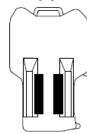
[Teach pendant enable switch]



This is used to switch between the teach mode and the playback mode in combination with the [Mode selector switch] on the operation panel or operation box.

[Enable switch] (Deadman switch)

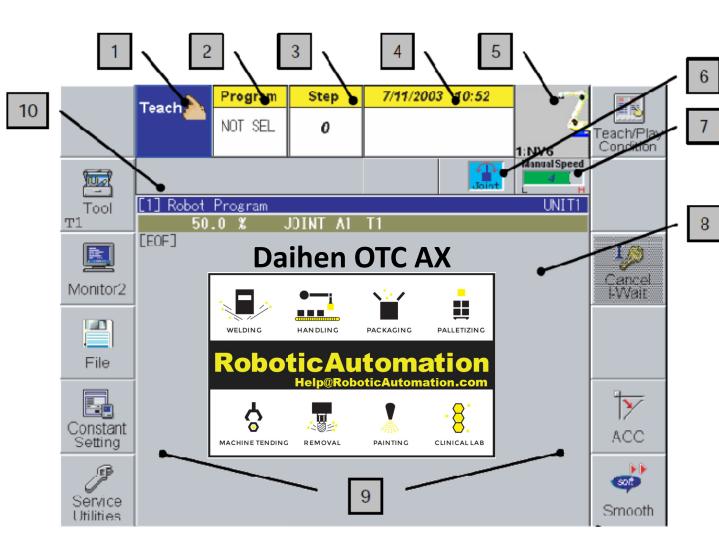


This switch is provided on the rear panel, and it is used when the robot is to be manually operated in the teach mode.

Normally, it is provided on the left side only. There may be two buttons, one at the left and the other at the right as an option.

When the enable switch is grasped, power is supplied to the robot (the motor power is turned ON). The robot can be operated manually only while the switch is grasped.

If an impending danger is sensed, either release the enable switch or grasp it tightly until a clicking sound is heard.



Program number display area
The number of the selected program is displayed.

Step number display area
The number of the step selected in the program is displayed here.

Date & time display area

The current date and time are displayed here.

5 Mechanism display area

The mechanism targeted for manual operation is displayed here.

With a multi-unit specifications robot, the numbers of the units involved in the teaching are also displayed.

Speed display area

The manual operation speed is displayed here. When [ENABLE] is pressed, the check speed is displayed.

Speed	Display	Speed	Display
Manual speed	Manual Speed S L	Check speed	Check Speed 5

Monitor display area

The contents of the program are displayed here (in the case of the initial settings).

a | f key display are

The functions that can be selected using the f keys are displayed here. The six keys on the left correspond to f1 to f6; the six keys on the right correspond to f7 to f12.

Variable status display area

The status displays including "input wait (I wait)" and "external start selected" appear as icons in this area. When this status ends, the icon is cleared.

Coordinate system display area

The selected coordinate is displayed here.

Enable switch

(Deadman switch)

right of rear panel)

(at both left and

Teach pendant

	The selected coordinate is displayed here.							
	Types of coordinate systems	Display						
	Axis coordinate system	Joint						
	Machine coordinate system	Robot						
	Tool coordinate system							
	(The number on the left of the icon is the tool number.)	1 Tool						
	Work coordinate system	Work						
	Absolute coordinate system (world coordinate system)	Jworld						
	Cylindrical coordinate system	cylin.						
	User coordinate system	Ten .						
	(The number on the left of the icon is the coordinate number.)	User						
5	Welding line coordinate System	Weld						

1 Mode display area

The selected mode (teach, playback or high-speed teach) is displayed here. (The highspeed teach mode is optional.)

The motor power, operation underway and emergency stopped statuses are also displayed.

also displayed.		
Status	Teach mode	Playback mode
Motor power OFF	Teach 🏊	Play. III III
Motor power ON, servo power OFF, now saving energy (playback mode)	Teach	Play. III iii back by and in ours
Motor power ON, servo power ON	Teach Motors	Flays LCA back (1905) Mokes (1)
Motors energized, check GO/BACK operation underway (teach mcde), now operating (playback mode)	Teach Notes Continued to the Continued t	Play No. 8 back to 18 Running 2
Emergency stopped	Teach	Flay Flay back G

When this is pressed, the robot is set to emergency stop.

