FANUC Robot series

R-30*i*A/R-30*i*B/R-30*i*B Plus CONTROLLER

Integrated Welding Control Interface

(WTC/Medar Specifications)

OPERATOR'S MANUAL

B-82684EN/02

Before using the Robot, be sure to read the "FANUC Robot Safety Manual (B-80687EN)" and understand the content.

SAFETY PRECAUTIONS

This chapter describes the precautions which must be followed to ensure the safe use of the robot.
Before using the robot, be sure to read this chapter thoroughly.

For detailed functions of the robot operation, read the relevant operator's manual to understand fully its specification.
For the safety of the operator and the system, follow all safety precautions when operating a robot and its peripheral equipment installed in a work cell.
In addition, refer to the "FANUC Robot SAFETY HANDBOOK (B-80687EN)".

1   DEFINITION OF USER

The user can be defined as follows.

Operator:
- Turns ON/OFF power to the robot
- Starts the robot program from the operator's panel

Programmer:
- Operates the robot
- Teaches the robot inside the safety fence

Maintenance engineer:
- Operates the robot
- Teaches the robot inside the safety fence
- Performs maintenance (repair, adjustment, replacement)

- Operator is not allowed to work in the safety fence.
- Programmers and maintenance engineers are allowed to work in the safety fence. The work inside the safety fence includes lifting, setting, teaching, adjustment, maintenance, etc.
- To work inside the safety fence, the person must receive a professional training for the robot.

During the operation, programming, and maintenance of your robotic system, the programmer, operator, and maintenance engineer should take additional care of their safety by wearing the following safety items.

- Adequate clothes for the operation
- Safety shoes
- A helmet

2   DEFINITION OF SAFETY NOTATIONS

To ensure the safety of users and prevent damage to the machine, this manual indicates each precaution on safety with "**WARNING**" or "**CAUTION**" according to its severity. Supplementary information is indicated by "**NOTE**".   Read the contents of each "**WARNING**", "**CAUTION**" and "**NOTE**" before using the robot.

Symbol	Definitions
⚠**WARNING**	Used if hazard resulting in the death or serious injury of the user will be expected to occur if he or she fails to follow the approved procedure.
⚠**CAUTION**	Used if a hazard resulting in the minor or moderate injury of the user, or equipment damage may be expected to occur if he or she fails to follow the approved procedure.
NOTE	Used if a supplementary explanation not related to any of WARNING and CAUTION is to be indicated.

- Check this manual thoroughly, and keep it handy for the future reference.

3   SAFETY OF THE USER

User safety is the primary safety consideration. Because it is very dangerous to enter the operating space of the robot during automatic operation, adequate safety precautions must be observed. The following lists the general safety precautions. Careful consideration must be made to ensure user safety.

(1)   Have the robot system users attend the training courses held by FANUC.

> FANUC provides various training courses.   Contact our sales office for details.

(2)   Even when the robot is stationary, it is possible that the robot is still in a ready to move state, and is waiting for a signal.   In this state, the robot is regarded as still in motion.   To ensure user safety, provide the system with an alarm to indicate visually or aurally that the robot is in motion.

(3)   Install a safety fence with a gate so that no user can enter the work area without passing through the gate.   Install an interlocking device, a safety plug, and so forth in the safety gate so that the robot is stopped as the safety gate is opened.

> The controller is designed to receive this interlocking signal of the door switch. When the gate is opened and this signal received, the controller stops the robot (Please refer to "STOP TYPE OF ROBOT" in "SAFETY PRECAUTIONS" for detail of stop type).   For connection, see Fig. 3 (b).

(4)   Provide the peripheral equipment with appropriate earth (Class A, Class B, Class C, and Class D).

(5)   Try to install the peripheral equipment outside the robot operating space.

(6)   Draw an outline on the floor, clearly indicating the range of the robot operating space, including the tools such as a hand.

(7)   Install a mat switch or photoelectric switch on the floor with an interlock to a visual or aural alarm that stops the robot when a user enters the work area.

(8)   If necessary, install a safety lock so that no one except the user in charge can turn on the power of the robot.

> The circuit breaker installed in the controller is designed to disable anyone from turning it on when it is locked with a padlock.

(9)   When adjusting each peripheral equipment independently, be sure to turn off the power of the robot.

(10) Operators should be ungloved while manipulating the operator panel or teach pendant. Operation with gloved fingers could cause an operation error.

(11) Programs, system variables, and other information can be saved on memory card or USB memories. Be sure to save the data periodically in case the data is lost in an accident. (refer to Controller OPERATOR'S MANUAL.)

(12) The robot should be transported and installed by accurately following the procedures recommended by FANUC. Wrong transportation or installation may cause the robot to fall, resulting in severe injury to workers.

(13) In the first operation of the robot after installation, the operation should be restricted to low speeds. Then, the speed should be gradually increased to check the operation of the robot.

(14) Before the robot is started, it should be checked that no one is inside the safety fence. At the same time, a check must be made to ensure that there is no risk of hazardous situations. If detected, such a situation should be eliminated before the operation.

(15) When the robot is used, the following precautions should be taken. Otherwise, the robot and peripheral equipment can be adversely affected, or workers can be severely injured.
-      Avoid using the robot in a flammable environment.
-      Avoid using the robot in an explosive environment.
-      Avoid using the robot in an environment full of radiation.
-      Avoid using the robot under water or at high humidity.
-      Avoid using the robot to carry a person or animal.
-      Avoid using the robot as a stepladder. (Never climb up on or hang from the robot.)
-      Outdoor

(16) When connecting the peripheral equipment related to stop (safety fence etc.) and each signal (external emergency, fence etc.) of robot, be sure to confirm the stop movement and do not take the wrong connection.

(17) When preparing footstep, please consider security for installation and maintenance work in high place according to Fig. 3 (c). Please consider footstep and safety belt mounting position.

RP1
Pulsecoder
RI/RO,XHBK,XROT

RM1
Motor power/brake

EARTH

Safety fence

Interlocking device and safety plug that are activated if the gate is opened.
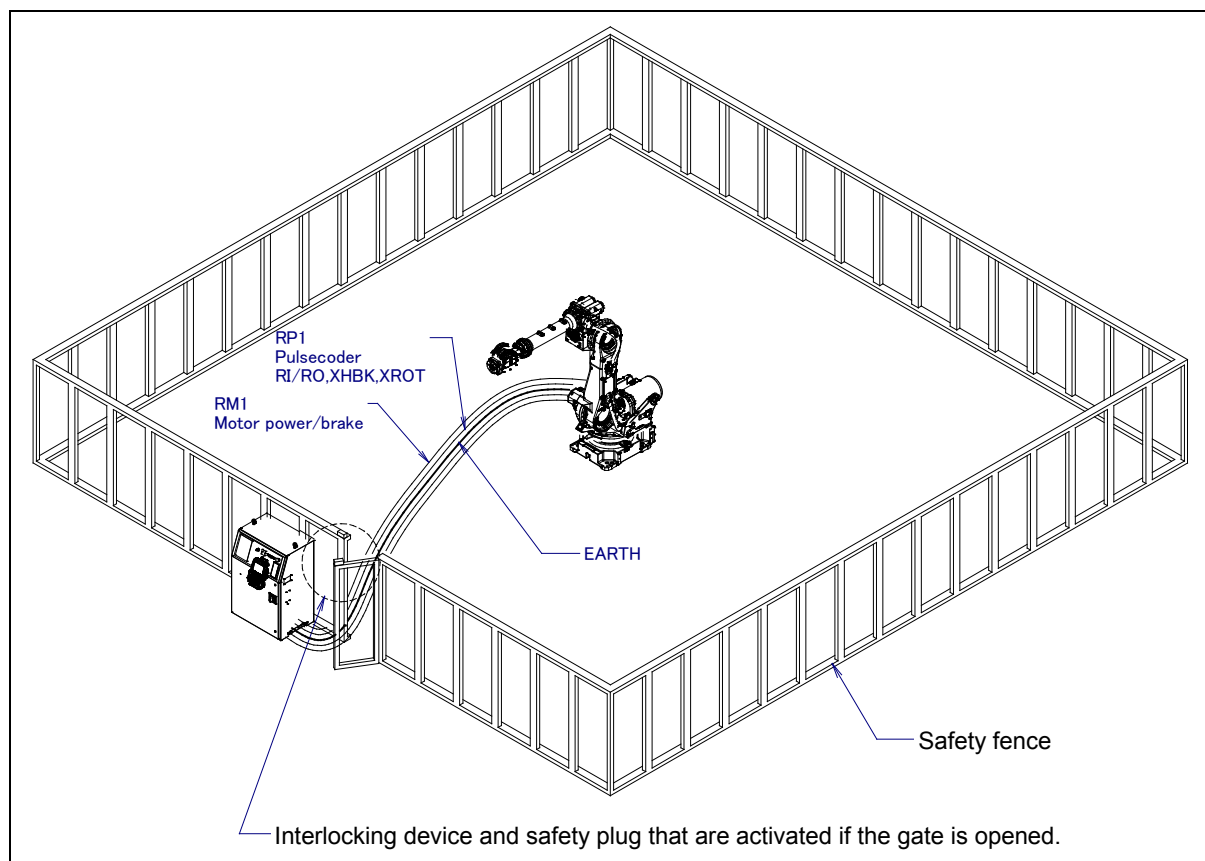
Fig. 3 (a) Safety fence and safety gate

> ⚠ **WARNING**
> When you close a fence, please confirm that there is not a person from all
> directions of the robot.

Dual chain

Emergency stop board
or Panel board

EAS1

EAS11

EAS2

EAS21

Single chain

Panel board

FENCE1

FENCE2

(Note)

For the R-30*i*B, the R-30*i*B Mate, the R-30*i*B Plus,
the R-30*i*B Mate Plus
Terminals EAS1, EAS11, EAS2, EAS21 are provided on the
emergency stop board.

For the R-30*i*A
Terminals EAS1, EAS11, EAS2, EAS21 or FENCE1, FENCE2
are provided on the emergency   stop board or connector panel.

For the R-30*i*A Mate
Terminals EAS1, EAS11, EAS2, EAS21 or FENCE1,FENCE2
are provided on the emergency stop board or in the connector
panel of CRMA64 (Open air type).

Refer to the ELECTRICAL CONNCETIONS Chapter
of CONNECTION of controller maintenance manual for details.

Fig. 3 (b) Connection diagram for the signal of safety fence
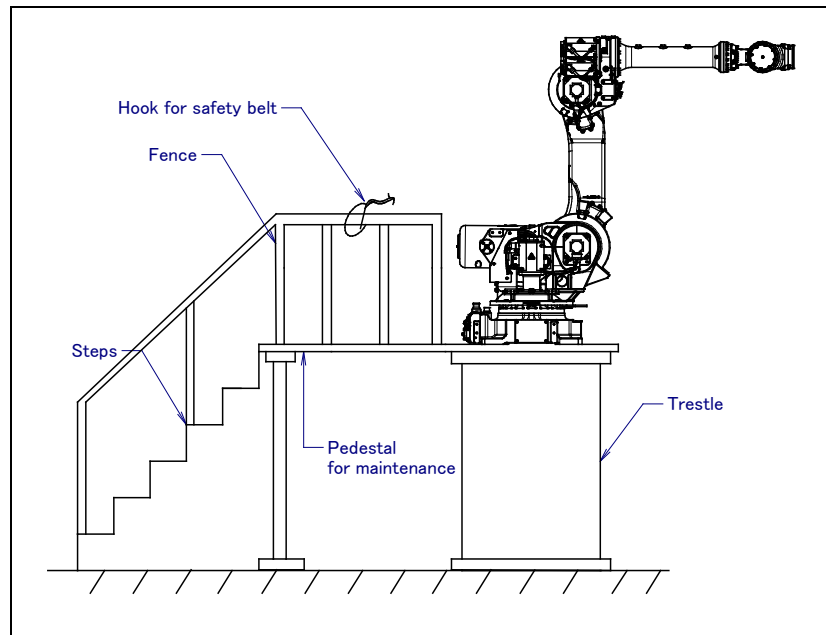
Fig. 3 (c) Pedestal for maintenance

3.1   SAFETY OF THE OPERATOR

An operator refers to a person who turns on and off the robot system and starts a robot program from, for example, the operator panel during daily operation.
Operators cannot work inside of the safety fence.

(1) If the robot does not need to be operated, turn off the robot controller power or press the EMERGENCY STOP button during working.
(2) Operate the robot system outside the operating space of the robot.
(3) Install a safety fence or safety door to avoid the accidental entry of a person other than an operator in charge or keep operator out from the hazardous place.
(4) Install the EMERGENCY STOP button within the operator's reach.

> The robot controller is designed to be connected to an external EMERGENCY STOP button. With this connection, the controller stops the robot operation (Please refer to "STOP TYPE OF ROBOT" in "SAFETY PRECAUTIONS" for detail of stop type) when the external EMERGENCY STOP button is pressed.   See the diagram below for connection.
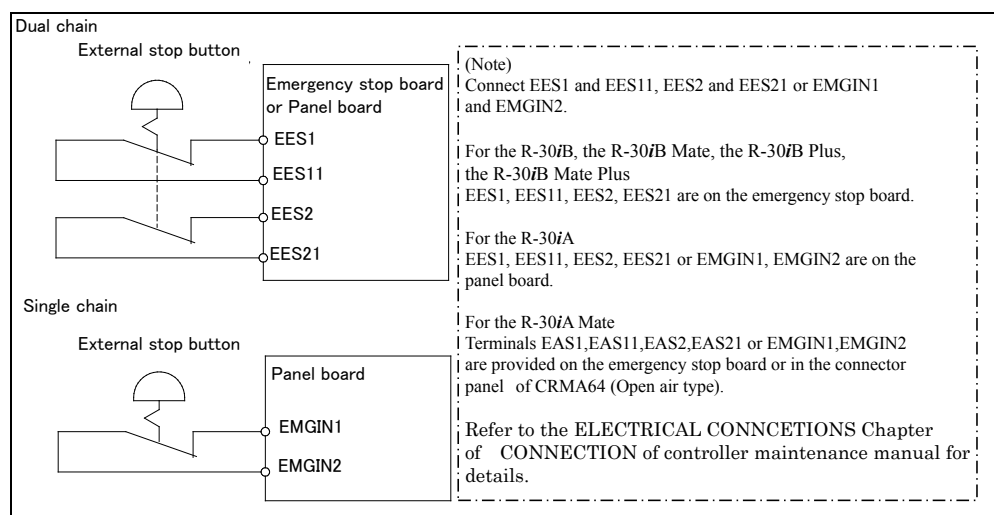
Fig. 3.1 Connection diagram for external emergency stop button

3.2   SAFETY OF THE PROGRAMMER

While teaching the robot, the operator may need to enter the robot operation area.   The programmer must ensure the safety   especially.

(1)   Unless it is specifically necessary to enter the robot operating space, carry out all tasks outside the operating space.
(2)   Before teaching the robot, check that the robot and its peripheral equipment are all in the normal operating condition.
(3)   If it is inevitable to enter the robot operating space to teach the robot, check the locations, settings, and other conditions of the safety devices (such as the EMERGENCY STOP button, the DEADMAN switch on the teach pendant) before entering the area.
(4)   The programmer must be extremely careful not to let anyone else enter the robot operating space.
(5)   Programming should be done outside the area of the safety fence as far as possible. If programming needs to be done inside the safety fence, the programmer should take the following precautions:
   -   Before entering the area of the safety fence, ensure that there is no risk of dangerous situations in the area.
   -   Be prepared to press the emergency stop button whenever necessary.
   -   Robot motions should be made at low speeds.
   -   Before starting programming, check the whole robot system status to ensure that no remote instruction to the peripheral equipment or motion would be dangerous to the user.

Our operator panel is provided with an emergency stop button and a key switch (mode switch) for selecting the automatic operation mode (AUTO) and the teach modes (T1 and T2).   Before entering the inside of the safety fence for the purpose of teaching, set the switch to a teach mode, remove the key from the mode switch to prevent other people from changing the operation mode carelessly, then open the safety gate.   If the safety gate is opened with the automatic operation mode set, the robot stops (Please refer to "**STOP TYPE OF ROBOT**" in SAFETY PRECAUTIONS for detail of stop type).   After the switch is set to a teach mode, the safety gate is disabled.   The programmer should understand that the safety gate is disabled and is responsible for keeping other people from entering the inside of the safety fence.

Teach pendant is provided with a switch to enable/disable robot operation from teach pendant and DEADMAN switch as well as emergency stop button. These button and switch function as follows:
(1) Emergency stop button: Causes the stop of the robot (Please refer to "STOP TYPE OF ROBOT" in SAFETY PRECAUTIONS for detail of stop type) when pressed.
(2) DEADMAN switch: Functions are different depending on the teach pendant enable/disable switch setting status.
   (a)   Enable: Servo power is turned off and robot stops when the operator releases the DEADMAN switch or when the operator presses the switch strongly.
   (b)   Disable: The DEADMAN switch is disabled.
   (Note)The DEADMAN switch is provided to stop the robot when the operator releases the teach pendant or presses the pendant strongly in case of emergency.   The R-30iB Plus/R-30iB Mate Plus /R-30iB/R-30iB Mate/R-30iA/R-30iA Mate employs a 3-position DEADMAN switch, which allows the robot to operate when the 3-position DEADMAN switch is pressed to its intermediate point.   When the operator releases the DEADMAN switch or presses the switch strongly, the robot stops immediately.

The operator's intention of starting teaching is determined by the controller through the dual operation of setting the teach pendant enable/disable switch to the enable position and pressing the DEADMAN switch.   The operator should make sure that the robot could operate in such conditions and be responsible in carrying out tasks safely.

Based on the risk assessment by FANUC, number of operation of DEADMAN switch should not exceed about 10000 times per year.

The teach pendant, operator panel, and peripheral device interface send each robot start signal.   However the validity of each signal changes as follows depending on the mode switch and the DEADMAN switch of the operator panel, the teach pendant enable switch and the remote condition on the software.

For the R-30iB Plus/R-30iB Mate Plus/R-30iB/R-30iB Mate/R-30iA Controller
or CE or RIA specification of the R-30iA Mate Controller

Mode	Teach pendant enable switch	Software remote condition	Teach pendant	Operator panel	Peripheral device
AUTO mode	On	Local	Not allowed	Not allowed	Not allowed
		Remote	Not allowed	Not allowed	Not allowed
	Off	Local	Not allowed	Allowed to start	Not allowed
		Remote	Not allowed	Not allowed	Allowed to start
T1, T2 mode	On	Local	Allowed to start	Not allowed	Not allowed
		Remote	Allowed to start	Not allowed	Not allowed
	Off	Local	Not allowed	Not allowed	Not allowed
		Remote	Not allowed	Not allowed	Not allowed

T1,T2 mode: DEADMAN switch is effective.

For the standard specification of R-30iA Mate Controller

Teach pendant enable switch	Software remote condition	Teach pendant	Peripheral device
On	Ignored	Allowed to start	Not allowed
Off	Local	Not allowed	Not allowed
	Remote	Not allowed	Allowed to start

(6)   (Only when R-30iB Plus/R-30iB Mate Plus/R-30iB/R-30iB Mate /R-30iA Controller or CE or RIA specification of R-30iA Mate controller is selected.) To start the system using the operator panel, make certain that nobody is in the robot operating space and that there are no abnormal conditions in the robot operating space.

(7)   When a program is completed, be sure to carry out the test operation according to the following procedure.

(a)   Run the program for at least one operation cycle in the single step mode at low speed.

(b)   Run the program for at least one operation cycle in the continuous operation mode at low speed.

(c)   Run the program for one operation cycle in the continuous operation mode at the intermediate speed and check that no abnormalities occur due to a delay in timing.

(d)   Run the program for one operation cycle in the continuous operation mode at the normal operating speed, and check that the system operates automatically without trouble.

(e)   After checking the completeness of the program through the test operation above, execute it in the automatic operation mode.

(8)   While operating the system in the automatic operation mode, the teach pendant operator must leave the safety fence.

3.3   SAFETY OF THE MAINTENANCE ENGINEER

For the safety of maintenance engineer personnel, pay utmost attention to the following.

(1)   During operation, never enter the robot operating space.

(2)   A hazardous situation may arise when the robot or the system, are kept with their power-on during maintenance operations. Therefore, for any maintenance operation, the robot and the system should be put into the power-off state. If necessary, a lock should be in place in order to prevent any other person from turning on the robot and/or the system. In case maintenance needs to be executed in the power-on state, the emergency stop button must be pressed.

(3)   If it becomes necessary to enter the robot operating space while the power is on, press the emergency stop button on the operator box or operator panel, or the teach pendant before entering the range.   The maintenance worker must indicate that maintenance work is in progress and be careful not to allow other people to operate the robot carelessly.

(4)   When entering the area enclosed by the safety fence, the worker must check the whole robot system in order to make sure no dangerous situations exist. In case the worker needs to enter the safety area whilst a dangerous situation exists, extreme care must be taken, and whole robot system status must be carefully monitored.

