

# Motoman XRC 2001 Controller TR3C Conversion Instructions

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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 Triple-Robot, 3-Controller (TR3C) is part of the Motoman family of robotic solutions and is fully supported by Motoman, Inc. The TR3C features three Motoman robots and three XRC 2001 controllers connected together by a series of cables. This configuration allows the three robots to operate as a fully functional triple robot system, taking full advantage of all the unique functions available only in a triple robot system configuration. The TR3C can be divided into three completely separate, stand alone units. **Reinitialization of the XRC 2001 controllers after setup or separation must be performed by a trained Motoman technician. Reinitialization of the XRC 2001 controller by a non-Motoman employee may void your warranty.**

### **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 TR3C 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 TR3C system.

#### **SECTION 3 - SETUP INSTRUCTIONS**

This section provides detailed instructions for set up of the TR3C.

#### **SECTION 4 - SEPARATION INSTRUCTIONS**

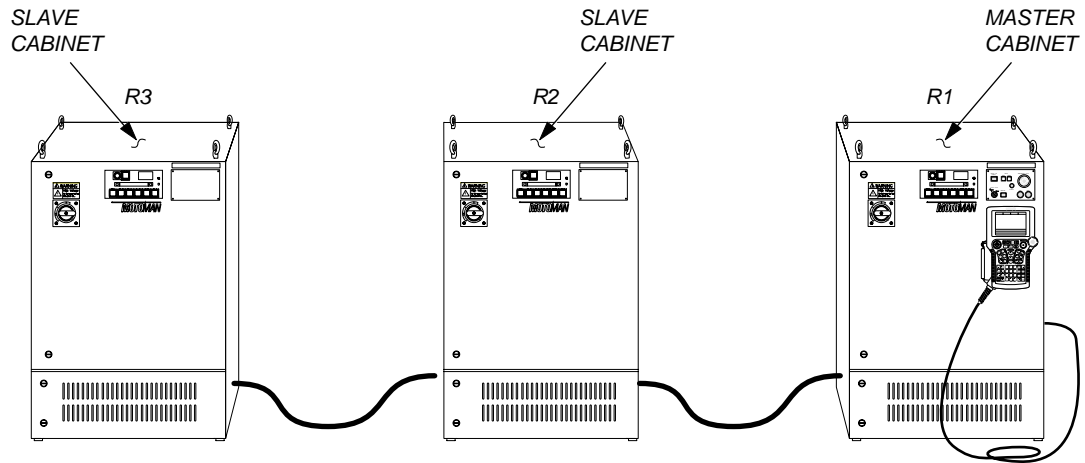
This section provides detailed instructions for separation of the TR3C.

#### **APPENDIX**

The Appendix contains references to system drawings.

## 1.2 System Overview

The TR3C is designed around three XRC 2001 controllers - master and two slaves. The master controller will hold the programming pendant. A communication cable connects the three controllers, giving the master control over both slaves. Figure 1-1 illustrates the system layout of the TR3C.



**Figure 1-1 TR3C System Layout**

The TR3C system includes the following major components:

- Three Motoman manipulators
- Three XRC 2001 controllers
- TR3C Controller Kit (P/N 146665)

## 1.3 Reference to Other Documentation

For additional information refer to the following:

- Motoman UP6 Manipulator Manual (P/N 145960-1)
- Motoman UP20 Manipulator Manual (P/N 145965-1)

## 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
- Application Type (welding)
- System Type (TR3C)
- Software Version (access using TOP MENU/SYSTEM INFO/VERSION/SYSTEM on the programming pendant)
- Robot Serial Number (located on the back side of the robot arms)
- Robot Sales Order Number (located on front of XRC 2001 master controller)

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# **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 2.2)
- 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 XRC 2001 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).

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## **SECTION 3**

# **SETUP INSTRUCTIONS**

Three XRC 2001 controllers can be easily combined to create the TR3C in just a short time. Follow established safety procedures at all times throughout the setup process. Failure to use safe work practices can result in damage to the equipment and injury to the workers.

Reinitialization of the XRC 2001 controllers after setup must be performed by a trained Motoman technician. Reinitialization of the XRC 2001 controller by a non-Motoman employee may void your warranty.



### **CAUTION!**

***It is the customer's responsibility to ensure that all XRC 2001 controllers use the same software version prior to initialization of system as TR3C. If there is a difference in software versions, call the Motoman Service Staff at 937.847.3200.***

## **3.1 Materials Required**

All system hardware necessary for set up of the TR3C is included with the system. Make certain you have the following kit before beginning setup procedures.

