ROADRUNNER3

OWNER'S MANUAL

Data I/O

PN 096-0447-001A

Data I/O has endeavored to ensure that the information in this document is accurate and complete. Data I/O assumes no liability for errors, or for any incidental, consequential, indirect, or special damages, including, without limitation, loss of use, loss or alteration of data, delays, or lost profits or savings, arising from the use of this document or the product which it accompanies.

The Technical Documentation Department also acknowledges the RRNextGen team members for their efforts in supporting the flow of information into this manual.

We are interested in your comments. email: userdocs@dataio.com

Contents

096-0447-001A

1 • Overview

2 • Installation

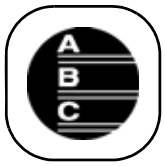
3 • Operation

4 • Service

5 • Maintenance

6 • Troubleshooting

Glossary • Glossary of Terms



Index • Index

Contact information: see inside back cover

Chapter 1

Overview

RoadRunner3 is —

In this chapter you'll learn about RoadRunner3's component units called modules, safety precautions, ESD, and stopping in an emergency.

RoadRunner3 is a compact, portable, automated programming and handling system that mounts directly to a Surface Mount Technology (SMT) Placement Machine. Easy to use and small enough to fit on a feeder bank, the RoadRunner3 programs and delivers programmed devices to the pick area of the placement machine, allowing our customers to integrate device programming and placement.

RoadRunner3 is available for many different SMT Placement Machines. The RoadRunner3 programs a variety of device sizes. For maximum device size, see "Device Sizes" on page 1-4.

THE PARTS OF A ROADRUNNER3 SYSTEM

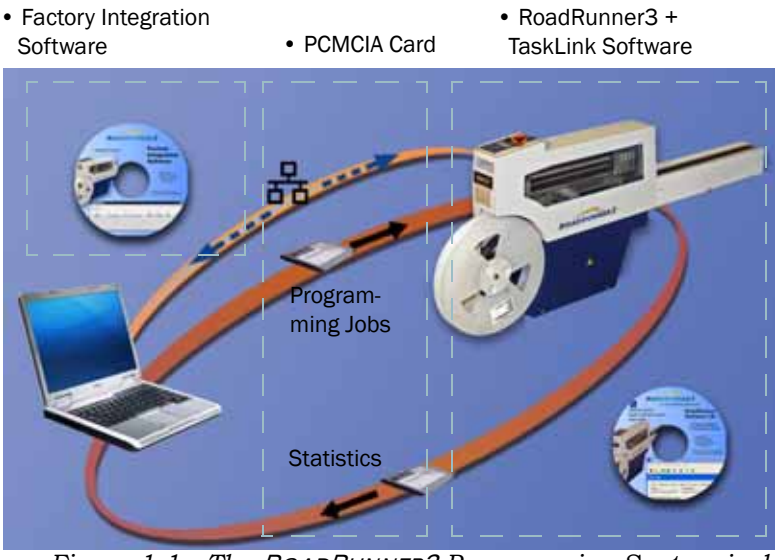


Figure 1-1—The ROADRUNNER3 Programming System includes TaskLink Software and a Job Card (PC not included). Factory Integration Software can be installed on a remote PC.

Figure 1-2—RoadRunner3 installed on an SMT Machine (top) and RoadRunner3 on a SIPLACE-X SMT (bottom).

Warning and Caution Notes

Special paragraphs in this manual warn about potentially hazardous situations and recommend safe practices to help avoid them.

A warning looks like this.

WARNING

This kind of warning indicates conditions that can cause personal injury or serious monetary loss.

A caution looks like this.

CAUTION: Indicates conditions that can cause damage to equipment.

They are included to help you use the system safely and prevent system damage.

Key to Symbols Used in this Manual

	General warning. Calls your attention to general caution and warning notes.
	Electrostatic Discharge (ESD) may cause damage. Discharge static against a common ground.
	High voltage. Turn power off before removing electronics cover.
	Crush hazard. Keep hands away from moving parts.
	Compressed air. Point air hoses away from body. Always wear approved eye protection.
	Heavy equipment. Use caution. May require two people. Or, mount properly using approved hardware.
	Equipment can tip over (such as feeder carts with some RoadRunners on them). Remove RoadRunner3 before moving cart.
	Collision hazard. Calls attention to situations when machinery could collide with objects or people if items are installed incorrectly.

Jump Right In

Be safe:

See: "Warning and Caution Notes" on page 1-3.
"Safety Features" on page 1-13.
"Precautions for Safe Operation" on page 1-15.

How do I run a job?

See "Basic Operator Steps" on page 3-2.

What do I do if it stops?

See: "Resolving Problems" on page 6-3.
"Error Messages" on page 6-6.
"Problems, but no Error Message" on page 1-16.

What information does Data I/O want if I have a service issue?

If you use the "Technical Support" link  on our Web site you'll see all the required text fields. Also, see the last page of this manual.

Overall System Description

The RoadRunner3 *System* consists of RoadRunner3 hardware, TaskLink™ Software for Windows-based PCs, and a PCMCIA card (PC-Card). It also includes Factory Integration Software (FIS). TaskLink is needed to create programming jobs for RoadRunner3. PC-Cards store jobs and contain job statistics.

Using prepared programming instructions and devices (blank or not), RoadRunner3 picks, erases (if set), programs, and delivers the devices to the pick area of an SMT Placement Machine.

NOTE: This manual refers to the RoadRunner3, TaskLink software, FIS Software, and a job card as the "RoadRunner3 System." The term "RoadRunner3" then, is used to mean the hardware unit that attaches to the SMT placement machine.

Device Sizes

Device size parameters for RoadRunner3:

NOTE: Device sizes listed are for reference and not a guarantee that RoadRunner3 will meet these specifications for all devices due to Socket Adapter types and restrictions, and other variables.

MAXIMUM DEVICE SIZE	LENGTH (MM)	WIDTH (MM)	HEIGHT (MM)
Standard 4-device mode operation	<15	32	6
In 2-device mode operation	31	32	6

Minimum device sizes must be >4 mm long and >3 mm wide.

On RoadRunner3, device width is perpendicular to the direction of PNP Head travel.

Development of the Programming Instructions for a Job

Programming instructions are developed using TaskLink™ for Windows.® The instructions are stored on PCMCIA Type I or II job cards that are formatted for RoadRunner3.

A RoadRunner3 operator can start a job by inserting a job card and pressing the *Start* button on the control panel.

Figure 1-3—The RoadRunner3 Control Panel and Display Screen

Control Panel

The Control Panel is a keypad and display that provides a User Interface (UI).

The main function of the Control Panel is to accept input (commands) from the operator via the keypad, while providing visual or auditory feedback to the operator regarding status of the system.

System Status

The **green** lamp lights when a job is running. It blinks when programmed devices are not yet at the SMT pick point.
The **yellow** lamp lights when the system will soon need attention or stop. It blinks when transferring files to the PC-card (also called Job card or CF card).
The **blue** lamp lights when the system is stopped. If there is an error, it is displayed on the keypad display.

CAUTION: Do not remove the job card unless the blue lamp is lit or the power is off.

For more information about the lamps and about error messages, see "Colored Lamp Significance" on page 6-1.

Blank Devices

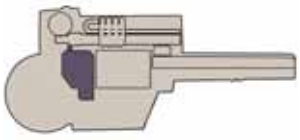
Before starting a job, the operator must mount a reel of tape containing devices onto RoadRunner3. Once the device tape is threaded into the RoadRunner3 and a job is started, the RoadRunner3 will pick devices from the tape and advance the tape automatically.

Periodically, new device tape must be loaded and the cover tape take-up reel must be emptied.

Tape Advancement

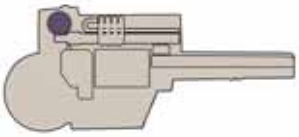
Tape advancement includes three functions—advancing the device tape, separating the cover tape from the device tape, and collecting the cover tape.

Tape-In Module



A stepper motor drives a sprocket that advances the device tape via sprocket holes in the tape. Tape movement is stepped, allowing the tape to stop each device directly under the PNP head pick point. The Tape-In Module has a Peel Bar that separates the cover tape from the pocket tape. The empty pocket tape is expelled at the front of RoadRunner3. The Tape-In Module adjusts to accommodate four tape sizes: 16, 24, 32 and 44 mm.

Cover Tape Module



The Cover Tape Module winds up used cover tape which must eventually be removed by the operator. A DC motor is synchronized with the tape advance motor and drives the Take-up Reel that winds up the cover tape. Refer to Figure 1-4.

Figure 1-4—Loading cover tape.

Robotic System

A four-probe Pick and Place (PNP) head driven by a linear stage ball screw comprises the Robotic System.

> *NOTE: For some very large devices, RoadRunner3 will operate with fewer than four probes as a function of the Socket Adapter.*

A stepper motor controls PNP head travel in the horizontal axis. Air cylinders control individual probe up and down motion. Together, these components pick, collect, and place devices.

The standard robotic system uses the *collect and place* principle to:

- pick one device at a time from the device tape until four (or fewer depending on the Socket Adapter) devices are collected
- place the devices into the programming sockets, one at a time
- pick the programmed devices out of the sockets, one at a time
- gang-place up to four devices on the conveyor belt, or place failed devices into the Reject Bin.

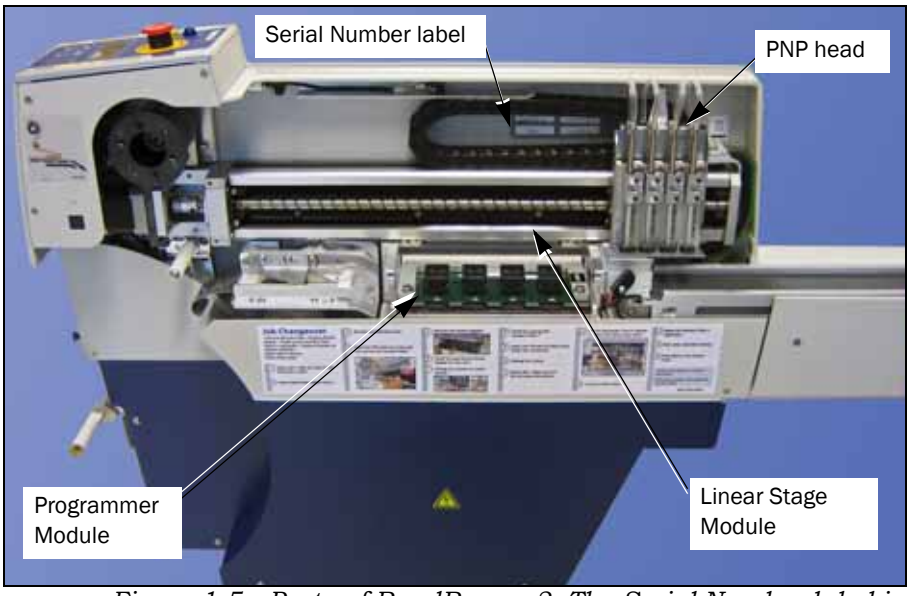


Figure 1-5—Parts of RoadRunner3. The Serial Number label is on the casting.

Pick and Place Head

The Pick and Place head (PNP) is part of the Linear Stage Module. It's the portion of the robotic system responsible for picking, collecting, and placing devices. It houses four pneumatic cylinders, and four probes. The pneumatic cylinders feature spring return to the upper position. The probes incorporate compliance to allow contacting all sizes of devices without applying excessive force.

The probes have rubber tips which must be kept clean in order to create adequate suction against the device.

Linear Stage

ROADRUNNER3 runs at slow speed when the Robotic Cover (safety shield) is not in place.

A Linear Stage—consisting of a stepper motor, encoder and ball screw— moves the PNP head linearly to accommodate the following positions:

- device tape pick point,
- reject bin,
- programmer sockets,
- conveyor belt

The Linear Stage motor receives signals from the motion controller via an amplifier.

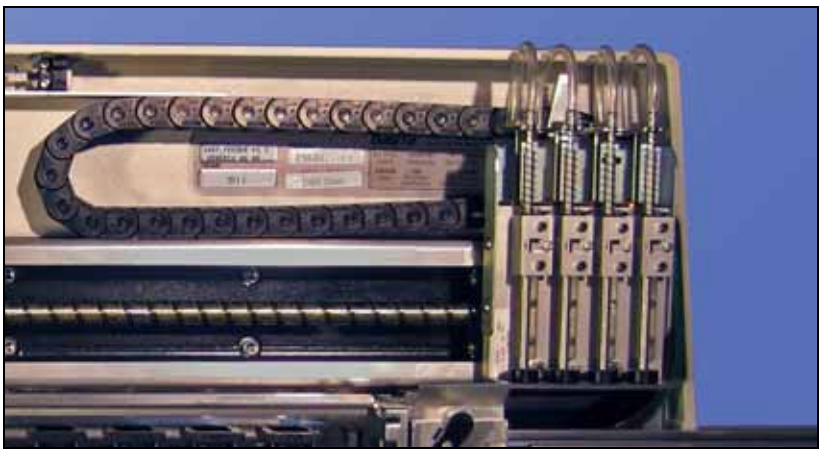


Figure 1-6—Pick and Place Assembly with Precisor.

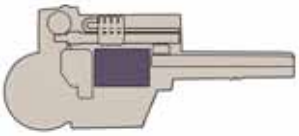
Vacuum Probes

The rubber-tipped probes use vacuum produced by the Pneumatic Module to pick up devices. The probes also deliver a puff of air to release the devices. Vacuum sensors detect whether a device is present at the end of each probe.

Device Placement Precision

Each probe brings its device into contact with the alignment plate, called a precisor, to center the device on the probe before placing it into a programming socket. Precisors are generally device-package specific.

Programmer Module



The Programmer Module writes data into the devices. From a mechanical standpoint, it consists of device-specific sockets on an adapter and an actuator. The Programmer Module is responsible for:

- opening the sockets
- ID checking, blank-checking, continuity-checking and erasing the devices (if selected during the job creation in TaskLink)
- writing data to the devices
- verifying the data written to devices

Opening the Sockets

The device sockets on the adapter are normally closed. To open the sockets, pneumatic cylinders pull the Actuator Plate down. Once the sockets are loaded, they close again, keeping the device leads in contact with the socket pins.

Programming Devices

To inquire about any upgrade kits for FlashCORE programmers, contact Data I/O.

The RoadRunner3 programmer architecture, called FlashCORE, was developed specifically for very high-speed programming of Flash memory devices. Up to four devices are programmed simultaneously according to the instructions from the particular job on the job card. Job cards must be created from a PC-card using *TaskLink for Windows* application.

If programming fails, or any of the checks or tests fail, the programmer illuminates the red LED in front of the socket containing the failed device and signals the Robotic System to place the device into the Reject Bin rather than on the conveyor belt.

Programming yield statistics are displayed on the keypad display. If a job is paused or ended, the statistics are written to the job card.

Programming sockets are a wear item, and therefore, must be replaced periodically. Socket manufacturers provide expected socket-insertion life cycles. See "Preventive Maintenance Schedule" on page 5-2 for recommendations for RoadRunner3.

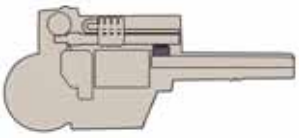
Output Conveyor

Successfully programmed devices are removed from the programming sockets by the PNP head and placed on the conveyor belt, then delivered to the SMT Placement machine's pick position.

The Conveyor Module includes a conveyor belt, a sensor that determines if devices are at the SMT pick point, and the path for the empty device tape. The conveyor runs momentarily when a job is started to determine if there are any unwanted devices on the belt (from a previous job). The belt stops when one of these conditions is met:

- a device is sensed at the SMT machine pick point
- the PNP head is ready to place devices on the belt
- it times out.

Reject Bin



Devices that have failed programming, as determined by data verification, are placed into a Reject Bin inside RoadRunner3.

The Reject Bin has a sensor that indicates when it is full by displaying a message on the keypad display: "Empty Reject Bin."

TaskLink's Handshake with RoadRunner3

TaskLink for Windows is the software program used to create instructions for the RoadRunner3 to program flash devices. It consists of various utilities for selecting

- the device to program,
- the data file to write to the device, and
- special programming options specific to the device.

*NOTE: The term **task** refers to a device programming objective being defined with TaskLink. The term **job** refers to a set of instructions for programming a specific number of devices with the RoadRunner3.*

A job contains the programming algorithm, the number of devices to process, special device options, and other items important for the programming of the device.

TaskLink must be installed on a Windows-based PC. To install TaskLink, see the instructions on the CD.

Parallel ATA-2 is an interface standard for the connection of storage devices and uses a PCMCIA form factor: 85.6 × 54 × 3.3 mm, 68 pin dual row connecting interface.

A PCMCIA memory card drive capable of reading and writing to Parallel ATA-2 specification must be available to the computer being used. For more about PCMCIA drives see "PC-Card Capacity Requirements" below.

See *TaskLink for RoadRunner3*'s on-screen Help to create a programming job.

PC-Card Capacity Requirements

RoadRunner3 uses a 68 pin PCMCIA (PC) Card to transfer job configuration and device programming data from TaskLink software (running on a PC) to RoadRunner3. The PC-card is used to store job files, statistics log, event log, algorithms, and even system updates.

On FlashCORE III programmers, the data image is stored internally. Therefore, if your job (or data image) is transferred over a network, the PC-card does not need to be sized to include the image file.

Ensure the card you use is big enough for your data file image data plus 130 KB for statistics and event files. The general formula used to calculate required PC-card size for one job is:

256 KB+device size+130 KB
Remember that 1 MB = 1024 KB.

In general, add 256 KB to device size (for system files). To calculate each job size, sum all jobs together and add 130 KB for statistics and event files. For example, when creating a card with two jobs, one for a 28F800 (1 MB) device and one for a 29LV160 (2 MB) device, you would need:

```
(256 KB+1024 KB)+(256 KB+2048 KB)+130 KB = 3714 KB or
```

3.8 MB
Use a 4 MB minimum ATA card for this example.

NOTE: The system operator can only access a single job from a non-Administrator PC-card. If there is more than one job on the card, then the last job loaded by the system supervisor is the one available. It is recommended that only one job be placed on each PC-card.

NOTE: Data I/O recommends that a 2 MB minimum card be used for even a single job. The maximum size PC-card that RoadRunner3 accepts is 4 GB; special formatting is required. See http://tinyurl.com/PC-card4GB-Format (goes to /FCNotes/Footnote/ on our FTP site).

CAUTION: PCMCIA Cards for use with RoadRunner3 must be formatted with FAT. (The current Windows default is FAT 32.) The card must be x40 speed.

It is best to test for functionality of cards with RoadRunner3 as well as testing card-readers to ensure usability before using them in production.

PCMCIA Compliant Interfaces Versus non-PCMCIA Compliant

Compliant PCMCIA reader/writers are the most flexible, although difficult to install. They generally use an ISA or PCI card to directly connect to the PC's bus or are built into a laptop. They will support many more types of cards than ATA, such as modems, ethernet and linear flash cards.

Non-Compliant PCMCIA reader/writers come with a number of different interfaces that will work for a desktop PC (and TaskLink for RoadRunner3). Computer hardware resources can be used with non-compliant PCMCIA reader/writers and the computer may not need to be opened. These reader/writers do not support modems, ethernet and linear flash cards.

Safety

Safety Features

The RoadRunner3 has several safety systems to reduce the likelihood of personal injury and machine damage during operation. These systems include:

1. Safety Shields and Interlocks
   During RoadRunner3 operation the metal and plastic safety shield (Robotics Cover) covers the operating area to protect operators from injury. If the shield is opened, robot speed will be reduced.

⚠ WARNING

Risk of injury. System robotics can injure your hands or fingers. Do not operate the ROADRUNNER3 with covers removed. When working inside the ROADRUNNER3, turn the power off.

2. Emergency Stop Button (E-Stop)
   When the E-Stop button (located on the keypad) is pressed, RoadRunner3 automatically removes power from all motion motors, the blue status lamp illuminates, and the programmer completes its programming cycle. The recently-programmed devices will remain in the sockets.

Figure 1-7—Emergency [movement] Stop Button

WARNING

Electric Shock Hazard. Do not use the E-Stop button to turn off power to the RoadRunner3. The E-Stop button does not completely remove power from the machine. Only power to the motion motors is shut off. Power is still applied to all of the other electronic systems.

CAUTION: The Emergency Stop button does not stop the SMT Placement equipment.

The Emergency Stop condition will not be cleared until the E-Stop button is restored to its run position. To restore the button to the run position, turn the Emergency Stop button clockwise until it springs back to its full height.

Precautions for Safe Operation

The RoadRunner3 System has been designed for safe and efficient operation. **The system can be dangerous if the RoadRunner3 safety features and precautions in this manual are ignored.**

For the Safety Features see "Safety Features" on page 1-13.

To avoid possible personal injury or damage to the equipment, please observe the following practices:

- Only **trained personnel** should install, maintain, repair, or troubleshoot this system.
- Do not operate the RoadRunner3 unless you have been thoroughly trained, and have **read and understand the instructions** in this manual, particularly those that describe the system's safety features.
- Do not use RoadRunner3 for any application other than its **intended use**.
- Do not operate the system if the **guards or safety devices** are not in their normal operating positions.
- Do not operate RoadRunner3 with any of the **outer sheet metal panels** removed.
- Do not operate RoadRunner3 while servicing, replacing, or adjusting any component unless directed to do so in this manual. Make sure that the RoadRunner3 is **properly shut down** before performing any of these operations.
- Do not place any part of your body near or in the direct path of **moving parts**.
- **Do not disable** or attempt to defeat any of the protective safety features of this system. Personal injury or equipment damage can occur if any safety systems on RoadRunner3 are disabled. If you suspect that a safety feature of the RoadRunner3 is damaged or malfunctioning, stop using the RoadRunner3 immediately and contact Data I/O Customer Service or a local Data I/O approved service representative.
- Use extra caution when working around the RoadRunner3's Output Belt. RoadRunner3's safety shields do not cover or fully enclose the **output conveyor**. It is possible that an operator's hands, other body parts, or loose clothing can get caught or pinched in it.
- Wearing **hearing protection** is recommended while operating the RoadRunner3. Sound pressure levels may exceed 85 decibels.
- Shut off the **pressurized air** or disconnect the air hose before servicing pneumatic parts.

Electrostatic Discharge

The circuit boards inside RoadRunner3 are susceptible to electrostatic discharge (ESD), which can damage the circuitry. Also, devices processed through the RoadRunner3 are very sensitive to static and can be damaged by accidental electrostatic discharge while being handled.

The easiest way to prevent damage from ESD is to make sure a common static potential (**ground**) exists between static-sensitive devices or components, their environment, and the operator.

Perform all repairs at an ESD-safe workstation.

Specifications

—basic unit without SMT Adapter—
For more information about SMT Adapters, see the next page.

Product specifications are subject to change without notice.

FACILITIES	
AC input voltage requirements	100-240 V~ ; 50/60 Hz (single phase)
AC Input Power	100 W (max)
Air requirements @ 2 dm^3/s (4.0 scfm) (113 L/min.)	5.2±.1 Bar (75±2 psi)
Air Inlet tube (varies)	8 mm (.31 in.) OD x 5 mm (.19 in.) ID

MODELS SUPPORTED	
SIPLACE-X	X2, X3, X4, X4I, SX-1, SX-2
SIPLACE	80F4, 80F5, F, S, HF, HS
Panasonic	NPM, CM401, CM402, CM602, DT
MYDATA	MY9, MY12, MY15, MY19
Fuji	NXT, AIM

DIMENSIONS	
Width	97.5 mm (3.84 in.)
Weight (net) except Fuji Weight (net) Fuji	21.3 kg (47 lbs) 22.6 kg (50 lbs)
Length with 330 mm (13 in.) reel	1263 mm (49.72 in.)
Approximate length protruding from SMT machine	Varies with SMT Machine
Height with 330 mm (13 in.) reel	520 mm (20.5 in.)
Input tape width supported	16 mm; 24 mm; 32 mm, 44 mm

DEVICE OUTPUT PLACEMENT (AT SMT PICK POINT)
NOTE: THESE NUMBERS ARE TYPICAL AND MAY NOT REFLECT YOUR PARTICULAR SETUP.

Output placement linear repeatability	±.25 mm
Output placement rotational repeatability	±5°

ENVIRONMENT	
Operating temperature range	20–40°C (68–104°F)
Temperature stabilization time after transportation	≥ 8 h
Humidity	5–90%

Chapter 2

Installation

Unpacking and installing the RoadRunner3 is easy. It is delivered pre-assembled with a few exceptions.

After installing RoadRunner3, and before a job can be run, there are four items that need to be installed onto the RoadRunner3:
• the Socket Adapter,
• Actuator Plate,
• Precisor (described in Chapter 3),
• and the Reject Bin which is described in this chapter on page 2-16.

Where are they?

The Reject Bin can be found in the Accessories box within the larger shipping box.

The device-related items ship separately.

The supplied air filter/regulator must be installed and the Reject Bin must be put into place.

Some RoadRunner3s require an additional item to install to adapt it to the SMT machine. These SMT Adapters are noted in the Mounting Instructions in this chapter where they apply.

All that is required to operate the RoadRunner3 is an SMT machine position and two external facilities.

⚠ WARNING

Personal Injury Hazard. Lifting heavy objects improperly could injure you. The RoadRunner3 and shipping box weighs 32 kg (70 lbs) maximum.

This chapter includes:

Unpacking the RoadRunner3

The RoadRunner3 is transported in an antistatic bag inside a heavy corrugated box with foam padding. There are some things

to do before running RoadRunner3. On arrival, ensure that there is no damage to the exterior of the box since this may also indicate damage to the machine inside. You may also want to check the time since there is a temperature stabilization period describe below. The Getting Started Guide offers quick steps regarding these tasks.

Temperature Stabilization

For more about Dry Run Mode see "Dry Run" on page 3-34.

It takes about eight hours for the RoadRunner3 temperature to stabilize to the new environment after shipping. Do not run a job before RoadRunner3 has stabilized—the chassis should be at room temperature. Running the unit in Dry Run Mode may prevent components from sticking during temperature changes and help even out the conveyor belt.

Checking for Damage During Shipping

After opening the box containing the RoadRunner3, inspect for damage that may have occurred during shipment. Two shock indicators have been applied to the bottom of the RoadRunner3 for your assurance that it has not been mishandled during shipping. They are red-orange plastic indicators, 50.8 mm (2 inches) long, applied with adhesive backing. If the RoadRunner3 has sustained sufficient impact (25 G) during shipment, the groove on either side of the label will be black or a color darker than the body color. See Figure 2-1. If this is the case, contact your local Data I/O Support Representative immediately. When both grooves are the same color as the body, no impact has occurred.

Figure 2-1—Shock Indicator is indicating that an impact has occurred (left side, black arrow).

Getting Started Quickly

A Getting Started Guide in the accessories box shows the contents of the box. Check that you have received everything on the list. (Additional items ordered, such as spare parts, are shipped in a separate box.) The Getting Started Guide can be used for a quick set-up reference.

Mounting the RoadRunner3

The RoadRunner3 is designed to mount to the SMT machine feeder table. Multiple RoadRunner3s may be mounted on the same SMT machine.

Mounting RoadRunner3 [MYDATA]

Skip ahead for mounting instructions for your specific model of RoadRunner3, or check the Table of Contents.

CAUTION: *Heavy weight. RoadRunner3 is heavy and dropping it can cause serious damage to itself, to you, and anything it falls upon. Use only approved hardware to mount RoadRunner3. Use great care when mounting RoadRunner3 to the feeder table.*

To mount the Feeder Bank Adapter and RoadRunner3 onto a MYDATA MY-Series Assembly Machine:

1. Slide the supplied Feeder Bank (GFI) Adapter onto the assembly machine feeder table at the desired slot. Push it forward as far as it will go.

Figure 2-2—Install the Feeder Bank Adapter onto the SMT Machine separately.

2. Lock the GFI Adapter base in place as shown in Figure 2-3 below.

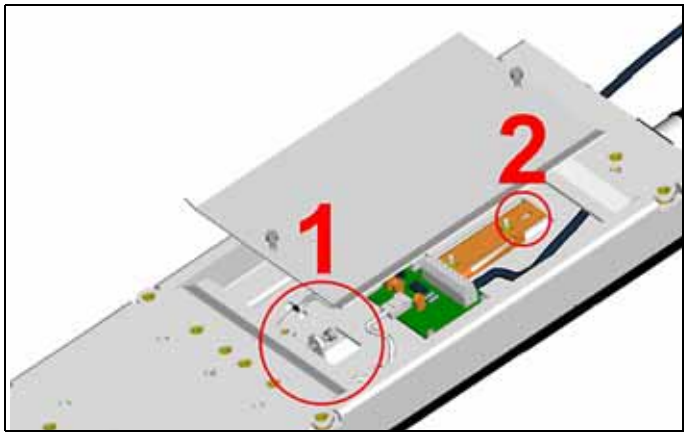


Figure 2-3—The GFI lock screw (M4) is found at (1) when not in use. Move the lock screw to (2) to secure the GFI to the SMT machine.

3. Holding RoadRunner3 at a slight angle, slide it under the hook on the Feeder Bank Adapter so that the RoadRunner3 centering plate teeth engage the pin next to the hook.

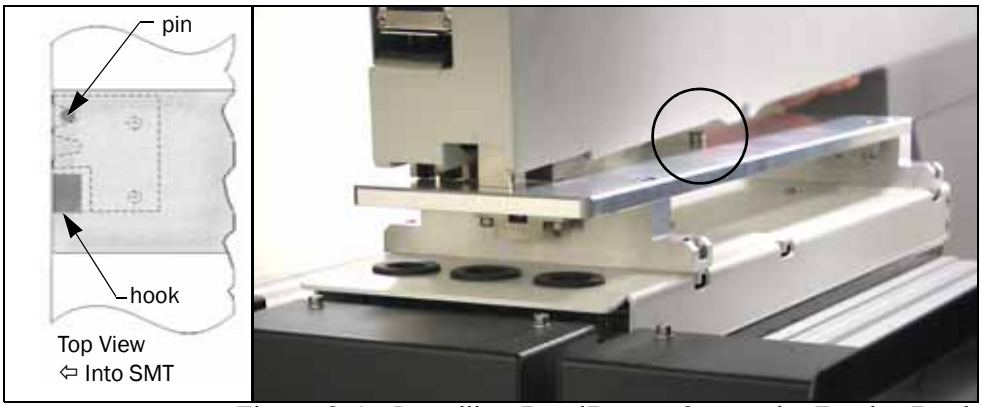


Figure 2-4—Installing RoadRunner3 onto the Feeder Bank Adapter. A dowel on the Adapter (circled) mates with the RoadRunner3 conveyor.

4. Lower RoadRunner3 letting the adapter dowels mate up with the bushings in the RoadRunner3. Refer to Figure 2-4.
5. Make sure that RoadRunner3 is secure.
6. For first time use at this SMT machine, adjust the Feeder Bank Adapter to align the pick points.

   6a. Compare the SMT pick point to the RoadRunner3 pick point. If adjustment is required, continue. Otherwise, go to step 7 below.

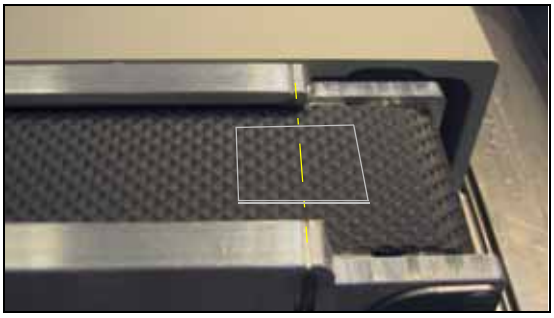


Figure 2-5—Devices center at the pick point marks on the RoadRunner3 conveyor.

6b. Loosen four screws on top of the Feeder Bank Adapter.

Figure 2-6—Adjusting the pick point.

6c. Screw the end screw in or out until the RoadRunner3 pick point is aligned with the SMT pick point.

6d. Retighten the four top screws.

7. On the Feeder Bank Adapter communication cable, orient the connector and plug it into the RoadRunner3 socket on the far end of the electronics housing, facing the feeder table.

To unplug the cable, pull back on the connector collar.

NOTE: After physical connection has been made, most SMT Placement machines require unique setup instruction for communicating with RoadRunner3. These are often supplied in a separate Customer Service Letter.

Mounting RoadRunner3 [Fuji NXT, AIM]

CAUTION: *Heavy weight. RoadRunner3 is heavy and dropping it can cause serious damage to itself, to you, and anything it falls upon. Use only approved hardware to mount RoadRunner3. Use great care when mounting RoadRunner3 to the feeder table.*

To mount RoadRunner3 onto a Feeder Table:

NOTE: When selecting slot positions for RoadRunner3, consider that access to it is from the right side.

Also, do not use the four left-most slots on the table or the two right-most slots. RoadRunner3 uses 9 slots.

1. Hold RoadRunner3, one hand in the handhold and one under the Conveyor, so the Conveyor overlaps the Feeder Table by 40 mm and is above a slot.

Figure 2-7—Mounting RoadRunner3 onto the SMT Feeder Table.

2. Lower RoadRunner3 allowing the nose to rest on the Feeder Table. Ensure that it settles into a slot.
3. Still holding the handhold, slide RoadRunner3 forward as far as it will go. RoadRunner3 locks into place.

Communications are automatically connected when the unit is properly mounted to an SMT machine. A barcode is supplied on

the left side of the RoadRunner3 for assisting placement machine setup with FujiTrax.

NOTE: After physical connection has been made, most SMT Placement machines require unique setup instruction for communicating with RoadRunner3. These are often supplied in a separate Customer Service Letter.

Mounting RoadRunner3 [Panasonic NPM, CM401, CM402, CM602, DT]

CAUTION: *Heavy weight. RoadRunner3 is heavy and dropping it can cause serious damage to itself, to you, and anything it falls upon. Use only approved hardware to mount RoadRunner3. Use great care when mounting RoadRunner3 to the feeder table.*

NOTE: When selecting slot positions for RoadRunner3, consider that access to it is from the right side.

The Panasonic Feeder Bank Adapter for RoadRunner3 uses 5 slots.

A Panasonic Feeder Bank Adapter and Host Feeder unit must be mounted to the SMT Feeder Bank prior to mounting the RoadRunner3. Then the RoadRunner3 can be mounted onto the Adapter. The steps for connecting the communication cable follow.

To mount the Feeder Bank Adapter and Host Feeder:

1. Align the Feeder Bank Adapter with the numbered feeder slots and slide it forward to engage the alignment features. Push the Feeder Bank Adapter forward as far as it will go.
2. Tighten the set screw to lock in place. See Figure 2-8. There is a Host Feeder that will be installed after installing RoadRunner3.

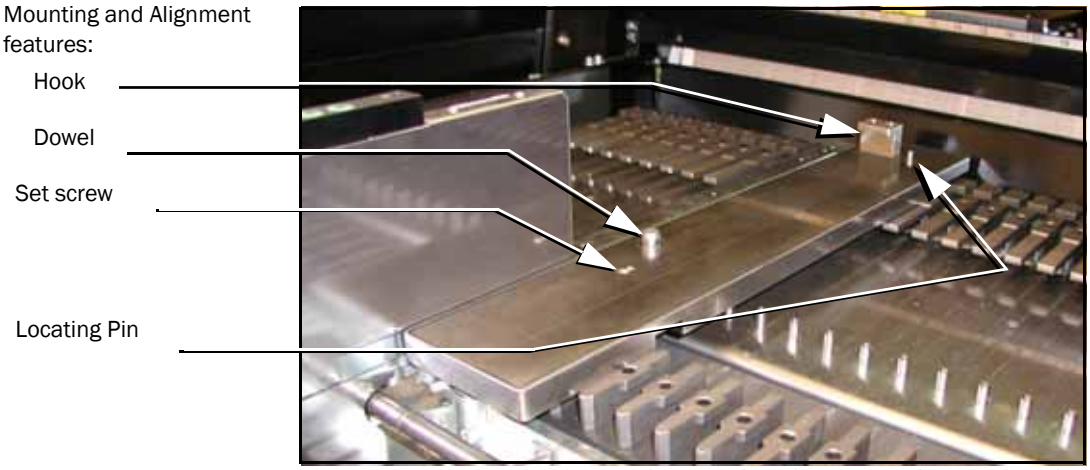


Figure 2-8—Panasonic Feeder Bank Adapter and Host Feeder mounted here on the CM402 SMT Feeder Bank.

To mount RoadRunner3 onto the Panasonic Feeder Bank Adapter:

1. Slide RoadRunner3 under the hook on the Feeder Bank Adapter so that the RoadRunner3 centering plate teeth engage the pin next to the hook. See Figure 2-9.

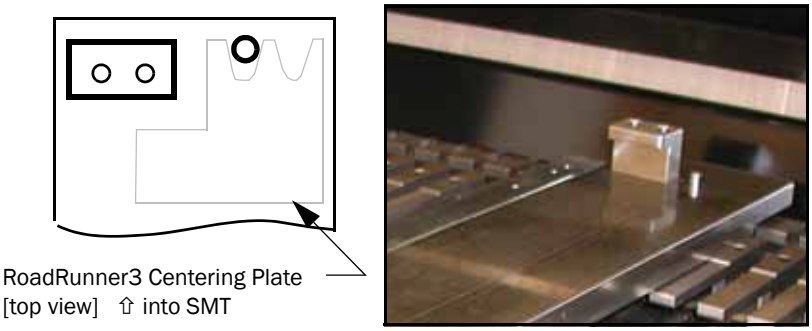


Figure 2-9—The Panasonic Feeder Bank Adapter has a hook and a dowel pin.

2. Lower RoadRunner3 so that the Feeder Bank Adapter dowel mates with the guide bushing on the RoadRunner3 conveyor. See Figure 2-10.

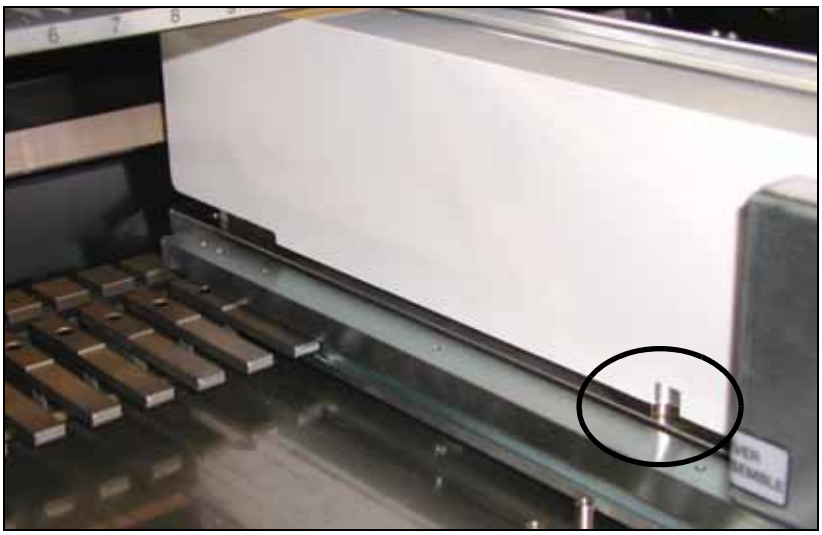


Figure 2-10—The dowel on the Adapter (circled) mates with RoadRunner3.

