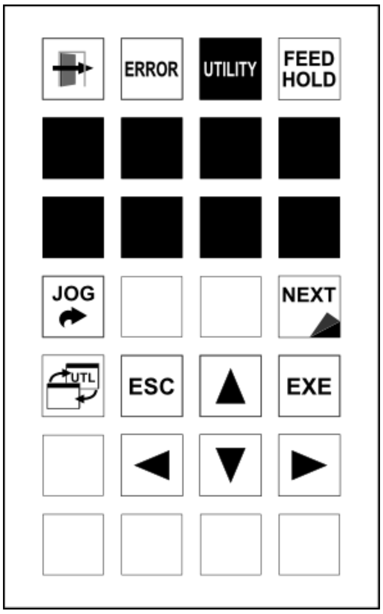
Functional Explanation

Displays and sets up payload values for manual guide.

Operating Procedure

Step 1: Calling the [PYLD] function

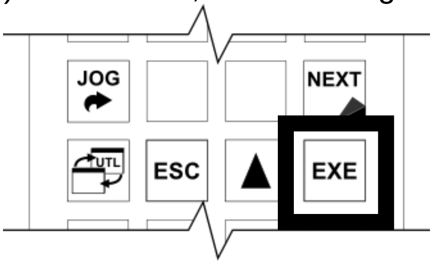
Press the [PYLD] key among the utility function selection keys.

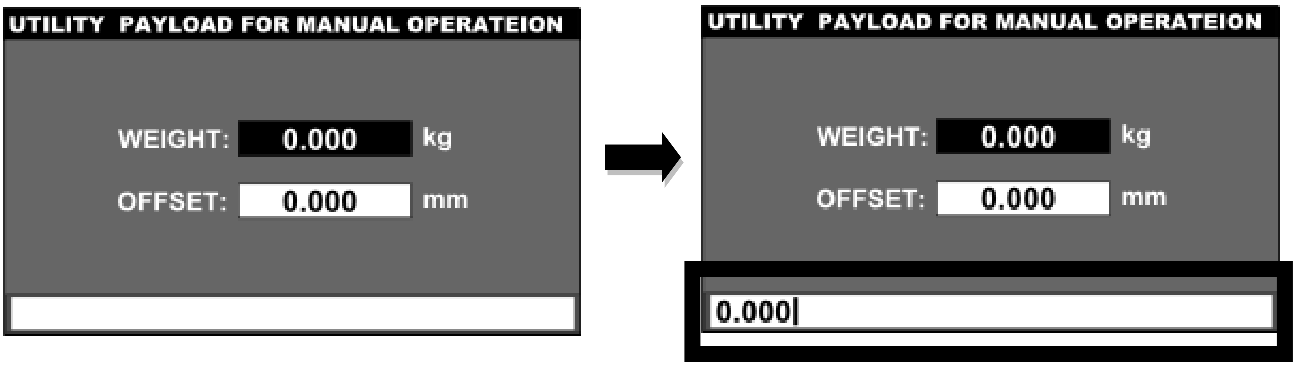
[PYLD] Screen and Key Sheet	Description of Display
 UTILITY PAYLOAD FOR MANUAL OPERATEION WEIGHT: 0.000 kg OFFSET: 0.000 mm  ERROR UTILITY FEED HOLD JOG NEXT UTL ESC ▲ EXE ◀ ▼ ▶	① Displays the work weight. ② Displays the center of gravity and size of a work.

Step 2: Editing Payload

Position the cursor on the item you want to edit, and press the [EXE] key.
Edit its value on the command line.

* For more information about the items, please see "Payload Data Editing" (Section 5.6) in Section 5, "Data Editing".





UTILITY PAYLOAD FOR MANUAL OPERATEION

WEIGHT: 0.000 kg

OFFSET: 0.000 mm

UTILITY PAYLOAD FOR MANUAL OPERATEION

WEIGHT: 0.000 kg

OFFSET: 0.000 mm

0.000

Once the values has been determined, press the [EXE] key. The edited data is reflected on the screen, and [U26]PAYLOAD FOR MANUAL OPERATION in the parameter file is updated at the same time.