P/N 146665 Controller Kit, TR3C, XRC 2001

*NOTE: All three controllers must use the same software version. If there is a difference in software versions, call the Motoman Service Staff at 937.847.3200. Access the software version using TOP MENU/SYSTEM INFO/VERSION/SYSTEM on the programming pendant)*

### **3.1.1 Customer-Supplied Items**

- Incoming power supply
- Safety glasses
- Phillips and flat screwdrivers
- Wire ties
- Wire cutters

## 3.2 Slave XRC 2001 Setup



### **DANGER!**

**All power must be removed from all XRC 2001 controllers before setup begins. Failure to remove power before setup will cause serious personal injury, loss of life, or equipment damage. Be sure to follow all Lockout/Tagout procedures.**



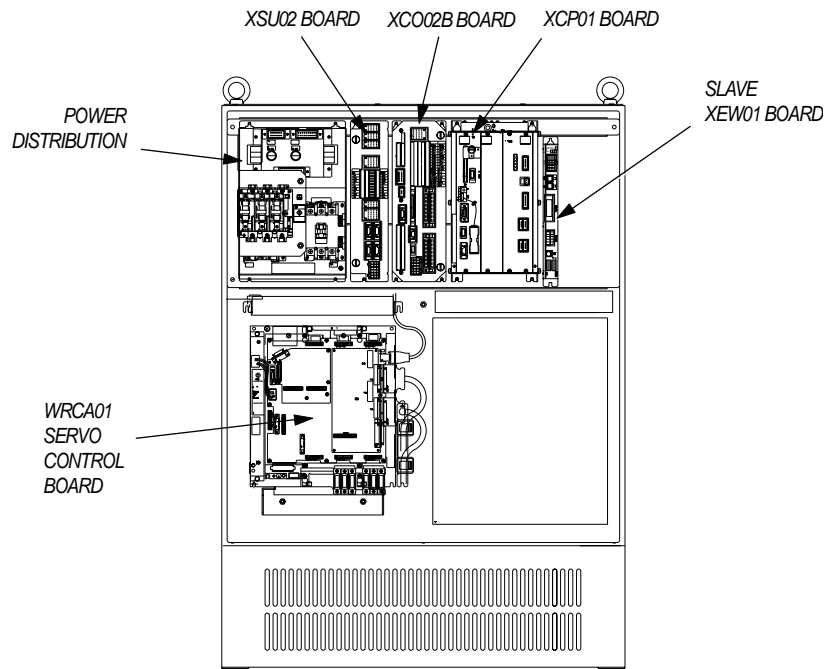
### **CAUTION!**

**Be sure to follow proper anti-static procedures to avoid damage to system components.**

Several modifications must be made to a slave controller. To set up a Slave XRC 2001 controller for TR3C operation, proceed as follows:

### 3.2.1 Removing Cables from the Slave Controllers

1. Open the slave XRC 2001 cabinet and locate XSU02 board (see Figure 3-1).



**Figure 3-1 Slave Controller Components**

2. Remove the cables from the following WRCA01 servo board connector and store in wire duct below board. This must be done on both R2 and R3.
  - CN10
3. Remove cable from the following XSU02 connectors and store in wire duct below board. This must be done on both R2 and R3.
  - CN23 and CN24 in R2
  - CN23 in R3

### **3.2.2 Removing the Playback Panel**

*NOTE:* These instructions need completed on both slave cabinets.

1. Locate playback panel on door and disconnect all cables and store in wire duct below playback panel.
2. Wire-tie loose connectors safely out of way.
3. Unbolt playback panel by removing four bolts and place into anti-static bag.

*NOTE:* The playback panel should be stored in a safe and dry location for future use should the TR3C need to be separated in the future.

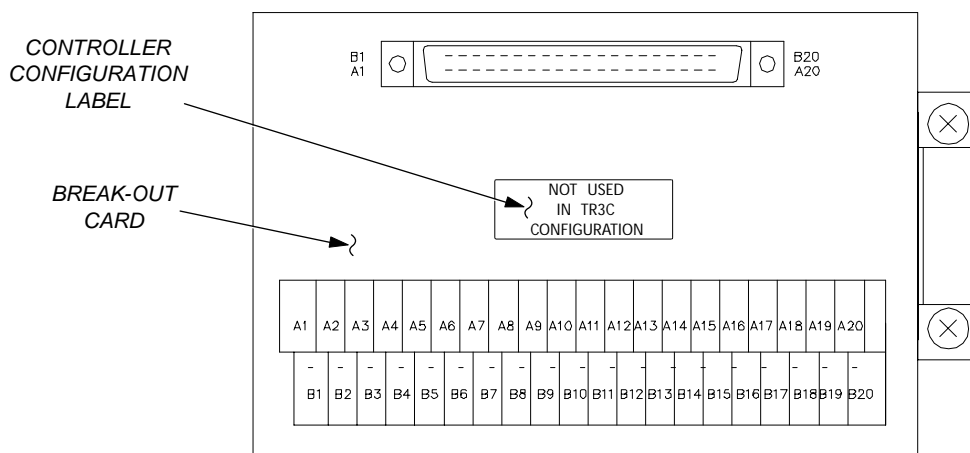
4. Install playback panel cover plate (P/N 143386-1) over opening left in door using four bolts removed in Step 3.
5. Disconnect programming pendant and pack safely away.
6. Cover programming pendant connector with plug provided.

