Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and keep for future reference.
Safety

For Your Safety

Robots generally have requirements which are different from other manufacturing equipment, such as larger working areas, high-speed operation, rapid arm movements, etc., which can pose safety hazards.

Read and understand the instruction manuals and related documents, and observe all precautions in order to avoid the risk of injury to personnel and damage to equipment.

Carelessness contributes to serious accidents in the work area.

It is the user’s responsibility to ensure that all local, state, and national codes, regulations rules, or laws relating to safety and safe operating conditions are met and followed.

**DANGER**

- Teaching operation and maintenance operation of the Robot must conform to:
  - Industrial Safety and Health Law
  - Order for Enforcement of the Industrial Safety and Health Law
  - Industrial Safety and Health Regulations
  - Technical Standards for Electrical Facilities

Other related laws and regulations are:

- Occupational Safety and Health Act in USA
- Factory Act (Gewerbeordnung) in Germany
- Health and Safety at Work, etc. Act in UK
- EC Machinery Directive 2006/42/EC

- Prepare
  - SAFETY WORK REGULATIONS
    based on concrete policies for safety management complying with related laws and regulations.

- Observe
  - JIS B 8433-1: 2015 “Robots for industrial environments-Safety requirements” (ISO 10218-1: 2011) for safe operation of the robot. (JIS B 8433 is for Japan only)

- Reinforce the
  - SAFETY MANAGEMENT SYSTEM
    by designating authorized operators and safety managers for the Robot, as well as giving continuing safety education and training.

- Teaching operation and maintenance operation the Robot are specified as “Hazardous Operations” in the Industrial Safety and Health Act (for Japan only). Personnel engaged in these operations must receive special training offered by YASKAWA.
We suggest that you obtain and review a copy of the ANSI/RIA National Safety Standard for Industrial Robots and Robot Systems (ANSI/RIA R15.06-2012). You can obtain this document from the Robotic Industries Association (RIA) at the following address:

Robotic Industries Association
900 Victors Way
P.O. Box 3724
Ann Arbor, Michigan 48106
TEL: (734) 994-6088
FAX: (734) 994-3338
www.roboticsonline.com

Ultimately, well-trained personnel are the best safeguard against accidents and damage that can result from improper operation of the equipment. The customer is responsible for providing adequately trained personnel to operate, program, and maintain the equipment.

We recommend approved YASKAWA training courses for all personnel involved with the operation, programming, or repair of the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

DANGER

• Personnel engaged in operation, maintenance, or management of the Robot must receive required training before using the Robot. For more information on training, contact Customer Support.

DANGER

• For safety, make sure to have and follow all manuals, read them thoroughly and understand the contents of them. Confirm that you have all required manuals. If any of the manuals are missing, contact Customer Support.

• Read and understand these instructions thoroughly before installing, operating, or maintaining the Robot.

Any matter not described in this manual must be regarded as “prohibited” or “improper”.

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Ultimately, well-trained personnel are the best safeguard against accidents and damage that can result from improper operation of the equipment. The customer is responsible for providing adequately trained personnel to operate, program, and maintain the equipment.

We recommend approved YASKAWA training courses for all personnel involved with the operation, programming, or repair of the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.
WARNING

- Safe operation of this equipment is the user’s responsibility.
  - The conditions under which the equipment will be operated safely should be reviewed by the user. The user must be aware of the various national codes, ANSI/RIA R15.06-2012 safety standards, and other local codes that may pertain to the installation and use of this equipment.

Not following all national codes, safety standards and local codes can result in death or serious injury

- Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location.
  - The following safety equipment is provided as standard:
    - Safety barriers
    - Door interlocks
    - EMERGENCY STOP button

Not providing additional safety measures as required can result in death or serious injury.

- Check all safety equipment frequently for proper operation.
  - Repair or replace any non-functioning safety equipment immediately.

If safety equipment does not operate properly death or serious injury can result.

CAUTION

- Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this equipment should program, or maintain the system.

Any personnel involved with the operation of the equipment must understand potential dangers of operation.
### NOTICE

- The drawings and photos in this manual are examples and differences may exist between them and the delivered product.
- YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the manual number will also be revised.
- Some operations require standard passwords and some require special passwords.
- If your copy of the manual is damaged or lost, contact Customer Support to order a new copy. Be sure to tell Customer Support the manual number listed on the front cover.
Notes for Safe Operation

Read this instruction carefully before installing, operating, maintaining, or inspecting.

In this instruction, Safe Operations are classified as “DANGER”, “WARNING”, “CAUTION” or “NOTICE”.

**DANGER**
Indicates a hazardous situation which, if not avoided, **WILL result in death or serious injury**. Safety Signs identified by the signal word DANGER. This is used sparingly and only for those situations presenting the most serious hazards.

**WARNING**
Indicates a hazardous situation which, if not avoided, **MAY result in death or serious injury**.

**CAUTION**
Indicates a hazardous situation, which if not avoided, **MAY result in minor to moderate injury**. It may also be used without the safety symbol as an alternative to “NOTICE”.

“CAUTION” without the safety symbol is used to indicate a situation which if not avoided **may result in equipment damage**.

**NOTICE**
NOTICE is preferred signal word for practices not related to personal injury. The safety symbol is not used with this signal word. As an alternative to “NOTICE”, the word “CAUTION” without the safety symbol may be used to indicate a message not relating to injury.

A “CAUTION” may result in a serious accident in some situations.

**NOTICE**
To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “DANGER”, “WARNING” or “CAUTION”.
Ensure Safety

DANGER

- When the power supplies of the Robot and Controller are turned ON at start-up, be sure to confirm the following:
  - Safety protection devices such as the emergency stop circuit, the safety plug, etc. operate normally.
  - Each axis operates normally in TEACH mode.
  - Robot operates normally at the speed limit or less in the TEACH mode.(Speed limit: 250 mm/s at the TCP or the flange)
  - The teaching function and the playback function operate normally.

- The Robot may stop movements while waiting for a condition to be satisfied during operation.
  Once meeting the condition the Robot starts movement causing a danger that will cause death or severe injury.

- Make sure to clearly indicate when Robot is in operation
  - Use a pilot lamp and/or an audible alert
  - The Robot stops operation if the operator comes close.

- Install a safety fence around the Robot to prevent any accidental contact with the Robot when power is applied.
  - Display a warning sign stating “Off-Limits During Operation” at the entrance of the safety fence.
  - The gate of the safety fence must be equipped with a safety interlock (safety plug) to turn the servo power OFF when the gate opens.
  - Make sure interlocks operate properly before use.

- For areas not enclosed by safety fences, use a photoelectric sensor, a safety light curtain, etc. to make sure that the Robot stops its operation if the operator enters its operating range.

Failure to observe this Danger will result in a serious accident due to contact with the Robot.
Definition of Terms Used Often in This Manual

The Motoman is the YASKAWA industrial robot product.

The Motoman usually consists of a Robot, Controller, Programming Pendant, and Robot cables.

In this manual, the equipment is designated as follows:

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<td>Controller</td>
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<tr>
<td>YRC1000 Programming Pendant</td>
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</tr>
<tr>
<td>Manipulator</td>
<td>Robot</td>
</tr>
<tr>
<td>Cable between the Manipulator and the Controller</td>
<td>Robot cable</td>
</tr>
<tr>
<td>Positioner</td>
<td>Positioner</td>
</tr>
</tbody>
</table>

Descriptions of the Programming Pendant keys, buttons, and displays are shown as follows:

*The button/switch names are denoted as symbols.
In this manual, names of companies, corporations, or products are trademarks, registered trademarks, or brand names for each company or corporation. The indications of ® and ™ are omitted.
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1 Introduction

1.1 About This Document

This manual is delivered with the Arc Welding Universal WELDCOM Interface (UWI), to provide an understanding on what it is for and how to use. Read and understand the Controller and Manipulator manuals before moving on to reading and understand this manual. Although basic in content, this manual is intended for personnel who have received operator training from YASKAWA and are familiar with the operation of this particular Motoman system. For more detailed information on any specific component or peripherals, review the full documentation package that is included (refer to section 1.4 “Reference Documentation” on page 1-5).

NOTICE

This manual documents a standard Motoman system. If the system is custom or modified, use this manual in conjunction with the drawings, schematics, and parts listing (Bill of Material) for the specific system. The drawings, schematics, and parts listing are included in the documentation package supplied with the Motoman system.

This manual is broken down to the following chapters:

- **Chapter 1 “Introduction”**
  This chapter provides general information about the Arc Welding Universal WELDCOM Interface, a list of reference documents, and customer support contact information.

- **Chapter 2 “Arc Welding Application”**
  This chapter provides a detailed information concerning the Arc Welding Universal WELDCOM Interface.

- **Chapter 3 “Process Selection in Arc Process Table”**
  This chapter explains how to add or modify an Arc Process Table.

- **Chapter 4 “ARCON Instruction”**
  This chapter explains the ARCON instruction which supplies an arc start signal to the power source to turn ON to start welding.

- **Chapter 5 “ARCOF Instruction”**
  This chapter explains an arc start instruction to turn off the power source to end welding by this instruction.

- **Chapter 6 “ARCSET Instruction”**
  This chapter explains an instruction for setting welding conditions.

- **Chapter 7 “Arc Condition File”**
  This chapter explains the files for settings for the welding sequence, welding process, and robot functions. This includes Arc Start Files (ASF) and Arc End Files (AEF).

- **Chapter 8 “Arc Retry and Restart Functions”**
  This chapter explains the functions for retrying or restarting after an arc failure.
1 Introduction
1.1 About This Document

- Chapter 9 “Wire Stick Functions”
The chapter explains various wire stick functions that checks operations, provides automatic operations and stops operations.

- Chapter 10 “Arc Monitor Function”
This chapter explains how to use the arc monitor function. The arc monitor monitors, analyzes and controls of the welding condition (welding current and welding voltage) of a specified welding section.

- Chapter 11 “Slope Up/Down Function”
This chapter explains how to use the slope up/down function during welding to gradually change the welding condition.

- Chapter 12 “Weaving Operation”
This chapter provides instructions for setting up a weaving operation.

- Chapter 13 “Arc Welding Management and Maintenance”
This chapter explains the diagnosis windows

- Chapter 14 “Welding Path Shift Function”
The chapter explains how to shift the welding path between upper board and lower board direction.

- Chapter 15 “Parameter”
This chapter reviews a list of available parameters for welding settings.

- Chapter 16 “Integration Signals”
This chapter supplies basic information for custom integrations.

- Chapter 17 “Alarms”
This chapter explains the different types of alarms.

- Appendix A
This Appendix includes tables of work instructions
1 Introduction

1.2 System Overview

The Universal WELDCOM Interface (UWI), is designed for power sources with modern digital interfaces. It provides a common interface while presenting information using power source manufacturer's terminology. Welding instructions in this manual may include illustrations with different brands of power sources, but programming is similar for all power sources.

Programming with the UWI involves setting up an Arc Process Table which is used to define the parameters that can be used for process control. There are up to 16 processes that can be defined, but at least one is required. Arc welding instructions require a process number to be specified to list the proper weld parameters.

INFORM uses ARCON and ARCOF instructions to start and stop the welding process. The UWI supports Arc Files (1-1000) which are global and can be used in multiple Jobs that may weld the same joint condition. The global weld file settings are not recorded for saved jobs. Also, if settings in weld files are changed, it can affect multiple weld locations and programs where that file is referenced.

There is also the option to record the arc instruction with weld settings directly in the job. This will allow weld settings to be adjusted for a specific weld location without affecting other welds or programs. When Jobs are saved and loaded back in the weld settings will be maintained.

There are two basic types of control with robotic welding power sources; Job mode or Advanced mode. Job mode utilizes programs in the power source to store weld settings. The robot will specify a program number in the power source with the desired weld settings, but does not control these settings. Advanced mode utilizes the robot to control the process parameters. The UWI provides the ability to use different settings or even slope them between different sequences of arc starting and arc ending. The advanced control makes it easier synchronize the weld settings with robot motion.

The UWI utilizes weld parameter fields (up to six) that are defined with terminology that is used by the power source manufacturer. A message window is often displayed with a description and range for a specific parameter. There is also an in the lower right of the screen that can be used to open a help graphic with more description of the weld or robot setting.

For multiple robot systems, the Arc Process Table is shared between all robots. For example, if pulse mode is assigned to Process 1, then Process 1 will be referenced as pulse mode in arc instructions for all robots.
1.3 System Structure Example of Arc Welding System

Fig. 1-1: System Structure of Welding Motoman

A normal system structure of an Arc Welding System consists of:

- Positioner
- Robot
- Torch
- Wire Feeder
- Welding Power Supply
- Controller

**NOTICE**

While the above list of items are included in a normal system structure of an Arc Welding System other items may be included.
1.4 Reference Documentation

For additional information on individual components, refer to the following documentation that is included with your system:

- Manipulator Manual
- Manipulator Maintenance Manual
- YRC1000 READ FIRST!! Safety Requirements (P/N 179526-1CD)
- YRC1000 Instructions (P/N 178642-1CD)
- YRC1000 Controller Manual Assembly (P/N 179531-1CD)
- YRC1000 General Operator's Manual (P/N 178645-1CD)
- YRC1000 Maintenance Manual (P/N 178643-1CD)
- YRC1000 Alarm Codes Manual (P/N 178644-1CD)
- Positioner Manual
- YRC1000 Independent/Coordinated Control Function Manual (P/N 178660-1CD)
- INFORM User's Manual (P/N 178649-1CD)
- Functional Safety Board Operation Manual (P/N 165988-1CD)
- Vendor manuals for system components not manufactured by YASKAWA
1.5 Customer Support Information

If you need assistance with any aspect of your Arc Welding UWI, contact Customer Support at the following 24-hour telephone number:

(937) 847-3200

For routine technical inquiries, you can also contact Customer Support at the following e-mail address:

techsupport@motoman.com

When using e-mail to contact Customer Support, please provide a detailed description of your issue, along with complete contact information. Please allow approximately 24 to 36 hours for a response to an inquiry.

NOTICE

Use e-mail for routine inquiries only. If there is an urgent or emergency need for service, replacement parts, or information, contact Customer Support at (937) 847-3200.

Have the following information ready before calling:

- System: Arc Welding UWI
- Manipulator: 
- Positioner: 
- Primary Application: Arc Welding
- Controller: YRC1000
- Software Version: Access this information on the Programming Pendant's LCD display screen by selecting (MAIN MENU) - (SYSTEM INFO) - (VERSION)
- Robot Serial Number: Located on the Robot data plate
- Robot Sales Order Number: Located on the Controller data plate
2 Arc Welding Application

2.1 General Descriptions of Instructions and Functions

2.1.1 Setup Connected Peripheral Devices

2.1.1.1 Welder Setup

The welder system should be preconfigured from the factory. The following information is provided for maintenance.

Miller Welder

– IP Address

**NOTICE**

See Miller Electric documentation for setting the welder IP address.

- The recommended default IP addresses are:
  - Welder 1 - 192.168.1.51, 255.255.255.0
  - Welder 2 - 192.168.1.52, 255.255.255.0
  - Welder 3 - 192.168.1.53, 255.255.255.0
  - Welder 4 - 192.168.1.54, 255.255.255.0

**NOTICE**

Other IP addresses may be used; but this may require changing the default address of the robot controller.

- Ethernet/IP

  The robot must be configured as an Ethernet/IP scanner to connect with the Miller welder. Please see the Ethernet/IP manual (178651-1CD) for details on how to input the scanner settings.

- The device information for the welder must match the following:
  - O->T RPI: 25 ms
  - T->O RPI: 25 ms
  - Connection timeout: 4
  - Connection type: Exclusive Owner
  - Input size: 16 byte
  - Output size: 22 byte
  - Configuration size: 0 word
  - Input instance: 100
  - Output instance: 112
  - Configuration instance: 128

- The TERMINAL OUTPUT must be configured as follows:
  - Terminal Output Function: Enable
  - M Register: 436
  - Terminal Output Setting: Enable
  - M Register: 438
2-2 Arc Welding Application
2.1 General Descriptions of Instructions and Functions

– I/O Allocation
When choosing the Concurrent I/O address of the welder, it is recommended to use the default addresses below. If other addresses are used, it may require special customization of the Concurrent I/O Ladder program.

<table>
<thead>
<tr>
<th></th>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet/IP CPU status byte</td>
<td>#21270</td>
<td>#31270</td>
</tr>
<tr>
<td>Welder (R1)</td>
<td>#23780</td>
<td>#33780</td>
</tr>
<tr>
<td>Welder (R2)</td>
<td>#24030</td>
<td>#34030</td>
</tr>
<tr>
<td>Welder (R3)</td>
<td>#24280</td>
<td>#34280</td>
</tr>
<tr>
<td>Welder (R4)</td>
<td>#24530</td>
<td>#34530</td>
</tr>
</tbody>
</table>

– Map Welders to Robot
The following settings can also be configured by directly modifying AxP parameters. See chapter 15 “Parameter” for a list of AxP parameter definitions.

The welder must be specified to which robot.

a) From the Main Menu on the Programming Pendant, touch {ARC WELDING} and then {Miller Setup}.

![Programming Pendant Screenshot](image-url)
2 Arc Welding Application

2.1 General Descriptions of Instructions and Functions

b) Specify the IP address that was assigned to each welder.

<table>
<thead>
<tr>
<th>Welder Number</th>
<th>IP Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welder 1</td>
<td>192.168.1.51</td>
</tr>
<tr>
<td>Welder 2</td>
<td>0.0.0.0</td>
</tr>
<tr>
<td>Welder 3</td>
<td>0.0.0.0</td>
</tr>
<tr>
<td>Welder 4</td>
<td>0.0.0.0</td>
</tr>
</tbody>
</table>

Unit Selection: English

Welder error monitoring:

- Voltage Sense: Enable
- Feeder Current: Enable
- Wire Feed Speed: Enable
- Coolant Flow: Enable
- Gas Flow: Enable

If you change any settings, you must reboot the controller for them to take effect.

NOTICE

If unsure of which IP addresses were chosen during the Ethernet/IP setup, touch the magnifying glass icon. This will bring up a list of each device that is configured in the Ethernet/IP Scan List.

<table>
<thead>
<tr>
<th>Ethernet/IP Scan List:</th>
</tr>
</thead>
<tbody>
<tr>
<td>192.168.1.51: CONTINUUM ()</td>
</tr>
<tr>
<td>Assign Welder 1 &gt; 192.168.1.51</td>
</tr>
<tr>
<td>Assign Welder 2 &gt; 0.0.0.0</td>
</tr>
<tr>
<td>Assign Welder 3 &gt; 0.0.0.0</td>
</tr>
<tr>
<td>Assign Welder 4 &gt; 0.0.0.0</td>
</tr>
</tbody>
</table>

NOTICE

If changes are made, the Robot Controller must be rebooted for the changes to take effect.

c) From the “Unit Selection” drop down, configure whether to use English or Metric weld settings.

d) If desired, specify Amps instead of wire feed speed.

e) From the “Welder Error Monitoring” section, specific errors from welder can be disable if desired.

f) After making selections, press the {Main Menu} button.
   • There will be a prompt to save changes.
2 Arc Welding Application

2.1 General Descriptions of Instructions and Functions

- Lincoln Welder
  - IP Address

**NOTICE**

See Lincoln Electric documentation for setting the welder IP address.

- The recommended default IP addresses are:
  - Welder 1 - 192.168.1.51, 255.255.255.0
  - Welder 2 - 192.168.1.52, 255.255.255.0
  - Welder 3 - 192.168.1.53, 255.255.255.0
  - Welder 4 - 192.168.1.54, 255.255.255.0

**NOTICE**

Other IP addresses may be used; but this may require changing the default address of the robot controller.

- Map Welders to Robot
  The following settings can also be configured by directly modifying AxP parameters. See *chapter 15 “Parameter”* for a list of AxP parameter definitions.

The welder must be specified to which robot.

  a) From the Main Menu on the Programming Pendant, touch (ARC WELDING) and then (Lincoln Setup).
2 Arc Welding Application

2.1 General Descriptions of Instructions and Functions

b) Specify the IP address that was assigned to each welder.

<table>
<thead>
<tr>
<th>Welder Number</th>
<th>IP Address</th>
<th>Wire Feeder</th>
<th>Feed Roll Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welder 1</td>
<td>192.168.1.51</td>
<td>AutoDrive6 4R90</td>
<td></td>
</tr>
<tr>
<td>Welder 2</td>
<td>192.168.1.52</td>
<td>AutoDrive6 4R100</td>
<td></td>
</tr>
<tr>
<td>Welder 3</td>
<td>192.168.1.53</td>
<td>AutoDrive6 4R100</td>
<td></td>
</tr>
<tr>
<td>Welder 4</td>
<td>192.168.1.54</td>
<td>AutoDrive6 8A</td>
<td>1/64 - 1.2mm</td>
</tr>
</tbody>
</table>

**NOTICE**
If unsure of which IP addresses were chosen during the welder setup, touch the magnifying glass icon. This will scan the network for any connected welders on the robot's subnet.

**NOTICE**
If unsure of which IP addresses were chosen during the welder setup, touch the magnifying glass icon. This will scan the network for any connected welders on the robot's subnet.

<table>
<thead>
<tr>
<th>Welder 1</th>
<th>0.0.0.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welder 2</td>
<td>0.0.0.0</td>
</tr>
<tr>
<td>Welder 3</td>
<td>0.0.0.0</td>
</tr>
<tr>
<td>Welder 4</td>
<td>0.0.0.0</td>
</tr>
</tbody>
</table>

![Main Menu]
If you change any settings, you must reboot the controller for them to take effect.

c) From the "Unit Selection" drop down, configure whether to use English or Metric weld settings.
2 Arc Welding Application

2.1 General Descriptions of Instructions and Functions

d) If desired, specify Amps instead of wire feed speed.

NOTICE

• If a servo feeder is selected for any of the robots, additional options for “Touch-Retract Start” and “Retract Start Ramping” will appear. These can be enabled or disabled for every weld that uses a specific process number.

  – Touch-Retract Start (AutoDrive S and SA) is a system that touches the wire to the work, senses the touch and retracts the wire, initiating the arc at a lower current. The softer start minimizes spatter or eliminates it altogether and extends the life of the consumable.

  – Retract Start Ramping works in conjunction with the Touch Retract Start setting to ramp the weld settings to create smoother transitions from the “starting to weld” state.

e) After making selections, press the {Main Menu} button.

  • There will be a prompt to save changes.

NOTICE

If changes are made, the Robot Controller must be rebooted for the changes to take effect.

– Configure Arc Monitoring

  UWI is compatible with the Arc Monitoring features, such as Yaskawa Cockpit. The controller must be configured to monitor the correct feedback data.

  a) From the Main Menu, touch {ARC WELDING} and then {APPLI COND.}. 

![Image of a menu interface with the ARC WELDING and APPLI COND options highlighted]
2. Arc Welding Application
2.1 General Descriptions of Instructions and Functions

b) Set the following definition values for each robot.
(Use the [PAGE] key to navigate to the settings for each robot).