Cautions

- The weight of a load is indicated in kg units, and the offset is indicated in mm units.
- The PAYLOAD setting value for manual guidance is stored in the user parameter file (file name: USER. PAR).
  If the PAYLOAD setting value for manual guidance is changed, the information in the user parameter file on the RAM drive is also automatically updated.

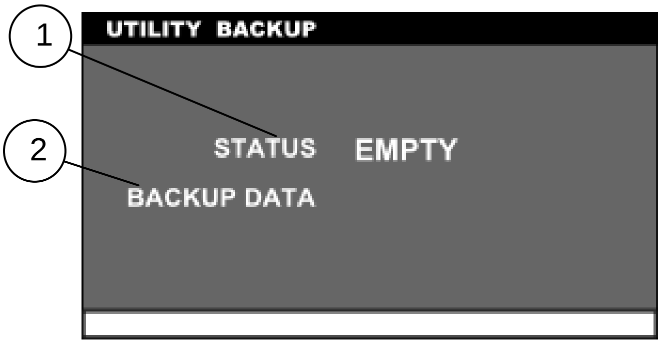
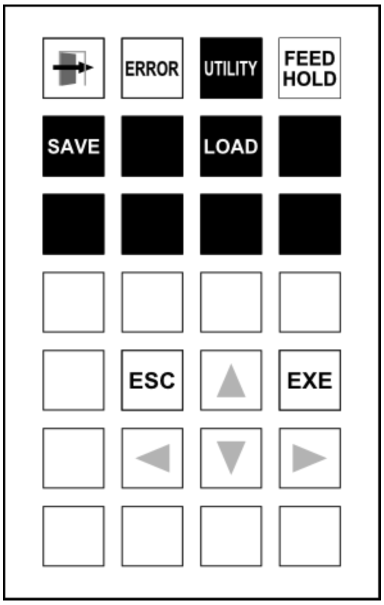
11.19 RAM Disk Backup [BACKUP]

Functional Explanation

Backs up the data in the RAM disk to the internal flash memory.
Provides a recovery method if the data in the RAM disk is inadvertently erased or if the RAM disk is damaged due to low battery voltage or other cause.

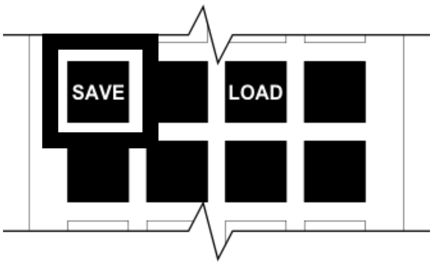
Operating Procedure

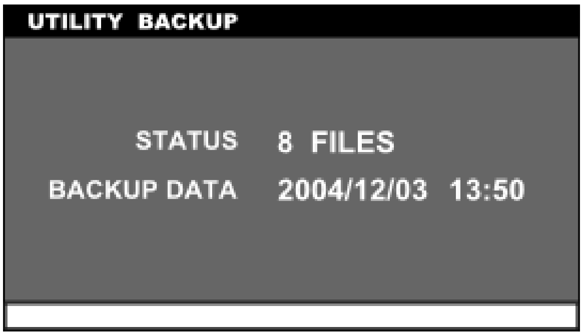
Step 1: Calling the [BACKUP] function
Press the [BACKUP] key among the utility function selection keys in the servo OFF state.

[BACKUP] Screen and Key Sheet	Description of Display
 UTILITY BACKUP STATUS EMPTY BACKUP DATA  	① Displays the status of backup. No file: EMPTY File present: The number of files and the total number of bytes are displayed. ② Displays the date of backup.

Step 2: Execution of backup

Unlock the password, and press the [SAVE] key.



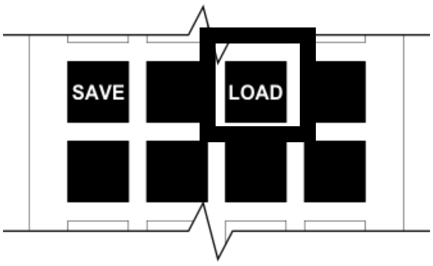

UTILITY BACKUP

STATUS 8 FILES
BACKUP DATA 2004/12/03 13:50

A progress bar appears during backup operation. When backup is completed, the progress bar disappears, and the write state to the flash memory is displayed on the screen.

