



MODEL 410 RECIPROCATOR

Rimrock Corporation

1700 Jetway Blvd. - Columbus, Ohio 43219

(614) 471-5926 - FAX (614) 471-7388

www.rimrockcorp.com

Rimrock Automation Equipment User Guide

© 2003

All rights reserved. Printed in the United States. This document and parts thereof may not be reproduced or copied without the written permission of RIMROCK CORPORATION. Contents of this manual must not be distributed to a third party nor be used for any unauthorized purpose.

Additional copies of this manual may be obtained from RIMROCK CORPORATION.

Warning and Disclaimer

Correct usage of the machine is important to assure the expected machine capabilities and functions as well as operator's safety. Please read this manual thoroughly.

The information in this manual is subject to change without notice and should not be construed as a commitment by RIMROCK CORPORATION. RIMROCK CORPORATION assumes no responsibility for any errors that may appear in this manual.

In no event shall RIMROCK CORPORATION be liable for incidental or consequential damages arising from use of this manual or of the software and hardware described in this manual.

For questions, comments, or concerns please contact Rimrock during normal business hours -- Monday through Friday 8:00 a.m. to 5:00 p.m. Eastern Standard Time.

Rimrock Corporation
1700 Jetway Blvd.
Columbus, Ohio 43219
Phone: (614) 471-5926
Fax: (614) 471-7388
Email: sales@rimrockcorp.com
www.rimrockcorp.com

Safety Alert Symbols

Throughout this manual there are safety alert symbols. Wherever they appear, in this manual or on safety signs on the machine, the user should be alert to potential for personal injury or accidents.

Always observe safety precautions and follow recommended procedures.



The words “**CAUTION**”, “**WARNING**”, and “**DANGER**” are used throughout this manual and on labels on machines to indicate hazards or unsafe practices. Observe the precautions indicated whenever you see the Safety Alert Triangle, no matter which word appears next to the exclamation point symbol.

CAUTION!

Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury. It may also be used to alert against a generally unsafe practice.

WARNING!

Indicates a hazardous situation that, if not avoided, could result in serious injury or death. It may also be used to alert against a highly unsafe practice.

DANGER!

Indicates a hazardous situation that, if not avoided, is very likely to cause death or extremely serious injury.

The word “**IMPORTANT**” is used throughout this manual to indicate actions that could result in damage to the equipment.

IMPORTANT!

Indicates an action that could result in damage to the equipment.

Replacement Parts

To order parts, contact Rimrock Sales Department at 614-471-5926.

Serial Number Identification

Knowing the serial number or C# is helpful when ordering replacement parts. This number is located on the machine name plate attached to the machine.

RIMROCK CORP. MANUFACTURED AND ASSEMBLED IN THE U.S.A.

MODEL No. : []

MFG. No. : [] - C- []

MFG. DATE : [] - []

RIMROCK CORPORATION • COLUMBUS, OHIO U.S.A.

Training

Rimrock provides several opportunities for training:

- Classroom training at its facility in Columbus, Ohio
- Training at the customer's facility
- Training videos
- Tech Tips on the Website www.rimrockcorp.com

Contact Rimrock for more information on training at 614-471-5926.

Safety

Introduction

Any machine, if not properly used, can be a hazard to people or other machines in the die cast plant.

Safety in the plant begins with training personnel to properly operate and maintain equipment. They must understand how the equipment functions in order to operate it safely. While the owner of the Rimrock equipment is responsible for all aspects of safety, Rimrock can help by providing equipment training. Contact Rimrock sales department for info on training in your plant or at Rimrock.

IMPORTANT!

This manual is intended for use by persons having electrical and mechanical training and a level of knowledge of these subjects that is generally considered acceptable in the die casting industry. Rimrock cannot be responsible nor assume any liability for injury or damage of any kind arising from the use of information in this manual.

Risk Assessment

Since Rimrock machines are installed in many plants for different applications occurring in different environments, each plant must perform its own risk assessment.

Determine the safety precautions that must be applied in each individual plant and insist that all employees follow these precautions.

Safety Standards

Many codes and standards have been initiated to maintain safety while installing, operating, and maintaining automation equipment. Follow all applicable federal, state, and local regulations at all times. Listed below are some of the most commonly applied standards for automation equipment in die casting. This is not intended to be an all-inclusive list of machine standards information.

- ANSI B152.1 Safety requirements for the design, manufacture, maintenance, and operation of die casting machines
- ANSI B11.19 Safeguarding when referenced by the other B11 machine tool safety standards; performance criteria for the design, construction, care, and operation
- ANSI B11.20 Safety requirements for construction, care, and use of manufacturing systems/cells
- ANSI/RIA R15.06 Industrial robots and robot system safety requirements
- ANSI Z535 Series Safety color code; environmental facility safety symbols; product safety signs and labels; and accident prevention tags
- NFPA 70 National Electric Code

Contact Global Engineering at 1(800) 854-7179, or its website at www.global.ihs.com, to obtain a copy of these industry standards.

For additional safety information specific to the die casting industry, see the NADCA Die Casting Safety Manual E-908. A copy of this manual is included with the printed materials shipped with the machine.

General Safety Tips

Machine owners, operators, maintenance personnel, and service personnel must know that safety practices are a vital part of the job. A safety program should be implemented in the plant and should include, but not be limited to:

- Personal protective equipment
- Clean work areas
- Work areas that are free of potential hazards
- Warning labels, signs, and equipment covers
- Guards around equipment
- Proper training
- Equipment maintenance
- Lockout/tagout procedures

Safety During Maintenance or Repair

Whenever maintenance or repair is performed on the machine, all equipment in the work cell must be in a zero energy state and proper lockout/tagout procedures must be performed.