<table>
<thead>
<tr>
<th>Definition</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCMON VOLT CMD REGIST ADDR</td>
<td>301</td>
<td>334</td>
<td>367</td>
<td>400</td>
</tr>
<tr>
<td>ARCMON CURR CMD REGIST ADDR</td>
<td>300</td>
<td>333</td>
<td>366</td>
<td>399</td>
</tr>
<tr>
<td>ARCMON COMMAND VALUE TYPE</td>
<td></td>
<td></td>
<td></td>
<td>BINARY</td>
</tr>
<tr>
<td>ARCMON SAMPL VOLT REGIST ADDR</td>
<td>305</td>
<td>338</td>
<td>371</td>
<td>404</td>
</tr>
<tr>
<td>ARCMON SAMPL CURR REGIST ADDR</td>
<td>304</td>
<td>337</td>
<td>370</td>
<td>403</td>
</tr>
</tbody>
</table>

– Check I/F Panel
The I/F Panel is provided to show simple status of the welder. This

[Diagram of I/F Panel]

a) Touch {I/F Panel} from the bottom menu.
• The “UWI Running” light should be green.
• The “UWI Fatal Error” light should be OFF.
• The “Welder #X Ready” light should be green for each
connected welder.
2.1.2 Teaching Operation

2.1.2.1 Teach a Weld Line

<table>
<thead>
<tr>
<th>Step</th>
<th>Instruction</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>NOP</td>
<td>Standby position</td>
</tr>
<tr>
<td>001</td>
<td>MOVJ VJ=10.00</td>
<td>Approach position</td>
</tr>
<tr>
<td>002</td>
<td>MOVJ VJ=80.00</td>
<td>Welding start point</td>
</tr>
<tr>
<td>003</td>
<td>MOVL V=800</td>
<td>Welding start</td>
</tr>
<tr>
<td>004</td>
<td>MOVL V=50</td>
<td>Welding condition change</td>
</tr>
<tr>
<td>005</td>
<td>MOVL V=50</td>
<td>Welding end point</td>
</tr>
<tr>
<td>006</td>
<td>MOVL V=800</td>
<td>Welding end</td>
</tr>
<tr>
<td>007</td>
<td>MOVJ VJ=50.00</td>
<td>Retract position</td>
</tr>
<tr>
<td>008</td>
<td>END</td>
<td>Standby position</td>
</tr>
</tbody>
</table>

2.1.2.2 Choose Weld Processes

- Chapter 3 “Process Selection in Arc Process Table”

2.1.2.3 Register Work Instructions

- ARCON section 4.3.1 “Registering the ARCON Instruction”
- ARCOF section 5.2.2 “Registering the ARCOF Instruction”
- ARCSET section 6.4 “Registering the ARCSET Instruction”

<table>
<thead>
<tr>
<th>Step</th>
<th>Instruction</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>NOP</td>
<td>Standby position</td>
</tr>
<tr>
<td>001</td>
<td>MOVJ VJ=10.00</td>
<td>Approach position</td>
</tr>
<tr>
<td>002</td>
<td>MOVJ VJ=80.00</td>
<td>Welding start point</td>
</tr>
<tr>
<td>003</td>
<td>MOVL V=800</td>
<td>Welding start</td>
</tr>
<tr>
<td>004</td>
<td>ARCON ASF##(1)</td>
<td></td>
</tr>
<tr>
<td>005</td>
<td>MOVL V=50</td>
<td>Welding condition change</td>
</tr>
<tr>
<td>006</td>
<td>ARCSET ASF##(2)</td>
<td></td>
</tr>
<tr>
<td>007</td>
<td>MOVL V=50</td>
<td>Welding end point</td>
</tr>
<tr>
<td>008</td>
<td>ARCOF AEF##(1)</td>
<td></td>
</tr>
<tr>
<td>009</td>
<td>MOVL V=800</td>
<td>Welding end</td>
</tr>
<tr>
<td>010</td>
<td>MOVJ VJ=50.00</td>
<td>Retract position</td>
</tr>
<tr>
<td>011</td>
<td>END</td>
<td>Standby position</td>
</tr>
</tbody>
</table>
2.1.2.4 Set Welding Conditions

- Arc welding start condition chapter 4 “ARCON Instruction”
- Arc welding end condition chapter 5 “ARCOF Instruction”

<table>
<thead>
<tr>
<th>Line</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>NOP</td>
</tr>
<tr>
<td>001</td>
<td>MOVJ VJ=10.00</td>
</tr>
<tr>
<td>002</td>
<td>MOVJ VJ=80.00</td>
</tr>
<tr>
<td>003</td>
<td>MOVL V=800</td>
</tr>
<tr>
<td>004</td>
<td>ARCON ASF#(1)</td>
</tr>
<tr>
<td>005</td>
<td>MOVL V=50</td>
</tr>
<tr>
<td>006</td>
<td>ARCSET ASF#(2)</td>
</tr>
<tr>
<td>007</td>
<td>MOVL V=50</td>
</tr>
<tr>
<td>008</td>
<td>ARCOF AEF#(1)</td>
</tr>
<tr>
<td>009</td>
<td>MOVL V=800</td>
</tr>
<tr>
<td>010</td>
<td>MOVJ VJ=50.00</td>
</tr>
<tr>
<td>011</td>
<td>END</td>
</tr>
</tbody>
</table>

2.1.2.5 Set Other Welding Functions

- Weaving chapter 12 “Weaving Operation”
- Arc retry function section 8.1 “Arc Retry Function”
- Arc restart function section 8.2 “Arc Restart Function”
- Wire-stick check function section 9.3 “Wire-Stick Check Function”
- Automatic wire-stick release function section 9.1 “Automatic Wire-Stick Release Function”
- Slope up/down function chapter 11 “Slope Up/Down Function”
- Welding path shift function chapter 14 “Welding Path Shift Function”
2.2 Function Keys

Each function used for arc welding is allocated on the [Numeric Keys] of the Programming Pendant.

- **[0]** REFP
  - Registers a reference point “REFP” in a job, or modifies the registered reference point
  - \([\text{REFP}] + [\text{FWD}]\)
    - Moves the Robot to the registered reference point

- **[1]** TIMER
  - Registers a timer instruction “TIMER” in a job.

- **[2]** GAS
  - Controls the flow of gas by opening or closing the solenoid valve
  - Operation does not cause any changes to job contents
  - Enabled in TEACH mode only

- **[5]** ARC OFF
  - Registers a welding end instruction “ARCOFF”
  - Refer to chapter 5 “ARCOF Instruction”

- **[6]** RETRACT
  - Used for wire inching
  - Retracts wire
  - Wire feed motor operates in reverse.
  - Is not available if Arc Start Cond. or Arc End Cond. window displayed.
2.2 Function Keys

- **Registers a welding start instruction “ARCON”**
- **[INTERLOCK] + [ARCON]**
  Switches welding path shift ON/OFF
- **Refer to chapter 4 “ARCON Instruction”**

- **Use for wire inching**
- **Feeds the wire forward**
- **Wire feed motor operates forward as speed specified for power source**
- **Is not available if the Arc Start Cond. or Arc End Cond. window is displayed.**

- **When security mode is in management mode, lights the LED and welding can be done during a test run**
- **Use for welding check during teaching**
- **When pressing the LED lights and a beep sounds**

### NOTICE

- **[FEED] and [RETRACT] are used to perform wire inching.**
- **The term wire inching refers to gradually feeding or retracting the welding wire through the torch and has nothing to do with the job procedure being taught.**
- **Wire inching and retraction speed and settings depend on the Power Source.**
- **Wire inching is performed only in TEACH mode when the arc does not occur.**
3 Process Selection in Arc Process Table

Every weld must specify a process from the Arc Process Table. This process includes information about a specific weld program and contains the available settings/controls for that waveform. The system will generate an alarm if Arc instructions are attempted to be used without specifying a process in the Arc Process Table. Welding processes vary between power source manufacturers and the UWI will list them referencing manufacturers names and reference numbers. Changes to the Arc Process Table are restricted to Management Security level.

3.1 Adding or Changing a Process to Arc Process Table

1. From the “Main Menu” on the Programming Pendant select “ARC WELDING” then “PROCESS SELECTION”.

![Process Selection in Arc Process Table](image)
2. Use the arrow keys to highlight the desired process number and press [SELECT] on the Programming Pendant.

3. Observe a list of available processes in the power source displays.

4. The list will show all available processes in the power source. There are pull down menus that filter the available modes to fit the application. The exact filters will vary based on the power source manufacturer. Use the Programming Pendant ARROW keys or touch to highlight the selection criteria and press [SELECT] to bring up the pull down menu. Press [ENTER] when desired value is highlighted by cursor.

   a) Full Process List can be filtered to show those for application.
### 3.1 Adding or Changing a Process to Arc Process Table

**b)** Filtered Process List from Miller Power Source.

```
<table>
<thead>
<tr>
<th>FILTER AVAILABLE MODES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Type</td>
</tr>
<tr>
<td>Wire Size</td>
</tr>
<tr>
<td>Wire Type</td>
</tr>
<tr>
<td>Gas Type</td>
</tr>
</tbody>
</table>
```

**AVAILABLE WELD MODES**

- 105: MIG 0.045" Steel Argon 90% CO2 10%
- 1003: AccuPulse 0.045" Steel Argon 90% CO2 10%
- 1025: AccuPulse 0.045" Steel Argon 90% CO2 10%
- 1082: AccuPulse 0.045" Steel Argon 90% CO2 10%
- 1303: AccuPulse 0.045" Stainless Steel Argon 90% CO2 10%
- 3004: Versa-Pulse 0.045" Steel Argon 90% CO2 10%
- 4006: RMD 0.045" Steel Argon 90% CO2 10%
- 8105: HD MIG 0.045" Steel Argon 90% CO2 10%

**c)** Filtered Process List from Lincoln Power Source.

```
<table>
<thead>
<tr>
<th>FILTER AVAILABLE MODES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Type</td>
</tr>
<tr>
<td>Wire Size</td>
</tr>
<tr>
<td>Wire Type</td>
</tr>
</tbody>
</table>
```

**AVAILABLE WELD MODES**

- 18: RapidArcMix - Steel (0.045")
- 20: CV CO2 - Steel (0.045")
- 21: CV ArcMix - Steel (0.045")
- 22: Pulse ArcMix - Steel (0.045")
- 404: Tandem Lead - Steel (0.045")
- 405: Tandem Trail - Steel (0.045")
- 418: ProPulse ArcMix - Steel (0.045")
- 462: HI Tandem Trail - Steel (0.045")
3. Process Selection in Arc Process Table

3.1 Adding or Changing a Process to Arc Process Table

5. Use the Programming Pendant ARROW keys or touch to highlight the desired Process and press [SELECT] or [ENTER] to register process.
   – The desired Process will display in the top line of the screen. Press [ENTER] again.

6. Press {Main Menu} and confirm change by selecting {YES} in dialog box to save changes.

**NOTICE**

- Miller Arc Process Selection is limited to eight programs in the power source.
- Specifying a different process in the table with an existing process will overwrite the data when saved. Arc instructions that referenced the original process may need to be edited for proper settings.
3.2 Removing a Process from Arc Process Table

1. Select ARC PROCESS SELECTION menu under the ARC WELDING the selections. Use the ARROW keys or touch the red X in circle to the right of the process to be deleted.

2. Use the Programming Pendant ARROW keys or touch (YES) in the dialog box to confirm that the process should be removed from the table.
4 ARCON Instruction

4.1 Function

This instruction outputs an arc start command. The arc start signal to the Power Source is turned ON to start welding by this instruction.

The function key [ARCON] can be used for registration.

NOTICE

To register the ARCON instruction using [INFORM LIST], select “DEVICE” from the instruction group list.

4.2 Syntax
4.3 Explanation

- **[1] WELDn**
  Choose one of the following tags.
  These tags are enabled only when multiple applications are in use and two or more applications are set as arc welding application.
  When there is only one application, these tags are not displayed.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>WELDn</td>
<td>Selects the Power Source 1 to 4.</td>
<td></td>
</tr>
</tbody>
</table>

- **[2] ASF# (Arc Welding Start Condition File Number)/ [3] CUSTOM** = Individual Setting of TAGs
  Be sure to choose either of the following. If selecting UNUSED it will weld with the process and weld settings from last ASF# or CUSTOM setting.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASF# (Arc welding start</td>
<td>Specifies the arc welding start condition file number.</td>
<td>No. 1 to 1000&lt;br&gt;The number can be specified by B/I/D variable.</td>
</tr>
<tr>
<td>condition file number)</td>
<td>Conditions to start welding are registered in the arc welding start condition file.</td>
<td></td>
</tr>
<tr>
<td>CUSTOM</td>
<td>Specifies setting of individual TAGs in JOB</td>
<td>Selection brings up menu for setting TAGs</td>
</tr>
</tbody>
</table>

- **[4] PROC# (Arc Process Number)**
  Setting of Arc Process Number from table is necessary to display appropriate TAGs for process control. The TAGs displayed are determined by power source and process type. (see chapter 3 "Process Selection in Arc Process Table")

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC# (Arc Process</td>
<td>Selects the process number from the table (up to 16)</td>
<td>Process number will determine the TAGs displayed in [5]. The output value can be specified by the B/I/D variable.</td>
</tr>
<tr>
<td>Number)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4 ARCON Instruction
4.3 Explanation

5. TAG or UNUSED (Arc Process Setting)

Individual weld parameter settings will be displayed with name and units according to power source manufacturers specification (up to six parameters). TAGs are “UNUSED” as initial setting and if selected will update with Default value. If a TAG is “UNUSED” it will use the setting from the previous weld or use Default value if the previous weld used a different PROC#.

TAG settings may include wire feed speed, amperage, voltage, trim, etc. The units will display according to power source manufacturers process specification and may include inch/min, m/min, amps, volts, or %. For definition of specific process parameter, consult power source manual.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAG1</td>
<td>Weld process parameter with manufacturers name and units.</td>
<td>The output value can be specified by B/I/D/B[ ]I[I ]/D[ ] variable.</td>
</tr>
<tr>
<td>TAG2</td>
<td>Up to six individual parameters are possible.</td>
<td></td>
</tr>
<tr>
<td>TAG3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNUSED</td>
<td>Will not display TAG or setting in ARCON instruction in job</td>
<td>Unused TAG will be set to value from last instruction or will use Default setting.</td>
</tr>
</tbody>
</table>

**NOTICE**

Process parameters that are UNUSED in ARCON instructions with CUSTOM TAGs may be changed by use of Arc Start Files with settings for those variables as previous instruction.

6. T = Time

This tag is added only when [3] CUSTOM is selected.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
</table>
| T=time| Specifies the timer value at the start of welding. Robot pauses after striking the arc and will not travel until time expires. | Unit: seconds
The time can be specified by I/I[I ] variable. (Unit: 0.01 sec.) |
| UNUSED| Will not display TAG or setting in ARCON instruction in job                 |                                                                      |
### 4 ARCON Instruction

#### 4.3 Explanation

- **[7] V = Speed**
  
  This tag is added or omitted only when [3] CUSTOM is selected. The speed setting will only be effective if program points do not have a speed TAG or welding speed is set as priority by parameter (programmed speed will be ignored and ARCON speed used).

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>V = Speed</td>
<td>Specifies the speed value at the start of welding.</td>
<td>Speed: 0.1 to 1500.0 mm/sec. The unit displayed can be changed by the setting of the parameter (S2C101) or Operate Condition Setting. The speed can be specified by B/B[ ]/I/I[ ]/D/ D[ ] variable.</td>
</tr>
<tr>
<td>UNUSED</td>
<td>Will not display TAG or setting in ARCON instruction in job</td>
<td></td>
</tr>
</tbody>
</table>

- **[8] RETRY**
  
  This tag is added only when [3] CUSTOM is selected.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>RETRY</td>
<td>Specifies the retry function. If an arc start failure occurs, the retry function will attempt to start the arc again before raising an alarm.</td>
<td>Refer to section 8.1 “Arc Retry Function”.</td>
</tr>
<tr>
<td>UNUSED</td>
<td>Will not display TAG or setting in ARCON instruction in job</td>
<td></td>
</tr>
</tbody>
</table>

- **[9] REPLAY**
  
  Only when *[8] RETRY* is added, be sure to add this tag.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>REPLAY</td>
<td>Specifies the replay mode. The replay mode is one of the modes to repeat the ARCON process when the retry function is enabled.</td>
<td>Refer to section 8.1 “Arc Retry Function”.</td>
</tr>
<tr>
<td>UNUSED</td>
<td>Will not display TAG or setting in ARCON instruction in job</td>
<td></td>
</tr>
</tbody>
</table>
4.3 Explanation

4.3.1 Registering the ARCON Instruction

1. Press [ARCON].
2. Press [ENTER].

**NOTICE**

ARCON instruction cannot be modified after it is registered to the job. Refer to the Controller GENERAL OPERATOR’S manual, section 3.6.4 “Modifying Instructions”.

If the ARCON instruction needs to be modified, delete it and then, add the necessary instruction.

4.3.2 Setting Welding Start Conditions

The ARCON instruction can be registered in any of the following three ways:

- With an arc welding start condition file
  [1] ARCON ASF#
  In this case, the welding condition is set using the arc welding start condition file. (Refer to section 7.3 “Arc Start Condition Files”.)

- With inline tags to specify conditions
  ARCON PROC#(1) WFS=250  V=18.0  T=0.50  V=60 RETRY

- Without additional items
  ARCON
  In this case, the weld will use the settings from the last used welding condition.

**NOTICE**

If two ARCON commands are used back to back in a job, then the second ARCON will act as an ARCSET command. However, if an ASF# is specified, it will execute both the Start Condition and then the Main Condition.
4.3.2.1 With an Arc Welding Start Condition File

1. Select the ARCON instruction in the instruction area (by pressing or using the INFORM LIST).
   - The ARCON instruction appears in the input buffer line.

2. Press [SELECT].
   - The DETAIL EDIT window appears.
3. Place the cursor on "UNUSED" and press [SELECT].

4. Select "ASF#( )" from the selection dialog and press [ENTER] or [SELECT].

5. Cursor over to numeric field and press [SELECT]
   – The number key pad appears. Touch numbers or use keypad to enter desired file number.
4.3 Explanation

- If it is desired to use variable for arc file number, cursor right to the Pull Down menu and press [SELECT]. Move cursor to desired setting and press [SELECT] or [ENTER].

- The ARCON ASF#( ) instruction appears in the input buffer line.

- If desired to change the variable number, cursor to highlight the variable and press [SELECT]. Touch numbers or use keypad for desired setting and press [ENTER].
4. ARCON Instruction

4.3 Explanation

6. Press [ENTER] to clear the “DETAIL EDIT” window and return to the “JOB CONTENT” display

   – The ARCON instruction appears in the input buffer line.

7. Press [ENTER] to record ARCON instruction into Job

   – Press [MODIFY] prior to [ENTER] to change an instruction to ARCON. Press [INSERT] prior to [ENTER] to insert ARCON instruction into next line after cursor.
4.3.2.2 With Inline Tags to Specify Conditions

1. Select the ARCON instruction in the instruction area (by pressing or using the “INFORM LIST”).
   - The ARCON instruction appears in the input buffer line.

2. Press [SELECT].
   - The “DETAIL EDIT” window appears.
4. Press [SELECT] and cursor to “CUSTOM” from the selection dialog.

5. Press [SELECT] or [ENTER].

– The PROC#( ) instruction appears in the input buffer line. TAGs appear for the process parameters with the manufacturers names, units, and allowable range. The number of parameters (1-6) depends on the manufacturer.
6. Cursor over to numeric field and press [SELECT]
   - The number keypad appears. Touch numbers or use keypad to enter desired Process number (1-16). Press [ENTER]. The TAGs will update with the parameters for the specified process.

   – If it is desired to use variables for the Process number, see "Using Robot Variables to Set Parameter Values".

7. Cursor or touch parameter and press [SELECT] to access pull down for setting or "UNUSED". Press [ENTER] to register setting.
4 ARCON Instruction
4.3 Explanation

– The parameter TAG appears in the input buffer line with default setting.

8. Cursor or touch the setting field to the right and press [SELECT] to enter a value. Use the screen numeric key pad or Programming Pendant numeric keys to specify value.
4 ARCON Instruction

4.3 Explanation

- The parameter TAG appears in the input buffer line with specified setting.

9. Repeat step 7 and step 8 to enter settings for desired process parameters or leave them designated as “UNUSED”. Press [ENTER] key to advance to next “DETAIL EDIT” screen for robot control parameters.
4.3 Explanation

10. Repeat step 7 and step 8 to enter settings for desired robot control parameters or leave them designated as “UNUSED”.

**NOTICE**

It is possible to change between the “DETAIL EDIT” screens for process control and robot control parameters. Pressing [ENTER] will advance from the process parameters to the robot parameters. Highlighting the ICON next to CUSTOM and pressing [SELECT] will return from Robot parameters back to process parameters.
11. Press [ENTER] on the robot parameters “DETAIL EDIT” screen displays and records the ARCON instruction with all TAG settings into the input buffer line.

- With the ARCON in the input buffer line, it is possible to cursor over to the individual TAGs and press [SELECT] to open the setting field and [ENTER] a changed value. Pressing [SELECT] with the ARCON highlighted will return to the “DETAIL EDIT” screens.

12. Press [ENTER] to record ARCON instruction into Job
- Press [MODIFY] prior to [ENTER] to change another instruction to ARCON. Press [INSERT] prior to [ENTER] to insert ARCON instruction into next Line after cursor.
Using Robot Variables to Set Parameter Values

**CAUTION**

- Setting of parameter value must take into consideration the units that are used by parameter; a value to set a voltage of 18 must be entered as 180 if the units are 0.1 volts.
- Use of Variable type must be considered for parameter's range of setting; a B-type variable should not be used to set a parameter that has a range beyond a value of 256.
- Welding alarms will occur if the setting of the Variable cause invalid commands; a PROC# that is beyond 16 or undefined process number, or a weld setting that is outside the manufacturer's defined range.

PROC# can be specified as a variable by highlighting pull down ICON and pressing [SELECT].
– The “DETAIL EDIT” screen populates with six generic parameter names and will use custom parameter settings.

– CSTPRM can be specified as variables by highlighting the pull down ICON and pressing [SELECT]. Setting of the process parameters is similar to step 7 and step 8.
4.3 Explanation

– Robot control parameters can be specified as variables by highlighting the pull down ICON and pressing [SELECT]. Setting of the Robot control parameters is similar to step 9 and step 10.

– Recording of the ARCON instruction into the Job is similar to step 11 and step 12. The instruction may exceed the Programming Pendant display width. Touch and drag can be used to move the display to the right to see the full width of instruction.
4.3.2.3 Without Additional Items

**NOTICE**

When an additional item is not provided for the ARCON instruction, set the welding conditions in advance with the welding condition setting instruction (ARCSET) before executing the ARCON instruction. (Refer to chapter 6 "ARCSET Instruction".)

1. Select the ARCON instruction in the instruction area (by pressing or using the INFORM LIST).
   - The ARCON instruction appears in the input buffer line.
2. Press [SELECT].

– The “DETAIL EDIT” window appears.

3. Place the cursor on “UNUSED” if the instruction has an “ASF” or “CUSTOM” specified. Press [SELECT] to update the “DETAIL EDIT” screen.
4. Press [ENTER] to register the instruction into the input buffer line.

5. Press [ENTER] to record the ARCON instruction into the Job.
   – Press [MODIFY] prior to [ENTER] to change another instruction to ARCON. Press [INSERT] prior to [ENTER] to insert ARCON instruction into next Line after cursor.
5 ARCOF Instruction

5.1 Function

This instruction outputs an arc end command.

The arc start signal to the Power Source is turned OFF to end welding by this instruction.

The function key [ARCOF] can be used for registration.

NOTICE

To register the ARCOF instruction using [INFORM LIST], select “DEVICE” from the instruction group list.

5.2 Syntax

5.2.1 Explanation

- [1] WELDn

Choose one of the following tags.

These tags are enabled only when multiple applications are in use and two or more applications are set as arc welding application.

When there is only one application, these tags are not displayed.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>WELDn</td>
<td>Selects the Power Source 1 to 4.</td>
<td></td>
</tr>
</tbody>
</table>
### 5.2 Syntax

#### [2] AEF# (Arc welding end condition file number)

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEF#</td>
<td>Specifies the arc welding end condition file number.</td>
<td>No. 1 to 1000</td>
</tr>
<tr>
<td></td>
<td>Conditions to end welding are registered in the arc welding</td>
<td>The number can be specified by B/I/D variable.</td>
</tr>
<tr>
<td></td>
<td>end condition file.</td>
<td></td>
</tr>
<tr>
<td>CUSTOM</td>
<td>Specifies setting of individual TAGs in JOB.</td>
<td>Selection brings up menu for setting TAGs</td>
</tr>
</tbody>
</table>

#### [4] PROC# (Arc process number)

Setting of Arc Process number from table is necessary to display appropriate TAGs for process control. The TAGs displayed are determined by power source and process type. (see section 3.1 “Adding or Changing a Process to Arc Process Table”)

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC#</td>
<td>Selects the process number from the table (up to 16)</td>
<td>Process number will determine the TAGs displayed in [5]. The</td>
</tr>
<tr>
<td></td>
<td></td>
<td>output value can be specified by B/I/D variable.</td>
</tr>
</tbody>
</table>

#### [5] TAG or UNUSED (Arc Process Setting)

Individual process settings will be displayed with name and units according to power source manufacturers specification (up to six parameters). TAGs are “UNUSED” as initial setting and if selected will update with Default value. If a TAG is “UNUSED” it will use the setting from the previous weld or use Default value if the previous weld used a different PROC#.