Step 3: Reloading backup

Unlock the password, and press the [LOAD] key.



A progress bar appears during reloading operation. When the progress bar disappears, reloading is completed.

Cautions

- When the backup file in flash memory is EMPTY, load operation is disabled.
- To use this function, it is necessary to unlock the password (see Section 1.6).
- Servo ON and JOG operation are disabled during this function.

11.20 Reproducing the Mark Origin [MKORG]

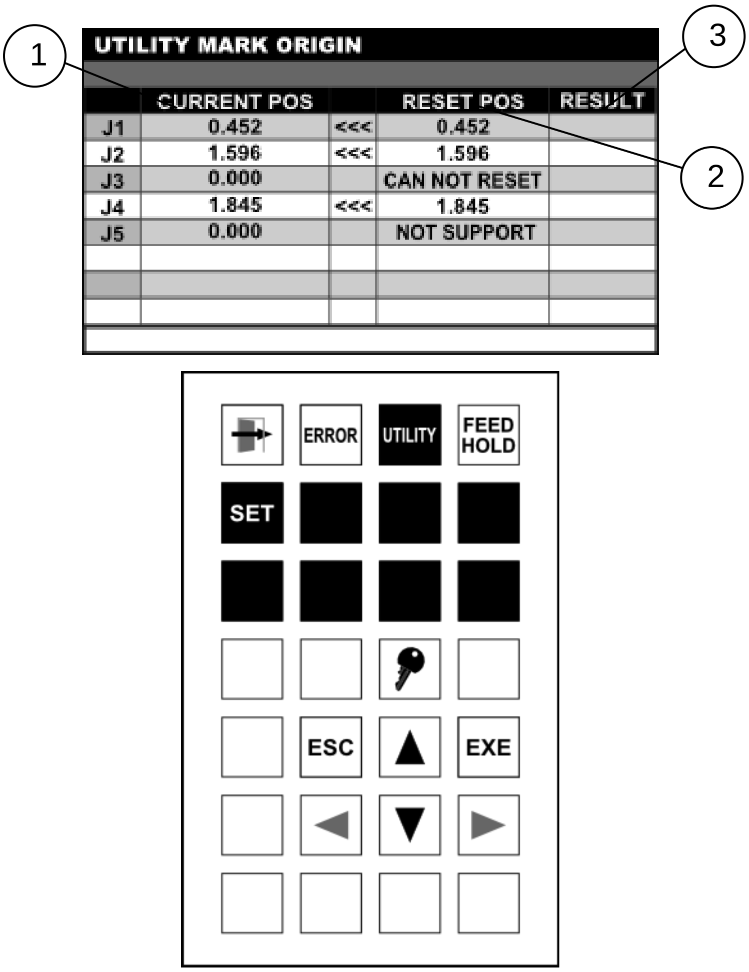
Functional Explanation

Sets up the mark origin. This function is a maintenance function. For details, refer to the Maintenance Manual.

Operating Procedure

Step 1: Calling the [MKORG] function

Press the [MKORG] key among the utility function selection keys in the servo OFF state. The MARK ORIGIN screen is displayed.

<table>
<tr><th>[MKORG] Screen and Key Sheet</th><th>Description of Display</th></tr>
<tr><td>


UTILITY MARK ORIGIN
<table>
<tr><th></th><th>CURRENT POS</th><th></th><th>RESET POS</th><th>RESULT</th></tr>
<tr><td>J1</td><td>0.452</td><td><<<</td><td>0.452</td><td></td></tr>
<tr><td>J2</td><td>1.596</td><td><<<</td><td>1.596</td><td></td></tr>
<tr><td>J3</td><td>0.000</td><td></td><td>CAN NOT RESET</td><td></td></tr>
<tr><td>J4</td><td>1.845</td><td><<<</td><td>1.845</td><td></td></tr>
<tr><td>J5</td><td>0.000</td><td></td><td>NOT SUPPORT</td><td></td></tr>
</table>
</td><td>
① Indicates the current position settings.
② Indicates the position settings after resetting.
The display changes according to the status (joint position) of the robot.
Numeric value display: Resettable
CANNOT RESET: Unresettable
NOT SUPPORT: This function is not supported.
③ Indicates the results after resetting.
</td></tr>
</table>

Cautions

- To edit the origin values, it is necessary to unlock the password (see Section 1.6).
- For details on displayed information, refer to the Maintenance Manual.