3. Verify that RoadRunner3 is secure.
4. Slide the Host Feeder onto the feeder slot just left of the Feeder Bank Adapter. Push the Host Feeder forward as far as it will go.

To connect the Communication Cable into the Host Feeder:

1. Correctly orient the connector (there may be a red dot on top for orientation) and plug it into RoadRunner3. The socket is located on the back side—facing the SMT feeder table.
2. Orient and plug the other end of the cable into the Host Feeder.
3. Screw in the two connector screws. See Figure 2-11.

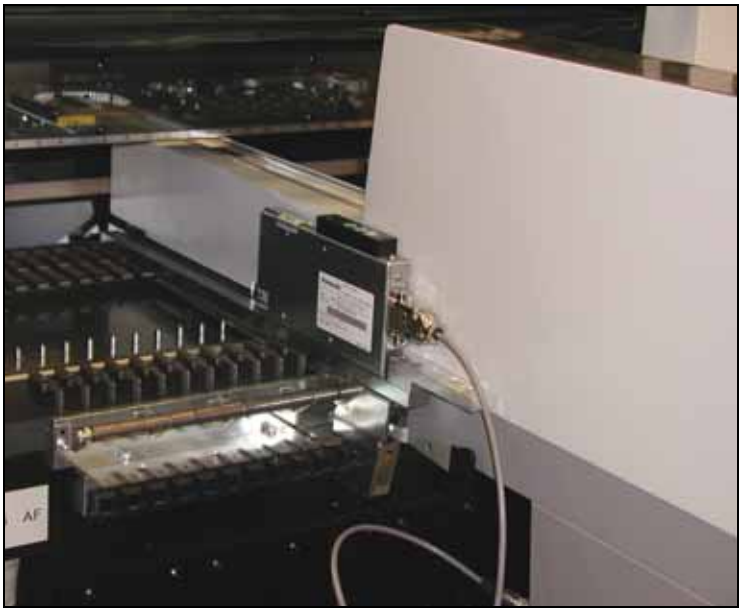


Figure 2-11—RoadRunner3 is mounted and the Communication Cable is plugged into the Panasonic Host Feeder unit. (RoadRunner model is shown for an example.)

NOTE: After physical connection has been made, most SMT Placement machines require unique setup instruction for communicating with RoadRunner3. These are often supplied in a separate Customer Service Letter.

Mounting RoadRunner3 [SIPLACE 80F4, 80F5, F, S, HS]

CAUTION: *Heavy weight. RoadRunner3 is heavy and dropping it can cause serious damage to itself, to you, and anything it falls upon. Use only approved hardware to mount RoadRunner3. Use great care when mounting RoadRunner3 to the feeder table.*

NOTE: When selecting slot positions for RoadRunner3, consider that access to it is from the right side.

RoadRunner3 for SIPLACE F, S, and H models uses 7 slots.

To mount the RoadRunner3 onto the machine feeder table:

CAUTION: *There are different hooks. Use of the wrong hook will cause mounting and device pick problems. Use the hook with the Hex socket screw that was supplied with your RoadRunner3.*

1. Slide the mounting hook around a pin on the feeder table where the RoadRunner3 is to be mounted. Refer to Figure 2-12 for placement details.

Figure 2-12—The Hex socket-screw-hook for RoadRunner3 on some Siemens SMT Machines.

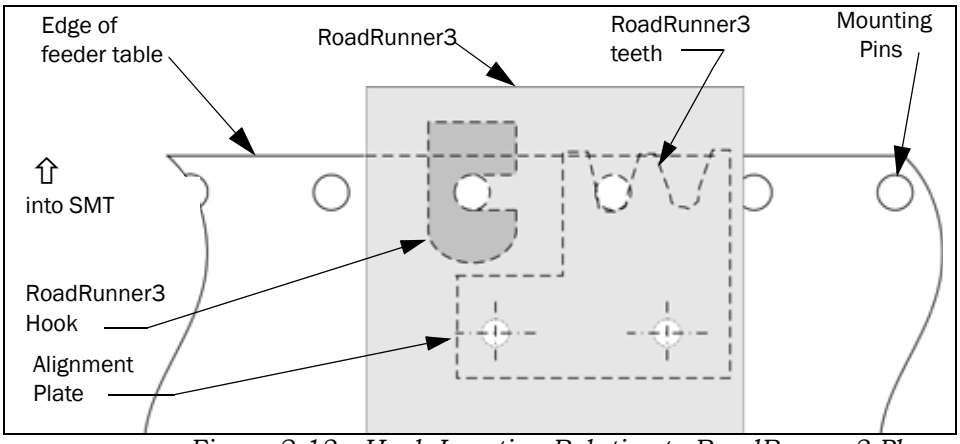


Figure 2-13—Hook Location Relative to RoadRunner3 Placement. Top View

WARNING

Personal Injury Hazard. RoadRunner3 is heavy and can fall if the correct mounting hook is not properly attached. Falling can injure you or damage RoadRunner3. The hook is absolutely required. Do not attempt to mount RoadRunner3 onto the feeder table without the hook installed onto the table.

2. Tighten the 3 mm socket-head adjustment screw.
3. Slide RoadRunner3 under the hook so that the teeth engage the pin next to the hook as shown in Figure 2-13.
4. Test to ensure RoadRunner3 is secure.

RoadRunner3 is now mounted to the SMT feeder table.

To connect the communication cable:

1. Orient the cable connector (there may be a red dot on top for orientation) and plug it into the RoadRunner3 socket on the far end of the electronics housing—facing the feeder table.
2. Plug the other end into the socket on the SMT feeder table that corresponds with the track the RoadRunner3 is mounted in.

NOTE: After physical connection has been made, most SMT Placement machines require unique setup instruction for communicating with RoadRunner3. These are often supplied in a separate Customer Service Letter.

To unplug the cable, pull back on the connector collar.

Mounting RoadRunner3 [SIPLACE X2, X3, X4, X4i, SX-1, SX-2]

CAUTION: *Personal Injury Hazard. Heavy weight. RoadRunner3 is heavy and dropping it can cause serious damage to itself, to you, and anything it falls upon. Use only approved hardware to mount RoadRunner3. Use great care when mounting RoadRunner3 to the feeder table.*

⚠ WARNING

Personal Injury Hazard. FEEDER CARTS CAN TIP causing personal injury or damage. Remove RoadRunner3 from the Feeder Cart before pulling the cart away from the SMT machine.

NOTE: When selecting slot positions for RoadRunner3, consider that access to it is from the right side.

The SIPLACE X Adapter for RoadRunner3 uses 9 slots.

NOTE: The SMT Adapter for SIPLACE X to RoadRunner3 must be attached to RoadRunner3 before being mounting onto a Feeder Bank.

If the SMT Adapter is not attached to the RoadRunner3, contact Data I/O support— attaching it requires removing the Conveyor Cover.

To mount the RoadRunner3 onto the machine feeder table:

1. Holding RoadRunner3 level, align the grooves on the Adapter with ribs on the Feeder Bank, and slide RoadRunner3 as far forward as it will go.

Figure 2-14—The SMT Adapter on SIPLACE X RoadRunner3 mates with ribs on the Feeder Bank.

2. Make sure that the SMT latches onto the RoadRunner3, and that RoadRunner3 is secure.

To connect the communication cable:

1. Orient the cable connector and plug the communication cable into the RoadRunner3 socket on the far end of the electronics housing—facing the feeder table. There may be a red dot on top for orientation.
2. Plug the other end into the socket on the SMT Adapter below the conveyor.

NOTE: After physical connection has been made, most SMT Placement machines require unique setup instruction for communicating with RoadRunner3. These are often supplied in a separate Customer Service Letter.

To unplug the cable, pull back on the connector collar.

Remember to remove RoadRunner3 from the Feeder Cart prior to removing the Feeder Cart from the SIPLACE Machine.

Installing the Reject Bin

The Reject Bin may not be in place when you receive your RoadRunner3. When it is in place, it sits above the Conveyor, just to the right of the programmer.

NOTE: The Reject Bin for a RoadRunner (manufactured prior to 2011) does not fit into a ROADRUNNER3.

Figure 2-15—The Reject Bin.

To install the Reject Bin, hold it by the tab, move it straight over the Reject Bin Bracket, and lower it as far as it will go.

CAUTION: *The PNP Head might collide with the Reject Bin if the Reject Bin is not installed properly. The bin must be all the way down to the floor of the bracket. You can test the clearance by pushing the E-Stop and then manually pushing the PNP Head over to the Reject Bin.*

NOTE: RoadRunner3 will not function without the Reject Bin in place.

Making the Necessary Connections

The RoadRunner3 requires only two external facilities: electrical AC power and standard shop pressurized air. Ethernet connection is optional. The specific requirements are stated below as well as on labels inside the RoadRunner3. Refer to Figure 2-16 for facility connection locations.

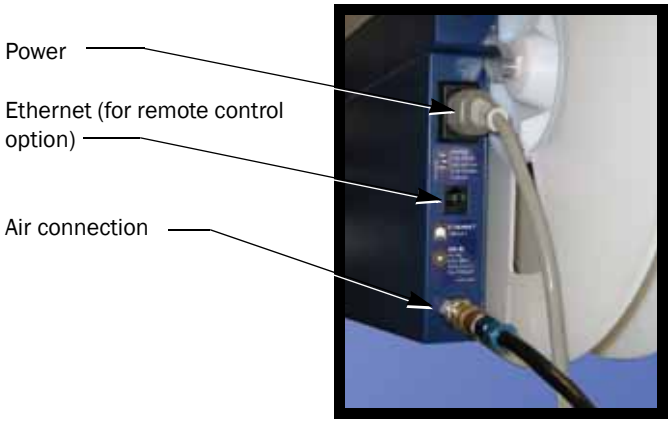


Figure 2-16—RoadRunner3 facility connection points on the 'Facilities Panel.' For most models, the communication connection is on the far side (not visible here).

Electrical Input Requirements

The RoadRunner3 uses 100-240VAC, 50/60Hz, single phase power. The required power is supplied through a single connection on the RoadRunner3's end panel. RoadRunner3 uses a standard IEC-320-C13 power cord. The power supply is self-regulating and requires no special settings for regional power systems.

Power is applied to the internal systems of the RoadRunner3 when the power switch is ON. All power is removed when the power switch is OFF.

⚠ WARNING

Electrical Shock Hazard. If the main power switch is ON, power is applied to the electronic systems of RoadRunner3, regardless of the position of the Emergency-Stop button or safety shield. Always turn the main power switch OFF before working inside the machine.

Pneumatic Input Requirements

RoadRunner3 requires a pressurized air source connected to the RoadRunner3's facilities panel. RoadRunner3 requires clean, dry, oil-free air, at approximately 5.17 Bars ±.01 (517 kPa ±1) (75 psi ±2) from an industrial grade compressor. The compressor tank should be of sufficient volume to maintain constant air pressure at a minimum of 113 Liters/minute (4 cubic feet/minute).

A 10 micron filter/separator/regulator must be installed between the compressor and the RoadRunner3 to extract any contaminants and moisture before the air enters the machine.

CAUTION: *Possible malfunction or damage. If the our precision regulator is not used, RoadRunner3 will not function properly and pneumatic parts can become damaged.*

Also, the warranty will be void regarding pneumatic components.

Installing the Pneumatic Regulator Assembly

Proper operation of RoadRunner3 on SMT machines is accomplished by installing a Data I/O Regulator Kit that shipped with your purchase (in the accessories box).

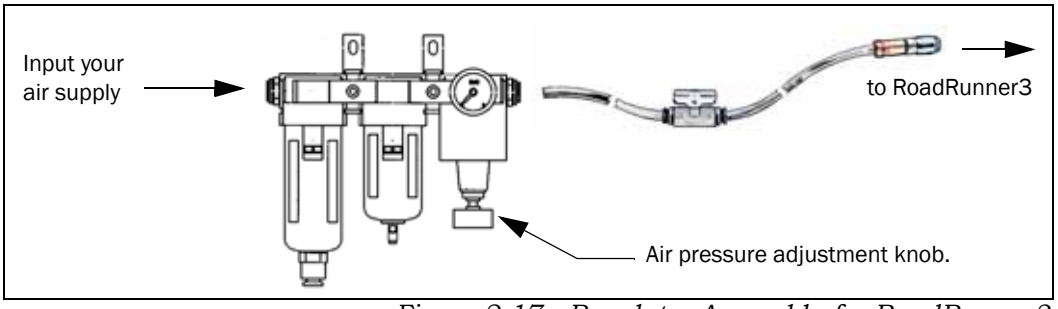


Figure 2-17—Regulator Assembly for RoadRunner3

1. Attach the supplied air hose assembly to the fitting on the RoadRunner3 by pushing it onto the RoadRunner3 air connector while allowing the collar to move back while you push.

   The 8 mm diameter inlet tube assembly has quick-disconnect fittings that stop air flow when disconnected. The air hose assembly also includes a shut-off valve.

2. Install the regulator between the air hose assembly and your air supply. For air pressure requirements, see "Specifications" on page 1-16.
3. Adjust the pressure at the regulator to .52 MPa (75 psi).

CAUTION: *Oil, excessive moisture, or poorly filtered air will obstruct RoadRunner3's internal air paths, affect system performance, and void the warranty related to air system failure. If oil or excessive moisture is detected, contact your local Data I/O approved service representative immediately.*

NOTE: If the air source cannot maintain the correct air pressure and volume, the RoadRunner3 will not operate correctly.

Removing the Air Hose Assembly

To remove the inlet air hose from the RoadRunner3, slide the sleeve on the tube connector back and pull it off. The tube fitting has an automatic shut off and may be removed without shutting off the air pressure.

Applying Power for the First Time

Turning Power On

For help with the Emergency Stop button see "Safety" on page 1-13.

For help with the Robotics Cover see "Removing the Robotics Cover" on page 4-7.

To install a Socket Adapter see Figure on page 3-5.

Before the RoadRunner3 is turned on, ensure the following:

- The external air line is connected to the regulator, and input air pressure is set correctly. See "Pneumatic Input Requirements" on page 2-18.
- The Emergency-Stop button is in the released (out) position.
- Some models: The communication cable is connected to the SMT machine.
- Optional: The Ethernet cable is connected.

NOTE: Although the Robotics Cover does not need to be in place at this time, RoadRunner3 will emit beeps while the cover is off and run at reduced speed.

After verifying the above conditions, turn the main power switch to the ON position.

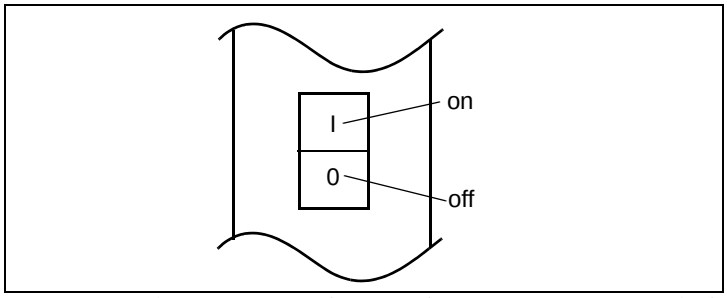


Figure 2-18—The RoadRunner3 Power Switch

Power is now applied to the RoadRunner3. (A job card must be inserted into the PCMCIA slot before devices can be programmed.)

WARNING

Electrical Shock Hazard. If the main power switch is ON, power is applied to the electronic systems of the RoadRunner3, regardless of the position of the E-Stop button or safety shield. Always turn the main power switch OFF before working inside of the machine.

After power is applied, the RoadRunner3 performs a Self-test. This test checks that all system components are present and functioning, and that all sensors are within calibration limits.

Verify that the unit starts up properly, and that there are no errors or warnings displayed on the keypad screen. If electrical or mechanical problems are noted, turn off RoadRunner3 and see Troubleshooting in Chapter 6. If you need help, contact your local Data I/O service representative.

Before turning the power off, the blue lamp should be illuminated, indicating that there is no operation in progress.

Configuring for Network Communication

To set up the network connection between RoadRunner3 and TaskLink, both must be configured.

Configuring TaskLink

What are the advantages of networking?

After TaskLink and RoadRunner3 are set up for networking, you can perform many activities from TaskLink without transferring the job via a PC-card to RoadRunner3. In fact RoadRunner3 could be in a different city. Some of those activities are:

- downloading jobs to RoadRunner3(s)
- viewing statistic files, jobs, and PC-card space available
- logging session data
- viewing the RoadRunner3 firmware version
- sending firmware update files
- setting supervisor privileges.

Compare to "Factory Integration Software" on page 2-23.

NOTE: RoadRunner3 was initially released with, and tested with, TaskLink version 7.60.

For instructions on configuring TaskLink, start TaskLink and click **`Help > Help Topics`**. In the contents, expand (+) **`Using Networked RoadRunner3s`** and click **`Configure TaskLink`**.

Configuring RoadRunner3

Configuring RoadRunner3 involves creating a network configuration card with TaskLink, inserting the card into RoadRunner3, and setting RoadRunner3 network parameters.
To create a network configuration card:

1. Start TaskLink and click **`Help`** > **`Help Topics`**. In the contents expand (+) **`Using Networked RoadRunner3s`** and click **`Configure`** RoadRunner3. Follow the instructions.

NOTE: The following steps are required after creating the network configuration on a PC-card (and are repeated from the TaskLink instructions).

2. Insert the Network Card into RoadRunner3.
3. On the Control Panel, scroll to, and select, **`System > Network`**.
4. Press the *Select* button.
5. Using the arrow buttons, toggle **`Network Parm:`** to **`Card`**.
6. Press the Menu button to save your changes.
7. Cycle the power on RoadRunner3 so that new network settings take effect.

To save the network configuration file, set the **`System > Network > NetworkTxt`** *parameter to* **`Save`**.

NOTE: The network configuration file is automatically deleted from the PC-card at the end of the process. This

prevents accidentally configuring two RoadRunner3 programmers with the same network settings.

RoadRunner3 is now configured to communicate with a network. Plug in a 100BaseT Ethernet Cable. The connection is shown in Figure 2-16.

Factory Integration Software

Data Remote and Data Track are utilities of the Factory Integration Software available with RoadRunner3. If ordered with your unit, it is on a separate CD in the accessories box.

Data Remote

Data Remote enables remote monitoring of RoadRunner. Customers can set up e-mail alerts when RoadRunner error messages display at the Control Panel. Data Remote also allows customers to create their own custom APIs. Desirable utilities run from a remote PC could include:

- Download, pause, and resume a job
- Clear the belt
- Set the pass quantity while a job is still running
- Lock and unlock a job

Data Track

Data Track makes these actions possible from a remote PC:

- Detailed data collection of the programming results
- Audit client provides data export (for MES, SPC, or archiving software)

What's next? In the next chapter you'll discover how different *Operator* functions are from *Supervisor* functions when operating RoadRunner3.

Chapter 3

Operation

The *ROADRUNNER3* operates with a set of job instructions created in TaskLink and contained on a PCMCIA memory card (PC-card). The instructions provide a detailed description of the programming requirements for a particular semiconductor device or group of devices. A PC-card is referred to as a *job* card after a set of instructions is written to it. There may be more than one set of instructions, or jobs, on the PC-card, with the maximum number depending upon the card's memory capacity. However, one job per card is recommended.

Within the two levels of functions mentioned, there are many menu commands to customize RoadRunner3 operation.

There are two levels of functions:

- those performed by an **operator**
- those performed by the **supervisor**

Some of the functions of the RoadRunner3, like calibration, are only available to the system supervisor. Additionally, RoadRunner3 job creation is generally considered a system supervisor function.

The RoadRunner3 operator performs specific functions concerned with running programming jobs. A system supervisor has the ability to set RoadRunner3 operational parameters, view operational statistics and perform various diagnostic routines.

Operator Functions

This section describes operator steps for setting up RoadRunner3 to program devices.

Basic Operator Steps

To set up RoadRunner3 to program devices, the operator must:

1. Change the Socket Adapter, page 3-5.
2. Change the Precisor, page 3-9 (in most cases).
3. Install a HIC or Standard Actuator Plate, page 3-7.
4. Adjust the Actuator Plate, page 3-8.
5. Insert a PC-card.
6. Check the hardware setup, page 3-9.
7. Set the width of the Adjustable Tape-In Module to match the device tape, page 3-10 (if the tape is a different width).
8. Load the device tape, page 3-12.
9. Align the device tape, page 3-14.
10. Start the job; see steps on page 3-15.

Before inserting the PC-card, a job must be created. See "TaskLink's Handshake with RoadRunner3" on page 1-11.

Turning On System Power

Verify that the covers are in place, that the power and air are connected, and then switch the main power ON. The three colored lamps illuminate while the system starts and the RoadRunner3 performs a Self-test of its internal electronics and sensors. When it is ready to accept commands, only the blue lamp will be on. Verify that there are no errors indicated on the Keypad Display.

NOTE: If RoadRunner3 has not been used for more than seven days, run it in Dry Run Mode (Supervisor card) for 15 minutes prior to programming. For more info see "Dry Run" on page 3-34.

Menus Available to the System Operator

The RoadRunner3 operator, with a non-administrator job card, can access a limited number of RoadRunner3 menus.

RoadRunner Ver 05.45.00.C Operator Menu

Main Menu

- Job
- Advance Pocket
- Align Pocket
- Purge
- Park Head
- Socket

Job

View	Job Name Device: E28F320 Checksum: 3FC00000 Mfg: INTEL Adapter: PA-G021 Prec: 621-0086-005 Act: 644-0016-001 Encrypted: Yes/No
Results	Passed: 992 Failed: 4 System Yld: 98.7 Prgrmr Yld: 99.6 Handler Yld: 99.5 Parts/Hour: 255 MCBI: 201[1] Skt 1 Yld: 99.9 Skt 2 Yld: 100 Skt 3 Yld: 100 Skt 4 Yld: 100 Skt Cycles: 249
End	
Remaining Devices	**Remaining: 77** **+-1** **+-10** **+-100** **+-1000** **+-10000**
Select	Job Name

Advance Pocket

When selected, each push of the UP Arrow (or DOWN Arrow) button advances (or reverses) the device tape by one pocket pitch. Holding a button down will continually move the tape.

Align Pocket

When selected, each push of the UP Arrow button advances the pocket tape 2 mm. The DOWN Arrow button does nothing.

Purge

Removes all devices from the Socket Adapter and places them into the Reject Bin.

Park Head

Moves the PNP head to the far front position above the belt..

Notes:
- Right column bolded items can be changed.

[1] Mean Cycles Between Interrupts

Socket

Socket 1: ENABLED	
Socket 2: ENABLED	
Socket 3: ENABLED	
Socket 4: ENABLED	
Adapter Statistics	**Reset Clean Count** Clean Count **Clean Alert: 3500** No: 22113204 Mfg: 09/23/02 Actuations:1055 Adptr. Life: 10000 Insertions: 4220 Pass: 4202 Fail: 16 Yld: 99.5 Socket 1 Insertions: 1055 Pass: 1053 Fail: 2 Yield: 99.8 Socket 2 Insertions: 1055 Pass: 1055 Fail: 0 Yield: 100 Socket 3 Insertions: 1055 Pass: 1051 Fail: 4 Yield: 99.6 Socket 4 Insertions: 1055 Pass: 1045 Fail: 10 Yield: 99.0

Figure 3-1—RoadRunner3 Operator Menus

Operator Functions

Keypad Operation

To make selections with the keypad follow these general guidelines:

- Navigate up to the desired menu (or to the top menu) by pressing the *Menu* button.

  When you are at the top menu, pressing *Menu* will have no effect. (**Job** is the top item on the top menu. However, you may need to press the *Up Arrow* button to see it in the display window.)
- Press the *Down Arrow* to move the triangular indicator down the list to the desired command. The command is not selected until the *Select* button is pressed.
- Press the *Select* button to select the item indicated. The menu will change or the triangular indicator will change to a circle when the item is selected.
- With some functions, the way the Up Arrow and Down Arrow keys function will change while that item is selected. For example, when **Advance Pocket** is selected, the *Up Arrow* advances the device tape rather than scrolling the menu. See Figure 3-2.
- To deselect an item press *Menu*. The circle will change back to a triangular indicator.

*This manual uses the word **scroll** to mean "press the Up Arrow or Down Arrow."*

The word select *is used to mean "press the Select button," (the button with the check mark on it). For example, "scroll to, and select,* **System***."*

3

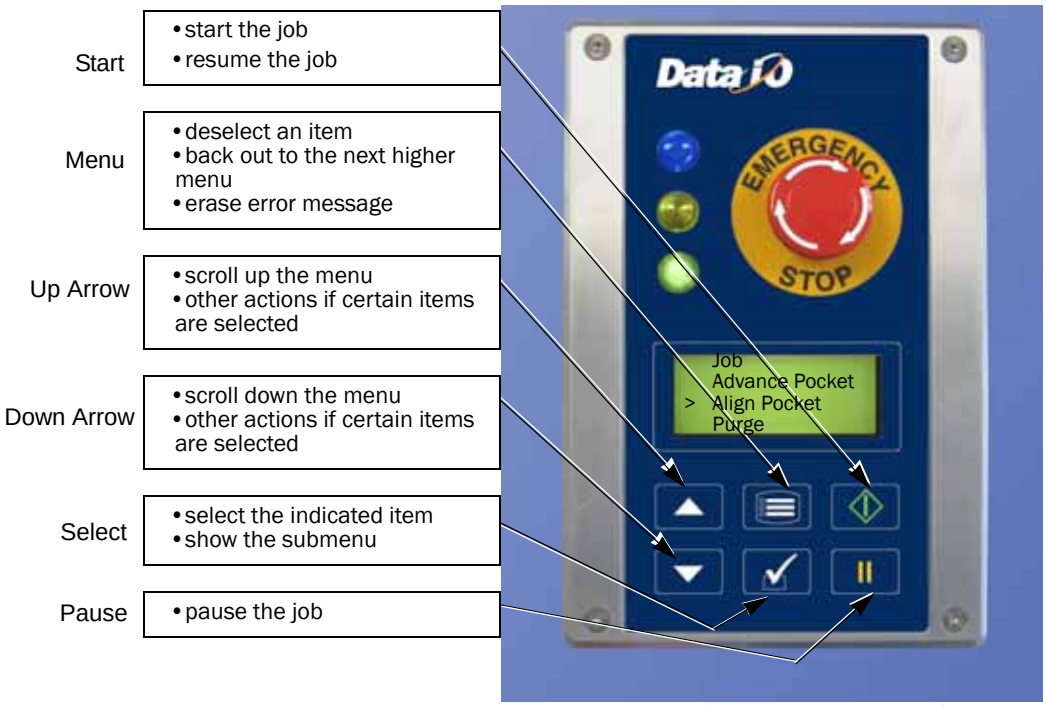


Figure 3-2—Keypad Layout

Operator Functions

Setting Up RoadRunner3 for a Programming Job

Before programming devices, several steps must be taken to configure the RoadRunner3 for the intended device.

Options comprising a job are normally selected in TaskLink at a PC by a supervisor or someone from the Engineering Department. The instructions are then written to a PCMCIA memory card (PC-Card). The instructions (or "job card") are inserted into the RoadRunner3.

Job cards for RoadRunner3 may also be used in Data I/O's FlashPAK programmer.

Once the PC-Card is inserted, the job hardware (such as Socket Adapter) needs to be set up. If more than one job resides on the card, then the last job loaded by the system supervisor will be available.

If the card has administrator authority then the operator can change the selected job. Decide which job you wish to run, then see the following sections for RoadRunner3 setup.

3

Changing the Socket Adapter

The Socket Adapter is the interface between the device and the programmer. Each package type that is processed by the RoadRunner3 may require a unique Socket Adapter.

Socket Adapters for Data I/O's FlashPAK programmer are interchangeable with RoadRunner3 Socket Adapters.

To change the Socket Adapter:

1. End a job if one is running.
2. Select **`Park Head`**.
3. Lift off the Robotics Cover.
4. Pull the Actuator Plate away from the programmer by sliding it out from the grooved brackets.
5. Unscrew the two captive screws that secure the adapter bracket. (Screws will remain in the bracket.)

See the Socket Adapter screws in Figure 3-3.

CAUTION: Electrostatic discharge (ESD) may damage parts. Before touching the adapter card, discharge static electricity from yourself by touching a common ground or an unpainted metal surface.

Figure 3-3—Unscrewing the Screws Securing the Socket Adapter

6. Rotate the adapter bracket up.
7. Lift the adapter up off locating pins, and out being careful not to damage the electronic circuitry on the adapter.

Figure 3-4—Removing the Socket Adapter

*CAUTION: Collision Hazard. Do **not** move the PNP head while the Socket Adapter Bracket is in the UP position. The head might get damaged. Always lower the bracket and screw it down before moving the PNP head.*

For more information, see "Changing the Actuator Plate" on page 3-7 and "Adjusting the Actuator Plate" on page 3-8.

8. Insert the correct adapter, ensuring that it seats correctly on the dowel pins.
9. Lower the adapter bracket and screw in the screws.
10. Slide the Actuator Plate back into place. Ensure the Actuator Plate matches the adapter: HIC or Standard.

The Actuator Plate must be adjusted if the device changed since the last job. Adjustment is covered a little later in this text.

Changing the Actuator Plate

An adjustable Actuator Plate is used on RoadRunner3 to open the sockets to place devices inside. There are two types of Adjustable Actuator Plates: one is designed for High Insertion Count (HIC) Adapters and can be identified by the three dots machined into the side (see the figure below). The other is for all other adapters. The Actuator Plate must be replaced each time you switch from a standard Socket Adapter to a HIC Socket Adapter and back.

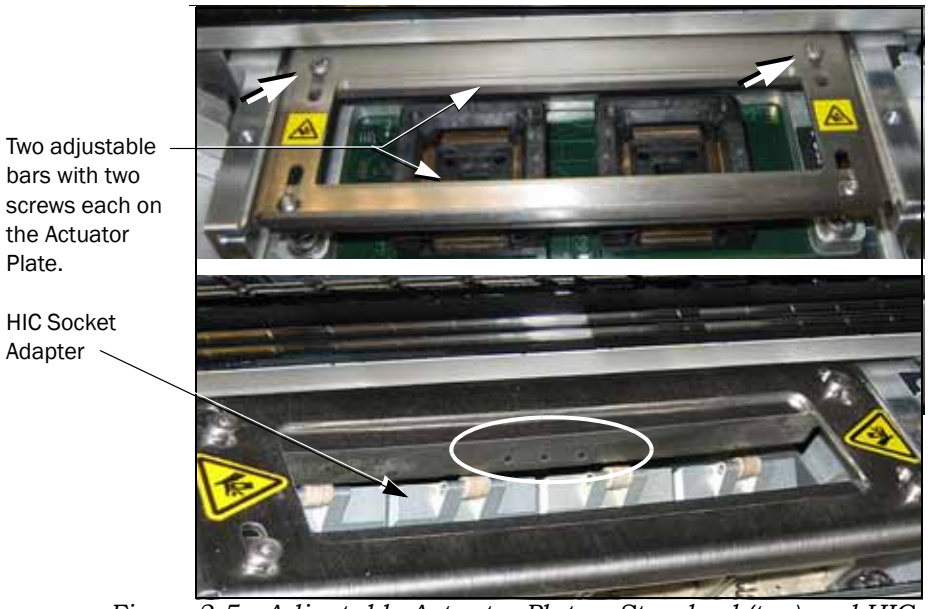


Figure 3-5—Adjustable Actuator Plates: Standard (top) and HIC, identifiable by the three dots, (bottom). Note that the HIC Sockets have rollers.

> *NOTE: On RoadRunner3, do not use non-adjustable Actuator Plates that came with earlier RoadRunners. They most often will not fit or not accommodate the correct stroke.*

To change the Actuator Plate (HIC and Standard):

1. Ensure that the actuator is in the up-position (sockets closed). If it is down, shut off the air supply.
2. Select **`Park Head`** from the main menu if it is not already parked.
3. Lift off the Robotics Cover.
4. Pull the Actuator Plate away from the programmer by sliding it out from the grooved brackets.

Figure 3-6—Changing the Actuator Plate

5. Slide the correct Adjustable Actuator Plate (HIC or Standard) into the grooved brackets, ensuring that it snaps firmly into place.

   If your Actuator Plate is not marked with an arrow indicating the direction to insert it, then insert it with the far flange bending down. The flange that bends up (if there is one) must be closest to the operator.

Adjusting the Actuator Plate

To adjust the Adjustable Actuator Plate (both types):

1. Ensure that the actuator is in the up-position (sockets closed). If it is down, shut off the air supply.
2. Select **`Park Head`** from the main menu if it is not already parked.
3. Lift off the Robotics Cover.
4. With a 2 mm Allen Wrench, loosen both screws for one actuator sliding bar and slide it inboard (toward center) as far as it will go.
5. Slide the bar outboard just far enough to allow a device to pass and fit into the socket. On HIC Adapters, the bars should just cover the socket rollers.
6. Tighten the two screws for that bar.
7. Perform steps 5, 6, and 7 for the second bar. The bars should be symmetrical in the actuator cutout.
8. Push the actuator down to verify proper socket open/close action.
9. With vacuum tweezers, place a device into a socket to verify clearance between the bars.
10. Turn on the air supply if it's off.

Operator Functions

NOTE: Without a job card inserted, the steps in the heading below cannot be accomplished. See "Supervisor Functions" on page 3-22 for creating a job card.

Changing the Precisor

The precisor assists in properly aligning devices before they are placed into the programming socket. Each precisor is shaped to correspond with a specific device.

To change the precisor:

1. Select **`Park Head`** from the main menu.
2. Lift off the Robotics Cover.
3. Being careful not to disturb the probe tips, pull the precisor plate down from the magnetized surface above.

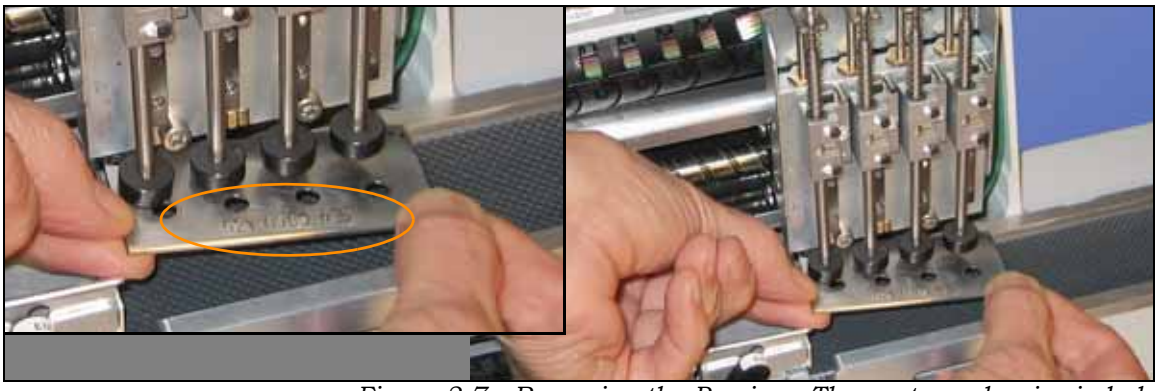


Figure 3-7—Removing the Precisor. The part number is circled.

4. Install the new precisor. Make sure that the part number on the precisor faces up and the small holes near the precisor edges mate up with the dowel pins on the PNP head. There should be no visible gap between the precisor and the PNP head.

Checking the Hardware Setup

To check the hardware setup, perform the following:

1. With the power on and system ready (the blue light is the only light on), insert a job card.
2. Using the control panel buttons, press the *Menu* button until the top level menu is displayed.
3. Scroll to, and select, **`Job`**.
4. Scroll to, and select, **`View`**.
   The list of hardware required for the job will be displayed.
5. Scroll through the list of hardware settings. Verify that each of the following job-specific hardware pieces is installed on RoadRunner3:

For more help see "Keypad Operation" on page 3-4.

Device:	Check this against the label on the reel of devices.
Checksum:	Check that this is the unique job ID number you wish to run. Checksum represents either the checksum of the device data, or the checksum of the device data plus extra bytes of storage for certain devices. The checksum represents the data in its original endian (byte order) as of Version 03.00.01.C.
Mfg:	Check that the device manufacturer listed matches the actual device manufacturer.
Adapter:	Check this against the label on the socket adapter.
Prec:	Check this against the (package-specific) number etched on the precisor plate.
Act:	Check this against the (package-specific) number on the actuator.

Also check that the Tape Advance module accommodates the appropriate width tape for the devices to be programmed.

Make any changes necessary to comply with the data in the Control Panel Display.

Adjusting the Tape-In Module

The Tape-In Module for RoadRunner3 is adjustable to four sizes of device tape: 16/24/32/44 mm. A notch on the Tape-In Module points to an etched number indicating the current setting.

> *NOTE: If the Tape-In Module has just been installed, it must be aligned before adjusting the width. See "Aligning the 4-position, Adjustable Tape-In Module" on page 4-13.*

Follow these steps to adjust the width of the Tape-In Module to accommodate your desired tape width:

1. Select **Park Head** from the main menu.
2. Turn the power OFF (when blue lamp is lit).
3. Remove the Robotics Cover.
4. Unscrew the Position Locking Screw most the way out using a 4 mm Hex Key. See Figure 3-8.

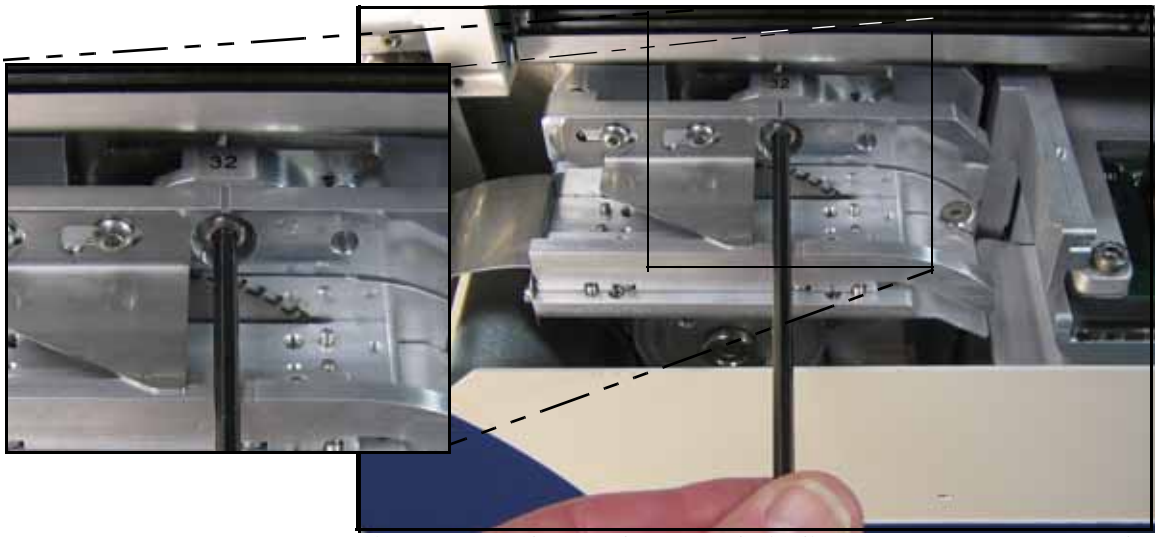


Figure 3-8—The notch currently indicates 32 mm. Unscrew the Position Locking Screw most the way out (about 20 mm).