TAG settings may include wire feed speed, amperage, voltage, trim, etc. The units will display according to power source manufacturers process specification and may include inch/min, m/min, amps, volts, or %. For definition of specific process parameter, consult the power source manual.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAG1</td>
<td>Weld process parameter with manufacturers name and units.</td>
<td>The output value can be specified by B/I/D/B[ ][ ]/D[ ] variable.</td>
</tr>
<tr>
<td>TAG2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG3</td>
<td>Up to six individual parameter are possible.</td>
<td></td>
</tr>
<tr>
<td>TAG4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNUSED</td>
<td>Will not display TAG or setting in ARCOF instruction in job</td>
<td>Unused TAG will be set to value from last instruction or will use</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Default setting if the last instruction used a different PROC#.</td>
</tr>
</tbody>
</table>
5.2 Syntax

Arc Welding UWI

5.2.2 Registering the ARCOF Instruction

1. Press [ARCOF].
2. Press [ENTER].

5.2.3 Setting Welding End Conditions

The ARCOF instruction can be registered in any of the following three ways:

- With an arc welding end condition file
  - ARCOF AEF#(1)
    - In this case, the welding condition is set using the arc welding end condition file. (Refer to section 7.4 “Arc End Condition Files”)
- With inline tags to specify conditions
  - ARCOF PROC#(1) WFS=250  V=18.0  T=0.50
- Without additional items
  - ARCOF
    - The weld will end immediately without any crater condition.

### NOTICE

Process parameters that are UNUSED in ARCOF instructions with CUSTOM TAGs may be changed by use of Arc End Files with settings for those parameters as a previous instruction.

#### T = Time [6]
This tag is added only when [3] CUSTOM is selected.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>T =Time</td>
<td>Specifies the timer value at the end of welding.</td>
<td>Unit: seconds&lt;br&gt;The time can be specified by I/L/I[I]{I[I]} variable.&lt;br&gt;(Unit: 0.01 sec.)</td>
</tr>
<tr>
<td>UNUSED</td>
<td>Will not display TAG or setting in ARCOF instruction in job</td>
<td></td>
</tr>
</tbody>
</table>

#### ANTSTK [unused]

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTSTK</td>
<td>Specifies the Anti-Stick Function. This Function is not active with UWI.</td>
<td>No action occurs if selected.</td>
</tr>
<tr>
<td>UNUSED</td>
<td>Will not display TAG or setting in ARCOF instruction in job</td>
<td></td>
</tr>
</tbody>
</table>
5.2.3.1 With an Arc Welding End Condition File

1. Select the ARCOF instruction in the instruction area (by pressing or using the INFORM LIST).
   – The ARCOF instruction appears in the input buffer line.

2. Press [SELECT].
   – The “DETAIL EDIT” window appears.
5. **ARCOF Instruction**

5.2 **Syntax**

3. Place the cursor on “UNUSED”.

4. Press [SELECT] and cursor to “AEF#( )” from the selection dialog.

5. Press [SELECT] or [ENTER].

   - The ARCOF AEF#( ) instruction appears in the input buffer line.
6. Cursor over to numeric field and press [SELECT]
   – The number keypad appears. Touch numbers or use keypad to enter desired file number.

   ![Image of number keypad]

   – If desiring to use a variable for the arc file number, cursor right to pull down menu and press [SELECT]. Move cursor to desired setting and press [SELECT] or [ENTER].

   ![Image of variable selection]
5. ARCOF Instruction

5.2 Syntax

– The ARCOF AEF#() instruction appears in the input buffer line.

– If it is desired to change the variable number, cursor to highlight the variable and press [SELECT]. Touch numbers or use keypad for desired setting and press [ENTER].

7. Press [ENTER] to clear the “DETAIL EDIT” window and return to THE JOB CONTENT display

– The ARCOF instruction appears in the input buffer line.
5.2 Syntax

8. Press [ENTER] to record ARCOF instruction into Job
   – Press [MODIFY] prior to [ENTER] to change an instruction to
     ARCOF. Press [INSERT] prior to [ENTER] to insert ARCOF
     instruction into next line after cursor.

5.2.3.2 With Additional Items to Specify Conditions

1. Select the ARCOF instruction in the instruction area (by pressing
   or using the INFORM LIST).
   – The ARCOF instruction appears in the input buffer line
5.2 Syntax

2. Press [SELECT].
   - The "DETAIL EDIT" window appears.

3. Place the cursor on “UNUSED” and press [SELECT].
4. Cursor to “CUSTOM” from the selection dialog.
5. Press [SELECT] or [ENTER].

- The PROC#( ) instruction appears in the input buffer line. TAGs appear for the process parameters with the manufacturers names, units, and allowable range. The number of parameters (1-6) depends on the manufacturer.

6. Cursor over to numeric field and press [SELECT]

- The number keypad appears. Touch numbers or use keypad to enter desired process number (1-16). Press [ENTER]. The TAGs will update with the parameters for the specified process.
7. Cursor or touch parameter and press [SELECT] to access pull down for setting or "UNUSED". Press [ENTER] to register setting.

- The parameter TAG appears in the input buffer line with Default setting.
8. Cursor or touch the setting field to the right and press [SELECT] to enter a value. Use the screen numeric keypad or Programming Pendant numeric keys to specify value.

- The parameter TAG appears in the input buffer line with specified setting.

9. Repeat step 7 and step 8 to enter settings for desired process parameters or leave them designated as "UNUSED". Press [ENTER]
5 ARCOF Instruction

5.2 Syntax

To advance to next “DETAIL EDIT” screen for robot control parameters.

10. Repeat step 7 and step 8 to enter settings for desired robot control parameters or leave them designated as “UNUSED”.

![Diagram of the interface showing ARCOF instruction with options for customization, timer, and anti-sticking settings.](image-url)
5.2 Syntax

Arc Welding UWI

NOTICE

It is possible to change between the “DETAIL EDIT” screens for process control and robot control parameters. Pressing [ENTER] will advance from the process parameters to the robot parameters. Highlighting the ICON next to “CUSTOM” and pressing [SELECT] will return from Robot parameters back to process parameters.

11. Press [ENTER] from the Robot parameters screen “DETAIL EDIT” screen displayed

- The “DETAIL EDIT” screen displays and records the ARCOF instruction with all TAG settings into the input buffer line.

NOTICE

- With ARCOF in the input buffer line, it is possible to cursor over to the individual TAGs and press [SELECT] to open the setting field and enter a changed value.
- Pressing [SELECT] with the ARCSET highlighted will return to the “DETAIL EDIT” screens.
5.2 Syntax

12. Press [ENTER] to record ARCOF instruction into Job.

5.2.3.3 Without Additional Items

1. Select the ARCOF instruction in the instruction area (by key or INFORM LIST).
   - The ARCOF instruction appears in the input buffer line.

2. Press [SELECT].
   - The DETAIL EDIT window appears.

3. Place the cursor on “UNUSED” if the instruction has an AEF or CUSTOM specified. Press [SELECT] to update the DETAIL EDIT screen.

4. Press [ENTER] to register the instruction into the input buffer line.

5. Press [ENTER] to record the ARCOF instruction into the Job.

NOTICE

• Press [MODIFY] prior to [ENTER] to change another instruction to ARCOF.

• Press [INSERT] prior to [ENTER] to insert ARCOF instruction into next line after cursor.
6 ARCSET Instruction

6.1 Function

This is the instruction to set the welding conditions (current, voltage, etc.) individually. It can set the data prior to an ARCON instruction or be used to change settings on program points while the robot is welding. The instruction does not start or end the welding process.

The ARCSET instruction can be registered in either of the following two ways:

• With an arc welding start condition file
  ARCSET ASF# (1)
  In this case, the welding condition is set using the arc welding start condition file.
  – ACOND=0: Set using the “Start Condition”
  – ACOND=1: Set using the “Main Condition”
  (Refer to chapter 7 “Arc Condition File”.)

• With inline tags to specify conditions
  – ARCSET PROC#(1) WFS=250 V=18.0
  (TAGs shown are reference and change for different process or power source)

NOTICE

Omitting the ACOND tag will set the weld condition to the Main Condition.
6.2 Syntax

6.3 Explanation

- [1] WELDn
  Choose one of the following tags.
  These tags are enabled only when multiple applications are in use and two or more applications are set as arc welding application.
  
  When there is only one application, these tags are not displayed.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>WELDn</td>
<td>Selects the Power Source 1 to 4.</td>
<td></td>
</tr>
</tbody>
</table>

- [2] ASF# (Arc welding start condition file number) [3] CUSTOM = Individual Setting of TAGs
  Be sure to choose either of the following.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASF# (Arc welding start condition file number)</td>
<td>Specifies the arc welding start condition file number. ACOND is an optional setting to specify use of Start (0) or Main (1) conditions.</td>
<td>No. 1 to 1000 The number can be specified by B/I/D variable. ACOND=UNUSED will use Main Condition. Can be specified by B/B[ ] variable.</td>
</tr>
<tr>
<td>CUSTOM</td>
<td>Specifies setting of individual TAGs in JOB</td>
<td>Selection brings up menu for setting TAGs</td>
</tr>
</tbody>
</table>
6 ARCSET Instruction
6.3 Explanation

■ [4] PROC# (Arc process number)
Setting of Arc Process number from table is necessary to display appropriate TAGs for process control. The TAGs displayed are determined by power source and process type. (See section 7.3.1 "PROCESS SELECTION Window")

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC# (Arc process number)</td>
<td>Selects the process number from the table (up to 16)</td>
<td>Process number will determine the TAGs displayed in [5]. The output value can be specified by B/I/D variable.</td>
</tr>
</tbody>
</table>

■ [5] TAG or UNUSED (Arc Process Setting)
Individual process parameters will be displayed with name and units according to power source manufacturers specification (up to six parameters). TAGs are “UNUSED” as initial setting and if selected will update with Default value. If a TAG is “UNUSED” it will use the setting from the previous weld or uses the default value from the previous weld used from a different PROC#.

TAG settings may include wire feed speed, amperage, voltage, trim, etc. The units will display according to power source manufacturers process specification and may include inch/min, m/min, amps, volts, or %. For definition of specific process parameters, consult power source manual.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAG1</td>
<td>Weld process parameter with manufacturers name and units. Up to six individual parameters are possible.</td>
<td>The output value can be specified by B/I/D/B[ ]/I[ ]/D[ ] variable.</td>
</tr>
<tr>
<td>TAG2</td>
<td>UNUSED Will not display TAG or setting in ARCSET instruction in job</td>
<td>Unused TAG will be set to value from last instruction or will use Default setting if the last instruction used a different PROC#.</td>
</tr>
<tr>
<td>TAG3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

■ [6] V = Speed
This tag is added only when [3] CUSTOM is selected. The speed setting will only be effective if program points do not have a speed TAG or welding speed is set as priority by parameter (programmed speed will be ignored and ARCSET speed used)

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>V=Speed</td>
<td>Specifies the speed value to next steps of welding.</td>
<td>Speed: 0.1 to 1500.0 mm/sec. The unit displayed can be changed by the setting of the parameter (S2C101) or Operate Condition Setting. The output value can be specified by B/I/D/B[ ]/I[ ]/D[ ] variable.</td>
</tr>
<tr>
<td>UNUSED</td>
<td>Will not display TAG or setting in ARCSET instruction in job</td>
<td></td>
</tr>
</tbody>
</table>
6.4 Registering the ARCSET Instruction

6.4.1 With an Arc Start Condition File

1. Press [INFORM LIST] key and select the ARCSET instruction from the DEVICE menu.

   – The ARCSET instruction appears in the input buffer line.

   ![ARCSET Instruction Screen](image)

   **NOTICE**

   UWI does not use the analog three and four setting. Setting a value will have no effect on the welding conditions. It may generate an Alarm 4484 for Wrong Port No. (Analog Output). This would require a value to be set to A*P10 (R1=1, R2=5, R3=6, R4=13).
2. Press [SELECT].
   – The “DETAIL EDIT” window appears.
     a) Place the cursor on “UNUSED” and press [SELECT].

   b) Place the cursor on “ASF#()” and press [SELECT] from the selection dialog.
6.4 Registering the ARCSET Instruction

c) Set the file number.
   
i) Move the cursor to the file number and press [SELECT].

ii) Enter the file number (1-1000) on Programming Pendant or numeric key pad and press Enter.
3. Specify the condition setting (optional)
   • Specifies whether to use START or MAIN file condition.
     
a) Place the cursor on CONDITION SET and press [SELECT].

b) Type the file number using [Numeric Key] and press [ENTER].
6.4 Registering the ARCSET Instruction

NOTICE

- By selecting the condition set number, either one of the “start condition” or “main condition” in the condition file can be specified.
  - ACOND=0: Sets the welding current and voltage which are specified in the “start condition”.
  - ACOND=1: Sets the welding current and voltage which are specified in the “main condition”
- An alarm will occur if 0 is set and START conditions are disabled in the file
- If ACOND is UNUSED, then the MAIN conditions will be used (same as setting to 1)

4. Press [ENTER].
   - The ARCSET ASF#( ) instruction appears in the input buffer line.
6.4 Registering the ARCSET Instruction

5. Press [ENTER] to register the instruction
   • The [INSERT] or [MODIFY] keys must be on to register the instructions into existing Job lines.
   • Press [CANCEL] to clear the changes in the input buffer line and not record changes.

6.4.1.1 Robot variables can be used to specify the values of settings in the ARCSET instruction:
   – If it is desired to use variable for arc file number, cursor right to pull down menu and press [SELECT]. Move cursor to desired setting and press [SELECT] or [ENTER] key.
6.4 Registering the ARCSET Instruction

– The ARCSET ASF#( ) instruction appears in the input buffer line.

– If requiring to change the variable number, cursor to highlight the variable and press [SELECT]. Touch numbers or use keypad for required setting and press [ENTER] key.

6.4.2 With Inline Tags to Specify Conditions

1. Select the ARCSET instruction from the [INFORM LIST] under the Device menu.

– The ARCSET instruction appears in the input buffer line.
2. Press [SELECT]

   • The DETAIL EDIT window appears.

3. Place the cursor on “UNUSED”

4. Press [SELECT] and cursor to “CUSTOM” from the selection dialog.
6. ARCSET Instruction

6.4 Registering the ARCSET Instruction

5. Press [SELECT] or ENTER.

- The PROC#( ) instruction appears in the input buffer line. TAGs appear for the process parameters with the manufacturers names, units, and allowable range. The number of parameters (1-6) depends on the manufacturer.

6. Cursor over to numeric field and press [SELECT]

   a) Observe the number key pad appears.
   
   b) Touch numbers or use keypad to enter desired PROCESS NO. (1-16).
   
   c) Press [ENTER]. The TAGs will update with the parameters for the specified process.
**NOTICE**

If requiring to use a variable for the process number, see section 6.4.3 “Robot variables can be used to specify the values of settings in the ARCSET instruction.” after completing these instructions.

7. Cursor or touch parameter and press [SELECT] to access pull down for setting or “UNUSED”. Press [ENTER] to register setting.

---

**Detail Edit**

- The parameter TAG appears in the input buffer line with default setting.

---

**Arc Welding UWI**

6. ARCSET Instruction

6.4 Registering the ARCSET Instruction
6.4 Registering the ARCSET Instruction

8. Cursor or touch the setting field to the right and press [SELECT] to enter a value.
   - Use the screen numeric key pad or Programming Pendant numeric keys to specify value.
   - The parameter TAG appears in the input buffer line with specified setting.
6.4 Registering the ARCSET Instruction

9. Repeat step 7 and step 8 to enter settings for desired process parameters or leave them designated as UNUSED. Press [ENTER] to advance to next “DETAIL EDIT” screen for the robot control parameters.

**NOTICE**

It is possible to change between the “DETAIL EDIT” screens for process control and robot control parameters. Pressing ENTER will advance from the process parameters to the robot parameters. Highlighting the ICON next to “CUSTOM” and pressing [SELECT] will return from Robot parameters back to process parameters.
10. Press [ENTER] with Robot parameters [DETAIL EDIT] screen displayed and it will record the ARCSET instruction with all TAG settings into the input buffer line.

- With the ARCSET in the input buffer line, it is possible to cursor over to the individual TAGs and press [SELECT] to open the setting field and [ENTER] a changed value.
- Pressing [SELECT] with the ARCSET highlighted will return to the “DETAIL EDIT” screens.
6.4 Registering the ARCSET Instruction

11. Press [ENTER] to record ARCSET instruction into Job

   • Press [MODIFY] prior to [ENTER] to change another instruction to ARCSET. Press INSERT prior to [ENTER] to insert ARCSET instruction into next Line after cursor.
6.4.3 Using Robot Variables for Parameter Values

**CAUTION**

- Setting of parameter value must take into consideration the units that are used by parameter; a value to set a voltage of 18 must be entered as 180 if the units are 0.1 volts.
- Use of variable type must be considered for parameter’s range of setting; a B-type variable should not be used to set a parameter that has a range beyond a value of 256.
- Welding alarms will occur if the setting of the variable cause invalid commands; a PROC# that is beyond 16 or an undefined process number, or a weld setting that is outside the manufacturer’s defined range.

**PROC#**

Can be specified as a variable by highlighting the pull down ICON and pressing [SELECT].
6.4 Registering the ARCSET Instruction

– The “DETAIL EDIT” screen populates with six generic parameter names and will use custom parameter settings.

• CSTPRM

Can be specified as variables by highlighting the pull down ICON and pressing SELECT. Setting of the Process Parameters is similar to step 7 and step 8 in section 6.4.2 “With Inline Tags to Specify Conditions”.
• **Robot Control Parameters**
  can be specified as variables by highlighting the pull down ICON and pressing [SELECT]. Setting of the Robot control parameters is similar to step 11 in section 6.4.2 "With Inline Tags to Specify Conditions".

---

**NOTICE**

The ARCSET instruction may exceed the Programming Pendant displays width. Use Touch and drag to move the display to the right for seeing the full width of the instruction.
7 Arc Condition File

7.1 Overview of Arc Start and Arc End Condition Files

There are two types of Arc Condition Files; Arc Start Files (ASF) and Arc End Files (AEF). There are 1000 files (1-1000) for Start and End and the file number is referenced in the ARCON /ARCSET/ARCCRTS/ARCOF/ ARCCTE instructions to specify the welding conditions. The Arc Condition Files contain settings for the welding sequence, welding process, and robot functions during the process. These files are global and can be re-used in different Jobs where the same joint condition might exist. The settings can be saved to external memory as ARCSRT.CND or ARCEND.CND files and reloaded to restore settings.

Arc Start and End Condition Files behave in a similar fashion. The files have Tabs along the left hand side that represent stages in the sequence and parameter settings are on the page displayed for corresponding Tab. Following are some operational behaviors that are common for both Start and End Condition Files.

7.2 Accessing Arc Condition Files

There are two ways to access Arc Condition File settings; select Condition file from Arc Welding Menu or press [Direct Open] while the cursor is on the instruction. The File Number is displayed in the upper right corner of the screen. If you access the Start or End Condition Files from the menu, it will display the last used File Number. If using the [Direct Open] instruction, then it will open the File Number programmed, which is often more convenient.

Fig. 7-1: Arc Condition Files (START/END) selection from Arc Welding Menu
7 Arc Condition File

7.2 Accessing Arc Condition Files

To access a specific File Number, touch or cursor to the File number box in the upper right and press [SELECT]. Key in the desired File Number and [ENTER]. The [PAGE] and [SHIFT]+[PAGE] can be used to advance or go back to display sequential File Numbers. Unused File Numbers will default to the Process Selection Tab where one of the defined process numbers (1-16) will have to be selected before the other Tab settings are available to program.

Fig. 7-2: Arc Condition Files (START/END) File Number and Unused Display

7.2.1 Process Selection for Arc Condition Files

An Arc Process must be specified for the Arc Condition File to display the rest of the Tabs. This is done by selecting the pull down menu and highlighting one of the available numbers (see chapter 3 "Process Selection in Arc Process Table")

Fig. 7-3: Arc Condition Files (START/END) Process Number is Selected and Tabs are populated.
7.2.2 Help Screens for Arc Condition Files

Parameter settings in the Arc Condition Files will display a description and setting range in a dialog box at the bottom of the screen. Most parameters have an ICON on the bottom right that will bring up a help screen with more information when the ICON is pressed.

Fig. 7-4: Help Screens and Buttons for Arc Condition Files.

Process parameters vary according to different processes and manufacturers. If it is desired to know the effect a particular process parameter has on the welding process, then the power source manufacturer's documentation should be consulted for that parameter.
7.3 Arc Start Condition Files

Arc Start Condition Files, ASF, utilize Tabs to present the process and robot parameters for the arc start sequence. Pressing the Tab menu or using the cursor to highlight it and pressing [SELECT] will display the field for the Tab.

7.3.1 (PROCESS SELECTION) Window

*Fig. 7-5: Process Selection Window*

1. **<Process Selection>**
   Select an Arc Process from the pull down menu. Only Arc Process numbers (1-16) that have been defined in the Arc Process Selection Table will be available for selection.

2. **Arc Process Name**
   Displays the Process Name for the number selected. Names vary according to power source manufacturers.
<File Comment>

Comment field can be used to add notations about these specific weld conditions.

- Programming of File Comment
  
a) Touch or place cursor on File Comment field and press [SELECT]

b) Enter desired comment using the keypad. "SYMBOL" tab can be selected to enter other characters.

Fig. 7-6: Keyboard and Symbol Keypad Tabs
c) Press [ENTER] to return to the Process Selection screen and [ENTER] again to register the typed comment into the File comment Field. [CANCEL] will clear the text.

Fig. 7-7: Type Comment in Comment Field

7.3.2 {STRIKE PARAMETERS} Window

Strike Parameters apply prior to the arc being started.
7.3.2.1 <GAS TIME CONTROL>

1 GAS PREFLOW TIME
Purge gas during approach to weld start point.

2 RI: RUN-IN WFS
Wire feed speed at the start before the arc is established.

3 DS: DYNAMIC START
Dynamic start allows the robot to immediately move without waiting for arc established confirmation.

4 DST: START TIMEOUT
The amount of time to allow movement without arc established confirmation. If the arc has not established by the end of the Start Timeout, then the robot will raise an alarm.

NOTICE
If the robot’s traveling time from the preceding step to the welding start point step becomes shorter than the gas preflow time due to job teaching, then the preflow time becomes shorter than the time specified.

NOTICE
Arc Retry cannot be used if Dynamic Start is enabled.
7.3.3 {START CONDITION} Window

Start Parameters apply once the arc is started. They can be disabled to have Main Conditions be applied from the beginning of the weld.

7.3.3.1 <ROBOT MOTION CONTROL>

1. S: ENABLE START CND
   Create desired weld characteristics prior to reaching the Main Condition welding parameters.

2. T: PAUSE AFTER STRIKE
   A length of time the robot will pause after the initiation of the arc and prior to the slope or main sequence.

**NOTICE**

If Dynamic Start is enabled, the robot will still pause for the time specified in T: PAUSE AFTER STRIKE. However, the T time will count against the time specified in DST: START TIMEOUT.
### 7.3.3.2 <Weld Parameters>

- **SLP: SLOPE WELD SETTINGS**
  
  Gradually adjust the welding parameters from the Start Condition to the Main Condition.

- **DIS: MOVE DISTANCE**
  
  If sloping is enabled, this is the Robot travel distance over which the weld parameters will slope up/down. If sloping is disabled, this is the robot travel distance over which the Start Condition will be applied. At the end of this distance, the Main Condition weld settings will be active.

- **SPD: ROBOT SPEED**
  
  Robot travel speed at the beginning of slope. The speed will gradually ramp to the speed specified in the Main Condition.

Weld control parameters (up to 6). Parameters vary according to different processes and manufacturers.
7.3.4 **{MAIN CONDITION} Window**

Main Conditions apply after Start Condition has completed. If no Start Condition is used, then the Main Condition will apply immediately at the start of the weld.

