

Motoman XRC 2001 Controller
ArcWorld II-200
System Manual
for UP6 Robot

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Motoman, Incorporated
805 Liberty Lane
West Carrollton, OH 45449
TEL: (937) 847-6200
FAX: (937) 847-6277
24-Hour Service Hotline: (937) 847-3200

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SECTION 1

INTRODUCTION

The ArcWorld II-200 is part of the ArcWorld family of standardized arc welding solutions. It is a fully integrated welding system, and is supported from wire to weld by Motoman, Inc.

The ArcWorld II-200 features a Motoman arc welding robot and XRC 2001 controller with menu-driven arc welding application software, complete welding package, two weld stations, operator interface, and total safety environment.

1.1 About this Document

This manual is intended as an introduction and overview for personnel who have received operator training from Motoman, and who are familiar with the operation of this Motoman robot model. For more detailed information, refer to the manuals listed in Section 1.3. This manual contains the following sections:

SECTION 1 - INTRODUCTION

This section provides general information about the ArcWorld II-200 and its components, a list of reference documents, and customer service information.

SECTION 2 - SAFETY

This section provides information regarding the safe use and operation of the ArcWorld II-200 system.

SECTION 3 - DESCRIPTION OF EQUIPMENT

This section provides a detailed description of the major components of the ArcWorld II-200 system. This section also includes a table of component specifications.

SECTION 4 - INSTALLATION

This section provides instructions for set up and installation of the ArcWorld II-200 system.

SECTION 5 - OPERATION

This section provides instructions for basic operation of the ArcWorld II-200 system. This section also provides procedures for start-up, loading, normal operation, fault recovery, and shutdown.

SECTION 6 - MAINTENANCE

This section contains a table listing periodic maintenance requirements for the components of the ArcWorld II-200 cell.

For detailed specifications including parts lists breakdown for the Barrier Assembly, refer to the Barrier Assembly Manual, P/N 147500-1.

1.2 System Overview

The ArcWorld II-200 provides a complete arc welding solution in a standardized configuration. The system is designed around a Motoman arc welding robot and XRC 2001 robot controller, and includes a complete welding package. Two stationary tables allow an operator to prepare and set up parts on one table while the robot welds on the other table. The cell provides a full complement of safety features designed to protect both personnel and equipment.

1.2.1 System Layout

All components of the ArcWorld II-200 are mounted to the floor. A spanner plate is used to help maintain proper alignment between the three major components: robot manipulator and two barrier stations. The robotic cell is fully enclosed by safety fencing and an interlocking door. The interlocked operator doors allow the operator to load parts on one table while the robot is welding parts on the other table. All operator controls, including those on the controller and welding power supply, are accessible from outside of the robotic enclosure. Figure 1-1 illustrates the system layout of the ArcWorld II-200 cell.

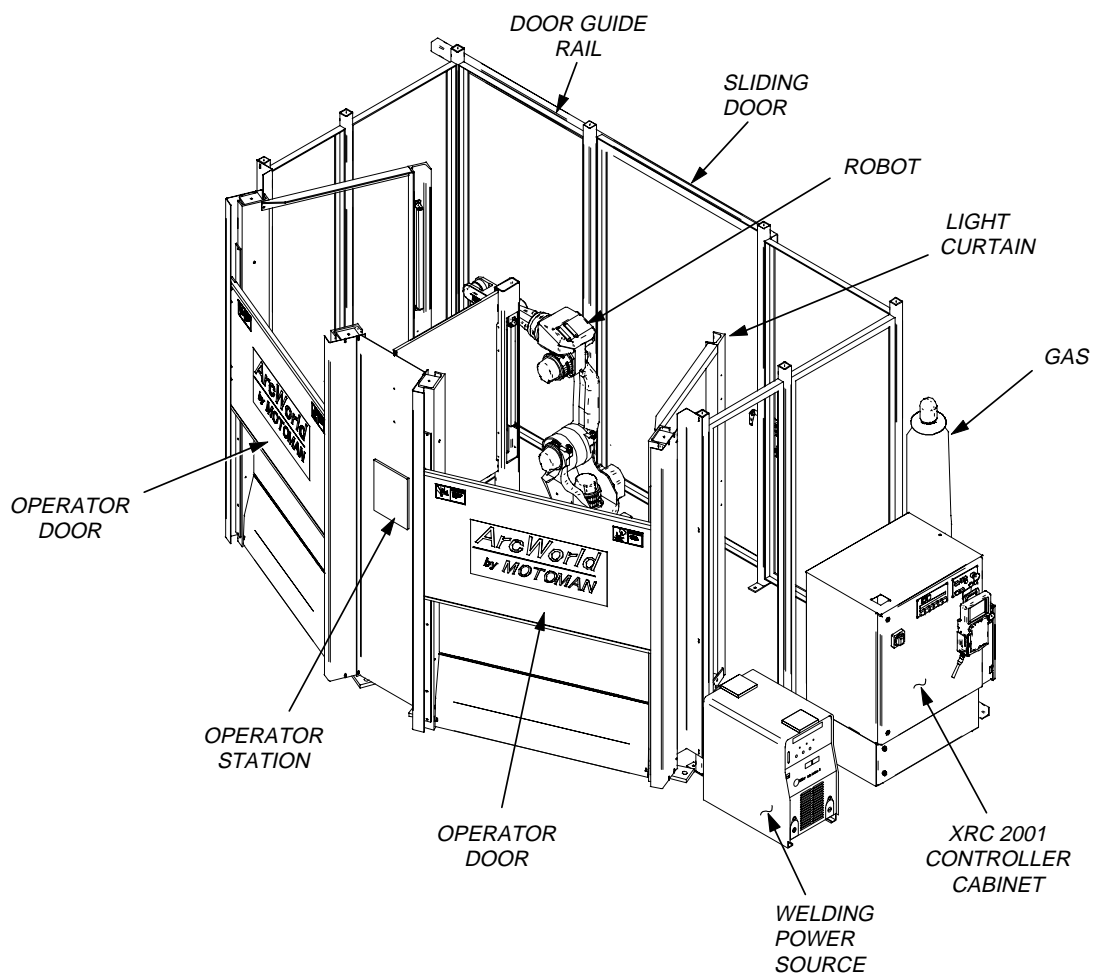


Figure 1-1 System Layout

NOTE: This manual is for a standard Motoman system. If your system is a custom or modified system, please use the drawing and Bill of Material (BOM) provided with the system for troubleshooting and spares provisioning.

1.2.2 Major Components

The ArcWorld II-200 includes the following major components:

- Motoman UP6 manipulator and XRC 2001 controller
- Two stationary work stations
- Common operator stations
- Welding equipment, including the following:
 - Welding power source
 - Motoman torch (water-cooled or air-cooled)
 - Wire feeder
 - Torch mount
- Safety equipment, including the following:
 - Safety fencing with arc curtains
 - Interlocked cell door
 - Interlocked barrier door
 - Light Curtains

1.2.3 Optional Equipment

The following equipment is available for use with the ArcWorld II-200:

- Torch tender
- Wire cutter
- Com-Arc III seam tracking unit
- Water circulator
- Robot/Positioner base
- Auxiliary equipment base
- Tabletops for tooling

1.3 Reference to Other Documentation

For additional information refer to the following:

- Motoman UP6 Manipulator Manual (P/N 142104-1)
- Motoman XRC 2001 Manual (P/N 145960-1)
- Motoman Operator's Manual for Arc Welding (P/N 142098-1)
- Motoman Concurrent I/O Parameter Manual (P/N 142102-1)
- Barrier Assembly Manual P/N 147500-1.
- Com-Arc Function Manual (P/N 144075-1)
- Vendor manuals for system components not manufactured by Motoman

1.4 Customer Service Information

If you are in need of technical assistance, contact the Motoman service staff at (937) 847-3200. Please have the following information ready before you call:

- Robot Type (UP6)
- System Type (ArcWorld II-200)
- Software Version (access using TOP KEY/SYSTEM INFO/VERSION/SYSTEM on the programming pendant)
- Robot Serial Number (located on the back side of the robot arm)
- Robot Sales Order Number (located on front side of controller)

SECTION 2

SAFETY

2.1 Introduction

It is the purchaser's responsibility to ensure that all local, county, state, and national codes, regulations, rules, or laws relating to safety and safe operating conditions for each installation are met and followed.

We suggest that you obtain and review a copy of the ANSI/RIA National Safety Standard for Industrial Robots and Robot Systems. This information can be obtained from the Robotic Industries Association by requesting ANSI/RIA R15.06. The address is as follows:

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

Ultimately, the best safeguard is trained personnel. The user is responsible for providing personnel who are adequately trained to operate, program, and maintain the robot cell. **The robot must not be operated by personnel who have not been trained!**

We recommend that all personnel who intend to operate, program, repair, or use the robot system be trained in an approved Motoman training course and become familiar with the proper operation of the system.

This safety section addresses the following:

- Standard Conventions (Section 2.2)
- General Safeguarding Tips (Section 2.3)
- Mechanical Safety Devices (Section 2.4)
- Installation Safety (Section 2.5)
- Programming Safety (Section 2.6)
- Operation Safety (Section 2.7)
- Maintenance Safety (Section 2.8)

2.2 Standard Conventions

This manual includes information essential to the safety of personnel and equipment. As you read through this manual, be alert to the four signal words:

- DANGER
- WARNING
- CAUTION
- NOTE

Pay particular attention to the information provided under these headings which are defined below (in descending order of severity).



DANGER!

Information appearing under the DANGER caption concerns the protection of personnel from the immediate and imminent hazards that, if not avoided, will result in immediate, serious personal injury or loss of life in addition to equipment damage.



WARNING!

Information appearing under the WARNING caption concerns the protection of personnel and equipment from potential hazards that can result in personal injury or loss of life in addition to equipment damage.



CAUTION!

Information appearing under the CAUTION caption concerns the protection of personnel and equipment, software, and data from hazards that can result in minor personal injury or equipment damage.

NOTE:

Information appearing in a NOTE caption provides additional information which is helpful in understanding the item being explained.

2.3 **General Safeguarding Tips**

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. General safeguarding tips are as follows:

- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation of this robot, the operator's manuals, the system equipment, and options and accessories should be permitted to operate this robot system.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the robot cell.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- In accordance with ANSI/RIA R15.06, section 6.13.4 and 6.13.5, use lockout/tagout procedures during equipment maintenance. Refer also to Section 1910.147 (29CFR, Part 1910), Occupational Safety and Health Standards for General Industry (OSHA).

