Motoman XRC Controller
ArcWorld 6200 DR2C System Manual for UP/SKX-Series Robots

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SECTION 1
INTRODUCTION

The ArcWorld 6200 DR2C (Dual Robot 2 Controller) 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 6200 DR2C features two Motoman arc welding robots, and two XRC controllers with menu-driven arc welding application software, two complete welding packages, a 180° reciprocating plane positioner, operator interface, and total safety environment. The DR2C can be reconfigured from a dual robot system with the Master XRC controlling system operation to two separate robotic systems with independent control. For more information, please call the Motoman service staff at (937) 847-3200.

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
Provides general information about the ArcWorld 6200 DR2C and its components, a list of reference documents, and customer service information.

SECTION 2 - SAFETY
Provides information regarding the safe use and operation of the ArcWorld 6200 DR2C system.

SECTION 3 - DESCRIPTION OF EQUIPMENT
Provides a detailed description of the major components of the ArcWorld 6200 DR2C system. This section also includes a table of component specifications.

SECTION 4 - INSTALLATION
Provides instructions for set up and installation of the ArcWorld 6200 DR2C system.

SECTION 5 - OPERATION
Provides instructions for basic operation of the ArcWorld 6200 DR2C system. This section provides procedures for start-up, loading, normal operation, fault recovery, and shutdown. A number of sample robot programs are also included in this section.

SECTION 6 - MAINTENANCE
Contains a table listing periodic maintenance requirements for the components of the ArcWorld 6200 DR2C cell.
1.2 System Overview

The ArcWorld 6200 DR2C provides a complete arc welding solution in a standardized configuration. The system is designed around two Motoman arc welding robots with two XRC controllers, and includes two complete welding packages. All system functions are controlled from the R1 Master XRC controller. A dual-station 180° reciprocating positioner with rotating headstock allows an operator to prepare and set up parts on one side while the robots weld on the other side. The cell provides a full complement of safety features designed to protect both personnel and equipment. Figure 1-1 illustrates the system layout of the ArcWorld 6200 DR2C cell.

1.2.1 System Layout

The robot manipulators and reciprocating positioner share a common spanner base to help maintain proper alignment among the components. Each XRC controller shares a common base with its welding power source. Additional auxiliary components, such as water circulators and Com-Arc III seam tracking systems, can be located on these bases as well. The robotic cell is fully enclosed by safety fencing and an interlocking door. Safety mats prevent positioner cycling while anyone stands on the mat. All operator controls, including those on the XRC and welding power supplies, are accessible from outside of the robotic enclosure.

![System Layout Diagram]

Figure 1-1 System Layout
The ArcWorld 6200 DR2C includes the following major components:

- Two Motoman UP6 or SK16X manipulators and DR2C XRC controllers
- MRM2-series dual-station 180° reciprocating positioner
- Master operator station
- Welding equipment, including the following:
  - MotoArc welding power sources
  - Motoman torches (water-cooled or air-cooled)
  - Wire feeders
  - Torch mounts
- Safety equipment, including the following:
  - Safety fencing with arc curtains
  - Interlocked safety mats
  - Interlocked cell door
  - Positioner arc screen

1.2.2 **Optional Equipment**

The following optional equipment are available for use with this system.

- Torch tenders
- Wire cutters
- Com-Arc III seam tracking units
- Water circulators

1.3 **Reference to Other Documentation**

For additional information refer to the following:

- Motoman UP6 Manipulator Manual (P/N 142104-1)
- Motoman SK16X Manipulator Manual (P/N 142105-1)
- Motoman Operator's Manual for Arc Welding (P/N 142098-1)
- Motoman Concurrent I/O Parameter Manual (P/N 142102-1)
- Motoman DR2C Conversion Instructions (P/N 143348-1)
- Com-Arc III Instruction Manual (P/N 132753-1)
- 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 or SK16X)
- Application Type (welding)
- System Type (ArcWorld 6200 DR2C)
- Software Version (5.101A)
- Robot Serial Number (located on the back side of the robot arm)
- Robot Sales Order Number (located on back side of XRC 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: 313/994-6088
FAX: 313/994-3338

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 2.1)
- General Safeguarding Tips (Section 2.2)
- Mechanical Safety Devices (Section 2.3)
- Installation Safety (Section 2.4)
- Programming Safety (Section 2.5)
- Operation Safety (Section 2.6)
- Maintenance Safety (Section 2.7)
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/SKX-Series Robot Description
The Motoman six-axis UP6 and SK16X robots and XRC robotic controller represent state-of-the-art technology in robotics today. The UP6 robot has a payload of 6 kg (13.2 lbs). It features a 1,325 mm (52.1 in.) reach and has a relative positioning accuracy of ± 0.08 mm (0.004 in.). The SK16X robot has a payload of 16 kg (35.2 lbs). It features a 1,555 mm (61.2 in.) reach and has a relative positioning accuracy of ± 0.1 mm (0.004 in.).

Each robot 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 DR2C XRC Controller
The DR2C XRC robotic controllers, shown in Figure 3-1, coordinates the operation of the ArcWorld 6200 DR2C system and are configured so that one controller directs the action of both robots, designated as Robot 1 (R1) and Robot 2 (R2). The Master XRC coordinates the operation of the entire cell and delegates tasks to both robots. Both welders (weld 1 and weld 2) and positioner are also controlled by the Master XRC. The Master XRC controls manipulator movement, 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, each 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 DR2C XRC Controller
3.2.1 Playback Box

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 XRC Playback Box](image)

**Servo Power**
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 Select**
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.

**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](Joint.png), ![World](World.png), ![Cylindrical](Cylindrical.png), ![Tool](Tool.png), ![User Frame](User Frame.png)

- **Manual Speed Setting**  
  ![Inching](Inching.png), ![Low](Low.png), ![Medium](Medium.png), ![High](High.png)

- **Cycle Mode**  
  ![Step](Step.png), ![1-Cycle](1-Cycle.png), ![Auto](Auto.png)

- **System Status**  
  ![E-Stop](E-Stop.png), ![Stop](Stop.png), ![Running/Start](Running/Start.png), ![Hold](Hold.png), ![Alarm](Alarm.png)

- **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 XRC 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 XRC and a floppy disk controller (FC1 or FC2), FDE (Floppy Disk Emulator) software, or other form of communication (see Figure 3-4).

---

**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.
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 XRC cabinet (see Figure 3-1).

3.3  **Operator Station**

The operator station (see Figure 3-6) includes a NEMA enclosure on a stand-alone pedestal. The following paragraphs describe the operator station controls.

3.3.1  **Cycle Start**

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

Two green palm buttons, located on the sides of the operator station, initiate a positioner sweep cycle if the robot is in the Home or Safe position (Cube 1). If both CYCLE START buttons are pressed while either robot is outside Cube 1, the CYCLE START (IN#1) command is latched into the XRC. Once the robot returns to Cube 1, the CYCLE START command is executed and the positioner sweeps. An anti-tiedown timer, set to 10 seconds, prevents the operator from holding the palm buttons down and continuously cycling the positioner. For more information on Cubic Interference Zones, refer to Appendix A.
3.3.2 **Emergency Stop (E-STOP)**

The operator station E-STOP, the robot E-STOP, and the sliding door interlocks are connected in series in the Emergency Stop circuit. Pressing an E-STOP button or interrupting a door interlock interrupts this circuit and stops 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.