### **3.2.3 Wiring the R2 Slave Controller**

#### **Connecting the TR3C Communication Cable**

The TR3C communication cable enables communication between the R1 master and R2 slave servo control boards and I/O units. To begin connecting the TR3C communication cable to the slave controller, proceed as follows:

1. Remove the XSU02 board from the controller. Locate SW1 and SW2 on the XCT01 board and set as follows: SW1 = 1-2, SW2 = 1-2. Reinstall XSU02 board in controller.
2. Remove one cable plate from side of R2 slave controller, adjacent to R1 controller.
3. Insert TR3C communication cable (P/N 146579) through opening and attach cable plate to controller with screws provided. Remove termination resistor and save for future separation.
4. Attach CN10 connector from communication cable to the front CN10 connection on servo control board.
5. Attach CN23 connector from communication cable to CN23 connection on XSU02 board.
6. Locate rotary switch on servo control board and set to one.
7. Place DR2C controller configuration labels, P/N 146483-1, on each break-out card (see Figure 3-2) in the controller, XCP01 board, and XCO02B board.



**Figure 3-2 Label Location**

Instructions 8 - 11 deal with connections for TR3C communications cable between R2 slave and R3 slave controllers.

8. Remove one cable plate from the side of R2 slave controller, adjacent to R3 controller.
9. Insert TR3C communication cable (P/N 146579) through the opening and attach cable plate to controller with screws provided.
10. Attach CN10 connector from communication cable to the back CN10 connection on servo control board. Save the terminating resistor for future use.
11. Attach CN24 connector from communication cable to CN24 connection on XSU02 board.

### **3.2.4 Wiring the R3 Slave Controller**

#### **Connecting the TR3C Communication Cable**

The TR3C communication cable enables communication between the R2 slave and R3 slave servo control boards and I/O units. To begin connecting the TR3C communication cable to the slave controller, proceed as follows:

1. Remove the XSU02 board from the controller. Locate SW1 and SW2 on the XCT01 board and set as follows: SW1 = 2-3, SW2 = 1-2. Reinstall XSU02 board in controller.
2. Remove one cable plate from the side of R3 slave controller, adjacent to R2 controller.
3. Insert TR3C communication cable (P/N 146579) through opening and attach cable plate to controller with screws provided.
4. Attach CN10 connector from communication cable to CN10 connection on servo control board.
5. Attach CN23 connector from communication cable to CN23 connection on XSU02 board.
6. Locate rotary switch on servo control board and set to two.
7. Place labels, P/N 146483-1, on break-out cards in bottom of controller, XCP01 board, and XCO02B board.



## 3.3 Master XRC 2001 Setup



### **CAUTION!**

**Be sure to follow proper anti-static procedures to avoid damage to system components.**

### 3.3.1 Connecting the TR3C Communication Cable

The TR3C communication cable enables communication between the R1 master and R2 slave servo control boards and I/O units. To begin connecting the TR3C communication cable to the master controller, proceed as follows:

1. Remove the XSU02 board from the controller. Locate SW1 and SW2 on the XCT01 board and set as follows: SW1 = 1-2, SW2 = 1-2. Reinstall XSU02 board in controller.
2. Remove one cable plate from the side of master controller, adjacent to R2.
3. Insert TR3C communication cable (P/N 146579) through opening and attach cable plate to controller with screws provided.
4. Locate servo control board.
5. Remove terminator from CN10 connection on servo control panel and save resistor for future separation.
6. Attach CN10 connector from communication cable to CN10 connection on servo control board.
7. Connect CN24 connector from communication cable to CN24 connection on XSU02 board.
8. Locate rotary switch on servo control board and set switch to zero.

### 3.3.2 Removing the XEW01 board

#### **Preferred Method**

If your system is set up for welding applications, the system is configured to include an XEW01 board.