2.4 **Mechanical Safety Devices**

The safe operation of the robot, positioner, auxiliary equipment, and system is ultimately 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 safety standards, and other local codes that may pertain to the installation and use of industrial equipment. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. The following safety measures are available:

- Safety fences and barriers
- Light curtains
- Door interlocks
- Safety mats
- Floor markings
- Warning lights

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

2.5 *Installation Safety*

Safe installation is essential for protection of people and equipment. The following suggestions are intended to supplement, but not replace, existing federal, local, and state laws and regulations. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. Installation tips are as follows:

- Be sure that only qualified personnel familiar with national codes, local codes, and ANSI/RIA R15.06 safety standards are permitted to install the equipment.
- Identify the work envelope of each robot with floor markings, signs, and barriers.
- Position all controllers outside the robot work envelope.
- Whenever possible, install safety fences to protect against unauthorized entry into the work envelope.
- Eliminate areas where personnel might get trapped between a moving robot and other equipment (pinch points).
- Provide sufficient room inside the workcell to permit safe teaching and maintenance procedures.

2.6 *Programming Safety*

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Programming tips are as follows:

- Any modifications to PART 1 of the controller PLC can cause severe personal injury or death, as well as damage to the robot! Do not make any modifications to PART 1. Making any changes without the written permission of Motoman will **VOID YOUR WARRANTY!**
- Some operations require standard passwords and some require special passwords. Special passwords are for Motoman use only. **YOUR WARRANTY WILL BE VOID** if you use these special passwords.
- Back up all programs and jobs onto a floppy disk whenever program changes are made. To avoid loss of information, programs, or jobs, a backup must always be made before any service procedures are done and before any changes are made to options, accessories, or equipment.
- The concurrent I/O (Input and Output) function allows the customer to modify the internal ladder inputs and outputs for maximum robot performance. Great care must be taken when making these modifications. Double-check all modifications under every mode of robot operation to ensure that you have not created hazards or dangerous situations that may damage the robot or other parts of the system.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.

- Inspect the robot and work envelope to be sure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Be sure that all safeguards are in place.
- Check the E-STOP button on the teach pendant for proper operation before programming.
- Carry the teach pendant with you when you enter the workcell.
- Be sure that only the person holding the teach pendant enters the workcell.
- Test any new or modified program at low speed for at least one full cycle.

2.7 **Operation Safety**

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Operation tips are as follows:

- Be sure that only trained personnel familiar with the operation of this robot, the operator's manuals, the system equipment, and options and accessories are permitted to operate this robot system.
- Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Inspect the robot and work envelope to ensure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Ensure that all safeguards are in place.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the cell.
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller, external servo box, and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- All modifications made to the controller will change the way the robot operates and can cause severe personal injury or death, as well as damage the robot. This includes controller parameters, ladder parts 1 and 2, and I/O (Input and Output) modifications. Check and test all changes at slow speed.

2.8 **Maintenance Safety**

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Maintenance tips are as follows:

- Do not perform any maintenance procedures before reading and understanding the proper procedures in the appropriate manual.
- Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.
- Back up all your programs and jobs onto a floppy disk whenever program changes are made. A backup must always be made before any servicing or changes are made to options, accessories, or equipment to avoid loss of information, programs, or jobs.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the cell.
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- Be sure all safeguards are in place.
- Use proper replacement parts.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller, external servo box, and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- All modifications made to the controller will change the way the robot operates and can cause severe personal injury or death, as well as damage the robot. This includes controller parameters, ladder parts 1 and 2, and I/O (Input and Output) modifications. Check and test all changes at slow speed.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).

SECTION 3

EQUIPMENT DESCRIPTION

3.1 *UP-series Robot Description*

The Motoman UP6 robot and XRC 2001 robotic controller represent state-of-the-art technology in robotics today. The six-axis UP6 robot has a payload of 6 kg (13.2 lbs). It features a 1,373 mm (54.05 inch) reach and has a relative positioning accuracy of ± 0.08 mm (0.004 inch).

The UP6 can reach below its own base as well as behind itself and can be mounted on the floor, wall, or ceiling with few modifications. However, the S-axis has been restricted by hardstops for use in this system. For more information, refer to the manipulator manual that came with your system.

3.2 *XRC 2001 Controller*

The XRC 2001 robotic controller, shown in Figure 3-1, coordinates the operation of the ArcWorld II-200 system. It controls manipulator movement and welding power supply, processes input and output signals, and provides the signals to operate the welding system. It maintains variable data and performs numeric processing to convert to and from different coordinate systems. In addition, the controller provides the following: main logic functions, servo control, program and constant data memory, and power distribution. For more information, refer to the manipulator manual that came with your system.

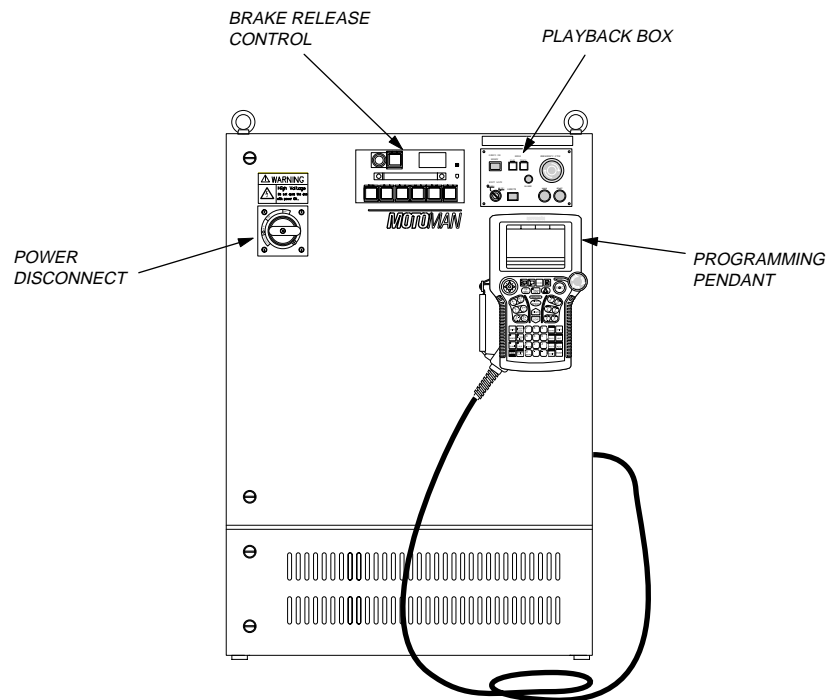


Figure 3-1 XRC 2001 Controller

3.2.1 Playback Panel

The playback panel (see Figure 3-2) contains the primary system controls and consists of the features described below. For more information, refer to the manipulator manual that came with your system.

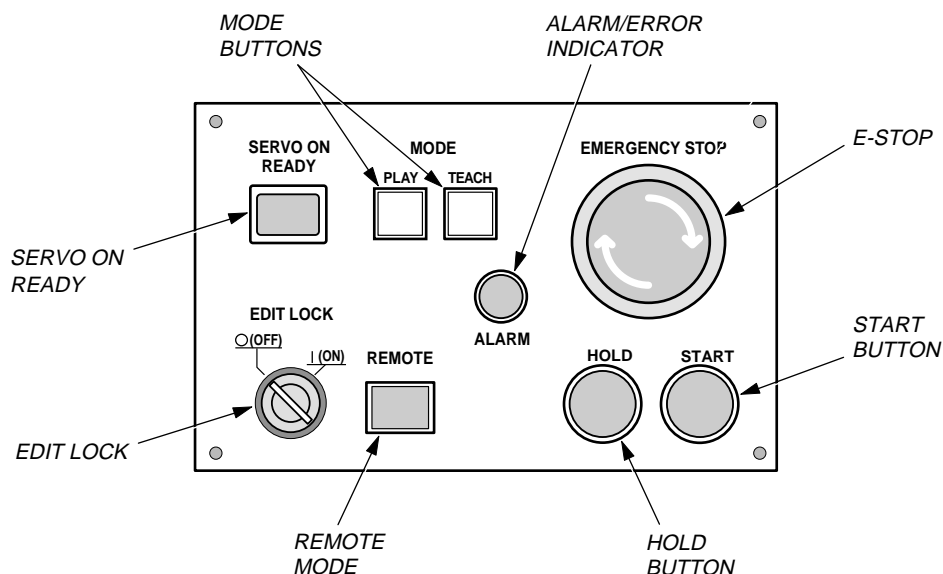


Figure 3-2 Controller Playback Panel

Servo On Ready

The SERVO ON READY pushbutton turns servo power ON. The switch lights when servo power is on. In TEACH mode, the SERVO ON READY pushbutton operates only when the TEACH LOCK button on the programming pendant is ON and the ENABLE switch on the programming pendant is held in.

Mode

The Mode push buttons (PLAY, TEACH and REMOTE) set the robot's mode of operation.

NOTE: Changing modes from PLAY to TEACH, during playback, will cause the program to cease execution (similar to HOLD); to resume operation, press PLAY and then START.

Alarm/Error

The ALARM/ERROR indicator light turns ON whenever an alarm or error condition occurs.

Emergency Stop (E-STOP)

The E-STOP button on the playback panel is connected in series with the system Emergency Stop circuit. Pressing E-STOP ceases all system operation.

Start

Pressing the START button while in PLAY mode with servo power on, causes playback execution of the current job to begin.

Hold

The HOLD button is a normally closed, momentarily actuated switch. Pressing HOLD halts operation of the manipulator until another Start signal is sent.

3.2.2 Programming Pendant

The programming pendant (see Figure 3-3) is the primary user interface for the system. The pendant has a 4x5-inch 12-line, 40-character LCD display and keypad. The system uses the INFORM II robot language and a menu-driven interface to simplify operator interaction with the robot. By using the pendant, the operator can teach robot motion, and perform programming, editing, maintenance, and diagnostic functions. The programming pendant consists of the items described below. For more information, refer to the manipulator manual that came with your system.

NOTE: The programming pendant LCD display goes dark after a few minutes of inactivity. Press any key to restore screen.