7.3.4.1 **<ROBOT MOTION CONTROL>**

1. **SPD: ROBOT SPEED**

Robot travel speed during weld see section 7.5 “Welding Speed Specifications”.

7.3.4.2 **<WELDER SETTINGS>**

2 3 4 Weld control parameters (up to 6). Parameters vary according to different processes and manufacturers.
7.3.5 **{OTHER OPTIONS} Window**

Other Options contain other robot settings.

7.3.5.1 **<MISCELLANEOUS CONTROLS>**

![Miscellaneous Controls Window](image)

1. **RT: ARC RETRY FUNCTION**
   
   Retry ARCON if the arc fails to ignite. RETRY conditions are specified in Arc Auxiliary Condition File.

---

**NOTICE**

Dynamic Start cannot be enabled if Arc Retry is used.
7. Arc Condition File
7.3 Arc Start Condition Files

② AR: ARC RESTART FUNCTION
Restart the weld if the arc is lost mid-weld. RESTART conditions are specified in Arc Auxiliary Condition File.

③ AM: ARC MONITORING
Control whether the realtime feedback should be tracked using features such as Graphical Arc Monitor or Cockpit.

④ PZ: POSITION SET ZONE
Controls the distance from actual robot position to the weld start point before activating the welder.

When the position set zone is set to 0, the welding start signal is output to the power source after the robot completely reaches the welding start point and stops.

⑤ SFT: WELDER PATH COORD SHIFT
Offsets the robot’s path from the taught program. Applies to all weld locations using the file number. Applies to all programmed points between ARCON and ARCOF instructions. For the details, refer to chapter 14 “Welding Path Shift Function”

a) UB: UPPER BOARD (-5.0 to 5.0 mm)
Shifting amount to the upper board direction. The UB direction is defined by the Z axis of the robot Base Frame.

b) LB: LOWER BOARD (-5.0 to 5.0 mm)
Shifting amount to the lower board direction. The LB direction is defined by rotating the UB vector 90 degrees through the Z axis of the current Tool Frame. (This feature requires proper tool calibration.)

⑥ DP: DUAL PULSE
Toggle between two weld settings at a high frequency. Dual pulse only occurs during the Main Condition. It will be ignored during any Start Condition or Crater Condition.

⑦ ALTERNATE ASF#()
The second ASF#() to use during the Dual Pulse operation. Only the MAIN Condition weld setting will be used. The Main Condition Speed will not be honored.
7 Arc Condition File
7.3 Arc Start Condition Files

⑧ DURATION PRIMARY
The amount of time spent in commanded ASF#. [ARCON ASF#(x)]

⑨ DURATION ALTERNATE
The amount of time spent in Alternate ASF#.
7.4 Arc End Condition Files

Arc End Condition Files, AEF, utilize Tabs to present the process and robot parameters for the arc end sequence. Pressing the Tab menu or using the cursor to highlight it and pressing [SELECT] will display the field for the Tab.

7.4.1 (PROCESS SELECTION) Window

1. Process Selection
   Select an Arc Process from the pull down menu. Only Arc Process numbers (1-16) that have been defined in the Arc Process Selection Table will be available for selection.

2. Arc Process Name
   Displays the Process Name for the number selected. Names vary according to power source manufacturers.

3. File Comment
   Comment field can be used to add notations regarding the AEF number.
   - Programming of File Comment.
     a) Touch or place cursor on File Comment field and press [SELECT]
     b) Enter desired comment using keypad. Symbols tab can be selected to enter other characters.
c) Press [ENTER] to return to the Process Selection screen and [ENTER] again to register the typed comment into the File comment Field. [CANCEL] will clear the text.
7.4.2 **{CRATER CONDITION} Window**

The Crater Condition will pause the robot at the end of the weld to fill the crater puddle. Optionally, the weld settings can gradually slope from the Main Condition as the robot approaches the end of the motion segment.

![Crater Condition Window](image)

7.4.2.1 **<ROBOT MOTION CONTROLS>**

1. **T: PAUSE TIME**
   
   A length of time the robot will pause at the end of the weld to achieve a crater fill.

![Pause Time Diagram](image)
7 Arc Condition File
7.4 Arc End Condition Files

② SLOPE WELD SETTINGS
Gradually adjust the welding parameters and robot speed from the Main Condition to the Crater Condition.

NOTICE
If sloping is enabled, the process number cannot change from the Main Condition. If attempting to change the process during a slope, an alarm will occur.

③ DIS: SLOPE DISTANCE
Robot travel distance, before the ARCOF, over which the weld parameters and speed will slope up/down.

④ SPD: Robot Speed
Target speed for the end of slope.

7.4.2.2 <WELDER SETTINGS>
⑤ ⑥ ⑦ Weld control parameters (up to 6). Parameters vary according to different processes and manufacturers.
7.4.3 **{FINISH CONDITION} Window**

The Finish Condition can be used to create a secondary crater condition or set reduced parameters to condition the wire. It can be disabled to have a Crater Condition only.
7.4.3.1 <ROBOT MOTION CONTROLS>

① **F: ENABLE FINISH CONDITION**
Weld settings after the crater fill for conditioning the wire or a second crater fill.

② **T: PAUSE TIME**
Duration of the Finish Condition during which the robot is stationary.

7.4.3.2 <WELDER SETTINGS>

③④⑤ Weld control parameters (up to 6). Parameters vary according to different processes and manufacturers.

7.4.4 {GAS POSTFLOW} Window
7.4.4.1 <GAS TIME CONTROL>

➊ GAS: POSTFLOW TIME
A specified time the gas flow valve remains open after completing the Crater and Finish Conditions.
7.4.5 {OTHER OPTIONS} Window

Other conditions contain other robot settings

7.4.5.1 <ARC END CONTROL>

1 PZ: POSITION SET ZONE

Controls the distance from actual robot position to the weld end position before activating the arc end sequence.

NOTICE

Crater at the end of the weld bead

If the timing of the Robot’s stop and the switch of the crater condition are not right, there may be rare occasions when the crater part becomes longer as shown below.

In this case, it is effective to set the position set zone to 0 in order to synchronize precisely the timings of the Robot’s stop and the switch of the crater condition.

When the position set zone is set to 1, the cycle time extends by 0.1 to 0.2 seconds, because the judgment that the Robot has reached the welding end point is delayed, compared with when the position set zone is set to other than 0.

Set the appropriate position set zone depending on the shape of crater.
2 WSC: WIRE STICK CHECK
Perform a touch-sense at the end of the weld to determine if wire is stuck to the part.

3 ASC: STICK CLEAR ATTEMPTS
Attempt to automatically clear the wire if a stick is detected.
7.5 Welding Speed Specifications

The welding speed is determined by one of the following:

• Welding speed specified by the play speed of the move instruction
• Welding speed specified by the ARCON instruction or the arc start condition file

When the move instruction does not specify a speed
Welding is performed at the welding speed of the ARCON instruction.

When the move instruction and ARCON instruction specify different speeds
Priority is given to one according to the parameter values described below.
To switch the priorities, change the parameter setting.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Contents</th>
<th>Initial Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AxP005</td>
<td>Move instruction speed is priority: 0</td>
<td>0</td>
</tr>
<tr>
<td>x: Application number</td>
<td>ARCON instruction speed is priority:1</td>
<td></td>
</tr>
</tbody>
</table>
7.6  Welding Execution Function during Teach Mode

When the [WELD ON/OFF] is pressed, the LED is lit with a beep sound, turning ON the system output signal “#50065: PERMISSIBLE WORK IN TEST RUN”.

When pressing [WELD ON/OFF] again, the LED goes out and the beep sound stops, then the system output signal “#50065: PERMISSIBLE WORK IN TEST RUN” turns OFF.

The standard ladder program of arc welding application supports the function that welding can be performed during TEACH mode by the signal “#50065: PERMISSIBLE WORK IN TEST RUN”.

*Welding can be performed during a test run only when the security mode is in management mode.

*Welding cannot be performed during a test run even while the LED is lit unless security mode is in management mode.

**NOTICE**

During a test run in TEACH mode, the Robot may not move at the actual welding speed due to the speed limit in some cases. (e.g. at a welding position/point where the Robot significantly changes its posture during a coordinated motion with a station)

In these cases, weld bead may be thicker compared with the bead that is formed during the playback operation, or burn through may occur as the speed of the welding is different from the speed that is appropriate for the welding conditions (current and voltage).

7.6.1  Test Run Operation Mode

In a test run, the Robot is moved through taught steps in a continuous motion by pressing [INTERLOCK] and [TEST START] simultaneously.

Normally the Robot moves only while [TEST START] is pressed after the pressing [INTERLOCK] and [TEST START] simultaneously. However, by setting the following parameter, the Robot is able to move by pressing [INTERLOCK] only.

- Test run operation mode (S2C308 d1 bit)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Contents and setting value</th>
<th>Initial value</th>
</tr>
</thead>
<tbody>
<tr>
<td>S2C308</td>
<td>Continue test run by pressing [TEST START] : 1 Continue test run by pressing [INTERLOCK] : 3 (Pressing [TEST START] is also available to continue test run.)</td>
<td>1</td>
</tr>
</tbody>
</table>
8 Arc Retry and Restart Functions

8.1 Arc Retry Function

Non-conductive material, such as rust, soot, or oil may cause an arc start failure during an arc start. An arc start failure stops the Robot and interrupts work. To prevent this, use the arc retry function.

When an arc start failure occurs and this arc retry function is performed, the ARCON process is repeated according to the retry condition defined in the Arc Auxiliary Condition File. The Robot repeats the ARCON procedure as it slightly shifts its position near the arc starting point. After that, the Robot returns to the starting point when an arc starts and continues working.

Fig. 8-1: Retry Function Example

1. Arc Start Failure
2. The Retry Procedure
   – Returns toward the previous step and performs a retract inching, then return to the teaching starting point and repeats the ARCON procedure.
3. After a successful arc start, the Robot continues to weld.
8.1.1 Arc Retry Function Setting

1. **NO. (0 to 9 times)**
   Maximum repetition count for the arc retry process.

2. **RETRACT TIME (0 to 2.50 seconds)**
   Wire retracting time in the arc retry process.

3. **REPLAY DISTANCE (0 to 99.9 mm)**
   Robot moving distance for an arc retry process at the replay mode.

4. **SPEED (1 to 600 cm/min)**
   Speed of the Robot when it returns to the welding start point at arc retry. When the welding start condition file (ASF#()) is specified to ARCON instruction or “REPLAY” is specified in the retry mode, the retry operation is executed not at the speed in the arc auxiliary condition file, but at the speed specified in the move instruction before ARCON instruction.

**NOTICE**

When the twin synchronous function, etc. is used, the arc retry function cannot be used.
8 Arc Retry and Restart Functions

8.2 Arc Restart Function

When the Robot stops because of an arc failure, a simple start leaves a break in the welding line. The break can be prevented by using an arc restart function. When the arc restart function is executed, the Robot restarts using the method specified in the Arc Auxiliary Condition File.

There are three methods to restart the Robot after an arc failure:

- With the arc OFF the controller outputs an error signal and the message “RESTARTING FOR ARC”, but continues Robot’s movement. After exiting the arc section, the controller outputs the message “END OF ARC RESTARTING”, and continues the operation.

- With the arc ON trial, the Robot automatically returns for the specified overlap length, and then continues welding.

- The Robot stops and waits for a manual intervention. After intervention (A), the operator should return the Robot to the original stop position (B). And then press [START] again. The Robot returns for the specified overlap length (C) and continues the work.

1 The arc auxiliary condition file defines: speed at restart; method of restart after a gas shortage or wire shortage.

2 The overlap length (the length of the section where welding is repeated after a restart) can be set as desired (0 to 99.9mm).
8.2 Arc Restart Function

8.2.1 Arc Auxiliary Condition File

8.2.1.1 Arc Restart Function Setting

1. NO. (0 to 9 times)
   Maximum repetition count for the arc restart process regarding the same welding section.

2. LAP DISTANCE (0 to 99.9 mm)
   Overlapped welding distance in a restart process.

3. SPEED (1 to 600 cm/min)
   Speed of the Robot as it moves backward in an arc restart process.

4. RESTART MODE
   – ARC FAILURE
     • NO RESTART:
       • Arc restart function is not used. The Robot stops with the arc failure alarm.
     • ARCOF CONTINUE:
       • With the arc OFF, the controller outputs the “Restarting for Arc” message and the Robot keeps moving.
       • After moving through the arc section, the controller outputs the “End of Arc Restarting” message and resumes a normal welding operation.
       • The message is reset when OT #4093 is turned ON and OFF.
     • AUTO RESTART:
       • The Robot automatically restarts.

NOTICE
A cursor operation resets the “restarting” status. Therefore, the arc restart function cannot be executed after the cursor operation.
8.2 Arc Restart Function

- **SEMI-AUTO RESTART:**
  - The Robot stops and waits for manual intervention.
  - The Robot restarts as the operator presses [START] again.
  - The restart status is reset when OT #4094 is turned ON and OFF.

- **GAS FAILURE**
  - **NO RESTART:**
    - Arc restart function is not used. The Robot moves with the gas shortage alarm.
  - **ALARM AT ARC END:**
    - The Robot continues the welding operation until it reaches the welding end point, where it stops with an alarm.

- **SEMI-AUTO RESTART:**
  - The Robot stops and waits for manual intervention.
  - The Robot restarts as the operator presses [START] again.
  - The restart status is reset when OT #4094 is turned ON and OFF.

---

**NOTICE**

The input signals to trigger GAS FAILURE and WIRE FAILURE are not connected to anything by default. These must be integrated with custom changes to the Concurrent I/O ladder program.

---

- **WIRE FAILURE**
  - **NO RESTART:**
    - Arc restart function is not used. The Robot moves with the wire shortage alarm.
  - **ALARM AT ARC END:**
    - The Robot continues the welding operation until it reaches the welding end point, where it stops with an alarm.
8 Arc Retry and Restart Functions

8.2 Arc Restart Function

• SEMI-AUTO RESTART:
  • The Robot stops and waits for manual intervention.
  • The Robot restarts as the operator presses [START] again.
  • The restart status is reset when OT #4094 is turned ON and OFF.

NOTICE

• When the complete synchronization of the twin synchronous function is used, the arc restart function cannot be used.
• The signal to reset the message “End of Arc Restarting” differs depending on the power source:
  OT#4093 (power source 1), OT#4085 (power source 2),
  OT#4077 (power source 3), OT#4069 (power source 4),
  OT#4061 (power source 5), OT#4053 (power source 6),
  OT#4045 (power source 7), OT#4037 (power source 8)
• The signal to reset the restart status differs depending on the power source:
  OT#4094 (power source 1), OT#4086 (power source 2),
  OT#4078 (power source 3), OT#4070 (power source 4),
  OT#4062 (power source 5), OT#4054 (power source 6),
  OT#4046 (power source 7), OT#4038 (power source 8)
8.3 Notes on Arc Welding

8.3.1 Notes on Restarting

If the Robot stops during welding, the arc is automatically turned OFF. When restarting, the arc automatically turns ON, and the Robot starts welding towards the step where the cursor is located on the screen. The welding current and voltage when the arc is turned ON again are the same as those before stopping.

NOTICE

- If the Robot is moved from the stopped position using [Axis Key], return the Robot to the stopped position before restarting for safe operation.
- It is possible to move the Robot to the stopped position automatically at restarting and start welding again by using parameter setting (S2C422, S2C423). [FWD] or [BWD] can be used for moving to the stopped position.
  - S2C422: Restart Operation after E-Stop condition (Set 2).
  - S2C423: Restart Operation after Jog Operation (Set 2).

Refer to CONTROLLER GENERAL OPERATOR’S MANUAL, Chapter 8 “Parameter”.

DANGER!

Arc OFF as manipulator stops.
Arc ON as manipulator restarts.
9 Wire Stick Functions

9.1 Automatic Wire-Stick Release Function

The automatic wire-stick release function can be used if wire stick clear (ASC) is enabled and specified in the Arc End File. Wire Anti-Stick is not performed if an ARCOF instruction is used without an Arc End File, AEF#().

When this function is used, the Robot does not immediately output the wire sticking signal upon detecting a wire stick, but automatically attempts to release the sticking by energizing the welder.

Only when the stick release process has failed for a specified number of times, the Robot stops and outputs the wire stick signal.

This function is specified in the arc end condition file. When it is used, the number of attempts are set in the arc end condition file; Other Settings Tab.

![Automatic Wire-stick Release](image)

Even if a single attempt has failed, the process is repeated up to the specified maximum repetition count.
9.2 Robot Stopped by Wire Stick

If a wire stick occurs at the end of welding, the Robot immediately stops in the hold status. While the Robot remains in the hold status, the [HOLD] lamp lights and the external system output signal "Wire Sticking" is output.

Wire stick occurs

External output signal is turned ON.

Diagram:
- Wire stick occurs
- External output signal is turned ON.
9.3 Wire-Stick Check Function

The wire may stick to the workpiece after welding is completed.

A wire stick check will be performed if it is enabled in the Arc End File (AEF). The AEF also controls how many attempts will be made to clear the wire, if a stick is detected.

When inline tags are used instead of an AEF, then the wire stick check is controlled by robot parameter A1P482. Set A1P482 = 1 to enable wire stick check when welding without an AEF.

An automatic stick-clear will not be attempted when using inline tags.

**NOTICE**

Wire stick

“Wire stick” refers to the contact of the wire to the workpiece as observed after the arc-OFF.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>482</td>
<td>Automatic stick-check if not using AEF (0 = Default: Disable) (1 = Enable) (Other = Alarm and use Default value)</td>
</tr>
<tr>
<td>483</td>
<td>Delay stick check after enabling Touch Sense (0 = Default: 50 ms (1 - 300 = 1 ms - 300 ms) (Other = Alarm and use Default value)</td>
</tr>
</tbody>
</table>
9 Wire Stick Functions

9.3 Wire-Stick Check Function

NOTICE

If using ARCOF without AEF#() file, then the Automatic Stick Check is determined by A*P482,483 settings. The Stick Clear Function is not used.
10 Arc Monitor Function

The arc monitor function is used to monitor, analyze and control the welding conditions (welding current and welding voltage) of the specified welding section.

- Samples the welding conditions and show them on the display.
- Calculates the average and deviation and detects the error.
- Saves the results of measurement and analysis in the file.

```
000 NOP
001 MOVJ VJ=10.00
002 MOVJ VJ=80.00
003 MOVL V=800
004 ARCON ASF#(1) Welding start
005 ARCMONON AMF#(1) Arc monitor start
006 MOVL V=50
007 ARCMONOF Arc monitor end
008 ARCOF AEF#(1) Welding end
009 MOVL V=800
010 MOVJ VJ=50.00
011 END
```
10.1 ARCMONON

10.1.1 Function
This is the instruction to start sampling the welding condition data.

10.1.2 Syntax

```
ARCMONON

WELD1
WELD2
WELD3
WELD4
WELD5
WELD6
WELD7
WELD8

AMF# (Arc monitor file number) [9]
```

10.1.3 Explanation

10.1.3.1 WELD[1]/WELD[2]/WELD[3]/WELD[4]
Choose one of the following tags.
These tags are enabled only when multiple applications are in use and two or more applications are set as arc welding application.

When there is only one application, these tags are not displayed.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>WELD1</td>
<td>Selects the Power Source 1.</td>
<td></td>
</tr>
<tr>
<td>WELD2</td>
<td>Selects the Power Source 2.</td>
<td></td>
</tr>
<tr>
<td>WELD3</td>
<td>Selects the Power Source 3.</td>
<td></td>
</tr>
<tr>
<td>WELD4</td>
<td>Selects the Power Source 4.</td>
<td></td>
</tr>
</tbody>
</table>

10.1.3.2 AMF# (Arc monitor file number) [9]

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMF#</td>
<td>Specifies the arc monitor file number.</td>
<td>No.: 1 to 100. The number can be specified by B/I/D/LB/LI/LD variable.</td>
</tr>
<tr>
<td>(Arc monitor file number)</td>
<td>The sampling results and statistical data are recorded in the arc monitor file.</td>
<td></td>
</tr>
</tbody>
</table>
10.2 ARC MONOF

10.2.1 Function

This is the instruction to end sampling the welding condition data.

10.2.2 Syntax

10.2.3 Explanation

10.2.3.1 WELD1/WELD2/WELD3/WELD4

Choose one of the following tags.

These tags are enabled only when multiple applications are in use and two or more applications are set as arc welding application.

When there is only one application, these tags are not displayed.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>WELD1</td>
<td>Selects the Power Source 1.</td>
<td></td>
</tr>
<tr>
<td>WELD2</td>
<td>Selects the Power Source 2.</td>
<td></td>
</tr>
<tr>
<td>WELD3</td>
<td>Selects the Power Source 3.</td>
<td></td>
</tr>
<tr>
<td>WELD4</td>
<td>Selects the Power Source 4.</td>
<td></td>
</tr>
</tbody>
</table>
10.3 GETFILE

10.3.1 Function
Retrieves the data of arc monitor file into the variable (D variable).

10.3.2 Syntax
GETFILE<DATA 1> Condition file specification (element number)

10.3.3 Explanation

10.3.3.1 D Variable Number/ LD Variable Number/D [Element Number]/ LD [Element Number] [1]
Be sure to add the following tag.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>D Variable Number/</td>
<td>Specifies the double-precision integer type variable in which</td>
<td></td>
</tr>
<tr>
<td>LD Variable Number/</td>
<td>the retrieved data is stored.</td>
<td>&lt;DATA 1&gt;</td>
</tr>
<tr>
<td>D [Element Number]/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD [Element Number]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
10.3.2 SPR# (Application quantity correcting condition file number) [2]/UDC# (Application quantity correcting condition file number) [3]/WEV# (Weaving condition file number) [4]/AMF# (Arc monitor file number) [5]

Be sure to choose one of the following tags.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPR# (Application quantity correcting condition file number)</td>
<td>Specifies the application quantity correcting condition file number (spray).</td>
<td>No.: 1 The number can be specified by B/I/D/LB/LI/LD variable. Only available with the servo sealer gun function (optional).</td>
</tr>
<tr>
<td>UDC# (Application quantity correcting condition file number)</td>
<td>Specifies the application quantity correcting condition file number (undercoating).</td>
<td>No.: 1 The number can be specified by B/I/D/LB/LI/LD variable. Only available with the undercoating function (optional).</td>
</tr>
<tr>
<td>WEV# (Weaving condition file number)</td>
<td>Specifies the weaving condition file number.</td>
<td>No.: 1 to 255 The number can be specified by B/I/D/LB/LI/LD variable.</td>
</tr>
<tr>
<td>AMF# (Arc monitor file number)</td>
<td>Specifies the arc monitor file number.</td>
<td>No.: 1 to 100 The number can be specified by B/I/D/LB/LI/LD variable. Only available with the arc monitor function (optional).</td>
</tr>
</tbody>
</table>

10.3.3.3 (Element number) [6]

Be sure to add the following tag.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Element number)</td>
<td>Specifies the element of the condition file from which the data are retrieved.</td>
<td>Element No.: 1 to 255 The number can be specified by B/LB variable.</td>
</tr>
</tbody>
</table>
10.3.4 Registering the GETFILE Instruction

1. Move the cursor to the address area.
2. Press [INFORM LIST].
3. Select {ARITH}.
4. Select the GETFILE instruction.
   – The instruction is displayed on the input buffer line with the same additional items as registered previously.
5. Press [ENTER].
   – The set contents are registered in the job.
### 10.3.5 File Data and Element Number

The relation between the element numbers of GETFILE instruction and the arc monitor file is shown as follows.

The numbers below denote the element numbers.

1. **STATUS**
2. **CURRENT**
3. **VOLTAGE**
4. **CURRENT AVERAGE**
5. **VOLTAGE AVERAGE**
6. **CURRENT DEVIATION**
7. **VOLTAGE DEVIATION**
8. **NUMBER OF DATA (NORMAL)**
9. **NUMBER OF DATA (ERROR)**
10.4 Arc Monitor File

10.4.1 Function
One hundred files for the arc monitor function are prepared.
The arc monitor file can be saved in an external memory device.
(Cannot be loaded.)