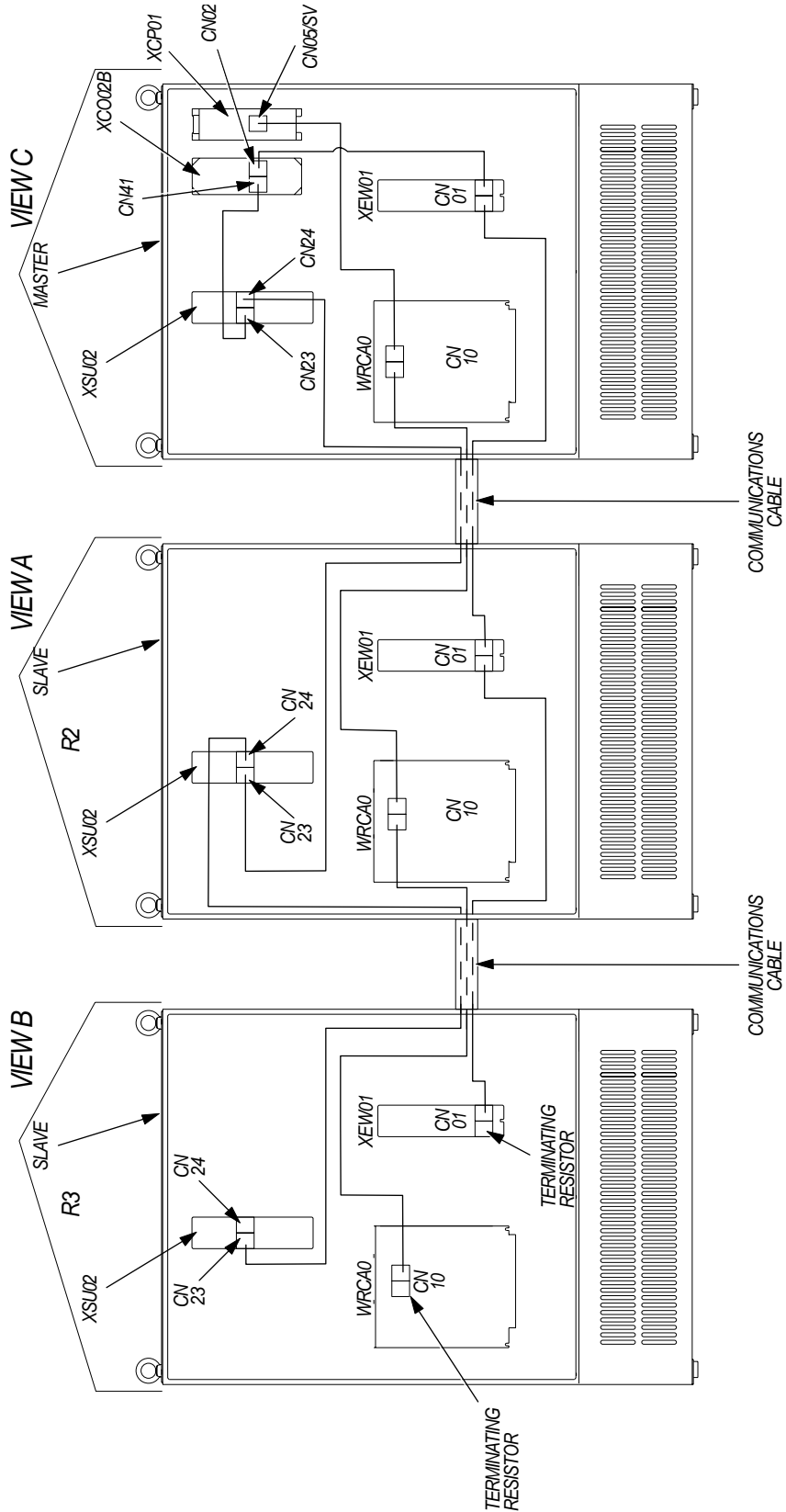
There are two ways to connect the XEW01 boards:

1. Connect the XEW01 board by locating XEW01 board in each controller (master and slaves). Following steps below:
  - a) Master Controller
    - Remove terminating resistor from CN01 and connect cable connector labeled I/O module from 146579 cable assembly to XEW01, CN01.
  - b) Slave Controllers
    - Locate cable connecting XEW01-CN01 to XCO02B-CN02 and disconnect.
    - Connect cable connector labeled I/O module from 146579 cable assembly, to XEW01, CN01.
    - Locate S1 rotary dials on Master and Slave XEW01 boards and set dials to correct numbers (Master R1=1, Slave R2=2, Slave R3=3).

**NOTE:** *The middle slave controller will have two cables connected to the XEW01, CN01 connector. One cable will be from the master connector to the slave, the other cable will be from the slave (middle controller) to the slave.*

### 3.3.3 Connection Diagram (Preferred Method)

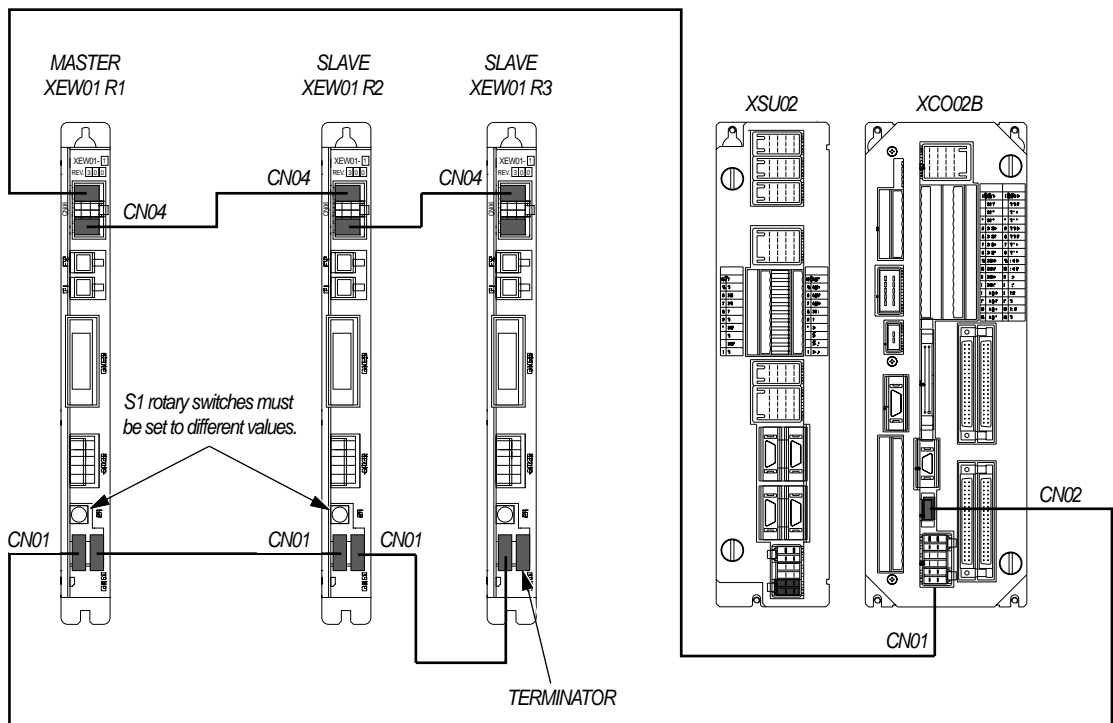
Figure 3-3 details the wire connections for the TR3C.