3.3.3 **Hold**

The HOLD button is a normally closed, momentarily actuated switch. Pressing the HOLD button stops the operation of the manipulator until another Start signal is sent. The indicator light stays ON only while the HOLD button is pressed. Operation resumes at the point in the program where the HOLD state was initiated. Refer to the manipulator manual for more information.

3.3.4 **Cycle Latched**

The CYCLE LATCHED lamp operates as an indicator light showing that the positioner CYCLE START command has been latched. It is not necessary to wait for the robots to finish welding and return to the Safe position (Cube 1) before pressing the CYCLE START palm buttons to sweep the positioner. Pressing the Cycle Start palm buttons while either robot is still in motion locks the CYCLE START command into the XRC. The CYCLE LATCHED light comes on, indicating CYCLE START latching. The positioner sweeps once the robots finish the current job and return to the Safe position (Cube 1). Stepping on the safety mats will unlatch the CYCLE START command from the XRC.

3.3.5 **Alarm**

The ALARM lamp is connected to the robot SERVO ON and ALARM OCCURRENCE outputs. The ALARM lamp turns on when the robot encounters an alarm condition or when servo power is cut.

3.3.6 **Positioner Auto/Manual**

The POSITIONER AUTO/MANUAL selector switch is used to select AUTOMATIC or MANUAL mode for the positioner. The selector switch is connected to robot Input #2. When the selector switch is in the AUTOMATIC position, the robot processes the part after the positioner sweeps. In MANUAL mode, the robot does not process the part after the positioner sweeps, but remains in the Safe position.

**NOTE:** This function is dependent on the structure of the Master job.

3.3.7 **Master Job Start**

The MASTER JOB START button is connected to the robot external start input. The robot will start the current active job when MASTER JOB START is pressed. The operator station must be enabled and servo power ON for the MASTER JOB START button to work.

3.3.8 **Operator Station Enable/Disable**

The OPERATOR STATION ENABLE/DISABLE selector switch transfers primary control of the ArcWorld cell from the XRC to the operator station. The REMOTE MODE button on the XRC playback panel lights when the operator station is enabled. Most prog. pendant functions are disabled while in REMOTE.
3.3.9 Reset

The RESET button is connected to the robot alarm reset input. A minor alarm or error condition is cleared when this button is pressed. In addition, the RESET button and the RIGHT CYCLE START buttons are interlocked and, when pressed simultaneously, reset the positioner when servo power is ON in Play mode. In Teach mode, the positioner is automatically reset when servo power is turned ON. The positioner only needs to be reset after initial power-up and after an emergency stop while in Play mode.

NOTE: Resetting the positioner may cause some positioner motion. You must be careful when you reset the positioner with the robot close to tooling. If an Emergency Stop occurs during programming, be sure to reset the positioner before resuming programming.

3.3.10 Servo On

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

3.4 MRM2-Series Positioners

The ArcWorld 6200 DR2C cell uses one of three different reciprocating positioners: the MRM2-250, the MRM2-500, or the MRM2-750. The MRM2-series positioners are AC-servomotor controlled by the XRC to provide coordinated motion. The standard distance between the headstock and tailstock faceplates on the MRM2-250 positioner is 2.6 meters (approximately 102 inches). The standard distance between the headstock and tailstock faceplates on the MRM2-500 and MRM2-750 positioners is 3.0 meters (approximately 118 inches).

Tables 3-1, 3-2, and 3-3 provide specifications for the MRM2-250, MRM2-500, and MRM2-750 positioners, respectively. The load side of the positioner is fixed for loading and unloading parts. The patented servo motor is used to sweep the positioner workstations into and out of the robot envelope, and also to turn the weld side of the positioner during welding.

A fixture frame is typically mounted between the headstock and tailstock faceplates to provide a highly flexible system. Fixtures are either mounted on, or integrated into, these frames for positioning and clamping of production parts. Pneumatic and electrical signals can be run to the fixtures if required. Depending on part size(s)/weights(s), you can mount single, multiple, or any parts combination to the fixture frame.

The ArcWorld 6200 DR2C dual system is capable of synchronized motion between various components depending on the job configuration. Synchronized components move at the same time during operation. R1 can be synchronized with the positioner; R2 can be synchronized with the positioner; and R1 can be synchronized with R2. Dual robots can work simultaneously on a rotating workpiece if the tasks are symmetric. The ArcWorld 6200 system is also capable of true coordinated motion, where linear, circular, or spline motion can be coordinated between R1 and the positioner, between R2 and the positioner, and between R1 and R2. Coordinated motion allows the robots to weld while the positioner rotates the parts. For additional information on coordinated motion, refer to the Coordinated Motion for Multi-Axes Systems manual (Part Number 139418-1).

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

The welding ground system consists of a spring-loaded copper brush that contacts the large gear inside the positioner gear housing. The ground cable to the welding power source is connected to the ground stud located on the right side of the positioner base as you face the rear of the ArcWorld 6200 DR2C cell.

**NOTE:** The ground cable connection to the insulated ground bar must be tight. If the connection is loose, arcing can occur and cause the insulator to melt.

3.4.2 Locking Pins

The MRM2-series positioners are equipped with fixture locking pins that prevent the headstock/tailstock faceplates from turning when the servo motor retracts. The fixture locking pins are spring loaded, so when the servo motor withdraws, the pins engage. Each headstock faceplate has two locking pins.

The MRM2-500 and MRM2-750 positioners are also equipped with a pair of sweep lock drive pins that prevent the sweep axis from turning during the welding and loading cycles. One sweep lock drive pin is located on the headstock drive base and the other is located on the tailstock drive base.

**Table 3-1  MRM2-250 Positioner Specifications**

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>249.5 kg (550 lbs), combined part/fixture weight per side500 kg (1100 lbs) total</td>
</tr>
<tr>
<td><strong>Maximum Weight Differential per Side (Offset Load)</strong></td>
<td>190.6 kg (375 lbs)</td>
</tr>
<tr>
<td>Swing Diameter</td>
<td>0.98 m (37.4 in.)</td>
</tr>
<tr>
<td>Temperature Operating Range</td>
<td>4-43˚C (40-110˚F)</td>
</tr>
<tr>
<td>Humidity (maximum)</td>
<td>Non-condensing 10-90% relative humidity</td>
</tr>
<tr>
<td>Shock (maximum)</td>
<td>Less than 0.5 G</td>
</tr>
<tr>
<td>Positioner Sweep Speed (Torque/Time)</td>
<td>1000 N•m (737.6 lb-ft) in 4 to 6 seconds</td>
</tr>
<tr>
<td>Servo Headstock Speed</td>
<td>1050 N•m (774.4 lb-ft) @ 0–16.8 rpm</td>
</tr>
<tr>
<td>Air Requirements</td>
<td>620.5 kPa (90 psi)</td>
</tr>
<tr>
<td>Electrical Requirements</td>
<td>24V DC for interface</td>
</tr>
<tr>
<td></td>
<td>208V AC, 10 amp</td>
</tr>
<tr>
<td></td>
<td>3-phase power supplied by XRC controller</td>
</tr>
<tr>
<td>Welding Current Rating</td>
<td>800 amperes at 100% duty cycle</td>
</tr>
</tbody>
</table>
**Table 3-2 MRM2-500 Positioner Specifications**