- Servo ON and JOG operation are disabled during this function.

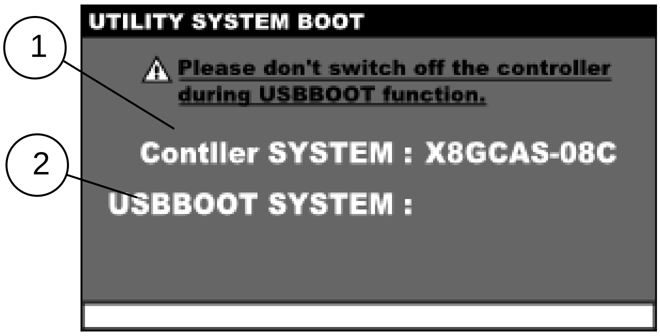
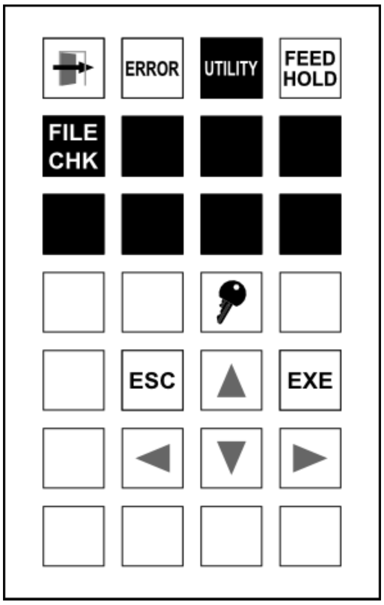
11.21 USB Boot [BOOT]

Functional Explanation

Performs version update of the main system of the control. This function is a maintenance function. For details, refer to the Maintenance Manual.

Operating Procedure

Step 1: Calling the [BOOT] function
Press the [BOOT] key among the utility function selection keys in the servo OFF state. The SYSTEM BOOT screen is displayed.

[BOOT] Screen and Key Sheet	Description of Display
 UTILITY SYSTEM BOOT Please don't switch off the controller during USBBOOT function. Contller SYSTEM : X8GCAS-08C USBBOOT SYSTEM :  	① Displays the current version name of the main system. ② Displays the name of the upgraded version to be loaded to the main system. ∗ This information is displayed after file check.

Cautions

- To use this USB BOOT function, it is necessary to unlock the password (see Section 1.6).
- For details on displayed information, refer to the Maintenance Manual.
- Servo ON and JOG operation are disabled during this function.
- This function is disabled while the editor is running.

Section 12 Self-Diagnosis

12.1 Classification of Errors

Errors detected by the self-diagnosis function are grouped and processed as described in the attached "Alarm Manual".

12.2 Display at Error Generation

TS3000

If an error occurs, the buzzer sounds intermittently. When "ALARM" is selected with the SELECT switch on the control panel, the relevant error number of ALARM flashes on the 7-segment LED. If the error level is 2, 4 or 8, the fault external control signal is output. At the time of emergency stop, the buzzer will not sound. The fault signal will not turn on, either.
To stop the alarm buzzer, press the STOP switch on the control panel, or execute the reset operation described in Section 12.4, "Error Reset".

TSL3000

If an error occurs, the buzzer sounds intermittently, and the ALARM LED on the front panel of the controller goes on.
If the error level is 2, 4 or 8, the fault external control signal is turned on.
At the time of emergency stop, the buzzer will not sound. The fault signal will not turn on, either.
To clear the alarm buzzer, execute the reset operation described in Section 12.4, "Error Reset".