DANGER!

Tasks can involve working between the die halves of the die cast machine. This is extremely dangerous. The user must put the die cast machine in a zero energy state and follow lockout/tagout procedures on the die cast machine and other equipment in the work cell. Follow the instructions from the manufacturer of the die cast machine to put all areas of the die cast machine and other related or connected equipment in a zero energy state.

Zero Energy State

When putting equipment in a zero energy state, you may encounter the following energy sources:

- Electrical power
- Pressurized air
- Hydraulics
- Hydraulic accumulators that store energy even when the electrical power is off
- Pressured fluids such as water and die lube
- Hot surfaces
- Components that can fall via gravity
- Other potential hazards not listed

CAUTION!

When users put equipment in a zero energy state, they must remember that heat is a form of energy too. Dissipate any heat before working on hot surfaces.

Lockout/Tagout Procedures

Follow these steps before performing any maintenance or repair work on the equipment:

1. Shut down the equipment
2. Isolate the equipment from the energy source
3. Release residual energy
4. Apply a lockout/tagout device to the energy-isolating device
5. Verify the isolation of the equipment

There are two types of energy-isolating devices: those that can be locked and those that cannot be locked. If the energy-isolating device cannot be locked with a lockout device, apply a tagout device. In order for the tagout to be effective, the employees must be trained to follow these limitations of tags:

- Tags are warning devices only and do not supply physical restraint
- Tags are not to be removed except by the person who applied them
- Tags are never to be ignored or bypassed
- Tags must be legible
- Tags must be made of materials able to withstand the environmental conditions
- Tags must be attached securely to the energy-isolating device

Additional safety measures may be taken when tagout is used, including:

- Removing and isolating a circuit element
- Blocking a control switch
- Opening a disconnecting device
- Removing a valve handle

Lockout/Tagout Steps

To lockout or tagout the energy-isolating device, disconnect the source of energy and follow the lockout/tagout procedures implemented by the plant. Typically, to lockout or tagout the equipment, the user must:

1. Disconnect the power
2. Put a lock with a lockout tag or a tagout tag through the door to the source of the power.
3. Record the name of the person working on the equipment on the tag

Note: The person working on the equipment should be the only person having a key to unlock the equipment. This procedure ensures that another person cannot restore energy to the equipment while someone is working on it.

Lockout/Tagout Removal

To remove the lockout or tagout devices and restore energy to the equipment, follow these steps:

1. Inspect the equipment to verify that all components are intact and operable.
2. Inspect the work area to ensure all tools, non-essential parts, and other unnecessary items are removed.
3. Check that all personnel are safely removed from the work area.
4. Remove the lockout or tagout device from the energy-isolating device.

CAUTION!

The lockout or tagout device must be removed only by the person who applied it.

5. Before starting the equipment, notify appropriate personnel that the lockout/tagout has ended.

Special Considerations

Special circumstances may exist when lockout/tagout procedures are used while working on the equipment.

Testing or Positioning

If testing or positioning of the equipment requires reenergization of the equipment, OSHA allows temporary removal of locks or tags. Follow these steps to reenergize the equipment:

1. Inspect the work area to ensure all tools, non-essential parts, and other unnecessary items are removed.
2. Check that all personnel are safely removed from the work area.
3. Remove the lockout or tagout device from the energy-isolating device.
4. Energize the equipment.
5. Test or position the equipment.
6. Deenergize the equipment and reapply the lockout/tagout devices.

Outside Personnel

If outside personnel are working in the plant, both the inside and outside personnel must inform each other of their lockout/tagout procedures.

Group Lockout or Tagout

Each plant must be responsible for determining the lockout/tagout procedures to be used when the equipment is worked on by a group of people.

Changes in Shift

When shift changes occur during lockout/tagout, if the person who controls lockout/tagout cannot remain, the oncoming shift must verify the deenergization and lockout/tagout.

Installation - 410 Reciprocator

Description

The Rimrock 410 Servo-Drive Reciprocator is an automatic spray system for the die casting industry. It offers the user a safe, fast, and accurate way to spray dies. The 410 Reciprocator improves the consistency and quality of castings, resulting in a product that is more saleable for the die cast manufacturer. The 410 Reciprocator's closed loop servo system provides highly accurate and fast machine movement. The unique linkage design guides the spray manifold through a straight-line path in the die area. This keeps the nozzles at a constant distance from the die faces assuring consistent spray patterns through the die. The user can automatically spray virtually any die using Rimrock manifolds.

Features

The 410 Reciprocator was designed with the customer's needs in mind. Some of the features of the 410 Reciprocator are:

- **Increased safety**
- **Reduced set up time**
- **Reduced cycle time**
- **Consistent spraying**
- **Easy maintenance and operation**
- **Quality castings**

Safety Precautions During Install

Follow these precautions when installing the reciprocator:

- Use all previously listed safety precautions
- Wear appropriate personal protective equipment such as safety glasses, ear plugs, safety harnesses, hard hat, gloves
- Follow lockout/tagout procedures
- Be sure the personnel involved in installations have read and understand this manual
- Consult the die cast machine manufacturer before making any changes to circuits
- Follow in-plant safety rules

CAUTION!

Read this entire 410 Servo-Drive Reciprocator User Guide before installing the Rimrock 410 Servo-Drive Reciprocator. Pay special attention to "Safety" section in the user guide.