10.4.2 Arc Monitor File

**A. FILE NUMBER (1 to 100)**
Shows the file number.

**B. CURRENT**
Shows the average value of current data between the last-performed ARCMONON and ARCMONOF.

**C. VOLTAGE**
Shows the average value of voltage data between the last-performed ARCMONON and ARCMONOF.

**D. STATUS**
Shows the result (normal/error) of the last-performed arc monitor.

**E. CURRENT AVERAGE/DEVIATION**
Shows the average/standard deviation of the retrieved average current value.

**F. VOLTAGE AVERAGE/DEVIATION**
Shows the average/standard deviation of the retrieved average current value.
10 Arc Monitor Function
10.4 Arc Monitor File

**G. NUMBER OF DATA**

Shows the number of retrieved data (normal/error).

**NOTICE**

The results of current and voltage are compared to the command values set in the APPL COND settings (section 2.1 “General Descriptions of Instructions and Functions”). Not all welders command amperage and voltage and desired set points may need to be specified in the M registers set by instructions/logic. A significant difference in Command and Result readings will result in a NG recorded as status indicating data is invalid. Alarm conditions during welding will also result in a NG data result.
### 10.4.3 Displaying the File

**Procedure 1**
1. Place the cursor on the ARCMONON instruction.
2. Press [DIRECT OPEN].
   - The arc monitor file window is displayed.
   - Press [PAGE] to call the next file number.
   - Press [SHIFT] + [PAGE] to call the previous file number.

**Procedure 2**
1. Select {ARC WELDING} under the main menu.
2. Select {ARC MONITOR} under the sub menu.
   - The arc monitor file window is displayed.
   - Press [PAGE] to call the next file number.
   - Press [SHIFT] + [PAGE] to call the previous file number.

---

**NOTICE**

The data of arc monitor file cannot be edited.
10 Arc Monitor Function
10.4 Arc Monitor File

- **File Initialization**
  All the files become ‘0’ after file initialization.
  1. Display the arc monitor file window.
  2. Select {CLEAR DATA} from the pull-down menu {DATA}.
     - Select {CLEAR DATA} and the confirmation dialog box appears.
     - {CLEAR DATA} from the arc monitor file window initializes only the displayed file number.
     - To initialize all the files, perform the initialization in the maintenance mode.

![Arc Monitor File Initialization](image-url)
11 Slope Up/Down Function

The slope up/down function is used during welding to gradually change the welding condition.

This function is extremely effective in conducting heat for such operations on workpieces such as the one Fig. 11-1.

During the welding of a workpiece as shown Fig. 11-1, especially during the period before the end of welding, the tearing or dropping of metal can occur quite frequently due to heat conduction.

However, even in this example, if the welding condition is gradually decreased before the end of welding, tearing and dropping of metal can be prevented.

Fig. 11-1: Welding of a Workpiece

Reference Job

<table>
<thead>
<tr>
<th>NOP</th>
<th>Moves to welding start point P1. Arc starts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOVL V=500</td>
<td>Move to taught point Pn-1. Gradually decreases the current from the point 20mm short of the welding end point.</td>
</tr>
<tr>
<td>ARCON PROC#(1) WFS=200</td>
<td>Moves to welding end point Pn. Arc ends.</td>
</tr>
<tr>
<td>MOVC V=80</td>
<td></td>
</tr>
<tr>
<td>MOVC V=80</td>
<td></td>
</tr>
<tr>
<td>MOVC V=80</td>
<td></td>
</tr>
<tr>
<td>MOVC V=80</td>
<td></td>
</tr>
<tr>
<td>ARCCTE PROC#(1) WFS=150</td>
<td></td>
</tr>
<tr>
<td>DIS=20.0</td>
<td></td>
</tr>
<tr>
<td>MOVC V=80</td>
<td></td>
</tr>
<tr>
<td>ARCOF PROC#(1) WFS=100</td>
<td></td>
</tr>
<tr>
<td>T=0.30</td>
<td></td>
</tr>
<tr>
<td>END</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 11-1: Welding of a Workpiece

Manipulator stop (0.3s)
11 Slope Up/Down Function

11.1 ARCCTS

11.1.1 Function

The ARCCTS instruction is used with a move instruction to gradually change the welding current and voltage during welding at the start of a motion segment.

A gradual change in the current or voltage is specified by an aimed value and the length of the slope up/down section. The length of the slope up/down section is set from the move start point (DIS).

If no length is specified, the entire section of the move instruction is used. Also, if the length is larger than the current motion segment, the length will be shortened to the match the motion segment length.

11.1.2 Syntax

11.1.2.1 Explanation

- **[1] WELDn**
  
  Choose one of the following tags.

  These tags are enabled only when multiple applications are in use and two or more applications are set as arc welding application.

  When there is only one application, these tags are not displayed.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>WELDn</td>
<td>Selects the Power Source 1 to 4.</td>
<td></td>
</tr>
</tbody>
</table>
11 Slope Up/Down Function

11.1 ARCCTS

- [2] ASF# (Arc Welding start condition file number) [3] CUSTOM = Individual Setting of TAGs
This tag can be added or omitted.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASF# (Arc welding start condition file number)</td>
<td>Specifies the arc welding start condition file number.</td>
<td>No. 1 to 1000 The number can be specified by B/I/D variable.</td>
</tr>
<tr>
<td>CUSTOM</td>
<td>Specifies setting of individual TAGs in JOB</td>
<td>Selection brings up menu for setting TAGs</td>
</tr>
</tbody>
</table>

**NOTICE**

When using an ASF as the target value, it will use the weld parameters in the Main Condition of the ASF.

But, the slope distance will be used from the Start Condition of the ASF. If the Start Condition or sloping is disabled in the ASF, then no sloping will be performed. In that case, the Main Condition settings will be immediately applied. (This is equivalent to an ARCSET ACOND=1 command.)

- [4] PROC# (Arc process number)
Setting of Arc Process number from table is necessary to display appropriate TAGs for process control. The TAGs displayed are determined by power source and process type.

**NOTICE**

The process number cannot be changed during a slope. To change the process during a weld the ARCSET command must be used.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC# (Arc process number)</td>
<td>Selects the process number from the table (up to 16)</td>
<td>Process number will determine the TAGs displayed in [5]. The output value can be specified by B/I/D variable.</td>
</tr>
</tbody>
</table>
11 Slope Up/Down Function
11.1 ARCCTS

- **[5] TAG or UNUSED (Arc Process Setting)**
  Individual process settings will be displayed with name and units according to power source manufacturers specification (up to six parameters). TAGs are UNUSED as initial setting and if selected will update with Default value. If a TAG is UNUSED it will use the setting from the previous weld or use Default value if the previous weld used a different PROC#.

  TAG settings may include wire feed speed, amperage, voltage, trim, etc. The units will display according to power source manufacturers process specification and may include inch/min., m/min, amps, volts, or %. For definition of specific process parameter, consult power source manual.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAG1</td>
<td>Weld process parameter with manufacturers name and units. Up to six individual variables are possible.</td>
<td>The output value can be specified by B/I/D/B [I]/D [ ] variable.</td>
</tr>
<tr>
<td>TAG2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNUSED</td>
<td>Will not display TAG or setting in ARCSET instruction in job</td>
<td>Unused TAG will be set to value from last instruction or will use Default setting if the last instruction used a different PROC#.</td>
</tr>
</tbody>
</table>

**NOTICE**

Process variables that are UNUSED in ARCCTS instructions with maintain values set by previous instruction.

- **[6] DIS = Distance**
  This tag is added only when [3] CUSTOM is selected.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIS = Slope</td>
<td>Specifies the slope up/down section length where the current and voltage are</td>
<td>Length: 0.1 to 6553.5mm The slope up/down section length can be specified by</td>
</tr>
<tr>
<td>up/down</td>
<td>section length where the current and voltage are gradually changed. The</td>
<td>B/I/D/B [I]/D [ ] variable. (Unit: 0.1mm)</td>
</tr>
<tr>
<td>section</td>
<td>length is set as the distance from the move start point. If no length is</td>
<td></td>
</tr>
<tr>
<td>length</td>
<td>specified, the entire section of the move instruction is used.</td>
<td></td>
</tr>
<tr>
<td>UNUSED</td>
<td>Will not display TAG or setting in ARCSET instruction in job</td>
<td></td>
</tr>
</tbody>
</table>

- **AN3 and AN4 setting**
  The Analog 3 and 4 setting are not used with UWI. Setting a value will have no effect on welding conditions. It may generate an Alarm 4484 for Wrong Port No. (Analog Output). This would require a value to be set to A*P10 (R1=1, R2=5, R3=9, R4=13).
<Example>
The weld parameters are gradually changed as the Robot moves toward the end point specified by the move instruction. In this case, the target wire feed speed is 200 in/min. The slope up/down section length is 100mm from the move start point.

MOVL V=80
ARCCTS PROC#(1) WFS=200 DIS=100.0

Gradually Decreasing Weld Parameter

Gradually Increasing Weld Parameter
11 Slope Up/Down Function
11.1 ARCCTS

11.1.3 Registering the ARCCTS Instruction

The ARCCTS instruction can be registered in either of the following ways:

• With an arc welding start condition file
  (1) ARCCTS ASF#(1)
  In this case, the welding condition is set using main condition of the arc welding start condition file. (Refer to section 7.3 “Arc Start Condition Files”.)

• With inline Tags to specify conditions
  (1) ARCCTS PROC#(1) WFS=250 V=18.0 DIS=50.0

11.1.3.1 With an Arc Welding Start Condition File

1. Press [INFORM LIST] and select (ARCCTS) from the DEVICE menu.

   ![Image of ARCCTS instruction registration]

   • The ARCCTS instruction appears on the input buffer line.

NOTICE

• The ARCCTS or ARCCTE instruction is valid for only one step.

• If the move section specified by the move instruction is shorter than the distance specified by the slope up/down section length (DIS=XXX), the change is performed equally over the entire section of the move instruction.

• If the ARCCTS or ARCCTE instruction specifies the distance as zero (DIS=0.00), the change is performed equally over the entire section of the move instruction.

• A pair of ARCCTS and ARCCTE instructions can be used on one move instruction. In this case, the ARCCTS instruction is executed first, then the ARCCTE instruction is executed in the remaining part of the move section. If the remaining part of the move section is 0mm, the value instantly changes to the value specified in the ARCCTE instruction.
2. Press [SELECT]
   – The DETAIL EDIT window appears.

   ![Diagram of DETAIL EDIT window]

   a) Move the cursor to “UNUSED” and press [SELECT].
   b) Place the cursor on ASF#( ) and press [SELECT].
3. Set the file number

a) Place the cursor on file number and press [SELECT].

b) Enter the file number (1-1000) by touch panel or numeric key pad and press [ENTER].
4. Press [ENTER]
   • The ARCCTS ASF#( ) instruction appears in the input buffer line.

5. Press [ENTER] if it is desired to register the instruction
   • The [INSERT] or [MODIFY] keys must be on to register the instructions into existing Job lines.
   • Press [CANCEL] to clear the changes from the input buffer line and not record changes.
NOTICE

• Robot variables can be used to specify the values of settings in the ARCCCTS instruction:
  − If desired to use variable for arc file number, cursor right to the Pull Down menu and press [SELECT]. Move cursor to desired setting and press [SELECT] or ENTER key.
  − The ARCCCTS ASF#( ) instruction appears in the input buffer line.

• If it is desired to change the variable number, cursor to highlight the variable and press [SELECT]. Touch numbers or use key pad for desired setting and press ENTER key.
11 Slope Up/Down Function
11.1 ARCCTS

- Follow step 4 and step 5 to [ENTER] the ARCCTS instruction with variable into the input buffer line and [ENTER] again to register the instruction into the Job.
11.1.3.2 With Inline Tags to Specify Conditions

1. Select the ARCCTS instruction from the [INFORM LIST] under the Device menu.
   - The ARCCTS instruction appears in the input buffer line.

2. Press [SELECT].
   - The DETAIL EDIT window appears.
3. Place the cursor on “UNUSED”

4. Press [SELECT] and cursor to “CUSTOM” from the selection dialog.

5. Press [SELECT] or ENTER.

   - The PROC#( ) instruction appears in the input buffer line. TAGs appear for the process parameters with the manufacturers names, units, and allowable range. The number of parameters (1-6) depends on the manufacturer.
6. Cursor over to numeric field and press [SELECT]
   • The number key pad appears. Touch numbers or use keypad to enter desired “PROCESS NO.” (1-16). Press ENTER. The TAGs will update with the parameters for the specified process.

   ![Image of the interface with a field labeled 'PROCESS NO.' and a numeric field to enter numbers.

   7. Cursor or touch parameter and press [SELECT] to access pull down for setting or UNUSED. Press ENTER to register setting.

   ![Image of the interface with parameters and a pull-down menu to select settings.]
11 Slope Up/Down Function

11.1 ARCCTS

- The parameter TAG appears in the input buffer line with Default setting.

8. Cursor or touch the setting field to the right and press [SELECT] to enter a value.
   • Use the screen numeric key pad or pendant numeric keys to specify value.
11 Slope Up/Down Function
11.1 ARCCTS

– The parameter TAG appears in the input buffer line with specified setting.

9. Repeat step 7 and step 8 to enter settings for desired process parameters or leave them designated as UNUSED. Press ENTER to advance to next DETAIL EDIT screen for robot control parameters.
10. Repeat step 7 and step 8 to enter settings for desired robot control parameters or leave as UNUSED.
11.2 ARCCTE

11.2.1 Function

The ARCCTE instruction is used with a move instruction to gradually change the welding current and voltage during welding at the end of a motion segment.

A gradual change in the current or voltage is specified by an aimed value and the length of the slope up/down section. The length of the slope up/down section is measured from the move end point (DIS).

If no length is specified, the entire section of the move instruction is used. Also, if the length is larger than the current motion segment, the length will be shortened to the match the motion segment length.

11.2.2 Syntax

11.2.3 Explanation

- [1] WELDn

Choose one of the following tags. These tags are enabled only when multiple applications are in use and two or more applications are set as arc welding application. When there is only one application, these tags are not displayed.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>WELDn</td>
<td>Selects the Power Source</td>
<td>1 to 4.</td>
</tr>
</tbody>
</table>


11 Slope Up/Down Function
11.2 ARCCTE

- [2] AEF# (Arc welding start condition file number) [3] CUSTOM = Individual Setting of TAGs

Be sure to choose either of the following.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEF# (Arc welding end condition file number)</td>
<td>Specifies the arc welding end condition file number.</td>
<td>No. 1 to 1000 The number can be specified by B/I/D variable.</td>
</tr>
<tr>
<td>CUSTOM</td>
<td>Specifies setting of individual TAGs in JOB</td>
<td>Selection brings up menu for setting TAGs</td>
</tr>
</tbody>
</table>

**NOTICE**

When using an AEF as the target value, it will use the weld parameters in the Crater Condition of the AEF.

If sloping is disabled in the AEF, then no sloping will be performed. In that case, the Crater Condition settings will be applied immediately at the end of the current motion segment.

- [4] PROC# (Arc process number)

Setting of Arc Process number from table is necessary to display appropriate TAGs for process control. The TAGs displayed are determined by power source and process type. (See chapter 3 “Process Selection in Arc Process Table”)

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC# (Arc process number)</td>
<td>Selects the process number from the table (up to 16)</td>
<td>Process number will determine the TAGs displayed in [5]. The output value can be specified by B/I/D variable.</td>
</tr>
</tbody>
</table>

- [5] TAG or UNUSED (Arc Process Setting)

Individual process settings will be displayed with name and units according to power source manufacturers specification (up to 6 parameters). TAGs are UNUSED as initial setting and if selected will update with Default value. If a TAG is UNUSED it will use the setting from last time used or use Default value if not set before.

TAG settings may include wire feed speed, amperage, voltage, trim, etc. The units will display according to power source manufacturers process specification and may include inch/min., m/min, amps, volts, or %. For definition of specific process parameter, consult power source manual.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAG1</td>
<td>Up to 6 individual variables are possible.</td>
<td>B[ ]I[ ]D[ ] variable.</td>
</tr>
<tr>
<td>TAG2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNUSED</td>
<td>Will not display TAG or setting in ARCCTE instruction in job</td>
<td>Unused TAG will be set to value from last instruction or will use Default setting if previously UNUSED.</td>
</tr>
</tbody>
</table>
NOTICE

Process variables that are UNUSED in ARCCTE instructions with maintain values set by previous instruction.

- **[6] DIS = Distance**
  This tag is added or omitted only when “CUSTOM=” is selected in the above “AEF# (Arc welding start condition file number) [2] / CUSTOM = (individual TAG setting) [3]”.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIS = Slope up/down section length</td>
<td>Specifies the slope up/down section length where the welding output is gradually changed. The length is set as the distance from the move end point. If no length is specified, the entire section of the move instruction is used.</td>
<td>Length: 0.1 to 6553.5 mm The slope up/down section length can be specified by B/I/D/B[ ]/I[ ]/D[ ] variable. (Unit: 0.1 mm)</td>
</tr>
<tr>
<td>UNUSED</td>
<td>Will not display TAG or setting in ARCCTE instruction in job</td>
<td></td>
</tr>
</tbody>
</table>

- **<Example>**
  The welding output is gradually changed as the Robot moves toward the move end point specified by the move instruction. The aimed wire feed speed is value are 150 in/min. The slope up/down section length is 100mm from the move end point.

```
MOVL V=80
  ARCCTE PROC#(1) WFS=150 DIS=100.0
    Process number cannot change during slope Target value of wire feed speed Slope up/down section length (distance from move end point)

MOVL V=80
```
11.2 ARCCTE

Gradually Decreasing Weld Parameters

Value immediately before execution of ARCCTE instruction

ARCCTE target value

ARCCTE executed

DIS=xxx

Move section specified by move instruction

Welding continues

Gradually Increasing Weld Parameters

Value immediately before execution of ARCCTE instruction

ARCCTE target value

ARCCTE executed

DIS=xxx

Move section specified by move instruction

Welding continues

NOTICE

• The ARCCTS or ARCCTE instruction is valid for only one step.

• If the move section specified by the move instruction is shorter than the distance specified by the slope up/down section length (DIS=XXX), the change is performed equally in the entire section of the move instruction.

• If the ARCCTS or ARCCTE instruction specifies the distance as zero (DIS=0.00), the change is performed equally in the entire section of the move instruction.

• A pair of ARCCTS and ARCCTE instructions can be used on one move instruction. In this case, the ARCCTS instruction is executed first, then the ARCCTE instruction is executed in the remaining part of the move section. If the remaining part of the move section is 0mm, the value instantly changes to the value specified in the ARCCTE instruction.
11.2.4 Registering the ARCCTE Instruction

The ARCCTE instruction can be registered by either:

- With an arc welding start condition file
  - ARCCTE AEF# (1)
    - In this case, the welding condition is set using the arc welding start condition file. (Refer to section 7.4 “Arc End Condition Files”.)
- With additional items to specify conditions
  - ARCCTE PROC#(1) WFS=250 V=18.0 DIS=50.0

11.2.4.1 With an Arc Welding End Condition File

1. Press (INFORM LIST) key on Programming Pendant and select the (ARCCTE) instruction from the DEVICE menu.
   - The “ARCCTE” instruction appears on the input buffer line.

2. Press [SELECT].
   - The DETAIL EDIT window appears.
11 Slope Up/Down Function

11.2 ARCCTE

a) Place the cursor on UNUSED and press [SELECT]

b) Place the cursor on AEF#( ) and press [SELECT]
3. Set the File number

   a) Place the cursor on file number and press [SELECT]

   b) Enter the file number (1-1000) using touch panel or Programming Pendant and press [ENTER].
4. Press [ENTER]
   - The ARCCTE AEF#( ) instruction appears in the input buffer line.

5. Press [ENTER] if it is desired to register the instruction
   - The (INSERT) or (MODIFY) keys must be on to register the
     instructions into existing Job lines.
   - Press (CANCEL) to clear the changes from the input buffer line and
     not record changes.
12 Weaving Operation

12.1 Weaving Basic Coordinate System

Weaving is performed based on the following coordinate system. This coordinate system is automatically generated when weaving is executed.

**Wall Direction:** Z-direction of the robot axis

**Horizontal Direction:** The direction to the approach point from the wall

**Direction of Travel:** The direction in which the Robot moves from the weaving start point to the end point

**NOTICE**

The approach point is a point indicated by a step immediately before the step where weaving starts.
12 Weaving Operation
12.1 Weaving Basic Coordinate System

**NOTICE**

Depending on the mounting status and shape of the workpiece, a definition of the above coordinate system may not be sufficient to generate a weaving pattern. In this case, register the reference point REFP 1, REFP 2, or REFP 3 (MODE: ELLIPSE).

If the “MODE” is set to “ELLIPSE”, the reference point REFP 1 will not be referred to.

For details, see section 12.4.2 “”.

### 12.1.1 Cases that Require the Registration of Reference Points

The registration of the reference point REFP 1, REFP 2, or REFP 3 is not usually required. They are required only with a special workpiece condition, etc.

The REFP 1, that defines the wall direction, is a point on the wall surface or its expansion plane. The REFP 2, which defines the horizontal direction, is a point at the right or left side of the wall.

If the “MODE” is set to “ELLIPSE”, REFP 3 is the reference point which defines the direction of travel.
# 12 Weaving Operation

## 12.1 Weaving Basic Coordinate System

**NOTICE**

For information on registering REFP, refer to the Controller General Operator’s Manual, section 3.2.3.2 Registering Reference Point Instructions*.

**< Example 1 >**

REFP 1 is registered because the wall direction is not parallel to the Z-axis of the robot coordinates.

```
Wall direction

Example

0003 MOVL V=120
0004 WVON WEV#(1)
0005 REFP 1
0006 MOVL V=50
0007 WVOF
```

**< Example 2 >**

REFP 2 is registered because the approach point is at another side of the wall.

```
Wall

Example

0009 MOVL V=120
0010 MOVL V=50
0011 WVON WEV#(1)
0012 REFP 2
0013 MOVL V=50
0014 WVOF
```

**NOTICE**

If the weaving start step (immediately before WVON) and the previous step (approach point) are same, the weaving start point and the approach point become same, and the horizontal direction become undefined.

In this case, register the reference point REFP 2.
12.2 WVON

12.2.1 Function

This is the weaving start operation.

12.2.2 Syntax

The tag to be used varies according to the control group of job.

Table 12-1: Job Type and Control Group

<table>
<thead>
<tr>
<th>Type</th>
<th>Control Group of Job</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent</td>
<td>Job with one Robot (Standard)</td>
<td></td>
</tr>
<tr>
<td>Coordinated</td>
<td>Job with two Robots</td>
<td>Option</td>
</tr>
</tbody>
</table>

Table 12-2: Tag Usage Limitation

<table>
<thead>
<tr>
<th>Tag</th>
<th>Control Group of Job</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB1</td>
<td>X</td>
<td>0</td>
</tr>
<tr>
<td>RB2</td>
<td>X</td>
<td>0</td>
</tr>
<tr>
<td>RB3</td>
<td>X</td>
<td>0</td>
</tr>
<tr>
<td>RB4</td>
<td>X</td>
<td>0</td>
</tr>
<tr>
<td>WEV#( )</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>AMP=</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>FREQ=</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>ANGL=</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>DIR=</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

O: Available
X: Not available
12.2 WVON

12.2.3 Explanation

- **[1] RBn**
  Be sure to choose one of the following tags.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBn</td>
<td>Specifies the weaving motion of robot 1 to 4.</td>
<td></td>
</tr>
</tbody>
</table>

  Be sure to choose one of the following tags.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEV# (Weaving condition file number)</td>
<td>Specifies the weaving condition file number. Conditions for the weaving motion are registered in the weaving condition file.</td>
<td>No. 1 to 16. The number can be specified by B/I/D/LB/LI/LD variable.</td>
</tr>
<tr>
<td>AMP = Weaving half-amplitude</td>
<td>Specifies the half-amplitude of weaving.</td>
<td>Half-amplitude: 0.1 to 99.9 mm. The half-amplitude can be specified by B/B]/LB/LB]/I/I]/LD/LD]/ variable. (Unit: 0.1 mm)</td>
</tr>
</tbody>
</table>

- **[4] FREQ = Weaving frequency**
  Only when "AMP = Weaving half-amplitude" is selected in the above "[2] WEV# (Weaving condition file number)/AMP = [3] Weaving half-amplitude", be sure to add the following tag.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREQ = Weaving frequency</td>
<td>Specifies the weaving frequency.</td>
<td>Frequency: 0.1 to 5.0 Hz. The frequency can be specified by B/I/D/B]/I]/D]/LB/LI/LD/LB]/I]/LD/ variable. (Unit: 0.1 Hz)</td>
</tr>
</tbody>
</table>

- **[5] ANGL = Weaving angle**
  Only when "AMP = Weaving half-amplitude" is selected in the above "[2] WEV# (Weaving condition file number)/AMP = [3] Weaving half-amplitude", this tag is added or omitted after "[4] FREQ = Weaving frequency"

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANGL = Weaving angle</td>
<td>Specifies the weaving angle.</td>
<td>Angle: 0.0 to 180.0 degree. The degree can be specified by B/I/D/B]/I]/D]/LB/LI/LD/LB]/I]/LD/ variable. (Unit: 0.1)</td>
</tr>
</tbody>
</table>
### [6] DIR = Starting direction of weaving

This tag can be added or omitted.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIR = Starting direction of weaving</td>
<td>Specifies the starting direction of weaving.</td>
<td>Direction: 0 to 1 0: Forward 1: Backward The direction can be specified by B/I/D/B[]/I]/D]/LB/LI/LD/LB]/LJ/LD[] variable.</td>
</tr>
</tbody>
</table>
### Setting conditions for weaving

- **Weaving half-amplitude**
  Specify the amplitude size of weaving motion.