**Figure 3-3 TR3C Connection Diagram**

**Optional Method**

2. Locating all XEW01 boards in the master controller. The XEW01 board must be removed from the slave controllers and placed in the master. To remove the XEW01 board, proceed as follows:
  - a) Locate XEW01 board (see Figure 3-5).
  - b) Locate cable connecting XEW01- CN04 to XCO02- CN01 and disconnect from XCO02- CN01.
  - c) Locate cable connecting XEW01- CN01 to XCO02B- CN02 and disconnect from XCO02B- CN02.
  - d) Loosen two M4 screws and remove XEW01 board.
  - e) Place XEW01 board, cables and hardware in anti-static bag until ready for placement in Master controller. See Figure 3-4 for the preferred XEW01 wiring method.



**Figure 3-4 XEW01 Wiring – Preferred Method**

**3.3.4 Installing the Slave XEW01 Board**

**Optional Method Continued**

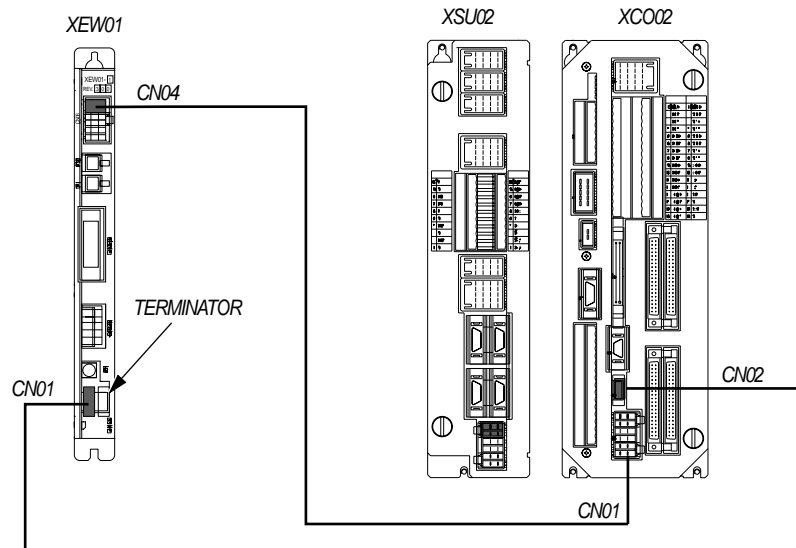
If the TR3C is to be set up for welding applications, the XEW01 board removed from the slave controllers must be installed into the master XRC 2001. To install the XEW01 board, proceed as follows:

1. Open Master XRC 2001 cabinet.
2. Locate XEW01 board removed from Slave controller.
3. Insert Slave XEW01 board to right of Master XEW01 board.
4. Attach XEW01 board to panel on back of master controller using M4 hardware provided.

## **Wiring the Slave XEW01 Board**

### **Optional Method Continued**

1. Locate CN01 connector on Master XEW01 board (see Figure 3-5).



**Figure 3-5 XEW01 Wiring**

2. Remove terminator from right side of Master CN01 connector.
3. Locate cable connected to CN01 on Slave XEW01 board.
4. Connect other end of Slave CN01 cable to right side of Master CN01 connector.
5. Insert terminator removed from Master CN01 connector and insert into right side of Slave CN01 connector.
6. Locate cable connected to CN04 on Slave XEW01 board.
7. Connect other end of Slave CN04 cable to bottom of Master CN04 connector.
8. Locate S1 rotary dials on Master and Slave XEW01 boards and set dials to correct numbers (Master R1=1, Slave R2=2, Slave R3=3).