Arm Safeguard

The arm of the reciprocator can fall, causing personal injury and equipment damage. Safeguard the arm when performing repairs or maintenance on reciprocators. This can be accomplished by placing a chain or strap on the reciprocator arm to prevent movement.

Path of the Reciprocator

Do not work in the path of the reciprocator. Discuss door-interlocking options with the die cast machine manufacturer. A barrier as specified by applicable federal and state codes must be present to keep users out of the path of the reciprocator when the reciprocator moves down.

Gravity

Always be aware that the force of gravity can cause the manifold to fall. When changing the manifold, get help lifting the manifold or use a crane. Always secure the manifold properly.

WARNING!

Mechanical parts that can fall (such as the reciprocator arm) should be brought to their lowest position during maintenance and repair.

Liquids

Flammable or dangerous liquids should not be used with the reciprocator spray system. Follow all precautions on the material safety data sheet (MSDS) provided with the die lube.

Specifications

Machine Weight

The 410 can weigh up to approximately 500 Lbs (227kg). Verify the lifting means can support the weight safely.

Utility Requirements

The 410 Reciprocator requires a power supply of:

120 Volts, 20 Amperes, 1 Phase

Connecting the Electrical Power

Rimrock recommends that users use machine tool transformers for their machines, rather than general purpose transformers. A machine tool transformer is constructed to withstand periods of high inrush and maintain good voltage regulation on the output of the transformer.

Performing Preliminary Steps

Perform these steps to prepare for the installation of the reciprocator:

1. Make sure there is an adequate supply of compressed air, water, lube, and electric power.
 - a. Check if the lines are large enough to handle the air and lube.
 - b. Make sure the air compressor can handle the addition load.
 - c. Find out if the present electrical system can handle the load. This is especially important if the reciprocator will be installed in an older building.
2. Confirm with the die cast machine manufacturer that the proper interlock connections, logic changes, and wiring changes to work with the die cast machine have been determined.
3. Before scheduling Rimrock services for start-up assistance, please complete the tasks on the Pre-Installation Checklist For Reciprocators, fill out the check list, and fax it to Rimrock. The pre-installation checklist is in the package attached to the side of the shipping crate (A copy is in the appendix). Use the pre-installation checklist to indicate the completeness of the installation. It is not a substitute for reading the manual.
4. Schedule startup assistance with Rimrock. To make the time the Rimrock representative spends on start up as effective as possible, be sure to complete all the tasks on the checklist before the representative arrives.
5. Use the drawings included with this manual for additional mounting, and installation information.

Mounting

After removing top and sides of shipping crate, remove all other packed equipment. Note the interconnecting cable is permanently attached to the reciprocator and should not be removed. Care must be taken when handling the reciprocator and cable assembly. Remove the mounting bolts that secure the reciprocator during shipping. Remove the covers to expose the lifting lugs. Using a crane of the appropriate size, place the hook in the lifting lugs on top of the reciprocator and lift it out of the crate.

Mount the 410 Reciprocator on top of and centered the stationary platen of the die cast machine on a flat surface. See the mechanical drawings supplied with this manual for dimensions.

Also refer to the layout from Rimrock to determine the mounting height, and whether spacers are required.

Spray System

Refer to the Spray System information in the Appendix section of this manual for detailed information on specifications, setup and operation of the spray equipment used on the Reciprocator.

Operation - 410 Reciprocator

Introduction

The Rimrock 410 Servo-Drive Reciprocator is an automatic spray system for the die casting industry. It sprays lube and air onto the dies to clean, lubricate, and help keep the die temperature constant. The sequence of operation is programmed in the reciprocator control system.

Typical Reciprocator Sequence

A typical reciprocator sequence is described below:

- Approach (if used)
- Cycle Start
- Spray positions
- Arm clear
- Cycle complete

Approach If there is an approach position set in the program, the reciprocator can move from the rest position to a position just above the dies as the dies open. This gives the reciprocator a head start toward the spray positions when the clear signal is received, which can reduce cycle time.

Cycle Start The reciprocator cycle is started and if the die cast machine is ready, fully open and clear, will extend into the die area.

Spray Positions The reciprocator moves down and up in the open die area to each programmed spray position. It can spray lube, water, air or a combination in each spray step.

Arm Clear As the Reciprocator moves up toward the rest position a proximity switch activates to signal that it is clear of the die area. The prox switch position is adjustable.

Cycle Complete When the Reciprocator machine cycle is complete, and the arm is fully retracted, it will issue a cycle complete signal. Once the dies lock and the reset signal is received, the cycle complete signal will turn off and the reciprocator will await the next cycle.

Preventive Maintenance

Preventive maintenance (PM) is essential for the 410 Reciprocator to continue to operate properly. Elements of an effective PM program include documentation, verification of proper ladle set-up, routine maintenance, inspection, spare/replacement parts, and electrical maintenance.

Documentation

Document what is done during PM to aid in determining the effectiveness of the program and to help tailor the plan to meet the specific needs of the facility.

CAUTION!

Do not attempt to perform any maintenance on equipment until all safety instructions have been reviewed and all power sources are locked out as described in Safety section of the users manual.

Gear Box Lubrication

The arm gear box is filled with grease by the manufacturer. Change the grease every 20,000 hours of operation or every four to five years. Remove the old grease, clean the internal parts, and re-pack with new grease (Shell Darina XL EP 2). Before replacing the gearbox input half, the pilot counter-bore in the side plate should be cleaned making sure any gasket or foreign material is removed. The counter-bore should have silicon gasket material applied (Loctite Ultra Copper). Be careful that NO excess silicon goes into the gear box area as this will damage the reducer. Over greasing will also cause damage to the reducer.