(5)   Before the maintenance of the pneumatic system is started, the supply pressure should be shut off and the pressure in the piping should be reduced to zero.

(6)   Before the start of maintenance work, check that the robot and its peripheral equipment are all in the normal operating condition.

(7)   Do not operate the robot in the automatic operation while anybody is in the robot operating space.

(8)   When you maintain the robot alongside a wall or instrument, or when multiple users are working nearby, make certain that their escape path is not obstructed.

(9)   When a tool is mounted on the robot, or when any movable device other than the robot is installed, such as belt conveyor, pay careful attention to its motion.

(10) If necessary, have a user who is familiar with the robot system stand beside the operator panel and observe the work being performed.   If any danger arises, the user should be ready to press the EMERGENCY STOP button at any time.

(11) When replacing a part, please contact your local FANUC representative. If a wrong procedure is followed, an accident may occur, causing damage to the robot and injury to the user.

(12) When replacing or reinstalling components, take care to prevent foreign material from entering the system.

(13) When handling each unit or printed circuit board in the controller during inspection, turn off the circuit breaker to protect against electric shock.
     If there are two cabinets, turn off the both circuit breaker.

(14) A part should be replaced with a part recommended by FANUC. If other parts are used, malfunction or damage would occur. Especially, a fuse that is not recommended by FANUC should not be used. Such a fuse may cause a fire.

(15) When restarting the robot system after completing maintenance work, make sure in advance that there is no person in the operating space and that the robot and the peripheral equipment are not abnormal.

(16) When a motor or brake is removed, the robot arm should be supported with a crane or other equipment beforehand so that the arm would not fall during the removal.

(17) Whenever grease is spilled on the floor, it should be removed as quickly as possible to prevent dangerous falls.

(18) The following parts are heated. If a maintenance user needs to touch such a part in the heated state, the user should wear heat-resistant gloves or use other protective tools.
   -      Servo motor
   -      Inside the controller
   -      Reducer
   -      Gearbox
   -      Wrist unit

(19) Maintenance should be done under suitable light. Care must be taken that the light would not cause any danger.

(20) When a motor, reducer, or other heavy load is handled, a crane or other equipment should be used to protect maintenance workers from excessive load. Otherwise, the maintenance workers would be severely injured.

(21) The robot should not be stepped on or climbed up during maintenance. If it is attempted, the robot would be adversely affected. In addition, a misstep can cause injury to the worker.

(22) When performing maintenance work in high place, secure a footstep and wear safety belt.

(23) After the maintenance is completed, spilled oil or water and metal chips should be removed from the floor around the robot and within the safety fence.

(24) When a part is replaced, all bolts and other related components should put back into their original places. A careful check must be given to ensure that no components are missing or left not mounted.

(25) In case robot motion is required during maintenance, the following precautions should be taken :
   - Foresee an escape route. And during the maintenance motion itself, monitor continuously the whole robot system so that your escape route will not become blocked by the robot, or by peripheral equipment.
   - Always pay attention to potentially dangerous situations, and be prepared to press the emergency stop button whenever necessary.

(26) The robot should be periodically inspected. (Refer to the robot mechanical manual and controller maintenance manual.) A failure to do the periodical inspection can adversely affect the performance or service life of the robot and may cause an accident

(27) After a part is replaced, a test execution should be given for the robot according to a predetermined method. (See TESTING section of "Controller operator's manual".) During the test execution, the maintenance worker should work outside the safety fence.

4 SAFETY OF THE TOOLS AND PERIPHERAL EQUIPMENT

4.1 PRECAUTIONS IN PROGRAMMING

(1) Use a limit switch or other sensor to detect a dangerous condition and, if necessary, design the program to stop the robot when the sensor signal is received.

(2) Design the program to stop the robot when an abnormality occurs in any other robots or peripheral equipment, even though the robot itself is normal.

(3) For a system in which the robot and its peripheral equipment are in synchronous motion, particular care must be taken in programming so that they do not interfere with each other.

(4) Provide a suitable interface between the robot and its peripheral equipment so that the robot can detect the states of all devices in the system and can be stopped according to the states.

4.2 PRECAUTIONS FOR MECHANISM

(1) Keep the component cells of the robot system clean, operate the robot where insulated from the influence of oil, water, and dust.

(2) Don't use unconfirmed liquid for cutting fluid and cleaning fluid.

(3) Adopt limit switches or mechanical stoppers to limit the robot motion, and avoid the robot from collisions against peripheral equipment or tools.

(4) Observe the following precautions about the mechanical unit cables. Failure to follow precautions may cause problems.
- Use mechanical unit cable that have required user interface.
- Do not add user cable or hose to inside of the mechanical unit.
- Please do not obstruct the movement of the mechanical unit when cables are added to outside of mechanical unit.
- In the case of the model that a cable is exposed, please do not perform remodeling (Adding a protective cover and fix an outside cable more) obstructing the behavior of the outcrop of the cable.
- When installing user peripheral equipment on the robot mechanical unit, please pay attention that the device does not interfere with the robot itself.

(5) The frequent power-off stop for the robot during operation causes the trouble of the robot. Please avoid the system construction that power-off stop would be operated routinely. (Refer to bad case example.) Please perform power-off stop after reducing the speed of the robot and stopping it by hold stop or cycle stop when it is not urgent. (Please refer to "STOP TYPE OF ROBOT" in "SAFETY PRECAUTIONS" for detail of stop type.)
(Bad case example)
- Whenever poor product is generated, a line stops by emergency stop and power-off of the robot is incurred.
- When alteration is necessary, safety switch is operated by opening safety fence and power-off stop is incurred for the robot during operation.
- An operator pushes the emergency stop button frequently, and a line stops.
- An area sensor or a mat switch connected to safety signal operates routinely and power-off stop is incurred for the robot.
- Power-off stop is regularly incurred due to an inappropriate setting for Dual Check Safety (DCS).

(6) Power-off stop of Robot is executed when collision detection alarm (SRVO-050) etc. occurs. Please try to avoid unnecessary power-off stops. It may cause the trouble of the robot, too. So remove the causes of the alarm.

5 SAFETY OF THE ROBOT MECHANICAL UNIT

5.1 PRECAUTIONS IN OPERATION

(1) When operating the robot in the jog mode, set it at an appropriate speed so that the operator can manage the robot in any eventuality.
(2) Before pressing the jog key, be sure you know in advance what motion the robot will perform in the jog mode.

5.2 PRECAUTIONS IN PROGRAMMING

(1) When the operating spaces of robots overlap, make certain that the motions of the robots do not interfere with each other.
(2) Be sure to specify the predetermined work origin in a motion program for the robot and program the motion so that it starts from the origin and terminates at the origin. Make it possible for the operator to easily distinguish at a glance that the robot motion has terminated.

5.3 PRECAUTIONS FOR MECHANISMS

Keep the robot operation area clean, and operate the robot in an environment free of grease, water, and dust.

5.4 PROCEDURE TO MOVE ARM WITHOUT DRIVE POWER IN EMERGENCY OR ABNORMAL SITUATIONS

For emergency or abnormal situations (e.g. persons trapped in or pinched by the robot), brake release unit can be used to move the robot axes without drive power.
Please refer to controller maintenance manual and mechanical unit operator's manual for using method of brake release unit and method of supporting robot.

6 SAFETY OF THE END EFFECTOR

6.1 PRECAUTIONS IN PROGRAMMING

(1) To control the pneumatic, hydraulic and electric actuators, carefully consider the necessary time delay after issuing each control command up to actual motion and ensure safe control.
(2) Provide the end effector with a limit switch, and control the robot system by monitoring the state of the end effector.

7 STOP TYPE OF ROBOT (R-30*i*A, R-30*i*A Mate)

The following three robot stop types exist:

Power-Off Stop (Category 0 following IEC 60204-1)

Servo power is turned off and the robot stops immediately. Servo power is turned off when the robot is moving, and the motion path of the deceleration is uncontrolled.
The following processing is performed at Power-Off stop.
- An alarm is generated and servo power is turned off.
- The robot operation is stopped immediately. Execution of the program is paused.

Frequent Power-Off stop of the robot during operation can cause mechanical problems of the robot.
Avoid system designs that require routine or frequent Power-Off stop conditions.

Controlled stop (Category 1 following IEC 60204-1)

The robot is decelerated until it stops, and servo power is turned off.
The following processing is performed at Controlled stop.
- The alarm "SRVO-199 Controlled stop" occurs along with a decelerated stop. Execution of the program is paused.
- An alarm is generated and servo power is turned off.

Hold (Category 2 following IEC 60204-1)

The robot is decelerated until it stops, and servo power remains on.
The following processing is performed at Hold.
- The robot operation is decelerated until it stops. Execution of the program is paused.

⚠ **WARNING**
1 The stopping distance and time of Controlled stop is longer than those of Power-Off stop. A risk assessment for the whole robot system which takes into consideration the increased stopping distance and stopping time is necessary when Controlled stop is used. Please refer to the operator's manual of a particular robot model for the data of stopping distance and time.
2 In multi arm system, the longest stopping distance and time of Controlled Stop among each robot are adopted as those for the system. A risk assessment for the whole robot system which takes into consideration a possibility that the stopping distance and time increase, is necessary on the multi arm system.
3 In the system which has extended axis, the longer stopping distance and time of Controlled Stop among robot and extended axis are adopted as those for the system. A risk assessment for the whole robot system which takes into consideration a possibility that the stopping distance and time increase, is necessary on the system which has extended axis. Please refer to the extended axis setup procedure of the controller operator's manual for considering the stopping distance and time of the extended axis.
4 In case of Controlled stop, motor power shutdown is delayed for a maximum of 2 seconds. In this case, a risk assessment for the whole robot system is necessary, including the 2 seconds delay.

When the emergency stop button is pressed or the FENCE is open, the stop type of robot is Power-Off stop or Controlled stop. The configuration of stop type for each situation is called *stop pattern*. The stop pattern is different according to the controller type or option configuration.

There are the following 3 Stop patterns.

Stop pattern	Mode	Emergency stop button	External Emergency stop	FENCE open	SVOFF input	Servo disconnect
A	AUTO	P-Stop	P-Stop	C-Stop	C-Stop	P-Stop
	T1	P-Stop	P-Stop	-	C-Stop	P-Stop
	T2	P-Stop	P-Stop	-	C-Stop	P-Stop
B	AUTO	P-Stop	P-Stop	P-Stop	P-Stop	P-Stop
	T1	P-Stop	P-Stop	-	P-Stop	P-Stop
	T2	P-Stop	P-Stop	-	P-Stop	P-Stop
C	AUTO	C-Stop	C-Stop	C-Stop	C-Stop	C-Stop
	T1	P-Stop	P-Stop	-	C-Stop	P-Stop
	T2	P-Stop	P-Stop	-	C-Stop	P-Stop

P-Stop: Power-Off stop
C-Stop: Controlled stop
-: Disable

The following table indicates the Stop pattern according to the controller type or option configuration.

Option	R-30iA				R-30iA Mate		
	Standard (Single)	Standard (Dual)	RIA type	CE type	Standard	RIA type	CE type
Standard	B (*)	A	A	A	A (**)	A	A
Stop type set (Stop pattern C) (A05B-2500-J570)	N/A	N/A	C	C	N/A	C	C

 (*) R-30iA standard (single) does not have servo disconnect.
(**) R-30iA Mate Standard does not have servo disconnect, and the stop type of SVOFF input is Power-Off stop.

The stop pattern of the controller is displayed in "Stop pattern" line in software version screen. Please refer to "Software version" in operator's manual of controller for the detail of software version screen.

"Controlled stop by E-Stop" option
When "Stop type set (Stop pattern C) (A05B-2500-J570)" option is specified, the stop type of the following alarms becomes Controlled stop but only in AUTO mode. In T1 or T2 mode, the stop type is Power-Off stop which is the normal operation of the system.

Alarm	Condition
SRVO-001 Operator panel E-stop	Operator panel emergency stop is pressed.
SRVO-002 Teach pendant E-stop	Teach pendant emergency stop is pressed.
SRVO-007 External emergency stops	External emergency stop input (EES1-EES11, EES2-EES21) is open. (R-30iA controller)
SRVO-194 Servo disconnect	Servo disconnect input (SD4-SD41, SD5-SD51) is open. (R-30iA controller)
SRVO-218 Ext.E-stop/Servo Disconnect	External emergency stop input (EES1-EES11, EES2-EES21) is open. (R-30iA Mate controller)
SRVO-408 DCS SSO Ext Emergency Stop	In DCS Safe I/O connect function, SSO[3] is OFF.
SRVO-409 DCS SSO Servo Disconnect	In DCS Safe I/O connect function, SSO[4] is OFF.

Controlled stop is different from Power-Off stop as follows:
-     In Controlled stop, the robot is stopped on the program path. This function is effective for a system where the robot can interfere with other devices if it deviates from the program path.
-     In Controlled stop, physical impact is less than Power-Off stop. This function is effective for systems where the physical impact to the mechanical unit or EOAT (End Of Arm Tool) should be minimized.
-     The stopping distance and stopping time of Controlled stop is longer than the stopping distance and stopping time of Power-Off stop, depending on the robot model and axis. Please refer to the operator's manual of a particular robot model for the data of stopping distance and stopping time.

For the R-30*i*A or R-30*i*A Mate, this function is available only in CE or RIA type hardware.

When this option is loaded, this function cannot be disabled.

The stop type of DCS Position and Speed Check functions is not affected by the loading of this option.

⚠ **WARNING**
   The stopping distance and stopping time of Controlled stop are longer than the stopping distance and stopping time of Power-Off stop. A risk assessment for the whole robot system, which takes into consideration the increased stopping distance and stopping time, is necessary when this option is loaded.

---

8   STOP TYPE OF ROBOT (R-30*i*B, R-30*i*B Mate)

There are following four types of Stopping Robot.

Power-Off Stop (Category 0 following IEC 60204-1)
Servo power is turned off, and the robot stops immediately. Servo power is turned off when the robot is moving, and the motion path of the deceleration is uncontrolled.
"**Power-Off stop**" performs following processing.
•   An alarm is generated, and then the servo power turns off. Instantly the robot stops.
•   Execution of the program is paused.
Frequent Power-Off stop of the robot during operation can cause mechanical problems of the robot.
Avoid system designs that require routine or frequent Power-Off stop conditions.

Controlled stop (Category 1 following IEC 60204-1)
The robot is decelerated until it stops, and servo power is turned off.
"**Controlled stop**" performs following processing.
•   The alarm "**SRVO-199 Controlled stop**" occurs along with a decelerated stop. The program execution is paused.
•   An alarm is generated, and then the servo power turns off.

Smooth stop (Category 1 following IEC 60204-1)
The robot is decelerated until it stops, and servo power is turned off.
"**Smooth stop**" performs following processing.
•   The alarm "**SRVO-289 Smooth Stop**" occurs along with a decelerated stop. The program execution is paused.
•   An alarm is generated, and then the servo power turns off.

- In Smooth stop, the robot decelerates until it stops with the deceleration time shorter than Controlled stop.

Hold (Category 2 following IEC 60204-1)

The robot is decelerated until it stops, and servo power remains on.
"**Hold**" performs following processing.

- The robot operation is decelerated until it stops. Execution of the program is paused.

⚠ **WARNING**

5   The stopping distance and time of Controlled stop and Smooth stop are longer than those of Power-Off stop. A risk assessment for the whole robot system which takes into consideration the increased stopping distance and stopping time is necessary when Controlled stop or Smooth Stop is used. Please refer to the operator's manual of a particular robot model for the data of stopping distance and time.

6   In multi arm system, the longest stopping distance and time of Controlled Stop or Smooth Stop among each robot are adopted as those for the system. A risk assessment for the whole robot system which takes into consideration a possibility that the stopping distance and time increase, is necessary on the multi arm system.

7   In the system which has extended axis, the longer stopping distance and time of Controlled Stop or Smooth Stop among robot and extended axis are adopted as those for the system. A risk assessment for the whole robot system which takes into consideration a possibility that the stopping distance and time increase, is necessary on the system which has extended axis. Please refer to the extended axis setup procedure of the controller operator's manual for considering the stopping distance and time of the extended axis.

8   When Smooth stop occurs during deceleration by Controlled stop, the stop type of robot is changed to Power-Off Stop.
    When Smooth stop occurs during deceleration by Hold, the stop type of robot is changed to Power-Off Stop.

9   In case of Controlled stop or Smooth Stop, motor power shutdown is delayed for a maximum of 2 seconds. In this case, a risk assessment for the whole robot system is necessary, including the 2 seconds delay.

When the emergency stop button is pressed or the FENCE is open, the stop type of robot is Power-Off stop, Controlled stop, or Smooth stop. The configuration of stop type for each situation is called *stop pattern*. The stop pattern is different according to the option configuration.

There are the following 3 Stop patterns.

Stop pattern	Mode	Emergency stop button	External Emergency stop	FENCE open	SVOFF input	Deadman switch (*)
A	AUTO	P-Stop	P-Stop	C-Stop	C-Stop	-
	T1	P-Stop	P-Stop	-	C-Stop	P-Stop
	T2	P-Stop	P-Stop	-	C-Stop	P-Stop
C	AUTO	C-Stop	C-Stop	C-Stop	C-Stop	-
	T1	P-Stop	P-Stop	-	C-Stop	P-Stop
	T2	P-Stop	P-Stop	-	C-Stop	P-Stop
D	AUTO	S-Stop	S-Stop	C-Stop	C-Stop	-
	T1	S-Stop	S-Stop	-	C-Stop	S-Stop
	T2	S-Stop	S-Stop	-	C-Stop	S-Stop

P-Stop: Power-Off stop
C-Stop: Controlled stop
S-Stop: Smooth stop
-: Disable
(*) The stop pattern of NTED input is same as Deadman switch.

The following table indicates the Stop pattern according to the controller type or option configuration.

Option	R-30*i*B/ R-30*i*B Mate
Standard	A(**)
Controlled stop by E-Stop (A05B-2600-J570)	C(**)
Smooth E-Stop (A05B-2600-J651)	D(**)

(**)R-30*i*B Mate does not have SVOFF input.

The stop pattern of the controller is displayed in "Stop pattern" line in software version screen. Please refer to "Software version" in operator's manual of controller for the detail of software version screen.

"Controlled stop by E-Stop" option

When "**Controlled stop by E-Stop**" (A05B-2600-J570) option is specified, the stop type of the following alarms become Controlled stop but only in AUTO mode. In T1 or T2 mode, the stop type is Power-Off stop which is the normal operation of the system.

Alarm	Condition
SRVO-001 Operator panel E-stop	Operator panel emergency stop is pressed.
SRVO-002 Teach pendant E-stop	Teach pendant emergency stop is pressed.
SRVO-007 External emergency stops	External emergency stop input (EES1-EES11, EES2-EES21) is open.
SRVO-408 DCS SSO Ext Emergency Stop	In DCS Safe I/O connect function, SSO[3] is OFF.
SRVO-409 DCS SSO Servo Disconnect	In DCS Safe I/O connect function, SSO[4] is OFF.

Controlled stop is different from **Power-Off stop** as follows:
- In Controlled stop, the robot is stopped on the program path. This function is effective for a system where the robot can interfere with other devices if it deviates from the program path.
- In Controlled stop, physical impact is less than Power-Off stop. This function is effective for systems where the physical impact to the mechanical unit or EOAT (End Of Arm Tool) should be minimized.
- The stopping distance and time of Controlled stop is longer than those of Power-Off stop, depending on the robot model and axis.

When this option is loaded, this function cannot be disabled.

The stop type of DCS Position and Speed Check functions is not affected by the loading of this option.

> ⚠ **WARNING**
> The stopping distance and time of Controlled stop are longer than those of Power-Off stop. A risk assessment for the whole robot system which takes into consideration the increased stopping distance and stopping time, is necessary when this option is loaded.

"Smooth E-Stop Function" option

When "**Smooth E-Stop Function**" (A05B-2600-J651) option is specified, the stop type of the following alarms becomes Smooth stop in all operation modes (AUTO, T1 and T2 mode).

Alarm	Condition
SRVO-001 Operator panel E-stop	Operator panel emergency stop is pressed.
SRVO-002 Teach pendant E-stop	Teach pendant emergency stop is pressed.
SRVO-003 Deadman switch released	Both deadman switches on Teach pendant are released.
SRVO-007 External emergency stops	External emergency stop input (EES1-EES11, EES2-EES21) is open.
SRVO-037 IMSTP input (Group: %d)	IMSTP input (*IMSTP signal for a peripheral device interface) is OFF.
SRVO-232 NTED input	NTED input (NTED1-NTED11, NTED2-NTED21) is open.
SRVO-408 DCS SSO Ext Emergency Stop	In DCS Safe I/O connect function, SSO[3] is OFF.
SRVO-409 DCS SSO Servo Disconnect	In DCS Safe I/O connect function, SSO[4] is OFF.
SRVO-410 DCS SSO NTED input	In DCS Safe I/O connect function, SSO[5] is OFF.
SRVO-419 DCS PROFIsafe comm. error	PROFINET Safety communication error occurs.