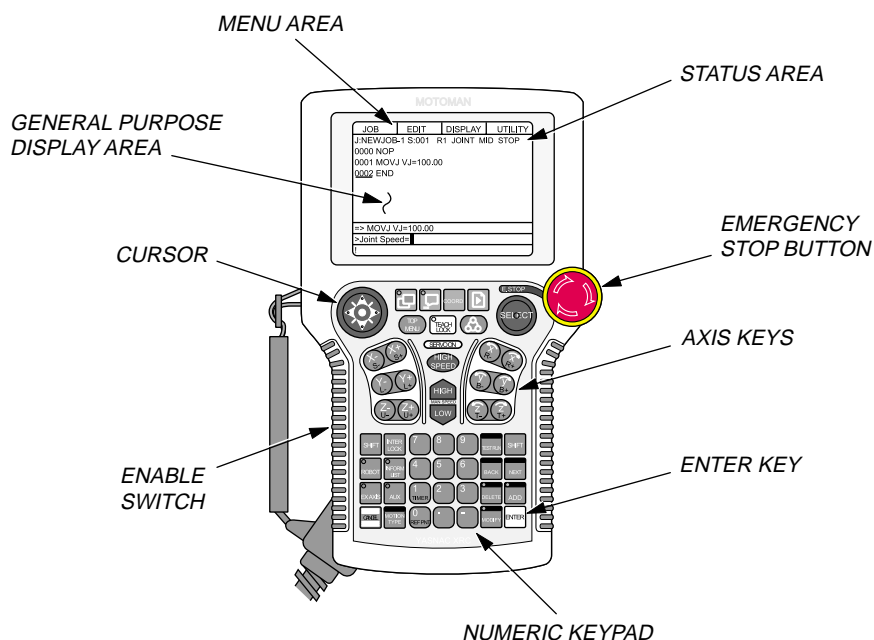


Figure 3-3 Programming Pendant

General Purpose Display Area

The General Purpose Display Area displays the currently selected menu choice.

Menu Area

The Menu Area contains menu selections for the currently selected screen.

Emergency Stop (E-STOP)


















The E-STOP button on the programming pendant is connected in series with the system Emergency Stop circuit. Pressing the E-STOP button interrupts this circuit and stops all system operation.

Keypad

The user keypad on the programming pendant serves as an input device. The keys are grouped into different functional sections to simplify operator use.

Status Area

The Status Area shows system status via the following symbols:

- **Active Robot, External Axis, or Base Axis**
R1, R2, R3; S1, S2, etc.; or B1, B2, etc.
- **Coordinate System**
 Joint,  World,  Cylindrical,  Tool, or  User Frame
- **Manual Speed Setting**
 Inching,  Low,  Medium, or  High
- **Cycle Mode**
 Step,  1-Cycle, or  Auto
- **System Status**
 E-  Stop  Running/Start,  Hold, or  Alarm
- **Additional Pages** (when applicable)

TOP MENU Key

The TOP MENU key returns the pendant display to the initial start-up menu. The cursor key can then be used to choose from the following menu icons:

- **JOB**
This icon accesses job selections including: Master Job, Select Job, Job Capacity, and Create New Job while in TEACH mode.
- **ARC WELDING, GENERAL, HANDLING, and SPOT WELDING**
This icon allows you to select the applications available to the controller.
- **VARIABLE**
This icon accesses the display and editing menu for the arithmetic variables and display of position variables.
- **IN/OUT**
This icon accesses DETAIL and SIMPLE displays of all I/O signals. In EDITING or MAINT. mode, Universal Outputs can be forced ON or OFF.
- **ROBOT**
This icon accesses robot information including: CURR.POS, POWER ON/OFF, POS, COMMAND POS, SECOND Home POS, OPE ORIGIN POS, and TOOL and USER COORDINATE.
- **SYSTEM INFO**
This icon provides Version information for both hardware and software, Alarm History, and Monitoring Time.

Area Key

The Area key moves the cursor to the different areas of the display screen.

Cursor Key

The Cursor key is an 8-way, directional key that moves the up, down, left or right to highlight a desired item that can then be chosen using the SELECT key.

SELECT Key

The SELECT key is used to choose the item currently highlighted by the cursor.

TEACH LOCK Key

The TEACH LOCK key locks operation of the robot with the programming pendant. Operation is not possible from the playback panel or operator station. Servo power can not be applied in TEACH mode unless TEACH LOCK is ON.

RS-232C Serial Port

This 9-pin serial port is used for data communication between the controller and a floppy disk controller (FC1 or FC2), FDE (Floppy Disk Emulator) software, or other form of communication (see Figure 3-4).

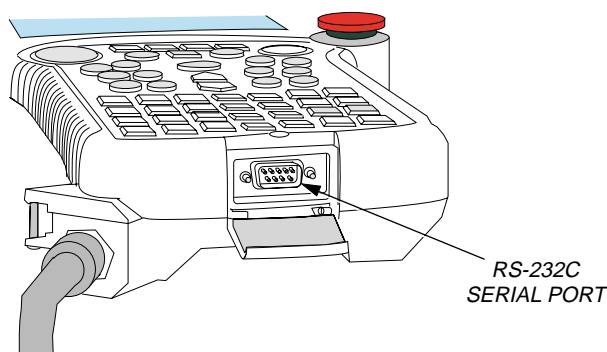


Figure 3-4 RS-232C Serial Port

ENABLE Switch

The ENABLE switch (see Figure 3-5) is a three-position switch located on the left rear of the programming pendant. It is a safety feature that controls servo power while in TEACH mode. When pressed in, this switch enables servo power to be turned on. However, should the operator release the switch, or grasp it too tightly, servo power is immediately disabled, preventing further robot movement.

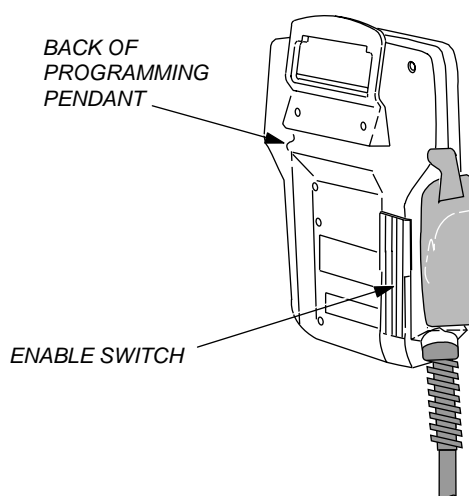


Figure 3-5 Enable Switch

3.2.3 Brake Release



WARNING!

Releasing brakes could cause personal injury or machine damage. Always support the axis to be released BEFORE you release it.

The Brake Release Control is a safety feature that allows you to release the automatic brakes on the robot in case of an emergency or robot failure. The Brake Release Control is mounted on the front of the controller cabinet (see Figure 3-1).

3.3 Operator Station

The ArcWorld II-200 has a common operator station (see Figure 3-6) that is mounted into the center support of both welding stations. The operator station consists of the items described in the following paragraphs.

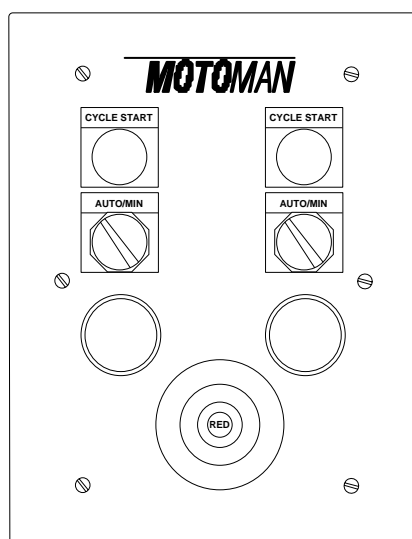


Figure 3-6 Operator Station

3.3.1 Cycle Start



WARNING!

The operation of the CYCLE START palm button is dependent on the structure of the Master job. Altering the Master job could result in injury to personnel or damage to the equipment.

Play Mode

The CYCLE START push button, located at the top of the op-station, completes the CYCLE START circuit when the operator presses this button. In AUTO, the operator door closes and the robot moves to the appropriate station. The following is an example of typical operation:

The CYCLE START push button is activated, sending a signal to IN#1 “CYCLE START INPUT.” Switches located on the operator door verify operator door closed and a signal is sent to IN#3 “OK TO WORK.” The robot is now able to enter the work area and perform the assigned job.

Teach Mode

Depressing the CYCLE START push button will cause the door to go from open to close or close to open depending on the door status.

3.3.2 AUTO/MANUAL

The AUTO/MANUAL button changes the function of the CYCLE START button.

- In **MANUAL** mode, pressing the CYCLE START button will open/close a station door on-demand. If the door is in motion, pressing CYCLE START will change its direction. If the door is stationary (at the top or bottom), pressing CYCLE START will raise/lower the door.

MANUAL mode can be used to reopen the operator door when part fixture adjustments are required (after the operator has pressed CYCLE START and the operator door has closed) before the robot begins.

- In **AUTO** mode, pressing the CYCLE START button raises (closes) the station door and permits the job cycle start. The door lowers (opens) at the end of the job.

The AUTO/MANUAL switch button is disabled at any station the robot is working at.

3.3.3 Emergency Stop (E-STOP)

The operator station E-STOP button is connected to the system Emergency Stop circuit. Pressing the E-STOP button interrupts this circuit and stops all system operation. Brakes are applied to the robot and all servo power is removed from the system. All door motion is also stopped.

3.4 Barrier Assembly

For detailed specifications including parts lists breakdown, refer to the Barrier Assembly Manual, P/N 147500-1.

3.4.1 Stationary Weld Tables

The ArcWorld II-200 features two optional weld tables (stations), each with a door that protects the operator from arc radiation, weld splatter, and physical contact with the robot arm. When the robot is finished working, the door lowers, giving the operator access to unload and reload parts from the fixture.

NOTE: In high humidity areas, use surface protection to prevent corrosion of the tooling plates.

Table 3-1 Weld Table Specifications

Conditions	Specifications
Part/Fixture Rating	Each optional table can support up to 453.6 kg (1,000 lbs)
Temperature Operating Range	4-43°C (40 to 110° F)
Humidity	Non-condensing 10 - 90% relative humidity is acceptable. NOTE: In high humidity areas, the weld table tooling plates may rust or corrode. Use surface protection to prevent corrosion of unpainted tooling surfaces.
Door Cycle Speed	2.0 seconds (approximate)

Table 3-1 Weld Table Specifications - continued

Conditions	Specifications
Electrical Requirements	24V DC, 3 amps for the interface is supplied by the controller.
Welding Current Rating	600 amperes at 100% duty cycle
Arc Shield	The arc screen protects from radiation between the operator and robot areas. Weld curtains on fencing and between stations
Duty Cycle	1 cycle per minute

3.5 Safety Features

The ArcWorld II-200 system incorporates a host of safety equipment. When all standard safety precautions are taken, the safety equipment helps to ensure safe operation of the robotic cell. The ANSI/RIA R15.06 Robot Safety Standard stipulates the user is responsible for safeguarding. *Users are responsible for determining whether the provided safeguards are adequate for plant conditions. Users must also ensure that safeguards are maintained in working order.*

3.5.1 Arc Screens



WARNING!