5. Pull the assembly out for access. See figure below.

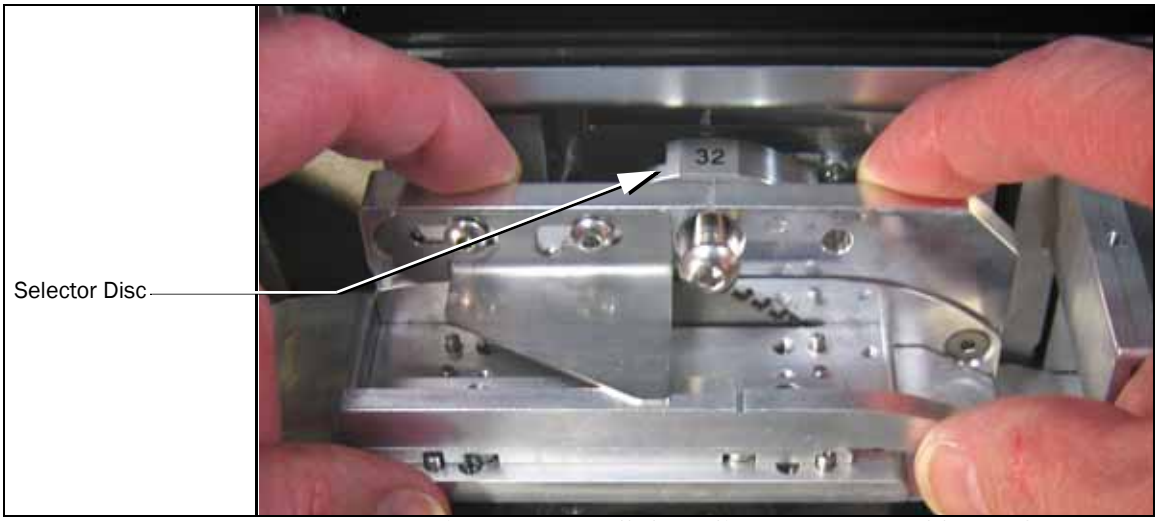


Figure 3-9—Pull the adjustment assembly out for access.

6. With your finger, rotate the Selector Disc so the notch points to the desired setting. If set at 16 or 44 mm, the disc will rotate in only one direction.
7. Push the assembly back in and tighten the Locking Screw.
8. If you are changing from 44 mm tape to 16 mm, or vice versa, you need to change to the other Peel Bar. Remove the peel bar. Otherwise, just loosen the two Peel Bar screws (2.5 mm).
9. Unscrew the two Front Track screws and move the track to the position corresponding to the new tape width. (The outboard-most position is for 44 mm and the inboard-most position is for 16 mm.)

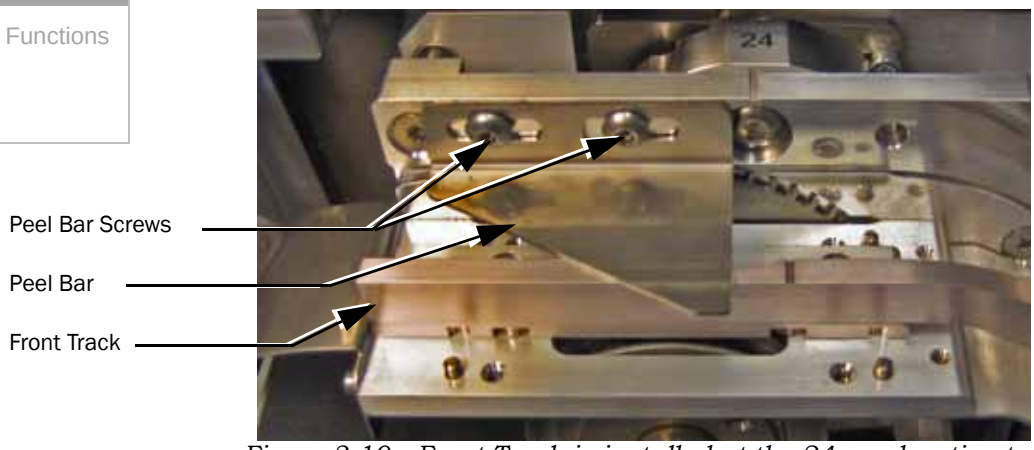


Figure 3-10—Front Track is installed at the 24 mm location to match the Selector Disc setting.

10. Screw in the two Front Track screws.
11. Install the correct Peel Bar if you removed the other one, but don't tighten down the screws yet.
12. See the next heading, *Loading Device Tape*. The Peel Bar screws need to be tightened when loading device tape.

Loading Device Tape

Devices to be programmed with the RoadRunner3 are sealed in device tape on a tape reel. Device tape (carrier tape) consists of pocket tape, which holds the devices, and cover tape. The maximum size tape reel you can use on a RoadRunner3 is 13 inch (33 cm) diameter.

The Tape-In Module simultaneously feeds the device tape into the machine and strips off the cover tape.

> *NOTE: Make sure the Tape-In Module is adjusted for your tape width. To adjust the Tape-In Module, see* *"Adjusting the Tape-In Module" on page 3-10**.*

To load device tape into the RoadRunner3:

1. Ensure that the brass button on the spindle is rotated to the center to allow a reel to slide over it. Install a reel of device tape. Rotate the brass button to lock the reel in place.

Figure 3-11—Locking a Reel onto the Spindle by rotating the brass button.

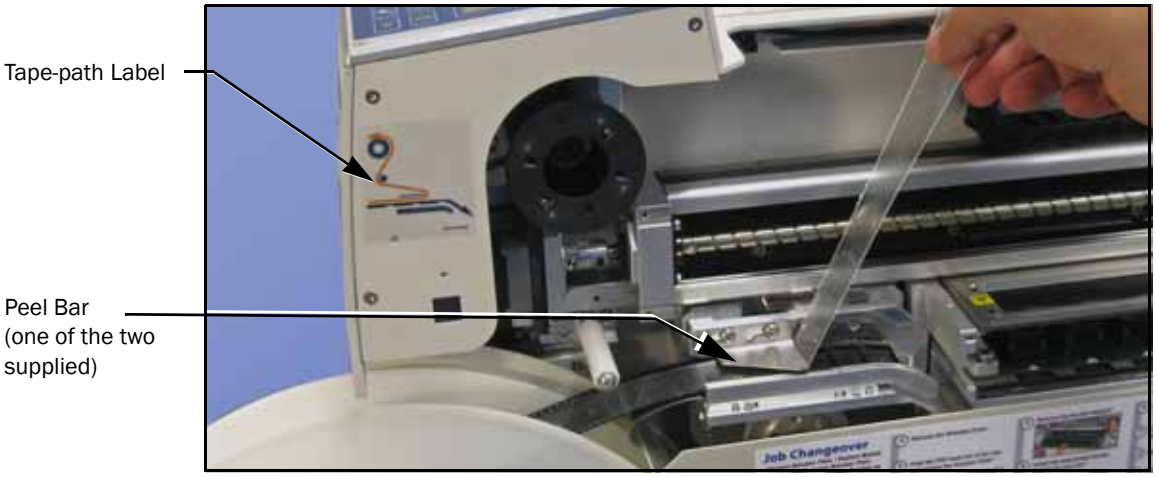


Figure 3-12—Loading device tape. Refer to the label on your unit to determine the tape path and cover tape path.

2. Switch the power switch ON and allow the system to start up.
3. Remove the Robotics Cover.
4. Insert the tape into the Tape-In Module to engage with the sprocket.
5. Press *Menu* until the top level menu is displayed.
6. Scroll to, and select, **`Advance Pocket`**.

CAUTION: Devices might fall into and jam the RoadRunner3. Do not advance devices past RoadRunner3's pick point. Remove devices with a vacuum tweezer.

7. Press the *Up Arrow* button to advance the tape.

8. Stop when the tape has advanced past the Peel Bar. Adjust the Peel Bar so that the front edge is between pockets, allowing a device to be picked cleanly from the pocket and still covering the next device. Retighten the Peel Bar screws.
9. Separate the cover tape from the device tape.
10. Thread the cover tape through the tape path as indicated in the tape-path diagram on your RoadRunner3. Attach it to the Cover Tape Reel. A small piece of adhesive tape may be required to stick the cover tape to the Take-Up Reel.

Aligning the Device Tape—All RoadRunner3 Models

The device tape pockets must be aligned with the pick point alignment mark on the Tape-In Module so that probes can pick the devices accurately.

To align the device tape:

1. Load the device tape as described in the previous section, "Loading Device Tape."

CAUTION: Device tape can jam if devices fall into tape path. Do not advance tape pockets with devices in them past the pick point. Remove the devices as necessary with a vacuum tweezer.

2. Advance the tape (**`Advance Pocket`** command) and press *Up Arrow*) until one of the holes in the center of a tape pocket is close to the Tape-In Module pick point.
3. At the top level menu, Scroll to, and select, **`Align Pocket`**.
4. Using the *Up Arrow* button to advance the device tape, line up (approximately) the center hole of one of the pockets with the pick point alignment mark. If you pass the mark (by more than one Up-Arrow-increment, 2 mm), use the next pocket. Always approach the mark with the tape traveling forward.
5. Press *Menu* to finish (or press *Start* if you are ready to start a job).

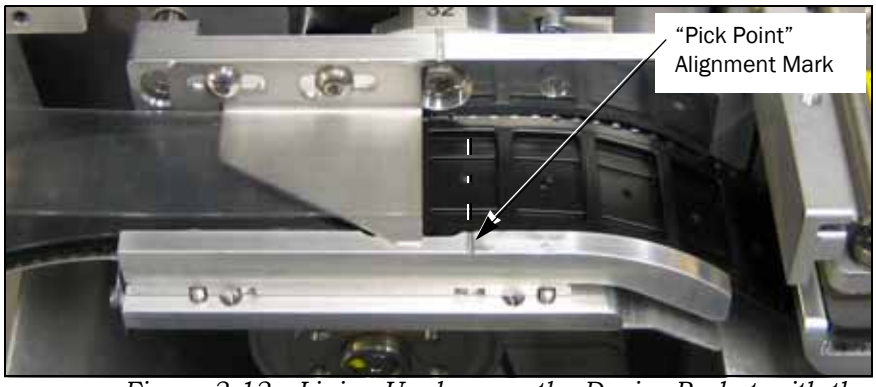


Figure 3-13—Lining Up, by eye, the Device Pocket with the Alignment Mark—alignment need not be exact as shown.

Programming Devices

Once the RoadRunner3 has been properly configured, device programming can begin. There are several processes associated with successful device programming, as well as recovering from job pauses or system shutdowns. Those processes are discussed in this section.

Starting a Job

To start a programming job:

1. Install the Robotics Cover (Safety Shield).

NOTE: If the Robotics Cover is not in place, RoadRunner3 will beep and run at a slower speed.

Device Tape, Socket Adapter, Actuator Plate, and precisor have already been installed. For more information see *"Setting Up RoadRunner3 for a Programming Job" on page 3-5.*

2. Switch the power ON [I].
3. Insert the PC-card containing the job to be run.
   Check that the correct job name is listed. If there is more than one job on the card, then the job last loaded by the system supervisor will be run, or, set the correct job (Supervisor card).
4. Clear the conveyor belt of any unneeded devices.
5. On the keypad, press the *Start* button.

The job will begin to run.

The green status lamp will flash until programmed devices reach the end of the conveyor belt. When devices have been transported to the SMT machine pick area, RoadRunner3 will pause and wait for the SMT machine to pick the devices. The green lamp will stop flashing and stay illuminated while the job is running.

When a device is picked by the SMT machine, the belt moves forward, presenting another device to the SMT pick head. When a sufficient number of devices have been picked, the RoadRunner3 places another group of programmed devices on the belt.

A red LED will light at each programming socket that fails to successfully program a device. Failed devices are placed into the Reject Bin rather than on the belt.

Stopping or Pausing a Job

To pause the RoadRunner3 after the current operation has finished, press the *Pause* button on the Keypad.

In case of emergency, press the Emergency-Stop button. The motor-controlled parts will stop and can now be moved by hand.

! WARNING

Electric Shock Hazard. If the main power switch is ON, power is applied to the electronic systems of the RoadRunner3, regardless of the position of the Emergency-Stop button or safety shield. Always turn the main power switch OFF before working inside the machine.

NOTE: Restarting after the Emergency-Stop button has been pressed requires re-aligning the device tape. See *"Restarting a Stopped Job" on page 3-16**.*

NOTE: The job statistics will continue when restarted after stopping or pausing the job (but not after ending or cancelling a job).

Restarting a Paused Job

To restart the RoadRunner3 after a job has been paused, press the *Start* button. The job will resume.

Restarting a Stopped Job

To restart the RoadRunner3 after the Emergency-Stop button has been pressed, perform the following:

1. Twist the Emergency Stop-button clockwise until it springs back to its normal operating position.
2. Press *Menu* until the top level menu is displayed.
3. Scroll to, and select, **`Align Pocket`**.

4. Press the *Up Arrow* button to advance the device tape until the **next** (not previous) pocket center hole lines up (approximately) with the alignment mark in the metal.
5. Press the *Start* button. The job will resume.

Disabling and Enabling a Socket

If a single socket produces an excessive number of errors during operation, it is automatically disabled to increase programming yield. RoadRunner3 will also disable a socket if a probe drops a device while attempting to pick it from the socket. If the socket is known to be good, it may be re-enabled by performing the following:

CAUTION: Possible mixup of programmed devices. Make sure that the socket is empty by visually inspecting it before enabling the socket.

1. Press the *Pause* button on the keypad if a job is currently running.
2. Press the *Menu* button until the top level menu is displayed.
3. Scroll to, and select, **Socket**.
4. Scroll until the disabled socket is indicated. Press the *Select* button.
5. Press the *Up Arrow* to enable the socket. (To disable it, press the *Down Arrow* button.)

Purging the Sockets

The Purge command in the Operator's Menu picks devices out of the programming sockets and places them into the Reject Bin. Purge cannot be used while a job is running—the blue lamp must be on. Purge can be used when sockets become disabled and the job has been stopped.

Ending (Cancelling) a Job

RoadRunner3 will end a job automatically when the number of successfully programmed devices equals the number that the particular job was set up to run (the *Pass Limit*). The job may have been set to program an infinite number of devices, in which case it will not stop automatically.

To stop a job see "Stopping or Pausing a Job" on page 3-16.

To cancel a job without finishing it:

1. Press the *Pause* button on the keypad.

Operator Functions

3

NOTE: All job statistics will end (and be stored on the memory card) when you cancel or end a job.

2. Scroll to, and select, **Job**.
3. Scroll to, and select, **End**.
   Programming and verification will continue only for devices still in the programming sockets. They will be picked and placed on the output conveyor or into the Reject Bin, as appropriate. The job will then stop.
4. Clear away excess devices from the output belt.
5. Empty the Reject Bin as described in the next section.

Emptying the Reject Bin

To empty the Reject Bin, pause the RoadRunner3 and remove the Reject Bin by its finger tab. Lift the bin up and pull out. Replace the bin after emptying. See Figure 3-14.

CAUTION: Collision hazard. To prevent damage to the probes, ensure that the Reject Bin is completely in place so the probes will not hit it.

Figure 3-14—The Reject Bin.

A best practice is to empty the Cover Tape Take-Up Reel after each reel of devices finishes.

Emptying the Cover Tape Module

When the Tape Take-Up Reel looks full, the used cover tape needs to be removed.

To empty the cover tape reel:

1. Press the *Pause* button.
2. Remove the Robotics Cover.
3. Rotate the cover tape Take-Up Reel backward to free up the tape.

Operator Functions

4. Unwind just enough cover tape for restarting it onto the reel, then cut the cover tape near the Take-Up Reel.
5. Pull the cover tape Take-Up Reel straight out from RoadRunner3

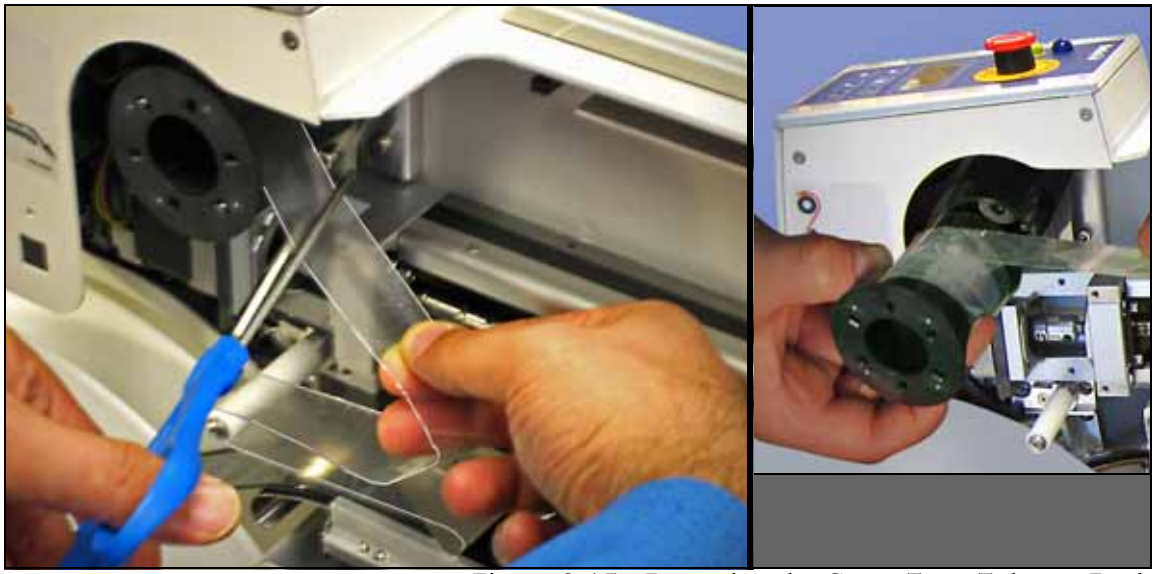


Figure 3-15—Removing the Cover Tape Take-up Reel.

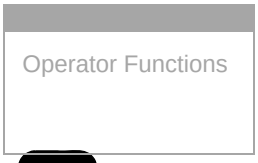
6. Unwind the used cover tape from the reel and discard it.
7. Slide the cover tape Take-Up Reel back onto the hub and rotate it until the holes line up with the steel pins. You may need to prevent the inner cylinder from rotating.
8. Rethread the cover tape onto the reel —a small piece of adhesive tape may be required.

For more information see "Loading Device Tape" on page 3-12.

Shutting Down RoadRunner3

To shut down RoadRunner3:

1. Press the *Pause* button if a job is running.
2. Press *Menu* until the top level menu is displayed.
3. Scroll to, and select, **`Job > End`**.
   Programming and verification will continue only for devices still in the programming sockets. They will be picked and placed on the output conveyor or into the Reject Bin, as appropriate. The job will then stop.
4. After the RoadRunner3 stops moving and the blue lamp illuminates, switch the power OFF [0].
5. Remove devices from the output belt.
6. Empty the Reject Bin.



For more information, see "Emptying the Cover Tape Module" on page 3-18.

7. Empty the Cover Tape Take-Up Reel:

   7a. Cut the cover tape near the Take-Up Reel and pull the device tape out of the RoadRunner3. Use caution to ensure that no devices fall from the device tape and into the machine.

   7b. Remove and empty the Take-Up Reel containing the used cover tape. Replace the reel.

Miscellaneous Settings

Changing the Pass Limit

An operator can change the Pass Limit at the RoadRunner3 Control Panel, but it does not save the change to the job card. The next time the job is run, the original Pass Limit will be in effect.

To change the Pass Limit at the Control Panel:

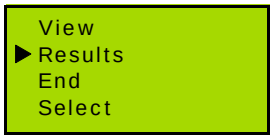
1. Select **`Job`**.
2. Select **`Remaining Devices`**.
3. Scroll to, and select, an increment for adjustment.
4. Press the *Up* or *Down Arrow* buttons as necessary.
5. Press *Menu*. Repeat steps if needed for another increment.

Changing Languages

To change languages:

1. Simultaneously press the *Select* button and the *Menu* button.
2. Press the *Down Arrow* or *Up Arrow* to locate the desired language.
3. Press *Menu* twice.

Programming Results



In addition to the number of devices **`Passed`** and **`Failed`**, the results listed in the Control Panel display under the **`Job > Results`** menu offer valuable information for tracking and ensuring optimum performance.

The **`System Yld`** eliminates rejected devices from the yield statistics. The formula is: Devices placed on belt / (Devices picked from input + Devices dropped at input).

The **`Prgrmr Yld`** eliminates dropped devices from the yield statistics. This gives an indication of how well the RoadRunner3 programmer is performing. The formula is: Devices placed on belt / (Devices placed on belt + Devices rejected).

Operator Functions

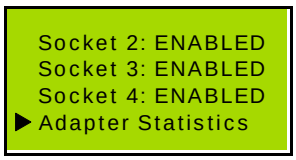
The **Handler Yld** is the overall yield. The formula is: (Devices placed on belt + rejected) / (Devices picked at input + Dropped at input).

Individual socket yields are also calculated. This data can be useful for troubleshooting low throughput, for example, in situations when the programmer yield drops long before the socket Actuations count nears the Adapter Life count (see Socket > Adapter Statistics). It will be easy to see if one socket of the four is the cause, in which case that socket can be disabled.

MCBI is the mean device count between interruptions.

Skt Cycles is the number of socket actuations during the current job.

Adapter Statistics



Many statistics for the Socket Adapter itself are listed in the **Socket** Menu under **Adapter Statistics**.

No. is a unique identification number for the currently installed Socket Adapter.

Mfg. is the date the currently installed Socket Adapter was first put into use.

Actuations is the number of cycles (opens and closes once) the Socket Adapter has been actuated during its life.

Insertions is the total number of device insertions for the life of the Socket Adapter. For example, if all four sockets were loaded every time the sockets were actuated, the number of insertions would be: Actuations x 4.

Also listed in the Adapter Statistics menu are **Pass**, **Fail**, and **Yield** calculations for the currently installed adapter and separate statistics for each individual socket.

Supervisor Functions

In addition to the Operator functions described in the previous section, the system supervisor performs many other functions. While the operator primarily runs programming jobs, the system supervisor has the ability to set RoadRunner3 operational parameters and view operational statistics, perform various diagnostic routines, and monitor event logs for programming and diagnostics. Additionally, the system supervisor can create programming jobs using *TaskLink for Windows* software.

Menus Available to the System Supervisor

To access the supervisor menus, a special supervisor card must be created in TaskLink on a PC-card. When this special card is inserted into the RoadRunner3, the system supervisor has access to a number of menus that are not available to the operator. Figure 3-16 shows the supervisor's menus that are in addition to the operators menus.

RoadRunner Ver 05.45.00.C Supervisor Menu

Main Menu

OPERATOR	SUPERVISOR
Job	Home
Advance Pocket[1]	Operation
Align Pocket[1]	System
Purge[1]	Robot Diagnostics
Park Head[1]	Programmer Diags
Socket[1]	Event Log

Job	
View	Job Name Device: E28F320 Checksum: 3FC00000 Mfg: INTEL Adapter: PA-G021 Prec: 621-0086-005 Act: 644-0016-001 Encrypted: Yes/No
Results	Passed: 992 Failed: 4 System Yld: 98.7 Prgrmr Yld: 99.6 Handler Yld: 99.5 Parts/Hour: 255 MCBI: 201[2] Skt 1 Yld: 99.9 Skt 2 Yld: 100 Skt 3 Yld: 100 Skt 4 Yld: 100 Skt Cycles: 249
End	
Remaining Devices	**Remaining: 77** **+-1** **+-10** **+-100** **+-1000** **+-10000**
Select	My-Job 1 My-Job 2 End of List

Notes:
- Right column **bolded** items can be changed.
- For information not described in the Owner's Manual see the Operator's Guide.
- Values shown are for EXAMPLE ONLY.

[1] See the 'Operator's Menu' list for this item.
[2] Mean Cycles Between Interrupts.
[3] Teach values shown are defaults for RoadRunner3 only.

Home
Sends the PNP Head to the Home position.

Operation	
Job	**Pick Retries: 2** **Error Retries: 3** **Reinsert:** **Pocket Pitch: 4** **Pocket Advance: 3** **Save Air: On** **Re-Home: Off** **Belt** **Clear Belt: Off** **Buffer: 1** **Prefill:Enabled** **Warning Msg: On** **Large Device: No**
Head	**Velocity: 600** **Accel: 1700**
Probes	**Puff: 50** **Pick: 200** **Place: 100** **Travel: 250**
Teach[3]	**Tape: 69.00** **Skt 1: 0.00** **Reject: -175.50** **Belt: -210.00** **Restore Defaults**

System	
Time	Hour: 23 Minute: 59 Month: 12 Day: 31 Year: 2012
Odometer	Hours: 469.92 Devices: 24742 **Timekeeping: OFF** Erase: 0.0s Blankcheck: 0.0s Program: 0.0s Verify: 0.0s
Update Software	
Network	**Network Parm: NVRAM/Card** **NetworkTxt: Del/Save** **Status: Enabled/ Disabled** PGM: Reds-RR2 IP: 123.123.12.456 Prog Port: 2727 **Eth Port:100-BT/10-BT** SUB: 255.255.255 GTW: 987.987.98.2 SNS: 0.0.0.0 SNS Port: 7500 HST: rr215.nt.data-io DOM: nt.data-io.com DNS: 139.138.16.105 DTS: 139.138.16.13 **Remote Port: 0** **Debug Port: 0** E_Addr: 0010EC002211 **Clear NetParms**
Adapter Alarm	On
Configuration	Firmware Version Ver 05.45.00.C Installed Boards Bkpln Brd Id: 11 EP860 48Mhz WFB FCIII Id: 160 Adptr Brd Id: 190 Hardware Config HwCfgIds 1,2,3, 7,8,9,10,11 Max Data Size: 16/32 GB JobChange: **Unlocked** View Prog Keys Prog Key information **Set Prog Key** **Remove Prog Key** Model: [*name-RR3*] **Feeder Comm: SBelt/FFI** **Reel Detect: Enable/ Disable**

Continued on the next page.

Figure 3-16—RoadRunner3 Supervisor Menu. Values are examples only.

Supervisor Functions

Robot Diags	
Robot:	**Enabled**
Run Mode:	**Job / Dry Run**
Belt	**Move: Fwd / Bkw** Pick Sensor: 0 Speed: 400 ± 10 **Measure Device** **Offset: 0.00** Repeatability Test **Start**
Sensors	Tape Sprocket: 0 Tape Broken: 0 Reject Full: 0 Reject Bin: 1 Air: 1 Interlock: 0 E-Stop: 0 **+Overtravel: 0** Home: 1
Socket	**State: Up** **Actuate: 0** **Act.Duration:150**[4]
Probe 1	**Position: Up** **Vacuum: Enabled** **Puff: Enabled** Vac Sense: 1 **Speed: 135 ± 5**
Probe 2	[same as Probe 1]
Probe 3	[same as Probe 1]
Probe 4	[same as Probe 1]
Head Position	Encoder: 8075
	Motor Pos[ition]: 40.37

Programmer Diags	
Programr: Enabled	
Exercise Display	
Test Cycles: 3	
Test All: PASS	
Bus Test: PASS	
Adtr ID Test: PASS	
LED Dvr Test: PASS	
G Node Test: PASS	
Vcc OC Test: PASS	
Vpp OC Test: PASS	
I2C Bus Test: PASS	
DAC Ref Test: PASS	
GSlew Test: PASS	
High RAM Test:	
Continuity Loop: 3	

Programmer Diagnostic tests require a Diagnostic Adapter Board for all items below this line.

Event Log	
View	
Clear	

NOTES:
[4] Act. Duration is set by the Socket Adapter.

Figure 3-17—Continuation of Supervisor Menus

Supervisor Functions

Setting Operational Parameters

While it is usually not necessary to change the system's operational parameters, some of them may require adjustment when changing to a different device package. All of them require setting after replacing the NVRAM battery since this information is stored in Non-Volatile RAM. The *Teach* function in the *Operation* menu contains the most often adjusted parameters. The following sections describe procedures for these four *Teach* parameters in detail. After that, common job parameters that can be customized are discussed. Supervisor Card is required to access these menus.

Operation > Teach > _____

Tape:	Used to teach the PNP head the position of the tape pocket at the pick point.	below
Skt 1:	Used to teach the PNP head the position of the first socket in the Socket Adapter board.	page 3-26
Reject:	Used to teach the PNP head the position of the Reject Bin.	page 3-26
Belt:	Used to teach the PNP head the position of the place point on the output belt.	page 3-27

Under some circumstances the keypad display may direct you to home the head before setting the operation parameters.

To home the head: From the top level menu, scroll to, and select, **Home**. Wait for the head to stop moving.

For details regarding step 1 see "Loading Device Tape" on page 3-12 and "Aligning the Device Tape—All RoadRunner3 Models" on page 3-14.

For more help see "Keypad Operation" on page 3-4.

Setting the "Tape" Parameter

To set the tape pocket position at the PNP pick point:

1. Load and align the device tape. "See Loading Device Tape" and "Aligning Device Tape."
2. On the Keypad, press the *Menu* button until the top level menu is displayed.
3. Scroll to, and select, **Operation**.
4. Scroll to, and select, **Teach**.
5. Scroll to, and select, **Tape**. The PNP head moves so probe #1 is positioned over the device tape pick position.
6. Use the *Up Arrow* or *Down Arrow* buttons to move the PNP head until probe #1 is perfectly centered over the hole in the center of the device tape. Pushing probe #1 down by hand and holding it while making this adjustment aids in judging when the probe is centered.
7. Press the *Menu* button to record your setting.

Supervisor Functions

3

*CAUTION: Probe collision hazard. Do **not** move the PNP head while the probe is in the DOWN position. The probe might get damaged. DO NOT SELECT THESE COMMANDS WHILE THE PROBE IS DOWN: Home, Purge, Probe #X speed, or any of the Teach operations—Tape, Skt1, Reject, Belt.*

While performing any Teach procedure, the PNP head may be moved incrementally with the Up Arrow or Down Arrow while the probe in the down position. Use caution.

Setting the "Skt 1" Parameter

To set the socket #1 position for the PNP head:

1. On the Keypad, press the *Menu* button until the top level menu is displayed.
2. Scroll to, and select, **`Operation`**.
3. Scroll to, and select, **`Teach`**.
4. Scroll to, and select, **`Skt1`**. The PNP head moves so probe #1 is positioned over socket #1.
5. Use the *Up Arrow* or *Down Arrow* buttons to move the PNP head until probe #1 is perfectly centered over socket #1. Pushing probe #1 down by hand and holding it while making this adjustment aids in judging when the probe is centered.
6. Press the *Menu* button to record your setting.

*CAUTION: Probe collision hazard. Do **not** move the PNP head while the probe is in the DOWN position. The probe might get damaged. DO NOT SELECT THESE COMMANDS WHILE THE PROBE IS DOWN: Home, Purge, Probe #X speed, or any of the Teach operations—Tape, Skt1, Reject, Belt.*

While performing any Teach procedure, the PNP head may be moved incrementally with the Up Arrow or Down Arrow while the probe in the down position. Use caution.

Setting the "Reject" Parameter

To set the Reject Bin position for the PNP head:

1. On the Keypad, press the *Menu* button until the top level menu is displayed.

Supervisor Functions

2. Scroll to, and select, **`Operation`**.
3. Scroll to, and select, **`Teach`**.
4. Scroll to, and select, **`Reject`**. The PNP head moves so probe #1 is positioned over the Reject Bin.
5. Use the *Up Arrow* or *Down Arrow* buttons to change the value of the PNP head position until probe #1 is perfectly centered over the Reject Bin.
6. Press the *Menu* button to record your setting.

NOTE: The probe should be placed in the DOWN position to verify that it is accurately centered on the Reject Bin. For details regarding lowering the probe tip *see "Robot Diagnostics" on page 3-34.* *When performing this operation, there is a risk of the probe tip striking the Reject Bin. To reduce the likelihood of damage to the probe tip, do not leave the probe in the DOWN position.*

CAUTION: Probe collision hazard. Do ***not*** *move the PNP head while the probe is in the DOWN position. The probe might get damaged. DO NOT SELECT THESE COMMANDS WHILE THE PROBE IS DOWN: Home, Purge, Probe #X speed, or any of the Teach operations—Tape, Skt1, Reject, Belt.*

While performing any Teach procedure, the PNP head may be moved incrementally with the Up Arrow or Down Arrow while the probe in the down position. Use caution.

Setting the "Belt" Parameter

To set up the output belt position for the PNP head:

1. On the Keypad, press *Menu* until the top level menu is displayed.
2. Scroll to, and select, **`Operation`**.
3. Scroll to, and select, **`Teach`**.
4. Scroll to, and select, **`Belt`**. The PNP head moves so probe #1 is positioned over the output belt.
5. Use the *Up Arrow* or *Down Arrow* buttons to change the value of the PNP head position until probe #1 places a device onto the output belt without striking the Reject Bin.
6. Press the Menu button to save your setting.

Supervisor Functions

NOTE: The probe tip should be placed in the DOWN position with a device attached to verify that it successfully clears the Reject Bin. The device vacuum will need to be turned on and a device must be attached to verify this operation. For details regarding turning on the vacuum and lowering the probe tip *see "Robot Diagnostics" on page 3-34.*

CAUTION: Probe collision hazard. Do ***not*** *move the PNP head while the probe is in the DOWN position. The probe might get damaged. DO NOT SELECT THESE COMMANDS WHILE THE PROBE IS DOWN: Home, Purge, Probe #X speed, or any of the Teach operations—Tape, Skt1, Reject, Belt.*

While performing any Teach procedure, the PNP head may be moved incrementally with the Up Arrow or Down Arrow while the probe in the down position. Use caution.

Operation > Job >

Other Operation menu items offer customizing actions that may affect throughput. These items are in the **`Operation > Job`** menu, and discussed below.

`Pick Retries:` Sets the number of attempts the probe makes to pick up a device before it moves to the next socket or tape pocket. The default is 2.

`Error Retries:` Sets the number of cycles the probe leaves a device in a socket before disabling it, in the event of a repeated errors of the same type (such as continuity). The default is 3.

`Pocket Pitch:` Allows fine tuning the tape movement to match the tape pocket pitch. This change only affects the current run. To change the pitch for subsequent job runs, edit the job in TaskLink as follows: 1) In TaskLink, select the job, 2) Click Edit, 3) Click the Media tab, 4) Change the pitch, 5) Click OK, 6) Load the job.

`Pocket Advance:` Sets the number of tape advances, and therefore Probe pick attempts from the tape, before displaying an error message. The default, and maximum, is three. For example, set Pocket Advance to one if you want RoadRunner3 to stop after two consecutive pick failures.

`Save Air:` When it is ON, this option shuts off air to the probes for the moments that it is not needed. The Save Air option should be

Supervisor Functions

OFF if the SMT machine has higher throughput than the RoadRunner3.

Save Air EXAMPLES:

- When set to OFF: the probes pick more devices from the sockets even though the belt is full of devices, and they hover over the belt waiting for space to place them.
- When set to ON: the probes do not pick more devices when the belt is already full. Instead, the air (vacuum) stops until the belt starts moving again. Then the vacuum starts and probes continue to pick devices.

Belt >

Clear: Removes all devices from the Conveyor Belt by running them off the end of the belt. Although it is a fast method of clearing the belt, devices will end up on the floor rather than in the Reject Bin.

Buffer: Sets the number of times the PNP Head places a group of devices onto the Conveyor Belt before sending them down to the pick point. A group of devices is four if four sockets program simultaneously. This effectively limits the space between each group placed on the belt.

Prefill: When Enabled, the PNP Head places as many groups of devices onto the Conveyor Belt as possible until the End-of-Belt sensor is tripped. Tripping the End-of-Belt sensor at any time will stop filling the belt and reset the Prefill command to **Disabled**. Prefill only occurs at the beginning of a job and will be disabled if devices are detected on the belt at the start of a job.

Warning Msg: When set to On, if devices are on the belt when the *Start* button is pushed, a message displays informing that there are "**Devices on belt.**" Remove devices if desired and press Start again.

Large Device: This feature will slow throughput but will increase the repeatability of device delivery for larger devices. (Devices can be considered large when the Socket Adapter has fewer than four sockets.)

Supervisor Functions

Setting System Parameters

The only system parameter that can be set is the real time clock. The odometer reading can be viewed only, and RoadRunner3 firmware can be updated from the *System* menu.

Setting the Real Time Clock

Generally, the only adjustment that will need to be made in this menu (*Time* function of the *System* menu) is the setting of the real time clock. The time and date are maintained by a lithium backup battery associated with the clock circuits on the programmer CPU. If the programmer module is replaced, the time may need to be reset.

To adjust the RoadRunner3 time and date:

1. Press the *Menu* button until the top level menu is displayed.
2. Scroll to, and select, **`System`**.
3. Scroll to, and select, **`Time`**.
4. Scroll until the time or date parameter requiring adjustment is indicated. Press the *Select* button.
5. Press the *Up Arrow* or *Down Arrow* buttons to adjust the parameter. Press the *Select* button.

Press the *Menu* button *once* to go back one menu level. Repeat steps 4 through 6 until the time is set correctly.

Odometer

The odometer displays total **hours** that the RoadRunner3 has been powered up and the total number of **devices** placed onto the conveyor belt since creation.

To view the odometer:

1. Press the *Menu* button until the top level menu is displayed.
2. Scroll to, and select, **`System`**.
3. Scroll to, and select, **`Odometer`**.

Also within the Odometer Menu is a **Timekeeping** command that records specific processing times in seconds. When Timekeeping is set to ON, times for these functions— Erase, Blankcheck, Program, and Verify— are recorded after each programming event. They are also written to the Event.log file. To turn Timekeeping on:

1. Scroll to, and select, System.
2. Scroll to, and select, Odometer.
3. Scroll to, and select, Timekeeping (the triangle at the beginning of the line changes to a circle).

Supervisor Functions

4. Press the Arrow Up button to change to ON.
5. Press the Menu button (or Start).

The next time you program a device the times will be available. Navigate to Timekeeping again to see them.

Timekeeping resets to OFF each time RoadRunner3 power is switched on.

Updating Programmer Firmware

Occasionally, an Update may be made to RoadRunner3's internal operating system to improve operability. To take advantage of this improvement, the new operating system must be uploaded into RoadRunner3. Software Version is displayed on the keypad screen at start-up (turn the power off and then on again).