To release emergency stop, turn the button clockwise.

Isplayed here.

Esystems

Display

Emergency stop button

18 19

f12

Liquid crystal

Operation



The functions are executed by pressing this key together with other keys.

[UNIT/MECHANISM] MECHA-



- When this is pressed on its own, the mechanisms are selected.
 - When a multiple number of mechanisms are connected to the system, the mechanism to be operated manually is selected.
- When this is pressed together with [ENABLE], the unit is selected.
 - When a multiple number of units are defined in the system, the unit to be operated is selected.

[SYNCHRONIZE] SYNCHRONIZE



This key is used by a system in which a multiple number of mechanisms are connected, and it has the following functions.

- When this is pressed on its own, it selects or releases coordinated manual operation.
- When this is pressed together with [ENABLE] during teaching, it selects or releases coordinated operations.

When cooperative operation is specified for a move command, "H" appears before the step number.

[INTERP/COORD] | COORD



- When this is pressed on its own, one of the coordinates is selected.
 - During manual operation, the coordinate system that serves as the reference for operation is selected. Each time it is pressed, the axis independent, orthogonal coordinates (or user coordinates) or tool coordinates are selected and displayed on the LCD screen.
- When this is pressed together with [ENABLE], the interpolation type is selected.

This switches the interpolation type (joint interpolation, linear interpolation or circular interpolation) of the recording status.

ICHECK SPD/ TEACH SPEED]



- When this is pressed on its own, the manual speed is changed.
 - The operating speed of the robot during manual operation is selected. Each time it is pressed, one of the 1 to 5 operating speeds is selected (the higher the number, the faster the speed).
 - Furthermore, the following function is provided as
- NACHI The playback speed recorded in the steps is also determined by the manual speed which has been selected by this key.
- DAIHEN The above setting is not established. Set the playback speed when teaching the movement commands.



This function is set by selecting [Constant Setting] → [5 Operation Constants] → [4 Record speed] → [Value of recording method — Decision method].

■ When this is pressed together with [ENABLE], the check speed is changed.

The speed during a check go or check back operation is selected. Each time it is pressed, one of the 1 to 5 operating speeds is selected (the higher the number, the faster the speed).

[STOP/CONTINUOUS]



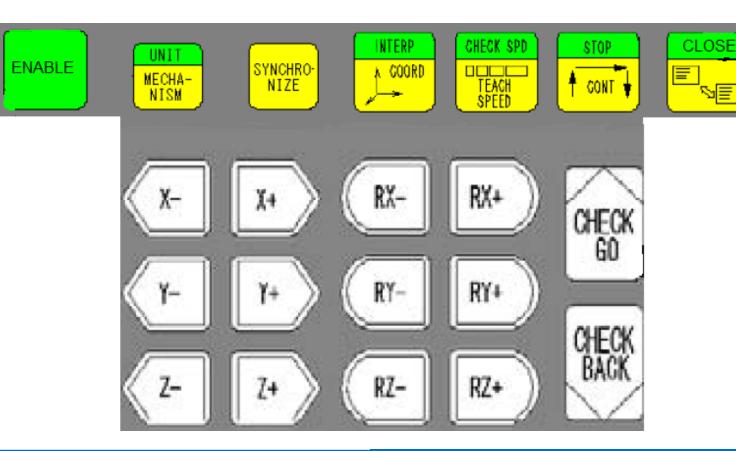
- When this is pressed on its own, continuous or noncontinuous is selected.
- Continuous or non-continuous during a check go or check back operation is selected.
- When continuous operation is selected, the operation of the robot does not stop at each step.
- When this is pressed together with [ENABLE], playback is stopped.
 - The program being played back is stopped. (This has the same function as the stop button.)

[CLOSE/ SELECT SCREEN]



- When this is pressed on its own, the screen is selected or moved.
 - If a multiple number of monitor screens are displayed, the screen targeted for operation is selected.
- When this is pressed together with [ENABLE], the screen is closed.

The selected monitor screen is closed.