## **3.4 Connecting the Power**

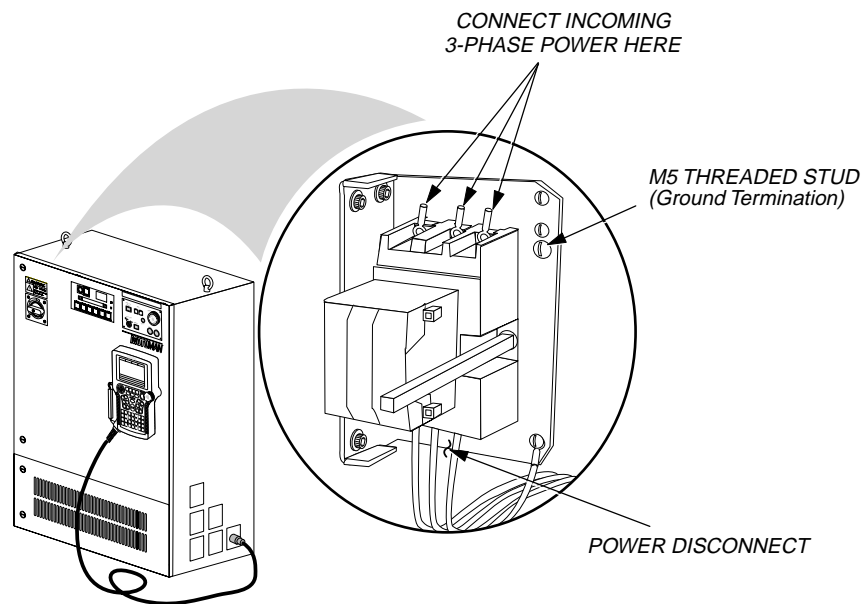
After all of the system components have been properly installed, three-phase AC power must be connected to all controllers. To connect incoming power to the TR3C, proceed as follows:



### **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 circuit breaker located inside XRC 2001 cabinet (see Figure 3-6). The engineering drawings show the size and type of wire needed.
2. Tighten screws to specified torque indicated on engineering drawings.



**Figure 3-6 Incoming Power Connections**

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

**NOTE:**

*The TR3C 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.*

## 3.5 Power up Instructions



### **WARNING!**

**The Master XRC 2001 controller must first be configured as a triple before any external axes can be added. Failure to do so will cause the TR3C system to not operate correctly.**

1. Turn on power to Slave controllers first.
2. Turn power on to Master controller.

## 3.6 Initialization of the Controller

Reinitialization of the XRC 2001 controllers after setup must be performed by a trained Motoman technician. Reinitialization of the XRC 2001 controller by a non-Motoman employee may void your warranty. For more information, please contact the Motoman service staff at 937.847.3200.

## **NOTES**

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## **SECTION 4**

# **SEPARATION INSTRUCTIONS**



### **DANGER!**

**All power must be removed from all XRC 2001 controllers before beginning the separation process. Failure to remove power before separation can cause serious personal injury, loss of life, or equipment damage. Be sure to follow all Lockout/Tagout procedures.**

The TR3C system can be easily separated to create three completely separate robotic units. Follow established safety procedures **at all times** throughout the separation process. Failure to use safe work practices can result in damage to the equipment and injury to the workers.

**Reinitialization of the XRC 2001 controllers after separation must be performed by a trained Motoman technician. Reinitialization of the XRC 2001 controller by a non-Motoman employee may void your warranty.**

## **4.1 Materials Required**

All system hardware necessary for separating the TR3C is included with the system. This section identifies customer-supplied items and tools required to complete separation.

- Playback panel
- Programming pendant

### **4.1.1 Customer-Supplied Items**

- Safety glasses
- Phillips and flat screwdrivers

## **4.2 Master XRC 2001 Separation**



### **CAUTION!**

**Be sure to follow proper anti-static procedures to avoid damage to system components.**

### **4.2.1 Disconnecting the TR3C Communication Cable**

To begin disconnecting the TR3C communication cable from the master controller, proceed as follows:

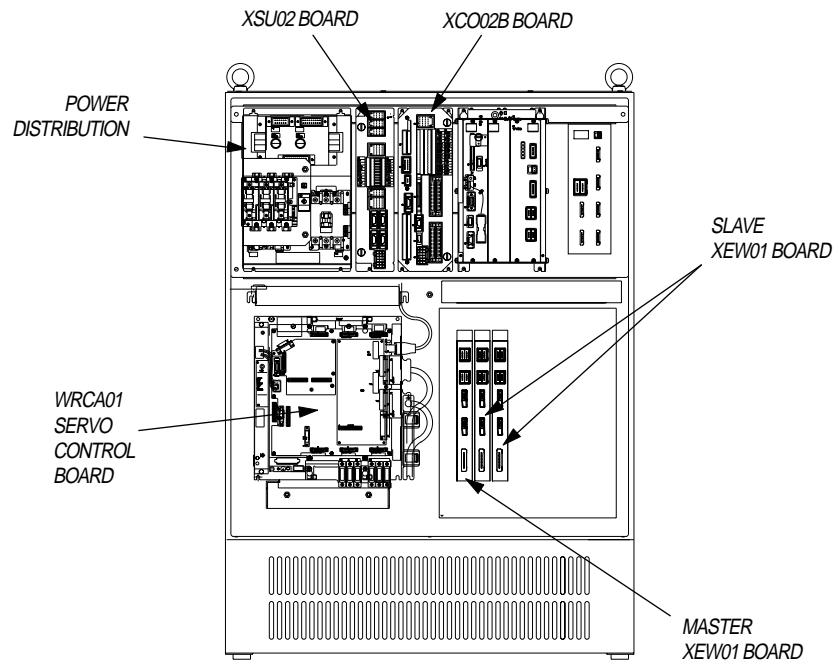
1. Disconnect CN24 connector from CN24 connection on XSU02 board.
2. Disconnect CN10 connector from CN10 connection on servo control board.
3. Remove the XSU02 board from the controller. Locate SW1 and SW2 on the XCT01 board and set as follows: SW1 = 2-3, SW2 = 1-2. Reinstall XSU02 board in controller.
4. Remove cable plate from side of master controller and remove cable.
5. Cover slot with cable plate using screws provided.