The update process begins at TaskLink. RoadRunner3 system updates, as well as new device and Socket Adapter support, arrive on a compact disk (CD). Install the update CD onto the computer that has TaskLink on it. It will generally self-install. When you restart TaskLink the following pop-up message will appear:

Figure 3-18—New Software Pop-up message.

Create a RoadRunner3 System Update Card in TaskLink. Refer to the TaskLink help menu for more information.

RoadRunner3 Firmware is another name for RoadRunner3 System Software.

To perform the RoadRunner3 update after the update card has been created:

1. Insert the PCMCIA memory card (PC-card) with the updated firmware into the PC-card slot beneath the Keypad.
2. Press the *Menu* button on the Keypad until the top level menu is reached. (You are at the top level when pressing *Menu* does not change the display.)
3. Scroll to, and select, **`System`**.

CAUTION: Machine damage hazard. Regarding the next step, ***Do not switch the power off***

while the update is in progress. The RoadRunner3 might get damaged and require service.

4. Scroll to, and select, **`Update Software`**.
5. While the firmware is being updated, the following message is displayed:

```
Update in progress.
Do not remove power
until complete.
```

The three status lamps cycle on and off until the update is complete.

6. When the update has finished, RoadRunner3 will beep and the blue status lamp will come on. The following message is displayed on the Keypad Display:

```
--Update complete--
Insert job card and
cycle Power to reboot.
```

7. Insert a job card. Switch the power OFF and then ON again to start up with the new firmware.

*NOTE: Algorithm updates are not performed using the **`Update Software`** menu item. Device algorithms do not reside within the RoadRunner3 itself. They are provided by TaskLink with the programming job on the PC-card.*

Algorithms are updated on TaskLink. For more information regarding algorithm updates contact your Data I/O sales representative. (See contact information on the last page of this manual.)

Network Settings

Network commands are covered in Chapter 2. See "Configuring for Network Communication" on page 2-22.

Adapter Alarm

RoadRunner3 beeps and displays "Adapter life has been exceeded" when the Socket Adapter has exceeded the manufacturer's recommended total number of actuations (a number viewable at **`Adapter Statistics > Adapter Life`** but cannot be changed). If you don't replace the adapter, RoadRunner3 will continue to alert you each time you start or pause a job. These

Supervisor Functions

The Adapter Clean count and Clean Alert menu items are different from this Adapter life cycle count. See next heading.

The **Clean Count** *is in the* **Job > Socket > Adapter Statistics** *menu and is also available to Operators.*

recurring alerts (beep and message) can be prevented. Navigate the menu to, and select, **System > Adapter Alarm**. Press the ArrowDown button to set to **OFF**. Press the Menu button. To view Socket Adapter life, see *Adapter Life* on page 6-6 in the Error Messages table under the section "Yellow Lamp is on."

Adapter Clean Count

Although not under the *System* menu, the Socket Adapter **Clean Count** displays "Adapter maintenance is required" when the adapter has been actuated its recommended number of cycles between cleaning. The counter can be reset after cleaning the sockets. Also, the cleaning interval setting can be changed. Both are described in the Troubleshooting chapter: see *Adapter Maintenance* on page 6-7 in the Error Messages table in the section "Yellow Lamp is on." To display the number of actuations since the last cleaning, scroll to, and select, **Socket > Adapter Statistics > Clean Count**.

3

Configuration Menu

The RoadRunner3 configuration command is under the **System** menu. Here you will find the firmware version and model designation of your RoadRunner3, such as **Model: MYDATA-RR3**, for example, for a RoadRunner3 set up for MYDATA SMT machines.

The **Feeder Comm** command allows setting Siemens RoadRunner3s to **FFI** so it communicates with SIPLACE X-Series placement machines.

Installed Boards and **Hardware Configuration Identification** (HwConfigId) are listed, which aid in determining if new device support algorithms are compatible with your RoadRunner3 hardware.

Miscellaneous items under **System** > **Config** are:

- several **Prog Key** commands used for, and described in, our SDM (Secure Digital Management) Software (sold separately).
- **Reel Detect** command which detects when a reel of devices has been removed and signals the SMT line. The default is Disabled.
- **Max Data Size:** reports the maximum data file size for your RoadRunner3 model.
- **JobChange** allows unlocking a job that was locked remotely with Factory Integration Service.

Supervisor Functions

Robot Diagnostics

The robot diagnostics menu contains a series of utilities used to verify proper operation and to troubleshoot the robotic system. These utilities are also useful when performing tests from other system menus.

For the Robot Diagnostics menu see Figure 3-17 on page 3-24.

The basic functions provided by the utilities in this menu are:

- Enable and disable the robot actions
- Allow system dry runs
- Fine tune output belt components and actions
- View other system sensor status
- Cycle each of the PNP probes and test other pneumatic components

Dry Run

When **`Run Mode`** is selected in the **`Robot Diags`** menu, use the *Up Arrow* or *Down Arrow* to toggle between **`Job`** and **`Dry Run`**. Use **`Dry Run`** to check the mechanical function of the robotics. Devices do not need to be present.

> When *Dry Run* is visible on the keypad screen, devices are not being programmed.

`Dry Run` disables the programmer as well as two sensors: the vacuum detect sensors and the cover-tape-broken sensor. **`Dry Run`** can be used to isolate mechanical problems or when the RoadRunner3 is new or has just been repaired. It can also be used to even out the conveyor belt when RoadRunner3 has been inactive for a week or more.

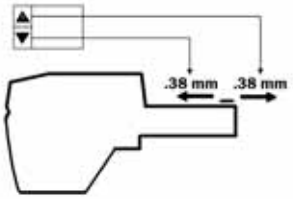
CAUTION: After using **`Dry Run`**, *reset* **`Run Mode`** *to* **`Job`** *or devices will not get programmed.*

Belt

When the **`Move`** command is selected in the **`Robot Diags > Belt`** menu, the belt can be set in motion with the *Up Arrow* (forward) or *Down Arrow* (backward). This allows the belt speed to be displayed. The speed is a measurement of the time (in milliseconds) that it took the belt to travel one head distance.

The **`Measure Device`** command in the **`Belt`** menu measures and centers the device at the End-of-Belt optic. (When starting a job, RoadRunner3 automatically centers the first device to arrive at the end of the belt to set the pick point.)

The Belt Offset movement:



The **`Offset`** command in the **`Belt`** menu allows adjusting the device position to accommodate the SMT pick head in the event that centering the device at the pick point (via the **`Measure Device`** command) is undesirable. Scroll to, and select, [✓] **`Robot Diags`** > **`Belt`** > **`Offset`**. Push the *Up* or *Down Arrow* once to adjust and wait for the belt to adjust the position. Press *Menu* to record and exit the **`Offset`** command.

Repeatability Test

After running the **`Measure Device`** command, the repeatability test can be performed by placing a device on the belt and selecting [✓] **`Robot Diags`** > **`Belt`** > **`Repeatability Test > Start`**. A log file is saved to the PC-card.

Sensors

Selecting *Robot Diagnostics*, then *Sensors*, displays the state of the sensors. 1 = blocked. 0 = unblocked. Menu items + *Overtravel* and – *Overtravel* must be selected to see the current setting.

Socket

The current state of the programming socket can be viewed and toggled with the Up and Down Arrows when **`State`** is selected.

By selecting *Actuate*, a socket delay time in milliseconds can be added with the Up Arrow. Zero is the default.

An actuator duration is set automatically for each Socket Adapter type. Use the **`Act. Duration`** command to manually reset the delay value in milliseconds. The new value will be retained in memory until a different adapter is installed. The default is zero. A few special Socket Adapters have a long duration that incorporates double opening and closing action.

Cycling the PNP Probes

The most frequently used utility is likely to be the Probe operations. The *Probe* menu selections allow the system supervisor to raise and lower each of the probes, turn vacuum on and off to the probe tip, and turn positive pressure (puff) air on and off to the probe tip.

For correct speed setting see "Adjusting and Balancing Probe Speed" on page 4-46.

To cycle the PNP probes:

1. Press the *Menu* button until the top level menu is displayed.
2. Scroll to, and select, **`Robot Diagnostics`**.

Supervisor Functions

3. Scroll to, and select, **Probe X** , where X is the probe number to be cycled.
4. Scroll to, and select, **Position**.
5. Press the *Up Arrow* or *Down Arrow* buttons to toggle *UP/DOWN*.

Other probe functions, **Vacuum**, **Puff**, **Vac Sense**, and **Speed**, can be viewed or toggled with the *Up Arrow* or *Down Arrow* buttons also. For example: when **Speed** is selected for probe #1, and a device is present at the pick point, then probe #1 will move down and up intermittently, and display the speed in the Control Panel screen. Press *Menu* to stop.

3

Programmer Diagnostics

PROGRAMMER DIAGS is another menu that the system supervisor can use.

For the Programmer Diags, see Figure 3-17 on page 3-24.

With the exception of *Continuity Loop*, all items listed after *Exercise Display* are for displaying the results of a diagnostic test using the Diagnostic Adapter Board (DAB). The DAB part number/name is FC-DIAGNOSTICS BOARD. The DAB detects problems related to programmer hardware failure—the Waveform Circuit Board and BackPlane Circuit Board. It does not test the Robot I/O Board or system timing. Instructions for performing the DAB test are in "Diagnosing with the Adapter Board" on page 5-4.

Programmer allows disabling the Programmer Module. No devices will get programmed.

Exercise Display verifies that the display and keypad are working properly. It runs through a test and then displays symbols of the buttons. When the keypad symbols are displayed on the screen, press each corresponding keypad button— that image will disappear. Press the E-stop last to return to the menu. Finally, press menu to exit the exercise.

Continuity Loop allows changing the number of continuity tests performed prior to programming a device.

Event Log

The Event Log lists status messages for Data I/O engineers. If Timekeeping is switched ON, it also lists programming times for each process. The letters are defined as follows:
E = erase time, B= blank check time, P= program time, V= verify time,
Oh= Overhead Time*, and Oa= Overall time.

*Overhead time is Overall time – Erase Time – Blank Check Time – Program Time – Verify Time – Serialization time.

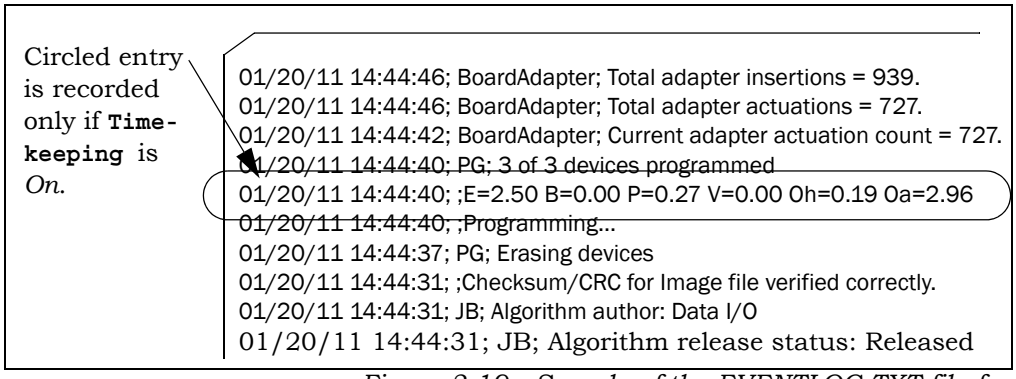


Figure 3-19—Sample of the EVENTLOG.TXT file for FlashCORE III in the FDRROOT > SYSTEM folder.

3

Session Data Log

For more socket statistic information, see "Adapter Statistics" on page 3-21.

Device socket activity is recorded in the Session Data Log file. If Session Data Logging is enabled in TaskLink, then a log file will be generated for each programming session and saved when the session ends. It records counts of 14 possible actions at each socket. The codes for these actions are as follows:

PASS - # of passed devices

CF	Continuity Failures
NB	Blank error (not blank)
IB	Illegal Bit
PF	Programming failed
VF1	Failed first verify pass
VF2	Failed second verify pass
FT1	Failed first functional test
FT2	Failed second functional test
SFF	Security bit failed to program
SFB	Programmed security bit failed
DO	Device overcurrent error
EF	Erase failed
EID	Mismatched electronic ID
OE	Other errors

Check TaskLink's *Session Data Logging* dialog box to discover if it is enabled, and if so, what location it is written to. (Open TaskLink, click **Setup** > **Session Data Logging**.)

Chapter 4

Service

For service, send RoadRunner3s under warranty back to Data I/O.

If your RoadRunner3 is NOT under warranty, you have the option of repairing it with instructions in this chapter or sending it back to Data I/O. See the inside, back cover for contact information.

RoadRunner3 embodies a modular design for ease of repair and replacement procedures. Many modules and components on the RoadRunner3 are designed to be serviced or replaced by qualified technicians. You may wish to keep backup modules or components (spares) for replacements. The replaced module or component may be sent to Data I/O for repair, certification, or replacement.

Replaceable Modules

Replaceable modules include:

- Tape-In Module
- Conveyor Module
- Control Panel Module
- Linear Stage Module (with PNP Head)
- Pneumatic Regulator Assembly
- Pneumatic Module
- Cover Tape Module
- PNP head (subassembly)
- Programmer Module

Some components can be replaced or adjusted at the customer location. Replacement and adjustment procedures for those components are included in this chapter. Some modules can be

removed and sent to Data I/O or a local representative for servicing or exchanging.

Within each main section of this chapter is an order form with Part Numbers. These numbers represent the RoadRunner3 configuration at the time of printing this chapter, and may not be the same as your unit. However, with your RoadRunner3 Model Number and Serial Number, Data I/O can find the latest interchangeable replacement.

CAUTION: *Electrostatic discharge may damage parts. Before servicing, place the RoadRunner3 on an ESD-safe workstation.*

Tools Required

Some of the tools required for replacing components of the RoadRunner3 are:

- Metric hex key set (also known as Allen wrench, Inbus key, Unbrako key) preferably with a ball-end on one end. Sizes 1.5 mm through 5 mm.
- Vacuum Tweezer
- Cable tie clippers
- Programmer alignment tool (6950019001)
- ESD-safe workstation (may include an ESD grounding strap, a table mat, and special antistatic clothing)
- Slotted screwdrivers
- Cable tie gun
- Loctite 222 or equivalent

Components Overview

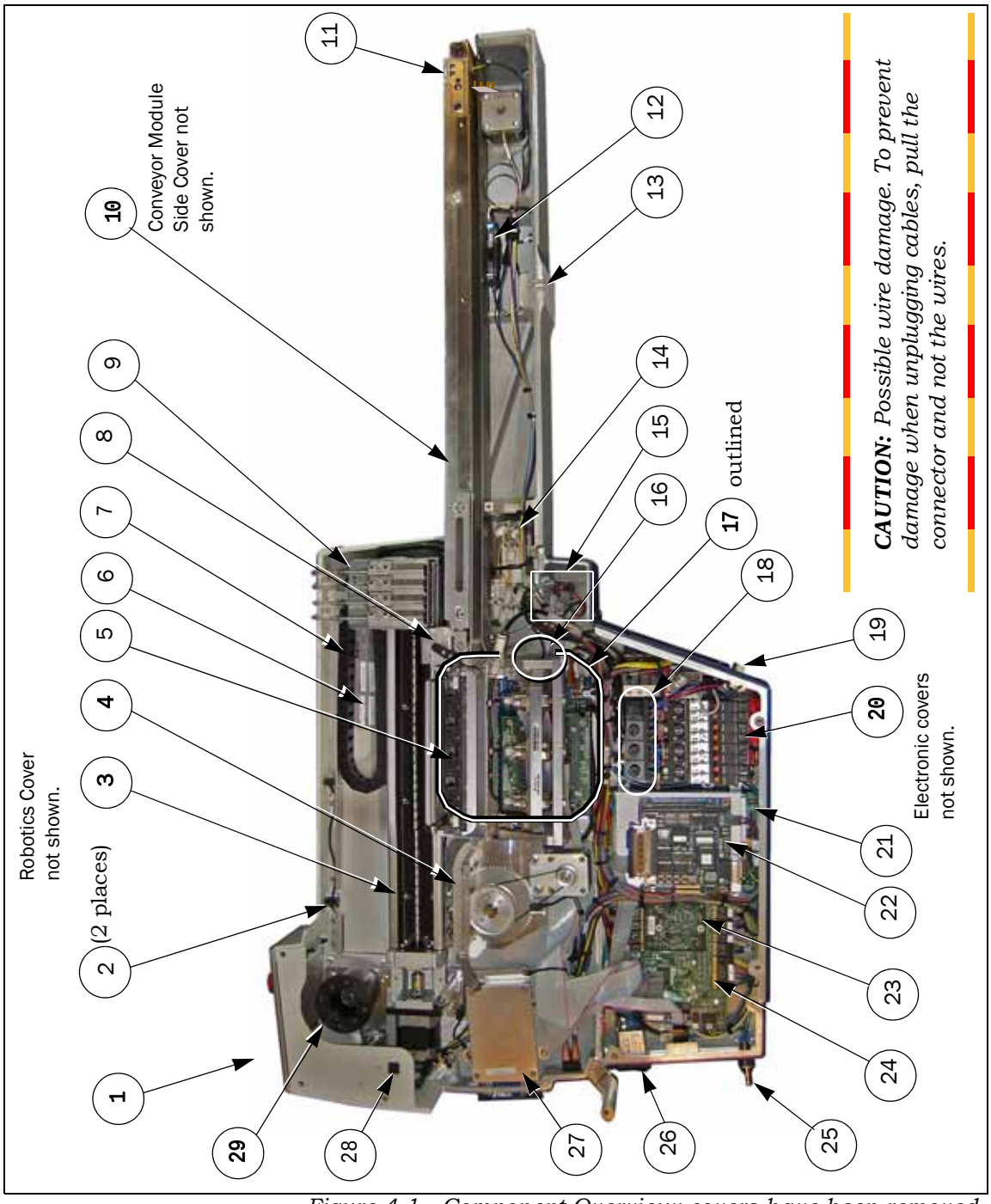


Figure 4-1—Component Overview; covers have been removed.

CAUTION: *Electrostatic discharge can damage parts. Before repair work begins, place the RoadRunner3 on an ESD-safe workstation.*

Component List

Modules are listed in bold type.

(Modules are assemblies installed and replaced as a unit.)

1. **Control Panel Module**, page 4–40
2. Head Limit sensors
3. **Linear Stage Module**, page 4–70
4. **Tape-In Module**, page 4–10
5. Socket Adapter (purchased separately)
6. Serial Number Label
7. Cable/Tube Carrier
8. Reject Bin
9. Pick and Place Head (PNP Head)
10. **Conveyor Module**, page 4–28
11. End-Of-Belt Sensor Optic
12. End-Of-Belt Optical fiber Amplifier
13. Mounting Guide-Pin bushing
14. Probe Control Manifold
15. Interconnect Panel
16. Socket Actuator Sensor (hidden)
17. **Programmer Module**, page 4–56
18. Vacuum Filters
19. SMT Communications Connection (some models)
20. **Pneumatic Module**, page 4–16
21. Power Supply (hidden)
22. Motion Controller PCB
23. Communications PCB
24. Robot I/O PCB
25. Air inlet connection
26. Power Switch
27. PC Card Reader/Writer
28. Robotics-Cover-Open Sensor
29. **Cover Tape Module**, page 4–24

CAUTION: *Electrostatic discharge may damage parts. Before repair work begins, place the RoadRunner3 on an ESD-safe workstation.*

Covers

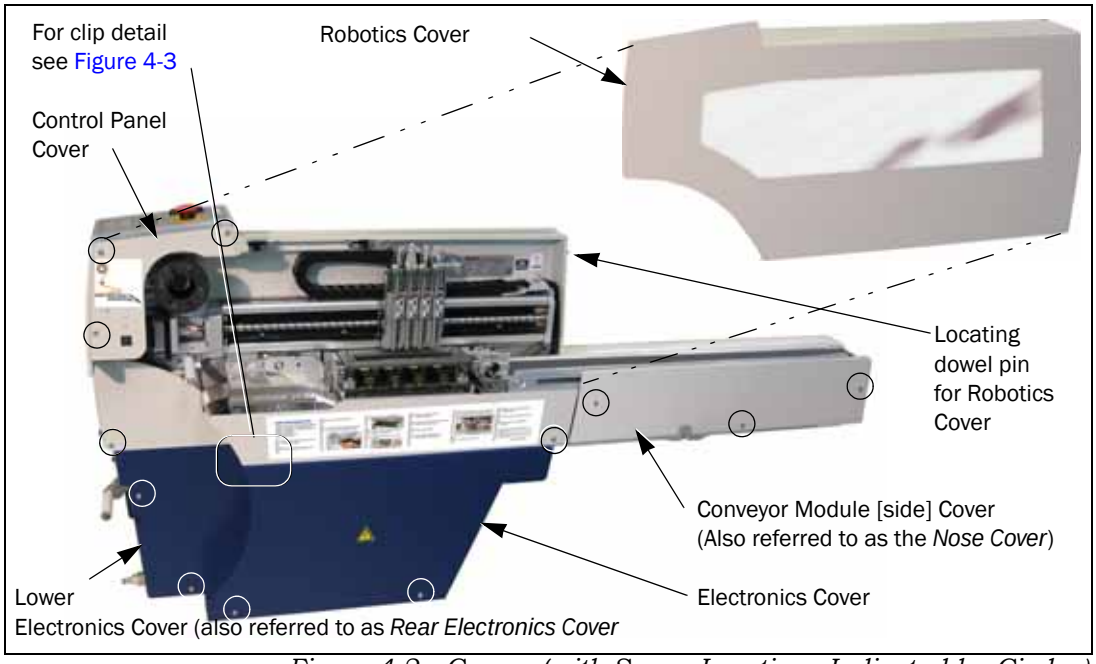


Figure 4-2—Covers (with Screw Locations Indicated by Circles)

The RoadRunner3 has five removable covers:

- Robotics Cover
- Electronics Cover
- Lower (Electronics) Cover
- Conveyor Module Cover
- Control Panel Cover

The Robotics Cover shields the tape path, programmer, Linear Stage and the movements of the PNP Head.

Data I/O Parts Ordering Information

Instructions: **1**. Copy this page. **2**. Fill in your RoadRunner3 model and serial numbers (see the label on the chassis under the Robotics Cover). **3**. Fill in the quantity for the item(s) desired. **4**. (Optional) Call your local Data I/O sale representative for part prices or use our Web page for Requesting Quotes. **5**. E-mail to OrderAdmin@dataio.com or FAX to 425-867-6972 with your purchase order.

RoadRunner3 Model No._____ Serial No._____

INVENTORY PART NUMBER	PART DESCRIPTION	QTY	PRICE EA.	TOTALS
615217000	Robotics Cover, RR3		$	$
6152214001	Electronics Cover Assy, RR3		$	$
6161788001	Lower Electronics Cover, RR3		$	$
6161791001	Conveyor Module Cover, RR3		$	$
7502405001	Control Panel Cover, RR3		$	$
			$	$

Signature:_____Date:_____Company:_____

Removing the Robotics Cover

Grasp the outer edges of the Robotics Cover and gently pull away from the Control Panel and out.

There is a locating dowel pin on the end opposite the Control Panel Module.

NOTE: The Robotics Cover can be removed while the RoadRunner3 is running. However, the robot speed reduces by 50%.

⚠ WARNING

Electric Shock Hazard. Do not remove the Lower Cover, Electronics Cover, or the Conveyor Module Cover while the RoadRunner3 is plugged in.

Removing the Electronic Covers

1. Turn the power OFF (0).
2. Disconnect the RoadRunner3 power cord and air supply.

NOTE: The RoadRunner3 pressurized air supply tube has a quick disconnect fitting with an automatic shut off. The line may be disconnected without shutting off the supply line air pressure.

3. Lift off the Robotics Cover.
4. Remove the three screws that hold the Electronics Cover to the chassis. *For screw locations see Figure 4-2.*
5. Slide the cover to the right to unhook a clip on the left side, then lift off. For *a detail of the cover clip see Figure 4-3.*

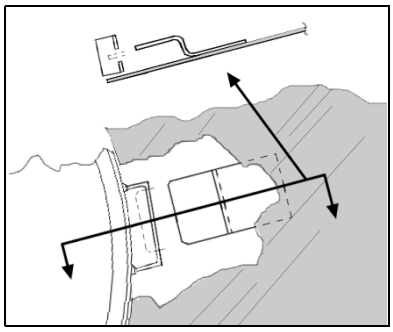


Figure 4-3—Detail of Clip on the Inside of the Electronics Cover (cut-away and cross-section)

6. Remove the three screws that hold the Lower Electronics Cover to the chassis. For screw locations see Figure 4-2.

Removing the Conveyor Module Cover

To remove the Conveyor Module Cover (also called the Conveyor Side Cover):

1. Turn the power off.
2. Disconnect the RoadRunner3 power cord and air supply.
3. Remove the three screws that hold the Conveyor Module Cover to the chassis. *For screw locations see Figure 4-2.*

Removing the Control Panel Cover

The Control Panel Cover is a small cover just below the Control Panel Module.

1. Turn the power off.
2. Disconnect the RoadRunner3 power cord and air supply.
3. Remove the three screws that hold the Control Panel Cover to the chassis. *For screw locations see Figure 4-2.*
4. Disconnect the Cover Open Sensor cable by pinching the clasp on the connector to release it and then pulling apart.

Tape-In Module

Remove the Position Locking Screw to remove the Tape-In Module body, after which the two Base Mounting Screws are accessible.

Figure 4-4—Location of Tape-In Module Position Locking Screw (circled). (Base Mounting Screws are Hidden.)

The Tape-In Module advances the device tape. The Tape-Advance Sensor sends sprocket motion feedback to the system controller.

If the device tape is not advancing correctly, there could be a problem with the Tape-In Module. Refer to the Troubleshooting chapter to identify the problem. If the problem is the Tape-In Module, remove it and return it to Data I/O for repair or replacement. If your RoadRunner3 is past warranty period, you may elect to repair it on-site if you have a certified technician.

The sensor on the far side of this module can be replaced independently.

Data I/O Parts Ordering Information

Instructions: **1**. Copy this page. **2**. Fill in your RoadRunner3 model and serial numbers (see the label on the chassis under the Robotics Cover). **3**. Fill in the quantity for the item(s) desired. **4**. (Optional) Call your local Data I/O sale representative for part prices or use our Web page for Requesting Quotes. **5**. E-mail to OrderAdmin@dataio.com or FAX to 425-867-6972 with your purchase order.

RoadRunner3 Model No._____ Serial No._____

INVENTORY PART NUMBER	PART DESCRIPTION	QTY	PRICE EA.	TOTALS
7502433001	Adjustable Tape-In Module, 16-24-32-44MM		$	$
6210124001	RR3 Tape-In Module Alignment Tool		$	$
			$	$
			$	$

Signature:_____Date:_____Company:_____

Removing the 4-position, Adjustable Tape-In Module

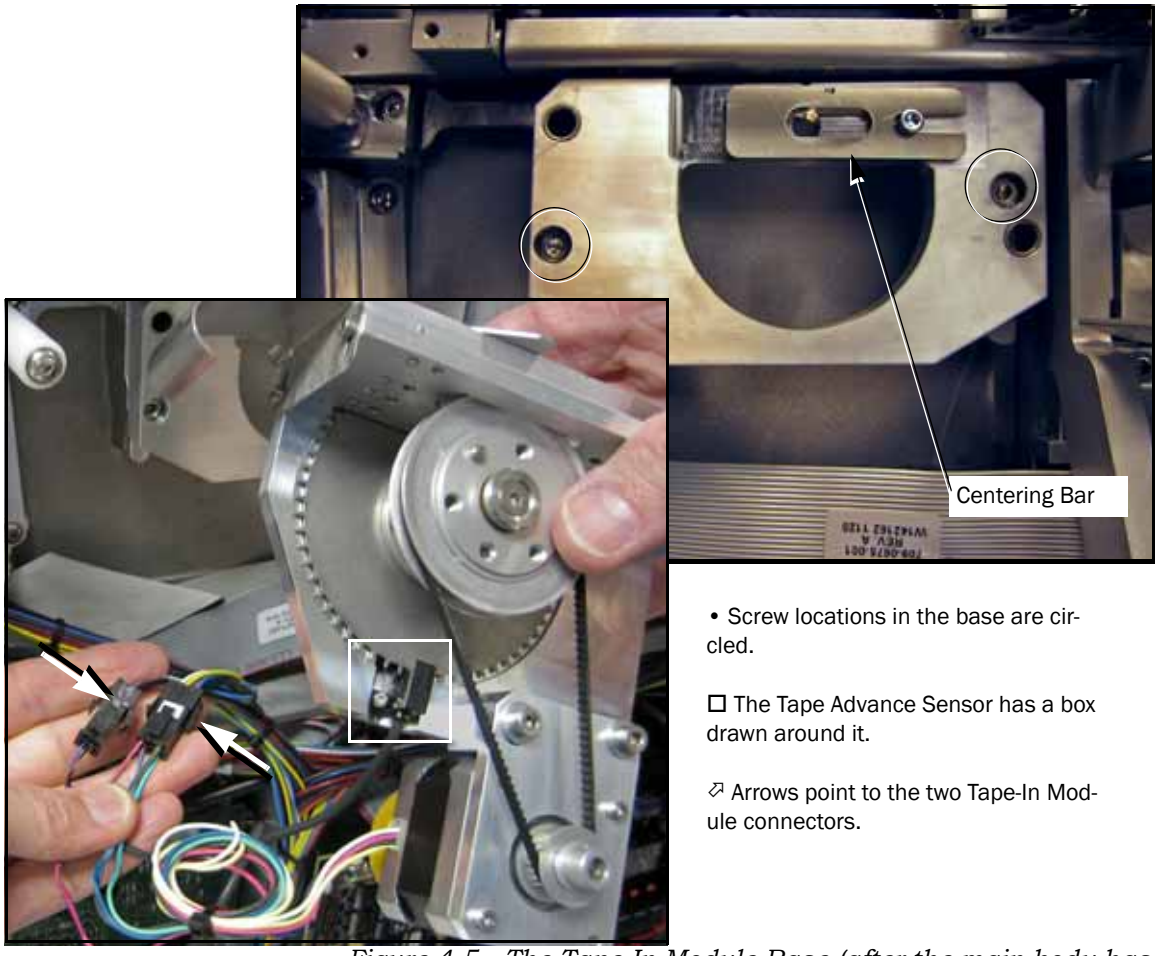
For Cover screws, see *Figure 4-2 on page 4-6*.

For Tape-In locking screw location, see *Figure 4-4*.

To remove the 4-positions Adjustable Tape-In Module:

1. Turn the power OFF [O].
2. Disconnect the power cord and air supply.
3. Remove the Robotics Cover and the two Electronics Covers.
4. Remove the Position Locking Screw (4 mm hex) and pull the main body of the Tape-In Module straight out from the base as far as wires allow. See the previous figure.
5. Check that wire labels are clearly marked and unplug the wires for the Tape Advance Sensor and the Tape-In Motor by pinching the clasp and pulling the connector apart.

   The sensor may be replaced independently of the module.



• Screw locations in the base are circled.

☐ The Tape Advance Sensor has a box drawn around it.

⇗ Arrows point to the two Tape-In Module connectors.

Figure 4-5—The Tape-In Module Base (after the main body has been removed).

5a. To replace the Tape Advance Sensor, remove the screw (1.5 mm hex) attaching the sensor to the module.

(The cable has been unplugged from the connector in a previous step.)

6. Remove the two screws attaching the Tape-In Module Base to the RoadRunner3 chassis with a 4 mm hex key.
7. Pull the Base straight out from the chassis.

Replacement is in the reverse order of removal with these four precautions:

- Ensure that cable connectors are mated correctly.
- Ensure that no wires or hoses get pinched.
- Ensure that the Module body pins engage the locating holes in the base.
- Align to the PNP head by performing the Tape-In Module alignment procedure. (See following heading.)

Aligning the 4-position, Adjustable Tape-In Module

The 4-position, Adjustable Tape-In Module must be in-line with the PNP head probes (as well as the programmer) along the axis of tape travel; that is, their distance from the RoadRunner3 casting must be the same. The PNP head is the control and is not adjustable in that direction.

*When should the Tape-In Module be **Aligned**?*

Align the Adjustable Tape-In Module any time one has been installed, or you experience alignment problems picking devices from the device tape. Tape-In Alignment Tool PN 621-0124-001 is required.

*To **adjust** the Tape-In Module, see "Adjusting the Tape-In Module" on page 3-10.*

To center the tape path under the PNP probes on RoadRunner3:

1. Remove device tape if installed.
2. Turn the power OFF [O].
3. Push the PNP head out of the way if necessary, and adjust the Tape-In Module for 32 mm tape.
4. Loosen the two Peel Bar screws (2.5 mm).
5. Remove the Front Track by removing the two 2 mm screws and lifting it up.
6. Install the Tape-In Alignment Tool at the 32 mm tape position with the same screws.

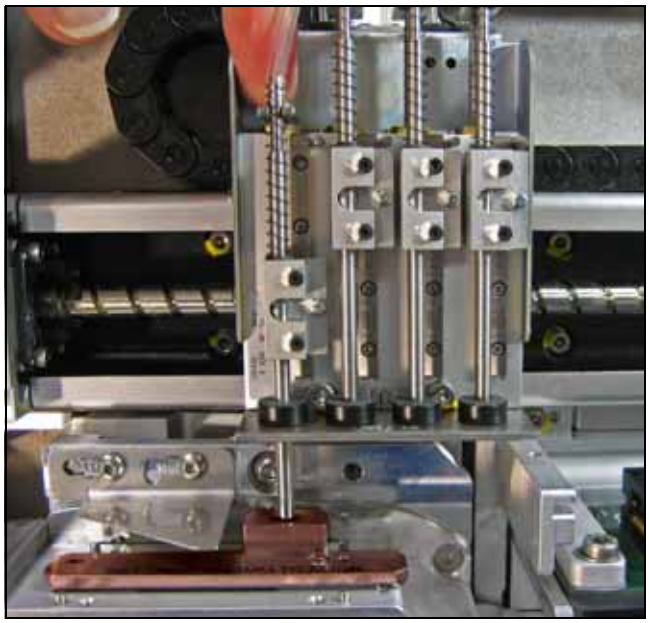
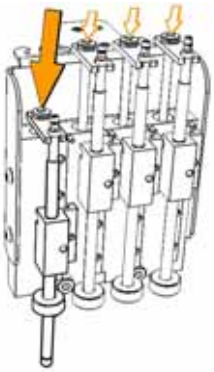


Figure 4-6—The Alignment Tool is installed (copper colored in this image). Push the probe (without tip) down to see if it mates with the slot in the tool.

To lower the probe, push it here with your finger.



7. Remove the rubber Probe Tip from Probe 1.
8. Move the PNP head so that Probe 1 is directly over the slot in the tool.

9. Extend Probe 1 fully by pushing down on the nut on the top plate.

   If the probe enters the slot in the tool, then the tape path is centered. Replace the Probe tip and remove the tool; you are done centering the tape path.
   If the probe is not centered, continue.
10. Unscrew the Position Locking Screw several millimeters.
11. Loosen the Centering Bar Screw with a 2.5 mm hex key. See figure below.
12. Slide the Centering Bar left or right as necessary to align the slot with the probe— use a slotted screw driver in the slot provided (or on the end of the Centering Bar) to pry the bar. Moving it to the right to moves the tape path out (away from the casting). See the figure below.

Figure 4-7—Adjusting the Tape-In Module: loosening the Centering Bar screw. The Centering Bar Adjustment slot is visible.

13. Tighten the Position Locking Screw. Then recheck the alignment.
    If the slot is aligned to the probe, continue to the next step.
    It not aligned, repeat from step 6.
14. Tighten the Centering Bar Screw.
15. Remove the Alignment Tool and install the Front Track.
16. Re-install the probe tip on probe 1 with square hole up to match the probe.

NOTE: Once set, centering is good for all tape settings.

Pneumatic Module

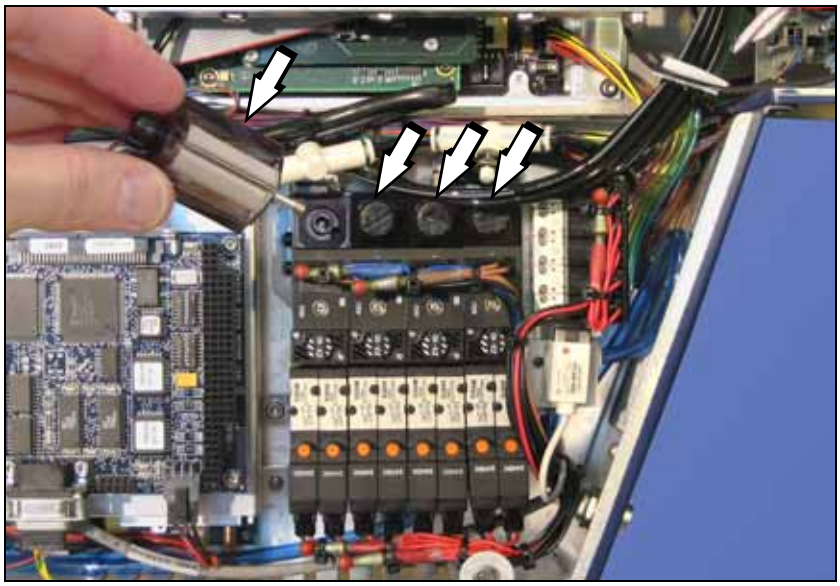


Figure 4-8—Pneumatic Module and Vacuum Filter Locations

The Pneumatic Module controls vacuum and blow-off air to the probes, as well as pressurized air to the probe cylinders and programmer socket cylinders.

Pneumatic Module suction is affected by clogged or dirty filters or hoses, by kinked hoses, and by improper connections. If the vacuum filters are clogged or dirty, vacuum sensors have difficulty detecting whether a device is on the probe or not. This can result in error messages such as “Device pick failure at input with probe 1.”

Data I/O Parts Ordering Information

Instructions: **1**. Copy this page. **2**. Fill in your RoadRunner3 model and serial numbers (see the label on the chassis under the Robotics Cover). **3**. Fill in the quantity for the item(s) desired. **4**. (Optional) Call your local Data I/O sale representative for part prices or use our Web page for Requesting Quotes. **5**. E-mail to OrderAdmin@dataio.com or FAX to 425-867-6972 with your purchase order.

RoadRunner3 Model No._____ Serial No._____

INVENTORY PART NUMBER	PART DESCRIPTION	QTY	PRICE EA.	TOTALS
2860001001	Vacuum filter		$	$
4800020001	Pneumatic Module		$	$
			$	$
			$	$
			$	$

Signature:_____Date:_____Company:_____

If you experience problems such as dropped devices or pick failures, replace the vacuum filters (below), adjust the vacuum sensor (page 4–51), or see the *Troubleshooting* chapter.

NOTE: In normal low-dust conditions, Vacuum Filters must be replaced every 6 months. Replacement may need to be done more frequently in dustier environments.