Bearing Lubrication

The 410 Servo Drive Reciprocator is equipped with bearings that are lubricated at assembly. No periodic lubrication is required.

Appendix - Reciprocator

This section contains notes, charts and other forms to aid in operation, installation and maintenance of Rimrock Automation equipment.

Pre-Installation Check List For Epic Reciprocators

General

- | | |
|---|---|
| <input type="checkbox"/> Personnel have read and understand the equipment manual. Extra copies of the manual can be purchased from Rimrock. | <input type="checkbox"/> Personnel skilled in electrical tasks, rigging/millwright/machine moving and plumbing/pipe-fitting (where required) are ready to assist with the start up. |
| <input type="checkbox"/> A safety barrier is set up with interlocking device(s) connected to the external safety inputs of the unit being installed. <i>Refer to the manual for more information.</i> | <input type="checkbox"/> Plan who should attend the training session and where and when it should take place. |
| <input type="checkbox"/> The service visit has been scheduled three weeks in advance. | <input type="checkbox"/> The die and the DCM are ready to run |

Controls

- | | |
|---|--|
| <input type="checkbox"/> The power has been connected to an industrial control or machine tool transformer with a disconnect that can be locked out. Refer to installation section of the manual. | <input type="checkbox"/> Connect the interlocking wires to interface relays or a dedicated I/O rack in the PLC. The programming and/or connections required for interlocking must be finalized with the die cast machine builder and completed before our arrival. |
| <input type="checkbox"/> Remote operator station (if used) is mounted. | |

Mechanical Unit

- | | |
|--|--|
| <input type="checkbox"/> The valve package is mounted and plumbed to the reciprocator and to plant air, lube, and water supply lines as required. Regulators for the lube and water lines connecting to the valve package are recommended. | <input type="checkbox"/> The unit is mounted to the DCM with the proper spacers according to the layout drawing. |
| | <input type="checkbox"/> The manifold is <u>not</u> installed on the unit. |

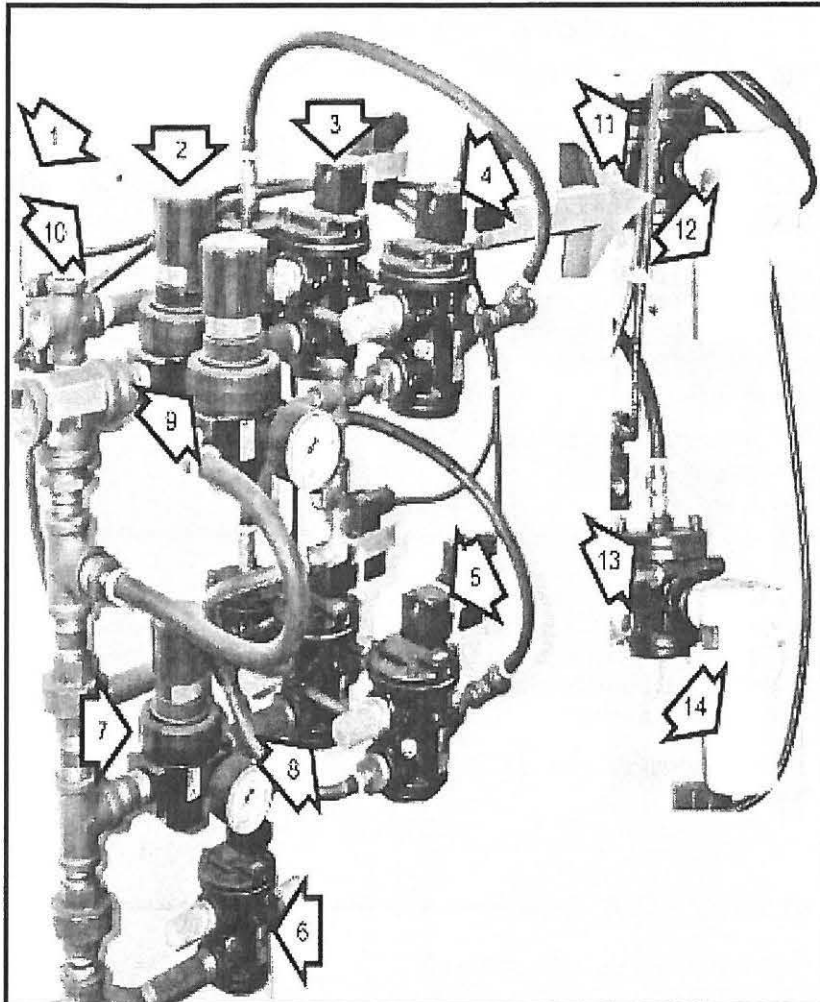
The items listed above are complete:

Signature _____ Date _____

Print Name _____ Title _____

Fax completed form to Rimrock Corporation at (614) 471-7388

Valve Package-Standard



The valve package controls the lube and air supply to the spray manifold. It consists of the following parts:

Item #	Control	Item #	Control
1	Junction Box	8	Spray "B" Air Valve
2	Spray "A" Air Regulator	9	Pilot Regulator
3	Spray "A" Valve	10	Mounting Plate
4	Pilot Valve "A"	11	Lube "A" Safety Valve
5	Pilot Valve "B"	12	Lube "A" Filter
6	Blow Valve "A"	13	Lube "B" Safety Valve
7	Spray "B" Air Regulator	14	Lube "B" Filter

Installing the Valve Package

The valve package controls the lube and air supply to the spray manifold. The valve package can be mounted on the floor or on the die cast machine. Before installing the valve package, determine the best location for it to be mounted.