Although the arc curtain blocks dangerous arc radiation, never look directly at the arc without protective eyewear!

Two separate arc screens are used on the ArcWorld II-200 system. The first is a metal arc screen on the positioner. This screen blocks arc radiation and sparks from the welding operation. The material used to cover the safety fencing of the entire robotic cell acts as the second arc screen. This material reduces the amount of ultraviolet radiation that escapes from the robotic cell.

3.5.2 Fencing

The safety fencing provided with the ArcWorld II-200 system encloses the entire robotic cell. It forms a physical barrier preventing entry into the robot envelope during automatic operation.

3.5.3 Emergency Stops (E-STOPS)

In addition to the safety features described above, the ArcWorld II-200 has strategically placed E-STOPS. These are operator-actuated devices that, when activated, immediately stop all system operation. Brakes are applied to the robot and all servo power is removed from the system. The system E-STOP lights come on and all positioner motion is stopped. The following is a list of their locations:

- The playback box on the controller
- The programming pendant
- The operator station

3.5.4 **ENABLE Switch**

The ENABLE switch is a safety feature which controls servo power while in TEACH mode. When pressed in, this switch allows the operator to turn servo power ON and initializes the system. However, should the operator release the switch or grasp it too tightly, servo power is immediately disabled, preventing further robot movement. For detailed information about the operation of the ENABLE switch, refer to the controller section in the manipulator manual that came with your system.

3.5.5 **Interlocked Cell Door**

A safety interlock on the cell entrance door prevents entry into the cell during PLAY mode. Opening the cell door with the robot in PLAY causes an E-STOP. Brakes are applied to the robot and all servo power is removed from the system. The system E-STOP lights come on and all positioner motion is stopped.

3.5.6 **Light Curtains**

The light curtains monitor the position of the robot. As the robot moves from Station 1 to Station 2, a signal is sent out to the controller informing it of the robot penetrating the light curtain. This output and a signal from the operator door are interlocked with the “OK TO WORK” output, preventing the robot from welding when the operator door is open.

3.5.7 **Brake Release**



WARNING!

Releasing brakes could cause personal injury or machine damage. Always support the axis to be released BEFORE you release it.

The Brake Release Control is a safety feature that releases the automatic brakes on the robot in case of an emergency or robot failure.

3.6 **Welding Equipment**

The ArcWorld system provides a complete complement of arc welding equipment. In its standard configuration, the ArcWorld system includes a power source, wire feeder, torch, and torch mount. Optional equipment including water circulators, Com-Arc units, and torch tenders may also be included with your system.

3.6.1 **Power Sources**

Motoman offers several different power sources for use with the ArcWorld II-200 system depending on your system’s application. Figure 3-7 shows some of the more common power sources used. However, the power source your system uses may be different. For more specific information, refer to the vendor manual that came with your system.

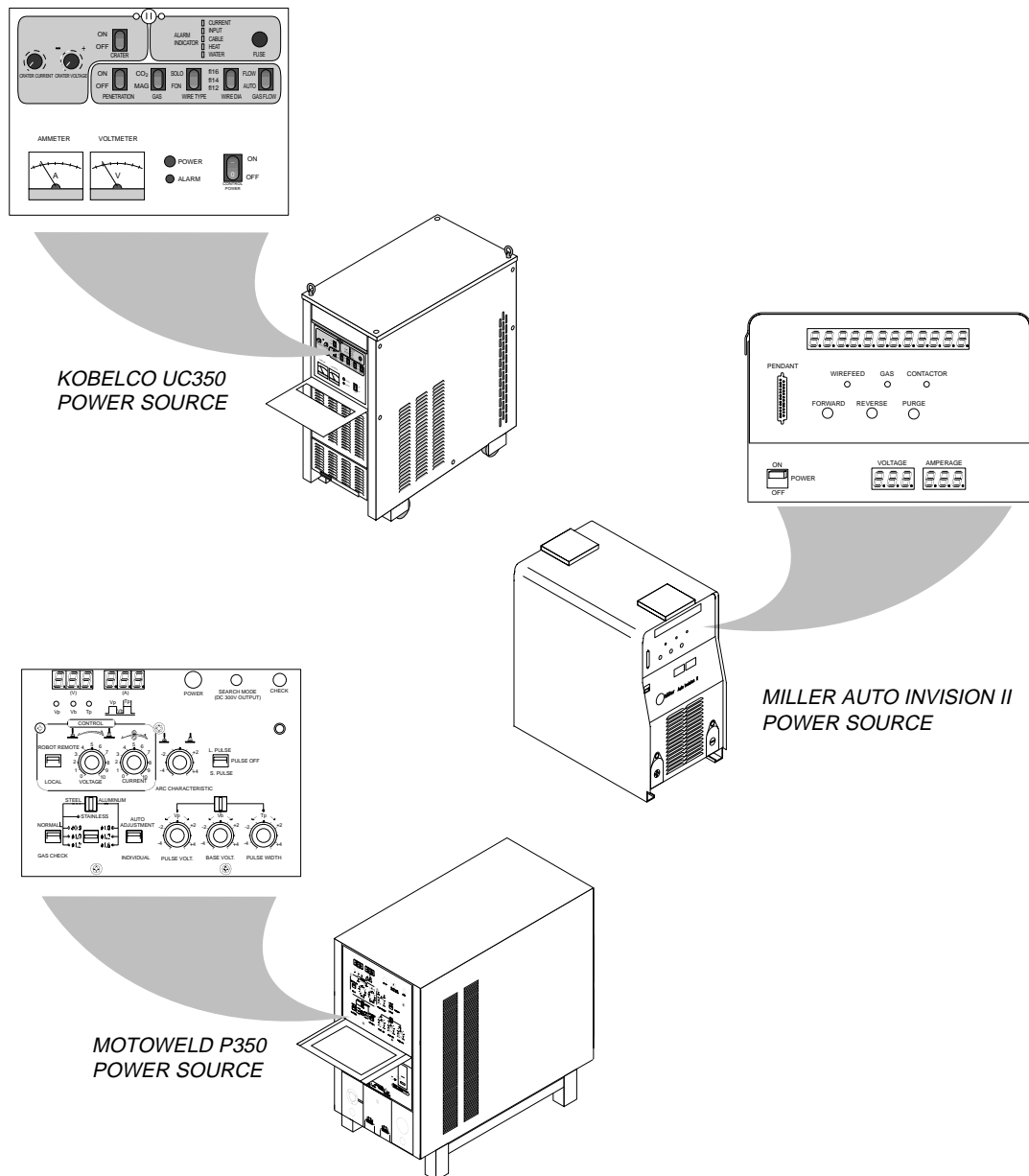


Figure 3-7 Available Power Sources

3.6.2 PWF4 Wire Feeder

The PWF4 wire feeder mounts on the robot arm. This 4-roll wire feeder provides reliable wire feeding at rates up to 750 inches per minute (IPM). An integral gas valve provides fast gas response time. The wire feeder has an inch forward button to help simplify set-up and reduce change-over time. Interchangeable feed rolls are used to accommodate different types and sizes of wire. A Shock Sensor Override switch located on the front of the feeder is used to recover from torch impact.

3.6.3 Universal Welding Interface (UWI)

The UWI provides microprocessor control to the wire feeder and MotoArc series power source. It scales the signals from the controller to the appropriate levels required for control of the welding components. It also provides isolation of the power source analog signals.

NOTE: Some power sources available with the ArcWorld II-200 system do not use the UWI. For more information specific to your system, refer to the vendor manuals shipped with your system.

3.6.4 GMAW Torch

The ArcWorld system uses either an air-cooled or a water-cooled robotic/automatic GMAW torch. These are heavy-duty torches designed for quick replacement while requiring minimum robot reprogramming. The GMAW torch is installed at the end of the robot wrist. For applications that use the water-cooled torch, the ArcWorld system includes a suitable water circulator kit.

3.6.5 Motoman Torch Mount

A Motoman Torch Mount protects the robot, workpiece, fixture, and positioner. It provides multi-directional impact detection, including Z-axis collisions. Torch impact causes a system E-STOP and immediately stops all system operation. Servo power is removed from the system and brakes are applied to the robot. All positioner and door motion is also stopped.

NOTES

SECTION 4

INSTALLATION

The ArcWorld system can be installed easily in just a short time by three workers. The more people involved (within reason), the more quickly installation can be completed. Follow established safety procedures **at all times** throughout the installation process. Failure to use safe work practices can result in damage to the equipment and injury to the workers.



CAUTION!

Installation of the ArcWorld system is not a task for the novice. The ArcWorld system is not fragile, but it is a highly sophisticated robotic system. Handle components with care. Rough handling can damage system electronic components.

4.1 Materials Required

All system hardware necessary for installing the ArcWorld system is included with the system. This section identifies customer-supplied items and tools required to complete installation.

4.1.1 Customer-Supplied Items

- Gas bottles for the welding torches
- Incoming power supply
- Two earth ground cables with two earth ground stakes
- Weld wire
- Stepladder
- Forklift and/or overhead crane

4.1.2 List of Tools

- | | |
|---|-------------------------------------|
| • Safety glasses | • Hammer |
| • Face shields | • Socket set |
| • Gloves | • Forklift and/or overhead crane |
| • Level | • Air-impact gun with sockets |
| • Ratchet with sockets | • Open-end wrench set |
| • Adjustable wrench set | • English allen wrenches |
| • Hammer drill with appropriate concrete bits | • Metric allen wrenches |
| • Phillips and flat screwdrivers | • Wrench sets (standard and metric) |

4.2 Site Preparation

To prepare your site, proceed as follows:

1. Clear floor space needed for unit (see Figure 4-1).

NOTE:

An additional 2.43 to 3.05 m (8 to 10 ft) on all sides is recommended for set up.