- **Weaving angle**
  Specify the angle of weaving motion.

- **Starting direction of weaving**
  Specify the starting direction of weaving motion.

#### Half-amplitude

- **Wall direction**
<table>
<thead>
<tr>
<th>Vertical</th>
<th>Horizontal</th>
</tr>
</thead>
</table>

#### Angle

- **Wall direction**
<table>
<thead>
<tr>
<th>Vertical</th>
<th>Horizontal</th>
</tr>
</thead>
</table>

#### Distance

- **Wall direction**
<table>
<thead>
<tr>
<th>Vertical/ho</th>
<th>Distance</th>
</tr>
</thead>
</table>

#### Travel direction

- **Wall direction**
<table>
<thead>
<tr>
<th>Forward</th>
<th>Backward</th>
</tr>
</thead>
</table>

#### Shapes

- **SINGLE**
  - Forward
  - Backward

- **TRIANGLE**
  - Forward
  - Backward

- **L-TYPE**
  - Forward
  - Backward

- **ELLIPSE**
  - Forward
  - Reverse
12.2.4 Registering the WVON Instruction

This is the instruction to start the weaving operation.

1. Move the cursor to the address area.
2. Press [INFORM LIST].
   - The instruction list dialog box appears.
3. Select “DEVICE”.
4. Select the WVON instruction.
   - The “WVON” instruction appears in the input buffer line.
5. Press [SELECT], and set the file number in the DETAIL EDIT window.
   – Select the file number (1 to 255).
   (1) Move the cursor to the file number and press [SELECT].
   (2) Input the file number using [Numeric Key] and press [ENTER].

6. Press [ENTER].
   – The set contents are displayed in the input buffer line.

   – The set contents are registered in the job.

   – When the set contents are not to be registered, press [CANCEL] to return to the JOB CONTENT window.
12.3 WVOF Instruction

12.3.1 Function
This is the weaving end instruction.

12.3.2 Syntax
The control group of job limits the tag usage.

![WVOF Diagram]

Table 12-3: Job Type and Control Group

<table>
<thead>
<tr>
<th>Type</th>
<th>Control Group of Job</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent</td>
<td>Job with one Robot (Standard)</td>
<td></td>
</tr>
<tr>
<td>Coordinated</td>
<td>Job with two Robots</td>
<td>Option</td>
</tr>
</tbody>
</table>

Table 12-4: Tag Usage Limitation

<table>
<thead>
<tr>
<th>Tag</th>
<th>Control Group of Job</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB1</td>
<td>X</td>
<td>O</td>
</tr>
<tr>
<td>RB2</td>
<td>X</td>
<td>O</td>
</tr>
<tr>
<td>RB3</td>
<td>X</td>
<td>O</td>
</tr>
<tr>
<td>RB4</td>
<td>X</td>
<td>O</td>
</tr>
</tbody>
</table>

O: Available
X: Not available
12 Weaving Operation
12.3 WVOF Instruction

12.3.3 Explanation

- **RB1/RB2/RB3/RB4 [1]**
  Be sure to choose one of the following tags.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBn</td>
<td>Specifies the weaving motion of robot 1 to 4.</td>
<td></td>
</tr>
</tbody>
</table>

**<Example>**

```
NOP
MOVJ VJ=50.00     · · · Step 1
MOVL V=220        · · · Step 2
MOVL V=200        · · · Step 3
WVON WEV#(2)      · · · Weaving start
ARCON ASF#(1)     · · · Welding start
MOVL V=138        · · · Step 4
ARCOF AEF#(2)     · · · Welding end
WVOF              · · · Weaving end
MOVL V=200        · · · Step 5
MOVJ VJ=50.00     · · · Step 6
END
```

The diagram shows the weaving process with steps 1 to 6, indicating the movement of the robots in sequential order.
12.3.4 Registering the WVOF Instruction

This is the instruction to end the weaving operation.
1. Move the cursor to the address area.
2. Press [INFORM LIST].
   – The instruction list dialog box appears.
3. Select “DEVICE”.
4. Select the “WVOF” instruction.
5. Press [ENTER].
   – The set contents are registered in the job.
12 Weaving Operation

12.4 WEAVING CONDITION Window

A. COND NO. (1 to 255)
The weaving condition file number between 1 and 255 is shown.

B. MODE, C. SMOOTH
Set the weaving mode to SINGLE, TRIANGLE, L-TYPE, or ELLIPSE. For the SINGLE, TRIANGLE, or L-TYPE mode, ON/OFF of SMOOTH can be set.

D. SPEED TYPE (FREQUENCY, MOVING TIME)
Specify the setting type of the weaving motion speed. Two types are available: setting by frequency and setting by the moving time in each weaving section.
E. FREQUENCY
Specify the weaving frequency if “SPEED TYPE” is set to “FREQUENCY”. Note that when the mode is set to “SINGLE” and the speed type is set to “FREQUENCY”, the maximum frequency is determined by the amplitude as illustrated in the graph below. Specify a frequency within the allowable range.

![Graph showing usable and not usable frequency ranges for different amplitudes.]

F. AMPLITUDE TYPE (SAME, EACH)
Specify the amplitude type of weaving, SAME or EACH. When the amplitude type is set to EACH, the right-left amplitude for SINGLE or the lateral-longitudinal amplitude for ELLIPSE (V: semi-minor axis, H: semi-major axis) can be specified.

When set to SAME in the SINGLE, TRIANGLE, or L-TYPE mode

When set to EACH in the SINGLE, TRIANGLE, or L-TYPE mode

The definitions of “right” and “left” differ depending on the wall direction, and the wall side is defined as “left”.

![Diagrams showing right and left amplitudes for different modes.]
12.4 WEAVING CONDITION Window

When set to SAME in the ELLIPSE mode

When set to EACH in the ELLIPSE mode

G. PATTERN

• AMPLITUDE

Specify the amplitude size at weaving when MODE is set to SINGLE or ELLIPSE.

When AMPLITUDE TYPE is set to EACH in the above step F, specify the amplitude size individually for the right-left amplitude for SINGLE or the lateral-longitudinal amplitude for ELLIPSE (V: semi-minor axis, H: semi-major axis).
12 Weaving Operation

12.4 WEAVING CONDITION Window

• VERTICAL, HORIZONTAL
  If MODE is set to TRIANGLE or L-TYPE, the data for the triangle must be set to define the weaving pattern.

  ![Diagram](image1)
  Vertical/horizontal distance: 1.0 to 25.0 mm

  MODE: TRIANGLE, L-TYPE

• ANGLE
  Specifies the angle of weaving motion.

  ![Diagram](image2)
  Angle: 0.0 to 180.0°

  MODE: SINGLE

  ![Diagram](image3)
  MODE: TRIANGLE, L-TYPE

  ![Diagram](image4)
  MODE: ELLIPSE
12.4 WEAVING CONDITION Window

- TRAVEL ANGLE
  Specifies the travel angle of weaving motion.

MODE: ELLIPSE
H. TIMER (MODE)
As shown below, a single weaving cycle is divided into three or four sections. The timer mode can be specified for each section.

Set one of the following timer modes:
WEAV STOP: Weaving stops but Robot moves.
ROBOT STOP: Robot stops.

I. MOVING TIME
If “SPEED TYPE” is set to “MOVING TIME”, the moving time specified here determines the moving speed in each of the weaving sections (explained in “TIMER (MODE)” above).

J. STOP TIMER
Specifies the timer to determine weaving stop or Robot stop for each section (explained in “TIMER (MODE)” above).

NOTICE
If the corner radius (CR) is specified in the move instruction, weaving operations cannot be performed.

When MODE is set to ELLIPSE, weaving operations can be performed only in MOVL, MOVC, SMOVL, SMOVC, or IMOV.

ELLIPSE cannot be used when the teaching such as the following is performed in the two-Robot coordinated system.
- The travel distance of the master-side Robot is longer than that of the slave-side Robot.
12 Weaving Operation

12.4 WEAVING CONDITION Window

K. HOVER WEAVING COND. (option)

- SET (ON/OFF)
  Specifies whether hover weaving is used or not.
- TIMER
  Finishes hover weaving when the time specified here ends.
- INPUT SIGNAL
  Finishes hover weaving when the input signal specified here is input.

Reference Job

<table>
<thead>
<tr>
<th>Job</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOP</td>
<td></td>
</tr>
<tr>
<td>MOVJ VJ=10.00</td>
<td></td>
</tr>
<tr>
<td>MOVJ VJ=25.00</td>
<td></td>
</tr>
<tr>
<td>REFP 3</td>
<td></td>
</tr>
<tr>
<td>ARCON ASF#(1)</td>
<td></td>
</tr>
<tr>
<td>WVON WEV#(1)</td>
<td></td>
</tr>
<tr>
<td>MOVL V=60</td>
<td></td>
</tr>
<tr>
<td>WVOF</td>
<td></td>
</tr>
<tr>
<td>ARCOF</td>
<td></td>
</tr>
<tr>
<td>MOVJ VJ=25.00</td>
<td></td>
</tr>
<tr>
<td>MOVJ VJ=25.00</td>
<td></td>
</tr>
<tr>
<td>END</td>
<td></td>
</tr>
</tbody>
</table>

Welding start point.
Reference point for defining the direction of travel.

*Teaching by interpolation instruction, not by joint interpolation.
The same point with the welding start point.

NOTICE

In hover weaving, the start and end points are the same. Therefore, the weaving direction cannot be determined. For this reason, the user needs to register a reference point (REFP 3) to define the direction of travel.

Wall Direction: Robot axis Z+ direction
Horizontal Direction: Direction from the wall to approach point
Direction of Travel: Direction from weaving start point to REFP 3

NOTICE

In hover weaving, the start and end points are the same. Therefore, the arc retry function and arc restart function are not available.
12.4 Weaving Operation

12.4.1 Displaying the Weaving File

1. Select {ARC WELDING} under the main menu.

2. Select {WEAVING}.

3. Display the desired file number.
   a) The desired file can be called up by using [PAGE].
   b) Press [PAGE] to call the next file.
   c) Press [SHIFT]+ [PAGE] to call the previous file.
12.4.2 Editing the Condition Data

1. Select the item to be edited.

2. Input the value using [Numeric Key].
12.5 **Prohibiting Weaving**

If the weaving instruction is registered during the "CHECK" operation in the play mode or "TEST RUN" or [FWD] operation in the teach mode, weaving is performed as well as other move instructions. However, in the cases when weaving should not be performed because the Robot collides with a workpiece, etc., follow the procedure below to prohibit weaving.

**12.5.1 Method to Prohibit Weaving during a “CHECK” Operation**

2. Select {UTILITY}.
3. Select {SETUP SPECIAL RUN}.
   – The SPECIAL PLAY window appears.
12.5 Prohibiting Weaving

4. Select “WEAV PROHIBIT IN CHK-RUN”.
   – Each time [SELECT] is pressed, “VALID” and “INVALID” alternate.

12.5.2 Method to Prohibit Weaving during a “TEST RUN” or FWD Operation

1. Press [AREA] on the JOB CONTENT window in the TEACH mode.
2. Select {UTILITY}.

3. Select {SETUP SPECIAL RUN}.
   – The SPECIAL TEACH window appears.
4. Select “WEAV PROHIBIT IN TEST RUN/NEXT”.

12.5.2.1 Method to Prohibit Weaving by Means of a System Input Signal

The system input signal 40047 is used.
13 Arc Welding Management and Maintenance

13.1 ARC WELD DIAGNOSIS Window

An optimum arc welding requires timely contact-tip replacement and nozzle cleaning.

It is also recommended that the user check how often such functions as arc retry, arc restart, and automatic anti-stick have been used and adjust the operating environment and work conditions accordingly.

The usage of the above-mentioned functions can be controlled or confirmed on the ARC WELD DIAGNOSIS window.

For example, contact-tip replacement is initially set at 180 minutes. When the welding time reaches 180 minutes, an external output signal (system output) is output. The operator can then replace the tip or adjust as necessary.

A. WORK CONTINUE (CONT, STOP)

When the Robot is restarted after it stops in the middle of a work section, the Robot either performs welding over the remaining part of the section or moves without performing welding.

B. TIP REPLACE, NOZZLE CLEAN (0 to 999 minutes)

In the “SETTING” fields, specify the optimum timings for contact-tip replacement and nozzle cleaning. The initial values are 180 minutes for contact-tip replacement; 30 minutes for nozzle cleaning. The “ACCUM.” fields display an accumulated service duration.

C. RETRY, RESTART (ARC)

In each of the “SETTING” fields, specify a reference value for the number of times each function is used. As an initial setting, 10 is specified for each function. Each of the “ACCUM.” fields displays the accumulated count, showing how many times the function has been used.

**NOTICE**

ARC RETRY and ARC RESTART counts:

These counts are different from the maximum repetition counts specified in the arc auxiliary condition file. These counts show how many times these functions have actually been used.
13.2 Editing the ARC WELD DIAGNOSIS Window

1. Select {ARC WELDING} under the Main Menu.

2. Select {ARC WELD DIAG.}.

3. Line up the cursor with each set item and press [SELECT] to edit.

4. Set the work continue specification.
### 13 Arc Welding Management and Maintenance

#### 13.2 Editing the ARC WELD DIAGNOSIS Window

- Each time [SELECT] is pressed, the setting alternates between “CONT” and “STOP”.

<table>
<thead>
<tr>
<th>ARC WELD DIAGNOSIS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>WORK CONTINUE</td>
<td>CONT</td>
<td>&lt;SETTING&gt;</td>
</tr>
<tr>
<td>TIP REPLACE</td>
<td>77 min</td>
<td>100 min</td>
</tr>
<tr>
<td>NOZZLE CLEAN</td>
<td>12 min</td>
<td>40 min</td>
</tr>
</tbody>
</table>

**NOTICE**

The accumulated value can be cleared by either of the following:
- ARC WELD DIAGNOSIS window
- External input signal (system input signal)
14 Welding Path Shift Function

14.1 Welding Path Shift Function

The welding path shift function shifts the welding path to upper board direction/lower board direction.

- The shifting path is from the welding start (ARCON) step to the welding end (ARCOFF) step.
- The shifting direction is to upper board direction and lower board direction.
- The shifting amount is to be set to Arc Start Condition File and the setting range is between -5.0 to 5.0 mm.

Usually, the welding path is taught when it is deviated slightly from the joint of boards. This function can perform welding the deviating path by teaching the joint of boards and set deviating amount as the shifting amount to Arc Start Condition File.

The Welding Path Shift Function has the following effects.

- The welding path is high accuracy, because it is easy to teach the joint of boards than the deviating path from it.
- The welding path can be managed with Arc Start Condition File, and it is easy to modify.

When correcting the workpieces position or welding many workpieces of the same shape, use the Parallel Shift Function. For the details of this function see the Controllers General Operator's Manual section 6.2 “Parallel Shift Function”.

14.1.1 The Shifting Direction Of the Welding Path Shift Function

<table>
<thead>
<tr>
<th>Upper board direction</th>
<th>Z-axis direction on the base coordinates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower board direction</td>
<td>The direction that turned 90 degrees Z-axis of base coordinates to Z-axis of tool coordinates.</td>
</tr>
</tbody>
</table>

Fig. 14-1: Shifting Direction Of the Welding Path Shift Function
14.1.2 Setting the Shifting Amount Of Welding Path
The shifting amount of the welding path is set with the procedures described in section 7.3.5 "(OTHER OPTIONS) Window".

14.1.3 Cancel the Welding Path Shift
Welding path shift is canceled with the following operations.
- Function keys.
- Menu on JOB CONTENT window.
- Editing the move instruction.

14.1.4 Function Keys
By the simultaneous pressing of [INTERLOCK] + [8 ARCON], the welding path shift is canceled and it is enabled when pressing those keys again.

14.1.5 Menu On JOB CONTENT Window
1. Select {JOB} under the Main Menu.
2. Select {JOB CONTENT}.
   - Contents of the job appear.
3. Select {UTILITY} under the pull down menu.
4. Select {ARC SHIFT CANCEL}.

- A dialog box confirming the cancel of welding path shift
  Select “YES” to cancel welding path shift and the window returns to the JOB CONTENT window.

**NOTICE**
Select “NO” to keep it and the window returns to the JOB CONTENT window.

14.1.6 Editing the Move Instruction

The welding path shift is canceled, when the present position is selected in inserting or modifying the move instruction. For the details, please refer to section 14.1.7 "Teaching Move Instruction during Welding Path Shift".
14.1.7 Teaching Move Instruction during Welding Path Shift

When inserting or modifying the move instruction while welding path shift, the teaching position can be selected from the following two positions.

The welding path shift is canceled when the present position is selected.

- **Present position**
  Select this mode in teaching the joint of boards.
  In playback, the Robot moves to the position where the shifting amount is added to the teaching position.

- **Position where the shifting amount is subtracted from present position.**
  In playback, the Robot moves to the present position.

1. Insert or modify the moving instruction.

   - A dialog box which confirms teaching the position where the shifting amount is subtracted from present position is displayed.
   Select "YES" to teach the position where the shifting amount is subtracted from present position and the window returns to the JOB CONTENT window.
   Select "NO" to teach the present position and the window returns to the JOB CONTENT window.
14.1.8 Restriction

Followings are the restrictions to this function

1. Register ARCON or ARCOF instruction to the job to which the welding section (move instruction) is registered. If ARCON instruction is executed in the CALL destination job, the welding path shift would not be operated in the welding section at the CALL source job.

2. In case modifying the shifting amount, set ARCSET with Arc Start Condition File that the next shifting amount is registered. Do not set ARCON instruction.

3. The welding path shift cannot be canceled in the welding section. Set "0" to the shifting amount in arc Arc Start Condition File.

4. This function cannot be used in the external reference point motion.

5. Do not register IMOV instruction in the welding section where the welding path shift is available. The Robot moves to the position where the shifting amount is doubled.

6. The welding path shift will be limited if teaching is performed in the following conditions.

<table>
<thead>
<tr>
<th>Condition of welding section</th>
<th>Restriction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z-axis of tool coordinates is parallel to Z-axis direction on the base coordinates.</td>
<td>ALARM 4987 WELD LINE CORD SHIFT MOV DISABLE</td>
</tr>
<tr>
<td>-Same point</td>
<td>1st step</td>
</tr>
<tr>
<td>-Short distance</td>
<td>2nd step</td>
</tr>
<tr>
<td>-Traveling direction is same as Z-axis direction on the base coordinates</td>
<td>Execute shifting operation to the upper/lower board direction of the previous step</td>
</tr>
</tbody>
</table>
## 15 Parameter

### 15.1 AxP Parameters For All Welder Settings

1. From the Main Menu, touch {Parameter} and then “AxP”.
   - “x” is the number of the particular welder.
     * A1P is for welder 1, A2P is for welder 2, etc.

#### 15.1.1 Global Settings For All Welders

These settings apply to all connected welders. Each of these are A1P. The A2P, A3P, and A4P parameters are ignored.

<table>
<thead>
<tr>
<th>A1P</th>
<th>Description</th>
</tr>
</thead>
</table>
| 460 | Unit for Run-in WFS  
(0 = In/Min)  
(1 = Meter/Min)  
(Other = In/Min) |
| 461 | Process 1 - Run-in WFS when not using ASF  
If A1P463 = 0:  
(0 = Default: 150 in/min)  
(25 - 500: 25 in/min - 500 in/min)  
(Other = Cap at limit)  
If A1P463 = 1:  
(0 = Default: 3.8 m/min)  
(6 - 127: 0.6 m/min - 12.7 m/min)  
(Other = Cap at limit) |
| 462 | Process 2 - Run-in WFS when not using ASF  
(See description in A1P461) |
| 463 | Process 3 - Run-in WFS when not using ASF  
(See description in A1P461) |
| 464 | Process 4 - Run-in WFS when not using ASF  
(See description in A1P461) |
| 465 | Process 5 - Run-in WFS when not using ASF  
(See description in A1P461) |
| 466 | Process 6 - Run-in WFS when not using ASF  
(See description in A1P461) |
| 467 | Process 7 - Run-in WFS when not using ASF  
(See description in A1P461) |
| 468 | Process 8 - Run-in WFS when not using ASF  
(See description in A1P461) |
| 469 | Process 9 - Run-in WFS when not using ASF  
(See description in A1P461) |
| 470 | Process 10 - Run-in WFS when not using ASF  
(See description in A1P461) |
## 15 Parameter
### 15.1 AxP Parameters For All Welder Settings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>471</td>
<td>Process 11 - Run-in WFS when not using ASF (See description in A1P461)</td>
</tr>
<tr>
<td>472</td>
<td>Process 12 - Run-in WFS when not using ASF (See description in A1P461)</td>
</tr>
<tr>
<td>473</td>
<td>Process 13 - Run-in WFS when not using ASF (See description in A1P461)</td>
</tr>
<tr>
<td>474</td>
<td>Process 14 - Run-in WFS when not using ASF (See description in A1P461)</td>
</tr>
<tr>
<td>475</td>
<td>Process 15 - Run-in WFS when not using ASF (See description in A1P461)</td>
</tr>
<tr>
<td>476</td>
<td>Process 16 - Run-in WFS when not using ASF (See description in A1P461)</td>
</tr>
</tbody>
</table>
| 477       | Run-in WFS Controlled by welder  
0 = Robot controls Run-in  
1 = Welder controls Run-in  
Other = Robot controls Run-in |
| 480       | Arc loss timeout mid-weld (0.1 sec)  
(0 = Default: 0.1 sec)  
(1 - 30 = 0.1 sec - 3.0 sec)  
(Other = Alarm and use Default value) |
| 481       | Arc Restart Function  
Restart arc at % of previous weld settings.  
(0 = Default: 100%)  
(60 - 140 = 60% - 140%)  
(Other = Alarm and use Default value) |
| 482       | Automatic stick-check if not using AEF  
(0 = Default: Disable)  
(1 = Enable)  
(Other = Alarm and use Default value) |
| 483       | Delay stick check after enabling Touch Sense  
(0 = Default: 50 ms)  
(1 - 300 = 1 ms - 300 ms)  
(Other = Alarm and use Default value) |
| 484       | Security level for editing ASF/AEF  
(0 = Default: EDITING OR HIGHER)  
(1 = EDITING OR HIGHER)  
(2 = MANAGEMENT OR HIGHER)  
(3 = SAFETY)  
(Other = Alarm and use Default value) |
| 485       | Override internal semaphore timeout  
(0 = Default: 100 ms)  
(50 - 1500 = 50 - 1500 ms)  
(Other = Use default) |
### 15 Parameter

#### 15.1 AxP Parameters For All Welder Settings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A1P</strong></td>
<td></td>
</tr>
<tr>
<td>490</td>
<td>Action for External Sensor #1 Fault:</td>
</tr>
<tr>
<td></td>
<td>0 = Nothing</td>
</tr>
<tr>
<td></td>
<td>1 = Pendant Message</td>
</tr>
<tr>
<td></td>
<td>2 = Kill Arc-Established</td>
</tr>
<tr>
<td></td>
<td>3 = Alarm at end of weld</td>
</tr>
<tr>
<td></td>
<td>4 = Alarm Immediately</td>
</tr>
<tr>
<td></td>
<td>(Other = Nothing)</td>
</tr>
<tr>
<td>491</td>
<td>Action for External Sensor #2 Fault:</td>
</tr>
<tr>
<td></td>
<td>0 = Nothing</td>
</tr>
<tr>
<td></td>
<td>1 = Pendant Message</td>
</tr>
<tr>
<td></td>
<td>2 = Kill Arc-Established</td>
</tr>
<tr>
<td></td>
<td>3 = Alarm at end of weld</td>
</tr>
<tr>
<td></td>
<td>4 = Alarm Immediately</td>
</tr>
<tr>
<td></td>
<td>(Other = Nothing)</td>
</tr>
<tr>
<td>492</td>
<td>Action for External Sensor #3 Fault:</td>
</tr>
<tr>
<td></td>
<td>0 = Nothing</td>
</tr>
<tr>
<td></td>
<td>1 = Pendant Message</td>
</tr>
<tr>
<td></td>
<td>2 = Kill Arc-Established</td>
</tr>
<tr>
<td></td>
<td>3 = Alarm at end of weld</td>
</tr>
<tr>
<td></td>
<td>4 = Alarm Immediately</td>
</tr>
<tr>
<td></td>
<td>(Other = Nothing)</td>
</tr>
<tr>
<td>493</td>
<td>Action for External Sensor #4 Fault:</td>
</tr>
<tr>
<td></td>
<td>0 = Nothing</td>
</tr>
<tr>
<td></td>
<td>1 = Pendant Message</td>
</tr>
<tr>
<td></td>
<td>2 = Kill Arc-Established</td>
</tr>
<tr>
<td></td>
<td>3 = Alarm at end of weld</td>
</tr>
<tr>
<td></td>
<td>4 = Alarm Immediately</td>
</tr>
<tr>
<td></td>
<td>(Other = Nothing)</td>
</tr>
<tr>
<td>499</td>
<td>Enable Debug Logging (BITFIELD)</td>
</tr>
<tr>
<td></td>
<td>b0: Enable debug logging</td>
</tr>
<tr>
<td></td>
<td>b1: Enable level 2 debugging</td>
</tr>
<tr>
<td></td>
<td>b2: Print log to screen / telnet</td>
</tr>
</tbody>
</table>
### 15.1.2 Settings For Each Connected Welder

These settings must be specified for each welder. A1P is used for welder 1, A2P for welder 2, etc.