Flow Rate for Air

A single lube system has a maximum flow of 94 cubic feet per minute (2662 liter/minute) of air. A dual lube system has a maximum air flow of 132 (3738 liter/minute). Rimrock recommends using a plant air system capable of providing the maximum air flow for your lube system.

If air flow capacity is in question, the following procedure can be used to determine air flow:

1. Unhook the air line going to the valve package.
2. Attach a flow meter.
3. Open the valve to obtain the maximum flow.
4. Measure the flow over a period of five minutes with all other cells running to determine the air flow capacity.

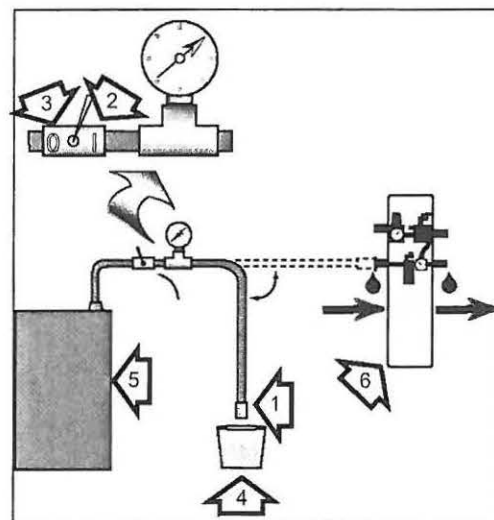
After determining that there is a sufficient supply of lube and air for the system, connect the lines to and from the valve package. Do not restrict the lines in any way.

Determining the Flow Rate for Lube

The 410 Reciprocator is designed to spray non-flammable die casting lubricants.

A flow meter is the best way to determine the gallons per minute of lube the lube supply is capable of delivering. If a flow meter is not available the following method can be used to estimate flow rate.

1. Turn lube valve OFF (#3).
2. Disconnect the lube line and place the line over a five gallon bucket (#1).
3. Turn lube valve ON (#2).
4. Time the lube flow, from the lube supply for 10 seconds (#5).
5. Turn lube valve OFF (#3).
6. Measure the amount of fluid accumulated in the bucket (#4).
7. Multiply the amount of fluid in the bucket by six to find how much fluid the system can deliver in one minute (flow available).
8. Empty the bucket and repeat steps 2–6 a few times.
9. Average the results for a more accurate reading.



Note: All fittings must be the same size as the pipes or hoses feeding the valve package (#6).

10. Multiply the number of nozzles in the spray system by the flow rate per nozzle as listed in the table below to find the flow the system requires.

Rimrock Model No.	Pounds per Square Inch (psi)/Bar				
	40/2.76	50/3.45	60/4.14	70/4.83	80/5.52
011 Nozzle	0.24 GPM 0.91 Ltr/M	0.28 GPM 1.06 Ltr/M	0.32 GPM 1.21 Ltr/M	0.36 GPM 1.36 Ltr/M	0.40 GPM 1.51 Ltr/M
025 Nozzle	1.90 GPM 7.19 Ltr/M	2.00 GPM 7.57 Ltr/M	2.10 GPM 7.95 Ltr/M	2.20 GPM 8.33 Ltr/M	2.30 GPM 8.71 Ltr/M
026 Nozzle	0.63 GPM 2.38 Ltr/M	0.66 GPM 2.50 Ltr/M	0.73 GPM 2.76 Ltr/M	0.78 GPM 2.95 Ltr/M	0.83 GPM 3.14 Ltr/M
025X Nozzle	0.44 GPM 1.67 Ltr/M	0.47 GPM 1.78 Ltr/M	0.52 GPM 1.97 Ltr/M	0.55 GPM 2.08 Ltr/M	0.57 GPM 2.16 Ltr/M

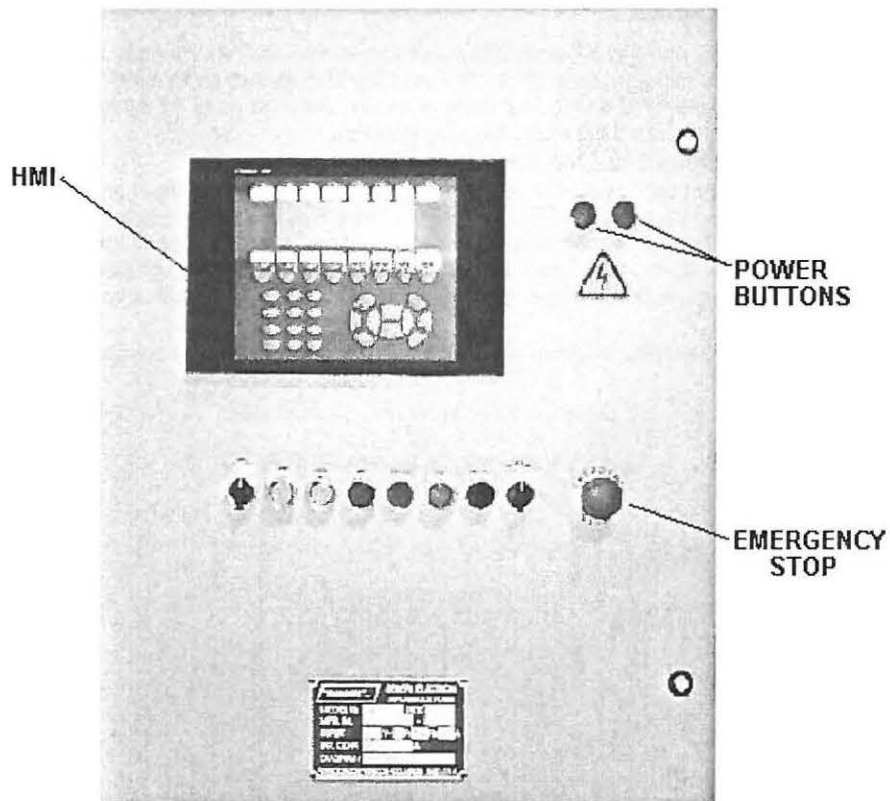
Note: The above numbers are approximate. The exact pressures and flow rates depend on configuration of the entire system.