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>500 kg (1100 lbs), combined part/fixture weight per side1000 kg (2200 lbs) total</td>
</tr>
<tr>
<td><strong>Maximum Weight Differential per Side (Offset Load)</strong></td>
<td>289.8 kg (639 lbs)</td>
</tr>
<tr>
<td><strong>Swing Diameter</strong></td>
<td>1.1 m (43.3 in.)</td>
</tr>
<tr>
<td><strong>Temperature Operating Range</strong></td>
<td>4-43˚C (40-110˚F)</td>
</tr>
<tr>
<td><strong>Humidity (maximum)</strong></td>
<td>Non-condensing 10-90% relative humidity</td>
</tr>
<tr>
<td><strong>Shock (maximum)</strong></td>
<td>Less than 0.5 G</td>
</tr>
<tr>
<td><strong>Positioner Sweep Speed (Torque/Time)</strong></td>
<td>2000 N•m (1475 lb-ft) in 5 to 7 seconds</td>
</tr>
<tr>
<td><strong>Servo Headstock Speed</strong></td>
<td>1060 N•m (781.8 lb-ft) @ 0–16.8 rpm</td>
</tr>
<tr>
<td><strong>Air Requirements</strong></td>
<td>620.5 kPa (90 psi)</td>
</tr>
<tr>
<td><strong>Electrical Requirements</strong></td>
<td>24 V DC for interface</td>
</tr>
<tr>
<td></td>
<td>208 V AC, 10 amp</td>
</tr>
<tr>
<td></td>
<td>3-phase power supplied by XRC controller</td>
</tr>
<tr>
<td><strong>Welding Current Rating</strong></td>
<td>700 amperes at 100% duty cycle</td>
</tr>
</tbody>
</table>

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

**Table 3-3 MRM2-750 Positioner Specifications**

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>750 kg (1650 lbs), combined part/fixture weight per side1500 kg (3300 lbs) total</td>
</tr>
<tr>
<td><strong>Maximum Weight Differential per Side (Offset Load)</strong></td>
<td>350 kg (770 lbs)</td>
</tr>
<tr>
<td><strong>Swing Diameter</strong></td>
<td>1.1 m (43.3 in.)</td>
</tr>
<tr>
<td><strong>Temperature Operating Range</strong></td>
<td>4-43˚C (40-110˚F)</td>
</tr>
<tr>
<td><strong>Humidity (maximum)</strong></td>
<td>Non-condensing 10-90% relative humidity</td>
</tr>
<tr>
<td><strong>Shock (maximum)</strong></td>
<td>Less than 0.5 G</td>
</tr>
<tr>
<td><strong>Positioner Sweep Speed (Torque/Time)</strong></td>
<td>3250 N•m (2397 lb-ft) in 6 to 8 seconds</td>
</tr>
<tr>
<td><strong>Servo Headstock Speed</strong></td>
<td>1725 N•m (1272.3 lb-ft) @ 14.2 rpm</td>
</tr>
<tr>
<td><strong>Air Requirements</strong></td>
<td>620.5 kPa (90 psi)</td>
</tr>
<tr>
<td><strong>Electrical Requirements</strong></td>
<td>24 V DC for interface</td>
</tr>
<tr>
<td></td>
<td>208 V AC, 10 amp</td>
</tr>
<tr>
<td></td>
<td>3-phase power supplied by XRC controller</td>
</tr>
<tr>
<td><strong>Welding Current Rating</strong></td>
<td>700 amperes at 100% duty cycle</td>
</tr>
</tbody>
</table>
3.4.3  Arc Shield

**WARNING!**
*Do not operate this equipment unless the arc screen is in place or eye damage can occur!*

The MRM2-series positioners are equipped with a sheet metal screen that runs between the face plates and visually separates the loading zone from the welding zone. This screen acts as a shield to protect the operator from the arc radiation and sparks produced by the welding operation.

3.5  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, Come-Arc units, and torch tenders may also be included with your system.

3.5.1  Power Sources

Motoman offers several different power sources for use with the ArcWorld 6200 DR2C system depending on your system’s application. The following are 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  Kobelco UC350 Power Source](image-url)
3.5.2 **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.

3.5.3 **Universal Welding Interface (UWI)**

The UWI provides microprocessor control to the wire feeder and MotoArc series power source. It scales the signals from the XRC 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 6200 DR2C system do not use the UWI. For more information specific to your system, refer to the vendor manuals shipped with your system.

3.5.4 **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.

3.5.5 **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.
3.6 Safety Features

The ArcWorld 6200 DR2C 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.

3.6.1 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 6200 DR2C system. The first is a metal arc screen that runs between the positioner face plates and acts as a shield to block 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 ultra-violet radiation that escapes from the robotic cell.

3.6.2 Fencing

The safety fencing provided with the ArcWorld 6200 DR2C system encloses the entire robotic cell. It forms a physical barrier preventing entry into the robot envelope during automatic operation.

3.6.3 Safety Mats

The ArcWorld 6200 DR2C safety mats help prevent serious injury to anyone entering the positioner area during the sweeping process. In PLAY mode, if the positioner is sweeping and a safety mat is activated, servo power is removed from the system and all positioner motion stops. Servo power is reapplied by pressing SERVO ON. However, the positioner will only continue its motion after it is reset using the RESET and right CYCLE START buttons on the operator station.

If the positioner is not in motion but the CYCLE START input has been latched (indicated by the STATION READY light), the CYCLE START input is unlatched and the STATION READY light turns off when the safety may is activated. Servo power remains ON.

3.6.4 Emergency Stops (E-STOPs)

In addition to the safety features described above, the ArcWorld 6200 DR2C 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 has one E-STOP button.
- The programming pendant has one E-STOP button.
- The operator station has one E-STOP button.
3.6.5 **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 XRC section in the manipulator manual that came with your system.

3.6.6 **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.

3.6.7 **Interference Cubes**

Cubic interference zones prevent interference between multiple manipulators or a manipulator and peripheral devices. The XRC monitors the robot tool center point (TCP) during operation. If the TCP enters one of the these software-defined interference zones, an output is turned on in the XRC. These outputs can be used to interlock the activity of other manipulators or peripheral devices. The XRC has eight possible cubes available. These cubes are internally tied to Specified Outputs:

\[
\begin{align*}
R1 &= \text{SOUT} \#081 - 088 \\
R2 &= \text{SOUT} \#089 - 096
\end{align*}
\]

The ArcWorld 6200 DR2C uses interference cubes to interlock robot position with positioner motion. The robot Home or Safe position (Cube 1) is defined behind the positioner, clear of the sweep zone. Each axis is placed in a position that provides the least amount of strain on the servo motors, with the U- and L- axes at 90˚ angles and the B axis in a relaxed, vertical position. This prevents drifting when servo power is off. Before the positioner can sweep, the robot must be in this safe position.