## 4.2.2 Removing the Slave XEW01 Board

### Optional Method

If the TR3C was set up for welding application, both slave XEW01 boards must be removed from the master controller and installed into the slave XRC 2001. To remove the slave XEW01 board from the master controller, proceed as follows:

1. Locate slave XEW01 board (see Figure 4-1).



**Figure 4-1 Slave XEW01 Board**

2. Disconnect CN01 cable from right side of CN01 connector on Master XEW01 board.
3. Disconnect CN04 cable from bottom of CN04 connector on Master XEW01 board.
4. Loosen M4 screws and remove slave XEW01 boards.
5. Place slave XEW01 board, cables, and hardware in anti-static bag until ready for placement in slave controller.

## 4.3 Slave XRC 2001 Separation

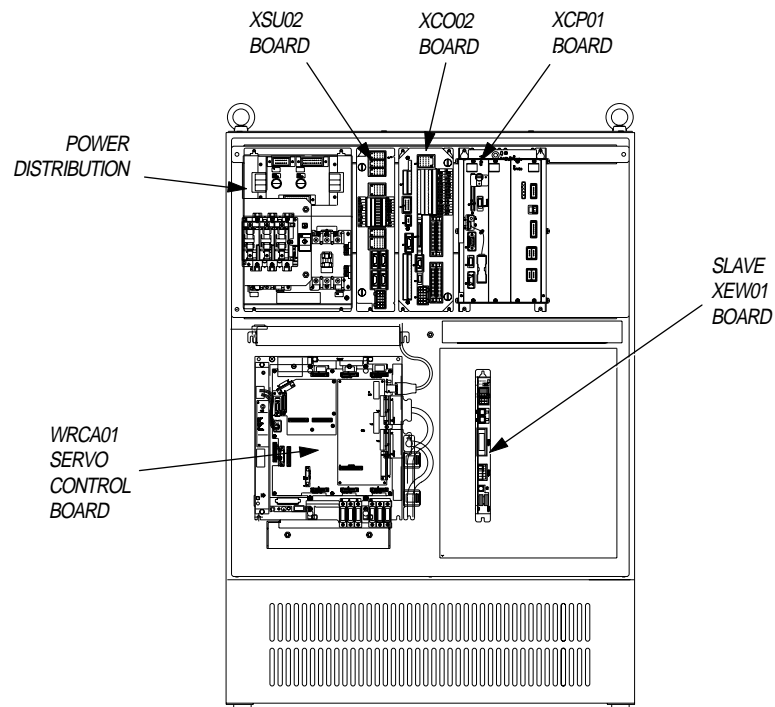


### **CAUTION!**

**Be sure to follow proper anti-static procedures to avoid damage to system components.**

Several modifications must be made to the slave controllers before wiring can begin. Some components removed from the master controller must be placed in the slave controllers. To separate the slave controller, proceed as follows:





**Figure 4-2 Controller Components**

### **4.3.1 Disconnecting TR3C Communication Cable**

The following instructions must be completed on **all three controllers**.

To begin disconnecting the TR3C communication cable from the slave controllers, proceed as follows:

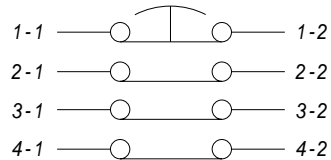
1. Remove the XSU02 board from the controller. Locate SW1 and SW2 on the XCT01 board and set as follows: SW1 = 2-3, SW2 = 1-2. Reinstall XSU02 board in controller.
2. Locate rotary switch on servo control board and set to zero.
3. Disconnect CN10 connector from CN10 connection on servo control board.
4. Locate CN10 connector in wire duct above servo board and connect to CN10 connection on servo control board.
5. Install terminating resistor if it is not present into the back connector on CN10.
6. Locate the CN23 and CN24 cables on R2 slave stored in the wire duct below the XSU02 board, and re-connect to XSU02.
7. Locate the CN23 on R3 cable stored in the wire duct below the XSU02 board, and re-connect to XSU02.
8. Remove communication cable plate from side of slave controller and remove cable.
9. Cover slot with cable plate using screws provided.

### **4.3.2 Installing the Programming Pendant**

1. Remove plug from programming pendant connector on right side of slave cabinet.
2. Unpack programming pendant and plug connector into receptacle.

### 4.3.3 Installing the Playback Panel

1. Unbolt playback panel cover plate by removing four bolts.
2. Unpack playback panel and insert into hole in door.
3. Bolt playback panel to door using hardware provided.
4. Locate playback panel cables wire tied inside cabinet and connect to playback panel as marked. See Figure 4-3 for wiring diagram.