Smooth stop is different from **Power-Off stop** as follows:
- In Smooth stop, the robot is stopped along the program path. This function is effective for a system where the robot can interfere with other devices if it deviates from the program path.
- In Smooth stop, physical impact is less than Power-Off stop. This function is effective for systems where the physical impact to the mechanical unit or EOAT (End Of Arm Tool) should be minimized.
- The stopping distance and time of Smooth stop is longer than those of Power-Off stop, depending on the robot model and axis.

Smooth stop is different from **Controlled stop** as follows:
- The stopping distance and time of Smooth stop is normally shorter than those of Controlled stop, depending on the robot model and axis.

When this option is loaded, this function cannot be disabled.

The stop type of DCS Position and Speed Check functions is not affected by the loading of this option.

> ⚠ **WARNING**
> The stopping distance and time of Smooth stop are longer than those of Power-Off stop. A risk assessment for the whole robot system which takes into consideration the increased stopping distance and stopping time, is necessary when this option is loaded.

9 STOP TYPE OF ROBOT (R-30*i*B Plus, R-30*i*B Mate Plus)

There are following three types of Stop Category.

Stop Category 0 following IEC 60204-1 (Power-off Stop)

Servo power is turned off, and the robot stops immediately. Servo power is turned off when the robot is moving, and the motion path of the deceleration is uncontrolled.

"**Stop Category 0**" performs following processing.

- An alarm is generated, and then the servo power turns off. Instantly the robot stops.
- Execution of the program is paused.

Frequent Category 0 Stop of the robot during operation can cause mechanical problems of the robot.
Avoid system designs that require routine or frequent Category 0 Stop conditions.

Stop Category 1 following IEC 60204-1 (Controlled Stop, Smooth Stop)

The robot is decelerated until it stops, and servo power is turned off.

"**Stop Category 1**" performs following processing.

- The alarm **"SRVO-199 Controlled stop"** or **"SRVO-289 Smooth Stop"** occurs along with a decelerated stop. The program execution is paused.
- An alarm is generated, and then the servo power turns off.

In Smooth stop, the robot decelerates until it stops with the deceleration time shorter than Controlled stop.
The stop type of Stop Category 1 is different according to the robot model or option configuration. Please refer to the operator's manual of a particular robot model.

Stop Category 2 following IEC 60204-1 (Hold)

The robot is decelerated until it stops, and servo power remains on.

"**Stop Category 2**" performs following processing.

- The robot operation is decelerated until it stops. Execution of the program is paused.

> ⚠ **WARNING**
> 1 The stopping distance and time of Stop Category 1 are longer than those of Stop Category 0. A risk assessment for the whole robot system which takes into consideration the increased stopping distance and stopping time is necessary when Stop Category 1 is used. Please refer to the operator's manual of a particular robot model for the data of stopping distance and time.
> 2 In multi arm system, the longest stopping distance and time of Stop Category 1 among each robot are adopted as those for the system. A risk assessment for the whole robot system which takes into consideration a possibility that the stopping distance and time increase, is necessary on the multi arm system.
> 3 In the system which has extended axis, the longer stopping distance and time of Stop Category 1 among robot and extended axis are adopted as those for the system. A risk assessment for the whole robot system which takes into consideration a possibility that the stopping distance and time increase, is necessary on the system which has extended axis. Please refer to the extended axis setup procedure of the controller operator's manual for considering the stopping distance and time of the extended axis.
> 4 When Stop Category 1 occurs during deceleration by Stop Category 2, the stop type of robot is changed to Stop Category 0.
> 5 In case of Stop Category 1, motor power shutdown is delayed for a maximum of 2 seconds. In this case, a risk assessment for the whole robot system is necessary, including the 2 seconds delay.

When the emergency stop button is pressed or the FENCE is open, the stop type of robot is Stop Category 0 or Stop Category 1. The configuration of stop type for each situation is called *stop pattern*. The stop pattern is different according to the option configuration.

There are the following 3 Stop patterns.

Stop pattern	Mode	Emergency stop button	External Emergency stop	FENCE open	SVOFF input	Deadman switch (*)
A	AUTO	Category 0	Category 0	Category 1	Category 1	-
	T1	Category 0	Category 0	-	Category 1	Category 0
	T2	Category 0	Category 0	-	Category 1	Category 0
C	AUTO	Category 1	Category 1	Category 1	Category 1	-
	T1	Category 0	Category 0	-	Category 1	Category 0
	T2	Category 0	Category 0	-	Category 1	Category 0
D	AUTO	Category 1	Category 1	Category 1	Category 1	-
	T1	Category 1	Category 1	-	Category 1	Category 1
	T2	Category 1	Category 1	-	Category 1	Category 1

Category 0:   Stop Category 0
Category 1:   Stop Category 1
-:   Disable
 (*) The stop pattern of NTED input is same as Deadman switch.
The following table indicates the Stop pattern according to the controller type or option configuration. The case R651 is specified.

Option	R-30*i*B Plus/ R-30*i*B Mate Plus
Standard	C(**)
Old Stop Function (A05B-2670-J680)	A(**)
All Smooth Stop Function (A05B-2670-J651)	D(**)

The case R650 is specified.

Option	R-30*i*B Plus/ R-30*i*B Mate Plus
Standard	A(**)
Stop Category 1 by E-Stop (A05B-2670-J521)	C(**)
All Smooth Stop Function (A05B-2670-J651)	D(**)

 (**)R-30*i*B Mate Plus does not have SVOFF input.

The stop pattern of the controller is displayed in "Stop pattern" line in software version screen. Please refer to "Software version" in operator's manual of controller for the detail of software version screen.

"Old Stop Function" option

When "**Old Stop Function**" (A05B-2670-J680) option is specified, the stop type of the following alarms becomes Stop Category 0 in AUTO mode.

Alarm	Condition
SRVO-001 Operator panel E-stop	Operator panel emergency stop is pressed.
SRVO-002 Teach pendant E-stop	Teach pendant emergency stop is pressed.
SRVO-007 External emergency stops	External emergency stop input (EES1-EES11, EES2-EES21) is open.
SRVO-408 DCS SSO Ext Emergency Stop	In DCS Safe I/O connect function, SSO[3] is OFF.
SRVO-409 DCS SSO Servo Disconnect	In DCS Safe I/O connect function, SSO[4] is OFF.

Stop Category 0 is different from **Stop Category 1** as follows:
- In Stop Category 0, servo power is turned off, and the robot stops immediately. Servo power is turned off when the robot is moving, and the motion path of the deceleration is uncontrolled.
- The stopping distance and time of Stop Category 0 is shorter than those of Stop Category 1, depending on the robot model and axis.

When this option is loaded, this function cannot be disabled.

The stop type of DCS Position and Speed Check functions is not affected by the loading of this option.

"All Smooth Stop Function" option

When "**All Smooth Stop Function**" (A05B-2670-J651) option is specified, the stop type of the following alarms becomes Stop Category 1 in all operation modes (AUTO, T1 and T2 mode).

Alarm	Condition
SRVO-001 Operator panel E-stop	Operator panel emergency stop is pressed.
SRVO-002 Teach pendant E-stop	Teach pendant emergency stop is pressed.
SRVO-003 Deadman switch released	Both deadman switches on Teach pendant are released.
SRVO-007 External emergency stops	External emergency stop input (EES1-EES11, EES2-EES21) is open.
SRVO-037 IMSTP input (Group: %d)	IMSTP input (*IMSTP signal for a peripheral device interface) is ON.
SRVO-232 NTED input	NTED input (NTED1-NTED11, NTED2-NTED21) is open.
SRVO-408 DCS SSO Ext Emergency Stop	In DCS Safe I/O connect function, SSO[3] is OFF.
SRVO-409 DCS SSO Servo Disconnect	In DCS Safe I/O connect function, SSO[4] is OFF.
SRVO-410 DCS SSO Ext Emergency Stop	In DCS Safe I/O connect function, SSO[5] is OFF.
SRVO-419 DCS PROFIsafe comm. error	PROFINET Safety communication error occurs.

Stop Category 1 is different from **Stop Category 0** as follows:
- In Stop Category 1, the robot is stopped along the program path. This function is effective for a system where the robot can interfere with other devices if it deviates from the program path.

- In Stop Category 1, physical impact is less than Stop Category 0. This function is effective for systems where the physical impact to the mechanical unit or EOAT (End of Arm Tool) should be minimized.
- The stopping distance and time of Stop Category 1 is longer than those of Stop Category 0, depending on the robot model and axis.

When this option is loaded, this function cannot be disabled.

The stop type of DCS Position and Speed Check functions is not affected by the loading of this option.

> ⚠ **WARNING**
> The stopping distance and time of Stop Category 1 are longer than those of Stop Category 0. A risk assessment for the whole robot system which takes into consideration the increased stopping distance and stopping time, is necessary when this option is loaded.

"Stop Category 1 by E-Stop" option

When "**Stop Category 1 by E-Stop**" (A05B-2670-J521) option is specified, the stop type of the following alarms become Category 1 Stop but only in AUTO mode. In T1 or T2 mode, the stop type is Category 0 Stop which is the normal operation of the system.

Alarm	Condition
SRVO-001 Operator panel E-stop	Operator panel emergency stop is pressed.
SRVO-002 Teach pendant E-stop	Teach pendant emergency stop is pressed.
SRVO-007 External emergency stops	External emergency stop input (EES1-EES11, EES2-EES21) is open.
SRVO-408 DCS SSO Ext Emergency Stop	In DCS Safe I/O connect function, SSO[3] is OFF.
SRVO-409 DCS SSO Servo Disconnect	In DCS Safe I/O connect function, SSO[4] is OFF.

Stop Category 1 is different from **Stop Category 0** as follows:
- In Stop Category 1, the robot is stopped along the program path. This function is effective for a system where the robot can interfere with other devices if it deviates from the program path.
- In Stop Category 1, physical impact is less than Stop Category 0. This function is effective for systems where the physical impact to the mechanical unit or EOAT (End of Arm Tool) should be minimized.
- The stopping distance and time of Stop Category 1 is longer than those of Stop Category 0, depending on the robot model and axis.

When this option is loaded, this function cannot be disabled.

The stop type of DCS Position and Speed Check functions is not affected by the loading of this option.

> ⚠ **WARNING**
> The stopping distance and time of Stop Category 1 are longer than those of Stop Category 0. A risk assessment for the whole robot system which takes into consideration the increased stopping distance and stopping time, is necessary when this option is loaded.

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TABLE OF CONTENTS

1   OVERVIEW

1.1   ABSTRACT OF FUNCTION

This function is to build in welding timer board (*1) to robot controller, to enable robot controller to edit weld sequence and to manage data such as welding data and alarms.

(*1) This corresponds to following timer board.
    Welder maker: Welding Technology Corp. (WTC)
    Description of product: MedWeld 3004 Integrated Welder

1.2   COMPOSITION

Fig.1.2 shows Main construction of Integrated Weld Timer.

PC 104 Motherboard	FANUC
IWC Software Option (WTC I/F)	FANUC
I/O Unit	FANUC
MedWeld 3004 Integrated Welder Board	WTC
MedWeld 3004 Firmware	WTC
Firing Cable, Medlan Cable	WTC
Welding Power Unit (Welder Type – AC, MFDC1, MFDC2)	WTC,NADEX
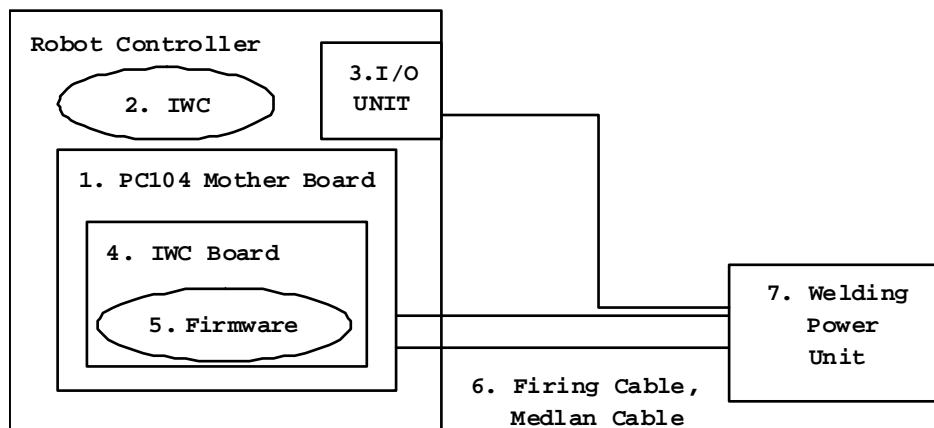
Fig.1.2 Main construction of integrated weld timer

1.3   LIMITATION

Robot software option of integrated welding timer depends on welder maker.
This manual explains software option for built-in welding timer of WTC. The limitations concerning this software option are described in Chapter 11.

1.4   TABLE OF CORRESPONDENCE TO MEDWELD 3004

There are several types of welders. And in the MedWeld 3004 firmware, there is a version, which corresponds to this welder type. Refer to following table.

Weld type	Version of firmware
AC	T99104-00-08, T05106-01-05
MFDC TYPE1	T96104-00-08
MFDC TYPE2	T96144-00-08, T96144-00-10, T05146-01-05

Confirm to the welder maker about details of the version of the firmware and the welder type.

NOTE

Among welder types, there is no data compatibility.
Do not load different welder type data.
It is necessary to set the welder type first.

NOTE

Do not load data files from a system with different version firmware.

NOTE

T05106-01-05 and T05146-01-05 can be used only with Japanese user interface.

---

2   SETUP

This chapter explains the setup procedure of integrated timer.

2.1   SETTING OF WELD INTERFACE

A weld interface (Digital or Integral) can be confirmed and/or changed on the Spot Config screen. The default value of a weld interface is "Integral" if your robot has this software option.
When changing a weld interface, or when increasing the number of equipment, it is necessary to perform changes in this screen.

Operation
MENUS → SETUP → F1 [TYPE] → Spot Config

The actual screen is changed by equipment type (air gun or servo gun). The following is servo gun example.

```
SPOT CONFIG
                                     6/34
       1 F Number:              F00000
       2 Load Spottool Macros:  DISABLED
       3 Number of equipments:  1
       4 Number of weld controllers: 1
       5 Current equipment, gun:  1, 1
       6   Weld interface:       INTEGRAL
       7   Number of guns:       SINGLE
       :                         :
      13   Weld cntler num for gun: 1
        Current weld controller:  1
       :                         :
       :                         :


    [TYPE]              [CHOICE]          >
```

When one integrated timer board is used

Item name	Setting value
Number of equipments	1 (default)
Number of weld controllers	1 (default)
Current equipment, gun	1,1(*1)
Weld interface	INTEGRAL (*2)
Number of guns	1 (default)
Weld cntler num for gun	1 (default)

*1) When you set for equipment 1 and gun 1, set this item 1,1.
*2) When your robot software does not have integrated weld controller option, you cannot change this to INTEGRAL. If your robot software has integrated weld controller but you want to change to un-integrated weld controller, change this item to DIGITAL.

When two integrated timer boards are installed

Item name	Setting value	
Number of equipments	2	
Number of weld controllers	2	
Current equipment, gun	1,1	2,1
Weld interface	INTEGRAL	INTEGRAL
Number of guns	1	1
Weld cntler num for gun	1	2

> **NOTE**
> When installing a timer board, you must set up the jumper, J2, on the board. If you install one board, set the jumper so that J2=BD1. If you install two boards, set the jumpers so that J2=BD1 on the first board and J2=BD2 on the second board. Refer to the manual provided by the welder maker for details.

2.2   SETTING OF WELDER TYPE

> ⚠**CAUTION**
> When you change the welder type after setting, you may lose setting data.
> At first, set the type of welder type without fail.

By following operation, set welder type of the welder that you are using.
This operation enables the robot to load corresponding firmware and default settings from the timer board.

1   Confirm type of an actual welder. (AC, MFDC type1, MFDC type2)
2   Confirm whether the board has firmware for the welder (refer to section 1.4).
3   Check current setting of the welder type by following procedures.

Operation
MENUS → DEP → F1 [TYPE] → DEP

```
Data Entry Panel
                                              1/1

              Integrated WTC Welder


           Welder Type:AC

    [TYPE]              [CHOICE]        >
```

Welder Type

Actual welder	Setting item
AC	AC
MFDC TYPE1	MFDC
MFDC TYPE2	NADEX MFDC

4   When actual welder and setting are different, change setting by following procedures.

How to change welder type
5   Press F4, [CHOICE]. Then select AC, MFDC, and NADEX MFDC on sub-menu displayed.
6   After changing, cycle power the robot controller.
7   If timer board is already integrated, do initialization by following procedures. If not yet, robot automatically initialize timer setting on first power up after inserting the board. Refer to section 2.5.

Operation
MENUS → DEP → F1 [TYPE] → Program

```
PROGRAM DEP

                    PROGRAM MODE


    [TYPE]   SCHED   STEPPER   SETUP   DEFLTS   >
```

・   Press F5, DEFLTS.

- 4 -

- Robot asks you if you really want to load default setting. Select →YES .
- "Reloading, may take a minutes…" is displayed on prompt line.
- After the message is gone, turn off the power supply and ON.

⚠**CAUTION**
  By this operation, robot controller loads default setting of specified welder type and current setting is lost.

2.3   INSTALL IWC BOARD

Install IWC board(s) on the PC/104 Motherboard. See following Fig.2.3.
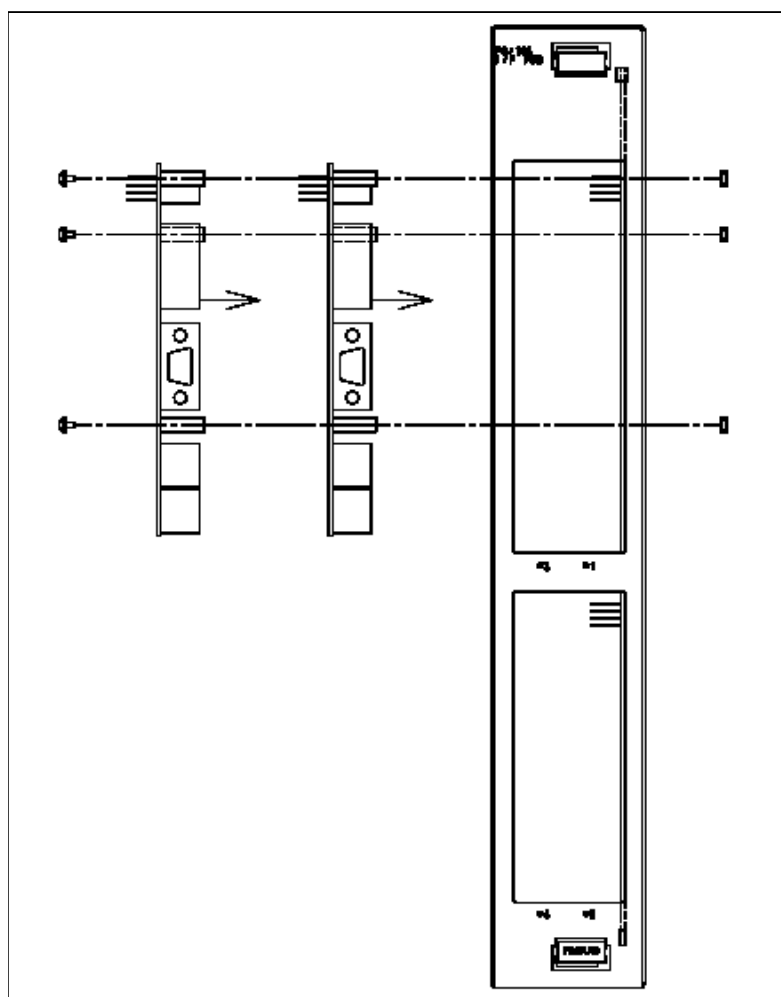
Fig.2.3 Setting to PC104 I/F board

NOTE
  You must use PC/104 motherboard that supports WTC integrated weld timer. Otherwise OS –012 will be posted when you open DEP screens.

2.4   SETTING OF PC/104 MOTHER BOARD

Insert the PC/104 motherboard into controller's card cage. See following Fig.2.4.