11. Use the findings to determine if the available flow (determined by a flow meter or steps 1–8) can meet the amount of flow needed in the spray system.
12. While timing, note the pressure gauge reading. This is the maximum pressure at which the system can operate when delivering its maximum flow.

Problems with spray can be caused by an insufficient supply of lube. The following factors influence the supply of liquid for correct atomization:

- Viscosity of the liquid
- Restrictions in the line
- Metering screw settings
- Pressure variances
- Nozzle tip size
- Amount of lube

Legend Control System



Typical Control Panel Layout

Installation

The LEGEND control panel must be mounted so the control devices are not less than 0.6m (2ft) above the service level and are in easy reach of the operator.

Interconnection to the machine is a heavy duty multi-pin connector on the side of the enclosure.

Interlocks to the Die Cast machine are connected to the terminal blocks inside the enclosure.

See the Electrical Drawings for connection information and power requirements.

Safety Information - Alkaline Battery Replacement and Disposal

Before working on equipment, be aware of the hazards involved with electrical circuitry and standard safety practices to prevent accidents. Battery maintenance should be performed only by qualified personnel.

Replacing the Batteries

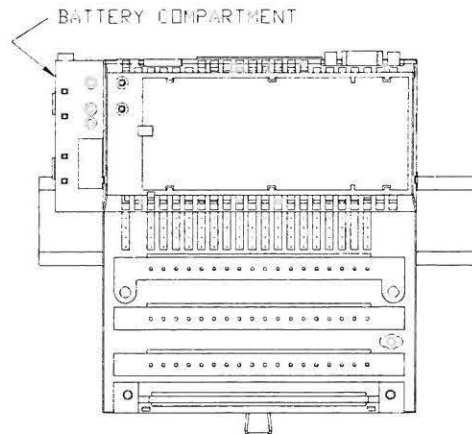
The Programmable Control CPU module is supplied with two AAA alkaline batteries. These batteries have an operating life of about 2 years. When the batteries lose their charge, the CPU will still function, but if power is removed from the CPU and the batteries have lost their charge or if they have been removed, the program in the CPU will revert to the Flash Memory Program.

Leave Power On When Changing Batteries

Once your CPU has been commissioned and is running, maintain power to the module whenever you change the batteries. Change the batteries by carefully pressing down on the battery compartment door tabs on the end of the CPU battery adapter module, remove and replace the batteries, then snap the battery compartment door shut. If too much force is used when opening, the battery compartment door hinge pins may break. If the pin breaks, the batteries may come loose causing CPU malfunctions.

Installing Batteries

When installing the batteries, observe correct polarity, as indicated on the compartment door.



CAUTION - ELECTRONIC CIRCUITRY EXPOSED



When the battery door is open, electronic circuitry is exposed. Follow proper ESD measures while handling the equipment during battery maintenance.

Failure to observe this precaution can result in injury or equipment damage.



CAUTION

Dispose of used batteries according to the manufacturer's instructions. Ultimate disposal of this product should be handled according to all national laws and regulations.

DO NOT EXPOSE TO HIGH TEMPERATURES, INCINERATE, PUNCTURE, CRUSH, RECHARGE, OR SHORT CIRCUIT.

Battery Monitor

Because the CPU assembly is designed to be installed in a cabinet where it cannot be seen at all times, the HMI has a BATTERY low warning on the Main Screen to monitor the health of the battery.

PROGRAMMING

The LEGEND control graphic HMI allows the user to set program parameters to create and tune an automatic sequence.

The upper row of LED lamps on the HMI indicate the status of interlock inputs, alarm, and other system functions.

Press the function buttons below the screen to:

TEACH-allows the user to setup positions, speeds and other parameters for the auto cycle.

MONITOR-shows the position, speed, and auto cycle information.

The function buttons below the screen are:

MAIN-always returns to the Main screen

PREV-returns to the previous screen

LIST-shows the alarm screen

ACK-acknowledges an alarm

PROGRAMMING SECURITY

All of the System setups are password protected. Any user who wants to change these parameters must log on with the Master password regardless of the Security Off/On setting.

All of the Teach parameters can be password protected. If security is turned on, any user must log in with either Operator or Master password to make changes to the Teach parameters. A lock appears on the Teach screens when the user is not allowed to make changes.

See the Security section in the appendix for specific information on the security system.

Legend Controls - Reciprocator

SETUP & HOMING

Pull out the EMERGENCY STOP button, and ensure power is on to the controller.

The Controller takes about 45 seconds to complete the bootup sequence. There will be a "Com err" message in the upper left hand corner of the HMI until the bootup sequence is done.

Verify the correct machine type is displayed on the main screen of the HMI and that the HMI and PLC software versions displayed are the same.

Press the green START button to turn power on.

Use the Control Operators to operate the machine as desired.

If power was off or a servo fault occurred, the machine will need to be Homed before it can be put into the Auto mode. The homing sequence is as follows:

- 1) Press the Manual button - It should light.
- 2) Press and hold the Home button - The machine should move through the homing sequence.
- 3) When the machine stops and the Home button is lit, the Homing sequence is complete.