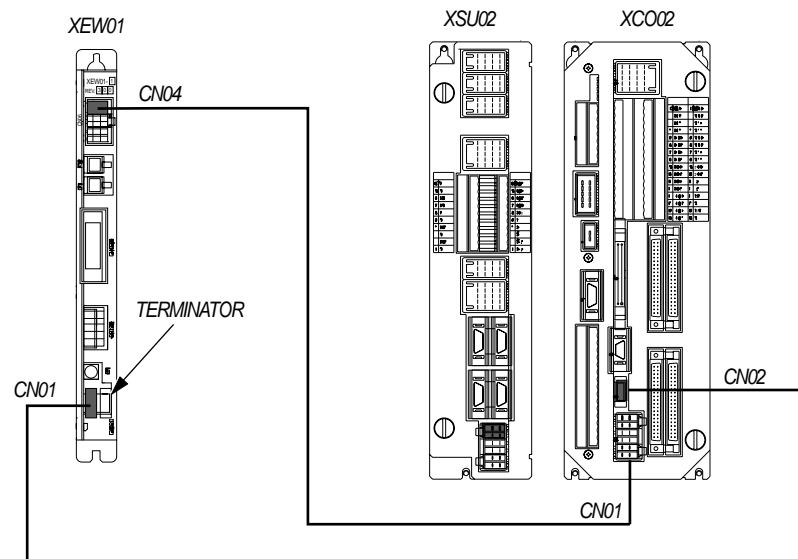


**Figure 4-3 Wiring Diagram**

### 4.3.4 Installing the XEW01 board

If the XRC 2001 is to be set up for welding application, the XEW01 board removed from the master controller must be installed into the slave XRC 2001. To install the XEW01 board, proceed as follows:

1. Locate XEW01 board removed from master controller.
2. Attach XEW01 board to panel on back of slave controller using M4 hardware provided.
3. Locate cable connected to CN01 on Slave XEW01 board.
4. Connect other end of CN01 cable to CN02 connection on XCO02B board.
5. Locate cable connected to CN04 on Slave XEW01 board.
6. Connect other end of CN04 cable to CN01 connection on XCO02 board.
7. Set the rotary switch to 1 on XEW01 board.



**Figure 4-4 XEW01 Wiring**

## 4.4 Connecting the Power

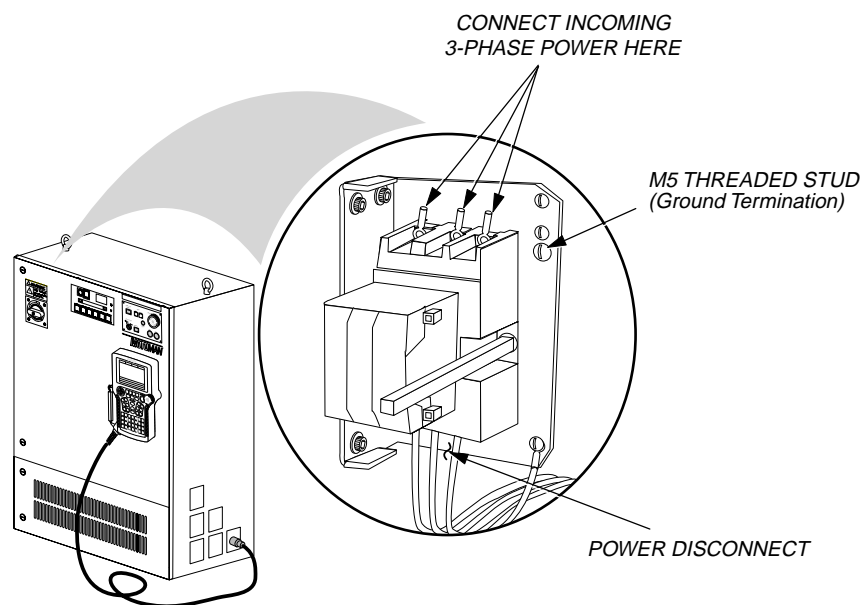
After all of the system components have been properly installed, connect power to each controller as follows:



### **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 circuit breaker located inside XRC 2001 cabinet (see Figure 4-5). The engineering drawings show the size and type of wire needed.
2. Tighten screws to specified torque indicated on engineering drawings.



**Figure 4-5 Incoming Power Connections**

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

#### **NOTE:**

*The TR3C 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.*

## 4.5 Initialization of the Controllers

**Reinitialization of the XRC 2001 controllers after separation must be performed by a trained Motoman technician. Reinitialization of the XRC 2001 controllers by a non-Motoman employee may void your warranty.**

After all of the system components have been separated and power has been connected, three XRC 2001 controllers must be configured as single robot systems. Configuration of the XRC 2001 controllers must be performed by a Motoman technician. For more information, please contact the Motoman service staff at (937) 847-3200.

## **NOTES**

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# ***APPENDIX A***

## ***SYSTEM DRAWINGS***

This section contains references to system drawings for the TR3C system. For information on specific part numbers, call the Motoman service staff at 937.847.3200.

<b><u>Drawing Number</u></b>	<b><u>Title</u></b>	<b><u>Sheet Number</u></b>
146665	Controller Kit, TR3C, XRC 2001	1
146665	Controller Kit, TR3C, XRC 2001	2
146665	Controller Kit, TR3C, XRC 2001	3

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