[Axis operating keys]

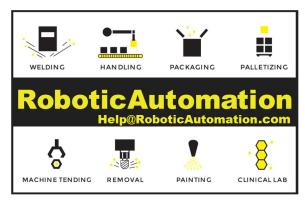


- When these are pressed on their own, they have no function.
- ■When these are pressed together with the [Enable(Deadman) switch], the axes are operated. The robot is moved manually. If an auxiliary axis to be moved, the operation target is selected ahead of time using [UNIT/MECHANISM].

[CHECK GO] [CHECK BACK] 60



- When these are pressed on their own, they have no function.
- ■When these are pressed together with the [Enable(Deadman) switch], the check go or check back operation is performed. Normally, the robot is stopped at each recorded position (step) but it can also be operated continuously. Use [STOP/CONTINUOUS] to select step or continuous.



[O.WRITE / REC] REC

- When this is pressed on its own, the movement command is recorded.
 - During teaching, the movement command is recorded.
 - This can be used only when the last step in the task program has been selected.
- When this is pressed together with [ENABLE], the movement command is overwritten.
 - The already recorded movement command is overwritten by the current recording statuses (position, speed, interpolation type, and accuracy). However, the command can be overwritten only when changes are made to what is recorded for the movement commands. A movement command cannot be overwritten by a function command; neither can a function command be overwritten by another function command.
- NACHI The recording position, speed and accuracy of a recorded movement command can each be revised using [MOD Position], [SPD] and [ACC], respectively.
- DAIHEN The recording position of a recorded movement command can be revised using [MOD Position].
 - The [SPD] and [ACC] key functions are set by selecting [Constant Setting] →[5 Operation Constants] \rightarrow [1 Operation condition] \rightarrow [5 Usage of SPD keyl or [6 Usage of ACC keyl.

[MOD Position] MOD

- When this is pressed on its own, it has no function.
- When this is pressed together with [ENABLE], the position is modified.
 - The position stored in the movement command now selected is changed to the current robot position.

[RESET/R]

This clears the input or returns the setting screen to • On a service or constant setting screen, for its original status. It also enables R codes (short-cut codes) to be input. The function that is to be used can be called immediately by inputting an R code.

INS

- When this is pressed on its own, it has no function.
- When this is pressed together with [ENABLE], a movement command is inserted.
- NACHI The movement command is inserted "Before" the current step.
- Dantil The movement command is inserted "After" the current step.



"Before" can be changed to "After" or vice versa by selecting [Constant Setting] → [5 Operation Constants] →[1 Operation condition] \rightarrow [7 Step insertion position].

[HELP] HELP

Press this for help concerning an operation or function. The built-in tutorial function (help function) is called.

[PROG/STEP]

cursor moves.



- When this is pressed on its own, a step is specified. This is used to call a step specified in the program.
- When this is pressed together with [ENABLE], a program is specified. The specified program is called.

■ When these keys are pressed on their own, the

■ When these are pressed together with [ENABLE],

On a screen where the settings are configured on a

• On a program editing screen, for instance, the

instance, the selection items arranged horizontally

On a teach or playback mode screen, the number of

multiple number of pages, the page is moved.

cursor is moved by several lines at a time.

the page is moved or changed.

(radio buttons) are selected.

the current step is changed.

[CLAMP ARC]

This key functions in a different way depending on the application concerned.

When the spot welding application is used

- When this is pressed on its own, the spot welding command is set.
 - It is used to set the spot welding commands. Each time the key is pressed, the ON or OFF is selected for the recording status.
- When this is pressed together with [ENABLE], the spot welding gun is manually pressurized.

When the arc welding application is used

- When this is pressed on its own, commands are easily selected.
- Selects "easy teach mode", which allows you to select move commands, welding start/stop commands and frequently used application commands with simple operations.
- When this is pressed together with [ENABLE], it has no function.

[DEL] DEL

- When this is pressed on its own, it has no function.
- When this is pressed together with [ENABLE], a step is deleted.

The step now selected (movement command or function command) is deleted.

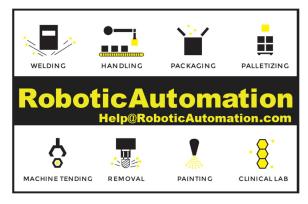


This enters the menu or numerical input contents.