2. Gather all customer-supplied items and required tools listed in Section 4.1.

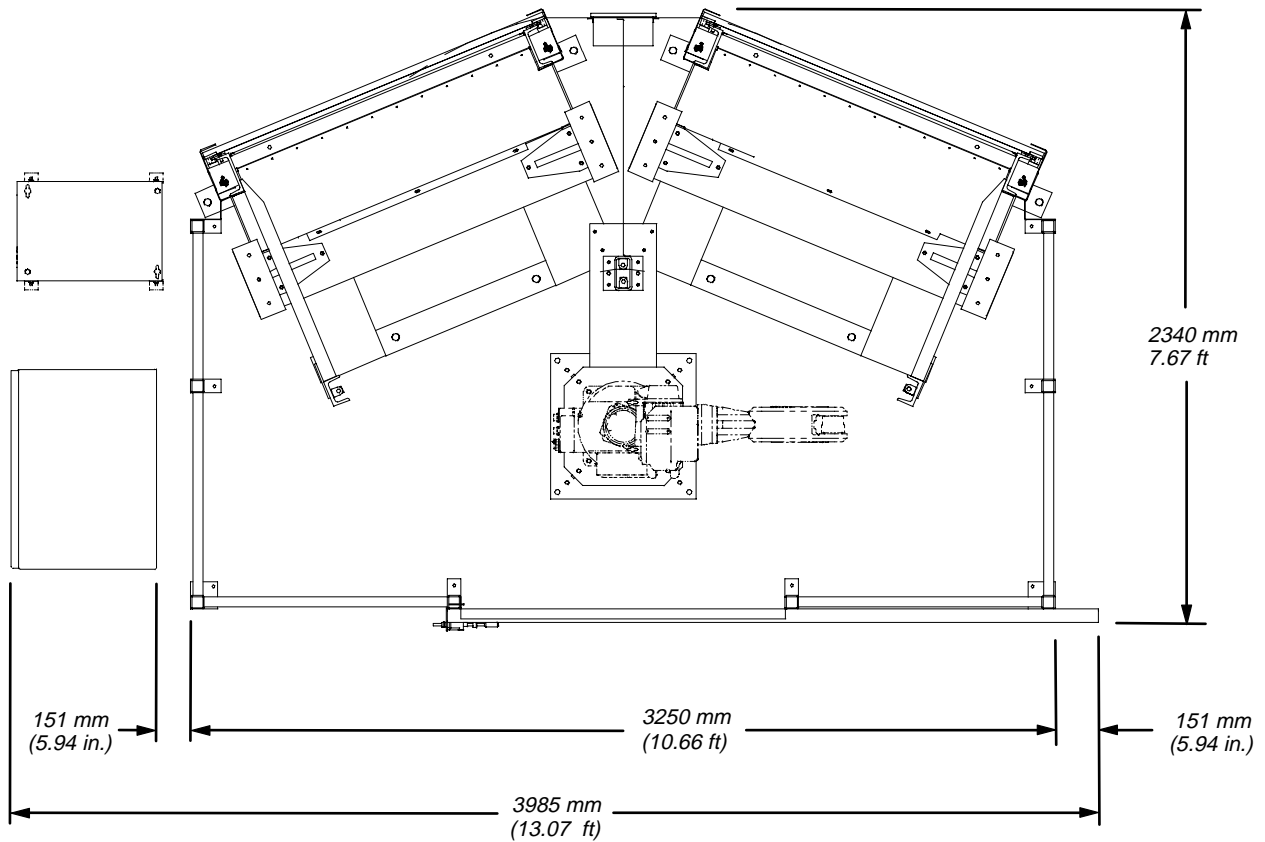


Figure 4-1 Area Needed for Installation

4.3 Removal from Shipping Skid

Cell components are placed onto a large shipping skid and then shipped to the customer. The customer is responsible for safely removing the components from the skid and inspecting them for damage.

NOTE: If damage is found, notify shipper immediately.

4.3.1 Unloading Procedures

To successfully unload the shipping skid, proceed as follows:



WARNING!

The shipping skid with all cell components loaded onto it weighs 1045.4 kg (2300 lbs). Be sure that your crane or forklift is capable of handling this much weight or damage to the equipment or injury to personnel can result.

1. Using a forklift, lift the loaded shipping skid and remove it from the hauler.
2. Carefully remove protective plastic wrapping from all cell components.
3. Inspect all cell components for shipping damage.

NOTE: If damage is found, notify shipper immediately.

4. Unbolt the each component from the wooden shipping skid using a 3/4-inch socket (see Figure 4-2).

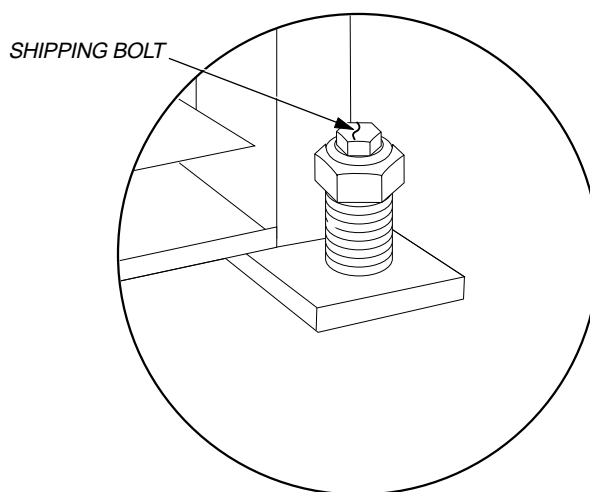


Figure 4-2 Remove Shipping Bolts

5. Use the lifting eye bolts to remove each component from the shipping skid.

4.4 Cell Components

4.4.1 List of Components

Once the cell components have removed from the shipping skid, account for each item with the following list:

- Robot
- Barrier - station 1
- Barrier - station 2
- Spanner Plate
- Fencing
- Divider
- Controller
- Cables
- Guards
- Welding power source
- Water circulator (optional)
- Torch cleaner (optional)

Figure 4-3 identifies the cell components and their preferred location.

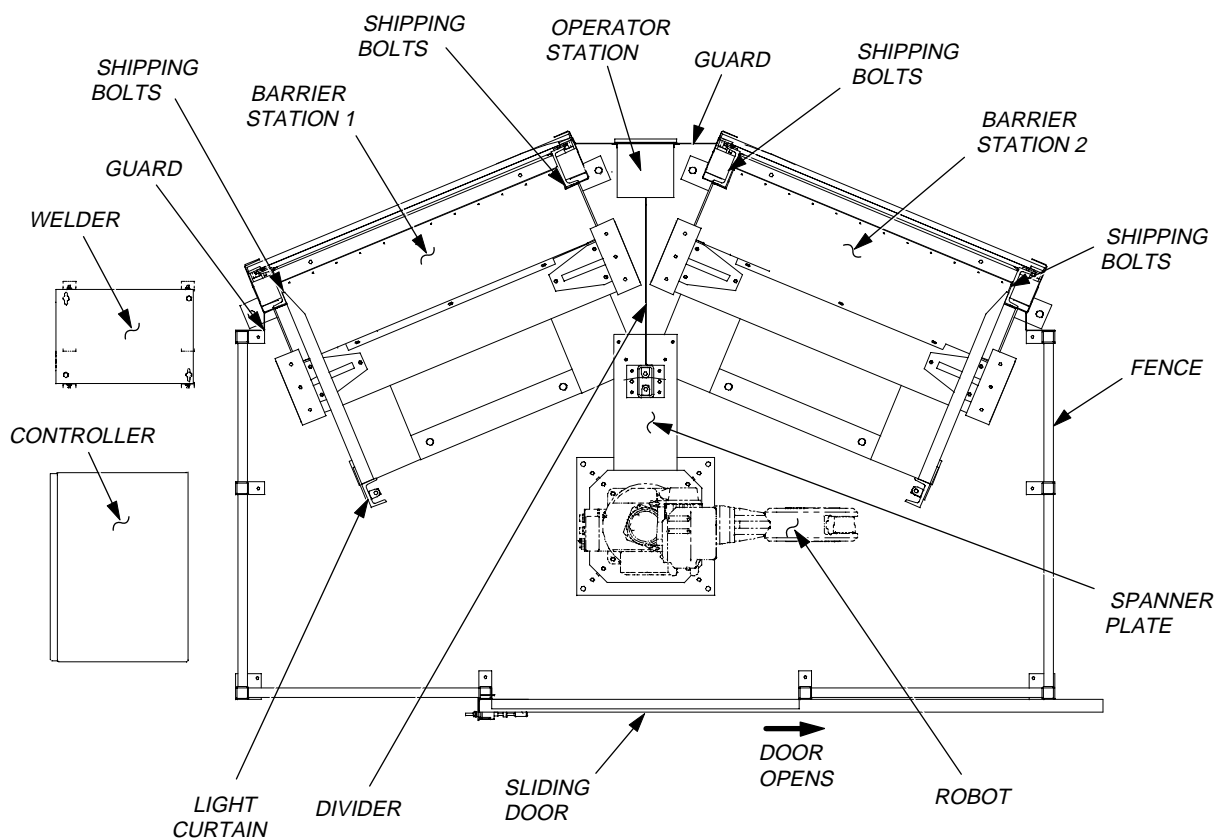


Figure 4-3 System Components

4.5 Assemble Cell Components

To make sure the cell is complete and to verify floor space efficiency, Motoman recommends that all cell components be set in place together prior to anchoring to the floor. Assemble the cell component in the order they appear below. Use Figure 4-3 and the system drawings to identify cell component locations.

4.5.1 Setting Up the Cell

Before permanently anchoring the cell components to the floor, set all pieces in place and fasten them together.

1. Place the barrier stations side-by-side with the doors defining the front of the cell.
2. Fasten both barrier stations together using the spanner plate and operator station panel. Recheck the location of the barrier stations and adjust as necessary.
3. Place the robot at the other end of the spanner plate and fasten them together. Recheck the location of the barrier stations/robot module and adjust as necessary.
4. Attach the guards on the outside of each barrier station.
5. Install light curtains.
6. Install barrier divider.
7. Construct the fencing around the cell. Stand the fencing up and fasten to outer guards. Apply the arc shield to the fencing.
8. Remove the four positioner shipping bolts, two on each positioner.
9. Recheck the location of all components and adjust if necessary.
10. Place the controller, welder, and welder on/off switch in place. These components can be placed anywhere the cables reach outside the cell. However they must be placed a minimum of 152.4 mm (6 inches) from the cell fencing.