Setup of these cubes is done at the factory prior to shipment. However, should any of these cubes need redefined or modified due to changes in tooling or system components, refer to Appendix A for basic interference cube setup.

3.6.8 **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. The Brake Release Control is mounted on the front of the XRC cabinet (see Figure 3-1).
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
- Incoming air supply: 0.04 cmm at 620.5 kPa (1.5 scfm at 90 psi)
- Stepladder
- Forklift and/or overhead crane

4.1.2 List of Tools
- Safety glasses
- Face shields
- Gloves
- Level
- Rachet with 3/4-in. socket
- Adjustable wrench set
- Hammer drill with appropriate concrete bits
- Phillips and flat screwdrivers
- Hammer
- Socket set
- Forklift and/or overhead crane
- Air-impact gun with 3/4-in. socket
- Open-end wrench set
- Two socket-head (Allen)
- Wrench sets (standard and metric
4.2 Site Preparation

To prepare your site, proceed as follows:

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

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

NOTE: The ArcWorld 6200 DR2C system will require a minimum area of 2.5 m (8.2 ft) by 3.9 m (12.9 ft). To ease installation, however, we recommend an additional 2.43 to 3.05 m (8 to 10 ft) on all sides.
4.3 Installing the Robots and Positioner

The robots and the operator station are wrapped in protective plastic and shipped on a wooden shipping skid. The positioner and the two robot spanner and riser assemblies are shipped on separate large wooden shipping skids.

4.3.1 Installing the Robots in the Standard Position

**CAUTION!**
The ArcWorld 6200 DR2C system consists of precision machinery that must be handled carefully to prevent damage.

To install the robots and the positioner, proceed as follows:

1. Unbolt positioner and two spanner and riser assemblies from their wooden shipping skids (see Figure 4-2).

   ![Positioner and Robot Spanner and Riser Assemblies on Shipping Skids](image)

   **Figure 4-2** Positioner and Robot Spanner and Riser Assemblies on Shipping Skids

   **WARNING!**
   Lift the positioner from the operator's side. Do not lift the positioner from either the headstock or the tailstock end or damage to cables may occur.

   2. Using a forklift or overhead crane, lift positioner and remove from wooden shipping skid.

   3. Inspect positioner for any shipping damage.

   **NOTE:** If damage is found, notify the shipper immediately.

   4. Place positioner in position, as shown in Figure 4-3.

   **NOTE:** Make sure there is adequate room on all sides of the positioner for the fencing, the operator station, the safety mats, and the auxiliary equipment common base.
WARNING!
The spanner and riser assembly weigh 136 kg (300 lbs). Be sure that your crane or forklift is capable of handling this much weight or damage to equipment or injury to personnel can result.

5. Using a forklift or overhead crane, lift each spanner/riser assembly from shipping skid.

6. Place each spanner/riser assembly in position.

7. Bolt each spanner/riser assembly to positioner with 4 bolts and washers (see Figure 4-4).

8. Carefully remove protective plastic wrapping from each robot.

NOTE: R1 and R2 robot identifiers are marked on the front of the robot S-axis housing.

9. Identify R1 and R2 robots.

10. Inspect robots for any damage.

NOTE: If damage is found, notify shipper immediately.
Figure 4-4 Bolting Each Spanner and Riser Assembly to the Positioner

**WARNING!**
The SK6 robot weighs 145 kg (320 lbs); the SK16 weighs 280 kg (617 lbs). Be sure that your crane or forklift is capable of handling at least this much weight or damage to the equipment or injury to personnel can result.

11. To move robots into position, attach chains to a forklift or overhead crane, as shown in Figure 4-5.

12. Attach a chain hook to each of the eyebolts on body of each robot.

**CAUTION!**
- Always attach the lifting device to the robot before removing anchor bolts to prevent the robot from toppling.
- Be sure to use a spreader bar to keep the dual chains from pulling against the robot assembly causing damage.

13. Unbolt robots from skid.

14. Using forklift or overhead crane, carefully lift R1 robot and move it to riser marked R1.
4.3.2 Changing the Position of the Robots

The ArcWorld 6200 DR2C robots and risers bolt to the spanners in their optimum shipping positions. However, certain welding applications may require a different distance between the robots and positioner. Therefore, the system is designed so the robot positions can be changed. The range of robot positioning is shown in Figure 4-5. To change the position of either robot, proceed as follows:

**NOTE:** If the position of either robot must be changed, it is important to do so before removing the shipping brackets.

1. Attach a chain hook to each of the robot eyebolts (see Figure 4-5).
CAUTION!

- Always attach the lifting device to the robot before removing anchor bolts to prevent the robot from toppling.
- Be sure to use a spreader bar to keep the dual chains from pulling against the robot assembly and causing damage.

2. Attach chains to overhead crane.
3. Remove four bolts holding robot riser to spanner (see Figure 4-5).
4. Carefully lift robot (with riser) and move it to desired position on spanner.
5. Align holes on robot riser with holes on spanner.

4.3.3 Removing the Shipping Brackets

CAUTION!

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

Three yellow brackets (see Figure 4-6) prevent the robot from moving during shipping. Two angle 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.
4.4 Leveling and Securing the Equipment

Once the robot risers and positioner are in place, level equipment and secure to floor. The lag bolts are shipped in the accessories box. To level and secure the equipment, proceed as follows:

1. Level robots, spanners, and positioner by adjusting leveling bolts on each component (see Figure 4-7).
2. Insert a 1/2" concrete drill bit through center of leveling bolts and drill holes in floor for lag bolts.
3. Vacuum concrete dust from holes.
4. Lag spanners and positioner to floor.

![Figure 4-7 Location of Leveling Bolts on Robot Risers and Positioner]

4.5 Installing the Programming Platform

The ArcWorld 6200 DR2C system includes individual programming platforms that require assembly. Two configurations are available: a 24-inch assembly and a 36-inch assembly. The configuration you receive will depend on the height of the robot risers. The platform pieces are shipped on separate wooden shipping skids. Refer to assembly drawing 139047 in Appendix C for more details. To assemble and install the 24-inch programming platform, proceed as follows:

1. Remove programming platform pieces from shipping crates.
2. Using hardware provided, bolt steps to platform as shown in Figure 4-8.
3. Bolt kick plates to platform as shown in Figure 4-8. Refer to assembly drawing 139047 in Appendix C for location of kick plates for each platform.
4. Install brackets on platform for hand rail (see Figure 4-8). Refer to drawing 139047 for location of brackets for each platform. The center platform does not require brackets or hand rail.
5. Insert pins in top two holes in hand rail. Insert handrail into holes in brackets (see Figure 4-8). Install hair pins in lower holes to secure handrail in bracket.
Figure 4-8 Assembling the Programming Platform (24-inch)

6. Place platform sections around robot risers as shown in Figure 4-9.

7. Insert a 1/2" concrete drill bit through center of lag holes on base of platforms and drill holes in floor for lag bolts.