TYPICAL RECIPROCATOR CYCLE:

In a typical cycle the reciprocator will be at the Rest Position as the die cast machine dwells. As soon as the dies start to open (Reciprocator Approach Interlock) the arm will move to the Approach Position. When the dies are full open (O.K. to Extend) and the part is clear of the dies, a signal to start is received (Reciprocator Start) either manually or from an extractor, and the reciprocator will start its spray cycle. The reciprocator will move down to each programmed position and do a combination of spray, blow, and dwells as programmed for each step.

After the last programmed step the reciprocator will retract to the rest position on its own. (The speed for Last Step Retract and the Decel Cushion are set at the factory.)

When the machine is clear and the Last Step Retract cycle is running the controller will give the Cycle Complete signal and continue to move to the Rest Position. The Cycle Complete output signals the die cast machine to close.

The Reciprocator must receive a "Reset" input from the die cast machine (typically "Dies Locked") before another auto cycle can be started. When the dies lock, the reciprocator will turn off the Cycle Complete output and await the next cycle.

TEACH SETTINGS

TEACH POSITION/SPEED SCREEN

The teach position/speed screen is where the position and speed data is entered for each step in the Auto cycle. The position setting is a value based on the stroke length of the reciprocator. The speed settings are a percent of full speed, with 99.99 being the maximum.

Teach by Example-If the machine is in the MANUAL mode, The Teach by Example function is enabled. The operator chooses which step to set by pressing the BACK or NEXT buttons or entering the Step number, and then moves the machine with manual Extend/Retract buttons until it reaches the desired position. Once the position is reached, the operator can press SET ARM button to save the position.

TEACH DWELL/AIR

Dwell time is the amount of time in seconds that the reciprocator will dwell after reaching the position in that step.

Air blow if turned on, will blow air while moving to the position target, and for as long as the dwell timer runs after the reciprocator reaches the position target.

TEACH SPRAY A/B

The spray functions are turned on and off on this screen. Two sprays are available.

The Spray outputs if turned on, will spray while moving to the position target, and for as long as the dwell timer runs after the reciprocator reaches the position target.

After the parameters are entered, the system will automatically save them into the running program.

DEFAULTS

The Default screen is accessed from the MONITOR screen, then by pressing the SYSTEM button. The Master login must be used to access the SYSTEM screen. The default settings can be changed as needed. These changes affect all moves. The Homing speed should not be changed as it is set for optimum performance of each machine. The default settings are shown below.

Homing Speed - Determines the speed the arm travels in the Homing sequence. The homing speed only affects the first part of the homing sequence when the reciprocator is retracting to the rest prox. The rest of the homing cycle speeds are factory set and are not changeable.

Manual Speed - Determines the speed the arm travels in the Manual Mode (except Homing).

Max Length - This setting is the actual stroke maximum length desired. It can be used when a mechanical interference limits the full travel of the reciprocator. If a position is programmed that is greater than this setting, the machine will only move as far as this position.

Machine Type - Changes the machine type to load correct values into certain motion parameters. Must have Super user password status to load new parameters. Changes only accepted when power is on and control is started but not in Auto or Manual mode.

Check Pos Tolerance. - Check position tolerance is the maximum allowable difference the program sees each time the arm passes the check position prox. when it moves toward the rest position. This is to verify mechanical tolerance of the arm.

Accel and Decel Time Factors - These are multipliers that increase or decrease the accel/decel time of each move. Longer accel times make the start of a move smoother, and longer decel times make the end of a move smoother. These settings only affect the moves in Auto Mode.

Last Step Speed - Determines the speed the arm travels on the last step of the Auto cycle.

Last Step Cushion - Determines the Decel rate of the arm on the last step of the Auto cycle. This keeps the reciprocator from slamming against the mechanical stop at the rest position.

Purge Timers - Determines the length of time the Spray solenoid will remain energized after the lube solenoid turns off to purge the lube valves to prevent dripping nozzles.

Machine Size - This setting should match the actual stroke length of the machine. It sets parameters in the program for the correct gear ratios and other information in the servo controller.

Memory Area Transfer

This screen is used to store and retrieve memory areas. A memory area is the settings for a die and up to 10 of these memory areas can be stored in the Legend Controller. The screen has 3 functions.

Running Program - Displays the name and the number of the current memory area being used for production

Load a Memory Area – is used to change to a different memory area. Place the number of the memory area in the field to the left of this text box, then cursor to this textbox and press enter. The memory area number and the name will then appear in the running program and the settings will be loaded.

Rename – The user can name memory areas by entering characters into the field to the left of this textbox, then cursoring to this text box and pressing enter. To enter text, press the number keys repeatedly and text character will begin to appear.

Memory Area Index

This screen shows the user the names of all 10 memory areas currently stored in the Legend Controller.

TROUBLESHOOTING

FAULTS

The following are LEGEND system faults require operator intervention to clear and reset:
To clear and reset a fault, correct the problem that caused the fault, then press the Fault pushbutton on the door.

9.00 - CONTROL POWER FAIL - Indicates the Control power has been interrupted.

9.05 - LOST OK TO EXTEND SIGNAL - This alarm indicates that the DCM clear signal to the Reciprocator has turned off while the Reciprocator is in the die area.

9.06 - RESET BEFORE CYCLE COMPLETE - This alarm indicates that the Reciprocator was running an auto cycle and received a Reset input before the auto cycle was completed.

9.07 - SERVO FAULT - This can be caused by an overloaded motor, a bad encoder signal, faulty hall sensor, loose motor wiring connection, aggressive speed settings with heavy manifolds, etc. Check the wiring and connections. The machine must be re-homed after this fault.