PC/104 mother board
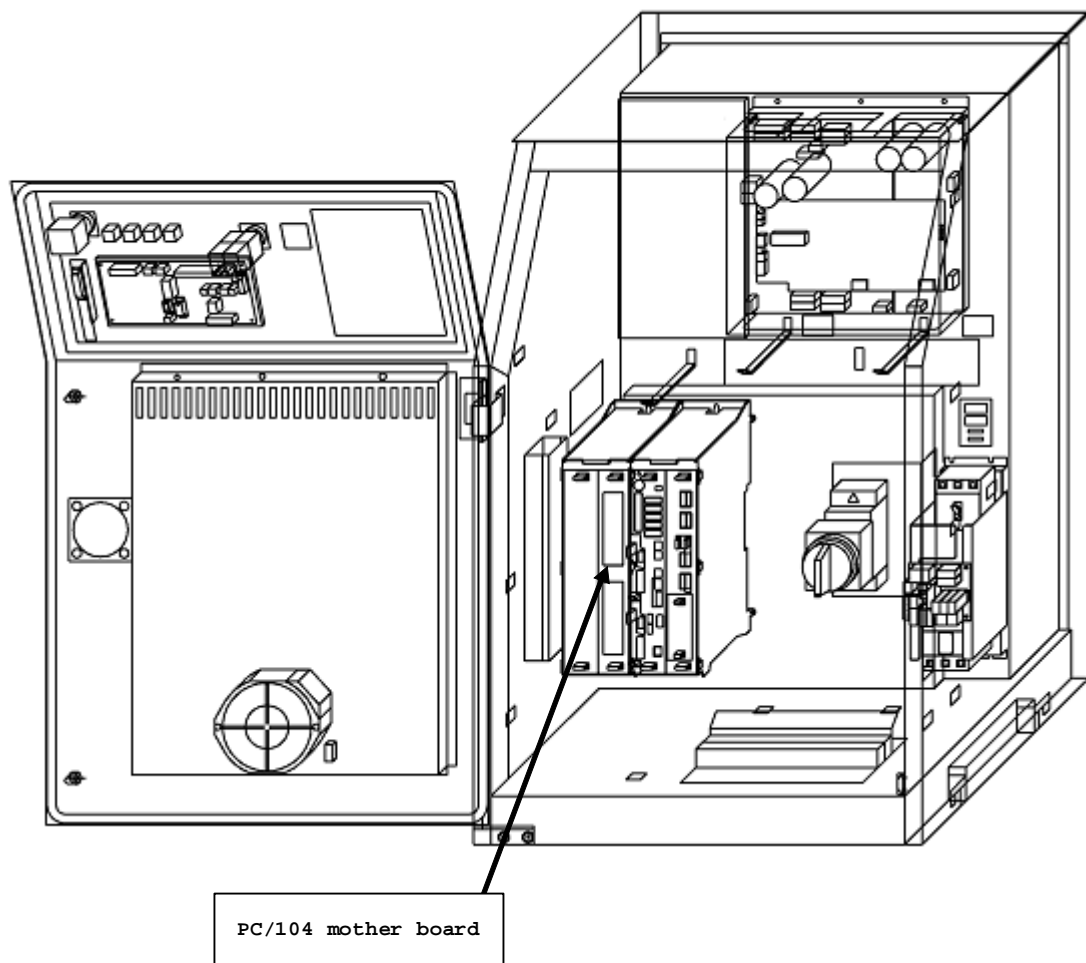
Fig.2.4 Setting of PC104 I/F board

2.5   CHECK INITIALIZATION

After inserting the board, you need to wait initialization of this function for about 3 minutes, when switching ON the power at first time. Display DEP setup screen to check if initialization completed.

Operation
MENUS → DEP → F1 [TYPE] → Program → F4 SETUP

```
┌──────────────────────────────────────────────────────┐
│ Program Setup                                          │
│ WC:1                                           1/53    │
│                                                        │
│   1 INVALID SEQUENCE SELECTED: (FAULT)                 │
│   2 WLD INITIATE NOT PRESENT: (ALERT)                  │
│   3 CONTROL STOP: (FAULT)                              │
│   4 STPPER APPROACHING MAX: (NONE)                     │
│   5 END OF STPPER: (FAULT)                             │
│   6 SUREWELD TREND LMT: (ALERT)                        │
│   7 HIGH CRNT LMT FAULT: (FAULT)                       │
│   8 LOW CRNT LMT FAULT: (FAULT)                        │
│   9 SCR MISFIRE: (ALERT)                               │
│  10 TIPS NOT TOUCHING: (FAULT)                         │
│  11 TIPS TOUCHING: (FAULT)                             │
│  12 SLOW CYL FAULT: (ALERT)                            │
│  13 INITIAL P.F. OUT OF RANGE: (ALERT)                 │
│  14 POWER FACTOR LMT: (ALERT)                          │
│  15 VOLTAGE COMPENSATION LMT: (ALERT)                  │
│  16 INSUFFICIENT LINE VOLTAGE: (ALERT)                 │
│  17 EXTENDED WLD: (ALERT)                              │
│  18 ISO CNTR OFF WHEN NEEDED: (FAULT)                  │
│  19 CRNT REGULATION LMT: (ALERT)                       │
│  20 NO ZERO CROSSING SYNC: (FAULT)                     │
│  21 I/O ADAPTER FAILED: (FAULT)                        │
│  22 SEQUENCE NOT PROGRAMMED: (FAULT)                   │
│  23 STPPER NOT PROGRAMMED: (FAULT)                     │
│  24 SETUP DATA NOT PROGRAMMED: (FAULT)                 │
│  25 DYNAMIC DATA NOT PROGRAMMED: (FAULT)               │
│  26 HIGH C-FACTOR LMT: (ALERT)                         │
│  27 LOW C-FACTOR LMT: (ALERT)                          │
│  28 HEAT CY LMT:(FAULT)                                │
│  29 WLD INTERRUPTION: (FAULT)                          │
│  30 PRESS NOT ACHIEVED: (FAULT)                        │
│  31 PRESS CRNT LOOP ALARM: (FAULT)                     │
│  32 WLD PROCEED: (FAULT)                               │
│  33 SECONDARY CRNT COIL/BOARD: (FAULT)                 │
│  34 CRNT MONITOR MODE: (PRIMARY)                       │
│  35 TRANSFORMER: (AC WOUND)                            │
│  36 CRNT LMT MODE: (AVERAGE)                           │
│  37 HIGH CRNT LMT WINDOW (%): 20                       │
│  38 LOW CRNT LMT WINDOW (%): 20                        │
│  39 HIGH POWER FACTOR LMT (%): 99                      │
│  40 LOW POWER FACTOR LMT (%): 10                       │
│  41 TIPS DOWN TEST FIRE %I: 20                         │
│  42 VLV 1 INITIAL PRESS (PSI): 05                      │
│  43 VLV 2 INITIAL PRESS (PSI): 05                      │
│  44 HEAT CY LMT (0=SEAM): 60                           │
│  45 SHORT DETECTION: (ENABLED)                         │
│  46 SHORTED SCR CY LMT: 60                             │
│  47 DATA COLLECT SAMPLE SIZE: 01                       │
│  48 DATA COLLECT SAMPLE FREQUENCY: 0001                │
│  49 TIPS DOWN VERIFIED CRNT: 0010                      │
│  50 TRANSFORMER TURNS RATIO 1:100                      │
│  51 NOMINAL LINE VOLTAGE: 468                          │
│  52 NOMINAL C FACTOR: 999                              │
│  53 SEC. CURR COIL FACTOR (X1000): 1000                │
│                                                        │
│ ┌──────┬──────┬──────┬────────┬─────────┬──────┬────┐ │
│ │[TYPE]│      │      │WC_NUM  │DWNLOAD  │      │ >  │ │
│ └──────┴──────┴──────┴────────┴─────────┴──────┴────┘ │
└──────────────────────────────────────────────────────┘
```

If "SPOT-061 Request failed" is posted when the screen is shown, you have to wait 30 seconds and display the screen again. When SETUP screen is shown successfully, the initialization has completed.

2.6   **WIRING**

> ⚠**CAUTION**
> Turn off power of robot and Welding Power Unit before your operations.

> **NOTE**
> The I/O connection varies depending on the system configuration. Terminal's name, the voltage of common and so on depends on the specification of contactor unit. Certainly, check the plan of welder maker.

1   Integrated weld timer board and Welding Power Unit are connected by exclusive cable.
   ・   MEDLAN cable
   ・   Firing cable
2   Following discrete I/O should be wired

Welder 1TB		Robot side	Setting name	
OCOM		+DC		
ICC		DO[ ]	Contactor (output)	
STI		DO[ ]	Shunt trip	
ICS		DI[ ]	Contactor (input)	See below
IRW		DI[ ]	Inverter ready	
ICOM		+DC		
ISRC		-DC		

   ・   Terminal's name, the voltage of common and the other specification depends on the specification of Welding power unit. Check the wiring position, and wire correctly.
   ・   There is necessary wiring not listed above according to customer's use. (Refer to chapter 3)
3   Setting signal index in I/O screen.

   Operation
   MENUS → I/O → F1 [TYPE] → Weld Intface

Set signal index you wired in following screens.

- 8 -

```
I/O Weld Out
WC: 1                                            1/3

        NAME                 OUT PT  SIM   STATUS
     1 Iso contactor:        DO[ 10]  U    ***      ← Contactor output
     2 Shunt trip:           DO[ 11]  U    ***      ← Shunt trip output
     3 Invter Rqst Wld:      DO[  0]  U    ***

     [TYPE]        IN/OUT                       >
```

⇕ **F3 IN/OUT**

```
Set signal index
you wired
```

```
I/O Weld IN
WC: 1                                            1/3

        NAME                 IN  PT  SIM   STATUS
     1 SCR overtemp:         DI[  0]  U    ***
     2 Iso contactor:        DI[ 10]  U    ***      ← Contactor input
     3 Invter Rdy Wld:       DI[ 11]  U    ***      ← Inverter ready to weld input

     [TYPE]        IN/OUT                       >
```

After setting, turn off/on robot power.

2.7   CONFIRMATION OF CONTACTOR OPERATION

Satisfy the following conditions for the confirmation of contactor.
· Wiring and setting the contactor input/output signal are completed.
· Turn off/on robot power after setting.
· Turn on power of the welder.

1   Confirm if I/O status of the contactor signals are correct.

Operation
MENUS → I/O → F1 [TYPE] → Spot → Weld Intface

```
I/O Weld Out
WC: 1                                            1/3

        NAME                 OUT PT  SIM   STATUS
     1 Iso contactor:        DO[ 10]  U    OFF      ← Contactor output
     2 Shunt trip:           DO[ 11]  U    ***
     3 Invter Rqst Wld:      DO[  0]  U    ***

     [TYPE]        IN/OUT                       >
```

⇕ **F3 IN/OUT**

```
I/O Weld IN
WC: 1                                            1/3

        NAME                 IN  PT  SIM   STATUS
     1 SCR overtemp:         DI[  0]  U    ***
     2 Iso contactor:        DI[ 10]  U    OFF      ← Contactor input
     3 Invter Rdy Wld:       DI[ 11]  U    ***

     [TYPE]        IN/OUT                       >
```

When the output state of contactor is OFF, contactor input status should be OFF, too. In addition, confirm if the actual contactor of the welder opens.

The contactor cannot be correctly controlled when relation described above isn't established. In this case, SPOT-002 occurs.

When SPOT-002 occurs
Confirm polarity of ICS and ICC of the welder.
For instance, when the contactor actually opens but ICS input on the robot side is on, then you reverse the polarity of the contactor input signal according to the following procedures.

Operation
MENUS → I/O → F1 [TYPE] → Digital → F3 IN/OUT

1   Set cursor to the index of contactor input signal. (i.e. DI[10])

```
I/O Digital IN
         #   SIM  STATUS               1/512
    DI[   1]  U    OFF   [                   ]
    DI[   2]  U    OFF   [                   ]
    DI[   3]  U    OFF   [                   ]
    DI[   4]  U    OFF   [                   ]
    DI[   5]  U    OFF   [                   ]
    DI[   6]  U    OFF   [                   ]
    DI[   7]  U    OFF   [                   ]
    DI[   8]  U    OFF   [                   ]
    DI[   9]  U    OFF   [                   ]
    DI[  10]  U    ON    [                   ]
    DI[  11]  U    OFF   [                   ]
    Sorted by port number.


     [TYPE]   NUM-SRT   CMT-SRT   DETAIL   HELP   >
```

2   Press NEXT> key. Then press F4, DETAIL.
3   Move cursor to item "Polarity", and press F4, INVERSE.

```
I/O Digital IN
     Port Detail                        2/3

       Digital Input            [  10]

     1  comment:  [                    ]
     2  Polarity:             NORAL
     3  Skip when simulated:  FALSE


     [TYPE]   PRV-PT   NXT-PT   INVERSE   NORMAL
```

4   Turn off/on robot power

Finally, the state of contactor output signal, actual state and input signal are as follow.

(Correct relation)

Contactor OUT signal		Actual contactor status		Contactor IN signal
ON	→	CLOSE	→	ON
OFF	→	OPEN	→	OFF

2.8 CHECK THE SIGNAL OF SHUNT TRIP

Shunt trip signal turns ON only when timer requests it to robot. Then breaker is dropped by it. Turn on the signal by your hand. Make sure breaker works. After check, turn OFF the signal. Set the signal connected by spot I/O screen.

Operation
MENUS → I/O → F1 [TYPE] → Spot → Weld Intface

```
I/O Weld Out
WC: 1                                      2/3

        NAME               OUT PT  SIM  STATUS
      1 Iso contactor:     DO[ 10]  U   OFF
      2 Shunt trip:        DO[ 11]  U   ON
      3 Invter Rqst Wld:   DO[  0]  U   ***


    [TYPE]           IN/OUT                 >
```

2.9 OTHER SIGNALS

Refer to chapter 3.

2.10 SETTING OF WELD SCHEDULE

Refer to section 4.4.

2.11 WELDING

Program schedule and perform spot welding to confirm if the system works. Make a program that uses spot instruction. The way to make a program and usage of spot instruction is just as usual. You can use manual welding, too.

3   I/O

This chapter explains the signal that relates to the integrated timer function.

3.1   CELL I/O

Operation
MENUS → I/O → F1 [TYPE] → Cell Intface

Output signal

```
I/O Cell Outputs
                                        1/22
      OUTPUT SIGNAL       TYPE #    SIM   STATUS
   1 Input Simulated:     DO[  0]   U     ***
   2 Output Simulated:    DO[  0]   U     ***
   3 OVERRIDE = 100:      DO[  0]   U     ***
   4 In cycle:            DO[  0]   U     ***
   5 Prog Aborted:        DO[  0]   U     ***
   6 Robot interlock:     DO[  0]   U     ***
   7 Process fault:       DO[  0]   U     ***
   8 Process alert:       DO[  0]   U     ***
   9 Process complete:    DO[  0]   U     ***
  10 Weld enabled:        DO[  0]   U     ***
  11 Stroke enabled:      DO[  0]   U     ***
  12 Proc1 tip rep re:    DO[  0]   U     ***
  13 Proc2 tip rep re:    DO[  0]   U     ***
  14 Apprch tip repla:    DO[  0]   U     ***
  15 Proc1 tip mnt re:    DO[  0]   U     ***
  16 Proc2 tip mnt re:    DO[  0]   U     ***
  17 One Spot Welded:     DO[  0]   U     ***
  18 Tryout Status:       DO[  0]   U     ***
  19 Heartbeat:           DO[  0]   U     ***
  20 IWC COMM Stat:       DO[  0]   U     ***
  21 Robot motion G1:     DO[  0]   U     ***
  22 Robot motion G2:     DO[  0]   U     ***


   [ TYPE ]   CONFIG   IN/OUT    SIM    UNSIM   >
```

Item	Description
IWC COMM Stat	This signal shows that initialization of Integrated weld timer after power supply has completed successfully. If this signal is ON, initialization succeeded. If OFF, initialization failed. NOTE) Once this signal turns ON after communication is established, this signal doesn't turns off even if communication error occurred. **After changing the setting, you should turn the power OFF/ON.**

Input signal

```
I/O Cell Inputs
                                        1/5
      INPUT SIGNAL        TYPE #    SIM   STATUS
   1 Weld/NO WELD:        DI[  0]   U     ***
   2 Stroke/NO STROKE:    DI[  0]   U     ***
   3 Rmt wtr svr rese:    DI[  0]   U     ***
   4 Ret hom frm poun:    DI[  0]   U     ***
   5 Tryout Mode:         DI[  0]   U     ***

   [ TYPE ]   CONFIG   IN/OUT    SIM    UNSIM   >
```

Item	Description
Weld/NO WELD	It is related to contactor control **After changing the setting, you should OFF/ON the power supply.**

3.2   WELD I/O

Operation

MENUS → I/O → F1 [TYPE] → Spot → Weld Intface
The following screen is shown. Output / input signal is changed by F3 key.

Output signal

```
I/O Weld Out
WC: 1                                          1/3

        NAME              OUT PT  SIM   STATUS
     1 Iso contactor:     DO[ 10]  U    OFF
     2 Shunt trip:        DO[ 11]  U    ON
     3 Invter Rqst Wld:   DO[  0]  U    ***


    [TYPE]          IN/OUT                    >
```

Item	Description
Iso contactor	Index of output signal connected to welder unit's ICC. After changing the setting, you should turn OFF/ON the power. Note) Wire this signal so that contactor closes when this signal is ON.
Shunt trip	Index of output signal connected to welder unit's STI. The signal is output by the request of shunt trip from timer board. The breaker of contactor unit is cut off by pulse output. Order of breaker cut off is transferred as follows. timer board→robot→welder unit. After changing the setting, you should turn OFF/ON the power.
Invter Rqst Wld	It is only for MFDC. It depends on type of inverter unit if this signal is needed or not. Refer to the manual of welder maker. Inverter unit of MFDC type2 doesn't need this signal for welding.

It is necessary to set contactor I/O signal.

Input signal

```
I/O Weld Out
WC: 1                                          1/3

        NAME              IN PT   SIM   STATUS
     1 SCR overtemp:      DI[  0]  U    ***
     2 Iso contactor:     DI[ 10]  U    OFF
     3 Invter Rdy Wld:    DI[ 11]  U    OFF


    [TYPE]          IN/OUT                    >
```

Item	Description
SCR overtemp	After setting it, alarm appears when this signal is OFF. Set as occasion calls. **After changing the setting, you should turn OFF/ON the power.**
Iso contactor	This is a signal for detecting contactor open and close (Welder:ICS). You have to wire this signal so that this signal turns ON when contactor closes and OFF when it is open. **After changing the setting, you should turn OFF/ON the power.**
Invter Rdy Wld	This is only for MFDC. This is a signal from the terminal of INVERTER READY TO WELD(IRW). When the initialization of inverter completed without fault error, it turns ON.

It is necessary to set contactor I/O signal.

3.3   IWC ALARM DO

You can output alarms sent timer board to DO. It is useful to detect specific weld alarm.

MENUS → SETUP → IWC ALM DO

```
┌─────────────────────────────────────────────────┐
│ DEP ALM DO                                        │
│ board: 1                               1/6        │
│                                                   │
│      1 Timer abnormal              DO [ 15]       │
│                                                   │
│        Num   Text                                 │
│      2 [ 6]  SUREWELD TREND LMT    DO [ 10]       │
│      3 [ 8]  LOW CRNT LMT FAULT    DO [ 11]       │
│      4 [26]  HIGH C-FACTOR LMT     DO [ 12]       │
│      5 [27]  LOW C-FACTOR LMT      DO [ 13]       │
│      6 [ 5]  END OF STPPER         DO [ 14]       │
│                                                   │
│   [ TYPE ]          WC_NUM                  >     │
└─────────────────────────────────────────────────┘
```

Item	Explanation
Timer abnormal	When the alarm which is not specified after second line appears, this signal is ON. It is OFF by reset operation.
After second line	
Number	Set alarm number. Refer to subsection 5.3.1, section 4.6.
Text	When you set alarm number, corresponding alarm text appears here.
Signal	Index of signal for alarm output. Reset operation turns OFF this signal.

To reset the timer board's alarms, perform one of the following operations.
- Press F2, RESET on DEP/Status/Fault screen.
- Execute RESET WELDER instruction.
- Perform a reset operation for the robot.*

* If "Reset WC with Robot" in Spot config screen is enabled, a reset operation for the robot with UI, SI, or RESET key on the teach pendant resets the timer board's alarms. If "Reset WC with Robot" is disabled, reset operations for the robot do not reset the timer board's alarms.

3.3.1   Output of Specific Alarm

Setup alarm output by following procedure.
1   Move cursor to alarm number column.

```
┌─────────────────────────────────────────────────┐
│ DEP ALM DO                                        │
│ board: 1                               1/6        │
│                                                   │
│      1 Timer abnormal              DO [ 15]       │
│                                                   │
│        Num   Text                                 │
│      2 [ 0]                        DO [  0]       │
│      3 [ 0]                        DO [  0]       │
│      4 [ 0]                        DO [  0]       │
│      5 [ 0]                        DO [  0]       │
│      6 [ 0]                        DO [  0]       │
│                                                   │
│   [ TYPE ]          WC_NUM                  >     │
└─────────────────────────────────────────────────┘
```

2   Input the alarm number you want to output.
     When you input the number, alarm text appears in Text column. The alarm number corresponds to the number of DEP PROGRAM SETUP screen.

```
┌────────────────────────────────────────────────┐
│ DEP ALM DO                                       │
│ board: 1                               1/6       │
│                                                  │
│      1 Timer abnormal            DO [  15]       │
│                                                  │
│        Num   Text                                │
│      2 [  6] SUREWELD TREND LMT  DO [   0]       │
│      :              :                            │
│      :              :                            │
│  ┌──────────┬─────────────┬──────────┬──────┐   │
│  │ [ TYPE ] │    WC_NUM    │          │  >   │   │
│  └──────────┴─────────────┴──────────┴──────┘   │
└────────────────────────────────────────────────┘
```

```
           DEP program SETUP Screen
           (MENUS → DEP → Program → F4 SETUP)
        ┌──────────────────────────────────────────┐
        │ Program SETUP                             │
        │ WC:1                           1/53       │
        │                                           │
        │   1 INVALID SEQUENCE SELECTED: (FAULT)    │
        │   2 WLD INITIATE NOT PRESENT: (ALERT)     │
        │   3 CONTROL STOP: (FAULT)                 │
        │   4 STPPER APPROACHING MAX: (NONE)        │
        │   5 END OF STPPER: (FAULT)                │
        │   6 SUREWELD TREND LMT: (ALERT)           │
Corresponding 7 HIGH CRNT LMT FAULT: (FAULT)        │
to this number 8 LOW CRNT LMT FAULT: (FAULT)        │
        │   9 SCR MISFIRE: (ALERT)                  │
        │   :         :                             │
        │   :         :                             │
        │ ┌────────┬────────┬─────────┬────────┬──┐ │
        │ │[ TYPE ]│ WC_NUM │ DWNLOAD │        │ >│ │
        │ └────────┴────────┴─────────┴────────┴──┘ │
        └──────────────────────────────────────────┘
```

・ About 30 items in SETUP screens are the setting of alarm level.