12.3 Error Display

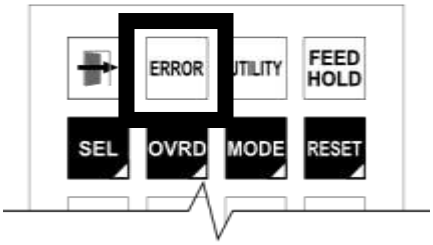
Functional Explanation

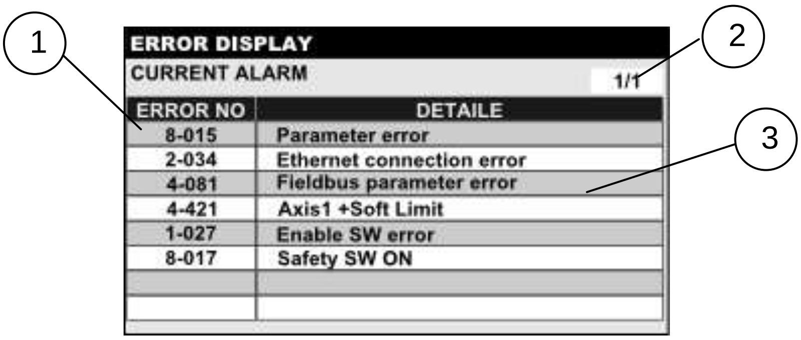
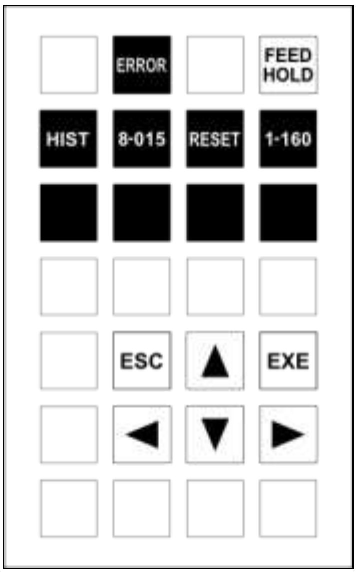
Displays the code number and description of the error currently being detected.

Operating Procedure

Step 1: Error display

Press the [ERROR] key. The code number and description of the error currently being detected is displayed on the screen.

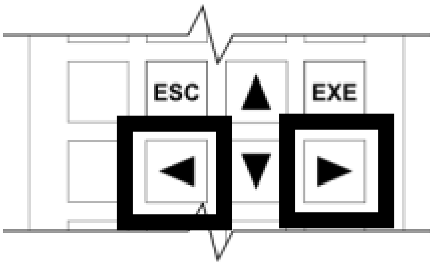

ERROR
UTILITY
FEED HOLD
SEL
OVRD
MODE
RESET

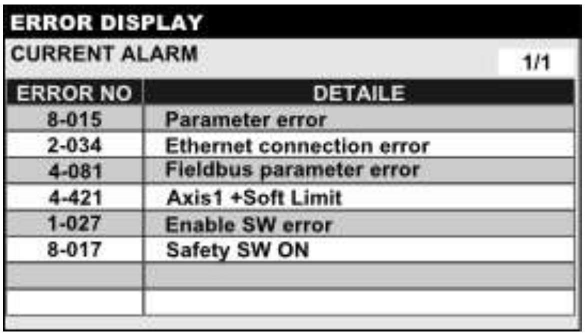
Default Screen and Key Sheet	Description of Display
 ERROR DISPLAY CURRENT ALARM 1/1 ERROR NO — DETAILE 8-015 — Parameter error 2-034 — Ethernet connection error 4-081 — Fieldbus parameter error 4-421 — Axis1 +Soft Limit 1-027 — Enable SW error 8-017 — Safety SW ON  ERROR FEED HOLD HIST 8-015 RESET 1-160 ESC ▲ EXE ◀ ▼ ▶	① Displays the error code number. ② Page number ③ Displays the description of the error.

Step 2: Displaying the date and time of error generation

Press the "Right Arrow" key. The date and time of error generation is displayed.

To return to the error description, press the "Left Arrow" key.