8. Vacuum concrete dust from holes.

9. Lag programming platforms to floor.

Figure 4-9 Location of the 24-Inch Programming Platform
To assemble the 36-inch programming platform, proceed as follows:

1. Remove programming platform pieces from their shipping crates.
2. Using hardware provided, bolt steps to left-hand platform, as shown in Figure 4-10.
3. Bolt kick plates and install handrail on left-hand platform. Refer to assembly drawing 139047 in Appendix C for location of kick plates and handrail. Handrail installation is also shown in Figure 4-10.

4. Install steps on center platform.
5. Install kick plates and handrail on right-hand platform.
6. Arrange all platforms, as shown in Figure 4-10.
7. Using hardware provided, bolt right-hand rear platform to right-hand platform and center platform.
8. Insert a 1/2" concrete drill bit through center of lag holes on base of platform and drill holes in floor for lag bolts.
9. Vacuum concrete dust from holes.
10. Lag programming platforms to floor.
4.6 Installing the Torch Tender Option

The optional torch tender is shipped in the robot shipping crate. To install the torch tender, proceed as follows:

1. Remove torch tenders from wooden shipping skid.
2. Place torch tenders in position next to programming platform, as shown in Figure 4-11. Be sure torch tender is within working range of robot. If you are unsure of robot’s working range, refer to manipulator manual that came with your system.
3. Drill into floor through holes in torch tender base.
4. Vacuum concrete dust from holes.
5. Lag torch tenders to floor.

![Figure 4-11 Location of the Torch Tenders](image)

4.7 Installing the Fencing

The fencing that makes up the welding cell’s protective walls is shipped on its own skid, all the hardware needed for the fencing, and specific assembly documentation (see Figure 4-12). To install the weld cell fencing, proceed as follows:

**NOTE:** The rear wall is the wall behind the robot, and the front wall is the wall in front of the positioner. The right wall is the wall that is on the right as you are facing the front wall, and the left wall is the wall that is on the left as you are facing the front wall.

**CAUTION!**

*Metal bands are under tension and, when cut, may cause injury. Be cautious when cutting the metal bands.*

1. Cut bands securing metal fencing and remove all items from skid.
2. Place fence components on floor around the robot and positioner, as shown in Figure 4-13.

3. Connect gate post to left side of rear wall, right section, at bottom (see Figure 4-14, Step A).

4. Connect a corner post to bottom section of right side of right rear wall (see Step B).
5. Connect corner post to front end of bottom section of right wall (see Step C).
6. Connect an end post to bottom and top halves of right front wall (see Step D).
7. Connect right front wall to bottom section of right wall at corner post (see Step E).
8. Raise right rear wall and right wall/front wall right sections. Bolt them together at corner post (see Step F).

![Figure 4-14 Assembly of the Fence Walls – Steps A through F](image)

9. Connect a corner post to rear end of bottom half of left wall (see Figure 4-15, Step G).
10. Connect end and corner posts to top and bottom halves of front wall left section (see Step H).
11. Connect front wall left section to bottom half of left wall at corner post (see Step I).
12. Connect right side of bottom and top halves of left rear wall to an end post (see Step J).
Figure 4-15 Fence Wall Assembly – Steps G through J

13. Raise left wall/front wall left section. Raise rear wall left section. Connect them at corner post (see Figure 4-16, Step K).

14. Steady left rear wall and install top door rail across door opening, using clamps provided (see Step L).

15. Install top halves of left wall, right rear wall, and right wall by bolting them to bottom halves and to end posts and corner posts (see Steps M, N, and O).
16. Raise cell door and slide it into position on door rail.
17. Close door and install remaining door rail clamp (see Figure 4-17).
18. Install stop bolt and tighten clamp.
19. Adjust door hangers until door latches firmly and securely.
20. Ensure cell walls are square.
21. After fence is in final position, insert a concrete drill bit through center of fence wall feet and drill holes in floor for lag bolts. Drill holes at locations shown in Figure 4-18. Drill two holes for each wall foot.
22. Vacuum concrete dust from holes.
23. Lag cell walls to floor.
24. Using bottom cell door guides as a template (see Figure 4-17), mark location of two mounting holes.
25. Remove bottom cell door guides.
26. Insert a concrete drill bit through center of pads and drill holes in floor for the lag bolts.
27. Vacuum concrete dust from holes.
28. Position bottom cell door guide (see Figure 4-17).
29. Lag cell door guides to floor to ensure smooth door operation.
4.8 Installing the Arc Curtains

The arc curtains are shipped in an accessories box. To install the arc curtains, proceed as follows:

![WIRE TIES](image)
![EYELETS](image)

**DANGER!**

_Do not install the arc curtains until after the cell walls have been lagged to the floor. Unsecured cell walls can fall and injure personnel and damage equipment._

1. Unfold arc curtains and install one curtain on inside of each cell wall, using supplied wire ties and eyelets in material (see Figure 4-19).

![Figure 4-19  Securing the Arc Curtains](image)

**NOTE:**

_The arc curtains have been pre-cut to match the cell walls. Each arc curtain bag contains documentation that includes the arc curtain’s dimensions. If necessary, these dimensions can be used to match the arc curtain to the correct cell wall._

2. Make sure there are no gaps between arc curtains.

3. Install door panel arc curtain on outside of door panel, using supplied wire ties and eyelets in curtain material.

4.9 Installing Auxiliary Equipment Common Bases

Each auxiliary equipment common (AEC) base contains an XRC controller, a welding power source, and disconnect. The common bases may also contain optional water circulators and Com-Arc III seam tracking units. The auxiliary equipment common bases are shipped on wooden shipping skids with accessories boxes secured to the top of the welding power sources. To install the AEC bases, proceed as follows:

1. Unbolt each AEC base by removing four shipping bolts using a 3/4-in. deep well socket (see Figure 4-20).
WARNING!
The auxiliary equipment common base weighs 680 kg (1500 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.

2. Using a forklift, lift each base and remove from wooden shipping skid.
3. Place AEC bases at least 0.6 m (2 ft) behind ArcWorld 6200 DR2C cell (see Figure 4-21).
4. Carefully remove protective plastic wrapping and cardboard from bases.
5. Remove accessories boxes from welding power sources and set safely aside.
6. Inspect AEC base components for any shipping damage.

NOTE: If damage is found, notify the shipper immediately.
Figure 4-21  Location of the Auxiliary Equipment Common (AEC) Base

**NOTE:** Once the auxiliary equipment is in place, level the equipment and secure it to the floor. The lag bolts are shipped in the accessories box. To level and secure the equipment:

7. Level each AEC base by adjusting leveling bolts (see Figure 4-22).

**NOTE:** The auxiliary equipment common bases do not have separate lag holes; lag holes must be drilled through the hole in the center of the leveling bolts.