Replacing the Vacuum Filters

For more information, see "Covers" on page 4-6.

If a tool, such as a flat blade, is used to remove the filter house after the thumbscrew has been removed, use caution not to damage the gasket.

1. Turn the power OFF [O].
2. Disconnect the power cord and air supply.
3. Remove the Robotics and Lower Covers.
4. Remove the square plastic housings with the Vacuum Filters by unscrewing the thumbscrews from the valve block.

NOTE: Ensure that the gasket between the housing and the valve block does not fall out during removal or installation of the housing. If it does, install the gasket into the groove on the valve block.

***CAUTION:** Part Damage Hazard. The filter housing has two locating pins. To prevent damage, orient the housing correctly when reinstalling.*

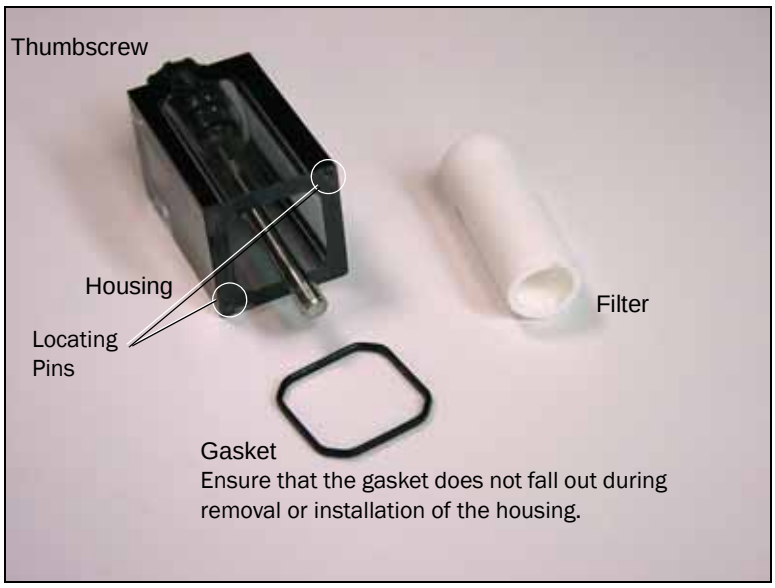


Figure 4-9—Vacuum Filter Components

To hold a troublesome gasket in place, a very small bit of silicon grease or even face oil can be applied.)

5. Remove the filter from the plastic housing.
6. When installing a new filter, make sure the rubber gasket is in place between the housing and the valve block.

Removing the Pneumatic Module

The RoadRunner3 pressurized air supply tube has a quick disconnect fitting with an automatic shut off. The line may be disconnected without shutting off the supply line air pressure.

1. Turn the power OFF [O].
2. Disconnect the power cord and air supply.
3. Pull off the Robotics Cover.
4. Remove the Lower Cover(s).

NOTE: The vacuum lines and air pressure lines must be reinstalled to their same locations. Do not reverse them. Ensure that each line has a label before disconnecting.

For more information, see "Removing the Electronic Covers" on page 4-7.

5. Disconnect the four vacuum lines on the manifold adjacent to the filters.
   To release the "One-touch" connector, push the connector sleeve and pull the tube simultaneously. See figure below. (To reconnect, simply insert the tube into the housing sleeve, pushing it all the way in.)

For the location of Probe vacuum lines, see Figure 4-11.

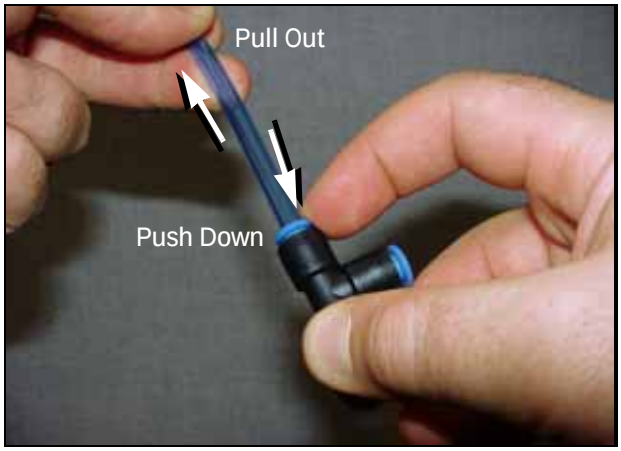


Figure 4-10—Disconnecting a Pneumatic Tube from the One-touch Connector

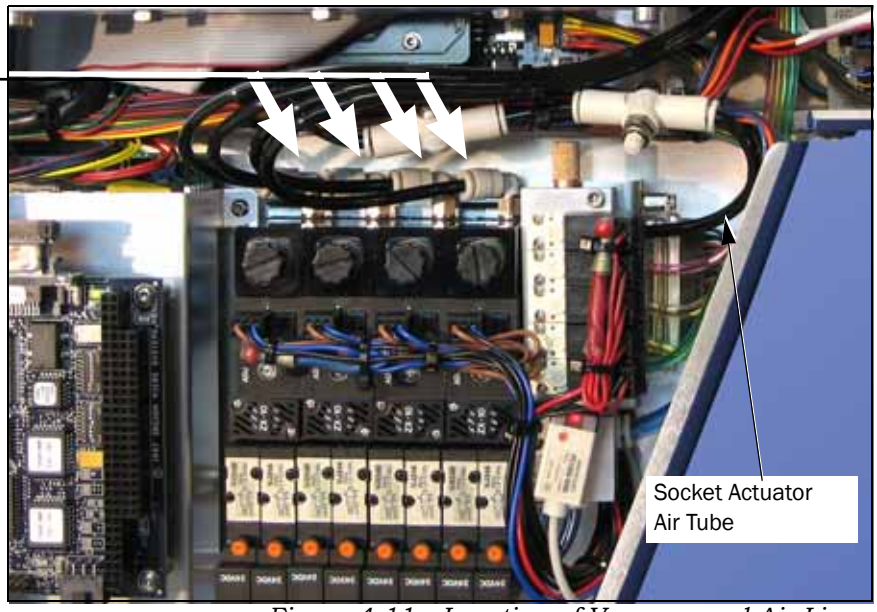


Figure 4-11—Location of Vacuum and Air Lines

The pneumatic access cover, secured with two screws, is on the back housing flange. See Figure 4-12.

6. Remove the Pneumatic Access Cover.
7. Disconnect the Pneumatic Manifold Supply Line at the One-touch connector on the manifold.
8. Unscrew the two screws from the 25-pin cable connector and unplug the connector from the manifold bracket.

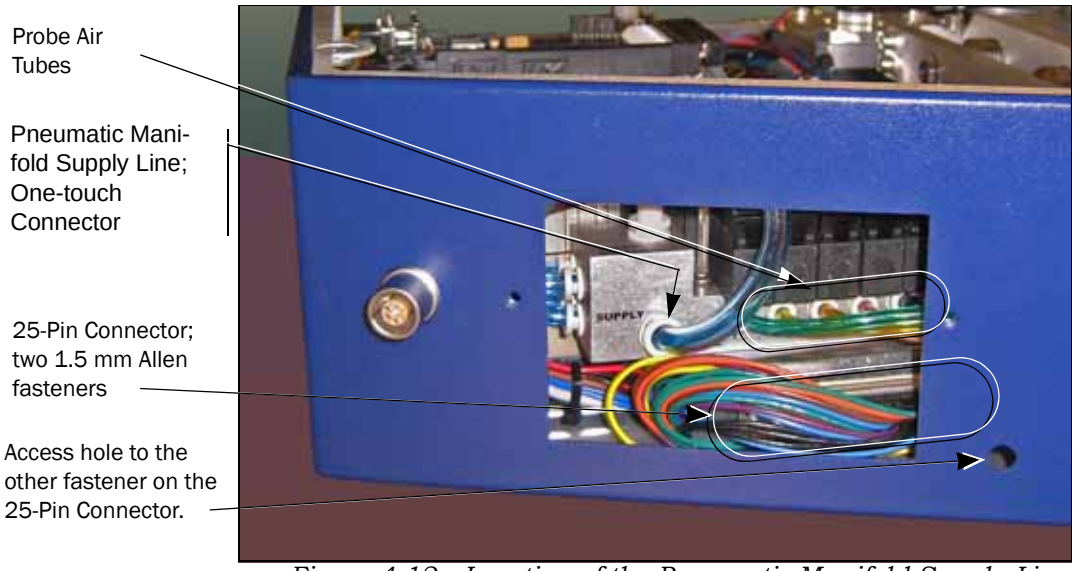


Figure 4-12—Location of the Pneumatic Manifold Supply Line and Wiring Connector. (The Pneumatic Access Cover has been removed.)

9. Remove the three screws securing the Pneumatic Module to the chassis. See figure below.

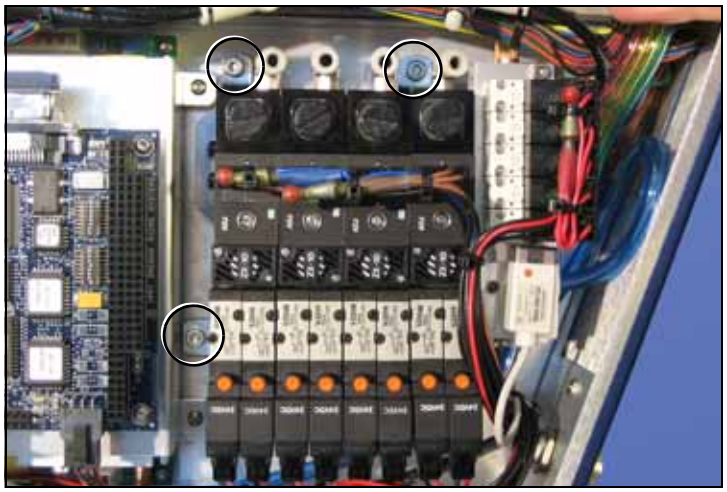


Figure 4-13—Pneumatic Module fastener locations. The Probe Vacuum Tubes have been Disconnected.

To identify tubing lines see Figure 4-11 and Figure 4-12.

10. Lift the Pneumatic Module enough to remove the four Probe Air Tubes and the Socket Actuator Air Tube (one-touch fittings).
11. Lift the Pneumatic Module free from the RoadRunner3 chassis.

Reinstalling the Pneumatic Module

Installation is done in the reverse order of removal; then the following post-installation adjustments are required:

1. Reconnect the power and pressurized air.
2. Switch the power on and verify that a Supervisor card is in the RoadRunner3.
3. At the Control Panel, verify proper electrical and pneumatic connections as follows:
   - 3a. Extend and retract each probe to verify correct plumbing. *Robot Diagnostics* » *Probe X* » *Position* » *Arrow Up/Down.*
   - 3b. Enable vacuum to each probe to verify correct plumbing. *Robot Diagnostics* » *Probe X* » *Vac Sense* » *Arrow Up/Down.*
   - 3c. Enable probe "Puff" and verify correct switching of positive air pressure at the probe tips. *Robot Diagnostics* » *Probe 1* » *Puff* » *Up/Down Arrow.*
   - 3d. Check the operation of the Socket Actuator. *Robot Diagnostics* » *Socket* » *State* » *Up/Down Arrow.*
4. Adjust the probe vacuum sensors.
5. Adjust probe speed.

For step 4 see "Adjusting Probe Vacuum Sensors" on page 4-51.

For step 5 see "Adjusting and Balancing Probe Speed" on page 4-46.

4

Adjusting the Low Air Pressure Sensor

The Low Air Pressure Sensor is part of the Pneumatic Module and is set at the factory to send a message to the Control Panel if the pressure drops below approximately 65 psi. If you are experiencing air pressure problems, this sensor can be adjusted as follows.

To adjust the Low Air Pressure Sensor:

1. Pause the RoadRunner3.
2. When the blue lamp is lit, turn the power OFF [O].
3. Disconnect the power cord and air supply.
4. Remove the Lower Cover.

For more information about removing the covers see page 4–7.

WARNING

Electric Shock Hazard. The following procedures require the Electronics Cover(s) to be removed while power is on. Only touch items described in the procedures. Use caution.

5. Reconnect the power cord and air supply.
6. Turn the power on.
7. With the power and the air on, check that the Low Air Pressure Sensor LED is lit.
8. Reduce the inlet air pressure to 4.48 Bar (65 psi) at the external pneumatic filter/regulator.
9. With a small screwdriver, rotate the sensor adjustment screw counter-clockwise until the LED goes out. Then turn it clockwise just until the LED lights.

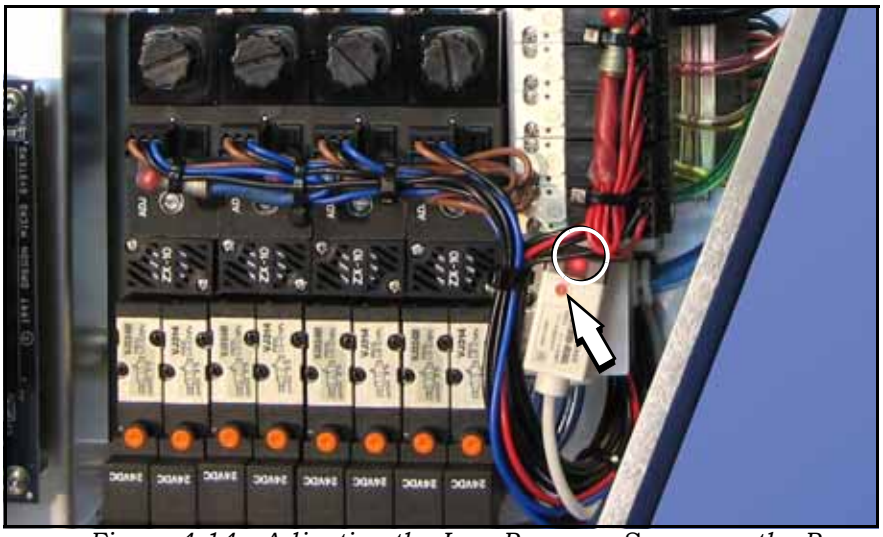


Figure 4-14—Adjusting the Low Pressure Sensor on the Pneumatic Module. The arrow points to the adjustment screw. The LED is circled.

The power must be OFF and the power cord disconnected before removing or replacing covers.

10. When the blue lamp is on, turn the power OFF [O].
11. Disconnect the power cord and air supply.
12. Replace the Lower Cover.
13. Reconnect the power cord and air supply.
14. Turn the power On.

Cover Tape Module and Tensioner

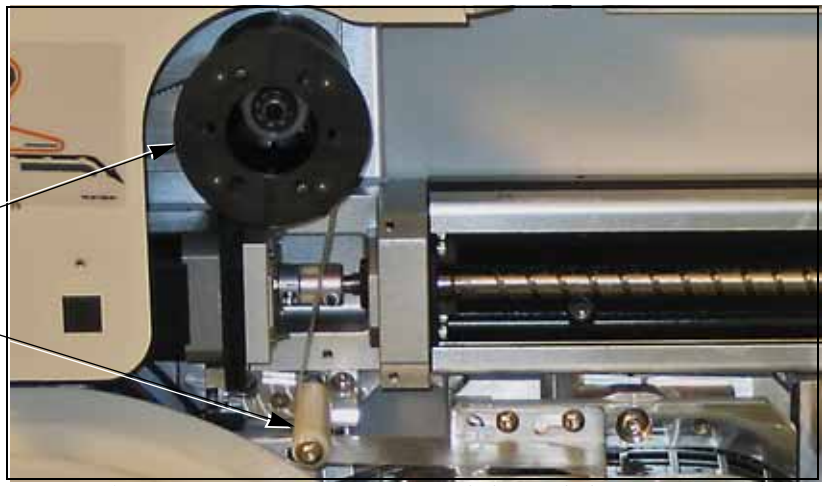


Figure 4-15—Cover Tape Module and the Tape Tensioner

If the Cover Tape Module fails to wind tape onto the reel, first check to see if the reel is full. Also, check that there is tension against the Tape Tension Roller.

If the Take-Up Reel is not full but the module is not winding tape (and the device tape is not jammed), then the Cover Tape Module is suspect. Check for these:

- loose Take-up Reel not seated on the pins
- loose or broken drive belt
- malfunctioning motor
- malfunctioning clutch assembly
- a motor connector that is loose or disconnected, or
- the Tape Tension roller does not roll freely.

You may need to remove the Control Panel Cover.

For more on the Control Panel Cover, see Figure 4-2.

If the problem is the motor or drive belt, then the Cover Tape Module needs to be returned to Data I/O for repair. If your RoadRunner3 is past warranty period, you may elect to repair it on-site if you have a certified technician.

Data I/O Parts Ordering Information

Instructions: 1. Copy this page. 2. Fill in your RoadRunner3 model and serial numbers (see the label on the chassis under the Robotics Cover). 3. Fill in the quantity for the item(s) desired. 4. (Optional) Call your local Data I/O sale representative for part prices or use our Web page for Requesting Quotes. 5. E-mail to OrderAdmin@dataio.com or FAX to 425-867-6972 with your purchase order.

RoadRunner3 Model No._____ Serial No._____

INVENTORY PART NUMBER	PART DESCRIPTION	QTY	PRICE EA.	TOTALS
7502402001	Cover Tape Module		$	$
7502403001	Cover Tape Sensor Assy		$	$
			$	$

Signature:_____Date:_____Company:_____

Removing the Cover Tape Module

For Control Panel screw locations, see Figure 4-2 on page 4-6.

1. Turn the power OFF [O].
2. Unplug the power cord.
3. Remove the Robotics Cover.
4. Pull the Take-Up reel off of the Cover Tape Module.
5. Remove the Control Panel Cover (three screws, 2 mm hex key). It's okay to leave the sensor wire attached.
6. Remove the Cover Tape Module by removing the three screws that attach it to the chassis (2.5 mm hex key).

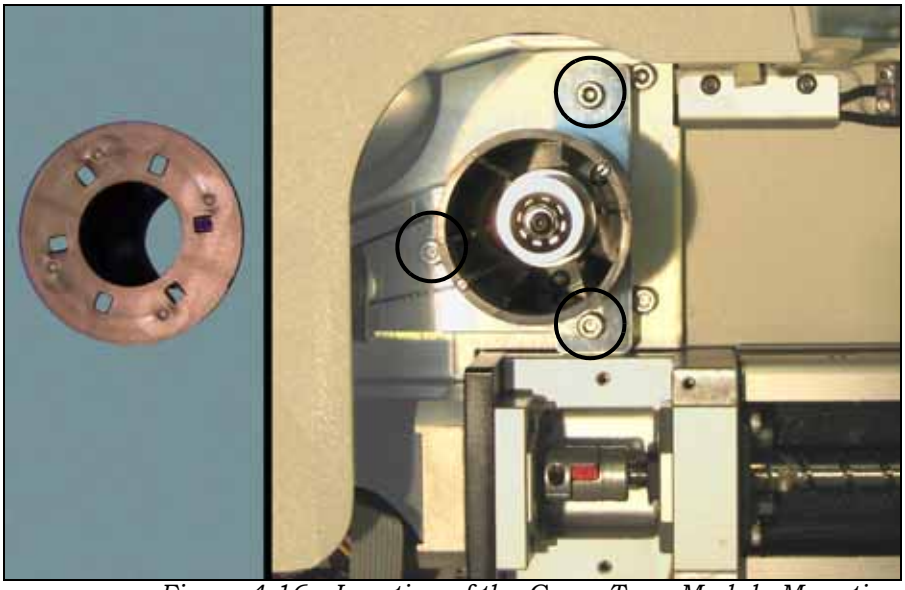


Figure 4-16—Location of the Cover Tape Module Mounting Screws (circled). The Take-Up Reel has been removed. The Control Panel Cover has not yet been removed.

7. Cut one Nylon cable tie if there is one.
8. Disconnect the cable from the Cover Tape Module motor by pinching the clasp and pulling the connector apart.

Replacement of the Cover Tape Module is done in reverse order of removal, except use thread locker (such as Loctite 222) to the Cover Tape Module screws.

Removing the Tape Tension Sensor

The Tape Tension Sensor can be replaced without removing the Tape Tension Assembly. To remove the Sensor:

1. Unscrew the sensor from the assembly with a 1.5 mm hex key. See figure below.

For location of the Card Drive screws, see *"PC-card Drive" on page 4-44.*

2. Remove the four screws attaching the PC-card Drive to the chassis, and slide the reader to the right and out as the cable allows.
3. Unplug the sensor connector by pinching the clasp and pulling.

Replacement is in the reverse order.

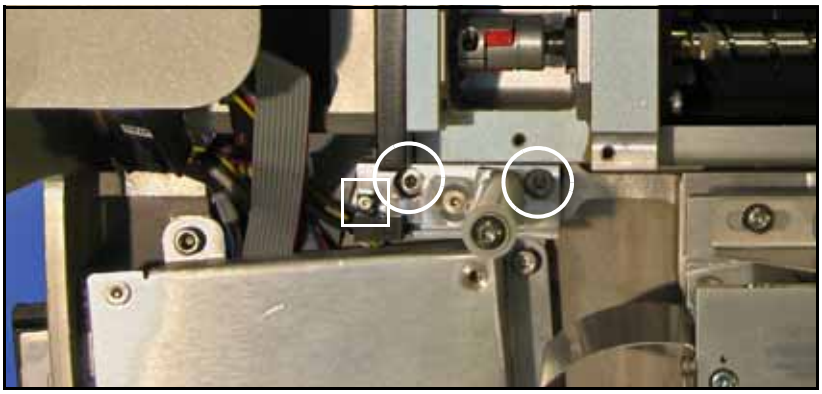


Figure 4-17—The Cover Tape Tensioner with mounting screws (circled) and Sensor screw (boxed).

Removing the Tape Tension Assembly

The Tape Tension Assembly incorporates a roller and sensor to detect if the cover tape breaks (or is not routed properly).

To remove the Tape Tension Assembly (with sensor):

1. Remove the two screws securing the assembly to the chassis with a 3 mm hex key.
2. Remove the four screws attaching the Card Drive to the chassis, and slide the reader to the right and out as the cable allows.
3. Unplug the Tape Tension Sensor connector by pinching the clasp and pulling.

Replacement is in the reverse order.

Conveyor Module

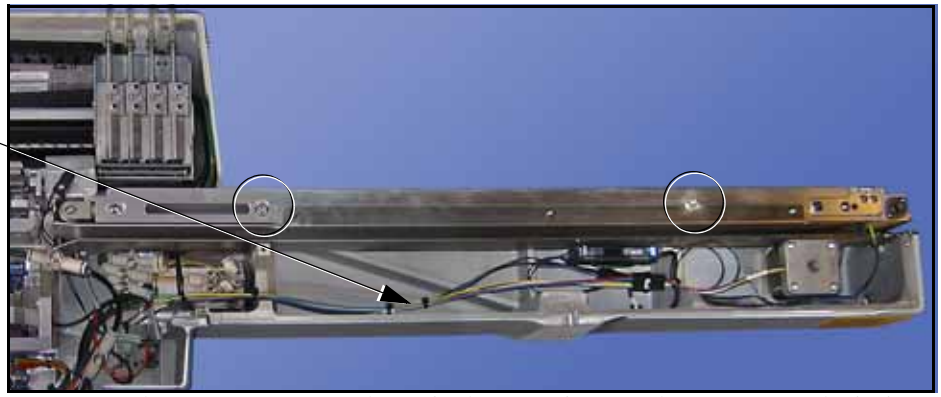


Figure 4-18—Location of wires and mounting screws (circled) on the Conveyor Module (covers removed).

The conveyor belt, the belt motor, and the End-of-Belt Sensor make up the main parts of the Conveyor Module.

If the conveyor belt becomes creased, it will cause devices placed on the crease to be mispositioned. For this reason, a Conveyor Module with a creased or damaged belt should be immediately replaced. However, a belt can become somewhat stiff or *set* from several days of inactivity. This can be easily remedied by running the RoadRunner3 in Dry Run mode for two minutes (**`Robot Diagnostics > Run Mode > Dry Run`**).

The entire Conveyor Module can be removed and replaced or sent to Data I/O for repair. The End-of-Belt sensor optic can be adjusted and the optical fiber amplifier retaught.

*If **`Dry Run`** is used, be sure to **reset `Run Mode` to `Job` or devices will not get programmed.***

Data I/O Parts Ordering Information

Instructions: **1**. Copy this page. **2**. Fill in your RoadRunner3 model and serial numbers (see the label on the chassis under the Robotics Cover). **3**. Fill in the quantity for the item(s) desired. **4**. (Optional) Call your local Data I/O sale representative for part prices or use our Web page for Requesting Quotes. **5**. E-mail to OrderAdmin@dataio.com or FAX to 425-867-6972 with your purchase order.

RoadRunner3 Model No._____ Serial No._____

INVENTORY PART NUMBER	PART DESCRIPTION	QTY	PRICE EA.	TOTALS
7502434001	Conveyor Module		$	$
			$	$
			$	$

Signature:_____Date:_____Company:_____

Removing the Conveyor Module

1. Turn the power OFF [O].
2. Disconnect the power cord and air supply.
3. Lift off the Robotics Cover.
4. Remove the Conveyor Module Cover.
5. Carefully cut the cable ties securing the wires for the belt motor and sensors.

For more information, see "Removing the Conveyor Module Cover" on page 4-8.

CAUTION: *Optic cables are fragile and may break. Use care to bend only gradually and gently, not severely.*

6. Disconnect two connectors—belt motor wires and Optical Fiber Amplifier wires—by pinching the clasp open and pulling the connector apart.

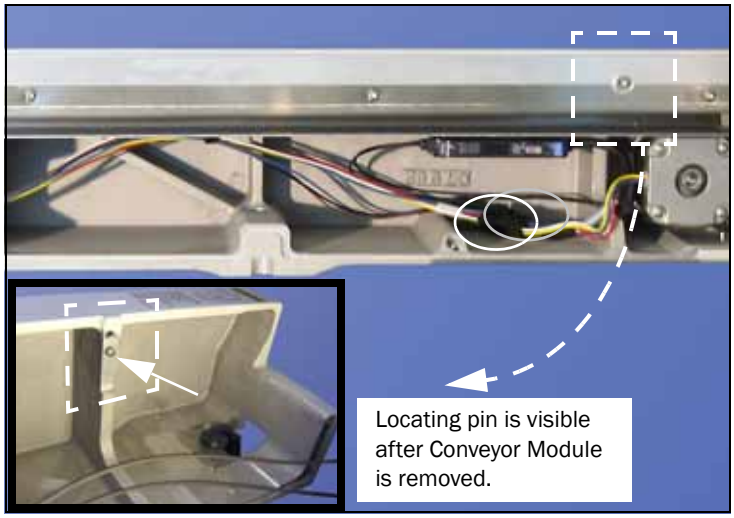


Figure 4-19—Conveyor Wire Connector Locations (Circled).

For Conveyor screw locations see Figure 4-18.

7. Remove the two screws attaching the Conveyor Module to the chassis (3 mm hex key).

CAUTION: *Possible machine damage. When removing and installing the Conveyor Module, be sure not to catch or pinch the Reject Bin Sensor wires.*

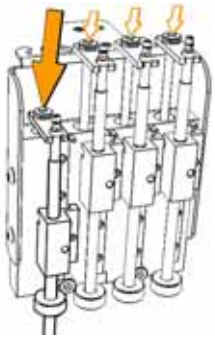
8. Lift the Conveyor Module free of the chassis.

Reinstalling the Conveyor Module

To reinstall the conveyor, reverse the removal steps, plus perform the following (Refer to Figure 4-19):

1. Notice the conveyor locating pin on the chassis. You may need to lift the Conveyor Module slightly to engage the pin.
2. Check that no wires are pinched between the Conveyor and the chassis.
3. Set the conveyor height as follows:
   - 3a. With the RoadRunner3 in its normal upright position and the conveyor fasteners snug but not tightened, move the PNP Head by hand so it is over the conveyor belt.
   - 3b. Place your thinnest device on the belt below Probe 1.
   - 3c. Lower Probe 1 fully (pushing on the nut directly above the probe stem). With the probe fully extended, adjust the conveyor height so there is approximately a 1 mm gap between the probe tip and the device on the belt. Then tighten the conveyor fasteners.
   - 3d. Recheck the height after tightening the fasteners.

Push probe here with finger.



Adjusting the End-of-Belt Sensor

The End-of-Belt Sensor Optic stops the conveyor belt when parts reach the pick point. The optic sends a beam across the pick point between two fiber optic sensors. When a device breaks the beam, the End-of-Belt Optic stops the belt. The most likely indication that the End-of-Belt Optic is out of adjustment or broken, is that parts fall off the end of the conveyor.

If parts are falling off the end of the conveyor, first test to make sure the optical fiber amplifier is functioning (see *Testing the End-of-Belt Sensor* below). If the sensor is functioning, but parts are still passing the pick point, reteach the optical fiber amplifier.

Testing the End-of-Belt Sensor

1. From the top level menu select **`Robot Diagnostics`**.
2. Select **`Belt`**.
3. Select **`Pick Sensor`**.

CAUTION: *Collision hazard. Make sure that the SMT Machine is stopped and that it is safe to open the safety shield before reaching into the work area.*

4. With the SMT gantry safely stopped out of the way, put your finger at the SMT pick point to block the sensor optic (see next image below).
5. The Control Panel display will show **`Pick Sensor: 1`** whenever your finger is blocking the beam, and **`Pick Sensor: 0`** when not blocked.

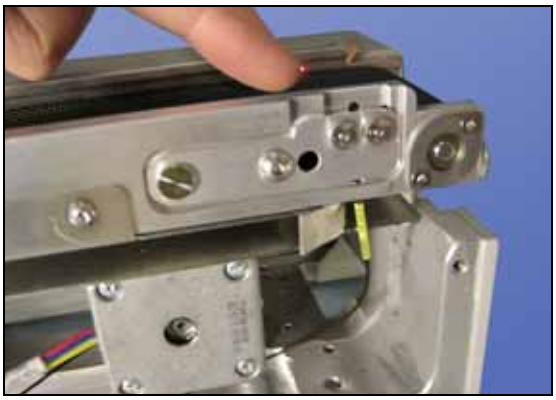


Figure 4-20—Testing the End-of-Belt Sensor (The Conveyor Side Cover need not be removed.)

6. If **`Pick Sensor: 1`** is not displayed when the beam is blocked,
   6a. check to make sure that all the sensor wires and fiber optics are connected properly.
   6b. the Conveyor Module may need to be replaced.
7. If **`Pick Sensor:1`** does display, see "Reteaching the End-of-Belt optical fiber amplifier," below.

Reteaching the End-of-Belt Optical Fiber Amplifier

1. Press the E-Stop.
2. Remove the Conveyor Module Cover.
3. Clean the conveyor belt. Blow off with dry compressed air, or use isopropyl alcohol on a lint-free cloth to clean the exposed portion of the belt and then dry it. Rotate the belt (toward SMT machine) and repeat until the entire belt is clean.
4. Press the Emergency Stop button—the conveyor belt can now be rotated by hand.
5. Rotate the belt by hand so that the optical fiber amplifier displays its highest value. When rotating, do not touch the belt within 25 cm of the sensor.
6. At this spot of highest value, place a device on the SMT pick point so it blocks the optic beam.
7. Push *Set* on the optical fiber amplifier.

The Optical fiber Amplifier is mounted in the Conveyor Module. See Figure 4-21.

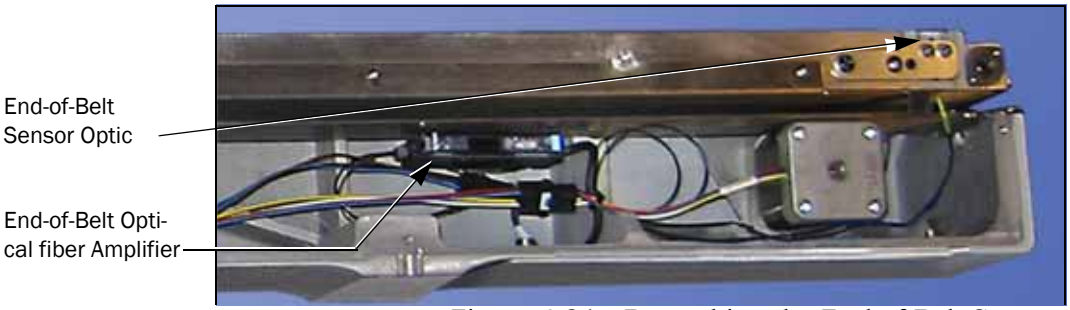


Figure 4-21—Reteaching the End-of-Belt Sensor.

When rotating the belt by hand, do not touch the belt within 25 cm of the sensor.

8. Remove the device from the belt and then rotate the belt (toward SMT machine) until the optical fiber amplifier displays its lowest value.
9. Push *Set* on the optical fiber amplifier again.

NOTE: In general, the End-of-Belt optical fiber amplifier should display a number less than 21 when a device is present at the SMT pick point and greater than 90 when no device is present. If it is not possible to achieve these numbers, then reposition the optic beam as described in the next heading. If these values still can not be achieved, the Conveyor Module may need to be replaced. Contact Data I/O Service.

10. If the amplifier displays a value <21 with a device present and >90 without a device, reinstall the Conveyor cover.
11. Release the E-Stop.

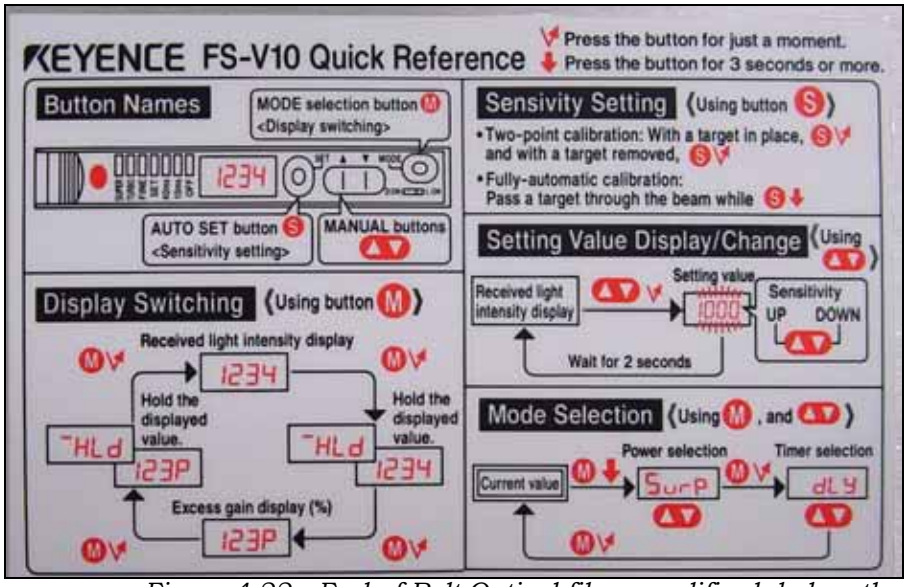


Figure 4-22—End-of-Belt Optical fiber amplifier label on the Conveyor Cover. The amplifier must be in "Super" mode.

Positioning the End-of-Belt Sensor

The End-of-Belt sensor rarely needs adjusting. The two possible times are:

- if the desired amplifier values cannot be achieved when reteaching the End-of-Belt Optical Fiber Amplifier, and
- if you are changing from programming a small device to a very large device, such as a large QFP package, or vice versa.

CAUTION: *Possible collision hazard. If the RoadRunner3 is mounted at an SMT Machine, the SMT pick head might move, colliding with you or equipment. Make sure the SMT Machine is stopped and unable to start up automatically.*

To reposition the End-of-Belt sensor:

1. Press the E-Stop.
2. With the Conveyor Side Cover removed, loosen the sensor Collector Bracket (2.5 mm hex key).
3. Loosen the sensor Emitter Bracket, blindly accessing the screw through the hole in the Collector Bracket.

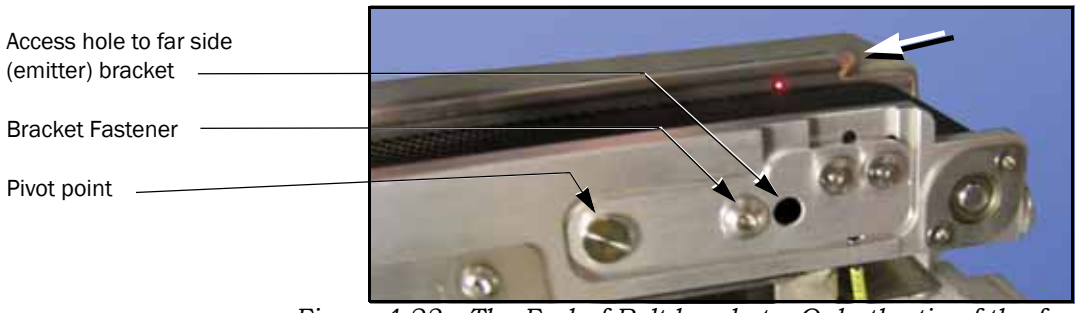


Figure 4-23—The End-of-Belt brackets. Only the tip of the far side bracket is visible (arrow).

4. Place the desired device on the center of the belt at the sensor.
5. Adjust the Emitter Bracket so that the sensor beam is just above the device when viewed from the right side of the conveyor. The bracket has a small tab that extends beyond the conveyor rail which allows moving it up or down with a finger.

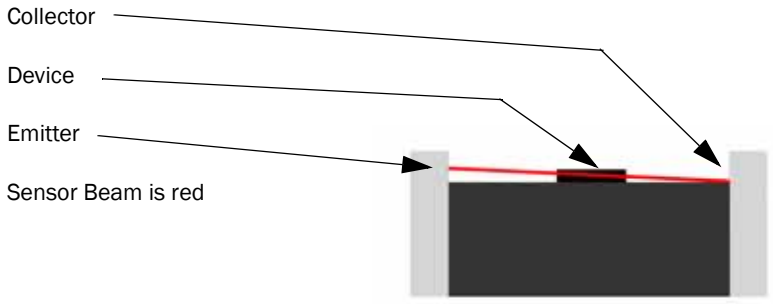


Figure 4-24—A cross-section of the conveyor, looking toward the SMT Assembly Machine.

6. Tighten the Emitter Bracket screw.
7. Remove the device from the belt.
8. Adjust the Collector Bracket so that the sensor is as low as it can go and still be visible above the belt. (The collector looks simply like a small hole on the belt-side of the rail.) Check the Optical Fiber Amplifier. Generally, the collector should be at it the lowest setting that produces an amplifier value near 100.
9. Place the device back on the belt and recheck the amplifier value. The value should be less than 21. Adjust the Collector Bracket if necessary: move it down for a lower reading.
10. Tighten the Collector Bracket Screw.
11. Reteach the End-of-Belt Optical Fiber Amplifier; see page 4–31.

Adjusting Belt Tension

If the Conveyor Belt seems to be slipping, the tension can be adjusted easily.

1. Stop a job if one is running and clear devices from the belt.
2. Remove the Robotics Cover.
3. Loosen the conveyor tension locking screw with a 2.5 mm hex key. See image below.
4. Access the tension screw through the long slot in the conveyor with a rounded end of a 4 mm hex key and turn it out (counterclockwise) to tighten the belt.
5. Tighten the tension locking screw.
6. Replace the Robotics Cover.