・ Enter index of DO.

```
┌────────────────────────────────────────────────┐
│ DEP ALM DO                                       │
│ board: 1                               1/6       │
│                                                  │
│      1 Timer abnormal            DO [  15]       │
│                                                  │
│        Num   Text                                │
│      2 [  6] SUREWELD TREND LMT  DO [  10]       │
│      :              :                            │
│      :              :                            │
│  ┌──────────┬─────────────┬──────────┬──────┐   │
│  │ [ TYPE ] │    WC_NUM    │          │  >   │   │
│  └──────────┴─────────────┴──────────┴──────┘   │
└────────────────────────────────────────────────┘
```

NOTE
・ You need the setting of error number and alarm corresponding to the specification of firmware you use.
・ When you change the timer board, the number corresponding to the alarm may be changed.
・ When you output alarms to integrated PMC. Use signal number （DO[xxx]） that corresponds to integrated PMC. Then PMC can recognize alarm DO.
  Example) Timer abnormal DO[11001] → R0.0 of integrated PMC
・ Multiple signals cannot be assigned to one alarm.

How to increase the number of alarm DO

The number of alarm DO is maximum 5 in standard. You can increase this by following method. (Maximum 30)

1   Change the value of $IWCALM_LINE.
2   Do controlled start.
3   Do cold start.

4   DEP MENU(SETUP AND PROGRAMMING)

This chapter explains the DEP (Data Entry Panel) screen. This screen enables operator to do the same operation on robot TP as data input device for traditional timer (DEP100 etc.).
Chapter 4 explains the settings and the programming.
Chapter 5 explains the state display and the alarm.

4.1   LIST OF MENU

MENUS → DEP

List of menu
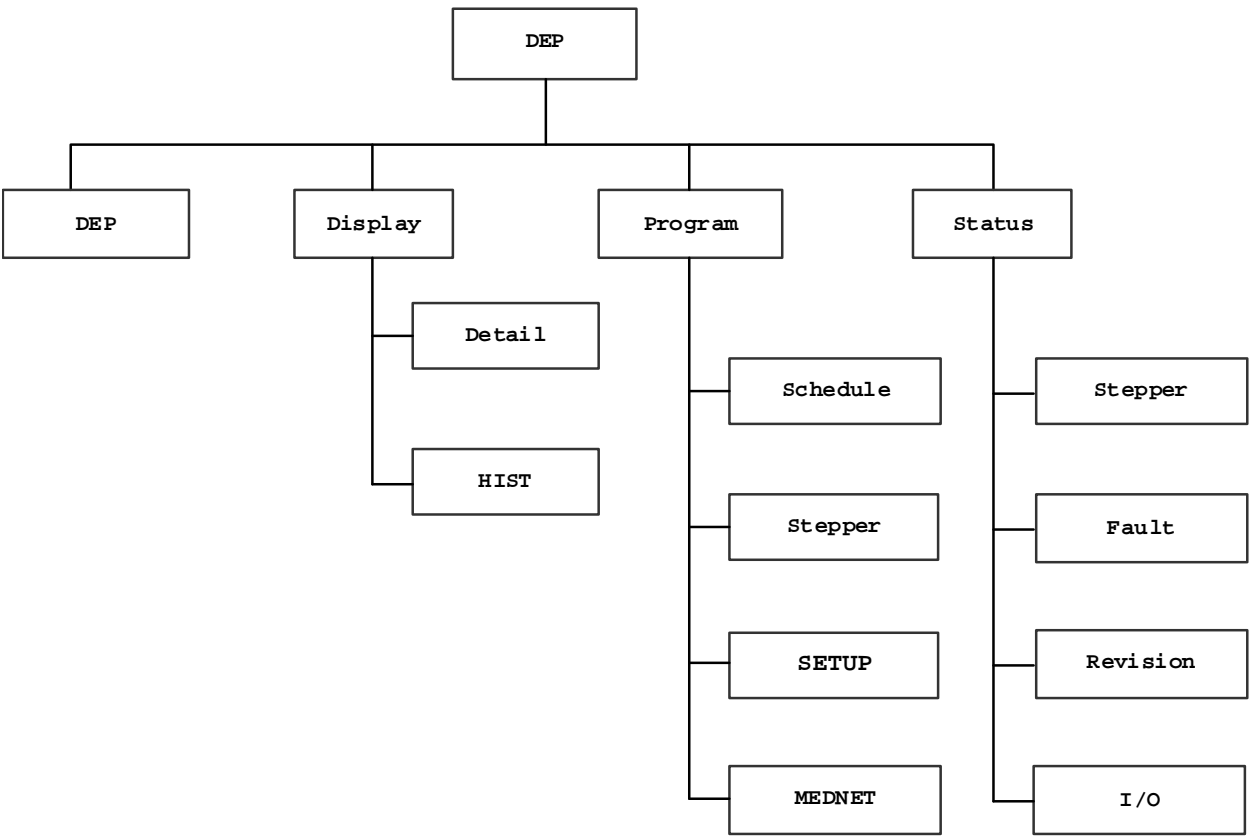
Fig.4.1 List of menu

> **NOTE**
> When the timer board is not mounted, neither the display, the program nor the status screens are correctly displayed.

4.2   DEP

Operation
MENUS → DEP → (F1 [TYPE] → DEP)

```
Data Entry Panel
                                            1/1

                  Integrated WTC Welder

                     Welder Type:AC

        [TYPE]                    [CHOISE]         >
```

On this screen, you can check and change the welder type setting. Refer to section 2.2 about how to change the welder type.

NOTE
    At first, set the welder type at installation.

4.3 PROGRAM, SETUP

Operation
MENUS → DEP → F1 [TYPE] → Program

You can enter to each setting screen from this screen.

```
PROGRAM DEP


                      PROGRAM MODE


     [TYPE]   SCHED   STEPPER   SETUP   DEFLTS   >
              SAVE    RELOAD    MEDNET  S_ASCII
```

This screen is setting of integrated weld timer itself and programming.
You can display each detail screen by function key. You can return from each screen with PREV key.

Explanation of function keys

First page

F2 SCHED	Weld schedule screen is shown.	4.4
	You can edit weld schedule in this screen.	
F3 STEPPER	Stepper setting screen is shown.	4.5
F4 SETUP	Setup screen is shown.	4.6
F5 DEFLTS	Return the setting to default one for shipment.	4.10

Second page

F1 SAVE	Save schedule, stepper, and setup data to the selected device.	4.8
F2 RELOAD	Reload schedule, stepper and setup data file from selecting device.	4.9
F3 MEDNET	MEDLAN setting screen is shown.	4.7
F4 S_ASCII	Save schedule, stepper, and setup data by the ASCII file to selected device.	

4.4 SCHEDULE SCREEN

Operation
MENUS → DEP → F1 [TYPE] → Program → F2 SCHED

```
Weld Card
Timer board number
Changes with F3 key
It is 1 usually.
```

```
Schedule number
It is the weld schedule
number of SPOT[ S=xx ]
Changes with F2key
The max number depends
on the spec. of timer.
```

```
Program Sequence
WC:1 SCH:1                                    1/8

  1 START OF SEQUENCE 1
  2 SEC. CURR LMTS: HI=00000 LOW=99990
  3 LINEAR STPPER #00 ASSIGNED (0 = OFF)
  4 SQUEEZE 20 CYS
  5 WLD 10 CY. 50 %I
  6 EXTEND WLD IF LOW CRNT LMT FAULT
  7 HOLD 05 CYS
  8 END OF SEQUENCE 1

   [TYPE]    SCH    WC_NUM   DWNLOAD   INSERT   >
   DELETE   PRINT
```

It is editing of welding schedule.

Explanation of function keys

First page

F2 SCH_NUM	Change weld schedule number.
F3 WC_NUM	Change board number.
F4 DWNLOAD	This is to download weld schedule to timer board.
	Do download to reflect the edit result.
	The content of the edit is not maintained if you do not download.
F5 INSERT	This inserts function to the line now cursor is on.

Second page

F1 DELETE	To delete the line now cursor is on.
F2 PRINT	This saves schedule displayed to selecting device as ASCII file. Files name is "board number" sch "weld schedule number".ls.
	In case of board 1 and weld schedule 5, 1sch5.ls.

*1) About the board number.
Board number is the number of the integrated timer board on the PC104 motherboard.
Refer to the manual of welder maker about each function.

4.4.1   Show Another Schedule

Press F2, SCH_NUM and input schedule number.

```
Program Sequence
WC:1 SCH:1                                    1/8

  1 START OF SEQUENCE 1
  2 SEC. CURR LMTS: HI=00000 LOW=99990
  3 LINEAR STPPER #00 ASSIGNED (0 = OFF)
  4 SQUEEZE 20 CYS
  5 WLD 10 CY. 50 %I
  6 EXTEND WLD IF LOW CRNT LMT FAULT
  7 HOLD 05 CYS
  8 END OF SEQUENCE 1

Enter Schedule number to display: 20
    [TYPE]   SCH_NUM   WC_NUM   DWNLOAD   INSERT   >
```

Specified schedule is shown.

```
Program Sequence
WC:1 SCH:20                          1/2

  1 START OF SEQUENCE 20
  2 END OF SEQUENCE 20

    [TYPE]  SCH_NUM  WC_NUM  DWNLOAD  INSERT  >
```

4.4.2   **Insert Function**

Move cursor to the previous line if you want to add function. To add function as the 1st line, move cursor to "START OF SEQUENCE nn".

```
Program Sequence
WC:1 SCH:20                          1/2

  1 START OF SEQUENCE 20
  2 END OF SEQUENCE 20

    [TYPE]  SCH_NUM  WC_NUM  DWNLOAD  INSERT  >
```

F5, INSERT is pressed. The following screen is shown

```
Program Sequence
                                     1/4

     WELD FUNCTIONS
     DELAY FUNCTIONS
     SPECIAL FUNCTIONS
     Direct entry:   0

    [TYPE]                   [CHOICE]       >
```

Select function you want to insert. There are two ways.

- Direct specification of number
  Move cursor to "direct entry", and input the function number.

```
Program Sequence
                                     1/4

     WELD FUNCTIONS
     DELAY FUNCTIONS
     SPECIAL FUNCTIONS
     Direct entry:     1

    [TYPE]                   [CHOICE]       >
```

The function corresponding to the input number is taught.

```
Program Sequence
WC:1 SCH:20 *                        2/3

  1 START OF SEQUENCE 20
  2 SQUEEZE 00 CYS
  3 END OF SEQUENCE 20

    [TYPE]  SCH_NUM  WC_NUM  DWNLOAD  INSERT  >
```

- Selection from function list
  The function is classified into three types.
  - WELD FUNCTINS

- 19 -

- DELAY FUNCTINS
- SPECIAL FUNCTIONS

```
┌─────────────────────────────────────────────┐
│ Program Sequence                             │
│                                      1/4     │
│     WELD FUNCTIONS                           │
│     DELAY FUNCTIONS                          │
│     SPECIAL FUNCTIONS                        │
│     Direct entry:   1                        │
│                                              │
├──────┬──────┬──────┬──────────┬──────┬──────┤
│[TYPE]│      │      │ [CHOICE] │      │  >   │
└──────┴──────┴──────┴──────────┴──────┴──────┘
```

Move cursor to one of them and press F4, [CHOICE].

```
┌─────────────────────────┐
│                    1     │
│ 1 DELAY FUNCTIONS        │
│ 2 SQUEEZE 00 CYS         │
│ 3 COOL 00 CYS            │
│ 4 HOLD 00 CYS            │
│ 5 OFF 00 CYS             │
│ 6 INITIAL SQUEEZE        │
│ 7 QUENCH 00 CYS          │
│ 8 – next page -          │
└─────────────────────────┘
```

Select the function from the shown sub-menu.
Refer to welder maker's manual for the function list that can be taught.

4.4.3   Delete Function

Move cursor to the line you want to delete.

```
┌─────────────────────────────────────────────────┐
│ Program Sequence                                 │
│ WC:1 SCH:20 *                          3/4       │
│                                                  │
│   1 START OF SEQUENCE 20                         │
│   2 SQUEEZE 00 CYS                               │
│   3 HOLD 00 CYS                                  │
│   4 END OF SEQUENCE 20                           │
│                                                  │
├──────┬────────┬────────┬──────────┬────────┬────┤
│[TYPE]│SCH_NUM │ WC_NUM │ DWNLOAD  │ INSERT │ >  │
├──────┼────────┼────────┼──────────┼────────┼────┤
│DELETE│ PRINT  │        │          │        │    │
└──────┴────────┴────────┴──────────┴────────┴────┘
```

Press NEXT> key and show the second page of function key.
Press F1, DELETE.

4.4.4   Edit of Function

Move cursor to the line you edit and press ENTER key.

```
┌────────────────────────────────────────────────────┐
│ Program Sequence                                   │
│ WC:1 SCH:20 *                          4/6         │
│                                                    │
│   1 START OF SEQUENCE 20                           │
│   2 LINEARR STEPPER #00 ASSIGNED (0=OFF)           │
│   3 SQUEEZE 00 CYS                                 │
│   4 WLD 00 HALF CYS 00000 AMPS                     │
│   5 HOLD 00 CYS                                    │
│   6 END OF SEQUENCE 20                             │
│                                                    │
├──────┬────────┬────────┬──────────┬────────┬──────┤
│[TYPE]│SCH_NUM │ WC_NUM │ DWNLOAD  │ INSERT │  >   │
└──────┴────────┴────────┴──────────┴────────┴──────┘
```

This leads you to following screen. (An actual display is different according to the function.)

```
┌──────────────────────────────────────────────┐
│ Program Edit                                   │
│                                         1/1    │
│                                                │
│     WLD  0  HALF CYS 00 AMPS                   │
│                                                │
├──────┬────────┬────────┬────────┬───────┬─────┤
│[TYPE]│  DONE  │ CANCEL │        │       │  >  │
└──────┴────────┴────────┴────────┴───────┴─────┘
```

Move cursor and input value.

```
┌──────────────────────────────────────────────┐
│ Program Edit                                   │
│                                         1/1    │
│                                                │
│     WLD 10 HALF CYS 5000 AMPS                  │
│                                                │
├──────┬────────┬────────┬────────┬───────┬─────┤
│[TYPE]│  DONE  │ CANCEL │        │       │  >  │
└──────┴────────┴────────┴────────┴───────┴─────┘
```

After editing is finished, press F2 DONE. When you abandon the result of editing, press F3, CANCEL.

```
┌──────────────────────────────────────────────────┐
│ Program Sequence                                   │
│ WC:1 SCH:20 *                              4/6     │
│                                                    │
│   1 START OF SEQUENCE 20                           │
│   2 LINEAR STPPER #00 ASSIGNED (0 = OFF)           │
│   3 SQUEEZE 00 CYS                                 │
│   4 WLD 10 CYS 05000 AMPS                          │
│   5 HOLD 00 CYS                                    │
│   6 END OF SEQUENCE 20                             │
│                                                    │
├──────┬─────────┬────────┬─────────┬────────┬──────┤
│[TYPE]│ SCH_NUM │ WC_NUM │ DWNLOAD │ INSERT │  >   │
└──────┴─────────┴────────┴─────────┴────────┴──────┘
```

4.4.5   Change Taught Function to Another One

When you change taught function to another function, insert new function (subsection 4.4.2), and delete unnecessary function (subsection 4.4.3). When you change values in function, edit the line (subsection 4.4.4).

4.4.6   Download (Update Result / Importance)

When you edit the schedule, "*" is shown at upper-left side on screen. This is the sign that it is edited, but is not downloaded to timer board.
For using the result of editing, you need to download the schedule to timer board.

Press F4, DWNLOAD.

```
┌──────────────────────────────────────────────────┐
│ Program Sequence                                   │
│ WC:1 SCH:20 *                              4/6     │
│                                                    │
│   1 START OF SEQUENCE 20                           │
│   2 LINEAR STPPER #00 ASSIGNED (0 = OFF)           │
│   3 SQUEEZE 00 CYS                                 │
│   4 WLD 10 CYS 05000 AMPS                          │
│   5 HOLD 00 CYS                                    │
│   6 END OF SEQUENCE 20                             │
│                                                    │
├──────┬─────────┬────────┬─────────┬────────┬──────┤
│[TYPE]│ SCH_NUM │ WC_NUM │ DWNLOAD │ INSERT │  >   │
└──────┴─────────┴────────┴─────────┴────────┴──────┘
```

It asks you what number of schedule to download.
·   If you want to download to same number, ENTER key is pressed.

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・   If you want to download to other number, number and ENTER key.
In case of there is second board, it ask you the board number. Input it.

```
┌──────────────────────────────────────────────────┐
│ Program Sequence                                   │
│ WC:1 SCH:20 *                              1/6     │
│                                                    │
│  1 START OF SEQUENCE 20                            │
│  2 LINEAR STPPER #00 ASSIGNED (0 = OFF)            │
│  3 HOLD 00 CYS                                     │
│  4 WLD 10 CYS 05000 AMPS                           │
│  5 HOLD 00 CYS                                     │
│  6 END OF SEQUENCE 20                              │
│                                                    │
│  Enter Schedule to download to:▇                   │
├──────┬────────┬────────┬─────────┬────────┬───────┤
│[TYPE]│SCH_NUM │WC_NUM  │DWNLOAD  │INSERT  │  >    │
└──────┴────────┴────────┴─────────┴────────┴───────┘
```

When you download, the asterisk "*" at upper-left side on screen goes out.

```
┌──────────────────────────────────────────────────┐
│ Program Sequence                                   │
│ WC:1 SCH:20                                1/6     │
│                                                    │
│  1 START OF SEQUENCE 20                            │
│  2 LINEAR STPPER #00 ASSIGNED (0 = OFF)            │
│  3 HOLD 00 CYS                                     │
│  4 WLD 10 CYS 05000 AMPS                           │
│  5 HOLD 00 CYS                                     │
│  6 END OF SEQUENCE 20                              │
│                                                    │
│                                                    │
├──────┬────────┬────────┬─────────┬────────┬───────┤
│[TYPE]│SCH_NUM │WC_NUM  │DWNLOAD  │INSERT  │  >    │
└──────┴────────┴────────┴─────────┴────────┴───────┘
```

4.4.7   Copy of Schedule

Press F4, DWNLOAD, and specify to the number of schedule to copy.

```
┌──────────────────────────────────────────────────┐
│ Program Sequence                                   │
│ WC:1 SCH:20 *                              1/6     │
│                                                    │
│  1 START OF SEQUENCE 20                            │
│  2 LINEAR STPPER #00 ASSIGNED (0 = OFF)            │
│  3 HOLD 00 CYS                                     │
│  4 WLD 10 CYS 05000 AMPS                           │
│  5 HOLD 00 CYS                                     │
│  6 END OF SEQUENCE 20                              │
│                                                    │
│  Enter Scheulde to download to: 50                 │
├──────┬────────┬────────┬─────────┬────────┬───────┤
│[TYPE]│SCH_NUM │WC_NUM  │DWNLOAD  │INSERT  │  >    │
└──────┴────────┴────────┴─────────┴────────┴───────┘
```

It is downloaded as schedule of specified number. The schedule of downloaded side is shown automatically.

```
┌──────────────────────────────────────────────────┐
│ Program Sequence                                   │
│ WC:1 SCH:50                                1/6     │
│                                                    │
│  1 START OF SEQUENCE 50                            │
│  2 LINEAR STPPER #00 ASSIGNED (0 = OFF)            │
│  3 HOLD 00 CYS                                     │
│  4 WLD 10 CYS 05000 AMPS                           │
│  5 HOLD 00 CYS                                     │
│  6 END OF SEQUENCE 50                              │
│                                                    │
│                                                    │
├──────┬────────┬────────┬─────────┬────────┬───────┤
│[TYPE]│SCH_NUM │WC_NUM  │DWNLOAD  │INSERT  │  >    │
└──────┴────────┴────────┴─────────┴────────┴───────┘
```

After editing (* is shown), editing contents is reflected in only the selecting schedule. On the above example, schedule 50 is changed, but 20 is not changed.
When you reflect the editing result to the original schedule, download it to original schedule first and copy later.