4.6 Leveling and Securing the Equipment

After everything is in position, level the equipment and secure it to the floor. The lag bolts are shipped in the accessories box. To level and secure the equipment, proceed as follows:



CAUTION!

Handle ArcWorld II-200 components carefully to avoid damage.

1. Level the component by adjusting leveling bolts.
2. Insert a 1/2-inch concrete drill bit through center of leveling bolts and drill holes for lag bolts.
3. Vacuum concrete dust from holes.
4. Lag robot/positioner common base to floor.

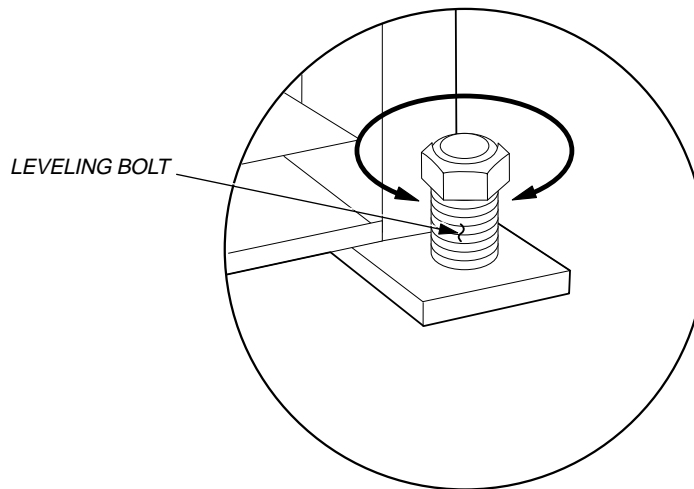


Figure 4-4 Leveling Bolts

4.7 Removing the Shipping Brackets/Bolts

4.7.1 Robot Shipping Brackets Removal



CAUTION!

Failure to remove shipping brackets from robot before operating the ArcWorld II-200 may result in damage to the robot drive mechanisms.

Three yellow brackets (see Figure 4-5) prevent the robot from moving during shipping. Two rod brackets secure the lower arm assembly to the S-axis housing. The smaller bracket on the rear of the robot prevents the S-axis housing from pivoting. After the robot is in place, remove the shipping brackets.

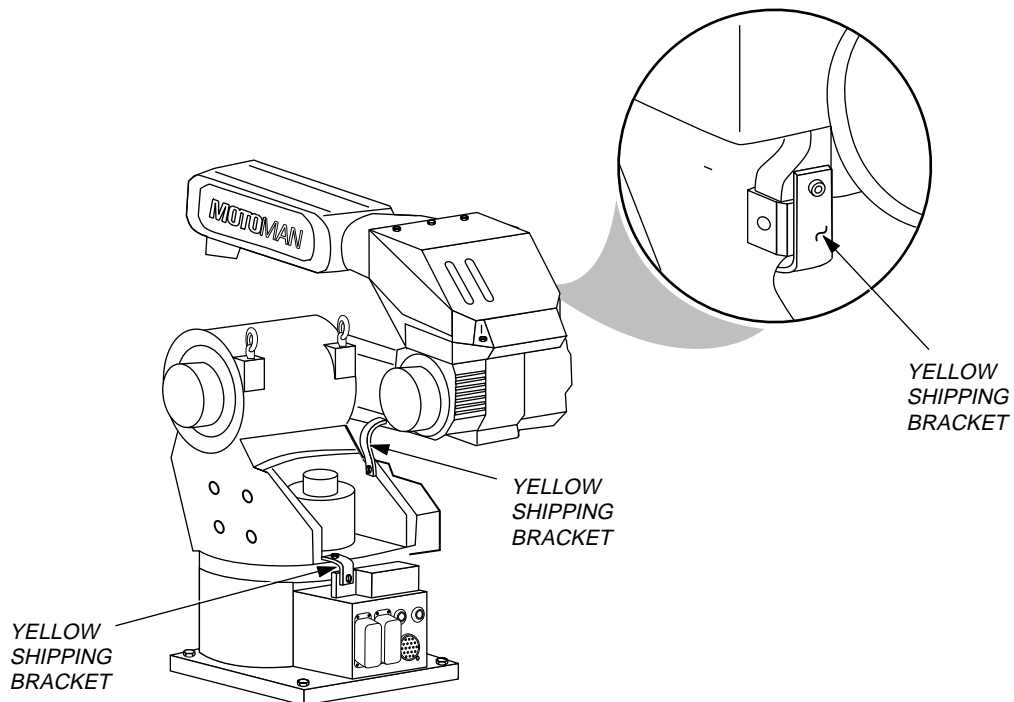


Figure 4-5 Location of Robot Shipping Brackets

4.7.2 Positioner Shipping Bolts Removal



CAUTION!

Failure to remove the positioner shipping bolts from before operating the ArcWorld II-200 will result in a blown fuse and possible damage to equipment.

For shipping purposes, a yellow-capped shipping bolt (see Figure 4-6) is inserted through both front posts of each positioner (four bolts total), and fastened to the counterbalance. Each bolt secures the counterbalance and the rest of the chain assembly to prevent the door from opening. **These four bolts must be removed before operation of the cell.**

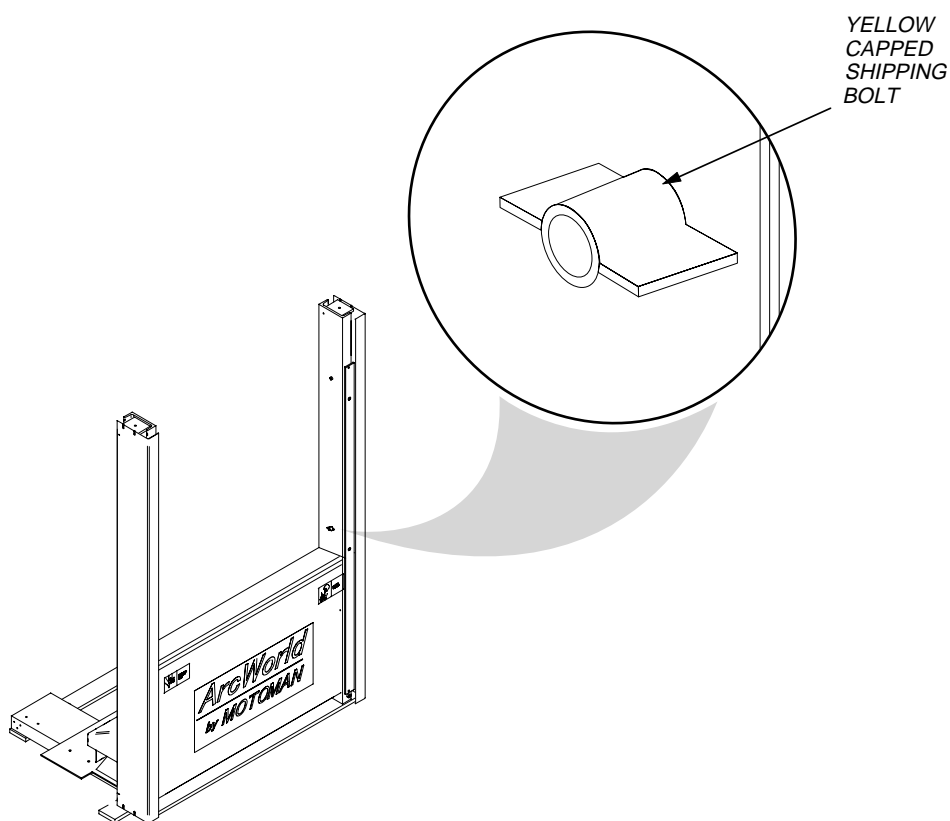


Figure 4-6 Location of Positioner Shipping Bolts

4.8 Connecting the Cables

After components are level and securely in place, the cables should be unwrapped from around the equipment and laid out according to the cable diagram included in the system drawing package. Each cable connection is clearly identified for ease of installation.



CAUTION!

Route wires and cables away from hazardous work areas to avoid wire breakage and unnecessary interruption of cell operation.

4.8.1 Connecting the Earth Ground

The robot and the controller must each be connected to an earth ground. An earth ground is a ground in which the equipment is connected to a ground stake driven into the earth. The ground stake must be driven a minimum of 2.43 m (8 ft) into the earth, and the earth must be treated with chemicals in order to reduce resistance to the ground stake. Deeper ground stakes may be required depending on area soil conditions. A maximum of 100 ohms ground resistance is recommended. To ground the robot and the controller, proceed as follows:



WARNING!

- **If proper earth grounds cannot be provided, do not use the equipment! Serious injury or death can occur.**
- **Do not place the MIG system within 15.24 m (50 ft) of other sources of noise (i.e., GTAW arc starters, plasma cutters, induction furnaces, high-power-resistance spot welders, dielectric heaters, etc.). Equipment that generates impulse or high-frequency noise can cause unexpected equipment operation and failure, which can result in serious injury or death.**

NOTE:

If the robot and the controller are within 4.57 m (15 ft) of each other, a common earth ground may be used. Otherwise, separate earth grounds must be used.

1. Connect one end of robot earth ground cable to lug marked EARTH GROUND on bottom back of robot.
2. Connect other end of robot earth ground cable to earth ground stake.
3. Connect one end of second earth ground cable to common ground bus bar inside the controller.
4. Connect other end of second earth ground cable to earth ground stake.

4.8.2 Connecting the Robot Cables

Three cables, 1BC, 2BC, and 3BC connect the robot to the controller. The 1BC cable supplies power to the robot servo motors. The 2BC cable provides communication between the controller and the robot. The 3BC cable connects the controller to the power supply. To connect the robot cables, proceed as follows:

NOTE:

The right side of the controller is on your right as you are facing the front of it.

1. Unpack programming pendant and plug connector into receptacle on right side of the controller.

2. Unpack two large black manipulator cables, connected to the controller, and route to back of robot.
3. Carefully engaging connectors, connect three cables (labeled 1BC, 2BC, and 3BC) to 1BC, 2BC, and 3BC connections on back of robot (see Figure 4-7).