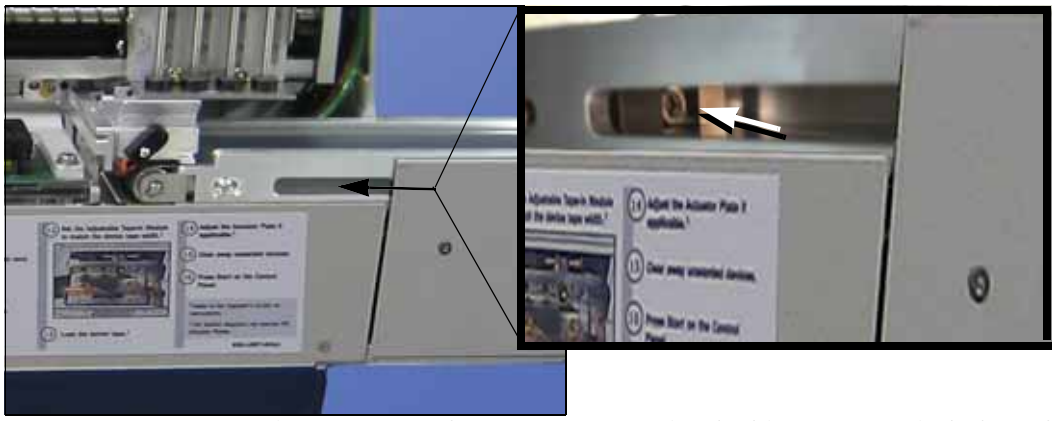


Figure 4-25—The Conveyor tension locking screw (circled) and the Tension Screw (arrow).

Reject Bin

Figure 4-26—The Reject Bin

The Reject Bin is not attached with fasteners. It lifts up and then out of the RoadRunner3.

The Reject Bin-*Full* Sensor senses when the bin is full and requires emptying. The Reject Bin-*Present* sensor senses the bin's presence. The sensors are attached to the Reject Bin Bracket.

Data I/O Parts Ordering Information

Instructions: **1**. Copy this page. **2**. Fill in your RoadRunner3 model and serial numbers (see the label on the chassis under the Robotics Cover). **3**. Fill in the quantity for the item(s) desired. **4**. (Optional) Call your local Data I/O sale representative for part prices or use our Web page for Requesting Quotes. **5**. E-mail to OrderAdmin@dataio.com or FAX to 425-867-6972 with your purchase order.

RoadRunner3 Model No._____ Serial No._____

INVENTORY PART NUMBER	PART DESCRIPTION	QTY	PRICE EA.	TOTALS
6074132001	Reject Bin		$	$
7090551003	Reject Bin-Full Sensor,		$	$
7090667001	Reject Bin-Present Sensor,		$	$
			$	$
			$	$

Signature:_____Date:_____Company:_____

Removing the Reject Bin Sensors

For more information, see "Removing the Electronic Covers" on page 4-7.

1. If the PNP head is near the Reject Bin, at the main menu scroll to, and select **Home**.
2. Turn the power OFF [O].
3. Disconnect the power cord and air supply.
4. Lift off the Robotics Cover.
5. Lift out the Reject Bin.
6. Remove the Electronics Cover.

Unscrew the two screws securing the Reject Bin Bracket to the chassis with a 3 mm hex key.

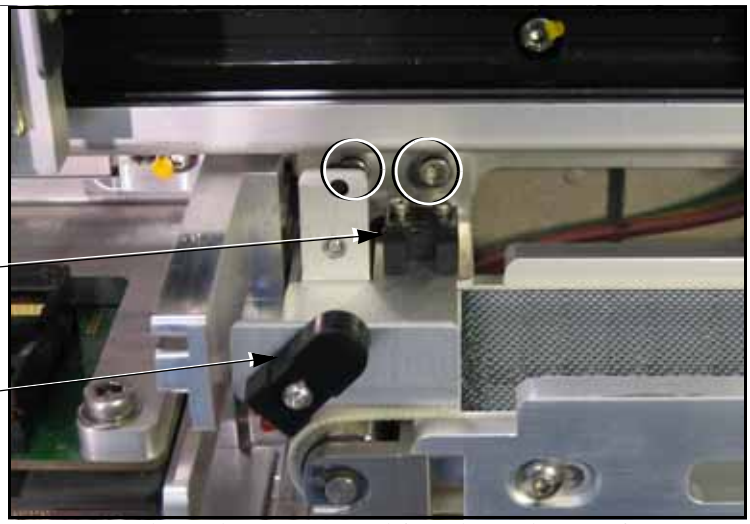


Figure 4-27—Reject Bin Sensors with Reject Bin Bracket Screw Locations circled. The left screw requires a ball-end hex key. The Reject Bin has been removed.

7. Unplug the Reject Bin Full optic sensor wires from the Interconnect Panel at J1C.
8. Unplug the Reject Bin Present Sensor wires from the Interconnect Panel at J1C2 and cut the Nylon cable tie (as necessary).
9. Carefully lift out the Reject Bin Bracket with sensors.

To remove the sensors:

10. Unscrew one screw through each optic sensor with a 1.5 mm hex key.
11. Unscrew two screws through the Bin Present Sensor with a 1.5 mm hex key.

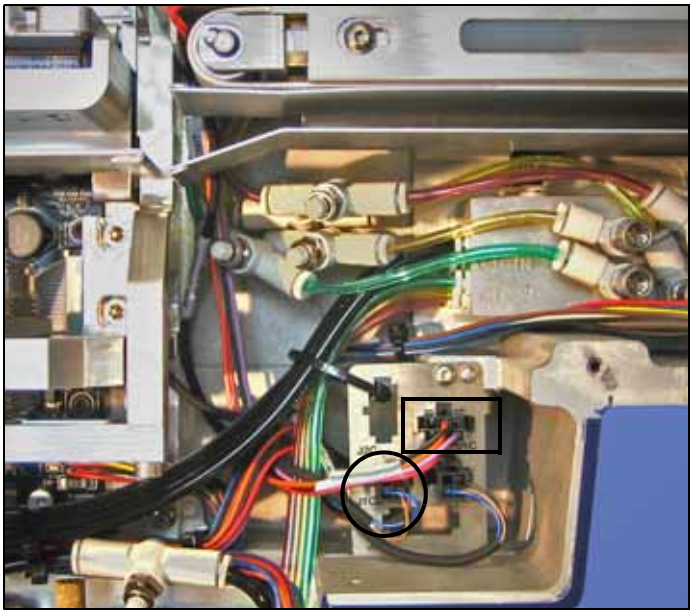


Figure 4-28—Connectors J1C (boxed) and J1C2 (circled).

To install the Reject Bin Sensors and bracket, reverse the removal procedures:

- Reinstall the Sensors and the Reject Bin Bracket
- Reinstall the Electronics Cover.

CAUTION: *Part damage hazard. Ensure that neither the Reject Bin nor the sensor wires contact the Conveyor Belt. Verify this when finished by pushing the E-Stop and rotating the Conveyor Belt by hand and watching closely.*

Control Panel Module

Figure 4-29—Control Panel Module, front and back

The Control Panel Module consists of the Emergency Stop button, Indicator Lamps, Control Panel buttons, and LCD screen. If any of the components in the Control Panel Module are not functioning correctly, check the wiring connections.

If components are still not functioning after connections are tested, return the Control Panel Module to Data I/O for repair.

> *NOTE: Do not disassemble the Control Panel Module. If a component is not functioning, send the entire Control Panel Module back to Data I/O.*

Data I/O Parts Ordering Information

Instructions: **1**. Copy this page. **2**. Fill in your RoadRunner3 model and serial numbers (see the label on the chassis under the Robotics Cover). **3**. Fill in the quantity for the item(s) desired. **4**. (Optional) Call your local Data I/O sale representative for part prices or use our Web page for Requesting Quotes. **5**. E-mail to OrderAdmin@dataio.com or FAX to 425-867-6972 with your purchase order.

RoadRunner3 Model No._____ Serial No._____

INVENTORY PART NUMBER	PART DESCRIPTION	QTY	PRICE EA.	TOTALS
7502397001	Control Panel Module		$	$
			$	$
			$	$
			$	$

Signature:_____Date:_____Company:_____

Removing the Control Panel Module

For more information, see "Removing the Robotics Cover" on page 4-7.

1. Turn the power OFF [O].
2. Disconnect the power cord and air supply.
3. Remove the Robotics Cover.
4. Remove the small corner panel by removing three screws with a 2 mm hex key. See figure below.

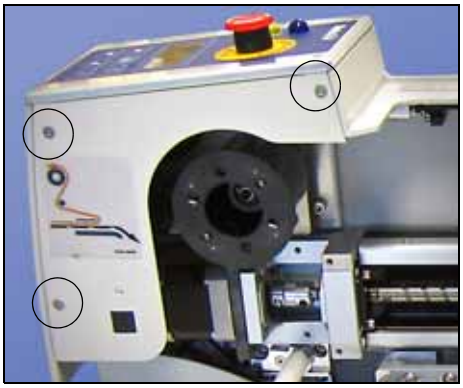


Figure 4-30—Corner Panel Cover with screw locations circled.

5. Remove the four screws on the face of the Control Panel with a 2 mm hex key.
6. Lift the Control Panel Module up enough to see the underside.
7. Unplug the Control Panel ribbon cable from the connector.
8. Remove the Cover Tape Module by removing the three screws that attach it to the chassis (2.5 mm hex key).
9. Follow the wires for the Emergency Stop button to their end connector (near the linear Stage motor) and disconnect it. You may need to cut some Nylon cable ties.
10. Carefully pull the cable up and free with the Control Panel.

For the E-Stop cable connector, see Figure 4-32.

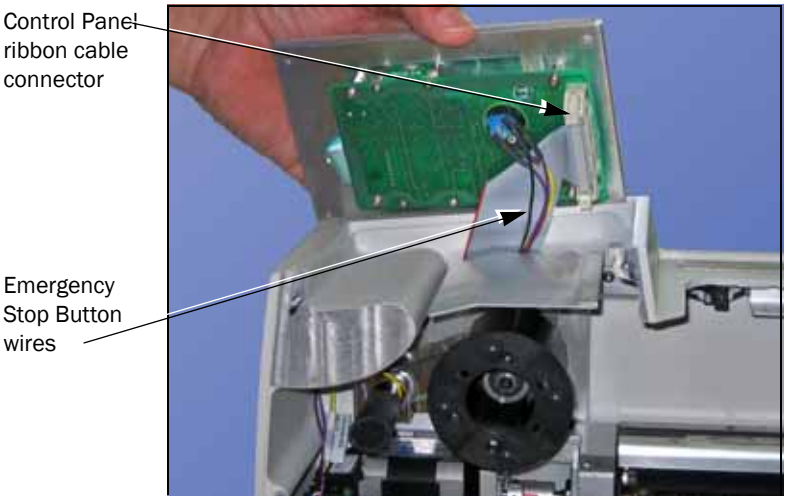


Figure 4-31—Location of Connector on the Control Panel.

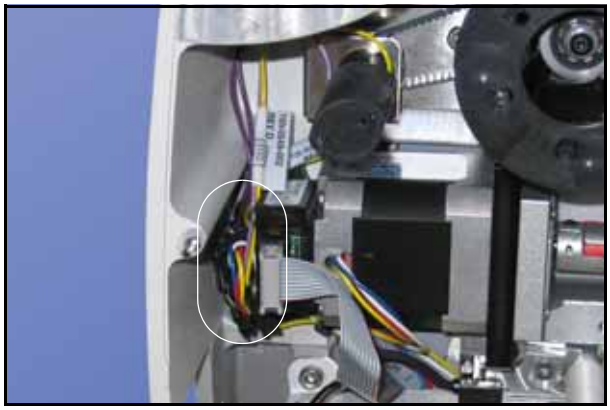


Figure 4-32—Bundle of wires includes the E-Stop Cable connector.

Replacement is the in the reverse order of removal, except with these precautions:

- Make sure the Control Panel ribbon cable and the E-Stop wires are folded so they lie flat and won't get pinched by the Control Panel Cover.
- Use thread locker on the Cover Tape Module screws.

After it is all reassembled, verify the proper operation of the following:

- Display
- Keypad
- Emergency Stop

PC-card Drive

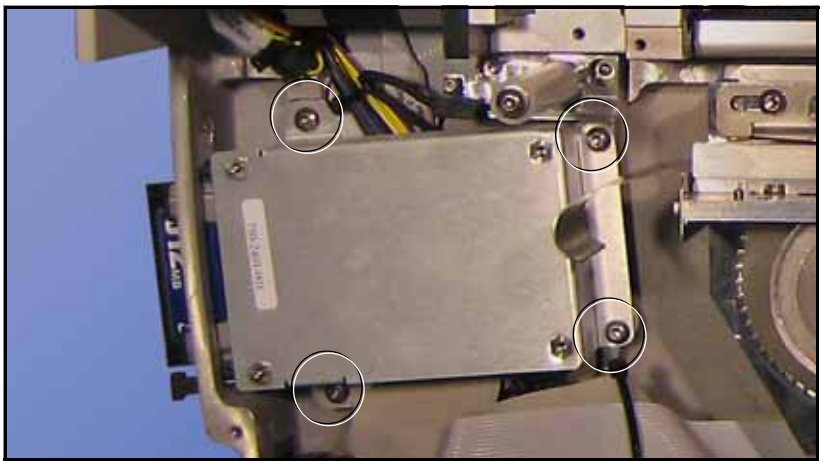


Figure 4-33—PC-card Drive. Four screw locations (circled) require 2.5 mm hex key. The Electronics Covers have been removed.

The PC-card drive (also called a Card Reader/Writer) accepts Type II PCMCIA cards. If you experience problems, first confirm that the PC card you are using is good. Test the Card Drive with a card that is known to function correctly. Test all connections. If the PC Drive is still not functioning, remove it and return it to Data I/O for repair.

Trouble with PC Cards is often that the card has become corrupt or that it was incorrectly formatted (must be FAT, not FAT 32).

Data I/O Parts Ordering Information

Instructions: **1**. Copy this page. **2**. Fill in your RoadRunner3 model and serial numbers (see the label on the chassis under the Robotics Cover). **3**. Fill in the quantity for the item(s) desired. **4**. (Optional) Call your local Data I/O sale representative for part prices or use our Web page for Requesting Quotes. **5**. E-mail to OrderAdmin@dataio.com or FAX to 425-867-6972 with your purchase order.

RoadRunner3 Model No._____ Serial No._____

INVENTORY PART NUMBER	PART DESCRIPTION	QTY	PRICE EA.	TOTALS
7502401001	PC Card Drive (reader/writer)		$	$
			$	$
			$	$
			$	$

Signature:_____Date:_____Company:_____

Removing the PC Card Drive

To remove the Card Drive:

1. Turn the power OFF [O].
2. Disconnect the power cord and air supply.
3. Lift off the Robotics Cover.
4. Remove the Electronics Cover(s).
5. Eject the PC Card if there is one.
6. Remove the four screws securing the drive to the chassis.
7. Slide the drive inboard (right) to clear the slot in the chassis and lift out as the cable allows.
8. Unplug the ribbon cable from the PC Drive connector.

For Electronic Cover screw locations see "Removing the Electronic Covers" on page 4-7.

For PC-car Drive screw locations, see Figure 4-33.

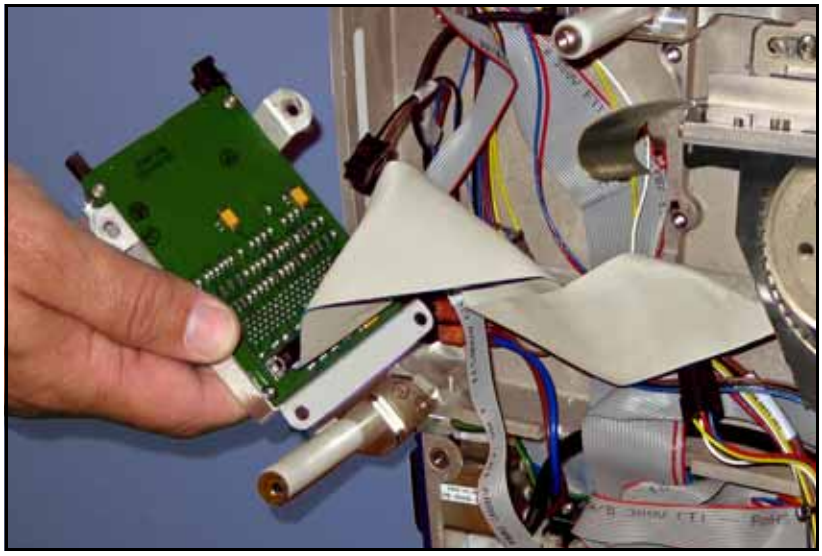


Figure 4-34—PC Drive Ribbon Cable is attached to the back of the drive.

Installation of the PC Card Drive is in the reverse order of removal with these additions:

- Ensure that no cables get pinched when placing the PC Drive over them.
- Before tightening the fasteners, press the eject button and check for clearance with the chassis. The button should not rub the chassis.

Pick and Place Head

The PNP head Module contains four probes, each with Vacuum Tips. Some parts can be replaced and some probe functions can be adjusted.

Aligning Pick and Place Points

Since device placement tolerance is small, the system may need aligning when a module is replaced or repaired. The system may also need aligning if any of the following error messages are displayed:

- Device pick failure at input, with probe *n*.
- Device pick failure on probe *n*.
- Device dropped from head *n*.

For system alignment procedures see "Setting the 'Tape' Parameter" and "Setting the 'Skt 1' Parameter" under heading "Setting Operational Parameters" on page 3-25.

Adjusting and Balancing Probe Speed

If the probe speed is too fast, devices in the carrier tape become unsettled as a probe contacts a device during the pick routine. If the probe speed is too slow, throughput will suffer and device placement problems may occur.

Before adjusting the probe speed the RoadRunner3 should be warm. It it has not been run in over one day, operate it in **`Dry Run`** mode for 15 minutes. After RoadRunner3 is warm, adjust the probe speed with power and pressurized air on. Ensure that vacuum to all probes is disabled before starting this procedure. The easiest way to ensure this is to cycle the power.

See "Loading Device Tape" on page 3-12 and "Aligning the Device Tape—All RoadRunner3 Models" on page 3-14.

Part A

1. Load and align the device tape without peeling off the cover tape. (The Cover Tape Peel Bar and Spool will not be used.)

WARNING

Pinch Point Hazard: Moving mechanical parts. Keep hands away from moving parts. The following procedures require the Robotics Cover to be removed while mechanical parts are in motion. Use caution.

2. Scroll to and select **`Robot Diagnostics`**.
3. Scroll to and select **`Probe 1`**.

4. Scroll to and select **Speed**. The probe will move to the device pick point and cycle continuously.

5. Read the speed that is now displayed in the screen. The speed should be 140 ±4.

If it needs adjustment skip to Part B.
If it does not need adjustment:

5a. Press *Menu*.

5b. Scroll to and select the next probe.

5c. Repeat from step 4 for each probe.
End of Part A.

Part B:

⚠ WARNING

Electric Shock Hazard. Do not touch any electronics that become exposed when the cover(s) is removed. Use caution and heed the following instructions

For more information on removing the covers, see "Removing the Electronic Covers" on page 4-7.

6. Turn power OFF [O].
7. Remove the Lower Cover and the Conveyor Module Cover.
8. Locate the Probe Interface Manifold: it is mounted on the chassis below and to the right of the Reject Bin.

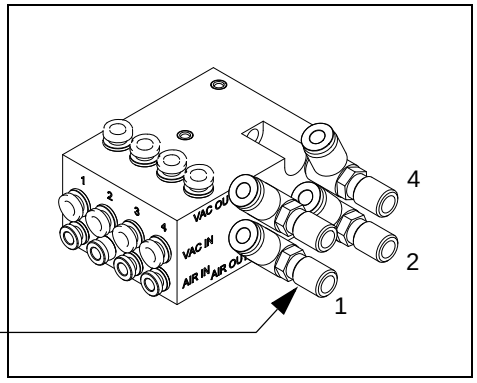


Figure 4-35—Probe Control Manifold
(Adjustment stems require a flat screwdriver for adjustment.)

9. Adjust the Probe Speed flow control for Probe 1 (or current probe) while watching the speed displayed at the keypad screen.
10. When the speed is within the proper range (140 ±4), press *Menu*—probe motion will stop.

11. Tighten the locknut ring on the Flow Control if applicable to your model.
12. Recheck the speed. If it is outside the proper range then re-adjust.
13. Scroll to and select the next probe.
14. Repeat steps 4 and on for the next probe.
15. When finished, see Adjusting Probe-Raising Speed (next heading).

Adjusting Probe-Raising Speed

NOTE: Probe lowering speed should be set first. See *"Adjusting and Balancing Probe Speed" on page 4-46*.

If the probe-raising speed is too fast, devices may rotate excessively after a pick operation and cause alignment problems; devices may even fall off the probes. To adjust the probe-raising speed:

1. Load and align the device tape without peeling off the cover tape. (The Cover Tape Peel Bar and Spool will not be used.)

⚠ WARNING

Pinch Point Hazard: Moving mechanical parts. Keep hands away from moving parts. The following procedures require the Robotics Cover to be removed while mechanical parts are in motion. Use caution.

2. Scroll to and select **`Robot Diagnostics`**.
3. Scroll to and select **`Probe 1`**.
4. Scroll to and select **`Speed`**. The probe will move to the device pick point and cycle continuously.

For more information see "Loading Device Tape" on page 3-12 and "Aligning the Device Tape—All RoadRunner3 Models" on page 3-14.

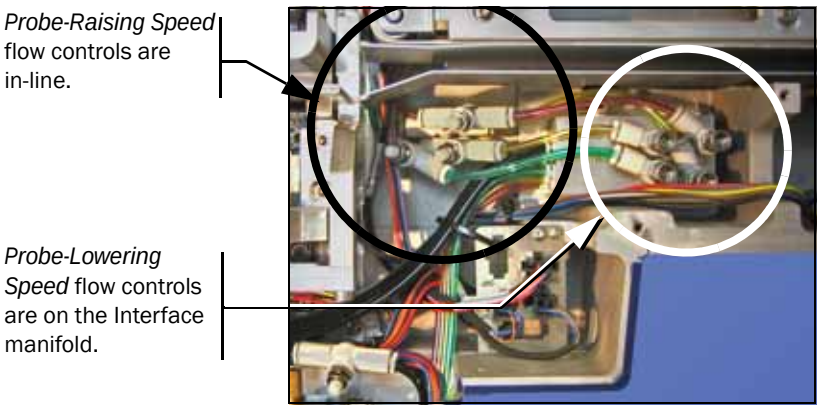


Figure 4-36—The in-line flow controls for adjusting the Probe Speed. Probe numbers are stamped on the manifold.

5. Watch the probe to observe the probe-raising speed. The probe should be fully up the very instant that the head jogs back and forth a couple millimeters.

   If the probe is fully up too soon (before the head jogs) or too late (after the head jogs), remove the Lower Cover and the Conveyor Module Cover.
6. Loosen the locknut ring on the in-line Flow Control for Probe 1 (or current probe).

For more information see "Covers" on page 4-6.

7. Manually adjust the speed by hand using the knob on the in-line flow control for Probe 1 raising speed (see figure above). Adjust the probe-raising speed until it synchronizes with the head jog.
8. Tighten the locknut ring.
9. Press Menu to deselect the current probe.
10. Scroll to and select the next probe.
11. Repeat these steps (from step 4 and on) for each probe.
12. This procedure affects the probe down speed slightly. See the previous heading "*Adjusting and Balancing Probe Speed*" and recheck the probe speed.
13. When finished, replace both covers and remove the device tape.

Resetting the *Pick* Delay and *Travel* Delay Times

The delay times do not change and do not usually require adjustment. The factory-set values are indicated in the following flow charts.

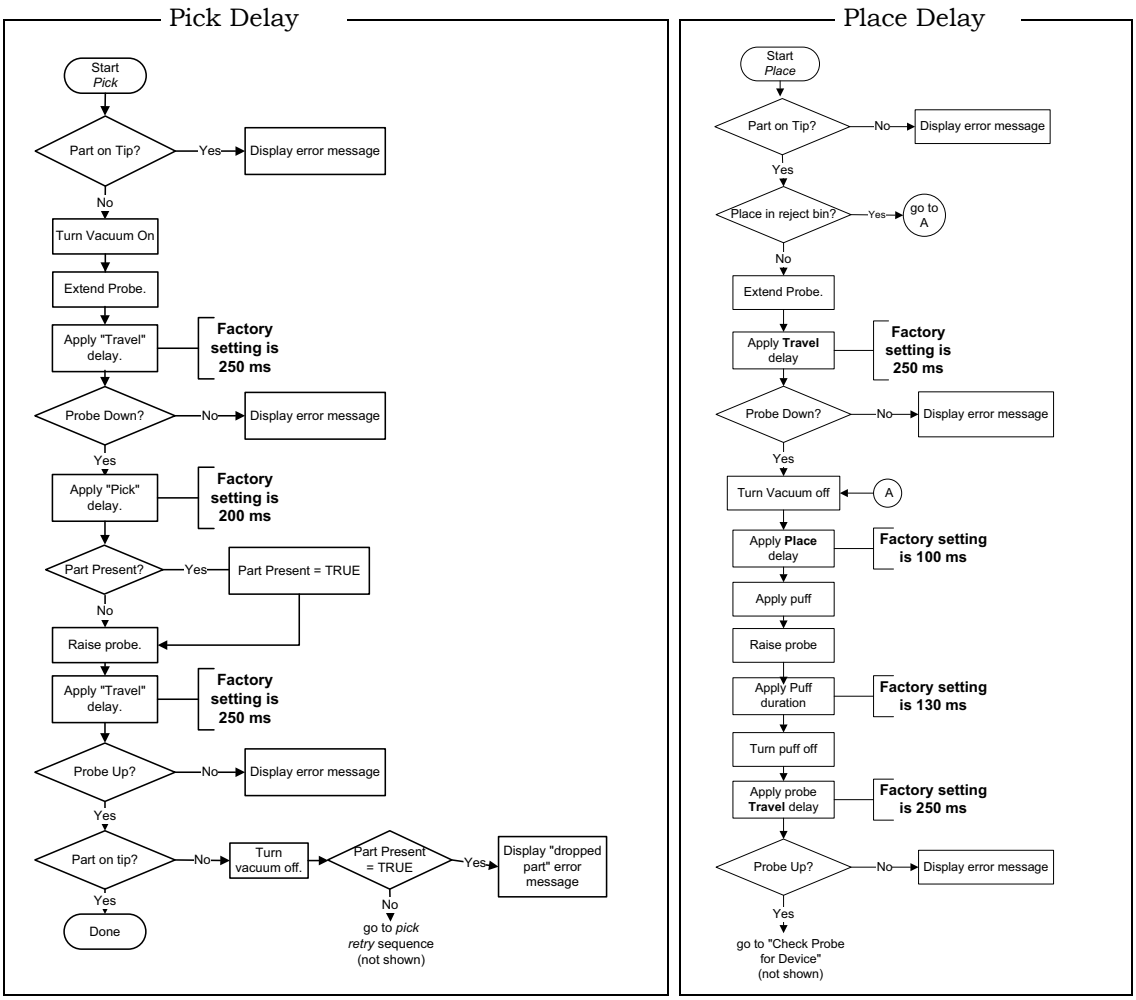


Figure 4-37—Pick and Place Delay Flow Charts

NOTE: Changes to these values are not recommended.

These values only affect the internal verification delay time, as indicated in the flow charts. To reset delay times:

1. From the top level menu on the display, select **`Operation`**.
2. Scroll to and select **`Probes`**.
3. Scroll to and select the setting you wish to adjust.
4. Use the *Arrow Up* and *Arrow Down* buttons to change the setting.

5. When finished, select *Menu*.

Adjusting Probe Vacuum Sensors

1. Turn power OFF [O].
2. Remove the Lower Cover.
3. Turn on pressurized air to RoadRunner3.
4. Check that the air pressure regulator is set to the specifications listed under *Specifications* in Chapter 1.

> **⚠ WARNING**
>
> *Electric Shock Hazard. The following procedures require the Electronics Cover(s) to be removed while power is on. Only touch items described in the procedures. Use caution.*

5. Turn power on to RoadRunner3.
6. Select *Menu* until you reach the top menu level and select **`Robot Diagnostics.`**
   6a. Scroll to, and select, **`Probe 1`**.
   6b. Scroll to, and select, **`Vacuum`**.
   6c. Press the *Up Arrow* to enable the probe vacuum.
7. Turn the vacuum sensor adjustment screw for Probe 1 (the first adjustment block) counter-clockwise just until the red LED adjacent to the adjustment screw illuminates.

   See next figure.

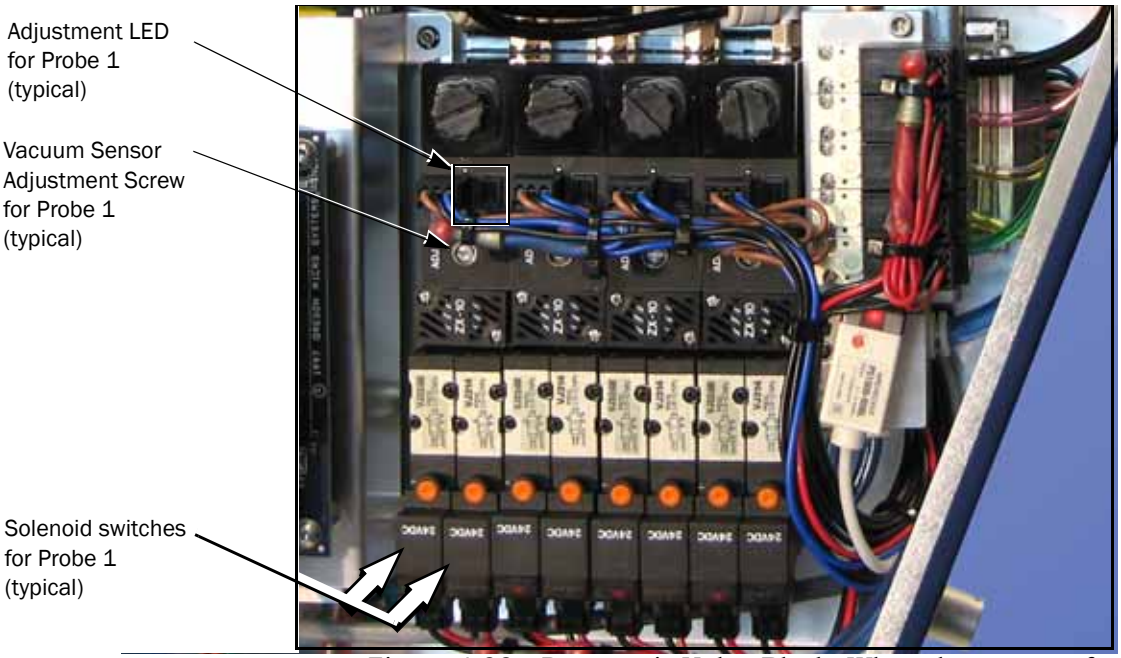


Figure 4-38—Pneumatic Valve Block. When the vacuum for Probe 1 is enabled, the two small LEDs on the solenoids (white arrows) for Probe 1 will be unlit.

7a. Then turn the same vacuum sensor adjustment screw clockwise until the red LED goes out. Continue turning the screw 1/2 to 1 more revolution clockwise.

7b. Test the setting by blocking air at the probe tip with your finger. The LED should illuminate. Adjust if necessary.

8. Press the down arrow to disable vacuum.
9. Press *Menu* twice to move up to **`Probe`**.
10. Press the down arrow to select the Probe 2.
11. Repeat steps from 6b to 9 for each probe.
12. Turn the power OFF [O].
13. (Optional) Turn the air OFF.
14. Re-install the Cover when finished.

Removing the PNP Head

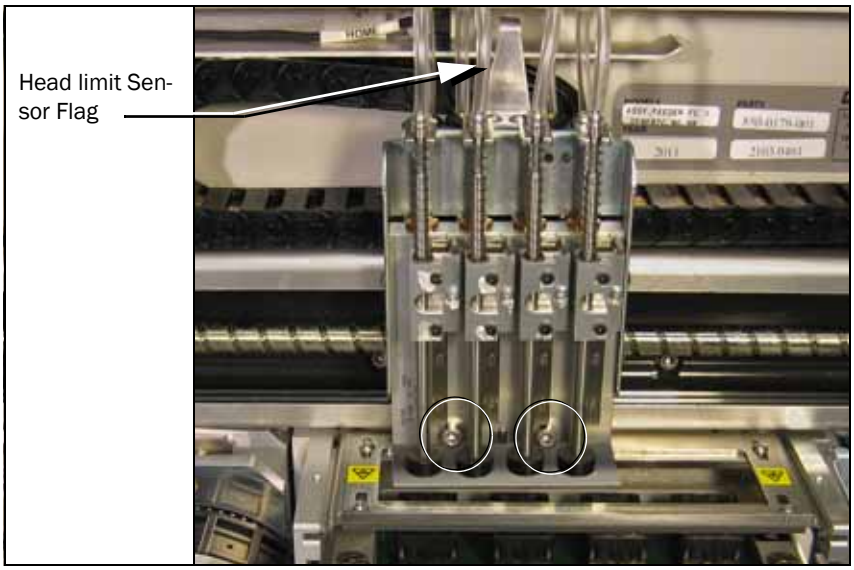


Figure 4-39—The PNP Head Mounting Screws (circled).

If you receive error messages relating to the Pick and Place (PNP) function, refer to the Error Messages chart in Chapter 6.

If you experience trouble with the Pick and Place Head that is not covered in this chapter, remove the head and send it to Data I/O Customer Service for repair or replacement. For example, a bent probe would require the PNP Head to be replaced.

Removal procedures are on the following page.

Note that the PNP Head is part of the Linear Stage Module.

Data I/O Parts Ordering Information

Instructions: **1**. Copy this page. **2**. Fill in your RoadRunner3 model and serial numbers (see the label on the chassis under the Robotics Cover). **3**. Fill in the quantity for the item(s) desired. **4**. (Optional) Call your local Data I/O sale representative for part prices or use our Web page for Requesting Quotes. **5**. E-mail to OrderAdmin@dataio.com or FAX to 425-867-6972 with your purchase order.

RoadRunner3 Model No._____ Serial No._____

INVENTORY PART NUMBER	PART DESCRIPTION	QTY	PRICE EA.	TOTALS
2890014005	Pick and Place Head		$	$
2880019001	Probe Tip		$	$
			$	$
			$	$

Signature:_____Date:_____Company:_____

To remove the Pick and Place Head:

1. (Optional) At the top level menu, select **`Home`** to move the head to a location that is easy to access.
2. Turn the power OFF [O].
3. Disconnect the power cord and air supply.
4. Remove the Robotics Cover.
5. Label and disconnect the tube from the top of each probe.
6. Remove two socket head cap screws attaching the head to the ball screw carriage [3 mm hex key].
7. Lightly pull the head a couple of centimeters away from the carriage.
8. Label each of the four pneumatic tubes on the back of the head. With a slotted screwdriver, remove the pneumatic tubes with fittings from the back of the head. Note that each has a washer.

For PNP Head screw locations see Figure 4-39.

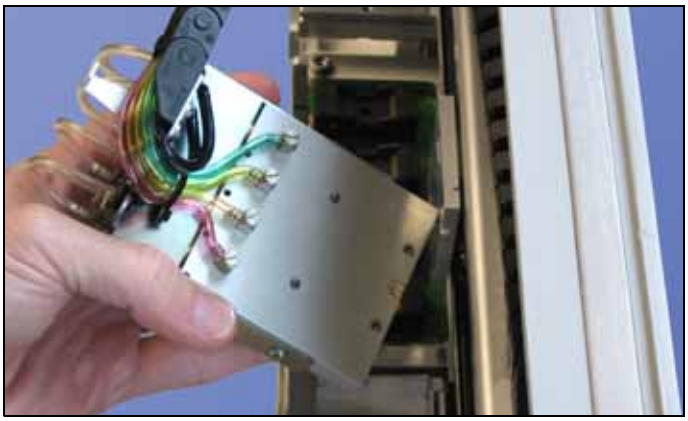
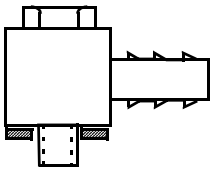


Figure 4-40—The four fittings on the back of the PNP Head. (The Head has been unbolted from the Linear Stage).

9. Remove two Head Bracket screws from each side of the head [2 mm hex key].

Tube Fitting and Gasket.



To reinstall a PNP Head, reverse the steps for removal *and* perform the following:

1. Install the four fittings onto the new head—the tubes are still attached. Ensure that each has a gasket.
2. Install the head Bracket onto the head.
3. Attach the tubes to the back of the head.
4. Install the head to the Linear Stage with the two socket screws. Use Loctite 222 or equivalent.
5. Perform the “Linear Stage Installation Verification” procedure.

For more information, see the “Linear Stage Installation Verification” on page 4-72.

Programmer Module

1-PCMCIA Cable Board

2- Ribbon Cable Connector J4

3- Actuation air tube

4. Quick Exhaust

5- Actuation Flow Control Valve

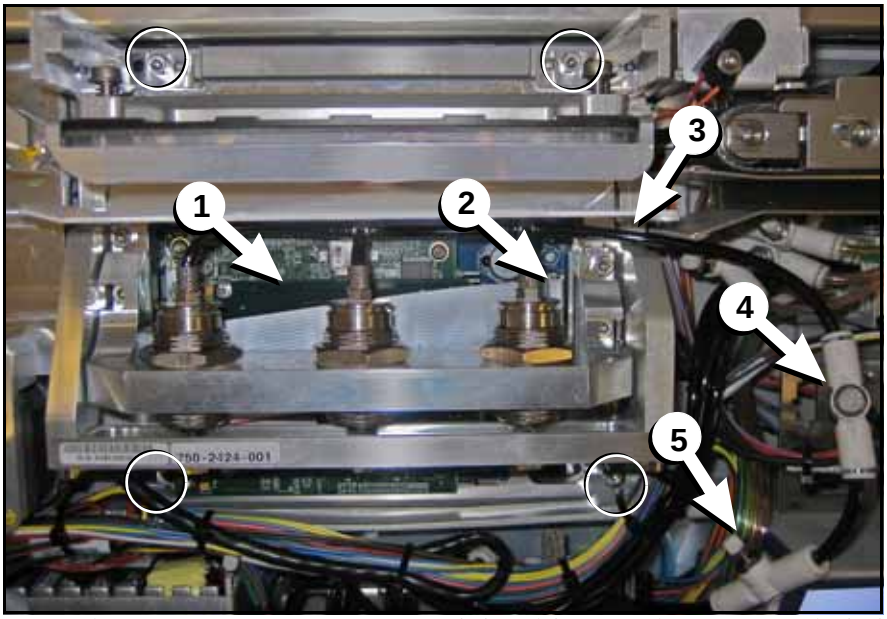


Figure 4-41—Programmer Module with mounting screws circled (with the lower left one hidden by cables).