SECURITY SYSTEM - LEGEND

Introduction

This section details the Security System incorporated in every Rimrock LEGEND Control system. The security system allows you to limit which personnel can access and operate its various features.

There are 2 security levels, MASTER and OPERATOR, which can be assigned personal identification numbers (PINs).

This document is intended to be used by the people who set up the system and who will be responsible for managing the operation of the equipment. These people will need full access to all security, programming, and operational functions. They will need to have the MASTER security level PIN as only MASTER users can access the security set-up.

Security Safeguard

System Setups are permanently restricted only to users who have the MASTER PIN. A user who wants to access System Setups must first log in with the MASTER PIN whether or not security for the Teach functions is being used.

Legend controllers are shipped with all Teach functions accessible to any person who can navigate the screens. In some facilities Teach security may not be necessary while in others it may be essential.

CAUTION

Only authorized personnel should be allowed to access the information in this section. Remove this section and store it in a secure location prior to distributing the User Guide to restricted personnel.

Log On

A PIN must be entered on the Machine's Main Screen to gain access to any restricted parameter. The factory pre-programmed MASTER PIN in every system is 5926.

In order to log on:

1. Go to the Machine's Main Screen. The upper left portion of the screen will display an entry box.
2. Use the alpha/numeric keys to type in the PIN and press the ENTER (↵) built-in function key.
3. If the PIN is correctly matched, either MASTER or OPERATOR, the entry box will clear and the "unlocked" symbol will appear.
4. If the PIN is not correctly matched, the screen will remain the same.

Once logged in you will notice that the entry box appears around the "unlocked" symbol. Pressing ENTER while the entry box is around this symbol will log you out.

Security Set-up

You can access the security settings only if logged in with the MASTER PIN. Once logged in the Monitor screen will display SYSTEM above a key. Pressing that key allows you to go to the System Setup screens. Go to the System Setup 2 screen by repeatedly pressing this SYSTEM key. On this screen are the 3 security settings which are explained below. It is strongly urged to keep the PIN numbers recorded in a safe place.

Security ON/OFF – Turns Teach security on or off. When on the user must log in to make any change to any Teach screen parameter. A "locked" symbol will also appear on the Teach screens until the user logs in. The parameters cannot be edited while locked.

MASTER – Establishes the MASTER PIN. The number can be from 1 to 32767.

OPERATOR – Establishes the OPERATOR PIN. The OPERATOR PIN may only grant access to Teach screen parameters, not System Setups.

Security Time Out

Security time out is the amount of time that the controls can be left idle before automatically logging off the user. The timer is permanently set to 60 seconds which starts upon log in. When a security time out occurs, the information last entered is retained and the screen being viewed when the time out occurred remains. The Teach screens immediately lock however the System Setup screens will remain unlocked until they are left.

Security Settings Back-up

All settings, including security, are saved in battery-backed memory in the Legend controller processor. Normal power failures will not reset these settings. However, if the batteries fail, the settings will be lost and the system will revert back to the original factory settings.

LEGEND RECIPROCATOR SETUP

MACHINE _____ DIE NAME _____ DATE ___ / ___ / ___

STEP	POSITION	SPEED	AIR	A	B
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

RIMROCK LEGEND 405/410 MERCUISER DRAWING PACKAGE

LEGEND


3440
 └── WIRE INDEX
 └── RUNG NUMBER
 └── SHEET NUMBER

←← DESIGNATES A MALE/FEMALE CONNECTION

○ DESIGNATES TERMINAL

SHEET 1	THIS PAGE
SHEET 2	MAIN CONTROLS
SHEET 3	LADLE SYSTEM I/O
SHEET 4	LADLE SERVO
SHEET 5	RECIPROCATOR SYSTEM I/O
SHEET 6	RECIPROCATOR SERVO AND POWER DRIVE
SHEET 7	PANEL PARTS LAYOUT
SHEET 8	PANEL BOM
SHEET 9	PUSHBUTTON REMOTE BOM
SHEET 10	HMI REMOTE BOM
SHEET 11	REMOTE CABLES BOM

4. DEBURR
 3. SURFACE FINISH 125
 2. ALL THREADS CLASS 2A OR 2B
 1. PARTS TO CONFORM TO RIMROCK CORP. ENGR. & MFG. STANDARDS
 NOTES (UNLESS OTHERWISE SPECIFIED)

MAT'L: SEE B.O.M.		DR MK DATE 4.21.04 SCALE NTS PIC
DR DATE	CR	SHEET 1 OF 11
 RIMROCK CORPORATION 1700 JEFFREY BLVD. COLUMBUS, OHIO 43215 <small>PHONE 614-471-3028 FAX 614-471-1073 *A Registered Trademark of Rimrock Corporation, Columbus, Ohio U.S.A.</small>		DRAWING NO. 140D16828-06
TOLERANCES UNLESS OTHERWISE SPECIFIED 2-DIGIT DECIMALS= ±.010 FRACTIONS= ±1/64 3-DIGIT DECIMALS= ±.005 ANGLES= ±1/2 4-DIGIT DECIMALS= ±.0005		DRAWING NAME LEGEND LADLE RECIPROCATOR
REVISIONS		TITLE PAGE
REVISIONS		FOR MERCUISER SPEC SYSTEM
THIS DRAWING IS THE PROPERTY OF RIMROCK CORP. AND IS FOR THE CONFIDENTIAL USE OF THE BUYER OR SUPPLIER OF THIS EQUIPMENT		