4.5   STEPPER SCREEN

Operation
MENUS → DEP → F1 [TYPE] → Program → F3 Stepper

Two kinds of steppers are prepared.
- Linear stepper
- Sure weld stepper (AC only)

In this screen, you select which stepper you program.
In case of linear stepper, press F2 Linear.
In case of sure-weld stepper, press F3, Sureweld.

```
┌─────────────────────────────────────────────────┐
│ Program Stepper                                  │
│                                                  │
│                                                  │
│                  Program Mode                    │
│                                                  │
│    F2 Linear stepper                             │
│    F3 Sure-weld stepper(AC only)                 │
│                                                  │
│                                                  │
├──────┬───────┬──────────┬──────┬──────┬──────────┤
│[TYPE]│Linear │ Sureweld │      │      │          │
└──────┴───────┴──────────┴──────┴──────┴──────────┘
```

- Sure weld stepper is AC only. In case of MCDC welder, you cannot use it.
- In case of using stepper, your weld sequences have to include functions to enable stepper.

  In case of Linear   :   LINEAR STEPPER #nn ASSIGNED (0= OFF)
  In case of Sure-Weld: SUREWELD STEPPER #nn ASSIGNED (0 = OFF)

- Refer to welder maker's manual for details of stepper function.

4.5.1   Linear Stepper Screen

Operation
MENUS → DEP → F1 [TYPE] → Program → F3 Stepper → F2 Linear stepper

You set the number of welding and the increase in current in each step, and stepper group. Refer to the welder maker's manual for details.

```
┌──────────────────────────┐  ┌──────────────────────────────────────────────┐
│ Weld Card                │  │ Program Stepper                              │
│ Timer board number       │──│ WC:1 STPR:1                           1/6    │
│ Changes with F3 key      │  │                                              │
│ It is 1 usually.         │  │   1 STP #01   3 %   700 AMPS   60 WLDS       │
└──────────────────────────┘  │   2 STP #02   3 %   700 AMPS  180 WLDS       │
                              │   3 STP #03   3 %   700 AMPS  300 WLDS       │
┌──────────────────────────┐  │   4 STP #04   3 %   700 AMPS  600 WLDS       │
│ Stepper number           │  │   5 STP #05   3 %   700 AMPS  800 WLDS       │
│ Changes with F2key       │──│   6 STPPER GROUP # 1                         │
│ The max number depends   │  │                                              │
│ on the spec. of timer.   │  ├──────┬─────────┬────────┬─────────┬─────┬───┤
└──────────────────────────┘  │[TYPE]│ STPR_#  │ WC_NUM │ DWNLOAD │     │ > │
                              │      │ PRINT   │        │         │     │   │
                              └──────┴─────────┴────────┴─────────┴─────┴───┘
```

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Explanation of function keys

First page

F2 STPR_#	Change the stepper number.
F3 WC_NUM	Change the board number.
F4 DWNLOAD	Download the editing stepper to timer board.
	In order to reflect the editing result, download is necessary.
	The content of the edit is not maintained if you do not download

Second page

F2 PRINT	Save stepper displayed to selecting device as ASCII file. Files name is "board number" lst "stepper number".ls.
	In case of board 1 and stepper 5, 1lst5.ls.

*1) About the board number
Board number is the number of the integrated timer board on the PC104 motherboard.

4.5.2   Edit of Stepper

Move cursor to the line you edit and press ENTER key.

```
Program Stepper
WC:1 STPR:1                                    1/6


  1 STP #01   3 %   700 AMPS    60 WLDS
  2 STP #02   3 %   700 AMPS   180 WLDS
  3 STP #03   3 %   700 AMPS   300 WLDS
  4 STP #04   3 %   700 AMPS   600 WLDS
  5 STP #05   3 %   700 AMPS   800 WLDS
  6 STPPER GROUP # 1


    [TYPE]   STPR_#   WC_NUM   DWNLOAD         >
```

Only one line is displayed like this.

```
Program Edit
                                               1/1

  STP #01   3 %   700 AMPS    60 WLDS

    [TYPE]    DONE    CANCEL                    >
```

Move cursor and input values. After you finish the change, press F2 DONE. When you abandon the change, press F3, CANCEL.

4.5.3   Download the Setting of Stepper (Importance)

This is the same as the editing of schedule (subsection 4.4.6).
When the stepper is changed, "*" is shown at upper-left side on the screen. This is the sign that it is edited, but is not downloaded to timer board. For using the result of editing, press F4, DWNLOAD.

```
Program Stepper
WC:1 STPR:1 *                                  1/6


    [TYPE]   STPR_#   WC_NUM   DWNLOAD         >
```

Input the number to download such as schedule.

4.5.4   Copy

It is same as schedule. Refer to subsection 4.4.7.

4.6   SETUP SCREEN

Operation
MENUS → DEP → F1 [TYPE] → Program → F4 SETUP

Alarm level (FAULT, ALERT), limitation of parameter and others are set.

```
Program Setup
WC:1                                        1/53

  1 INVALID SEQUENCE SELECTED: (FAULT)
  2 WLD INITIATE NOT PRESENT: (ALERT)
  3 CONTROL STOP: (FAULT)
  :        :
  :        :
 49 TIPS DOWN VERIFIED CRNT: 0010
 50 TRANSFORMER TURNS RATIO 1:100
 51 NOMINAL LINE VOLTAGE: 468
 52 NOMINAL C FACTOR: 999
 53 SEC. CURR COIL FACTOR (X1000): 1000


   [TYPE]            WC_NUM   DWNLOAD          >

              PRINT
```

Setting items depends on the specification of timer board.
Refer to welder maker's manual for each item.

Explanation of function keys

First page

F3 WC NUM	Changing the board number.
F4 DWNLOAD	Download editing setup data to the timer board.
	In order to reflect the editing result, download is necessary.
	The content of the edit is not maintained if you do not download

Second page

F2 PRINT	Save setup data to selecting device as ASCII file.
	Files name is "board number" set.ls.
	In case of board 1, 1set.ls.

*1) about the board number
Board number is the number of the integrated timer board on the PC104 motherboard. In case of first
sheet is defined 1.

4.6.1   Change the Setting

Their fundamentals are same as schedule and stepper. Press the input key on the line you want to change.

```
Program Setup
WC:1                                              7/53

  1 INVALID SEQUENCE SELECTED: (FAULT)
  2 WLD INITIATE NOT PRESENT: (ALERT)
  3 CONTROL STOP: (FAULT)
  4 STPPER APPROACHING MAX: (NONE)
  5 END OF STPPER: (FAULT)
  6 SUREWELD TREND LMT: (ALERT)
  7 HIGH CRNT LMT FAULT: (FAULT)
  8 LOW CRNT LMT FAULT: (FAULT)
  9 SCR MISFIRE: (ALERT)
 10 TIPS NOT TOUCHING: (FAULT)
 11 TIPS TOUCHING: (FAULT)


      [TYPE]            WC_NUM   DWNLOAD           >
```

It becomes the editing screen of only one line such as the follow. This screen is not displayed for the set item that cannot be changed.

```
Program Edit

  HIGH CRNT LMT FAULT:  (FAULT)

      [TYPE]    DONE    CANCEL   [CHOICE]          >
```

There are some items that select the setting from some selection. In case of them, F4 becomes [CHOICE]. Sub-menu is displayed by pressing F4, [CHOICE]. Choose the setting.

```
                            1
  1   (FAULT)
  2   (ALEART)
  3
  4
  5
  6
  7
  8
```

After the change is finished, press F2 DONE. If you abandon your edit, press F3, CANCEL.

4.6.2 Download the Setting

When it is changed and not download, it is shown (*) at upper-left side on the screen. This is the sign that it is edited, but is not downloaded to timer board. For using the result of change, press F4, DWNLOAD. When you download, "SPOT-065 WC:1 Set-Up Data Changed" is posted.

4.7 MEDLAN SETTING SCREEN

Operation
MENUS → DEP → F1 [TYPE] → Program → NEXT> → F3 MEDNET

You can set the MEDNET address, and WELDER ID. They are the setting to use the function of network by MEDLAN. In case of no using the network, you do not need the setting.

```
Program Net Addrs
WC:1                                              1/2


        MedLAN Network Address:255
        MedLAN Welder ID:      0000000000


    Address value > 31 will take timer
    off of network.


      [TYPE]          WC_NUM                    >
```

Setting method

- MedLan Network Address   : Input by the numerical key.
- MedLand Welder Id   : Move the cursor, and press the ENTER key.

```
Program Net Addrs
WC:1                                              1/2


        MedLAN Network Address:255
        MedLAN Welder ID:        agm

    Address value > 31 will task timer
    off of network.
                              ┌─────────────────┐
                              │ Alpah input 1   │
                              │ 1 Upper Case    │
                              │ 2 Lower Case    │
                              │ 3 Punctuation   │
                              │ 4 Options       │
                              └─────────────────┘
      ABCDEF   GHIJKL   MNOPQR   STUVNX   YZ_@*.   >
```

When network address is changed, warning like following is posted.
- SPOT-064 WC:1 MedLan Addr from …

When Welder Id is changed, warning like following is posted.
- SPOT-065 WC:1 Welder Id remotely changed
- SPOT-064 WC:1 WC ID from …

4.8   SAVE DEP ITEMS

You can save the setting of each DEP menu to the selecting device. Refer to subsection 4.8.1 about saving files.

```
┌─────────────────────────────────────────────────────┐
│ NOTE                                                 │
│    Save is possible ONLY when the timer board is mounted. │
└─────────────────────────────────────────────────────┘
```

Refer to chapter 7 for other data saves.

Operation
MENUS → DEP → F1 [TYPE] → Program

```
PROGRAM DEP


              PROGRAM MODE


      [TYPE]   SCHED    STEPPER   SETUP    DEFLTS   >
      SAVE     RELOAD   MEDNET    S_ASCII
```

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1   Press NEXT> key, it shows the second page of function key.
2   Press F1, SAVE.
3   That is all, and start saving. "Saving… please wait". Wait until it goes out.

NOTE
・ In case of saving to MC, creating as subdirectory is recommended. (Refer to subsection 4.8.2)
・ You may wait for some minutes to save it. It is shorter, when there are a few files on MC.

4.8.1   Saving Files

Item	Target data	File name
Schedule	Welding sequence	1SEQnnn.DT (nnn=1-255)
Setup data	Setting data by Program (Alarm level, Parameter limit and etc.)	1SET.DT
Linear stepper	Setting of Linear Stepper	1LSTnn.DT(nn = 1-31)
Sure-weld Stepper	Setting of Sure weld stepper	1ASTnn.DT(nn = 1-31)

The data format is binary.

4.8.2   About Subdirectory

The maximum number of files that root directory of FLASH ATA can have is 512. This is the specification of FLASH ATA card. There is a possibility for the number of files to exceed 512 when all files of the robot and all welding schedule files are saved.
In the subdirectory, the number of maximum files is not limited.

How to create subdirectory
1   MENUS → FILE → F5 [UTIL] → Make DIR
2   Input DIR name
Then the subdirectory is created, and target directory is changed.

How to change directory
1   Display list of the memory card (F2 [DIR]).
2   Move cursor to < DIR > in which you want to move to and press ENTER key.
Target directory is changed.

Target directory
The saving/loading into the memory card is done to the device and directory displayed on the left of the file screen.

```
FILE
MC:¥xxx¥*.*


     [TYPE]    [DIR]    LOAD    [BACKUP]   [UTIL]   >
```

4.9 LOAD DEP ITEMS

Pressing F7 (F2 of second page), RELOAD loads dt files (refer to subsection 4.8.1).

> **NOTE**
>   ONLY when the timer board is mounted, load is possible.

Operation
MENUS → DEP → F1 [TYPE] → Program

```
PROGRAM DEP


                          PROGRAM MODE



     [TYPE]    SCHED   STEPPER   SETUP   DEFLTS   >
              SAVE    RELOAD    MEDNET   S_ASCII
```

1   Press NEXT> key, it shows the second page of function key.
2   Press F2, RELOAD.
3   Following warning window is displayed on center of screen.

```
YOU ARE ABOUT TO OVERWRITE
YOUR SCHEDULE, STEPPER
AND SETUP DATA!!
ARE YOU SURE YOU WANT TO DO
THIS?

        YES         NO
```

4   In case of reading the data, move cursor to YES, and press ENTER key.
5   LOAD is started. There is the indicator (reloading…) on the prompt line. Wait for it.

・   It may take some minutes for load to complete. It is shorter, when there are a few files on MC.
・   All of file is the target of load. When a file to be loaded is not found "SPOT-377 Could not read file (file name)" is posted. Loading continues and the next file is loaded.
・   Including schedule, the setting data that has not loaded, robot download all data to timer board. For this reason, alarms such as "SPOT-065 Sequence#%d Data Changed" (%d is the schedule number) is posted for all of them.

4.10 INITIALIZE TO THE DEFAULT

You can set the schedule, stepper and setup data back to default ones for shipment from factory.

Operation
MENUS → DEP → F1 [TYPE] → Program

```
PROGRAM DEP


                          PROGRAM MODE



     [TYPE]    SCHED   STEPPER   SETUP   DEFLTS   >
```

When you press F5, DEFLTS, following alarm window appears.

```
YOU ARE ABOUT TO OVERWRITE
YOUR SCHEDULE, STEPPER
AND SETUP DATA!!
ARE YOU SURE YOU WANT TO DO
THIS?

        YES        NO
```

If you really want to overwrite settings, choose Yes.

⚠**WARNING**
   The current set data is lost by this operation.

NOTE
・ You may wait for some minutes, in order to change the setting.
・ This operation must be done while the timer board is mounted.

5   DEP MENU (STATUS AND ALARM)

This chapter explains the DEP (Data Entry Panel) screen.
Chapter 5 explains the state display and the alarm.
Chapter 4 explains the setting and the programming.

5.1   STATUS

Operation
MENUS → DEP → F1 [TYPE] → STATUS

```
┌──────────────────────────────────────────────────────┐
│ Status DEP                                           │
│                                                      │
│                                                      │
│                      STATUS MODE                     │
│                                                      │
│                                                      │
│                                                      │
├───────┬────────┬────────┬────────┬────────┬─────────┤
│[TYPE] │ STEPPER│ FAULT  │  REV   │  I/O   │    >    │
└───────┴────────┴────────┴────────┴────────┴─────────┘
```

You can enter to the following screen from this screen with function key.
You can return from each screen with PREV key.

Explanation of function keys

F2 STEPPER	Stepper status screen is shown.	Refer to section 5.2
F3 FAULT	Alarm status screen is shown	Refer to section 5.3
F4 REV	Revision Version screen is shown.	Refer to section 5.4
F5 I/O	State of communication data with timer board is shown.	Refer to section 5.5

5.2   STEPPER SCREEN

In this screen, select which stepper status you display.

```
┌──────────────────────────────────────────────────────┐
│ Status Stepper                                       │
│                                                      │
│                                                      │
│                      STATUS MODE                     │
│                                                      │
│         F2 Linear stepper                            │
│         F3 Sure-weld stepper(AC only)               │
│                                                      │
├───────┬────────┬──────────┬────────┬────────┬───────┤
│[TYPE] │ Linear │ Sureweld │        │        │   >   │
└───────┴────────┴──────────┴────────┴────────┴───────┘
```

For linear stepper status, press F2, Linear.
For sure-weld stepper, press F3, Sureweld.

5.2.1   Linear Stepper Status Screen

Operation
MENUS → DEP → F1 [TYPE] → Status → F2 STEPPER → F2 Linear

Status of linear stepper is shown, changed and reset.

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```
Status Lin Step
WC:1                                    1/2
              LINEAR STEPPER STATUS


       Boost:              0
    1 Total Welds:         0
      STEP:#               1
      Step Count:          0
    2 Stepper:#            1
      STATE:              ON


   [TYPE]   ADVANCE   WC_NUM              >
```

Item	Explanation	Change
Boost	Boost (%) of current	Non
Total Welds	Total wells of the stepper	Possible
Step #	Present step of stepper on the screen	Non
Step Count	Stepper count of the present	Non
Stepper No	Indicating Stepper number	Possible
State	ON/OFF of stepper	Non

5.2.2   Change the Stepper Status

You can change the stepper status by following methods. You can change additional weld current by the stepper.

- Change the value of Total Welds
  Move the cursor to Total Welds and input the value directly.
  If you input 0, it is just same as reset the stepper.
- Press F2, ADVANCE
  Stepper becomes the initial status of next step#.

Refer to the manual of welder maker about the detail of stepper.

5.2.3   Sure-Weld Stepper Status Screen

Operation
MENUS → DEP → F1 [TYPE] → Status→F2 STEPPER → F3 Sureweld

It is shown the sure-weld stepper status, changed and reset it.
This screen is only for AC type.

```
Status Sure Step
WC:1                                    1/3
              SURE STEPPER STATUS


      Max 1 Cyc. drop:        0.00
    1 BOOST:                  0 %
    2 Total Welds:            0
      UT= 0         DT= 0
      Exp=0     No Exp=0
    3 Stepper :#              31
      STATE:                  ON


   [TYPE]   RESET   WC_NUM              >
```

- You can change boost directly.
- You can reset to set the welds total to 0.

・ You can reset to press F2, RESET.

Item	Explanation	Change
Max 1 cycle dropping	The maximum of Average power factor per 1 cycle.	Non
Boost	Boost of current (%)	Possible
Total Welds	Total Welds of use this stepper	Possible
UT	The counter representing the number of up trends	Non
DT	The counter representing the number of down trends	Non
Exp	Counter of expulsion times	Non
No Exp	Counter of no expulsion times in welding	Non
Stepper No	Stepper number of indicating	Possible
STATE	On/OFF of stepper is shown. The current is not increased by OFF.	Non

5.3   FAULT (ALARM) SCREEN

Operation
MENUS → DEP → F1 [TYPE] → Status → F3 FAULT

This screen shows the current alarm on the timer board.

```
Status Fault
WC: 1                                           1/2

        1 LOW CRNT LMT FAULT
        2 EXTENDED WLD


    [TYPE]    RESET    WC_NUM    HIST          >
```

Explanation of function keys

F2 RESET	Reset the alarm of the timer board	
F3 WC NUM	Change the timer board number	
F4 HIST	Alarm history screen is shown.	Refer to subsection 5.3.2

5.3.1   About Alarm of Timer Board

・ The alarm of timer board is informed like the alarms of robot. It is SPOT-064.
・ Appearance of alarm is checked by alarm screen of DEP, and by common alarm screen (MENU→ALARM).
・ The alarm of timer board can be output to digital signal.
・ To reset the timer board's alarms, perform one of the following operations.
    ・ Press F2, RESET on DEP/Status/Fault screen.
    ・ Execute RESET WELDER instruction.
    ・ Perform a reset operation for the robot.*

*If "Reset WC with Robot" in Spot config screen is enabled, a reset operation for the robot with UI, SI, or RESET key on the teach pendant resets the timer board's alarms. If "Reset WC with Robot" is disabled, reset operations for the robot do not reset the timer borad's alarms.

```
MENUS → DEP → TYPE → Status → FALUT

┌─────────────────────────────────────────┐
│ Status Fault                             │
│ WC: 1                              1/2    │
│                                          │
│        1 START OF FAULTS                 │
│        2 HIGH CRNT LMT FAULT             │
│        3 LOW CRNT LMT FAULT              │
│                                          │
│                                          │
│   [TYPE]  RESET   WC_NUM   HIST      >   │
└─────────────────────────────────────────┘


MENUS → SETUP → IWC ALM DO

┌─────────────────────────────────────────┐
│ DEP ALM DO                               │
│ board: 1                           1/6   │
│                                          │
│     1 Timer abnormal          DO [  1]   │
│                                          │
│        Num      Text                     │
│     2 [7] HIGH CRNT LMT FAULT DO [  2]   │
│     :           :                        │
│     :           :                        │
│   [TYPE]         WC_NUM              >    │
└─────────────────────────────────────────┘
```

```
MENUS → ALARM→ HIST

┌─────────────────────────────────────────┐
│ Alarm : HIST                             │
│                                          │
│   1   SPOT-010  Major alarm detected     │
│   2  [SPOT-064] HIGH CRNT LMT FAULT      │
│                                          │
│                                          │
│                                          │
│   [TYPE]         ACTIVE  CLEAR  DETAIL   │
└─────────────────────────────────────────┘


MENUS → DEP → TYPE → Program → SETUP

┌─────────────────────────────────────────┐
│ Program Setup                            │
│ WC:1                              1/53   │
│                                          │
│   1 INVALID SEQUENCE SELECTED: (FAULT)   │
│   2 WLD INITIATE NOT PRESENT: (ALERT)    │
│   3 CONTROL STOP: (FAULT)                │
│   4 STPPER APPROACHING MAX: (NONE)       │
│   5 END OF STPPER: (FAULT)               │
│   6 SUREWELD TREND LMT: (ALERT)          │
│   7 HIGH CRNT LMT FAULT: (FAULT)         │
│   8 LOW CRNT LMT FAULT: (FAULT)          │
│   9 SCR MISFIRE: (ALERT)                 │
│   :         :                            │
│   :         :                            │
│                                          │
│   [TYPE]         WC_NUM  DWNLOAD     >   │
└─────────────────────────────────────────┘
```

5.3.2   Alarm History Screen

Operation

MENUS → DEP → F1 [TYPE] → Status→F3 FAULT → F4 HIST

The alarm hist screen is composed in the following order.
You can return from each screen with PREV key.

Operation	Explanation	
MENUS →DEP →F1[TYPE] →STATUS →F3 FAULT	Current alarm	Section 5.3
F4 HIST	Alarm history *) Top menu of following nesting	Below 1
F3 PART_ID	You can confirm which program encountered how many weld alarms.	Below 2
F3 WELD_ID	This screen shows how many weld alarms occurred at which welding position in specified program in previous menu.	Below 3
F3 FLTS	Detailed display of alarm at a program and a welding position	Below 4

1   This screen displays alarm history for the past 100 times of welding.
   ・   This history includes alarm during welding only. Alarms "During welding" includes those told
       before starting welding after robot requested welding to timer board, too.
   ・   Not 100 alarms, but all alarms for 100 times of welding.
       When several alarms occurred at one welding, all of them are recorded together. Total number
       of alarms may be over 100.
   ・   When welding is done more than 100 times, oldest data is deleted.