The Programmer Module consists of the WaveForm Board, Main Controller Board, BackPlane Board, the Socket Adapter, and the Socket Actuator that opens and closes the programmer sockets.

If Programmer Module sockets become worn, the Socket Adapter needs attention. The Socket Adapter needs cleaning when yield drops, and needs replacing when cleaning fails to boost yield. If replacing the Socket Adapter does not solve problems in the Programmer Module, see "Diagnosing with the Adapter Board" in the Maintenance Chapter, or contact Data I/O for Programmer Module replacement or repair.

For more information, see "Changing the Socket Adapter" on page 3-5.

Data I/O Parts Ordering Information

Instructions: **1**. Copy this page. **2**. Fill in your RoadRunner3 model and serial numbers (see the label on the chassis under the Robotics Cover). **3**. Fill in the quantity for the item(s) desired. **4**. (Optional) Call your local Data I/O sale representative for part prices or use our Web page for Requesting Quotes. **5**. E-mail to OrderAdmin@dataio.com or FAX to 425-867-6972 with your purchase order.

RoadRunner3 Model No._____ Serial No._____

INVENTORY PART NUMBER	PART DESCRIPTION	QTY	PRICE EA.	TOTALS
7502424001	FC III Programmer		$	$
6950019001	Programmer Alignment Tool		$	$
			$	$

Signature:_____Date:_____Company:_____

Removing the Programmer Module

NOTE: Only technicians who have taken the RoadRunner3 Service training course should attempt to remove the Programmer Module.

*NOTE: **A Programmer Alignment Tool is required** to reinstall the Programmer Module. (This tool is part of the Starter Kit spare parts; for more information see "Accessories and Spare Parts Kits" on page 4-74.)*

For Electronic Covers location see "Removing the Electronic Covers" on page 4-7.

See "Changing the Socket Adapter" on page 3-5.

1. Turn the power OFF [O].
2. Disconnect the power cord and air supply.
3. Lift off the Robotics Cover.
4. Remove the Electronics Cover(s).
5. Move the PNP Head away from the programmer.
6. Remove the Actuator Plate by sliding it out of the bracket.
7. Remove the Socket Adapter.
8. Lift out the Reject Bin.
9. Disconnect Cable **J3** by pulling the connector straight out.

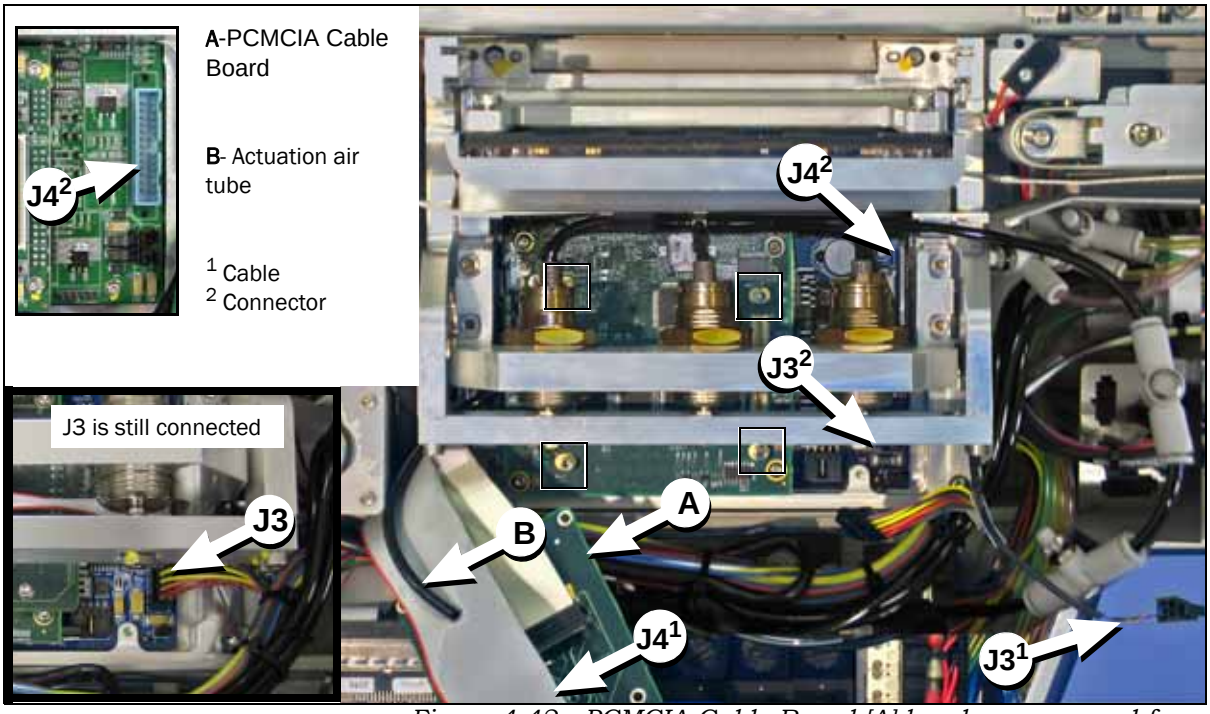


*Figure 4-42—PCMCIA Cable Board [A] has been removed from the Programmer Module (squares). The air tube [B] disconnected. **J3** and **J4** cables unplugged—see insets for closer views.*

CAUTION: *Part damage hazard. Ribbon Cables might get damaged if pulled or pinched. Cable damage is often not visible. Pull cables by the connector only.*

Cables & tubes are identified in Figure 4-42 above, & Figure 4-41 above that.

For air fitting information see Figure 4-10 on page 4-19.

Programmer Module screw locations are indicated in Figure 4-41.

10. Disconnect ribbon cable **J4** by pulling the connector straight out and pull the cable out of the way to the left.
11. Disconnect the **Actuation Air Tube** from the quick exhaust fitting. It is a One-Touch fitting.
12. Remove the **PCMCIA-Board** from the Programmer Module by removing the four screws with a 2 mm hex key and then unplugging it (pulling up) from the board below. THE RIBBON CABLE IS NOT REMOVABLE FROM THIS PCB. Slide the board out of the way to the left.
13. Remove four screws securing the Programmer Module to the chassis using a 2.5 mm hex key. Note that it still has cables attached.
14. Unplug the **Ethernet Cable** (701-3215) connector and the Serial **RJ45** (Motion Controller) connector from the left side of the Programmer Module. It will be helpful to pull the Module part way out to access the clip on the far side of each—it needs to be pushed to release the connector.
15. Unplug the Actuation Sensor cable **JC5** from the Interconnect Panel by pinching the clasp on top so it opens like a clothes-pin and pulling the connector.

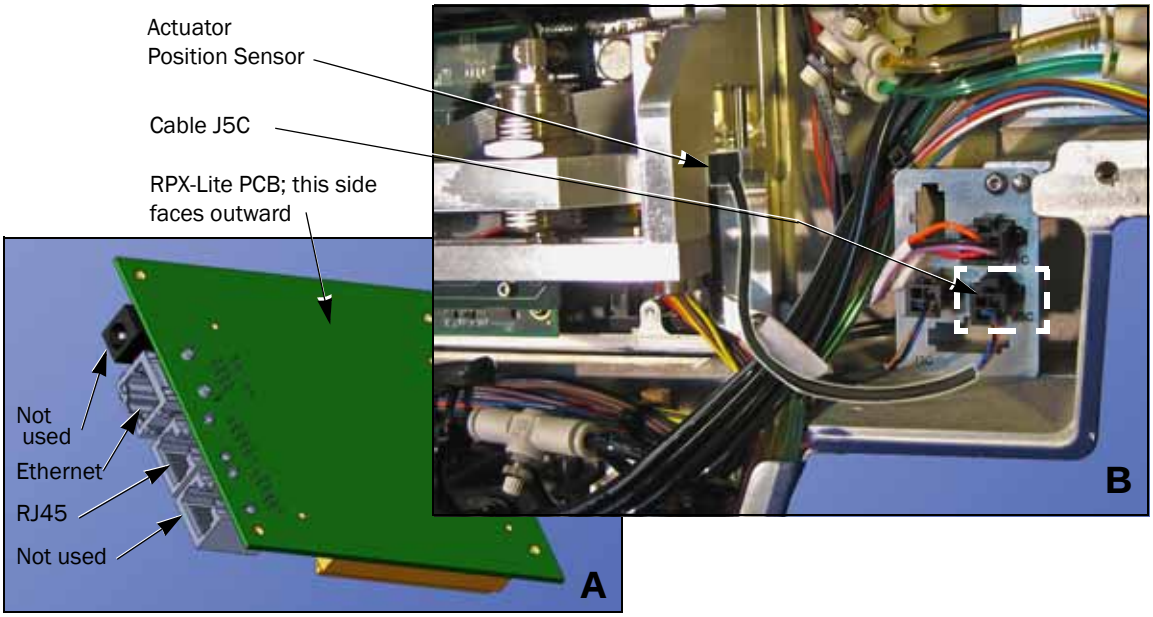
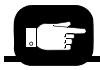


Figure 4-43—A = The RPX-Lite PCB is part of the programmer. B = Cable Interconnect Panel with the Cable JC5 and Sensor highlighted.

16. Lift the Programmer Module out from the chassis.

Reinstalling the Programmer Module

To reinstall a Programmer Module, perform the following steps:



Refer to Figure 4-43 on the previous page for locations.

1. Plug the **Ethernet Cable** (if present) and **RJ45** Motion Control Cable into the left side of the Module.
2. Feed the **PCMCIA-PCB** into place from the left and plug it in.
3. Reinstall the Programmer Module ensuring that no wires or hoses are pinched, and, with thread locker, tighten the four screws.
4. Install the four screws to attach the PCMCIA-PCB.
5. Reconnect the **Actuation Air Tube**.
6. Plug in the Actuation Sensor Cable **JC5**.
7. Plug in the ribbon cable **J4**.
8. Plug in cable **JC3**.
9. Reinstall the Reject Bin.
10. Verify Programmer Module alignment with the alignment tool (see below). If necessary, align the programmer.

Aligning the Programmer Module

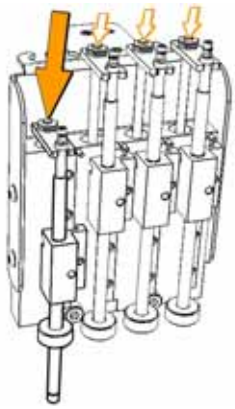
Align the Programmer Module with the power still OFF, as follows:

Figure 4-44—The Programmer Module Alignment Tool Installed on the Programmer in place of a Socket Adapter. (PROBE TIPS MUST BE REMOVED PRIOR TO ALIGNMENT PROCEDURE.)

CAUTION: *Casting might get damaged. For this procedure, loosen the Programmer Module*

mounting screws (two upper screws) before each attempt to adjust the Programmer Alignment Screws.

Push probe here with finger.



1. With the power OFF, install the Programmer Alignment Tool (sales part number is PROGRAMMER ALIGNMENT TOOL) onto the Programmer Module in place of a Socket Adapter.
2. Remove the rubber Probe Tip and vacuum chamber block from Probe 1 (the far left probe) and extend Probe 1 into the alignment tool hole #1. If the probe **passes** through the hole easily, then the left side of the programmer is properly aligned—skip to step 3.
   2a. If Probe 1 **does not pass** through easily, loosen the upper left Programmer Module mounting screw two revolutions. (See figure below.)
   2b. Adjust the left Position Alignment set screw (adjacent to the mounting screw) with a 2 mm hex key so that the probe does pass through easily. Turn the screw clockwise to move the module away from the chassis.
   2c. When done, tighten the upper left Programmer Module screw.

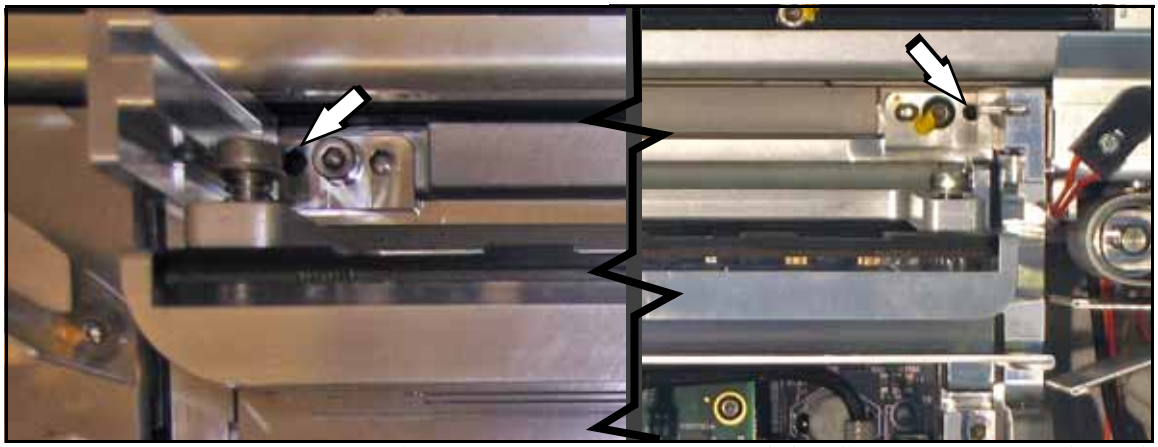


Figure 4-45—Programmer Module Alignment Screw. The Left Screw (left) is shown closer.

3. Remove the rubber tip and vacuum chamber block from Probe 4 and extend it into the alignment tool hole #4. If the probe **passes** through the hole easily, then the right side of the programmer is properly aligned—skip to step 4.
   3a. If probe 4 **does not pass** through easily, loosen the upper right Programmer Module mounting screw two revolutions.
   3b. Adjust the right Position Alignment set-screw accordingly.
   3c. When done, tighten the upper right programmer mounting screw.

4. **Retest**.
   If the module requires further adjustment, be sure to loosen the left or right mounting screw first.
5. Remove the Alignment Tool.
6. Replace the vacuum chamber blocks and rubber probe tips.

Adjusting the Actuation Speed

The programmer actuation speed needs to be adjusted so that the sockets open without being slammed by the Actuator Plate. If it is too fast, causing a hard landing, it could damage sockets or cause devices to bounce.

This procedure follows the safety practice of removing power before removing and installing covers/panels covering electronic parts.

1. Install a Socket Adapter and Actuator Plate.
2. Plug in the AC Power cable.
3. Connect the external air via the supplied regulator, ensuring that it is set to approximately 5.17 Bars (75 PSI).
4. Press the Emergency Stop button to prevent the PNP Head from moving.

CAUTION: *Pinch hazard. Keep hands and fingers away from the PNP Head, Gantry lead screw, and programmer actuator.*

The E-Stop does not stop the programmer from actuating—opening and closing the sockets.

CAUTION*: Shock hazard. The E-Stop does not stop electrical flow to internal electronics.*

5. Insert a job card with Supervisor authority and turn the power on.
6. Pause the RoadRunner3.
7. When the blue lamp is lit, turn the power OFF [O].
8. Disconnect the power cord and air supply.
9. Remove the Electronics Cover.

WARNING

Electric Shock Hazard. The following procedures require the Electronics Cover(s) to be removed while power is on. Only touch items described in the procedures. Use caution.

10. Re-attach the power cord and air supply.
11. Turn power and air back on.
12. Locate the Actuation Flow Control and adjust it counter-clockwise to full open, then turn it clockwise 2-1/2 revolutions.
13. At the Control Panel, press *Menu*. Then scroll to and select **`Robot Diagnostics > Socket > State`**. After selecting the **`State`** command a dot, or bullet, appears next to it. Then the *Down Arrow* and *Up Arrow* buttons will actuate the programmer. KEEP FINGERS AWAY FROM THE PROGRAMMER AND ACTUATOR PLATE.
14. Actuate the programmer and watch the speed. If the actuator appears to hit the sockets too hard, loosen the locking ring and adjust the flow control and then retry. Use the flow control to soften the impact. However, setting speed too slow may cause timing problems as well as reduced throughput.
15. Turn power OFF [O].
16. Disconnect power and air supply.
17. Reinstall the Robotics cover.
18. Reinstall the power cable and air supply.
19. Turn power and air supply back on.
20. Retighten the locking ring on the flow control.
21. Reinstall all RoadRunner3 covers.

To locate the Actuation Flow Control, see *Figure 4-41 on page 4-56*.

NVRAM Battery

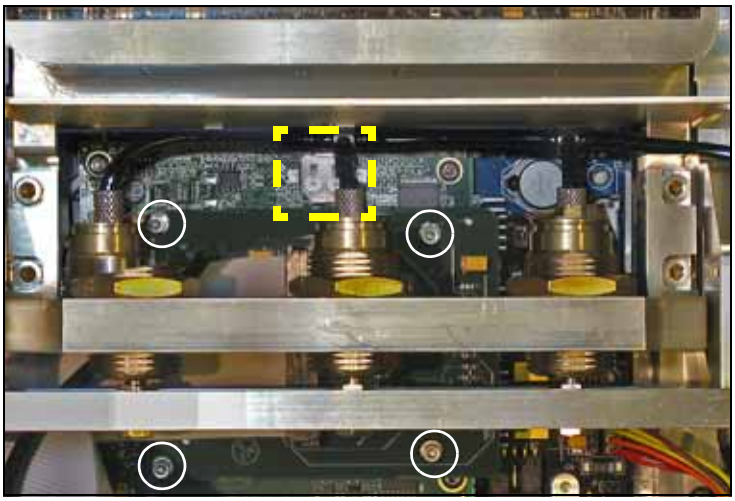


Figure 4-46—The Programmer with Ribbon Cable J4 disconnected. The shiny NVRAM Battery is boxed. PCMCIA Board screws are circled.

RoadRunner3 uses a lithium battery to power the non-volatile read-only memory (NVRAM). If information stored in NVRAM is lost, RoadRunner3 will not function correctly. If it displays this error message: **`NVRAM Battery Failed`**, NVRAM data will be lost when RoadRunner3 is turned off and the battery will need to be replaced.

After a new battery has been installed in RoadRunner3, alignment of the reinstalled Programmer Module must be verified and adjusted if necessary. Next, the PNP Head positions—Socket Status, Network Settings, time, and date—must be retaught. This procedure follows the battery replacement instructions

It takes approximately 90 minutes to replace the battery. If programmer alignment is required, add 30 minutes. Allow an additional 20 minutes to reteach the system.

Data I/O Parts Ordering Information

Instructions: **1**. Copy this page. **2**. Fill in your RoadRunner3 model and serial numbers (see the label on the chassis under the Robotics Cover). **3**. Fill in the quantity for the item(s) desired. **4**. (Optional) Call your local Data I/O sale representative for part prices or use our Web page for Requesting Quotes. **5**. E-mail to OrderAdmin@dataio.com or FAX to 425-867-6972 with your purchase order.

PRoadRunner3 Model No._____ Serial No._____

INVENTORY NAME	PART DESCRIPTION	QTY	PRICE EA.	TOTALS
4210001001	NVRAM Battery		$	$
			$	$

Signature:_____Date:_____Company:_____

Removing the NVRAM Battery

The battery is located on the front side (operator side) of the RPX_LITE circuit board. To access it, the Programmer Module must be removed and the PCB stack removed from the back of the framework.

For Electronic Cover screw locations, see "Removing the Electronic Covers" on page 4-7.

1. Turn the power OFF [O].
2. Disconnect the power cord and air supply.
3. Lift off the Robotics Cover.
4. Remove the Electronics Cover(s).
5. Remove the Programmer Module. See "Removing the Programmer Module" on page 4-57.
6. Remove the two screws securing the Backplane board to the frame. Note that other PCBs are still attached to it.

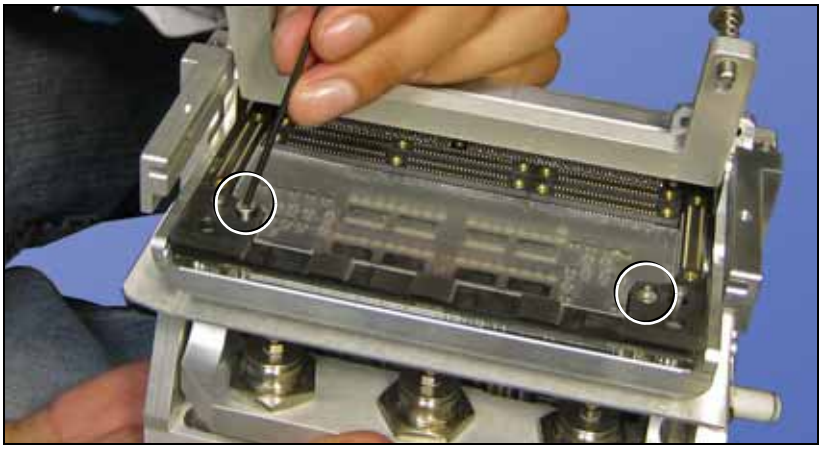


Figure 4-47—Removing the Backplane board from the programmer frame. Screws are circled.

7. LIft off the black spacer strip.
8. Looking at the back of the programmer, remove the screw at the lower left corner of the Waveform board.

Figure 4-48—The back side of the Waveform board. The attachment screw is circled.

9. Work the PCB stack (the Backplane board and other attached boards) off the two dowel pins and free of the framework.

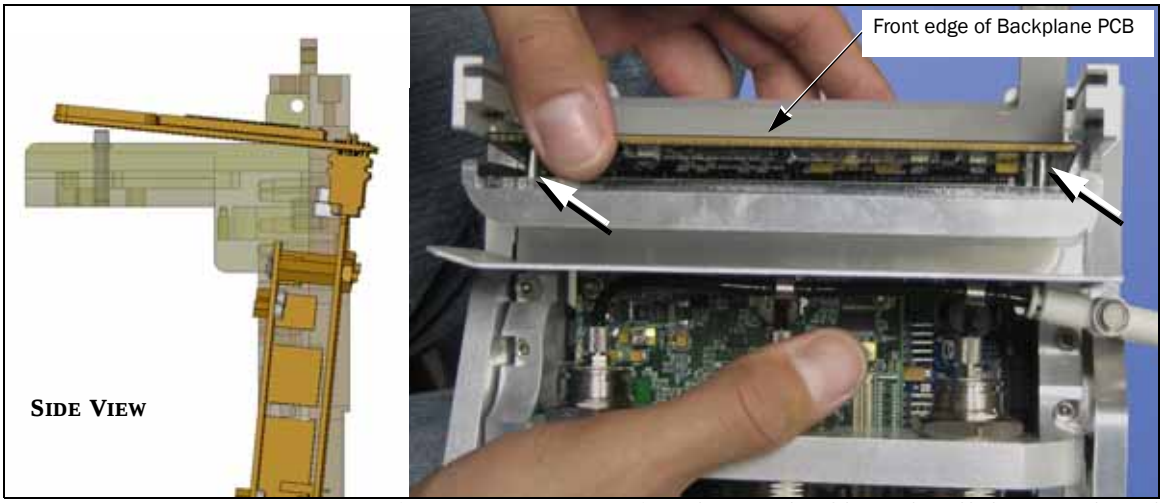


Figure 4-49—Removing the stack of boards off the two dowel pins (arrows) and free of the programmer frame.

10. Push the old battery out of the clip with a small tool carefully, preventing damage to board components.

Figure 4-50—Pushing the battery up out of the clip. (Your RPX-Lite board may not look like this.)

11. Insert a new battery of the same type.

Reinstalling the Programmer Components

For Programmer Module installation instructions, see "Reinstalling the Programmer Module" on page 4-59.

1. Reinstall the board stack into the programmer frame and onto the dowel pins.
2. Reinstall the black spacer with the countersink at the holes facing up.
3. Install the two screws securing the Backplane board.
4. Install one screw on the back of the Waveform board.
5. Reinstall the programmer.
6. Reinstall all covers.

Reteaching the NVRAM

After a new battery has been installed in RoadRunner3, you need to teach it the PNP Head positions, the Socket Status, Network Settings, and the time and date so that they can be stored again in NVRAM.

To reteach the NVRAM,

1. Connect the air supply and power cord.
2. Switch the power On.
3. Insert a PC card with Supervisor Authority into RoadRunner3. For help on setting Supervisor Authority, open TaskLink and click **Help > Help Topics > Menus > Tools Menu > Set Administrator Privileges > How to Set Administrative Privileges**.
4. Press the Menu button on the Control Panel.

Head Positions

1. Teach the Tape pocket position—see *Setting the Tape Parameter* in Chapter 3.
2. Teach the Socket 1 position—see *Setting the Skt 1 Parameter* in Chapter 3.
3. Teach the Reject Bin position—see *Setting the Reject Parameter* in Chapter 3.
4. Teach the Belt position—see *Setting the Belt Parameter* in Chapter 3.

Network Values

*The RoadRunner3 IP Address (**IP**), Programmer Port (**Prog Port**), Subnet Mask (**Sub**), and Gateway (**GTW**) are listed in the RoadRunner3 menu under **System** > **Network**.*

If your RoadRunner3 is networked to a computer with TaskLink, you need to configure the network settings again.

1. Use the Network Wizard in TaskLink (**Tools > Create Network Configuration Card**) to create a Network Configuration card. (Generally, the previous network values are automatically inserted except a zero or a dummy number will be placed into the IP address field.) Enter data for the IP address, Programmer Port, Subnet Mask and Gateway. When done click **Finish**.
2. Remove the PC card and insert the card into the target RoadRunner3.
3. Scroll to and select **System > Network > Network Parm**.
4. Press the *Down Arrow* to change **Network Parm** to **Card**.
5. Cycle the power.

Reteaching the Time settings

To set the time:

1. Press the *Menu* button.
2. In the top level menu, scroll to and select **`System > Time`**.
3. Scroll to Hour.
   Set to the correct hour as follows:
   • Press *Select*
   • Adjust number with the *Up Arrow* or *Down Arrow*
   • Press *Menu* to save.
4. Scroll to each remaining parameter (**`Minutes`**, **`Month`**, **`Day`**, **`Year`**) and set in the same manner.

Linear Stage Module

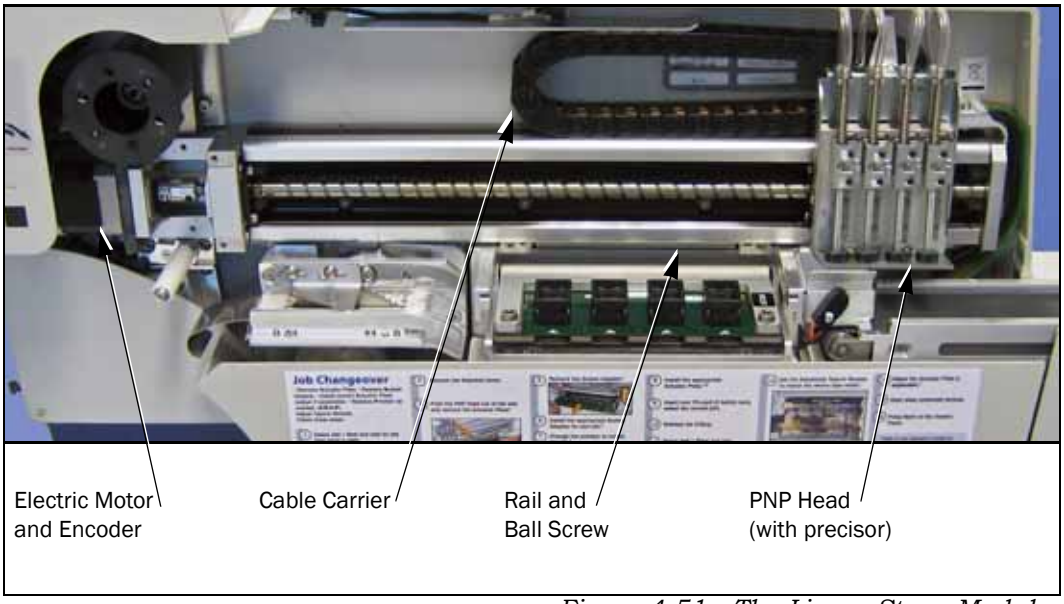


Figure 4-51—The Linear Stage Module.

To remove the PNP Head only, see "Removing the PNP Head" on page 4-54.

The Linear Stage module, part of the Robotic System, consists of a rail and ball screw, a stepper motor with encoder, and a cable carrier. The Linear Stage is removed as an assembly with the PNP Head.

Data I/O Parts Ordering Information

Instructions: **1**. Copy this page. **2**. Fill in your RoadRunner3 model and serial numbers (see the label on the chassis under the Robotics Cover). **3**. Fill in the quantity for the item(s) desired. **4**. (Optional) Call your local Data I/O sale representative for part prices or use our Web page for Requesting Quotes. **5**. E-mail to OrderAdmin@dataio.com or FAX to 425-867-6972 with your purchase order.

RoadRunner3 Model No._____ Serial No._____

INVENTORY PART NUMBER	PART DESCRIPTION	QTY	PRICE EA.	TOTALS
7502400001	Linear Stage Module		$	$
			$	$
			$	$

Signature:_____Date:_____Company:_____

Removing the Linear Stage Module

NOTE: After a Linear Stage Module is installed, both the Programmer and Tape-In Modules must be re-aligned. Therefore, this entire procedure may take more than two hours.

1. Turn the power OFF [O].
2. Disconnect the power cord and air supply.
3. Lift off the Robotics Cover.
4. Remove the Electronics Cover(s).

See "Removing the Electronic Covers" on page 4-7.

5. Remove the Conveyor Module Cover.

See "Removing the Conveyor Module Cover" on page 4-8.

6. Remove the Conveyor Module screws (the wires do not need to be unplugged) and lift it out of the way.

For locating the Conveyor screws, see Figure 4-18 on page 4–28.

7. (Label if necessary and) disconnect four *black* Linear Stage air hoses from the Probe Control Manifold's upper surface. The Probe Control Manifold is located below, and to the right of the Reject Bin. The connections are one touch fittings.
8. (Label if necessary and) disconnect four *colored* air hoses from the Probe Control Manifold. The connections are one touch fittings.

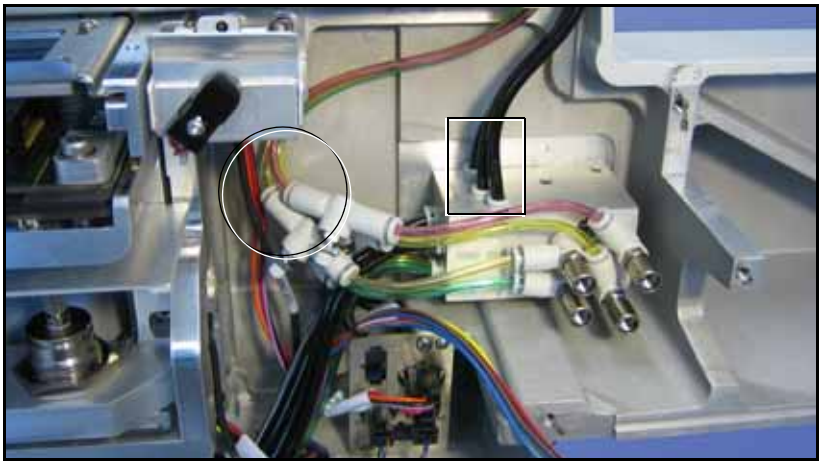


Figure 4-52—Air tubes from the Linear Stage must be disconnected: four black tubes (boxed) and four colored tubes (circle). The Conveyor Module has been removed, but wires are not disconnected—the wires can be seen descending from the chassis.

For Control Panel Cover location, see Figure 4-2 on page 4-6.

9. Remove the Control Panel Cover.
10. Unplug the ribbon cable at the Linear Stage Encoder.
11. Cut the cable tie securing connector J8B; it is adjacent to the Linear Stage motor. See figure below.

12. Unplug the connector J8B from the extension cable connector by pinching the clasp and pulling apart.

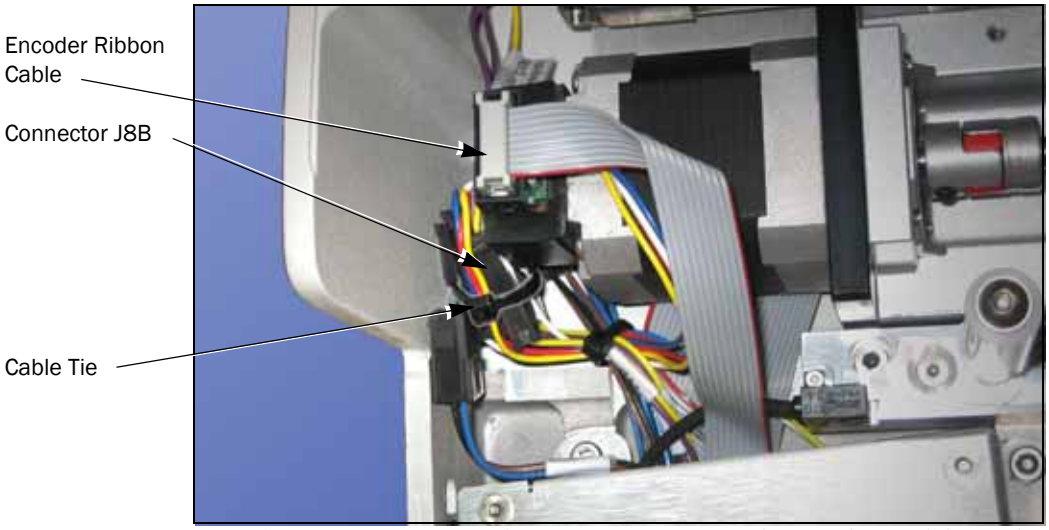


Figure 4-53—Two wire connectors must be unplugged from the Linear Stage Module.

13. Remove eight screws securing the Linear Stage Module to the chassis. (Slide the head out of the way as necessary.) See the figure below.

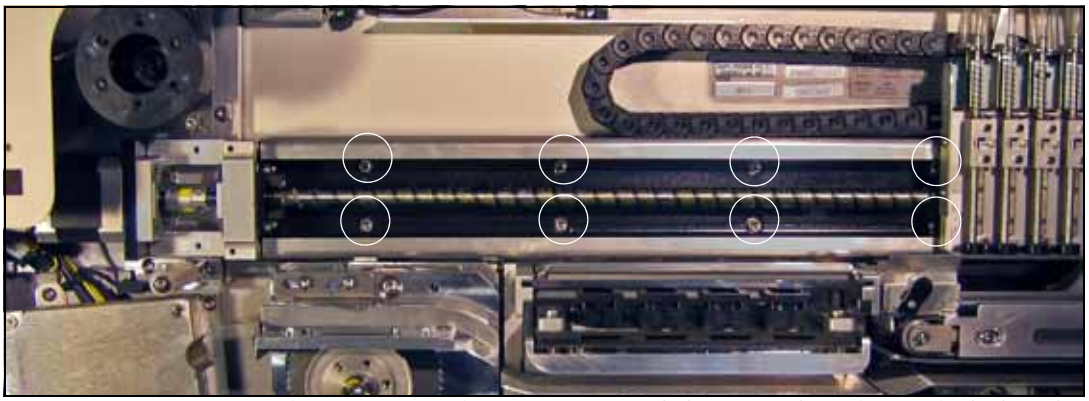


Figure 4-54—Linear Stage Module screw locations (circled). (The Conveyor Module would not be in place at this time.)

Linear Stage Installation Verification

To replace the Linear Stage Module, reverse the steps for removal *and* perform the following:

For Conveyor Module reinstallation, see *page 4–30*.

1. For Conveyor Module reinstallation, see heading *Reinstalling the Conveyor Module* earlier in this manual.
2. With the power OFF [O], slide the PNP Head along the entire length of the Linear Stage. Check that the Head Flag (small bracket on top the head) clears the position sensors.
3. Verify electrical and pneumatic connections as follows:

3a. Connect the air hose and turn the power on.

3b. Verify that the head homes.

3c. Extend and retract each probe to verify correct air cylinder plumbing. *Robot Diagnostics* > *Probe X* > *Position* > *Arrow Up/Down.*

3d. Enable vacuum to each probe to verify correct vacuum line plumbing. *Robot Diagnostics* > *Probe X* > *Vac Sense.* Then block the air at the probe tip with a gloved finger or piece of stiff paper. Confirm that the Vac Sense changes from 0 to 1.

4. Adjust the Probe Vacuum Sensors.
5. Verify correct probe speed.
6. Perform the *Aligning the Programmer Module* procedure.
7. Perform the *Aligning the 4-position, Adjustable Tape-In Module* procedure.
8. Reteach the robot the four operation parameters: **`Tape`**, **`Socket1`**, **`Reject`** and **`Belt`**.

For probe vacuum settings see "Adjusting Probe Vacuum Sensors" on page 4-51.

For probe speed information see "Adjusting and Balancing Probe Speed" on page 4-46.

For Programmer alignment see "Aligning the Programmer Module" on page 4-59.

For Tape-In Module alignment see "Aligning the 4-position, Adjustable Tape-In Module" on page 4-13.

For reteaching the robot see "Setting Operational Parameters" on page 3-25.

Accessories and Spare Parts Kits

Kits of spare parts prevent long delays if you experience down time due to part wear or failure. Our spares kits are designed to assist customers in maintaining and supporting their RoadRunner3(s). There are four types of spares kits described below. There is no overlap of parts within kits. Use the Part Number below to order your spares kit.

Extra Parts for RoadRunner3

KITS THAT COME WITH YOUR ROADRUNNER3	DESCRIPTION	REQUIRES ADVANCED ROADRUNNER3 SERVICE TRAINING
ACCESSORIES KIT **PN 9520393001**	Contains consumable parts needed to maintain high productivity of the RoadRunner3. It also includes the Alignment Kit, below. This kit is essential for all RoadRunner3 customers.	No, except *Yes* for using the Alignment Kit tools.
ALIGNMENT/VERIFICATION KIT **9520392001**	Support tools include the Diagnostic Adapter Board (DAB), the Programmer Alignment Tool and the Tape-In Module Alignment tool. One of these kits is part of the Accessories Kit. However, more can be purchased.	Yes
SPARES KITS AVAILABLE	**DESCRIPTION**	**REQUIRES ADVANCED ROADRUNNER3 SERVICE TRAINING**
PROGRAMMER SPARES KIT **PN 9520389001**	Contains a replacement FlashCORE III programmer for the RoadRunner3. This kit also includes a spare Robot IO board and Communication board. Considered the most important spare part kit— it is highly recommended that all customers have at least one.	Yes
SELF-SERVICE SPARES KIT **PN 9520391001**	Contains spare RoadRunner3 subassemblies that allow customers to quickly repair a RoadRunner3 and place it back into production without any waiting. These subassemblies have been chosen by our Service Department as most useful to have. This kit includes a Pneumatic Module, a Linear Stage Module, a Conveyor Module, and a PNP head assembly.	Yes
SUPPLEMENTAL SPARES KIT **PN 9520390001**	Failure of these parts would render the RoadRunner3 inoperable. But there is a very low history of failure for these parts. This kit is recommended only for customers who may have difficulty receiving shipped parts quickly.	Yes

These kits and contents are listed on the following pages.