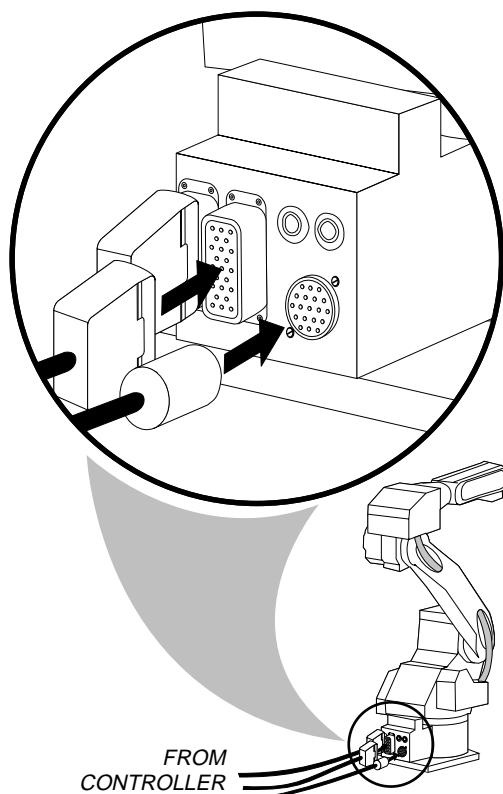


Figure 4-7 Connecting Robot to the Controller

4.8.3 Connecting the Com-Arc III and the Wire Cutter (Optional)

The Com-Arc III and the wire cutter are options. Typically, the wire cutter is installed on the optional torch tender. The Com-Arc III cable is connected to the left side of the controller. The wire cutter cable is connected on the right side of the controller. The Com-Arc III is usually shipped with its cables connected. To connect the wire cutter:

1. Unwrap wire cutter cable.
2. Plug wire cutter cable into connector on wire cutter unit.
3. Connect wire cutter to an air supply set at 85 to 100 psi.

For detailed installation and operation instructions for the Com-Arc III, refer to the Com-Arc III Instruction Manual (P/N 132753-1).

4.8.4 Connecting Water Circulator (Optional)

If your system uses the water cooled welding torch, it is necessary to connect the Motoman water circulator. To connect the water circulator, proceed as follows:

1. Connect two water hoses from weld torch to connections on water circulator marked WATER-IN and WATER-OUT (see Figure 4-8).

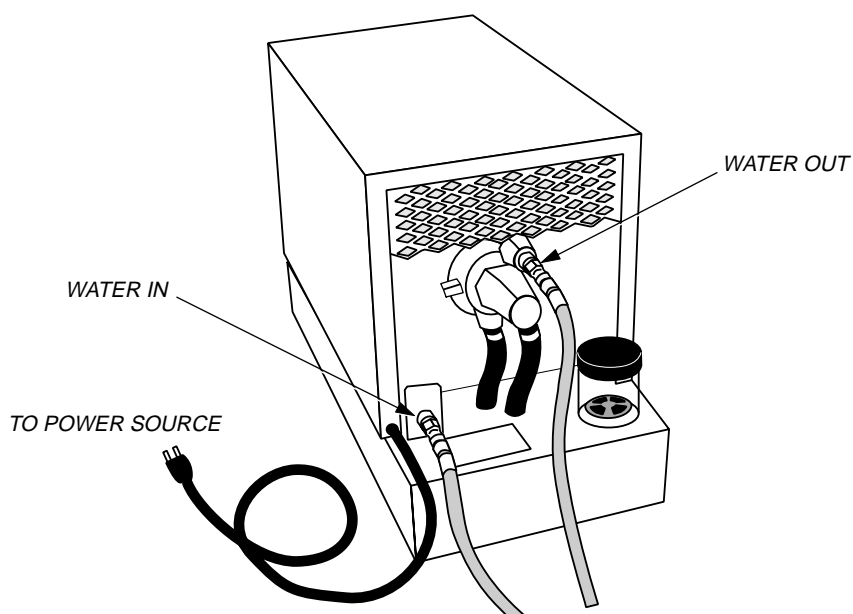


Figure 4-8 Water Circulator Connections



CAUTION!

- ***Use only the antifreeze provided by Motoman. Automotive anti-freeze contains stop-leak additives that will clog the small torch water-cooling ports and damage the gaskets in the pump.***
 - ***Do not fill the water circulator past its fill line. Damage to the water circulator could occur.***
2. Fill water circulator tank with antifreeze coolant provided (P/N 131224-1).
 3. Plug power cable into electrical outlet on back of power source.

4.9 Connecting the Power

After all of the system components have been properly installed, connect the power to the ArcWorld II-200. To connect incoming power to the ArcWorld II-200, proceed as follows:



DANGER!

Power should be connected only by a qualified electrician. Electrical and grounding connections must comply with applicable portions of the national electrical code and/or local electrical codes.

1. Install 3-phase power wiring to the circuit breaker located inside the left wall of the controller cabinet (see Figure 4-9). The engineering drawings shows the size and type of wire needed.
2. Tighten screws to the torque indicated in the engineering drawings.

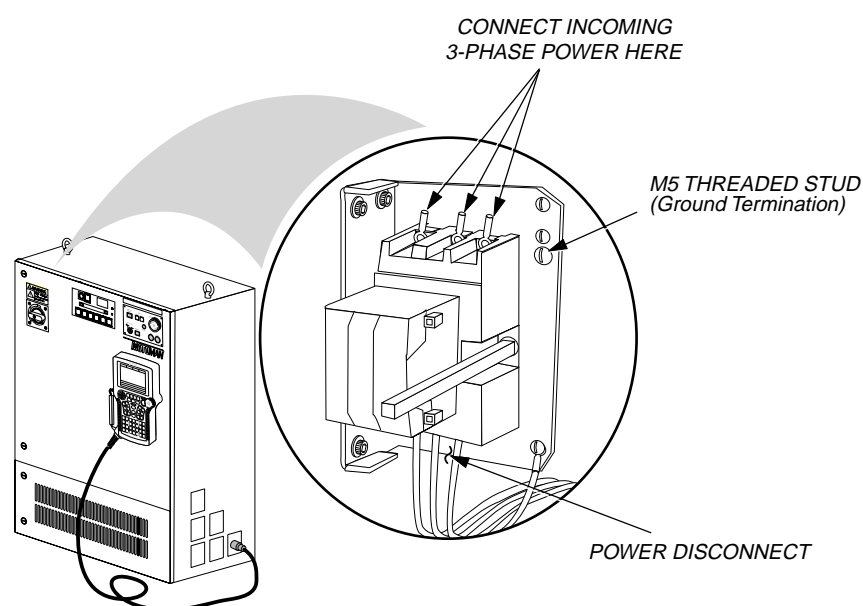


Figure 4-9 Incoming Power Connections

3. Install an M5 lug on the incoming ground wire.
4. Terminate the ground wire to the frame ground M5 threaded stud with M5 hardware provided.

NOTE:

The ArcWorld II-200 is configured for three-phase 460/480V AC, unless other voltage was requested. If other voltage is required for your plant, you must make the necessary modifications to the transformer. For more information, refer to the manipulator manual that came with your system.

4.10 *Conducting a Safety/Operation Check*

Before installing the tooling and fixtures for your application, take a few minutes to perform a safety/operation check. To conduct a safety/operation check, proceed as follows:

1. Check that all shipping brackets and bolts have been removed from robot and positioners (see Section 4.7).
2. Check that cell door is closed and latched.
3. Check that all cable connections are tight.
4. Check air line connections to the optional torch tender and wire cutter.
5. Be sure welding power source is set correctly (see welding power source vendor's manual).
6. Verify incoming line power matches input power specified on front of the controller.

Your ArcWorld II-200 is now ready for power-up. The ArcWorld system should be operated only by personnel who have received operator training from Motoman and who are familiar with the operation of this Motoman robot model. Turn the main power ON, and continue the safety/operation check.

7. Check all system E-STOPS (pendant, operator station, playback panel).
8. Check system Hold buttons.

4.11 *Installation of Tooling and Fixtures*

Your ArcWorld II-200 system is now ready for the installation of tooling and fixtures for your application. Installation of tooling and fixtures should be performed by personnel who are familiar with the operation of this system. Tooling and fixtures are supplied by the customer. After tooling is installed, test both positioners for proper operation:

- Operator doors achieve full cycle time (2 seconds).

SECTION 5

OPERATION

The ArcWorld II-200 is a fully integrated robotic GMAW welding cell. The robot welds on one station while the operator loads the other station with parts. Once the robot is finished welding, it returns to the safe position (Cube 24), the operator doors cycle, and the robot begins welding on the other station. The operator can now safely remove the welded piece and load new production parts onto the station.

This section provides operating procedures for the ArcWorld II-200 system. These include the following:

5.1 Programming

The operation of this system is programming dependent. The following operating instructions are based on one possible configuration of this system. Your system configuration and job structure may differ slightly from that presented here, however basic operation will be the same.

Any changes made to your system configuration and/or job structure will alter the operation of this cell. Motoman recommends you do not modify the original jobs and system configuration that came with your system. The application programs may assign values to memory locations in the controller. Consult your system documentation before modifying your system. If modifications need to be made, they should be made to copies of these jobs and not to the originals. Modifications should only be performed by personnel who have received operator training from Motoman, and who are familiar with the operation of this Motoman system. If you have questions concerning the configuration of your system please contact the 24 hour Service Hotline, at (937) 847-3200 (see Section 1.4).

5.1.1 I/O Assignment

The ArcWorld II-200 uses the following user and dedicated inputs and outputs (see Tables 5-1 and 5-2).

XRC 2001 Dedicated Inputs

- Servo On
- External Emergency Stop

XRC 2001 Dedicated Outputs

- Servo Power ON
- TEACH mode
- Cube 24
- Alarm Occurrence

For more information on user and dedicated I/O, refer to the Concurrent I/O Parameters Manual (P/N 142102-1).

Table 5-1 XRC 2001 User Inputs

Input	Assignment
IN#001	CYCLE START INPUT S1
IN#002	AUTO/MANUAL 1
IN#003	OK TO WORK 1
IN#004	S1 LIGHT CURTAIN CLEAR
IN#005	S1 DOOR LOWERED
IN#006	S1 BRAKE RELEASED
IN#007 thru 008	NOT USED
IN#009	CYCLE START INPUT S2
IN#010	AUTO/MANUAL 2
IN#011	OK TO WORK 2
IN#012	S2 LIGHT CURTAIN CLEAR
IN#003	S2 DOOR LOWERED
IN#014	S2 BRAKE RELEASED
IN#015 thru 016	NOT USED

Table 5-2 XRC 2001 User Outputs

Output	Assignment
OUT#001	S1 MOTOR ENABLE
OUT#002	S1 RESERVED
OUT#003	S1 DOOR DIRECTION 0 = DOWN 1 = RAISE
OUT#004	NOT USED
OUT#005	S1 RELEASE BRAKES
OUT#006 thru 008	NOT USED
OUT#009	S2 MOTOR ENABLE
OUT#010	RESERVED
OUT#011	S2 DOOR DIRECTION 0 = DOWN 1 = RAISE
OUT#012	NOT USED
OUT#013	S2 RELEASE BRAKE
OUT#014 thru 016	NOT USED

5.2 **Daily Operation**

The procedures below represent the typical operating sequence from power up to shutdown. Your basic operating procedures may vary depending on your situation.