```
Fault Frequency
All/All                                          1/4

         Fault                        # of Occur.
      1 NO FAULTS ACTIVE                   4
      2 VOLTAGE COMPENSTATION LMT          1
      3 EXTENDED WLD                       9
      4 ISO CNTR OFF WHEN NEEDED           1

     [TYPE]           PART_ID    SAVE            >
```

2   When you press F3, PART_ID on above screen, the following screen is displayed. This shows the
     number of appearance alarm each program.

```
Part Fault Freq.
All/All                                          1/4

         PART ID/Style name          # of Faults
      1 2DOOR                             9
      2 3DOOR                             1
      3 4DOOR                             4
      4 TEST                              1

     [TYPE]           WELD_ID    SAVE            >
```

3   When you press F3, WELD_ID on above screen, the following screen is displayed. You are shown
     the number of appearance alarm at each program corresponding to the cursor.

```
Weld Fault Freq.
2DOOR/ALL                                        1/4

         WELD ID                      # of Faults
      1 WELD ID #2                        4
      2 WELD ID #3                        1
      3 WELD ID #4                        3
      4 WELD ID #10                       1

     [TYPE]           FLTS       SAVE            >
```

PART_ID

4   When you press F3, FLTS, the following screen is displayed.
     It shows the kind of alarm and its number at previous screen corresponding to the cursor "WELD ID
     #".

```
Weld Faults
2DOOR/2                                          1/4

         FAULT                        # of Occur.
      1 NO FAULTS ACTIVE                  1
      2 VOLTAGE COMPENSATION LMT          1
      3 EXTENDED WLD                      1
      4 ISO CNTR OFF WHEN NEEDED          1

     [TYPE]                      SAVE            >
```

     You are shown which position of which program at upper-left side on screen. This sample is the 2 of
     program (2DOOR).

5.3.3   Saving of Alarm History

When you press F4, SAVE on the screen of alarm history, its data is saved. File name is WELD.DT, and
format is CSV.

```
This file was created on 06-12- 8 21:32  from Spot Tool+  V7.20P/16
Robot F-Number:F00000
Robot Hostname:ROBOT
WC_NUM, AVG_PFACT, AVG_I, AVG_V, CFACT, %I, SCHED_NO, CYCLES, PROG,
POSITION,  TIME,  INVALID  SEQUENCE  SELECTED,WLD  INITIATE  NOT
PRESENT,CONTROL STOP,STPPER APPROACHING MAX,END OF STPPER,HIGH CRNT
LMT FAULT,LOW CRNT LMT FAULT,CONTROL FAILED TO FIRE,EXTENDED WLD,ISO
CNTR OFF WHEN NEEDED,NO ZERO CROSSING SYNC,I/O ADAPTER FAILED,WLD
DATA  NOT  PROGRAMMED,HIGH  C-FACTOR  LMT,LOW  C-FACTOR  LMT,HEAT  CY
LMT,WLD INTERRUPTION,PRESS NOT ACHIEVED,PRESS CRNT LOOP ALARM,WLD
PROCEED,INVERTER   SERIAL   COMM   ERROR,LOW   POWER   LINE   ,SOFT
OVERCURRENT  ,CRNT  REGULATION  ,WLDING  TRANSFORMER  ,DC  BUS  OVER
VOLTAGE  ,INVERTER  BUS  ,INVERTER  OVER  TEMP  ,OUTPUT  GROUND  ,HARD
OVERCURRENT ,DRIVER LOW VOLTAGE ,INVERTER SYSTEM FAILURE ,ILLEGAL
POWER FREQUENCY ,MAIN FUSE OPEN ,SEC CRNT SENSOR ,VLV 1 INITIAL PRESS
(PSI),VLV 2 INITIAL PRESS (PSI),HEAT CY LMT (0=SEAM),
 1,    -1,    0,    557,    0,    0,    1,    0,AA_11,    1,18-APR-03
10:18  ,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,
 1,    -1,    0,    558,    0,    0,    1,    0,AA_11,    1,18-APR-03
10:18  ,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,
 1,    -1,    0,    558,    0,    0,    1,    0,AA_11,    1,18-APR-03
10:19  ,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,
```

After headline, parameter is formed by CSV style. It is hard to read this style. But it is easy to do so after you paste it to spread sheet in such MS-Excel.

・   Copy all of text of weld.dt, and paste.
・   You appoint the position of pause, and divide by comma.
    Or
・   You open the file, weld.dt on the Excel.
・   You appoint the position of pause by text file wizard shown automatically.

WC_ NUM	AVG_ PFAC T	AVG _I		SCHE D_NO	CYC LES	PROG	PO SITI ON	TIME	INVAL ID SEQU ENCE SELE CTED	WLD INITI ATE NOT PRE SEN T		MAIN FUSE OPEN	SEC CRNT SENS OR	VLV 1 INITIAL PRESS (PSI)	VLV 2 INITIA L PRESS (PSI)	HEA T CY LMT (0=S EAM)
1	−1	0		1	0	AA_11	1	2012/4/18 10:18	0	0		0	0	0	0	0
1	−1	0	omit	1	0	AA_11	1	2012/4/18 10:18	0	1	omi t	0	0	0	0	0
1	−1	0		1	0	AA_11	1	2012/4/18 10:19	0	0		0	0	0	0	0

　　　　←――――――――――→　　　　　←――――――→　←――――――→
　　　　　　Welding data　　　　　　　　Appearance alarm　　Extra data

- ・ Time of welding is recorded on TIME.
- ・ Left side of TIME is data of welding.
- ・ Right side of TIME is alarm of welding. If 1 is recorded, the alarm occurred at welding.
     In this example," Weld initiate not present" appear on the welding of second from upper.
- ・ POSITION is the comment of position. In case of no comment, it becomes the position number.
- ・ According to the type of firmware, the line except alarm adds to most right line. This is a part of
     setup item, and all of fields corresponding to it are 0.

5.4   REVISION SCREEN

Operation
MENUS → DEP → F1 [TYPE] → Status → F4 REV

```
Status Revision
WC:1
                Dep Revision Version

    CPU 80652M5 SERIAL 10197748
    LCA xper 2.8
    PRGM T99104-00-10 EXEC L806x-02-04

    [TYPE]            WC_NUM                      >
```

Item	Explanation
CPU	Version of hardware
SERIAL	Serial number of timer board
LCA	Version of Logic Cell Array (LCA)
PRGM	Version of Application software program
EXEC	Version of IWC loader software program

5.5   I/O SCREEN

Operation
MENUS → DEP → F1 [TYPE] → Status → F5 I/O

This screen shows the communication data between timer board and robot software. This is composed of
input screen and output screen. Input screen is the signal from timer to robot, and output screen is the
signal from robot to timer.

Parts of the communication data can be checked with output signals, DO or GO.

Refresh rate
Output : 1 sec per 1 cycle. And it is refreshed at starting of weld, too.
Input : When the status is changed, input is refreshed.
Even if status is not changed, it is updated cyclically (about 1sec).

5.5.1   Input Screen

This is the data from timer board to robot.

```
DEPIO IN STAT
WC:1                                          1/8

        1 Ready to Weld:      0    DO [   0]
        2 Weld/NoWeld:        0    DO [   0]
        3 Weld Complete:      0    DO [   0]
        4 Stepper Reset:      0    GO [   0]
        5 Alert:              0    DO [   0]
        6 Fault:              1    DO [   0]
        7 Weld in Progress:   0    DO [   0]
         Shunt Trip:          0
         AIN1:                0
         AIN2:                0
        8 MFDC Rqst To Weld:  0    DO [   0]


    [TYPE]              WC_NUM    I/O              >
```

Item	Explanation
Ready to Weld	Timer board is ready to weld. (When you set the Invrt rdy weld input signal(refer to section 3.2), it functions.）
Weld/NoWeld:	Welding mode of timer board is shown. **SIM mode is 1(ON)**
Weld Complete	Weld completed at 1
Stepper Reset	The number of reset stepper is shown.
Alert	Alert alarm
Fault	Fault alarm. This is usually 1. When fault occurred, this becomes 0.
Weld in Progress	This is 1 during welding
Shunt Trip	It is the request of shunt trip. When the robot receives it, it output the pulse signal of shunt trip.
AIN1	Feed back value of valve pressure.
AIN2	（only use of valve）
MFDC Rqst To weld	Only MFDC, output the value to Inverter Request to Weld signal.

*   To check Stepper Reset using an output signal, use group output, GO.
*   This screen does not allow you to set up output signals for Shunt Trip, AIN1 and AIN2.

5.5.2   Output Screen

This is the signal from robot to timer board.

```
DEPIO OUT STAT
WC:1                                          1/7

        1 Weld Schedule:      0    GO [   0]
        2 Reset Stepper:      0    GO [   0]
        3 Weld Mode:          1    DO [   0]
        4 Init Weld:          0    DO [   0]
        5 Reset Fault:        0    DO [   0]
         ISO Contactor:       0
        6 Control Stop:       1    DO [   0]
         AOUT1:               0
         AOUT2:               0
        7 MFDC Rdy To Weld :  1    DO [   0]


    [TYPE]              WC_NUM    I/O              >
```

Item	Explanation
Weld Schedule	Weld Schedule
Reset Stepper	Request of Reset Stepper
Weld Mode	Request of weld mode. Robot set 0 at SIM mode
Init Weld	Weld starting

Item	Explanation
Reset Fault	The request of alarm resetting
Iso Contactor	Status of Iso contactor
Control Stop	Internal use
AOUT1	Output of valve pressure
AOUT2	(Only use of valve)
MFDC Rdy To Weld	Only MFDC, output Invter Rdy Wld signal from welder

*   To check Weld Schedule or Reset Stepper using an output signal, use group output, GO.
*   This screen does not allow you to set up output signals for Iso Contactor, AOUT1 and AOUT2.

5.5.3   Example

・   You want to check the request of starting weld from robot to timer.
     (Check the output of Weld initiate)
・   You want to know the weld mode of state from robot to timer.
     (Check the output of Weld mode)
・   You want to know the weld mode of timer.
     (Check the input of Weld/Noweld)

It may be not possible to read change of I/O because of update cycle of screen display.

5.6   DISPLAY SCREEN

Operation
MENUS → DEP → F1 [TYPE] → Display

This screen shows weld result.

In case of MFDC

```
Display Weld Data
WC:1

      PRI. V:    556          SCHD:      3
      PRI. I:    190        ONTIME:    145
      SEC. I:   9500           CYC:   1200
                             CFACT:    396
        AIN1:      0          AIN2:      0
       AOUT1:      5         AOUT2:      5

       LINE V:    564


    [TYPE]   DETAIL   WC_NUM   HIST          >
```

Explanation of function key

F2 DETAIL	A detailed screen is displayed.	Subsection 5.6.1
F3 WC NUM	Change the timer board.	
F4 HIST	History of welding result is shown.	Subsection 5.6.2

Item	Explanation
PRI. V	Average primary voltage
PRI. I	Average primary current
SEC. I	Average secondary current
AVG.PF	Average power factor
%I	Average percent line current fired
ONTIME	Average inverter weld on-time(unit is μ sec)（MFDC only）

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Item	Explanation
CFACT	This is C-Factor. For derail, refer to the operation manual made by welder maker.
AIN1	The feedback value of valve pressure
AIN2	
AOUT1	Output of valve pressure
AOUT2	
LINE V	Primary line voltage level read from the welding contactor panel. In case of MFDC, It is the value after rectification.

In case of AC

```
Display Weld Data
WC:1

         PRI. V:   460          SCHD:    01
         PRI. I:  0037            %I:    51
         SEC. I: 03710           CYC:    10
        AVG. PF:    99         CFACT:   074
           AIN1:    00          AIN2:     0
          AOUT1:    01         AOUT2:    01


         LINE V:   461


    [TYPE]    DETAIL    WC_NUM    HIST              >
```

5.6.1   Detailed Screen

This screen displays the maximum, average and minimum of main parameter.

Operation
MENUS → DEP → F1 [TYPE] → Display → F2 DETAIL

In case of MFDC

```
Display Weld Data
WC:1

          DC Bus V  PriI    SecI
      --------------------------------------
      MAX     561    0196   09800
      AVG     556    0190   09500
      MIN     555    0186   09300
      --------------------------------------
      CFACT  00396          AVG. ON TIME  0145
      SCH.    003            MFDC  CYC    1200
      ----------------------------
      LINEV  564  Z.C.  SYNC:  TRUE


    [TYPE]           WC_NUM           HELP    >
```

Item	Explanation
DC Bus V	Average DC bus voltage level of Only MFDC. It corresponds to PRI.V on the display weld data.
PRI. I	Average primary current
SEC. I	Average secondary current
CFACT	This is C-Factor, and just same as display weld data.
AVG.ON TIME	It corresponds to ON TIME on the display weld data.
SCH.	Schedule number
LINE V	Primary line voltage level read from the welding contactor panel.
Z.C.SYNC	TRUE indicates the IWC has proper synchronization with the incoming power line's voltage zero crossing. FALSE indicates the IWC is unable to synchronize with the incoming power line's voltage zero crossing. The IWC will not allow welding to occur until synchronized.

In case of AC

```
Display Weld Data
WC:1

          LineV    PriI    SecI    PF
       -------------------------------------
       MAX    470    0041   04100    99
       AVG    460    0037   03700    99
       MIN    450    0003   00300    99
       -------------------------------------
       CFACT  074              %I    51
       SCH.    01             CYC    10
       -------------------------------------
       LINEV    458  Z.C.       SYNC  TRUE


     [TYPE]         WC_NUM              >
```

5.6.2   History Screen of Result of Weld

Based on the result of weld of last 100 points, this screen shows statistic figures of current and voltage.
- It records the results of weld point for last 100 points.
- Each average, standard deviation and variance of voltage, current, power rate and CFactor are shown.
- You can limit data for calculation by program name, position number, and schedule number. (Refer to subsection 5.6.3)

Operation
MENUS → DEP → F1 [TYPE] → Display → F4 HIST

```
Data History
WC:1

    Program:
    (                           ALL  )
    Sched:     1 Weld ID:  1
     Param     Avg        Std       Var
     V  :     0.00       0.00      0.00
     I  :     0.00       0.00      0.00
     PF :     0.00       0.00      0.00
     CF :     0.00       0.00      0.00

     [TYPE]   ALL   WC_NUM   SAVE        >
```

Explanation of function key

F2 ALL	Shown object is all of program.
F3 WC NUM	Changing the timer board
F4 SAVE	Saving the weld results

5.6.3   Filter of Calculation Data

You can limit data for calculation to ones of specific program, weld id (position number) and schedule. Move cursor to corresponding items and change value.

In case of program, you select the cursor corresponding to parenthesis, and press F4, [CHOICE].

```
Data History
WC:1

      Program:
      (                                    ALL  )
      Sched:      1  Weld ID:  1
       Param       Avg         Std        Var
       V  :      583.67       14.98      224.33
       I  :     2666.67      942.81   888888.81
       PF :       -1.00        0.00      224.33
       CF :      367.33        7.24       49.33


     [TYPE]     ALL     WC_NUM   [CHOICE]         >
```

You can select program from sub-menu.

```
                                   1
  1 AA01
  2 AA02
  3 AA03
  4 AA04
  5 TESTPROG1
  6 TESTPROG2
  7 TESTPROG3
  8 TESTPROG4
```

The result of calculation is displayed. This result is based on welds by AA01.tp. All of the following results are 0. This means there is no weld data by AA01.tp within the last 100 welds.

```
Data History
WC:1

      Program:
      (                                    AA01  )
      Sched:      1  Weld ID:  1
       Param       Avg         Std        Var
       V  :        0.00        0.00        0.00
       I  :        0.00        0.00        0.00
       PF :        0.00        0.00        0.00
       CF :        0.00        0.00        0.00


     [TYPE]     ALL     WC_NUM   [CHOICE]         >
```

For example, you want to check if weld parameters are proper or not. You can show the weld data based on each schedule so that you can check the dispersion of data.
And when you set the program and weld ID (position number), you can check the specific point. When the gun isn't taught perpendicular to the work, current of weld may be influenced. You can compare the problem point with the normal point.

6   INSTRUCTION

6.1   SPOT

The SPOT instruction is used to weld.
The usage is just as usual (just same as non integrated weld timer).
Robot requests the timer board weld of the specified weld schedule number (S).

　　　SPOT[SD=1, P=1 , t=**, <u>S=1</u>, ED=1]
　　　　　S: weld schedule number

・　The weld schedule number of SPOT (the value of S) corresponds to the following number shown by
　　DEP PROGRAM screen.

```
┌─────────────────────────────────────────────────┐
│ Program Sequence                                 │
│ WC:1 SCH:1                              1/4       │
│                                                  │
│   1 START OF SEQUENCE 1                          │
│   2 SQUEEZE 20 CYS                               │
│   3 WLD 10 CY. 50 %I                             │
│   4 HOLD 05 CYS                                  │
│                                                  │
│ ┌──────┬─────────┬────────┬─────────┬────────┬──┐│
│ │[TYPE]│ SCH_NUM │ WC_NUM │ DWNLOAD │ INSERT │ >││
│ └──────┴─────────┴────────┴─────────┴────────┴──┘│
└─────────────────────────────────────────────────┘
```

6.2   RESET STEPPER

You can reset stepper by this instruction.

　　　RESET STEPPER [WC=1, SN=1, SV=0]
　　　　　WC: timer board number (1,2)
　　　　　SN: stepper number (1～31)
　　　　　SV: no use

NOTE
　　　If communication is not established, you can not execute this instruction.

WC and SN correspond to the following number on the DEP PROGRAM STEPPER screen.

```
        WC       Equivalent of SN

┌─────────────────────────────────────────────────┐
│ Program Stepper                                  │
│ WC:1 STPR:1                             1/6       │
│                                                  │
│  1 STP #01   3 %   700 AMPS   60 WLDS            │
│  2 STP #02   3 %   700 AMPS  180 WLDS            │
│  3 STP #03   3 %   700 AMPS  300 WLDS            │
│  4 STP #04   3 %   700 AMPS  600 WLDS            │
│  5 STP #05   3 %   700 AMPS  800 WLDS            │
│  6 STPPER GROUP # 1                              │
│                                                  │
│ ┌──────┬────────┬────────┬─────────┬───────┬───┐│
│ │[TYPE]│ STPR#  │ WC_NUM │ DWNLOAD │       │ > ││
│ └──────┴────────┴────────┴─────────┴───────┴───┘│
└─────────────────────────────────────────────────┘
```

Do the instruction, and its stepper is reset. Total weld is 0 on the stepper condition screen.