Determination operation of numerical input can also be performed with arrow keys by <Constant Setting> - [7F-key] - [7 Numerical input] and switching to "Cursol" under [Decision method of numerical input].





[OUT] OUT

- When this is pressed on its own, a short-cut to the SETM function command is provided. During teaching, this short-cut calls the output signal command (SETM <FN105> function command).
- When this is pressed together with [ENABLE], the manual signals are output. The external signals are set to ON or OFF manually.

[IN] (IN

During teaching, this short-cut calls the input signal wait "positive logic" command (WAITI <FN525> function command).

[SPD] SPD

NACHi This is used to revise the speed of recorded movement commands.

This is used to set the speed of movement commands.

(The setting is reflected in the recording status.)



This function is set by selecting [Constant Setting] →[5 Operation Constants] → [1 Operation condition] →[5 Usage of SPD key].

[ACC] ACC

NACHI This is used to revise the accuracy of a recorded movement command.

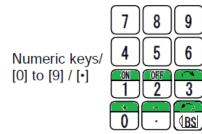
DAIHEN This is used to set the accuracy of a movement command which is to be recorded. (What has been set is reflected in the recording status.)



This function is set by selecting [Constant Setting] →[5 Operation Constants] → [1 Operation condition] →[6 Usage of ACC key].

[TIMER] TIMER

During teaching, this short-cut records the timer command (DELAY <FN50> function command).



placed inside the check box.

- When these are pressed on their own, numbers (0 to 9, decimal point) are input.
- When [1] is pressed together with [ENABLE], ON is selected.
 On a setting screen, for instance, a check mark is
- When [2] is pressed together with [ENABLE], OFF is selected.

On a setting screen, for instance, the check mark inside the check box is removed.

- When [3] is pressed together with [ENABLE], redo. This re-does the operation which was restored by clearing (undo) the operation immediately before. It is effective only while creating a new or editing an existing program.
- When [0] is pressed together with [ENABLE], "+" is input. Input "+".
- When [•] is pressed together with [ENABLE], "-" is input. Input "-".

[FN] (Function) FN

This is used when selecting the function commands.

[EDIT]

This opens the program editing screen.

On the program editing screen, principally the function commands are changed, added or deleted and the parameters of movement commands are changed.

[I/F] (Interface)

When a teach pendant with touch panel specifications is used, the interface panel window is opened.



AX21 Capable of operating the following functions.

- When these are pressed on their own, numbers (4 to 9) are input.
- When [4] is pressed together with [ENABLE], AS/AE is selected.

During teaching, commands regarding arc welding will be displayed on the f key (f1 ~ f12).

- When [5] is pressed together with [ENABLE], WS/WE is selected.During teaching, commands regarding weaving will
- During teaching, commands regarding weaving will be displayed on the f key (f1 ~ f12).
- When [6] is pressed together with [ENABLE], SENSOR is selected.During teaching, commands regarding sensor will be displayed on the f key (f1 ~ f12).
- When [7] is pressed together with [ENABLE], P is selected.

This short-cut calls the movement command for the Joint Interpolation (JOINT).

- When [8] is pressed together with [ENABLE], L is selected.
- This short-cut calls the movement command for the Line Interpolation (LIN)
- When [9] is pressed together with [ENABLE], C is selected.

This short-cut calls the movement command for the Circular Interpolation (CIR).

[BS] (Back space)

- When this is pressed on its own, a number or character is deleted.
- The number or character before the cursor position is deleted. The key is also used to release a selection during file operations.
- When this is pressed together with [ENABLE], undo the operation immediately before.

The operation performed immediately before is cleared, and the status prior to the change is restored.

It is effective only while creating a new or editing an existing program.

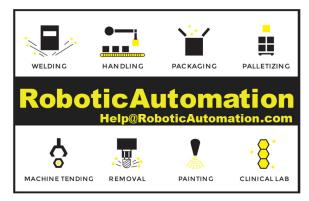


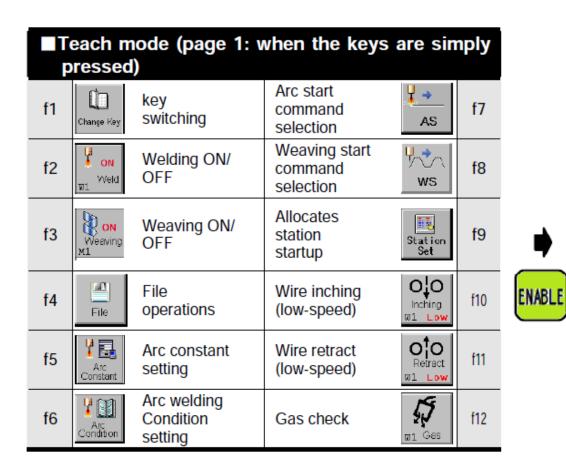
[END/TIMER] TIMER

AX21 Capable of operating the following functions.