<table>
<thead>
<tr>
<th>AxP</th>
<th>Miller</th>
<th>Lincoln</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>Welder IP Address Octet 1 (eg. 192)</td>
<td>Welder IP Address Octet 1 (eg. 192)</td>
</tr>
<tr>
<td>401</td>
<td>Welder IP Address Octet 2 (eg. 168)</td>
<td>Welder IP Address Octet 2 (eg. 168)</td>
</tr>
<tr>
<td>402</td>
<td>Welder IP Address Octet 3 (eg. 1)</td>
<td>Welder IP Address Octet 3 (eg. 1)</td>
</tr>
<tr>
<td>403</td>
<td>Welder IP Address Octet 4 (eg. 51)</td>
<td>Welder IP Address Octet 4 (eg. 51)</td>
</tr>
<tr>
<td>404</td>
<td>Feeder Selection:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 = Power Feed® 10R</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 = AutoDrive® 4R90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 = AutoDrive® 4R220</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 = AutoDrive® 4R100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100 = AutoDrive® SA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>101 = AutoDrive® S</td>
<td></td>
</tr>
<tr>
<td>405</td>
<td>Feed roll size for servo feeder:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 = 3/64 - 1.2mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 = 1/16 - 1.6mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 = 0.035 - 0.9mm</td>
<td></td>
</tr>
<tr>
<td>408</td>
<td>Automatic burnback level after ARCOF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0 = Default: 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1 - 50 = 1 - 50) (Higher number is more bb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Other = Alarm and use Default value)</td>
<td></td>
</tr>
<tr>
<td>409</td>
<td>Period for welder feedback telemetry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0 = Default: 25 ms)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(8 - 100 = 8 - 100 ms)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Other = Alarm and use Default value)</td>
<td></td>
</tr>
<tr>
<td>410</td>
<td>Time delay between low-mid speed inching</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0 = Default: 3 sec)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1 - 10 = 1 - 10 sec)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Other = Alarm and use Default value)</td>
<td></td>
</tr>
<tr>
<td>411</td>
<td>Time delay between mid-high speed inching</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0 = Default: 5 sec)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1 - 10 = 1 - 10 sec)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Other = Alarm and use Default value)</td>
<td></td>
</tr>
<tr>
<td>413</td>
<td>Bitfield for welder error monitoring</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b0: Disable voltage sense</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b1: Disable wfs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b2: Disable arc runtime</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b3: Disable feeder current</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b4: Disable coolant flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b5: Disable gas flow</td>
<td></td>
</tr>
</tbody>
</table>
### 15 Parameter

#### 15.1 AxP Parameters For All Welder Settings

<table>
<thead>
<tr>
<th>AxP</th>
<th>Miller</th>
<th>Lincoln</th>
</tr>
</thead>
<tbody>
<tr>
<td>414</td>
<td>Lock front panel</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0 = Default: Locked)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1 = Unlocked)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Other = Locked)</td>
<td></td>
</tr>
<tr>
<td>415</td>
<td>Weld Set Selection</td>
<td>Weld Set Selection</td>
</tr>
<tr>
<td></td>
<td>(0 = Default: English)</td>
<td>(0 = Default: Imperial)</td>
</tr>
<tr>
<td></td>
<td>(1 = Metric)</td>
<td>(1 = Metric)</td>
</tr>
<tr>
<td></td>
<td>(Other = English)</td>
<td>(2 = User/Custom)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3 = Amps and Volts)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Other = Alarm and use Default)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Not compatible with PW455m and PW655m)</td>
</tr>
<tr>
<td>416</td>
<td>Use Amps instead of WFS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0 = Default: No)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1 = Yes)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Other = No)</td>
<td></td>
</tr>
<tr>
<td>418</td>
<td>Process 1 - Bitfield</td>
<td>b0: Disable TR start (servo feeders only)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b1: Disable TR ramping (servo feeders only)</td>
</tr>
<tr>
<td>419</td>
<td>Process 2 - Bitfield</td>
<td>b0: Disable TR start (servo feeders only)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b1: Disable TR ramping (servo feeders only)</td>
</tr>
<tr>
<td>420</td>
<td>Process 3 - Bitfield</td>
<td>b0: Disable TR start (servo feeders only)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b1: Disable TR ramping (servo feeders only)</td>
</tr>
<tr>
<td>421</td>
<td>Process 4 - Bitfield</td>
<td>b0: Disable TR start (servo feeders only)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b1: Disable TR ramping (servo feeders only)</td>
</tr>
<tr>
<td>422</td>
<td>Process 5 - Bitfield</td>
<td>b0: Disable TR start (servo feeders only)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b1: Disable TR ramping (servo feeders only)</td>
</tr>
<tr>
<td>423</td>
<td>Process 6 - Bitfield</td>
<td>b0: Disable TR start (servo feeders only)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b1: Disable TR ramping (servo feeders only)</td>
</tr>
<tr>
<td>424</td>
<td>Process 7 - Bitfield</td>
<td>b0: Disable TR start (servo feeders only)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b1: Disable TR ramping (servo feeders only)</td>
</tr>
</tbody>
</table>
### 15 Parameter
#### 15.1 AxP Parameters For All Welder Settings

<table>
<thead>
<tr>
<th>AxP</th>
<th>Miller</th>
<th>Lincoln</th>
</tr>
</thead>
</table>
| 425 |        | Process 8 - Bitfield  
|     |        | b0: Disable TR start (servo feeders only)  
|     |        | b1: Disable TR ramping (servo feeders only)  |
| 426 |        | Process 9 - Bitfield  
|     |        | b0: Disable TR start (servo feeders only)  
|     |        | b1: Disable TR ramping (servo feeders only)  |
| 427 |        | Process 10 - Bitfield  
|     |        | b0: Disable TR start (servo feeders only)  
|     |        | b1: Disable TR ramping (servo feeders only)  |
| 428 |        | Process 11 - Bitfield  
|     |        | b0: Disable TR start (servo feeders only)  
|     |        | b1: Disable TR ramping (servo feeders only)  |
| 429 |        | Process 12 - Bitfield  
|     |        | b0: Disable TR start (servo feeders only)  
|     |        | b1: Disable TR ramping (servo feeders only)  |
| 430 |        | Process 13 - Bitfield  
|     |        | b0: Disable TR start (servo feeders only)  
|     |        | b1: Disable TR ramping (servo feeders only)  |
| 431 |        | Process 14 - Bitfield  
|     |        | b0: Disable TR start (servo feeders only)  
|     |        | b1: Disable TR ramping (servo feeders only)  |
| 432 |        | Process 15 - Bitfield  
|     |        | b0: Disable TR start (servo feeders only)  
|     |        | b1: Disable TR ramping (servo feeders only)  |
| 433 |        | Process 16 - Bitfield  
|     |        | b0: Disable TR start (servo feeders only)  
|     |        | b1: Disable TR ramping (servo feeders only)  |
16 Integration Signals

16.1 Inputs For Custom Integration

Several Concurrent I/O signals are monitored by UWI for integrating with a work cell. The use of these signals require custom modifications of the Concurrent I/O Ladder program.

<table>
<thead>
<tr>
<th></th>
<th>Welder 1</th>
<th>Welder 2</th>
<th>Welder 3</th>
<th>Welder 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Sensor #1 Fault</td>
<td>71220</td>
<td>71470</td>
<td>71720</td>
<td>71970</td>
</tr>
<tr>
<td>External Sensor #2 Fault</td>
<td>71221</td>
<td>71471</td>
<td>71721</td>
<td>71971</td>
</tr>
<tr>
<td>External Sensor #3 Fault</td>
<td>71222</td>
<td>71472</td>
<td>71722</td>
<td>71972</td>
</tr>
<tr>
<td>External Sensor #4 Fault</td>
<td>71223</td>
<td>71473</td>
<td>71723</td>
<td>71973</td>
</tr>
<tr>
<td>User Defined Work End Prohibit</td>
<td>71225</td>
<td>71475</td>
<td>71725</td>
<td>71975</td>
</tr>
</tbody>
</table>

16.1.1 External Sensor Fault

These signals are intended to be connected to some external sensor that is critical to the weld process, such as a gas-flow or coolant-flow sensor. When these signals turn on, the action performed is determined by parameters A1P490 - A1P493.

0 = Nothing
1 = Pendant Message
2 = Kill Arc-Established
3 = Alarm at end of weld
4 = Alarm Immediately

16.1.2 Work End Prohibit

When this signal is on, the robot job will remain on the ARCOF command until the signal turns off. During this time, the robot will remain stationary at the final ARCOF point.

This could be used to prevent the robot job from continuing until a quality-scan or stamping operation has been performed.
# 17 Alarms

## 17.1 Common Alarm Codes

This section includes common alarm codes for all welders.

<table>
<thead>
<tr>
<th>Alarm Code</th>
<th>Sub Code</th>
<th>Meaning</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>8500, 8600, 8700, 8800</td>
<td>0</td>
<td>CIO is incompatible with UWI configuration</td>
<td>CIO is below minimum required version</td>
<td>Upgrade CIO with the latest version of UWI ladder</td>
</tr>
<tr>
<td>8500, 8600, 8700, 8800</td>
<td>0</td>
<td>CIO is not valid for UWI operations</td>
<td></td>
<td>Merge existing CIO with latest UWI ladder modifications</td>
</tr>
<tr>
<td>1</td>
<td>“Arc Lost Timeout” setting (A1P480) is invalid</td>
<td>Value of parameter A1P480 is out of range</td>
<td>(1) Update parameter A1P480 to fall within range 100-3000 (ms)</td>
<td>(1) Update parameter A1P480 to fall within range 100-3000 (ms)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(2) Or set parameter to zero (defaults to 800ms)</td>
<td>(2) Or set parameter to zero (defaults to 800ms)</td>
</tr>
<tr>
<td>2</td>
<td>“Arc Restart Scalar” setting (A1P481) is invalid</td>
<td>Value of parameter A1P481 is out of range</td>
<td>(1) Update parameter A1P481 to fall within range 60-140 (%)</td>
<td>(1) Update parameter A1P481 to fall within range 60-140 (%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(2) Or set parameter to zero (defaults to 100%)</td>
<td>(2) Or set parameter to zero (defaults to 100%)</td>
</tr>
<tr>
<td>3</td>
<td>“Auto Stick-check with no AEF” setting (A1P482) is invalid</td>
<td>Value of parameter A1P482 is out of range</td>
<td>Update parameter A1P482 to fall within range 0-1 (enabled-disabled)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>“Stick Check Delay after Touch Sense” setting (A1P483) is invalid</td>
<td>Value of parameter A1P483 is out of range</td>
<td>(1) Update parameter A1P483 to fall within range 1-300 (ms)</td>
<td>(1) Update parameter A1P483 to fall within range 1-300 (ms)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(2) Or set parameter to zero (defaults to 50ms)</td>
<td>(2) Or set parameter to zero (defaults to 50ms)</td>
</tr>
<tr>
<td>8501, 8601, 8701, 8800</td>
<td>0</td>
<td>Weld process table could not be loaded. Could not read WELDPROC.DAT</td>
<td>Software operation error occurred</td>
<td>Turn the power OFF then back ON.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Failed to save weld process table. Could not write to WELDPROC.DAT</td>
<td>Corrupt files or other error</td>
<td>If the alarm occurs again:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(1) Save the CMOS.BIN &amp; ALL.PRM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(2) Open LOG VIEWER and EXPORT the logs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(3) Contact Customer Support about occurrence status (operating procedure)</td>
</tr>
</tbody>
</table>

Other

If the alarm occurs again:

(1) Save the CMOS.BIN & ALL.PRM
(2) Open LOG VIEWER and EXPORT the logs
(3) Contact Customer Support about occurrence status (operating procedure)
## 17.1 Common Alarm Codes

<table>
<thead>
<tr>
<th>Alarm Code</th>
<th>Sub Code</th>
<th>Meaning</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>8501, 8601, 8701, 8800</td>
<td>2</td>
<td>Failed to erase weld process table. Could not write to WELDPROC.DAT</td>
<td>Corrupt files or other error</td>
<td>If the alarm occurs again: (1) Save the CMOS.BIN &amp; ALL.PRM (2) Open LOG VIEWER and EXPORT the logs (3) Contact Customer Support about occurrence status (operating procedure)</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Failed to allocate Watchdog task. [FATAL]</td>
<td>Too many Watchdogs in use by software</td>
<td>(1) Save the CMOS.BIN &amp; ALL.PRM (2) Open LOG VIEWER and EXPORT the logs (3) Contact Customer Support about occurrence status (operating procedure)</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Failed to read Arc Start File.</td>
<td>Invalid system call return value</td>
<td>(1) Save the CMOS.BIN &amp; ALL.PRM (2) Open LOG VIEWER and EXPORT the logs (3) Contact Customer Support about occurrence status (operating procedure)</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Failed to read Arc End File.</td>
<td>Invalid system call return value</td>
<td>(1) Save the CMOS.BIN &amp; ALL.PRM (2) Open LOG VIEWER and EXPORT the logs (3) Contact Customer Support about occurrence status (operating procedure)</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Timeout Watchdog for weld task not responding.</td>
<td>Watchdog timeout not refreshed within the timeout period</td>
<td>(1) Save the CMOS.BIN &amp; ALL.PRM (2) Open LOG VIEWER and EXPORT the logs (3) Contact Customer Support about occurrence status (operating procedure)</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Deadlock occurred in Watchdog task. [FATAL]</td>
<td>Unable to acquire semaphore</td>
<td>(1) Save the CMOS.BIN &amp; ALL.PRM (2) Open LOG VIEWER and EXPORT the logs (3) Contact Customer Support about occurrence status (operating procedure)</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Deadlock occurred in Watchdog task. [FATAL]</td>
<td>Unable to acquire semaphore</td>
<td>(1) Save the CMOS.BIN &amp; ALL.PRM (2) Open LOG VIEWER and EXPORT the logs (3) Contact Customer Support about occurrence status (operating procedure)</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Deadlock occurred in Watchdog task. [FATAL]</td>
<td>Unable to acquire semaphore</td>
<td>(1) Save the CMOS.BIN &amp; ALL.PRM (2) Open LOG VIEWER and EXPORT the logs (3) Contact Customer Support about occurrence status (operating procedure)</td>
</tr>
</tbody>
</table>
## 17 Alarms

### 17.1 Common Alarm Codes

<table>
<thead>
<tr>
<th>Alarm Code</th>
<th>Sub Code</th>
<th>Meaning</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| 8501, 8601, 8701, 8800 | 10 | Deadlock occurred in Watchdog task. [FATAL] | Unable to acquire semaphore | (1) Save the CMOS.BIN & ALL.PRM  
(2) Open LOG VIEWER and EXPORT the logs  
(3) Contact Customer Support about occurrence status (operating procedure) |
| | 11 | Unable to allocate Watchdog task. [FATAL] | Too many Watchdogs in use by software | (1) Save the CMOS.BIN & ALL.PRM  
(2) Open LOG VIEWER and EXPORT the logs  
(3) Contact Customer Support about occurrence status (operating procedure) |
| | 12 | Failed to create main welder task for R1. | Internal task allocation error | (1) Save the CMOS.BIN & ALL.PRM  
(2) Open LOG VIEWER and EXPORT the logs  
(3) Contact Customer Support about occurrence status (operating procedure) |
| | 13 | Failed to create AP parameter monitoring task. | Internal task allocation error | (1) Save the CMOS.BIN & ALL.PRM  
(2) Open LOG VIEWER and EXPORT the logs  
(3) Contact Customer Support about occurrence status (operating procedure) |
| | 14 | Failed to create pendant command processing task. | Internal task allocation error | (1) Save the CMOS.BIN & ALL.PRM  
(2) Open LOG VIEWER and EXPORT the logs  
(3) Contact Customer Support about occurrence status (operating procedure) |
| | 15 | Failed to create pendant server task. | Internal task allocation error | (1) Save the CMOS.BIN & ALL.PRM  
(2) Open LOG VIEWER and EXPORT the logs  
(3) Contact Customer Support about occurrence status (operating procedure) |
| | 16 | Failed to create Watchdog task. | Internal task allocation error | (1) Save the CMOS.BIN & ALL.PRM  
(2) Open LOG VIEWER and EXPORT the logs  
(3) Contact Customer Support about occurrence status (operating procedure) |
| | 17 | Failed to create Watchdog timeout monitoring task. | Internal task allocation error | (1) Save the CMOS.BIN & ALL.PRM  
(2) Open LOG VIEWER and EXPORT the logs  
(3) Contact Customer Support about occurrence status (operating procedure) |
### 17.1 Common Alarm Codes

<table>
<thead>
<tr>
<th>Alarm Code</th>
<th>Sub Code</th>
<th>Meaning</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| 8501, 8601, 8701, 8800 | 18 | Failed to notify new ARC command. | Unable to place message in queue | If the alarm occurs again: (1) Save the CMOS.BIN & ALL.PRM  
(2) Open LOG VIEWER and EXPORT the logs  
(3) Contact Customer Support about occurrence status (operating procedure) |
| 19 | Failed to create Watchdog timeout for Dynamic Start processing. | Internal task allocation error | If the alarm occurs again: (1) Save the CMOS.BIN & ALL.PRM  
(2) Open LOG VIEWER and EXPORT the logs  
(3) Contact Customer Support about occurrence status (operating procedure) |
| 8502, 8602, 8702, 8802 | 0 | Communication with welder interrupted. | Error occurred on welder | (1) Check if welder is in an error state  
(2) Attempt to resolve error on welder  
(3) Network communication lost  
(1) Ensure welder is powered on  
(2) Check wired connection to welder  
(3) Ensure robot can ping welder |
| 8502, 8602, 8702, 8802 | 1 | Communication with welder interrupted during weld. | Error occurred on welder | (1) Check if welder is in an error state  
(2) Attempt to resolve error on welder  
(3) Network communication lost  
(1) Ensure welder is powered on  
(2) Check wired connection to welder  
(3) Ensure robot can ping welder |
| 8502, 8602, 8702, 8802 | 2 | Inline tag “Process Number” is not valid. | Process Number is outside the valid range | Ensure the specified Process Number is greater than zero and less than or equal to the maximum number of allowed Processes. |
| 8502, 8602, 8702, 8802 | 3 | Process Number in Arc Start File is not valid. | Process Number is outside the valid range | Ensure the selected Process Number is greater than zero and less than or equal to the maximum number of allowed Processes. |
| 8502, 8602, 8702, 8802 | 4 | The Process Number in Arc End File is not valid. | Process Number is outside the valid range | Ensure the selected Process Number is greater than zero and less than or equal to the maximum number of allowed Processes. |

No Process Number was specified: Select one of the available Processes.
<table>
<thead>
<tr>
<th>Alarm Code</th>
<th>Sub Code</th>
<th>Meaning</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| 8502, 8602, 8702, 8802 | 5 | The Process specified using inline-tag is not configured. | Specified Process is not configured or has been deleted | (1) Open PROCESS SELECTION  
(2) Select and configure the desired Process  
Specify a different pre-configured Process Number |
|  | 6 | The Process specified in Arc Start File is not configured. | Specified Process is not configured or has been deleted | (1) Open Arc Start File  
(2) Select a different pre-configured Process Number |
|  | 7 | The Process specified in Arc End File is not configured. | Specified Process is not configured or has been deleted | (1) Open Arc End File  
(2) Select a different pre-configured Process Number |
|  | 8 | No Process Number was provided for ARC command. | ARC command missing Process Number (after reboot) | (1) Modify ARC command and set Process Number  
(2) Or run another ARC command that specifies a Process Number |
|  | 9 | Attempted to run ARC command before establishing communication to the welder. | Welder not ready to communicate  
Network communication failure | Wait for welder to fully power on and connect to the robot  
(1) Ensure welder is powered on  
(2) Check wired connection to welder  
(3) Ensure robot can ping welder |
|  | 10 | Attempted to run ARC command before establishing communication to the welder. | Welder not ready to communicate  
Network communication failure | Wait for welder to fully power on and connect to the robot  
(1) Ensure welder is powered on  
(2) Check wired connection to welder  
(3) Ensure robot can ping welder |
|  | 11 | Arc Start File is configured for a different welder brand than the one running on the system. | ASF was configured prior to UWI software change | (1) Open ASF  
(2) Select new Process Number  
(3) Redefine weld settings |

Other: If the alarm occurs again:  
(1) Save the CMOS.BIN & ALL.PRM  
(2) Open LOG VIEWER and EXPORT the logs  
(3) Contact Customer Support about occurrence status (operating procedure)
## 17 Alarms