- Perform Start-up Procedures (see Section 5.2.1).
- Move Robot to Home Position (see Section 5.2.2).
- Selecting Master Job (see Section 5.2.3).
- Perform Operation Cycle(see Section 5.2.4).
- Perform Shutdown Procedures(see Section 5.2.5).

5.2.1 **Start-Up**

To start up the ArcWorld cell from a Power-Off condition, proceed as follows:

1. Turn on welding power source disconnect.
2. Set MAIN POWER switch on controller to ON.
3. Set INPUT POWER switch on welding power source to ON.
4. Open regulator valve on welding gas supply.
5. Make sure the enclosure door is closed and securely latched.
6. Press TEACH mode button on controller playback panel.
7. Place robot in Home position (Cube 24).

5.2.2 **Robot Home (Cube 24) Position**

To move the robot to the Home position (Cube 24), proceed as follows:

1. Press TEACH mode button on controller playback panel.
2. Press TOP MENU on programming pendant.
3. Select JOB icon using cursor keys and press SELECT.
4. Cursor to SELECT JOB and press SELECT key.
5. Using cursor keys, move cursor to Home job and press SELECT. Home job appears on display screen.
6. Turn servo power ON by pressing SERVO ON on playback box, pressing TEACH LOCK and holding in ENABLE switch on the programming pendant.
7. Use INTERLOCK and FWD buttons on programming pendant to jog robot to Home (Cube 24) position.

5.2.3 **Starting the Master Job**

With the system powered up and in TEACH mode, call up the Master job, then...

1. Press TOP MENU key on programming pendant.
2. Select JOB icon using cursor keys and press SELECT.
3. Cursor to SELECT JOB and press SELECT key. Job list appears on display screen.
4. Using cursor keys, move cursor to Master job and press SELECT. Master job appears on display screen.
5. Make sure enclosure doors are closed and securely latched.
6. Press PLAY mode button on controller playback panel. Job playback operation is enabled.

7. Press SERVO ON button on playback panel.
8. Press START button on playback panel.

The ArcWorld II-200 cell is now ready for operation.

5.2.4 **Perform Operation Cycle**

Perform the operation cycle as follows:

1. Load Station 1 (station on the right) with production parts.
2. Press the CYCLE START button on operator Station 1. The operator door rises, and the robot moves to the Home 1 position.
3. The controller waits for the “OK TO WORK” input, signaling that the operator door is up and the robot is in Zone 1.
4. The robot moves into the work area and begins welding. When the robot has finished welding, it returns to the Home position, then proceeds to Station 2. As soon as the robot has left Station 1, the operator door lowers giving the operator access to the welded parts on Station 1.
5. While the robot is welding at Station 1, load Station 2 (station on the left) with production parts.
6. Press the CYCLE START button on operator Station 2. The operator door rises. The robot begins welding at Station 2 as soon as it has finished welding at Station 1.
7. While the robot is welding on Station 2, unload the welded parts from Station 1 and load new parts.
8. Activate CYCLE START to raise the operator door and permit the robot to return to Station 1.

NOTE:

The robot will not return to Station 1 until CYCLE START has been activated, even if it has completed work at Station 2. If the robot finishes working at Station 2 before Station 1 is reloaded, the robot will return to the Home position (Cube 24) and wait for a CYCLE START command from either station.

Once all production work is finished and the robot completes work on the last station, the robot returns to the Home position and both operator doors open to permit unloading/loading. The doors remain in the down position until CYCLE START is activated at one or both stations.

5.2.5 **Shutdown**

Use the following procedure to shut down the ArcWorld II-200 cell after operation is complete:

1. Make sure the robot is in the Home position (Cube 24).
2. Turn off system servo power by pressing E-STOP button on operator station, programming pendant, or playback panel.
3. Press TEACH mode button on playback panel.
4. Set controller Main Power switch to OFF position.
5. Set Main Power switch on welding power source to OFF position.
6. Close regulator valve on welding gas supply.

The ArcWorld II-200 cell is now shut down.

5.3 System Recovery

Under certain conditions you will be required to clear an alarm or error. The paragraphs below describe the different types of alarms and errors you may encounter and how to remedy them when you do.

5.3.1 Alarms and Errors

Alarms and errors will cause the program to stop. There are three levels of alarms and errors: Error Messages, Minor Alarms, and Major Alarms. For more detailed information about alarm recovery, refer to manipulator manual that came with your system.

Error Messages

These are simple errors such as pressing the START button when the robot is not in PLAY mode, or enabling the programming pendant without the servo power being live. Errors like these are cleared by pressing the CANCEL button on the programming pendant.

Minor Alarms

Minor alarms are usually programming errors. Minor alarms might occur if a circle has been programmed with fewer than three circular points, etc. These alarms are cleared by pressing the SELECT soft key on the programming pendant.

Major Alarms

Major alarms are hardware failures. Major alarms might occur because of a servo tracking error or an abnormal speed and are usually associated with crashes. To clear these alarms, you must turn off the controller and then turn it on again.

5.3.2 Error Messages

Door Time Out Error:

A time function has been built into the CIO of the controller. If the door fails to reach the intended position within the allotted time, the alarm will occur and stop the system operation. This condition would occur if the door motor fuse is blown, or if the time has been improperly set.

Gas Flow Error:

A gas flow input has been implemented in the controller CIO. This input will trigger an alarm in PLAY mode only. User must attach contact to input for proper operation.

Water Flow Error:

A water flow input has been implemented in the controller CIO. This input will trigger an alarm in PLAY mode only. User must attach contact to input for proper operation.

5.3.3 Door Default Settings

The door default function is coded into the CIO of the controller. This function will detect if the Door Open and Door Closed switches are both on at the same time. If this fault occurs either the door up or door down switches have failed and should be replaced before system operation continues.that

5.3.4 Shock Sensor Recovery

The ArcWorld welding package includes a Motoman gun mount. This mount is designed to protect the torch from damage in case of a crash. A slight deflection of the torch activates a SHOCK SENSOR message, which triggers an E-STOP condition. To clear the E-STOP condition, you must override the shock sensor and move the robot clear of the impact. To override the shock sensor, proceed as follows:



CAUTION!

It is possible to crash the robot with the Shock Sensor Override Switch left in the "Override" position. Always remember to reactivate the Shock Sensor before continuing system operation.

1. Press TOP MENU on programming pendant.
2. Select ROBOT icon using cursor keys and press SELECT.
3. Cursor to OVERRUN-S.SENSOR and press SELECT key.
4. Select RELEASE to release shock sensor.
5. Turn servo power ON by holding ENABLE switch on the programming pendant and pressing SERVO ON.

NOTE: TEACH LOCK must be ON to turn servo power on in TEACH mode.

6. Move manipulator clear of impact position.

The ArcWorld II-200 cell is now ready to continue operation.

5.3.5 E-STOP Recovery

An E-STOP can occur under any of the following conditions:

- Pressing the E-STOP button on the operator station, programming pendant, or playback panel.
- Opening sliding door on robot enclosure when robot is in PLAY mode.
- Actuating shock sensor on torch mount.

To restart the ArcWorld II-200 cell after an E-STOP condition occurs, follow the procedure below.

1. To clear E-STOP condition, perform any of the following actions that apply:
 - Release the E-STOP button on the operator station, programming pendant, or controller playback panel.
 - Close sliding door.
 - Clear Shock Sensor condition (see Section 5.3.4).
2. Press START button on the play back box.

The ArcWorld II-200 cell is now ready to continue operation.

5.3.6 Using the Brake Release

Robot

The brake release control panel is located on front of the controller. Each axis brake is controlled by an individual axis buttons. Simultaneously pressing the ENABLE button and one of these axis buttons releases the indicated axis. To release the brakes, proceed as follows:

1. Press E-STOP button on programming pendant, playback panel, or operator station, to be sure servo power is OFF.
2. Provide adequate support for axis to be released. Support should withstand payload of robot and approximate weight of robot. Listed below is the weight of each available robot:

UP6 – 135 kg (297 lb)



WARNING!

Releasing brakes could cause personal injury or machine damage. Always support the axis to be released BEFORE you release it.

3. Release specific axis brake by pressing and holding corresponding axis button and ENABLE button at same time.

NOTE:

You must hold both the axis and ENABLE buttons down for the axis to remain released. Releasing either button will automatically lock the brakes again.

Positioner

The brake release is only active in TEACH MODE. The brakes are inactive in PLAY MODE.

NOTES

SECTION 6

MAINTENANCE

6.1 Periodic Maintenance

For detailed specifications including parts lists breakdown for the Barrier Assembly, refer to the Barrier Assembly Manual, P/N 147500-1.

Table 6-1 provides periodic maintenance items and intervals for the ArcWorld II-200 cell. Keep in mind that the maintenance intervals serve as guidelines only. You should adjust the frequency of maintenance to suit your specific work conditions.

For periodic maintenance procedures and schedules for the individual components of your ArcWorld II-200, refer to the manipulator and additional manuals that came with your system.



CAUTION!

Use only the antifreeze provided by Motoman. Automotive antifreezes contain stop-leak additives that will clog the small torch water-cooling ports, and damage the gaskets in the water circulator pump.

Table 6-1 Periodic Maintenance

<i>Frequency</i>	<i>Component</i>	<i>Procedure</i>
<i>Daily</i>	Water circulator (For water-cooled torch application only.)	Check the fluid in the water circulator. Add fluid as required. Use only distilled water and approved antifreeze (Motoman P/N 131224-1).
<i>*Daily</i>	Light Curtains	Validate functionality.
<i>Daily</i>	Door Up switches	Validate that both switches are actuating as door goes in/out of position

*Refer to vendor's literature for frequency time table.

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