- When this is pressed on its own, it will lead to a short-cut to DELAY (function command)
- During teaching, this short-cut records the timer command (DELAY <FN50> function command)
- When this is pressed together with [ENABLE], it will lead to a short-cut to END (function command)
 During teaching, this short-cut records the end

command (END <FN92> function command).





■Teach mode (page 1: when the keys are pressed together with [ENABLE])									
f1	Change Key	f key switching	Arc end command selection	f7					
f2	Select W1 Arc	Welder select	Weaving end command selection	f8					
f3	Select Robot	Weaving ON/ OFF target robot switching	Forcibly initiates I release. (Input wait release)		f9				
f4		No function	Wire inching (high-speed)	OLO Inching W1 High	f10				
f5	Constant Setting	Sets the constant.	Wire retract (high-speed)	Orto Retract W1 High	f11				
f6	Service Utilities	Service menu	No function		f12				





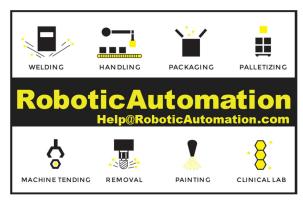
Initial layout of f keys for arc welding (teach mode)





■Teach mode (page 2: when the keys are simply pressed)								
f1	Change Key	f key switching	Sets the teach or playback conditions	Teach/Play Condition	f7			
f2	Sensor	Sensor ON/ OFF	Manual speed Switching (speed up)	Manual Speed Spd. Dec.	f8			
f3	Signal	Input/output ON/OFF	Manual speed switching (speed down)		f9			
f4	Monitor2	Sets monitor 2	No function		f10			
f5	Tool	Tool switching	Sets the accuracy.	ACC ACC	f11			
f6	StepClear	Step Clear/ Change Specified Return	Performs the Smooth setting.	Smooth	f12			

■ Teach mode (page 2: when the keys are pressed together with [ENABLE])									
f1	f key Switching	No function	f7						
f2	No function	No function	f8						
f3	No function	No function	f9						
f4	No function	No function	f10						
f5	No function	Pass/ positioning setting	f11						
f6	Automatic operation pause status release (only during station startup)	Acceleration setting Accel	f12						



		k mode (page pressed)	1: when	the keys	are	
f1	Change Key	f key switching	Arc welding Condition setting	Arc Condition	f7	
f2	ON Weld	Welding ON/ OFF	No function		f8	
f3	Weaving M1	Weaving ON/ OFF	No function		f9	
f4	Arc Monitor	Arc monitor	Wire inching (low-speed)	OLO Inching W1 Low	f10	
f5		No function	Wire retract (low-speed)	Retract	f11	
f6	* STOP	Stop	Gas check	₽ Gas Gas	f12	

		k mode (page together with	1: when the [ENABLE])	keys	are
f1	Change Key	f key switching	Service Menu	Service Utilities	f7
f2	Select W1 Arc	Welder select	Forcibly initiates I release. (Input wait release)		f8
f3	Select Robot	Weaving ON/OFF target robot switching			f9
f4	Step Single	Step continuous	No function		f10
f5	Cycle	Switches between cycle, Continuous and step.	Speed override (10% up)	100%	f11
f6	* STOP	Stop	Speed override (10% down)	Override	f12





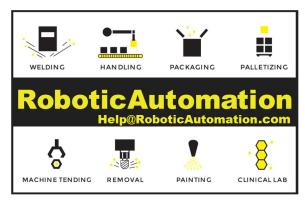
Initial layout of f keys for arc welding (playback mode)