8. Insert a 1/2" concrete drill bit through center of leveling bolts and drill a hole into floor.

9. Vacuum concrete dust from holes.

10. Lag each AEC base to floor.
4.10 Installing the Operator Station

To install the operator station, proceed as follows:

1. Unload operator station and carefully remove protective wrapping.
2. Inspect operator station for shipping damage.

*NOTE:* If damage is found, notify shipper immediately.

3. Place operator station in position, as shown in Figure 4-21.
4. Using appropriate concrete drill bit, drill through holes through operator station base.
5. Vacuum concrete dust from holes.
6. Lag operator station to floor.

4.11 Installing the Safety Mats

Safety mats require special handling to prevent damage to the internal electrode assembly. The safety mats and safety mat trim are wire-tied to the positioner base. The safety mat control box is mounted on the front of the positioner.

Grasp the mat by its long edges and lift, while causing a slight bow down the length of the mat (see Figure 4-23). This prevents the mat from kinking lengthwise. To install the safety mats, proceed as follows:
CAUTION!
Mats are susceptible to edge damage and bending. Be careful not to impact the edges or corners of the mats. Do not attempt to lift large mats alone.

1. Vacuum or sweep floor surfaces where mats will be mounted to ensure surfaces are flat, smooth, and free of debris.
2. Place safety mats in front of positioner (see Figure 4-24).

NOTE: The perimeter trim is placed along the outside perimeter of the safety mats. The activation strips are the wider pieces of trim used to cover the seam where two safety mats join.
3. Place two activation strips in position where safety mats join.
4. Place safety mat perimeter trim in position.

NOTE: For the perimeter trim, use a 1/4" drill bit; for the activation strips, use a 9/32" drill bit.
5. Holding activation strips and perimeter trim securely in place, drill 2.5 cm (1 in.) deep through pre-drilled holes into floor.

NOTE: It is important to drill straight down into floor. Activation strips are designed to "float" up and down when they are walked on. Angled mounting screws might interfere with this operation.
6. Remove activation strips and perimeter trim.
7. Remove any debris from underneath mats or trim.
8. Reposition activation strips and perimeter trim.
9. Insert appropriate anchors into holes for perimeter trim and activation strips.
10. Insert #10 x 1-1/4" screws into perimeter trim.
11. Tighten screws until mats are secure.
12. Insert #12 x 1-1/2" screws (smooth shank near head) into activation strips.
13. Tighten only until screw head makes contact with activation strips, and then back off 1/8 to 1/4 turn.

NOTE: Over-tightening screws on activation strips can cause mats to send a continuous stop signal.

4.12 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 for both the R1 and R2 robots is clearly identified for ease of installation. Please refer to your system drawing package for information on placement and installation of cables.

4.12.1 Connecting the Earth Ground

The robots and the controllers 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 eight feet 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 robots and XRCs, 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 50 feet 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 XRC are within 15 feet of each other, a common earth ground may be used. Otherwise, separate earth grounds must be used.

1. Connect one end of an earth ground cable to the lug marked EARTH GROUND on the bottom back of each robot.
2. Connect the other end of each of these cables to the earth ground stake.
3. Connect one end of another earth ground cable to the common ground bus bar inside each XRC.
4. Connect the other end of these cables to the earth ground stake.

### 4.12.2 Connecting the Welding Ground

The two ground welding cables are shipped in an accessories box. To connect the ground welding cables, proceed as follows:

1. Remove one of the ground welding cables from accessories box.
2. Connect one end of ground welding cable to grounding bolt located on robot side of positioner below servo motor (see Figure 4-25).
3. Connect other end of ground welding cable to negative (-) terminal on welding power source (see Figure 4-26).

4. Repeat Steps 1, 2, and 3 for other ground welding cable and power source.

![Grounding Weld Cable Connection](image)

**Figure 4-26 Positive and Negative Terminals on the Welding Power Source**

### 4.12.3 Connecting the Robot Cables

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

**NOTE:** The right side of the XRC 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 XRC controller.
2. Unpack two large black manipulator cables, connected to XRC controller, and route to back of robot.
3. Carefully engaging connectors, connect two cables (labeled 1BC and 2BC) to 1BC and 2BC connections on back of robot (see Figure 4-27).
4. Connect positive power source cable from robot #1 (R1) to positive weld cable connection on front of R1 power source.
5. Connect positive power source cable from robot #2 (R2) to positive weld cable connection on front of R2 power source.
4.12.4 Connecting the System Interface Box

The system interface box is mounted on the back of the system fencing. To connect the system interface box, proceed as follows:

1. Locate and unpack Door Switch cable and connect to side of interface box.
2. Unpack safety mat cable and connect between safety mat junction box on front of positioner and interface box.
3. Unpack operator station cable and connect to interface box.
4. Unpack two positioner cables from interface box and connect to left side of XRC cabinet.
4.12.5  **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 form weld torch to connections on water circulator marked WATER-IN and WATER-OUT (see Figure 4-28).

![Figure 4-28 Water Circulator Connections](image)

2. Plug power cable into electrical outlet on back of power source.

4.13  **Connecting the Power**

After all of the system components have been properly installed, connect the power to the ArcWorld 6200 DR2C.

**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.*

To connect incoming power to the ArcWorld 6200 DR2C:

1. Install 3-phase power wiring to circuit breaker located inside left wall of each XRC cabinet (see Figure 4-29). Table 4-1 shows the size and type of wire needed.
2. Tighten screws to torque indicated in Table 4-1.
Figure 4-29  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 6200 DR2C 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.

Table 4-1  Incoming Power Specifications (Decal)

<table>
<thead>
<tr>
<th>Lug Data</th>
<th>60/75°C wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catalog No.</td>
<td>TCAL14</td>
</tr>
<tr>
<td>Wire Size</td>
<td>#14-7 Copper</td>
</tr>
<tr>
<td></td>
<td>#12-8 Aluminum</td>
</tr>
<tr>
<td>Torque</td>
<td>#14-7, 4.0 N•m (35 lb-in.)</td>
</tr>
</tbody>
</table>
4.14 **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:

1. Check that all three yellow shipping brackets have been removed from robots and positioner (see Section 4.3.3).
2. Be sure there is a clearance of at least 2.5 cm (1 in.) on either side of positioner.
3. Be sure safety mats are placed correctly.
4. Check that cell door is closed and latched.
5. Check that all cable connections are tight.
6. Be sure that the welding power source is set correctly (see the welding power source vendor’s manual).
7. Check air line connections to positioner air line regulator and to optional torch tender and wire cutter.
8. Verify that incoming line power matches the input power specified on the sticker on the front of the XRC.

Your ArcWorld 6200 DR2C 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.