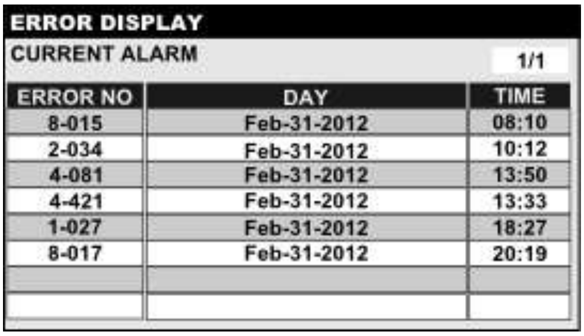




ERROR DISPLAY

CURRENT ALARM 1/1

ERROR NO	DETAILE
8-015	Parameter error
2-034	Ethernet connection error
4-081	Fieldbus parameter error
4-421	Axis1 +Soft Limit
1-027	Enable SW error
8-017	Safety SW ON



ERROR DISPLAY

CURRENT ALARM 1/1

ERROR NO	DAY	TIME
8-015	Feb-31-2012	08:10
2-034	Feb-31-2012	10:12
4-081	Feb-31-2012	13:50
4-421	Feb-31-2012	13:33
1-027	Feb-31-2012	18:27
8-017	Feb-31-2012	20:19

Step 3: Page feed

Press the "Down Arrow" key. If the error description contains more than one page, the next page is displayed.

When the "Up Arrow" key is pressed, the previous page is displayed.

Step 4: Ending error display

Press the [ESC] key. The screen moves to the top of the screen.

Error display takes effect regardless of the mode.

12.4 Error Reset

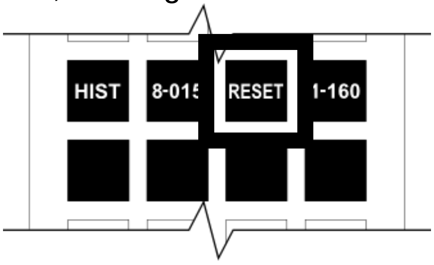
Functional Explanation

Erases the display of errors which have been resolved. It also stops the alarm buzzer. If all errors have been resolved, the fault external control signal is reset (turned off) by this operation.

Operating Procedure

Step 1: Execution of error reset

Press the [RESET] key during error display. The display of errors that have been resolved, fault signals and buzzer are reset.



Cautions

- The soft limit and emergency stop are automatically reset after a relevant error has been corrected.
- If a reset operation is performed when the cause of the error has not been removed, the error will occur again. In such a cause, the error generation time is updated at the reset operation.

12.5 Error Reset by External Signal

Functional Explanation

Resets all the errors whose cause has been removed.

Operating Procedure

(a) Switch the master key and set the EXT.SIG mode.

(b) Reset the error by turning "ON" the ALARM_RST signal.

Cautions

- This function can be executed, irrespective of presence or absence of the teach pendant.

12.6 All Errors Reset

Functional Explanation

Resets all the errors whose cause has been removed.

Operating Procedure

Step 1: Execution of all errors reset
Select "ALARM" by pressing the SELECT switch on the control panel.
Press the [STOP] key on the control panel. All errors whose cause has been removed are reset.
The same effect can be achieved by turning "ON" the ALARM_RST signal when in the external signal mode.

Caution

- This function can be executed, irrespective of presence or absence of the teach pendant.