### 17.1 Common Alarm Codes

<table>
<thead>
<tr>
<th>Alarm Code</th>
<th>Sub Code</th>
<th>Meaning</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| 8502, 8602, 8702, 8802 | 12 | Arc End File is configured for a different welder brand than the one running on the system. | AEF was configured prior to UWI software change | (1) Open AEF  
(2) Select new Process Number  
(3) Redefine weld settings |
| | | | | Other | If the alarm occurs again:  
(1) Save the CMOS.BIN & ALL.PRM  
(2) Open LOG VIEWER and EXPORT the logs  
(3) Contact Customer Support about occurrence status (operating procedure) |
| | 13 | Arc Start File uses a Process that was recently changed. Weld settings in ASF may now be invalid and need to be updated. | Process was changed without updating ASF | (1) Open ASF  
(2) Update the weld settings |
| | 14 | Arc End File uses a Process that was recently changed. Weld settings in AEF may now be invalid and need to be updated. | Process was changed without updating AEF | (1) Open AEF  
(2) Update the weld settings |
| | 15 | Cannot change Process Number during ARCCTS sloping command. | Process used by ARCCTS ASF differs from previous commanded Process | Change the selected Process Number of ARCCTS command or previous ARC command |
| | 16 | Cannot change Process Number during sloping of ARCOFF designated in Arc End File. | Process used by ARCOFF AEF differs from previous commanded Process | Change the selected Process Number of ARCOFF command or previous ARC command |
| | 17 | Cannot change Process Number during sloping of ARCCTS command. | Process used by ARCCTS differs from previous commanded Process | Change the selected Process Number of ARCCTS command or previous ARC command |
| | 18 | Cannot change Process Number during sloping of ARCCTE command. | Process used by ARCCTE differs from previous commanded Process | Change the selected Process Number of ARCCTE command or previous ARC command |
| | 19 | Cannot use ARCCTS while using a Process configured for Job Mode | Selected Process in ARCCTS is configured for Job Mode | Select a different Process that is not configured for Job Mode |
| | 20 | Cannot use ARCOFF sloping while using a Process configured for Job Mode | Selected Process in ARCOFF (sloping) is configured for Job Mode | Select a different Process that is not configured for Job Mode or disable sloping |
| | 21 | Cannot use ARCCTS while using a Process configured for Job Mode | Selected Process in ARCCTS is configured for Job Mode | Select a different Process that is not configured for Job Mode |
| | 22 | Cannot use ARCCTE while using a Process configured for Job Mode | Selected Process in ARCCTE is configured for Job Mode | Select a different Process that is not configured for Job Mode |
| | 23 | One of the defined or UNUSED weld setting parameters is outside the allowed range. | UNUSED inline-tag is a required weld setting | Update inline-tags for ARC command to use required tags |
| | | | Inline-tag data is outside of allowed range | Update inline-tag data to align with specified range limits |
### 17 Alarms

#### 17.1 Common Alarm Codes

<table>
<thead>
<tr>
<th>Alarm Code</th>
<th>Sub Code</th>
<th>Meaning</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>8502, 8602, 8702, 8802</td>
<td>24</td>
<td>Arc Start File is not configured for usage with UWI.</td>
<td>ASF has not been opened or configured</td>
<td>(1) Open Arc Start File (2) Select Process and configure weld settings</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>Arc End File is not configured for usage with UWI.</td>
<td>AEF has not been opened or configured</td>
<td>(1) Open Arc End File (2) Select Process and configure weld settings</td>
</tr>
<tr>
<td></td>
<td>26</td>
<td>The specified ARC command is not supported.</td>
<td>ARC command not supported</td>
<td>(1) Save the CMOS.BIN &amp; ALL.PRM (2) Open LOG VIEWER and EXPORT the logs (3) Contact Customer Support about occurrence status (operating procedure)</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>ARC command must specify an ASF/AEF or at least one inline-tag.</td>
<td>ARC command missing tag(s)</td>
<td>“Modify ARC command to use ASF/AEF or, when using CUSTOM, specify at least one tag”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Process Number is not configured</td>
<td>Select a different Process or configure the current Process</td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>Cannot specify same Arc Start File number for use with Dual Pulse setting.</td>
<td>ASF Dual Pulse setting references same ASF# as source file</td>
<td>(1) Open Arc Start File (2) Navigate to OTHER OPTOINS &gt; DUAL PULSE (3) Set ALETERNATE ASF#() to a different file number than the currently open ASF</td>
</tr>
<tr>
<td></td>
<td>29</td>
<td>Arc Start File is must enable Start Condition when using ARCSET with ACOND=0</td>
<td>ARCSET ACOND is set to 0 and ASF: Start Condition is disabled</td>
<td>(1) Open Arc Star File (2) Enable and set Start Condition (3) Or set ACOND=1 to use Main Condition</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>Arc generation confirmation signal was not received within the specified timeout when using Dynamic Start in the Arc Start File.</td>
<td>No arc established within the specified duration</td>
<td>Adjust Dynamic Start timeout in Arc Start File</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>General arc generation failure</td>
<td>Remove the slag and check wire feeding so current can flow through the wire tip.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unstable wire supply</td>
<td>Check the functionality of the following devices and feed state: - Wire feeder - Feeder motor - Feeder clamp - Torch</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No power generation from power supply</td>
<td>Check that the power supply is properly delivering power to the work piece.</td>
</tr>
</tbody>
</table>
## 17.1 Common Alarm Codes

<table>
<thead>
<tr>
<th>Alarm Code</th>
<th>Sub Code</th>
<th>Meaning</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>8505</td>
<td>0</td>
<td>UWI logging level is currently set to Debug or Debug Level 2. This feature should only remain enabled while troubleshooting. It is possible for this to cause performance issues if left enabled.</td>
<td>A1P499 Parameter set to non-zero</td>
<td>Set A1P499 to zero</td>
</tr>
</tbody>
</table>

LOG VIEWER override of LOGGING LEVEL:

1. Open LOG VIEWER
2. Navigate to SETTINGS
3. Set LOGGING LEVEL to MANDITORY

Note: Value resets to that of A1P499 after controller reboot.
# 17.2 Miller Specific Alarm Codes

These alarms are specific to the Miller welder.

<table>
<thead>
<tr>
<th>Alarm Code</th>
<th>Sub Code</th>
<th>Meaning</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>8503, 8603, 8703, 8803</td>
<td>1001</td>
<td>Centerpoint has detected one or more missing welds for the previous part.</td>
<td>Missing welds for previous part</td>
<td>Update part processing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Invalid configurations in Centerpoint</td>
<td>Fix Centerpoint configurations for part</td>
</tr>
<tr>
<td>1002</td>
<td></td>
<td>Centerpoint has detected a fault in processing of the previous part.</td>
<td>Fault in processing of part</td>
<td>Update part processing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Invalid configurations in Centerpoint</td>
<td>Fix Centerpoint configurations for part</td>
</tr>
<tr>
<td>1004</td>
<td></td>
<td>Centerpoint has detected an issue with the welding duration of the previous part.</td>
<td>Weld duration too high/low</td>
<td>Update part processing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Invalid configurations in Centerpoint</td>
<td>Fix Centerpoint configurations for part</td>
</tr>
<tr>
<td>1008</td>
<td></td>
<td>Centerpoint has detected more that the expected number of welds were performed for the previous part.</td>
<td>Too many welds for previous part</td>
<td>Update part processing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Invalid configurations in Centerpoint</td>
<td>Fix Centerpoint configurations for part</td>
</tr>
<tr>
<td>1016</td>
<td></td>
<td>Centerpoint has detected that the total clamp time for the previous part is low.</td>
<td>Clamp time is low</td>
<td>Update part processing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Invalid configurations in Centerpoint</td>
<td>Fix Centerpoint configurations for part</td>
</tr>
<tr>
<td>1032</td>
<td></td>
<td>Centerpoint has detected that the total clamp time for the previous part is high.</td>
<td>Clamp time is high</td>
<td>Update part processing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Invalid configurations in Centerpoint</td>
<td>Fix Centerpoint configurations for part</td>
</tr>
<tr>
<td>1064</td>
<td></td>
<td>Centerpoint has detected that the total Arc on time for the previous part is low.</td>
<td>Arc on time is low</td>
<td>Update part processing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Invalid configurations in Centerpoint</td>
<td>Fix Centerpoint configurations for part</td>
</tr>
<tr>
<td>1128</td>
<td></td>
<td>Centerpoint has detected that the total Arc on time for the previous part is high.</td>
<td>Arc on time is high</td>
<td>Update part processing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Invalid configurations in Centerpoint</td>
<td>Fix Centerpoint configurations for part</td>
</tr>
<tr>
<td>2001</td>
<td></td>
<td>Centerpoint has detected the last weld exceeded the voltage limit.</td>
<td>Voltage too high</td>
<td>Update part processing</td>
</tr>
<tr>
<td>2002</td>
<td></td>
<td>Centerpoint has detected the last weld is under the voltage limit.</td>
<td>Voltage too low</td>
<td>Update part processing</td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td>Centerpoint has detected the last weld exceeded the amperage limit.</td>
<td>Amperage too high</td>
<td>Update part processing</td>
</tr>
<tr>
<td>Alarm Code</td>
<td>Sub Code</td>
<td>Meaning</td>
<td>Cause</td>
<td>Remedy</td>
</tr>
<tr>
<td>-----------</td>
<td>----------</td>
<td>---------</td>
<td>-------</td>
<td>--------</td>
</tr>
<tr>
<td>8503, 8603, 8703, 8803</td>
<td>2008</td>
<td>Centerpoint has detected the last weld is under the amperage limit.</td>
<td>Amperage too low</td>
<td>Update part processing</td>
</tr>
<tr>
<td></td>
<td>2016</td>
<td>Centerpoint has detected the last weld exceeded the gas limit.</td>
<td>Gas usage too high</td>
<td>Update part processing</td>
</tr>
<tr>
<td></td>
<td>2032</td>
<td>Centerpoint has detected the last weld is under the gas limit.</td>
<td>Gas usage too low</td>
<td>Update part processing</td>
</tr>
<tr>
<td></td>
<td>2064</td>
<td>Centerpoint has detected the last weld exceeded the wire limit.</td>
<td>Wire usage too high</td>
<td>Update part processing</td>
</tr>
<tr>
<td></td>
<td>2128</td>
<td>Centerpoint has detected the last weld is under the wire limit.</td>
<td>Wire usage too low</td>
<td>Update part processing</td>
</tr>
<tr>
<td></td>
<td>2256</td>
<td>Centerpoint has detected the last weld exceeded the weld duration limit.</td>
<td>Weld duration too long</td>
<td>Update part processing</td>
</tr>
<tr>
<td></td>
<td>2512</td>
<td>Centerpoint has detected the last weld is under the weld duration limit.</td>
<td>Weld duration too short</td>
<td>Update part processing</td>
</tr>
</tbody>
</table>
| | 201 | Failed to select weld process slot on power source. | Internal system error | (1) Save the CMOS.BIN & ALL.PRM  
(2) Open LOG VIEWER and EXPORT the logs  
(3) Contact Customer Support about occurrence status (operating procedure) |
| | 202 | Failed to write weld process to process list on power source. | Network communication failure | Ensure Robot has established network connection to the power source.  
Power source is not turned on | Ensure that the power source is turned on and fully booted.  
Other | If the alarm occurs again:  
(1) Save the CMOS.BIN & ALL.PRM  
(2) Open LOG VIEWER and EXPORT the logs  
(3) Contact Customer Support about occurrence status (operating procedure) |
### 17.2 Miller Specific Alarm Codes

<table>
<thead>
<tr>
<th>Alarm Code</th>
<th>Sub Code</th>
<th>Meaning</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| 8503,      | 203      | Failed to open ETHERIP.DAT file. This prevents the system from loading Ethernet IP configurations and communicating with the welder. [FATAL] | Ethernet IP is not configured | (1) Boot into maintenance mode  
(2) Ensure the Option Function: Ethernet IP is properly configured  
(3) Reboot Robot Controller |
| 8603,      |          |         |       |        |
| 8703,      |          |         |       |        |
| 8803       |          |         |       |        |
| ALL OTHER  |          | Error occurred on power source. | Error occurred on power source. | (1) Use Miller owners manual to determine source of error using alarm sub code  
(2) Resolve error using suggested steps |
|            |          |         |       |        |
|            |          |         |       |        |
## 17.3 Lincoln Specific Alarm Codes

These alarms are specific to the Lincoln welder.

<table>
<thead>
<tr>
<th>Alarm Code</th>
<th>Sub Code</th>
<th>Meaning</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>8503, 8603, 8703, 8803</td>
<td>1</td>
<td>Arc Link equipment is not ready to weld.</td>
<td>Error code on power source</td>
<td>Resolve any outstanding errors on the power source.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Wire drive is missing</td>
<td>Ensure that the wire feeder is connected to the power source.</td>
</tr>
</tbody>
</table>
| | 2 | Failed to obtain semaphore lock while attempting to send/receive Arc Link message. | Resource allocation failure | (1) Save the CMOS.BIN & ALL.PRM  
(2) Open LOG VIEWER and EXPORT the logs  
(3) Contact Customer Support about occurrence status (operating procedure) |
| | 3 | Failed to obtain semaphore lock while waiting to receive Arc Link message. | Resource allocation failure | (1) Save the CMOS.BIN & ALL.PRM  
(2) Open LOG VIEWER and EXPORT the logs  
(3) Contact Customer Support about occurrence status (operating procedure) |
| | 4 | Failed to send complete Arc Link message to power source. | Network connection failure | Check network connection between robot and power source is functioning correctly. |
| | | | Other | If the alarm occurs again:  
(1) Save the CMOS.BIN & ALL.PRM  
(2) Open LOG VIEWER and EXPORT the logs  
(3) Contact Customer Support about occurrence status (operating procedure) |
| | 5 | Checkpoint service not available on power source. | Power source is not configured for Checkpoint | Setup Checkpoint services on power source. |
| | | | Other | If the alarm occurs again:  
(1) Save the CMOS.BIN & ALL.PRM  
(2) Open LOG VIEWER and EXPORT the logs  
(3) Contact Customer Support about occurrence status (operating procedure) |
## 17 Alarms
### 17.3 Lincoln Specific Alarm Codes

<table>
<thead>
<tr>
<th>Alarm Code</th>
<th>Sub Code</th>
<th>Meaning</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>8503, 8603, 8703, 8803</td>
<td>6</td>
<td>Communication failure between robot and power source. Failed to send/receive Arc Link message.</td>
<td>Network connection failure</td>
<td>Check network connection between Robot and power source is functioning correctly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other</td>
<td>If the alarm occurs again: (1) Save the CMOS.BIN &amp; ALL.PRM (2) Open LOG VIEWER and EXPORT the logs (3) Contact Customer Support about occurrence status (operating procedure)</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>One of the weld settings sent to the power source is out of the allowed range.</td>
<td></td>
<td>Ensure that all required weld settings are within the allowed range.</td>
</tr>
<tr>
<td>849</td>
<td></td>
<td>Checkpoint detected an issue with the amperage levels of the last weld.</td>
<td>Amperage was too high or too low</td>
<td>Adjust weld parameters of last weld</td>
</tr>
<tr>
<td>850</td>
<td></td>
<td>Checkpoint detected an issue with the voltage levels of the last weld.</td>
<td>Voltage was too high or too low</td>
<td>Adjust weld parameters of last weld</td>
</tr>
<tr>
<td>851</td>
<td></td>
<td>Checkpoint detected an issue with the wire feed speeds of the last weld.</td>
<td>Wire Feed Speed was too high or too low</td>
<td>Adjust weld parameters of last weld</td>
</tr>
<tr>
<td>852</td>
<td></td>
<td>Checkpoint detected an issue with the weld score of the last weld.</td>
<td>Weld score was too low</td>
<td>Adjust weld parameters of last weld</td>
</tr>
<tr>
<td>853</td>
<td></td>
<td>Checkpoint detected an issue with the time of the last weld.</td>
<td>Time of the weld was too long or too short</td>
<td>Adjust timing and weld process for last weld</td>
</tr>
<tr>
<td>897</td>
<td></td>
<td>Checkpoint detected an issue with the amperage levels of the last weld.</td>
<td>Amperage was too high or too low</td>
<td>Adjust weld parameters of last weld</td>
</tr>
<tr>
<td>898</td>
<td></td>
<td>Checkpoint detected an issue with the voltage levels of the last weld.</td>
<td>Voltage was too high or too low</td>
<td>Adjust weld parameters of last weld</td>
</tr>
<tr>
<td>899</td>
<td></td>
<td>Checkpoint detected an issue with the wire feed speeds of the last weld.</td>
<td>Wire Feed Speed was too high or too low</td>
<td>Adjust weld parameters of last weld</td>
</tr>
<tr>
<td>900</td>
<td></td>
<td>Checkpoint detected an issue with the weld score of the last weld.</td>
<td>Weld score was too low</td>
<td>Adjust weld parameters of last weld</td>
</tr>
<tr>
<td>901</td>
<td></td>
<td>Checkpoint detected an issue with the time of the last weld.</td>
<td>Time of the weld was too long or too short</td>
<td>Adjust timing and weld process for last weld</td>
</tr>
<tr>
<td>865</td>
<td></td>
<td>Checkpoint detected an issue with the amperage levels of the last weld.</td>
<td>Amperage was too high or too low</td>
<td>Adjust weld parameters of last weld</td>
</tr>
<tr>
<td>866</td>
<td></td>
<td>Checkpoint detected an issue with the voltage levels of the last weld.</td>
<td>Voltage was too high or too low</td>
<td>Adjust weld parameters of last weld</td>
</tr>
<tr>
<td>867</td>
<td></td>
<td>Checkpoint detected an issue with the wire feed speeds of the last weld.</td>
<td>Wire Feed Speed was too high or too low</td>
<td>Adjust weld parameters of last weld</td>
</tr>
</tbody>
</table>
# 17 Alarms

## 17.3 Lincoln Specific Alarm Codes

<table>
<thead>
<tr>
<th>Alarm Code</th>
<th>Sub Code</th>
<th>Meaning</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>8503, 8603, 8703, 8803</td>
<td>868</td>
<td>Checkpoint detected an issue with the weld score of the last weld.</td>
<td>Weld score was too low</td>
<td>Adjust weld parameters of last weld</td>
</tr>
<tr>
<td>869</td>
<td>Checkpoint detected an issue with the time of the last weld.</td>
<td>Time of the weld was too long or too short</td>
<td>Adjust timing and weld process for last weld</td>
<td></td>
</tr>
<tr>
<td>ALL OTHER</td>
<td>Error occurred on power source.</td>
<td>Error occurred on power source.</td>
<td>(1) Open Power Wave Manager (2) Lookup the alarm sub code (3) Resolve error using information supplied by power supply welder manufacturer.</td>
<td></td>
</tr>
</tbody>
</table>
## A Appendix

### A.1 Table of Work Instructions

- `< >` indicates alpha-numerical data.
- If multiple items are shown in one additional item section, select one.

**Table A-1: Arc Welding Instructions (Sheet 1 of 3)**

<table>
<thead>
<tr>
<th>Function</th>
<th>Outputs arc start conditions and an arc start instruction for the Power Source.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ARCON</strong></td>
<td><strong>Additional Item</strong></td>
</tr>
<tr>
<td></td>
<td>Custom = <code>&lt;TAGs&gt;</code></td>
</tr>
<tr>
<td></td>
<td>PROC# = &lt;process selection&gt;</td>
</tr>
<tr>
<td></td>
<td>T = &lt;Robot stopping time&gt;</td>
</tr>
<tr>
<td></td>
<td>V = &lt;Robot moving speed&gt;</td>
</tr>
<tr>
<td></td>
<td>RETRY</td>
</tr>
<tr>
<td><strong>Example</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Function</th>
<th>Outputs arc end conditions and an arc end instruction for the power source.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ARCOF</strong></td>
<td><strong>Additional Item</strong></td>
</tr>
<tr>
<td></td>
<td>Custom = <code>&lt;TAGs&gt;</code></td>
</tr>
<tr>
<td></td>
<td>PROC# = &lt;process selection&gt;</td>
</tr>
<tr>
<td></td>
<td>T = &lt;Robot stopping time&gt;</td>
</tr>
<tr>
<td></td>
<td>ANTSTK</td>
</tr>
<tr>
<td><strong>Example</strong></td>
<td></td>
</tr>
</tbody>
</table>
### Table A-1: Arc Welding Instructions (Sheet 2 of 3)

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
<th>Additional Item</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ARCS</strong></td>
<td>Changes the welding conditions individually.</td>
<td>Additional Item: WELD1, WELD2, WELD3, WELD4</td>
<td>Displayed only when using multiple power sources.</td>
</tr>
<tr>
<td></td>
<td>Custom = &lt;TAGs&gt;</td>
<td>ASF#(&lt;arc start condition file number&gt;)</td>
<td>CSTPRM(): 1 to 6</td>
</tr>
<tr>
<td></td>
<td>PROC# = &lt;process selection&gt;</td>
<td>CSTPRM = &lt;parameters per welding process. Varies by power source maker&gt;</td>
<td>PROC#: 1 to 16</td>
</tr>
<tr>
<td></td>
<td>V = &lt;Robot moving speed&gt;</td>
<td></td>
<td>0.1 to 1500.0 mm/sec 1 to 9000 cm/min</td>
</tr>
<tr>
<td></td>
<td>ACOND = &lt;0, 1, or unused&gt;</td>
<td></td>
<td>0 = Start Cond. 1 = Main Cond. Unused = Main Cond.</td>
</tr>
<tr>
<td><strong>ARCC</strong></td>
<td>Changes the welding conditions gradually during execution of welding away from program point.</td>
<td>Additional Item: WELD1, WELD2, WELD3, WELD4</td>
<td>Displayed only when using multiple power sources.</td>
</tr>
<tr>
<td></td>
<td>Custom = &lt;TAGs&gt;</td>
<td>ASF#(&lt;arc start condition file number&gt;)</td>
<td>CSTPRM(): 1 to 6</td>
</tr>
<tr>
<td></td>
<td>PROC# = &lt;process selection&gt;</td>
<td>CSTPRM = &lt;parameters per welding process. Varies by power source maker&gt;</td>
<td>PROC#: 1 to 16</td>
</tr>
<tr>
<td></td>
<td>DIS = &lt;distance from the movement’s start position&gt;</td>
<td></td>
<td>0.00 to 6553.5 mm</td>
</tr>
<tr>
<td><strong>ARCC</strong></td>
<td>Changes the welding conditions gradually during execution of welding towards program point.</td>
<td>Additional Item: WELD1, WELD2, WELD3, WELD4</td>
<td>Displayed only when using multiple power sources.</td>
</tr>
<tr>
<td></td>
<td>Custom = &lt;TAGs&gt;</td>
<td>AEF#(&lt;arc end condition file number&gt;)</td>
<td>CSTPRM(): 1 to 6</td>
</tr>
<tr>
<td></td>
<td>PROC# = &lt;process selection&gt;</td>
<td>CSTPRM = &lt;parameters per welding process. Varies by power source maker&gt;</td>
<td>PROC#: 1 to 16</td>
</tr>
<tr>
<td></td>
<td>DIS = &lt;distance from the movement’s end position&gt;</td>
<td></td>
<td>0.00 to 6553.5 mm</td>
</tr>
<tr>
<td><strong>WVON</strong></td>
<td>Starts weaving.</td>
<td>Additional Item: RB1, RB2, RB3, RB4</td>
<td>Displayed only when using multiple Robots.</td>
</tr>
<tr>
<td></td>
<td>WEV#(&lt;weaving condition file number&gt;)</td>
<td></td>
<td>1 to 255</td>
</tr>
<tr>
<td><strong>Example</strong></td>
<td>ARCSET PROC#(1) AMP=200</td>
<td></td>
<td>ARCSET PROC#(2) VOLT=20.0 V=80</td>
</tr>
<tr>
<td></td>
<td>ARCSET ACOND=1ASF#(101)</td>
<td></td>
<td>ARCSET V=80</td>
</tr>
<tr>
<td></td>
<td>ARCCTS PROC#(1) AMP=200 TRIM=50 DIS=100.0</td>
<td></td>
<td>ARCCTS AEF#(99)</td>
</tr>
<tr>
<td></td>
<td>ARCCTE PROC#(1) AMP=200 TRIM=50 DIS=100.0</td>
<td></td>
<td>ARCCTE PROC#(2) WFS=200 VOLT=22.0 SLOPE=25 DIS=5.0</td>
</tr>
<tr>
<td></td>
<td>ARCCTE AEF#(B001)</td>
<td></td>
<td>WVON WEV#(1)</td>
</tr>
</tbody>
</table>
### Table A-1: Arc Welding Instructions (Sheet 3 of 3)

<table>
<thead>
<tr>
<th>WVOF</th>
<th>Function</th>
<th>Additional Item</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ends weaving.</td>
<td>RB1, RB2, RB3, RB4</td>
<td>WVOF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

Displayed only when using multiple Robots.