9. Check all system E-STOPS (pendant, op-station, breakaways, playback box).
10. Check system Hold buttons.

4.15 **Installation of Tooling and Fixtures**

**WARNING!**

*When loading fixturing and/or tooling weighing over 90.7 kg (200 lbs) per side, the arcscreen must be removed and the fixturing loaded on the robot side. Do Not sweep the positioner to load the robot side!*

Your ArcWorld 6200 DR2C 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 the positioner for proper operation:

- Verify that the air line FRL is set for 620.5 kPa (90 psi).
- Positioner achieves full sweep time (4 - 8 seconds, depending on positioner).
SECTION 5
OPERATION

The ArcWorld 6200 DR2C is a fully integrated robotic gas metal arc welding (GMAW) cell. The Master job setup, and the sub-jobs programmed within it, determine how the robots perform the welding operation or other tasks. The robots weld parts on one side of the reciprocating positioner, while the operator loads or unloads parts on the opposite side. Once the robots finish with the welding process, they return to the Safe position. The operator then sweeps the positioner 180° to the opposite side, which moves the next set of parts into the welding zone and enables the robots to start welding.

The MRM2-250, MRM2-500, and MRM2-750 positioners use a 180° reciprocating motion that sweeps the table from the operator's loading zone, into the robots' work zone, and back. The positioner screen visually divides the positioner table into two rectangular halves, labeled Side A and Side B. As the positioner reciprocates, Side A moves under the primary axis and Side B moves over the primary axis. When Side A is in the robots' welding zone, Side B is facing the operator and ready to be loaded or unloaded, and vice versa. Additionally, the headstock/tailstock on both Sides A and B rotate, which provides two welding surfaces per side. Loading fixtures and pneumatic or electric lines can be attached to the headstock and tailstock on both sides. Loading fixtures must be supplied by the customer.

5.1 Programming

The operation of this system is programming dependent. The operating instructions included in this section 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. 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).

A major advantage of the ArcWorld 6200 DR2C system is its high degree of flexibility. The operator can fine tune the movement of the robots and the positioner according to the parts configuration. The MRM2-series positioner, with its programmable primary axis and headstocks, proves highly versatile when configured with the UP6 or SK16X robot.

The robots can be programmed to weld a part with the headstock stationary, or the robots and headstock can move simultaneously to weld a part while turning. Both robots may be programmed to weld different seams on the same part or each robot may be programmed to execute a completely different job at the same time.
With the programming pendant, the operator can develop a series of jobs for the robots. You can program the R1 robot (R1) independently, the station axis independently (S1 job), or R1 robot and station axis together (R1 + S1 job combinations). You must select the axis combination when teaching the job initially. Motoman recommends programming the robot and station axis together (R1 + S1 jobs) to reduce the risk of interference.

### 5.1.1 I/O Assignment

The ArcWorld 6200 DR2C uses the following user and dedicated inputs and outputs (see Tables 5-1 and 5-2).

**XRC Dedicated Inputs**
- Servo On
- External Job Start
- Alarm Reset
- REMOTE mode ON
- Hold
- External Emergency Stop

**XRC Dedicated Outputs**
- Servo Power ON
- TEACH mode
- Cube 1
- Alarm Occurrence

**Table 5-1 XRC User Inputs**

<table>
<thead>
<tr>
<th>Input</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN#001</td>
<td>CYCLE START</td>
</tr>
<tr>
<td>IN#002</td>
<td>AUTO/MANUAL</td>
</tr>
<tr>
<td>IN#009</td>
<td>FIXTURE A IS LOCKED FIXTURE A LOCK ON</td>
</tr>
<tr>
<td>IN#010</td>
<td>FIXTURE B IS LOCKED FIXTURE B LOCK ON</td>
</tr>
<tr>
<td>IN#011</td>
<td>SERVO DRIVE UNIT IS RETURNED SERVO DRIVE RETURNED</td>
</tr>
<tr>
<td>IN#012</td>
<td>SERVO DRIVE UNIT IS FORWARD SERVO DRIVE FORWARD</td>
</tr>
<tr>
<td>IN#013</td>
<td>SERVO LOCK PIN IS FORWARD SERVO LOCK ON</td>
</tr>
<tr>
<td>IN#014</td>
<td>SERVO LOCK PIN IS RETURNED SERVO LOCK OFF</td>
</tr>
<tr>
<td>IN#015-016</td>
<td>NOT USED</td>
</tr>
</tbody>
</table>
5.2 Daily Operation

The following is the typical sequence of operation for the ArcWorld 6200 DR2C cell after start-up:

1. Load production parts on fixtures located on operator side of positioner.
2. Press both CYCLE START palm buttons on the operator station. CYCLE LATCHED light comes on, positioner sweeps, placing unwelded parts in robot welding area and returns empty side to operator loading area.
3. After the positioner sweeps, robots begin welding sequence on parts. Coordinated motion capabilities allow positioner to rotate parts on positioner, while robots move and weld at same time.
4. Load more parts to be welded into fixture on operator side of positioner.
5. Press both CYCLE START palm buttons on operator station. CYCLE LATCHED light comes on. The robots finish welding and return to Safe Position (Cube 1), positioner sweeps returning welded parts outside cell and placing newly loaded, unwelded parts in robot work area.
6. Unload welded parts from fixture.

**NOTE:** Before sweeping at first power up, make sure the correct job has been loaded, and weight of parts and fixtures is approximately equal on both sides of positioner (refer to Section 3.4).

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 XRC to ON.
3. Set INPUT POWER switch on welding power source to ON.
4. Open regulator valve on welding gas supply.
5. Make sure both enclosure doors are closed and securely latched.
6. Disable operator station.
7. Press TEACH mode button on XRC playback panel.
8. Place robots in Safe position (Cube 1).

**Table 5-2 XRC User Outputs**

<table>
<thead>
<tr>
<th>Output</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT#001</td>
<td>CYCLE LATCHED</td>
</tr>
<tr>
<td>OUT#004-005</td>
<td>WIRE CUTTER</td>
</tr>
<tr>
<td>OUT#006-008</td>
<td>NOT USED</td>
</tr>
<tr>
<td>OUT#009</td>
<td>WITHDRAW SERVO</td>
</tr>
<tr>
<td>OUT#010</td>
<td>ADVANCE SERVO</td>
</tr>
<tr>
<td>OUT#011</td>
<td>SWEEP LOCK ON</td>
</tr>
<tr>
<td>OUT#012</td>
<td>SWEEP LOCK OFF</td>
</tr>
<tr>
<td>OUT#013-016</td>
<td>NOT USED</td>
</tr>
</tbody>
</table>
5.2.2 Robot Safe (Cube 1) Position

To move the robots to the Safe position (Cube 1), proceed as follows:
1. Press TEACH mode button on XRC 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 Cube 1 job and press SELECT. Cube 1 job appears on display screen.
6. Turn servo power ON by pressing SERVO ON, pressing TEACH LOCK and holding in ENABLE switch.
7. Use INTERLOCK and FWD buttons on programming pendant to jog robot to Safe (Cube 1) 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 both enclosure doors are closed and securely latched.
6. Press PLAY mode button on playback panel. Playback operation is enabled.
7. Press SERVO ON button on playback panel.
8. Reset positioner by simultaneously pressing RESET and right CYCLE START buttons on operator station.
9. Place ENABLE/DISABLE switch on operator station in ENABLE position. XRC is placed in REMOTE mode and system control is transferred to operator station.