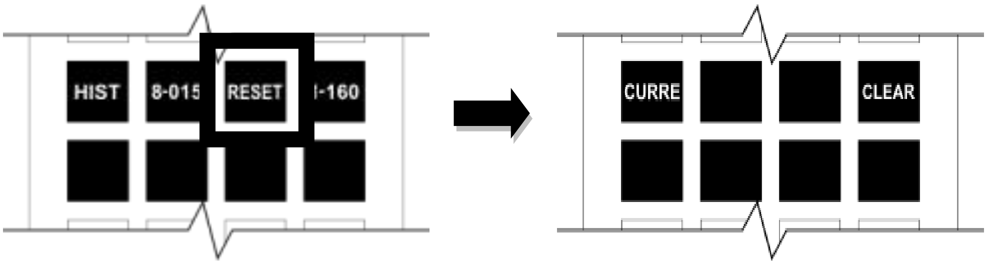
12.7 Error History Display

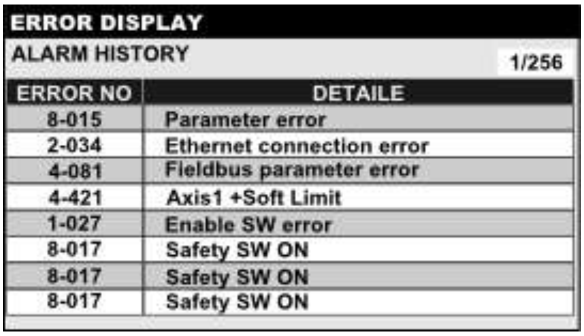
Operating Procedure

Displays the history number, code number and time of error generation in the order in which errors occurred.

Operating Procedure

Step 1: Displaying error history
Press the [HIST] key during error display. The error history is displayed on the screen.
Additionally, the [CURRE] key is displayed on the Function menu of the key sheet.


HIST
8-015
RESET
I-160
CURRE
CLEAR


ERROR DISPLAY
ALARM HISTORY
1/256

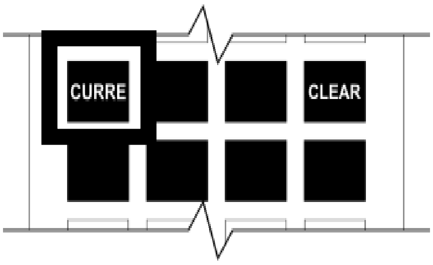
ERROR NO	DETAILE
8-015	Parameter error
2-034	Ethernet connection error
4-081	Fieldbus parameter error
4-421	Axis1 +Soft Limit
1-027	Enable SW error
8-017	Safety SW ON
8-017	Safety SW ON
8-017	Safety SW ON

Step 2: Displaying the date and time of error (history)

Press the "Right Arrow" key. The date and time of error generation is displayed. To return to the error description, press the "Left Arrow" key.

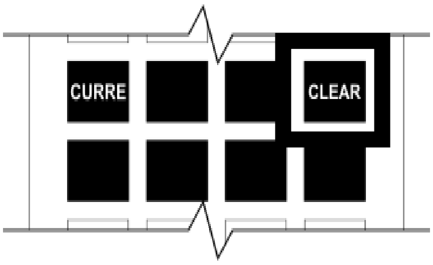
Step 3: Switching to error display

Press the [CURRE] key. The display changes from error history to the error currently being detected.


CURRE
CLEAR

Step 4: Clearing error history

Press the [CLEAR] key. The error history is cleared.


CURRE
CLEAR

Caution

- If the number of errors in the error history exceeds the maximum, errors are erased from the oldest one.

12.8 Compile Error Display

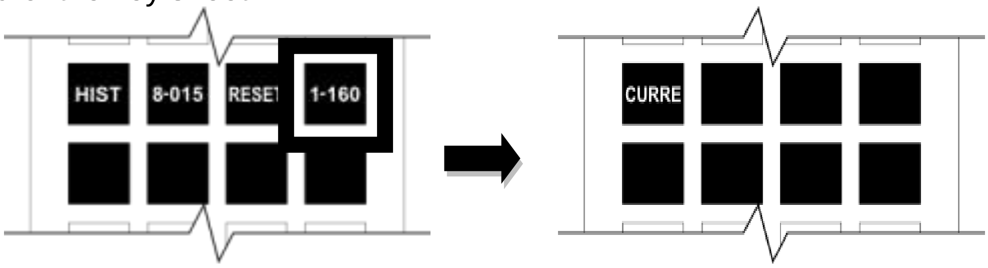
Functional Explanation

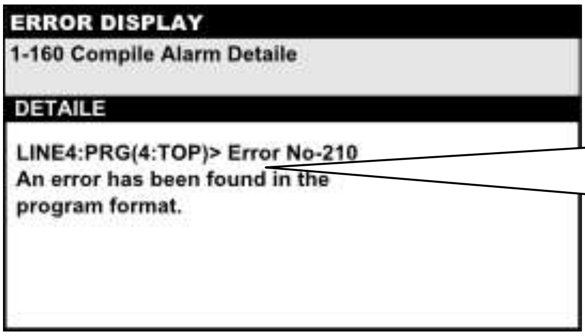
If an SCOL program containing a syntax error is selected as an execution file, a compiler error will occur. The details of a compile error can be viewed on the error screen.