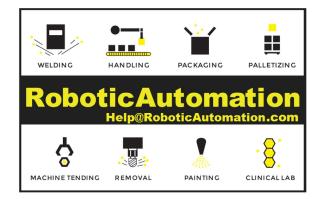
■ Playback mode (page 2: when the keys are simply pressed)								
f1	Change Key	f key switching	Sets the teach or playback conditions.	f7				
f2	Sensor	Sensor ON/ OFF	No function	f8				
f3	Specified	Step Clear/ Change Specified Return	No function	f9				
f4	Current A B Stopped	Changing the method for returning to the stopped position for normal startup	No function	f10				
f5	Current	Changing the method for starting up after a step set.	No function	f11				
f6	≯ → STOP	Stop	No function	f12				

		k mode (page together with	: 2: when the [ENABLE])	keys	are
f1	Change Key	f key switching	No function		f7
f2		No function	No function		f8
f3		No function	No function		f9
f4		No function	Wire inching (high-speed)	O O O O O O O O O O O O O O O O O O O	f10
f5		No function	Wire retract (high-speed)	OOO Retract	f11
f6	→ STOP	Stop	Simultaneously switches the start select and program select or station monitor	Start Prog Con Con Staron Monitor	f12



f1	f key Switching	Move command (JOINT)	Joint P	f7		f1	Change Key	f key switching	Start allocation	Station Set	f7		
f2	Weld start command(A	Move command (LINE)	Line L	f8	1			f2	JMP	Step jump command(JMP)	SET command	TES	f8
f3	Weld end command (A	Move command (CIRCLE)	CircleC	f9	•	f3	CALLP	Program call command (CALLP)	RESET command	RESET	f9		
f4	Fixed patter Weaving sta Command (WFP)		OLO Inching W1 Low	f10	Change Key	f4	WAX	Joint weaving Start command (WAX)	ON wait command (WAITI)	WAITI	f10		
f5	Weaving en Command (OCO Retract W1 Low	f11		f5		No function	OFF wait command (WAITJ)	WAITJ	f11		
f6	END instruction	Gas check	W1 Gas	f12		f6	DELAY SE	Timer command (DELAY)	No function		f12		

Initial layout of f keys for arc welding (when the CLAMP/ATRC key has been pressed)



Input the number of the program.

- Select the teach mode.
- While holding down [ENABLE], press [PROG/STEP].
 - >> The [Program Selection] window now opens.

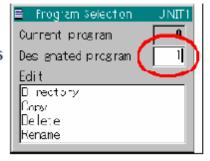




Input the number of the program in the "Designated program" field, and press [Enter].

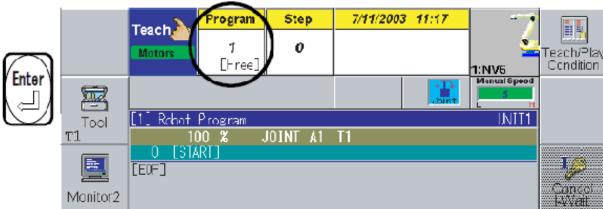
When "1" is to be specified as the program number, for instance, press the [1] numeric key.

Numeric keys



4 Press [Enter].

>> Program "1", a new program, is now opened.

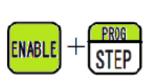


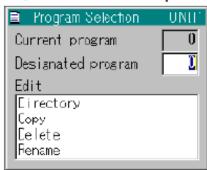
At this point, the teaching can now begin



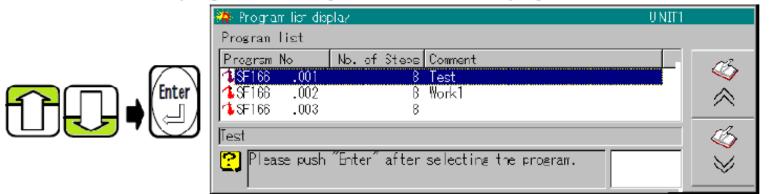
Listing the programs on the display

- Select the teach mode.
- While holdings down [ENABLE], press [PROG/STEP].
 - >> The [Program Selection] window now opens.





- Align the cursor with "Directory", and press [Enter].
 - >> A list of the programs already created is now displayed.



- Align the cursor with the program to be opened, and press [Enter].
 - >> The selected program is now opened.