The ArcWorld 6200 DR2C cell is now ready for operation.

5.2.4 Shutdown

Use the following procedure to shut down the ArcWorld 6200 DR2C cell after operation is complete:
1. Make sure robots are in Safe position (Cube 1).
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.

The ArcWorld 6200 DR2C cell is now shut down.
5.3 System Recovery

Under certain conditions you will be required to clear an alarm or error. Clearing an alarm or error requires different operator actions depending on the type. 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 RESET (F5) 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 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.
- Stepping on safety mat when positioner is sweeping.
- Actuating the shock sensor on the torch mount.
- Loss of air system pressure.

To restart the ArcWorld 6200 DR2C cell after an E-STOP condition occurs, follow the procedure below.

1. To clear the E-STOP condition, perform any of the following actions that apply:
   - Release E-STOP button on the operator station, programming pendant, or XRC playback panel.
   - Close the sliding door and connect the safety plug.
   - Step off the safety mat.
   - Clear the Shock Sensor condition (refer to Section 5.3.3).
   - Restore operating air pressure.
CAUTION!
If an emergency stop condition occurs while the positioner is sweeping, the positioner will continue the sweep when system is reinitialized.

2. Press SERVO ON button on operator station, programming pendant or playback panel.
3. Press RESET button and right CYCLE START button on operator station to initialize system.
4. Ensure operator station is enabled.
5. Press MASTER JOB START button on operator station.

The ArcWorld 6200 DR2C cell is now ready to continue operation.

5.3.3 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. Place SHOCK SENSOR OVERRIDE switch, located on front of feeder, into OVERRIDE position.
2. Press CANCEL on programming pendant to clear alarm.
3. 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.

4. Move manipulator clear of impact position.
5. Move Shock Sensor Override switch to SHOCK SENSOR position.

The ArcWorld 6200 DR2C cell is now ready to continue operation.
5.3.4 Using the Brake Release

The brake release control panel is located on front of the XRC. Each axis brake is controlled by an individual axis button. 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 axis. Listed below are weights support should be able to hold:
   - UP6 21 pounds
   - SK16X 55 pounds

![WARNING!](image)

**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.
SECTION 6
MAINTENANCE

6.1 Periodic Maintenance

For periodic maintenance procedures and schedules for UP6 and SK16X robots and the XRC controller, refer to the manipulator manual that came with your system. For additional maintenance information about the reciprocating positioner, refer to your positioner manual.

For maintenance information about the welding power source, refer to your MotoArc Owner’s Manual.

Table 6-1 provides a list of periodic maintenance to be performed on the ArcWorld 6200 DR2C cell. Keep in mind that the maintenance intervals given serve as guidelines only. You should adjust the frequency of maintenance to suit your specific work conditions.

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.

- Excessive copper ground lubricant may damage weld ground due to electrical arcing through air pockets in grease.

Table 6-1 Periodic Maintenance

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Component</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regularly</td>
<td>MRM2-250 servo head-stock RV drive unit</td>
<td>Check for proper grease levels and quality. Use Epinoc APO grease (Motoman P/N 132434-1) as required.</td>
</tr>
<tr>
<td>Daily</td>
<td>Water circulator (for water-cooled torch application only)</td>
<td>Check the fluid in the water circulator. Add fluid as required. Use only distilled water and approved antifreeze (Motoman P/N 131224-1).</td>
</tr>
<tr>
<td>Daily</td>
<td>Air system water trap on the front of the MRM2 positioner</td>
<td>Check water trap and empty if required.</td>
</tr>
<tr>
<td>Monthly</td>
<td>MRM2 weld grounds</td>
<td>Lubricate with Burndy Penetrox E conductive copper lubricant (P/N PEN-E-8).</td>
</tr>
<tr>
<td>Monthly</td>
<td>Cables</td>
<td>All electrical cables should be inspected for wear and breakdown. Check cable connections for tightness.</td>
</tr>
</tbody>
</table>
6.2 **Spare Parts List**

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>ArcWorld 6200 DR2C safety mat kit</td>
<td>130157-5</td>
</tr>
<tr>
<td>Safety mat controller box</td>
<td>131038-1</td>
</tr>
<tr>
<td>Positioner interface 4-pole relay, 24V DC</td>
<td>470108-5</td>
</tr>
<tr>
<td>Positioner interface fuse, 2A 250V</td>
<td>400647-3</td>
</tr>
<tr>
<td>Positioner interface fuse, 1/2A 250V</td>
<td>130293-2</td>
</tr>
<tr>
<td>Positioner valve, 4-way, double solenoid</td>
<td>132108-1</td>
</tr>
</tbody>
</table>

### Tables 6-2 through 6-4 give the locations of fuses and circuit breakers that are significant to the operation of the total system. In most cases, spare fuses are placed in the accessory bag with the controller.

**WARNING!**

*Replace fuses with those of the same type and rating. Replacement with fuses of higher amperage rating or lower voltage will damage the robot controller and/or auxiliary equipment, necessitating costly replacement.*

**Abbreviations:**
- CB — designates circuit breaker
- F, FU, or 101FU — designates fuse
Table 6-3  MotoArc 450 CV Fuses and Circuit Breaker

<table>
<thead>
<tr>
<th>Designator</th>
<th>Rating</th>
<th>Part #</th>
<th>Location</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>CB1</td>
<td>10A 115V</td>
<td>203627-7</td>
<td>Upper rear panel</td>
<td>Protects 115V circuit.</td>
</tr>
<tr>
<td>CB2</td>
<td>10A 24V</td>
<td>203627-7</td>
<td>Upper rear panel</td>
<td>Protects 24V circuit.</td>
</tr>
<tr>
<td>F1</td>
<td>0.5A W-11166-11</td>
<td>On contactor box</td>
<td>Protects contactor circuit.</td>
<td></td>
</tr>
</tbody>
</table>

Table 6-4  Universal Welding Interface (UWI) Fuses

<table>
<thead>
<tr>
<th>Designator</th>
<th>Rating</th>
<th>Part #</th>
<th>Location</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>8A 250V</td>
<td>Wickman 19374K-4A</td>
<td>On KXA motor speed control</td>
<td>Limits damage from shorts or component breakdowns in DC power supply module.</td>
</tr>
<tr>
<td>FU2</td>
<td>0.25A 125V</td>
<td>Wickman 19303K-500A</td>
<td>On interface board</td>
<td>Protects shock sensor circuit.</td>
</tr>
<tr>
<td>FU3</td>
<td>0.5A 125V</td>
<td>Wickman 19303K-500A</td>
<td>On interface board</td>
<td>Protects 24V circuit.</td>
</tr>
<tr>
<td>Fuse</td>
<td>1A 250V</td>
<td>TD-1</td>
<td>Front of Com-Arc box</td>
<td>Protects 200V circuit.</td>
</tr>
</tbody>
</table>
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