Operating Procedure

Step 1: Compile error detail display

Press the [1-160] key while a compile error is occurring. The details of the compile error are displayed on the screen. Additionally, the [CURRE] key is displayed on the Function menu of the key sheet.





ERROR DISPLAY

1-160 Compile Alarm Detaile

DETAILE

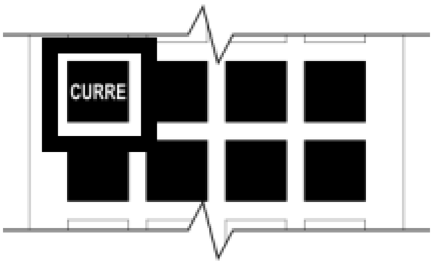
LINE4:PRG(4:TOP)> Error No-210
An error has been found in the program format.

Compile error structure
LINE4 → Line number where an error is occurring
PRG(5:TOP) → Error generating block (the number of lines from the top line)
ERROR NO-214 → Error number

For details about error descriptions, refer to Appendix, "Compile Error and Compile Warning Messages" in the Robot Language Manual.

Step 2: Exiting compile error detail display

Press the [CURRE] key to return to the current error display screen, or press the [ESC] key to exit error display.



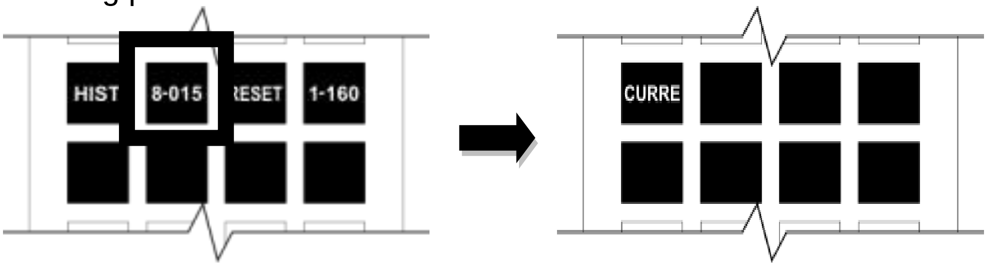
12.9 Parameter Error Detail Display

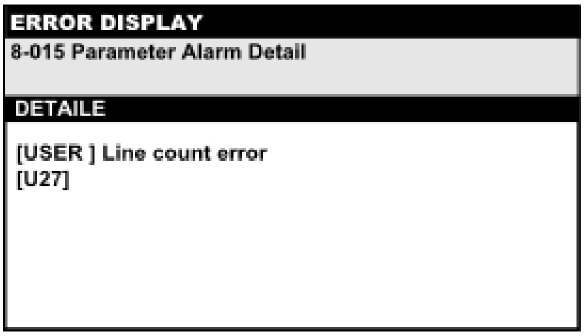
Functional Explanation

If there is an error in a parameter file when the controller is powered on, a parameter error will occur. The details of a parameter error can be viewed on the error screen.

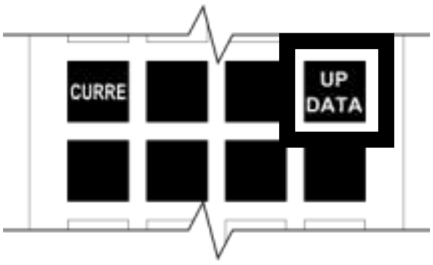
Operating Procedure

Step 1: Parameter error display
Press the [8-015] key (parameter error detail display).
The name of the error-causing parameter file and the error cause are displayed on the screen. Open the corresponding parameter file with the parameter editor and fix the error-causing parameter.




ERROR DISPLAY
8-015 Parameter Alarm Detail
DETAILE
[USER] Line count error
[U27]

Related Function

Regarding the parameter error "Item count shortage", the parameter file can be fixed automatically. Press the [UPDATA] key during parameter error detail display. The error-causing parameter file is fixed automatically. After the parameter has been fixed, turn the power to the controller on/off.