```
┌─────────────────────────────────────────────────────┐
│ Status Lin Step                                      │
│ WC:1                                         1/2     │
│                 LINEAR STEPPER STATUS                │
│                                                      │
│        Boost:                  2                     │
│      1 Total Welds:            600                   │
│        STEP:#                  2                     │
│        Step Count:             15   ┌─ Equivalent    │
│      2 Stepper:#              (1) ◄──┤  of SN         │
│        STATE:                  ON                    │
│                                                      │
│ ┌─────┬─────────┬─────────┬──────┬────────┬───┐     │
│ │[TYPE]│ ADVANCE │ WC_NUM  │      │ HELP   │ > │     │
│ └─────┴─────────┴─────────┴──────┴────────┴───┘     │
└─────────────────────────────────────────────────────┘
```

6.3   RESET WELDER

This is the instruction of error (abnormal) reset from robot controller to weld timer.

    RESET WELDER [WC= n]
        WC: timer board number (1,2)

This instruction can be used if you need to reset only weld timer.

┌───┐
│ **NOTE**   │
│   If communication is not established, you can not execute this instruction. │
└───┘

7　　DATA SAVING

Saving and loading method depends on kind of data.

Item	Object data	Specification	Data form
Schedule	Welding sequence	1SEQnnn.DT (nnn=1-255) ・Saving/loading ・FTP can be used	Binary
Setup data in DEP	Data set by Program Setup Alarm level	1SET.DT ・Saving/loading ・FTP can be used	Binary
Linear stepper	Setting of Linear Stepper	1LSTnn.DT(nn = 1-31) ・Saving/loading ・FTP can be used	Binary
Sure-weld Stepper	Setting of Sure weld stepper	1ASTnn.DT(nn = 1-31) ・Saving/loading ・FTP can be used	Binary
Weld and alarm history	Weld results of last 100 Weld alarm history	WELD.DT ・Only saving ・FTP cannot be used.	ASCII
Setting of I/O and others	WELD I/O IWC ALARM DO IWC STAT DO IWC COMM Stat Welder type	SYSSPOT.SV ・Saving/loading ・FTP can be used	Binary

7.1　　SAVING OF SCHEDULE, STEPPER AND SETUP

You can save it by the following method.
A)　Save on the DEP PROGRAM screen (subsection 7.1.1)
B)　Save on the FILE screen (subsection 7.1.2)
C)　Data transfer to PC (by FTP) (subsection 7.1.3)

7.1.1　　Save at Dep/Program Screen

Refer to section 4.8.

> **NOTE**
> It is not possible, when the timer board is not mounted.

7.1.2　　Save at File Screen

It is just same as usual backup operation.
MENUS → FILE → F4 [BACKUP] → "All of above" or "Application".

> **NOTE**
> When the timer board has never been mounted, these are not saved.

7.1.3   FTP/Get

Preparation
- ・   You start up the application for using FTP.
- ・   It is possible to communicate using TCP/IP.

A)   Login to the robot controller by using FTP.
B)   Change dir to FR7; (cd FR7:).
C)   Set mode to binary (binary).
D)   Do "get file name". (get file_name)
       Board1, schedule10: "get 1seq10.dt"
       Board1, linear stepper5: "get 1lst5.dt"
       SETUP data of board1: "get 1set.dt"

> **NOTE**
> When the timer board has never been mounted, these cannot be acquired.

7.2   LOAD OF SCHEDULE, STEPPER AND SETUP

You can load the following method.
A)   Load on the DEP PROGRAM screen (subsection 7.2.1)
B)   Load on the FILE screen of control start (subsection 7.2.2)
C)   Data transfer to PC (by FTP) (subsection 7.2.3)

7.2.1   Load on the DEP PROGRAM Screen

Refer to section 4.9.

> **NOTE**
> It is not possible, when the timer board is not mounted.

7.2.2   Load on the FILE Screen of Control Start

It is the same of the loading of usual DT file.
It is loaded by (all) and (application) at controlled start menu. All of selecting device file is read.

7.2.3   FTP/PUT

Preparation
- ・   You start up the application for using FTP.
- ・   It is possible to communicate using TCP/IP.

A)   Do your operation 0～0 of subsection 7.1.3.
B)   Put file_name
       Board 1, schedule 10: "put 1seq10.dt"
       Board 1, linear stepper 5: "put 1lst5.dt"
       SETUP data of board 1: "put 1set.dt"
C)   Turn off and on the power supply of robot

7.3　SAVING OF WELD AND ALARM HISTORY

It is saved to WELD.DT. This file cannot be loaded.
Refer to subsection 5.3.3 about operation.

7.4　SV FILES

The following SV file is read/loaded by usual operation for SV files.

・　SYSSPOT.SV

8   ALARM CODES

SPOT-063 STOP %s
Cause   **:**   A weld fault has happened on the weld controller.
Remedy   **:**   Refer to manual for weld controller for detailed info on the fault.

SPOT-064 WARN %s
Cause   **:**   A weld alert has happened on the weld controller.
Remedy   **:**   Refer to manual for weld controller for detailed info on the alert.
               When "WLD DATA NOT PROGRAMMED" occurs, there can be an error not only on the timer board but also on the data in the robot controller. Perform either of the following steps.
               If the saved files (1seq*.dt、 1set.dt) are available:
               1. Copy the files to a memory card etc.
               2. Load the files by using the DEP PROGRAM screen
               If the saved ASCII files (1seq*.ls、 1set.ls) are available:
               1. Check the executed schedule number on the EDIT screen.
               2. Set and download the schedule by using DEP PROGRAM SCHEDULE screen.
               3. Set and download the executed stepper by using DEP PROGRAM STEPPER screen.
               3. Set and download the setup data by using DEP PROGRAM SETUP screen.

SPOT-065 WARN %s
Cause   **:**   A weld event has happened on the weld controller.
Remedy   **:**   This is logging information only. No remedy is required.

SPOT-066 WARN lwc NOT ready
Cause   **:**   Unable to perform operation due to IWC status.
Remedy   **:**   Refer to the specific IWC error status, and follow that remedy.

SPOT-350 WARN IWC board not found
Cause   **:**   No IWC boards were found on the controller.
Remedy   **:**   If an IWC board was expected, this indicates that there is probably a serious hardware problem and that the board should be replaced. If an IWC board is not expected, then the IWC driver should be removed from the system configuration.

SPOT-351 WARN IWC driver not running
Cause   **:**   The IWC driver is waiting for the PC/104 motherboard to complete its reset cycle.
Remedy   **:**   This is a system programming error. Document the events that led to the error, and call your FANUC technical representative.

SPOT-352 WARN Invalid IWC index
Cause   **:**   The specified IWC board is not installed.
Remedy   **:**   This is a system programming error. Document the events that led to the error, and call your FANUC technical representative.

SPOT-353 WARN IWC message in progress
Cause   **:**   A message cannot be sent to the IWC because a previous message transaction is still in progress.
Remedy   **:**   This is a system programming error. Document the events that led to the error, and call your FANUC technical representative.

SPOT-354 WARN Invalid IWC msg buffers
Cause   **:**   The buffers sent for a message transaction are not valid in number and/or length.

Remedy : This is a system programming error. Document the events that led to the error, and call your FANUC technical representative.

SPOT-355 WARN Invalid IWC function code
Cause : The function request to the IWC driver is invalid.
Remedy : This is a system programming error. Document the events that led to the error, and call your FANUC technical representative.

SPOT-356 WARN Checksum error, IWC msg send
Cause : The IWC reported a checksum error during a message send operation. This might indicate a problem with the board or driver software.
Remedy : Document the events that led to the error, and call your FANUC technical representative.

SPOT-357 WARN Invalid buffer, IWC msg send
Cause : The IWC reported an invalid buffer during a message send operation. This might indicate a problem with the board or driver software.
Remedy : Document the events that led to the error, and call your FANUC technical representative.

SPOT-358 WARN Checksum error, IWC msg recv
Cause : An invalid checksum was computed on a message segment received from the IWC board. This might indicate a problem with the board or driver software.
Remedy : Document the events that led to the error, and call your FANUC technical representative.

SPOT-359 WARN Invalid buffer, IWC msg recv
Cause : An invalid buffer tag was detected on a message segment received from the IWC board. This might indicate a problem with the board or driver software.
Remedy : Document the events that led to the error, and call your FANUC technical representative.

SPOT-360 WARN IWC buffer too small
Cause : The buffer passed to the IWC driver was too small to hold the message received from the IWC.
Remedy : Document the events that led to the error, and call your FANUC technical representative.

SPOT-361 WARN Ack timeout, IWC msg send
Cause : The IWC did not acknowledge a message segment that was sent to it.
Remedy : Document the events that led to the error, and call your FANUC technical representative.

SPOT-362 WARN Timeout, IWC msg recv
Cause : The IWC did not send a response message within the allowable time limit.
Remedy : Document the events that led to the error, and call your FANUC technical representative.

SPOT-363 WARN IWC motherboard error
Cause : The IWC driver was unable to communicate with the PC/104 motherboard driver.
Remedy : Document the events that led to the error, and call your FANUC technical representative.

SPOT-364 WARN IWC has invalid DPRAM signature
Cause : An IWC board was detected, but the contents of the dual-port RAM area is not what is expected.
Remedy : Make sure that the correct type of IWC board is installed. If the problem persists, swap in a new board.

SPOT-365 WARN Unsupported IWC version/rev level
Cause : An IWC board was detected, but the version and/or revision level of its dual-port RAM is not supported by the installed driver.

Remedy : Install an IWC with a compatible version level, or check to see if there is an updated version of the driver available.

SPOT-366 WARN Unable to register IWC interrupt
Cause : The driver was unable to register an interrupt for the IWC board.
Remedy : Document the events that led to the error, and call your FANUC technical representative.

SPOT-367 WARN Only 29 functions allowed in a schedule
Cause : The user tried to insert more than 40 functions into a schedule.
Remedy : Do not insert more than 40 functions in a schedule.

SPOT-368 WARN Imp. can only come before weld FCTN
Cause : The user tried to insert an impulse function(function 60) before a non-weld function.
Remedy : Insert the impulse function directly before a weld function.

SPOT-369 WARN FCTN not supported by the timer
Cause : The user directly entered an invalid function number to be inserted.
Remedy : Choose another function from the choice list, or look up the function number of a valid function.

SPOT-370 WARN Could not download schedule %d
Cause : The schedule failed 2 download tries to the timer.
Remedy : Try cycling controller power. If the error still exists, document the events that led to the error, and call your FANUC technical representative.

SPOT-371 WARN Could not download stepper %d
Cause : The stepper failed 2 download tries to the timer.
Remedy : Try cycling controller power. If the error still exists, document the events that led to the error, and call your FANUC technical representative.

SPOT-372 WARN Could not read sequence file %d
Cause : The sequence file could not be read from the FROM.
Remedy : Make sure the sequence exists on FROM.

SPOT-373 WARN Could not download setup data
Cause : The setup data failed 2 download tries to the timer.
Remedy : Try cycling controller power. If the error still exists, document the events that led to the error, and call your FANUC technical representative.

SPOT-374 WARN Could not download Dynamic data
Cause : The dynamic data failed 2 download tries to the timer.
Remedy : Try cycling controller power. If the error still exists, document the events that led to the error, and call your FANUC technical representative.

SPOT-375 WARN Could not read stepper file %d
Cause : The stepper file could not be read from the FROM.
Remedy : Make sure the stepper exists on FROM.

SPOT-376 WARN Could not read setup file %s
Cause : The setup file could not be read from the FROM.
Remedy : Make sure the setup file exists on FROM.

SPOT-377 WARN Could not read file %s
Cause : The named file could not be read from the Device.

Remedy   :   Make sure the file exists on the Device.

SPOT-378 WARN IWC ID jumpers incorrect
Cause   :   The ID jumpers on the IWC card(s) are not set so that the cards can be identified as card #1 and card #2.
Remedy   :   If there is one card in the system, its ID must be set to 1. If there are two cards, one must be set as card 1 and the other as card 2 according to the slots they are in.

SPOT-379 WARN IWC slave busy
Cause   :   The IWC slave busy bit is set in the status word.
Remedy   :   Retry the operation after a short delay.

SPOT-380 WARN Invalid IWC Firmware Version
Cause   :   The firmware versions on the timer card must be the same if there are 2 timers. Either the firmware version itself is different, or the revision level of the firmware is different.
Remedy   :   Make sure that the firmware version and revision level match for both cards. It could be viewed by plugging in one card at a time and viewing the revision level of each one.

9 SUPPLEMENT

9.1 CHANGE WELD TYPE

Before you use a non-integrated weld timer, you must change Weld interface.

Operation
MENUS → SETUP → F1 [TYPE] → Spot Config

```
┌──────────────────────────────────────────────────────┐
│ SPOT CONFIG                                            │
│                                             6/34       │
│      1 F Number:                   F00000              │
│      2 Load Spottool Macros:       DISABLED            │
│      3 Number of equipments:       1                   │
│      4 Number of weld controllers: 1                   │
│      5 Current equipment, gun:     1, 1                │
│      6  Weld interface:            DIGITAL             │
│      7  Number of guns:            SINGLE              │
│      :                             :                   │
│     13  Weld cntler num for gun:   1                   │
│        Current weld controller:    1                   │
│      :                             :                   │
│      :                             :                   │
│                                                        │
├──────────────────────────────────────────────────────┤
│    [TYPE]              [CHOICE]            >           │
└──────────────────────────────────────────────────────┘
```

Turn off and on the controller after changing Weld interface to DIGITAL.

10   TROUBLE SHOOTING

10.1   WHEN ONE OF DEP SCREENS IS DISPLAYED, OS-012 IS POSTED.

Cause

One of following causes this.
A)   Integrated Weld Timer board is not installed.
B)   Initialization at power supply is not finished.
C)   Initialization at power supply failed.
D)   The PC/104 motherboard mounted does not support WTC integrated weld timer.

Remedy

A)   Integrated weld timer board is not installed.
     Install the board.
B)   Initialization at power supply is not finished.
     When you show DEP screen just after controller get up, initialization may be still in progress. After waiting a moment, retry it.
C)   Initialization completed can be checked by the signal of communication. Refer to chapter 3.
     Initialization at power supply failed.
     In case of neither 0, nor B), the trouble appears on the middle of initialization. Cycle power.
D)   Check the order number of the PC/104 motherboard mounted, and call your FANUC technical representative.

10.2   WHEN THE SCREEN OF IWC IS DISPLAYED, INTP-311 IS POSTED

Cause

Integrated Weld Timer board is not installed.

Remedy

Install the board.

10.3   DISPLAY OF DEP SCREEN IS ABNORMAL.

Refer to section 10.1.

10.4   YOU CANNOT INSERT A FUNCTION ON THE PROGRAMMING SCREEN

Cause

When the cursor is on "END OF SEQUENCE ##", you cannot insert.
Function is inserted to the next line the cursor exists.

Remedy

Point the cursor to other line.

10.5 DOWNLOADED SCHEDULE RETURNED TO ORIGINAL ONE

Cause

One of followings causes this.
A)   When you download a schedule, you specify a schedule number to which you download. It seems that you didn't specified currently displayed schedule.
B)   In case you loaded files before you display the schedule again.
     Remember if you loaded files or not.

Remedy

A)   In case of this, it is downloaded to specified schedule (stepper). (The screen changes to the specified one automatically). But the schedule is not downloaded as currently displayed schedule.
B)   Download to the original schedule from the specified schedule.
     If you saved the data, reload it.

10.6 WHEN YOU TURN ON WELD/NOWELD SIGNAL, CONTACTOR DOES NOT CLOSE

Cause

First, ON/OFF the contactor signal by manual operation.
When contactor does not open and close, check the connection.
The cause except it is considered as follows.
1   You set Weld/Noweld signal and contactor output signal, but you didn't cycle power.
2   You set the using SYSRDY on contactor control, and the signal is OFF.

Remedy

1   Supply the power.
2   Do SYSRDY ON.

10.7 INTEGRATED WELD TIMER SIGNAL IS NOT DISPLAYED ON THE WELD I/O SCREEN.

Cause

Weld interface of the equipment is not INTEGRAL.

Remedy

Open Spot Config screen and then set Weld interface of the equipment to INTEGRAL.

10.8 SPOT-373 " COULD NOT DOWNLOAD SETUP DATA" IS POSTED.

Cause

Robot downloads the setting data it has (1set.dt) at power up, but timer rejects it.
This happens at cold start just after you changed the type of firmware.

Remedy

Do either 1 or 2

1   Download the 1set.dt taken from the robot of the same firmware.
2   Load the default setting, and set again.
     Refer to section 4.10.

10.9 "WELD INITIATE NOT PRESENT" HAPPENS

Cause
This happens when the program is paused after starting weld and before timer returns weld completion. Because of pause during weld, Weld initiate signal drop through Dual port ram.

Remedy
Pick up the cause of stopping the program, and run the program again.

10.10 ALARM DO, WHICH IS SPECIFIED IN ALARM DO SCREEN, IS NOT OUTPUT

Cause
One of following causes this.
1   Specified alarm didn't occurred.
2   You specified alarm number, but you forgot specify DO index.
3   There are two boards and you specified DO for the other board.
4   It is internal error of timer board.

Remedy
1   Target of alarm DO output is SPOT-064. First, you check the alarm appears or not. If it does not appear, the DO doesn't turn on.
     If the alarm actually occurs, check the contents. The alarm corresponds to an item in DEP PROGRAM SETUP screen. Check the number and text are set on the alarm output screen.

```
MENUS → SETUP → IWC ALM DO

DEP ALM DO
board: 1                          1/6        MENUS → DEP → Program → F4 SETUP

    1 Timer abnormal       DO [  1]          Program SETUP
                                             WC:1                          1/53
    Num       Text
    2 [7]  HIGH CRNT LMT FAULT  DO [  2]       1 INVALID SEQUENCE SELECTED: (FAULT)
    :          :                               2 WLD INITIATE NOT PRESENT: (ALERT)
    :          :                               3 CONTROL STOP: (FAULT)
                                               4 STPPER APPROACHING MAX: (NONE)
  [TYPE]       WC_NUM          >               5 END OF STPPER: (FAULT)
                                               6 SUREWELD TREND LMT: (ALERT)
                                               7 HIGH CRNT LMT FAULT: (FAULT)
         It corresponds to this number.       8 LOW CRNT LMT FAULT: (FAULT)
                                               9 SCR MISFIRE: (ALERT)
                                               :        :
                                               :        :

                                               [TYPE]       WC_NUM  DWNLOAD     >
```

2   Set the port number.

```
┌─────────────────────────────────────────────────────┐
│ DEP ALM DO                                           │
│ board: 1                                    1/6      │
│                                                      │
│      1 Timer abnormal              DO [   1]         │
│                                                      │
│        Num      Text                                 │
│      2 [7] HIGH CRNT LMT FAULT     DO [   0]         │
│        :          :                                  │
│        :          :                                  │
│                                                      │
│ ┌──────┬─────┬─────────┬─────┬─────┬─────┐           │
│ │[TYPE]│     │ WC_NUM  │     │     │  >  │           │
│ └──────┴─────┴─────────┴─────┴─────┴─────┘           │
└─────────────────────────────────────────────────────┘
```
Port number might be 0.
Confirm port number.

In case of the above figure, only alarm number is set and index of DO is 0. In this case, signal is not output. Timer abnormal signal is not output, also.

3   In case of 2 boards, you can set alarm DO respectively. Board number is written on the top of screen.

This corresponds to board number.
Confirm board number.

```
┌─────────────────────────────────────────────────────┐
│ DEP ALM DO                                           │
│ board: 1                                    1/6      │
│                                                      │
│      1 Timer abnormal              DO [   1]         │
│                                                      │
│        Num      Text                                 │
│      2 [7]  HIGH CRNT LMT FAULT    DO [   0]         │
│        :          :                                  │
│        :          :                                  │
│                                                      │
│ ┌──────┬─────┬─────────┬─────┬─────┬─────┐           │
│ │[TYPE]│     │ WC_NUM  │     │     │  >  │           │
│ └──────┴─────┴─────────┴─────┴─────┴─────┘           │
└─────────────────────────────────────────────────────┘
```

Check board you use and the setting of it.

(4)   The following errors are internal error. Alarm DO doesn't support these.
    ・   Shorted Contactor
    ・   Eprom Error
    ・   Ram Data Failure
    ・   Non Compatibility
    ・   Isolation Contactor
    ・   LSB 5 Fault
    ・   LSB 6 Fault
    ・   LSB 7 Fault

11   LIMITATION ITEMS

A)   This robot software option can control WTC Integrated Weld Timer only.
B)   It is not possible to use together with another maker's timer board.
C)   The specifications of tool correspond to only SpotTool+.
D)   Support 2 units of Integrated Weld Timer board.
E)   In case of 2 units of timer,
   ・   You cannot mix the AC type and the MFDC type.
   ・   The firmware both timers must be the same version.
   ・   You cannot execute SPOT inst. at the same time by both timers.
F)   You cannot use double gun (2 gun per 1 unit).
G)   Do not change the system variables related to this function by the parameter instruction.
H)   For purge of FROM, you may wait for a few minutes to save and download the setting.
I)   When you use gun change, you should set the weld condition to each gun.
J)   The screens of Integrated Weld Timer are not shown correctly without the board. You may have errors when you display them without timer board.
K)   When you cold start for the first time after you installed timer boards, robot makes files for saving of setting. In this case, the TP key's response is late for a few minutes.
      It is no problem on second starting up.
L)   In case of having 2 timer boards, initialize and filing time become longer.
   ・   Initialize time at power on is longer
   ・   The time for SAVE, LOAD
   ・   There is no influence in the program execution time of the welding etc.
M)   It is considered the kinds of alarms will increase with the changing of firmware. WELD.DT cannot contain the 35th and later alarms.

INDEX

REVISION RECORD

Edition	Date	Contents
02	Sep.,2012	Applied to R-30*i*B controller's manual
01	Mar.,2007	

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