FlashCORE III (FC III) is the latest programmer architecture for the RoadRunner3.

Accessories Kit, RoadRunner3

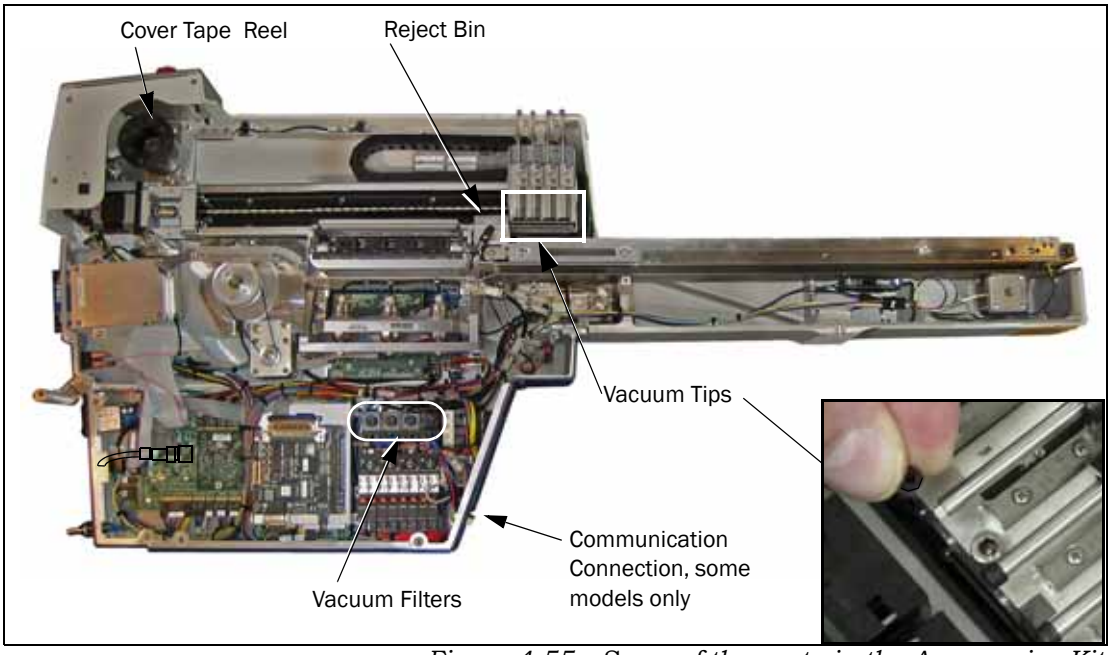


Figure 4-55—Some of the parts in the Accessories Kit

Not a spare parts kit, the Accessories Kit comes with every RoadRunner3. Some of the parts in the Accessories Kit are listed below and more details on the next page.

Data I/O Parts Ordering Information

Instructions: **1**. Copy this page. **2**. Fill in your RoadRunner3 model and serial numbers (see the label on the chassis under the Robotics Cover). **3**. Fill in the quantity for the item(s) desired. **4**. (Optional) Call your local Data I/O sale representative for part prices or use our Web page for Requesting Quotes. **5**. E-mail to OrderAdmin@dataio.com or FAX to 425-867-6972 with your purchase order.
RoadRunner3 Model No._____ Serial No._____

NOT A COMPLETE LIST HERE

INVENTORY PART NUMBER	PART DESCRIPTION	QTY	PRICE EA.	TOTALS
2880019001	Probe Tip, 4.57MM OD		$	$
2860001001	Vacuum Filter, 70PSI		$	$
5600222001	Thread locker		$	$
6040214001	Floating Chamber Block		$	$
5250018001	Cover Tape Take-Up Reel, 6 Holes		$	$
5658000001	Vacuum Tool		$	$
7013215004	PCMCIA PCB		$	$
9920521001	FIS SW Developers Web Service		$	$
9920520001	Factory Integration Software (FIS)		$	$
9520392001	Alignment/Verification Kit- RR3		$	$
9520393001	This Accessory Kit (all above + more)		$	$

Signature:_____Date:_____Company:_____

Replacing the Probe Tips

The rubber tip pulls straight off. To install a rubber tip, hold it with the square hole oriented to the square end of the probe and work it onto the probe.

After replacing Probe Tips, they should be cleaned to remove finger oil. For cleaning, see PNP Probe Tips in the table on page 5–3.

Replacing the Air Inlet Tube Assembly

To remove the Air Inlet Tube Assembly at the RoadRunner3 air connector:

1. Stop or pause the job if one is running.
2. Remove the Robotics Cover.
3. If there are any devices currently on the probes, remove them; they will fall off when air is removed.
4. Pull the collar on the quick release fitting back as you pull the tube assembly off the connector. (The quick release fitting, often called a one-touch fitting, has a safety shut off feature—the compressed air need not be turned OFF.)

To connect an Air Inlet Tube Assembly, push it onto the RoadRunner3 connector.

Alignment/Verification Kit, RoadRunner3

Clockwise:
TAPE-IN MODULE ALIGNMENT TOOL (ABOVE)

PROGRAMMER ALIGNMENT TOOL

DIAGNOSTIC ADAPTER BOARD (DAB)

Figure 4-56—Tools in the Alignment Kit; RoadRunner3

The three tools in this kit are for:

- Aligning the Tape-In Module with the PNP head after installing it
- Aligning the Programmer Module with the PNP head after installing it
- Performing the Programmer diagnostics

Data I/O Parts Ordering Information

Instructions: **1**. Copy this page. **2**. Fill in your RoadRunner3 model and serial numbers (see the label on the chassis under the Robotics Cover). **3**. Fill in the quantity for the item(s) desired. **4**. (Optional) Call your local Data I/O sale representative for part prices or use our Web page for Requesting Quotes. **5**. E-mail to OrderAdmin@dataio.com or FAX to 425-867-6972 with your purchase order.
RoadRunner3 Model No._____ Serial No._____

INVENTORY PART NUMBER	PART DESCRIPTION	QTY	PRICE EA.	TOTALS
6950019001	Programmer Alignment Tool		$	$
9102200003	FlashCORE Diagnostics Adapter Board (DAB)		$	$
6210124001	Tape-In Module Alignment Jig		$	$
			$	$
9520392001	This Alignment Kit [all above]		$	$

Signature:_____Date:_____Company:_____

Programmer Spares Kit, RoadRunner3

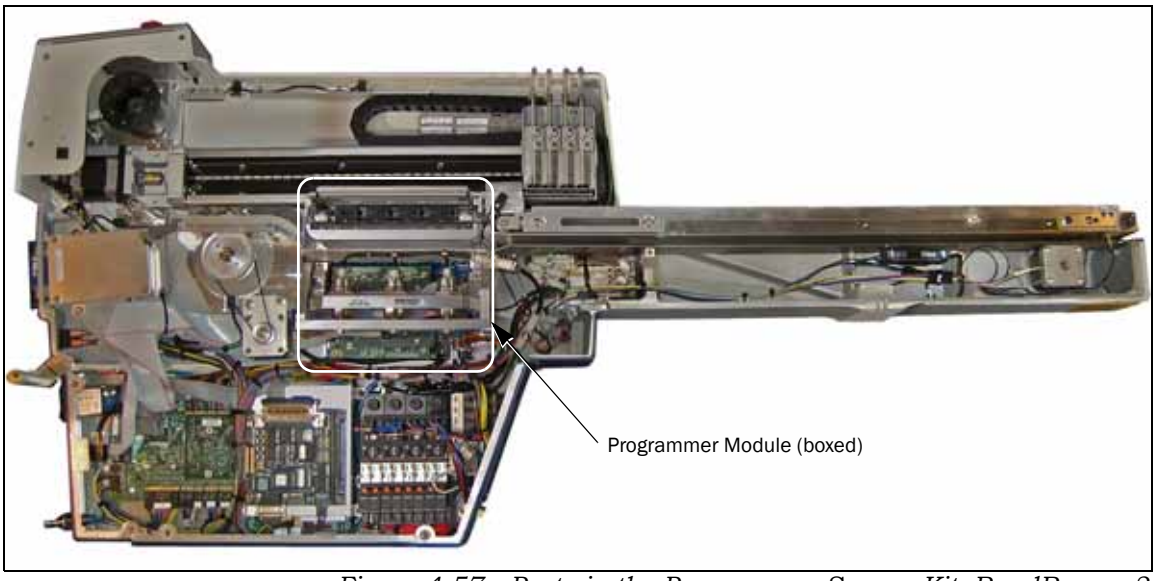


Figure 4-57—Parts in the Programmer Spares Kit; RoadRunner3

The Programmer Module in this kit is always the latest architecture for the RoadRunner3. Removal instructions start on page 4–57, and instructions are also included in the kit.

Data I/O Parts Ordering Information

Instructions: **1**. Copy this page. **2**. Fill in your RoadRunner3 model and serial numbers (see the label on the chassis under the Robotics Cover). **3**. Fill in the quantity for the item(s) desired. **4**. (Optional) Call your local Data I/O sale representative for part prices or use our Web page for Requesting Quotes. **5**. E-mail to OrderAdmin@dataio.com or FAX to 425-867-6972 with your purchase order.
RoadRunner3 Model No._____ Serial No._____

INVENTORY PART NUMBER	PART DESCRIPTION	QTY	PRICE EA.	TOTALS
7502424001	Programmer Module, FC III		$	$
			$	$
			$	$
			$	$
9520389001	This Programmer Spares kit		$	$

Signature:_____Date:_____Company:_____

Self-Service Spares Kit, RoadRunner3

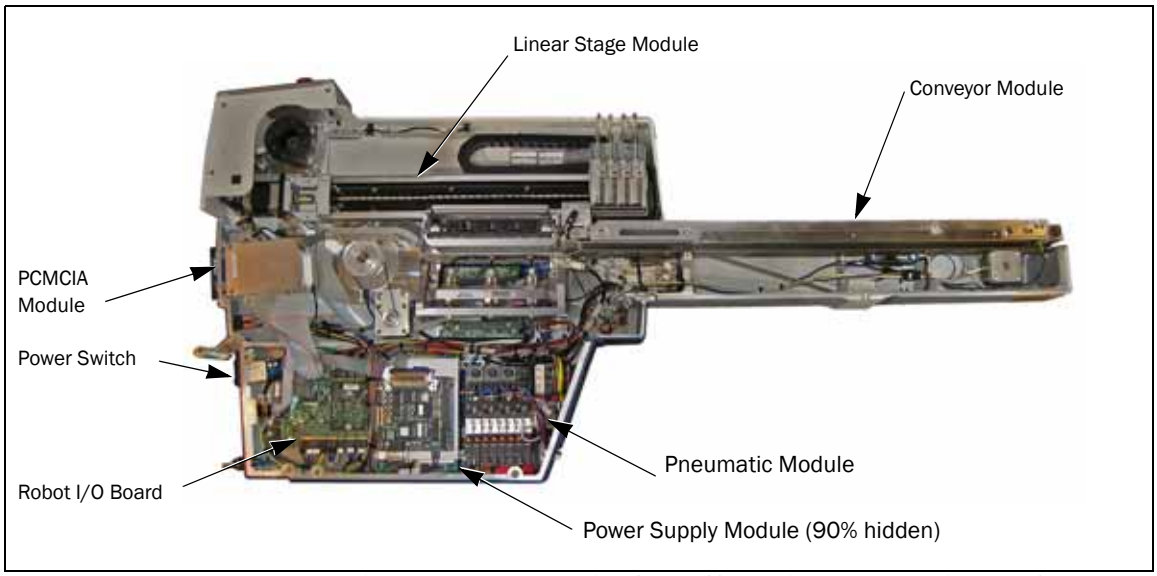


Figure 4-58—Parts in the Self-Service Spares Kit; RoadRunner3

The two PCBs, the Power Supply board and the Robot I/O board, require Advanced RoadRunner3 Service training. Replacement instructions come with the kit and are **not** covered in this manual.

4

Data I/O Parts Ordering Information

Instructions: **1**. Copy this page. **2**. Fill in your RoadRunner3 model and serial numbers (see the label on the chassis under the Robotics Cover). **3**. Fill in the quantity for the item(s) desired. **4**. (Optional) Call your local Data I/O sale representative for part prices or use our Web page for Requesting Quotes. **5**. E-mail to OrderAdmin@dataio.com or FAX to 425-867-6972 with your purchase order.

RoadRunner3 Model No._____ Serial No._____

INVENTORY PART NUMBER	PART DESCRIPTION	QTY	PRICE EA.	TOTALS
7502400001	Linear Stage Module		$	$
7502434001	Conveyor Module, 44 mm		$	$
7013214002	PCMCIA Board		$	$
3710035001	Power Switch, Rocker		$	$
4800020001	Pneumatic Module		$	$
6154887001	Robot I/O Board		$	$
8060010001	Power Supply Board 5V/10, 24V/2,12V/.8		$	$
			$	$
			$	$
			$	$
9520391001	This Self-Serve Spares kit [all above]		$	$

Signature:_____Date:_____Company:_____

The Self-Service Spares Kit for RoadRunner3 contains parts listed on page 4–80. It is available to those who have attended an Advanced RoadRunner3 Service course.

Customer Training

For information about advanced training, contact the Data I/O Customer Service Center. A training course may be ordered when purchasing a RoadRunner3 or at a later time.

NOTE: This chapter does not describe replacement instructions for all the parts in the Self-Service Spares Kit. For additional information, contact Data I/O or your nearest authorized representative. To find your nearest representative, see the information on the last page of this manual.

Supplemental Spares Kit, RoadRunner3

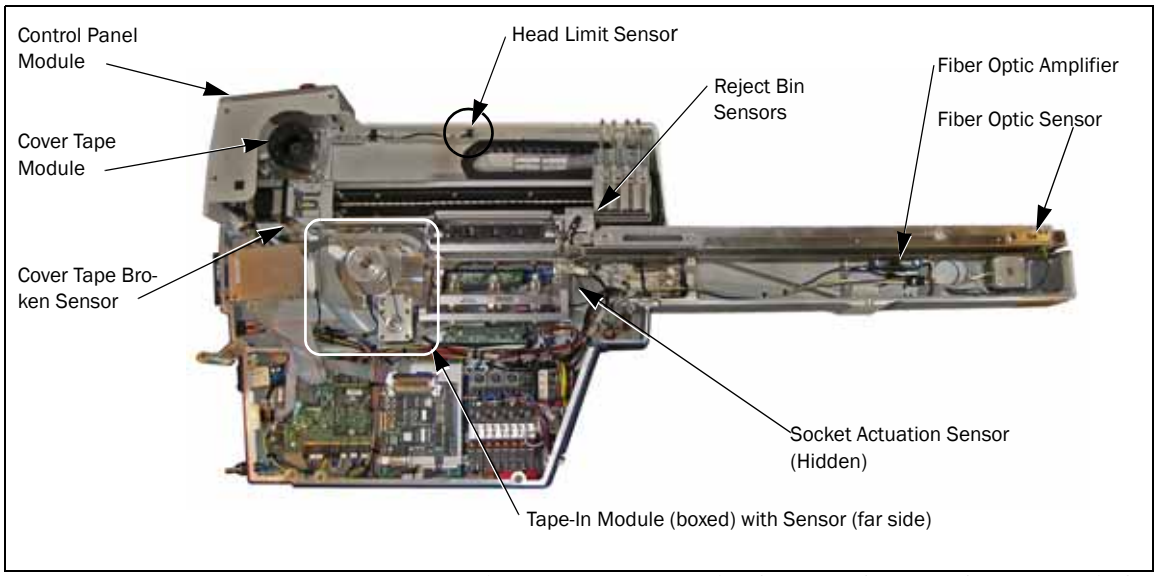


Figure 4-59—Parts in the Supplemental Spares Kit for RoadRunner3

4

There is a very low history of failure for parts in this kit, but customers who may have difficulty receiving shipped parts quickly might find this kit valuable.

Data I/O Parts Ordering Information

Instructions: **1**. Copy this page. **2**. Fill in your RoadRunner3 model and serial numbers (see the label on the chassis under the Robotics Cover). **3**. Fill in the quantity for the item(s) desired. **4**. (Optional) Call your local Data I/O sale representative for part prices or use our Web page for Requesting Quotes. **5**. E-mail to OrderAdmin@dataio.com or FAX to 425-867-6972 with your purchase order.
RoadRunner3 Model No._____ Serial No._____

INVENTORY PART NUMBER	PART DESCRIPTION	QTY	PRICE EA.	TOTALS
3110093001	Fiber Optic Sensor		$	$
6310162002	Memory Upgrade Label		$	$
7090535002	Slot Sensor (Cover-Tape-Broken Sensor)		$	$
7090550003	Head Limit Sensor		$	$
7090551002	Reject Bin Optic Sensor		$	$
7090556002	Fiber Optic Amplifier		$	$
7502402001	44 mm Cover Tape Module		$	$
7502397001	44 mm Control Panel Module		$	$
			$	$
			$	$
9520390001	This Supplemental Spares kit [all above]		$	$

Signature:_____Date:_____Company:_____

Chapter 5

Maintenance

In addition to the maintenance schedule, which starts on the next page, there are instructions for using a Diagnostics Adapter Board. Also, at the end of this chapter are sign-off charts to track maintenance.

Tools Required

Some of the tools required for maintaining the RoadRunner3 are:

- ESD grounding strap
- four digit volt meter/multi-meter (calibrated)
- vacuum tweezer
- water for cleaning
- Hex Keys (Allen wrenches), .5 mm through 5 mm
- compressed air
- isopropyl alcohol
- lint-free cloth
- cotton swabs (optional)
- Grease: Lubriplate DS-ES 4 or equivalent
- OPTIONAL: grease gun –with nozzle for fitting B-M6F
- OPTIOINAL: pen for the sign-off chart

Preventive Maintenance Schedule

To ensure that the RoadRunner3 continues to operate at its greatest capabilities, perform the preventive maintenance steps at the intervals indicated in chart on the following page.

This chart is based on programming 20,000 devices each week. If you process more than that, preventive maintenance should be performed more often.

MAINTENANCE SCHEDULE

INTERVAL	COMPONENT	TOOLS REQUIRED	ACTION
DAILY	Conveyor Belt	Compressed air (clean and dry) and a Supervisor PC-card	Pause job and clear devices from belt as necessary. Blow compressed air on belt, rotate the belt (`Robot Diags > Belt > Move > Up Arrow`) until entire belt is cleaned with air. (Press Up Arrow 4 or 5 times for entire belt). If a PC-card with Supervisor authority is not available, push the E-Stop and rotate the belt by hand.
	Sockets	compressed air 4 mm Allen Wrench	Remove dust and debris with clean, dry compressed air. Press down on the socket opener to ensure dust and debris are cleared from beneath the contacts as well. Check for wear; replace the Socket Adapter if necessary. Or, as needed for best throughput: Remove the Socket Adapter and clean in an ultrasonic bath with approved cleaning fluid. When done, we recommend blowing it dry with clean, dry compressed air to ensure no moisture remains.
WEEKLY	Tape-In Module	Compressed air (clean and dry)	Remove dust and debris with clean, dry compressed air.
	Conveyor Belt	Isopropyl alcohol Lint-free cloth	Push the E-Stop. Clean the exposed portion with isopropyl alcohol on a cloth, then dry it. Rotate the belt by hand and repeat. Release the E-Stop. (Realign the device tape before running a job. See "Aligning the Device Tape—All RoadRunner3 Models" on page 3-14.)
	Entire System	Vac-tool	Perform the system self-test once each week, with power and air, to verify proper operation of all internal electronic systems. To run the self-test perform the following: 1. End a job if one is running. 2. Clear all devices from the sockets and from the conveyor belt. 3. Toggle the power switch OFF, then ON again. The self-test will begin automatically. Check the LCD display for system errors.

MAINTENANCE SCHEDULE

INTERVAL	COMPONENT	TOOLS REQUIRED	ACTION
	Backplane-to-adapter terminals	Dry compressed air	Remove the Socket Adapter and blow off the Backplane PCB terminals.
	PNP Probe Tips	water cloth or swab	Clean with water on a clean, lint-free cloth or swab. DO NOT USE SOLVENTS. Check for wear; replace the tips if necessary.
QUARTERLY	Chassis and Covers	Isopropyl alcohol Lint-free cloth	Clean with isopropyl alcohol on a cloth. *NOTE: Do not use solvents such as acetone, lacquer thinner, mineral spirits, or any type of abrasive compound on the safety shield surfaces. Use of these products will damage the safety shield surface and reduce visibility of the operating area.*
	Ball Screw	Lubriplate DS-ES 4 or equivalent	Replenish the ball screw grease. See "Lubricating the Ball Screw" on page 5-3.
	Conveyor Belt		Visually inspect for frayed edges, separating seam, and gouges.
	Vacuum Filters		Remove each filter from the Pneumatic Module to check for dirt (filter is no longer white). Replace with new filter if necessary. Refer to Replacing the Vacuum Filters in Chapter 4. (Maintenance interval may be adjusted depending on your findings.)
YEARLY	Programmer (Waveform Circuit Board and Robot I/O Board)	• Diagnostic Adapter Board. • RoadRunner3 firmware version 5.45.00.C or later. • 4 mm Allen Wrench (hex key)	Perform the Diagnostic Adapter Board (DAB) test. The procedure is outlined at the end of this maintenance schedule. *NOTE: This maintenance is optional. The DAB can be purchased from Data I/O or your Data I/O Representative.* The RoadRunner3's DACs are self-calibrating and rely on a precision voltage source for this action. If the measured voltage is outside of the acceptable range, send RoadRunner3 (or just the Programmer Module) to Data I/O or an approved service center for repair.

Lubricating the Ball Screw

The ball screw is part of the Linear Stage. The PNP Head is screwed to the ball screw slide.

The ball screw OEM used type Lubriplate DS-ES 4. (www.lubriplate.com) The re-lubrication interval varies depending on the operating conditions of the rolling guides. A six month interval (or 1000 hours of usage) is generally recommended. You should use approximately 12-13 g of lubricant on the screw when re-lubricating the assembly.

IF A GREASE GUN IS USED
To replenish the ball screw grease:

1. Turn the power off.
2. Wipe off the old grease.
3. Apply at the grease nozzle to the ball slide fitting. There is only one fitting—it is on the far (conveyor) side of the slide. The grease fitting is B-M6F. Supply grease until it comes out from the ball slide. Move the slide by hand to work the grease into all areas.

IF A GREASE GUN IS NOT USED
TO REPLENISH THE BALL SCREW GREASE:

1. Turn the power off.
2. Wipe off the old grease.
3. Apply grease directly to the rail and ball groove of the screw shaft. Move the ball slide so the grease permeates into it.

Diagnosing with the Adapter Board

The FC Diagnostic Adapter Board (DAB), part number 910-2200-003 or later, detects problems related to programmer hardware failure—the Waveform Circuit Board and BackPlane Circuit Board. It does not test the Robot I/O Board or system timing.

Running Diagnostics on the Programmer

To run the diagnostic test:

1. Select `Park Head` from the Main menu.
2. Lift off the Robotics Cover.

CAUTION: *To prevent ESD shock, before you touch the Socket Adapter, discharge static electricity from yourself by touching a common ground or an unpainted metal surface. Wear ESD prevention equipment.*

3. Pull the Actuator Plate away from the RoadRunner3 by sliding it out from the grooved brackets.

4. Unscrew the two captive screws that secure the Socket Adapter bracket and rotate the adapter bracket up.
5. Lift the adapter free, being careful not to damage the electronic circuitry.
6. Insert the Diagnostic Adapter Board ensuring that it seats correctly on the adapter pins.
7. Lower the adapter bracket and screw in the screws.
8. Insert a supervisor PC-card into the RoadRunner3.
9. Scroll to and select `Programmer Diags` on the keypad screen.
10. Scroll to and select *Test All*, or select one of the individual tests listed (rather than *Test All*).

For Programmer Module removal instructions, see "Removing the Programmer Module" on page 4-57.

The pass/fail test results are displayed on the RoadRunner3 keypad display, while test result details are written to `/fdrroot/system/diaglog.txt` on the PC-card. If any of the tests show *FAIL* on the keypad display (for example: `Adtr ID Test: FAIL`) remove and return the Programmer Module, along with the PC-card containing the test results, to Data I/O Corporation or to your nearest Data I/O approved service center. For contact numbers see the inside back cover.

Electrical Equipment Disposal Notice

This symbol (displayed on your Data I/O product) indicates that the item must not be discarded with general municipal waste. Return products displaying this symbol to Data I/O so that they may be recycled, reused, or otherwise properly disposed of, in accordance with the European Union's WEEE Directive.

At no cost to the equipment owner in the European Union, Data I/O will collect this equipment and process it accordingly. Contact your nearest Data I/O office to receive information about returning marked products with no charge.

RoHS for China

Notice of Restriction of Hazardous Substances pertaining to China:

部件名称	有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr^{6+})	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
框架	X	O	O	O	O	O
操作员控制台面板	X	O	O	O	O	O
拾取器调整系统	X	O	O	O	O	O
倦带封装系统	X	O	O	O	O	O
倦状输入模块	X	O	O	O	O	O
编程器模块	X	O	O	O	O	O
自动机械臂系统	X	O	O	O	O	O
电源	X	O	O	O	O	O
空气泵系统	X	O	O	O	O	O
控制模块 CCA	X	O	O	O	O	O
滚动传送系统	X	O	O	O	O	O

O：表示该有害物质在该器件所有均质材料中的含量均在 SJ/T 11636-2006 标准规定的限量要求以下。

X：表示该有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11636-2006 标准规定的限量要求。

Maintenance Sign-off Charts

COPY THIS CHART TO USE NEAR YOUR *ROADRUNNER3*.

RoadRunner3 SN_____
For maintenance instructions see
"Preventive Maintenance Schedule" on page 5-2.

DAILY
- Blow off sockets
- Check Socket Wear (Yield) and remedy
- Blow off Conveyor Belt

Enter name of people responsible or daily check marks:

Name SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY

WEEKLY
- Blow out Tape-In Module
- Perform System Self-test
- Clean PNP Probe tips.
- Wipe Conveyor Belt

Enter initials and date:

Initial—Date JAN.	FEB.	MAR.	APR.	MAY	JUN.

JUL.	AUG.	SEP.	OCT.	NOV.	DEC.

QUARTERLY
- Clean covers
- Check Vacuum Filters
- Check Ball Screw for visible lube
- Lube Ball Screw
- Perform Programmer Diagnostic test (semiannually okay)

Enter initials and date:

Initial—Date JAN.–FEB.–MAR.	APR.–MAY–JUN.	JUL.–AUG.–SEP.	OCT.–NOV.–DEC.

YEARLY
- Check waveform board voltage

Enter initials and date:

Initial—Date 20___

5

My Notes:

Chapter 6

Troubleshooting

This chapter describes error messages and failure symptoms along with probable steps for resolution. The “Error Messages” chart is organized by lamp color when the error is displayed, and then alphabetically by error message within each color section.

NOTE: These procedures should be performed by qualified service personnel.

NOTE: Some RoadRunner3s operate with fewer than four sockets. The troubleshooting help that follows lists error messages for four sockets (four probes) but resolutions apply to RoadRunner3s as applicable.

Colored Lamp Significance

There are three types of messages displayed by the RoadRunner3 at the Control Panel. They are Informative, Warning, and Critical, and are described in the Lamp Significance chart below.

LAMP ON	EVENT	STATUS	ACTION REQUIRED	POSSIBLE CAUSES
Green 	programming	Running	none **CAUTION:** Do not remove the PC-card. Do not remove power.	none
Green blinking 	programming but no devices are currently at the SMT pick point	Running	none **CAUTION:** Do not remove the PC-card. Do not remove power.	The job has just been started, or the RoadRunner3 is between programming cycles and the device programming time is longer than the SMT placement time.
Yellow 	Warning message regarding an impending stop.	The system is not running at its optimum, or a stop is impending.	The system does not require immediate attention, but it will very soon or it will stop. **CAUTION:** Do not remove the PC-card. Do not remove power.	A possible warning would be “Reject bin needs to be emptied.”
Yellow blinking 	Accessing the PC-card Reading from, or writing to the job card.	A job may or may not be running.	None. **CAUTION:** Do not remove the PC-card. Do not remove power.	Typical causes are writing statistics, reading the job.
Yellow & blue alternating –case 1 	Power is applied.	The system starts and the RoadRunner3 performs a Self-test of its internal electronics and sensors. —or— see next	None. —or— see next	The power was turned on or the power cable was plugged in by an operator. —or— see next
Yellow & blue alternating –case 2	A job is downloading to the card via the Ethernet.	• Stopped. • Receiving a job.	None. **CAUTION:** Do not remove the PC-card.Do not remove power.	Receiving/loading a job via the Ethernet.
Blue 	CRITICAL or FATAL error, or job is stopped.	Stopped. • Operator attention is required. There may be an error message. • The PC-card can be removed and the power can be turned Off.	If there is an error message, attend to it. If no error message, the job is ended.	Critical example: *Reject bin is full*. Fatal example: PNP head motor controller not responding. No error: a job has ended.

LAMP ON	EVENT	STATUS	ACTION REQUIRED	POSSIBLE CAUSES
All lamps cycle ON and OFF 	Updating the software.	Updating. No job is running.	Wait until RoadRunner3 beeps and the blue lamp lights. **CAUTION:** Do not remove the PC-card. Do not remove power.	The Update Software command was started by an operator.
No change in lamp status but a message appears	INFORMATIVE message (usually a status notice).	A job may or may not be running.	None	Normal activity. Example: *Waiting for belt to clear...*

Status lamps do not change = INFORMATIVE Message: Indicates a machine state. It does not require attention. Example: “Waiting for belt to clear...”

Yellow lamp lights = WARNING: Indicates that the system is not running at its optimum, has degraded, or a stop is impending. It does not require immediate attention. Example: “Reject bin needs to be emptied.”

Blue lamp lights = CRITICAL or FATAL Message: Stops the RoadRunner3. The job cannot continue without operator action. Critical example: “Reject bin is full.” Fatal example: “Unable to raise probe 1.”

NOTE: A lit blue lamp with no messages displayed indicates that the RoadRunner3 is stopped (not currently running a job).

Resolving Problems

In case of a system failure, the onboard diagnostic system will, in most cases, notify the user. Most subsystem failures or anomalies detected by system sensors will be displayed on the keypad screen.

Testing the Programmer

In addition to the onboard diagnostic system, a Diagnostic Adapter Board (DAB) detects problems related to programmer hardware failure. The DAB tests the Waveform Circuit Board and BackPlane Circuit Board—parts of the RoadRunner3 programmer. The DAB does not test the Robot I/O Board or system timing.
See “Diagnosing with the Adapter Board” on page 5-4.

Viewing Errors

If an error occurs, a message should be displayed on the keypad screen, and the yellow or blue status lamp will illuminate. The *blue* status lamp denotes that the RoadRunner3 has stopped. The *yellow* status indicator denotes an abnormal condition that may cause the RoadRunner3 to stop.

To view and correct errors, perform the following:

1. On the Keypad, press the *Menu* button to remove the error message. If there are other error messages, the next one will appear.
2. Check the error as indicated by the message and correct it as necessary.

Clearing Jammed Device Tape

If the tape advances incorrectly or not at all, it may be jammed inside the RoadRunner3. To clear the tape path:

For information about loading the device tape into the RoadRunner3, refer to "Loading Device Tape" on page 3-12.

The pocket pick point must be retaught before running again. See "Aligning the Device Tape—All RoadRunner3 Models" on page 3-14

1. Press the Emergency Stop button (to continue the job later) or select Job, then End, and turn the power off.
2. Cut the cover tape near the Take-Up Reel.
3. Cut the pocket tape at the end of the conveyor.
4. Remove the pocket tape from the RoadRunner3 by pulling it back out from the input side. It should pull from the machine easily.
5. Inspect the pocket tape and remove any flaws, cuts, or breaks in the tape before reloading it.

NOTE: A common cause of jammed device tape is inferior tape splices.

Disabling and Enabling a Socket

If a single socket produces an excessive number of errors during RoadRunner3 operation, it is automatically disabled to improve throughput and reduce the likelihood of rejecting good devices because of a worn or dirty socket. If the socket is known to be good, then it may be re-enabled by performing the following:

NOTE: Before enabling a socket that has been automatically disabled, be absolutely sure that it is not damaged in some way. Repeated failures on a single socket

usually indicate socket failure or damage of some sort, even if it is not readily apparent.

If no damage is suspected or visible, make sure that there are no devices in the socket before enabling.

1. Press the *Pause* button on the Keypad if a job is currently running.
2. Press the *Menu* button until *Job* is displayed.
3. Press the *Up Arrow* or *Down Arrow* buttons until *Socket* is displayed. Press the *Select* button.
4. Press the *Up Arrow* or *Down Arrow* buttons until the disabled socket is highlighted. Press the *Select* button.
5. Press the *Up Arrow* button to change the state of the socket from *Disabled* to *Enabled*.

Error Messages

Lamp Color	Error Message	Resolution
	No Change in Lamps	
No change in lamps	Card not present.	Insert (or re-insert) a job card into the PCMCIA card slot.
	More than one socket pulled over-current.	• Ensure that the Job options are correct and agree with the type of device. Sockets will be disabled if programmer hardware is degraded
	One or more sockets have pulled over current.	• Ensure that the Job options are correct and agree with the type of device. Sockets will be disabled if programmer hardware is degraded.
	VCC for socket *n* has pulled over current.	• Ensure that the Job options are correct and agree with the type of device. Sockets will be disabled if programmer hardware is degraded.
	VPP for socket *n* has pulled over current.	See above. ↑
	Waiting for belt to clear...	Wait.
	Yellow Lamp is On	
Yellow lamp is on	A bad Update Card was detected. Cannot proceed Update operation.	• Make sure you are not using a Job card. • Try using another PCMCIA card.
	Adapter life has been exceeded.	Replace the Socket Adapter or expect a decline in throughput. This message displays when socket manufacturers' recommended number of actuations is exceeded. The **`Adapter Life`** number may be viewed (but not changed) on the RoadRunner3 menu by selecting `Socket > Adapter Statistics > Adptr. Life`.
	Adapter maintenance is required. The cleaning interval has been exceeded.	Clean the Socket Adapter. For cleaning information, see *Sockets* in the Daily Maintenance schedule. The clean interval is determined by the number set in the `Clean Alert` field. To reset the counter, on the RoadRunner3 Menu navigate to `Socket > Adapter Statistics > Reset Clean Count`. Press the *Select* button. To change the alert number, on the RoadRunner3 Menu select `Socket > Adapter Statistics > Clean Alert`. Use the Up or Down Arrow buttons to raise or lower the number. Set it to 0 to disable the alert feature.
	Cover open.	Put the Robotics Cover on the unit.

LAMP COLOR	ERROR MESSAGE	RESOLUTION
	Device pick failure at input with probe 2.	No operator intervention is necessary. (A device is on probe 1.) Operation will continue without a device on this probe.
	Device pick failure at input with probe 3.	See above. ↑
	Device pick failure at input with probe 4.	See above. ↑
. . . Yellow lamp is on . . .	Device pick failure on probe *n*.	(Pick failure at the socket.) No operator intervention is necessary. The programmer socket and probe will be disabled. CAUSE **A**: DEVICE IS TILTED IN THE SOCKET • Remove the device from the socket. If this error occurs often: CAUSE **B**: SOCKET IS NOT COMPLETELY OPENED • Verify that the Actuator Plate is fully compressing and opening the sockets. Check for interference. • Verify that the system air pressure is within specified limits. Adjust as required; see specifications at the end of Chapter 1. CAUSE **C**: MISALIGNMENT OF HEAD • Align the Pick and Place Head. CAUSE **D**: VACUUM SENSORS ARE OUT OF ADJUSTMENT • Adjust the vacuum sensors. CAUSE **E**: PROBE TIP NOT SEATED OR NOT CLEAN • Clean the rubber tip with a damp cloth and then dry it. • Remove and replace the rubber probe tip. • Verify that the rubber cup is on the probe. CAUSE **F**: THE *PICK* OR *TRAVEL* DELAY VALUES ARE TOO LOW • Reset the *pick* delay. • Reset the *travel* delay. CAUSE **G**: THE PROBE TIP IS CRACKED OR DAMAGED • Remove and replace the rubber probe tip. CAUSE **G**: PROBE SPEED IS TOO FAST OR TOO SLOW • Verify that the system air pressure is within specified limits. Adjust as required; see specifications at the end of Chapter 1. • Adjust the probe speed. • Reset the probe *travel* delay.
	Devices are on belt.	Remove devices if desired.
	Devices are on belt. START to continue. PAUSE to cancel.	Remove devices if desired and select *Start* or *Pause*.
	Inadequate air pressure detected.	• Ensure that the supply air is connected. • Check that the supply air pressure is within the specified limits (see specifications at the end of Chapter 1).

LAMP COLOR	ERROR MESSAGE	RESOLUTION
	Job name missing from JobParms.txt file	Make a new job card by recreating the job in TaskLink.
	Reading Card ...Please Wait	Wait.
	Reject bin needs to be emptied.	Remove devices from the reject bin.
. . . Yellow lamp is on . . .	Socket *n* Disabled error limit exceeded.	• Select *Pause*. If there is a device in the socket, remove it and re-enable the socket. • Ensure that the Job options in TaskLink are correct and agree with the type of device. If this problem persists, a new socket adapter or programmer may be needed.
	Unexpected device on probe *n*.	No operator intervention is necessary. The device is dropped into the reject bin.

Blue Lamp is On

Blue lamp is on	Adapter board not compatible with other boards.	Contact Data I/O Customer Service.
	Adapter board not supported by software.	The required software is on the RoadRunner3 compact disk (CD) that is supplied with new adapters. Install the CD for the new adapter, (or device or algorithm) onto the computer containing TaskLink. *NOTE: The CD has the TaskLink Version and RoadRunner3 System Software version written on the face of it. If the RoadRunner3 System Software version is different from the version shown on the RoadRunner3 startup screen, then you must also update the RoadRunner3 firmware.* Then make a new job card by recreating the job in TaskLink.
	Algorithm is not compatible with system software.	Reload Job onto card.
	All sockets are disabled.	Ensure that the Job options are correct and agree with the type of device.
	All sockets pulled over current.	No operator intervention necessary.
	Backplane board not supported by software.	Contact Data I/O Customer Service.
	Boot.bin is not read correctly. This file may be corrupted.	Replace the update card with a new one.

LAMP COLOR	ERROR MESSAGE	RESOLUTION
	Boot.bin is too big. Call Data I/O service.	Contact Data I/O Customer Service.
	Boot.bin programmed in FLASH has failed check-sum verification.	Contact Data I/O Customer Service.
	Cannot close Boot.bin.	Replace the update card with a new one.
	Cannot close sockets.	• Check for interference or jammed actuator plate. • Verify that the Socket Open Sensor is working properly.
	Cannot close Sys-Flash.bin.	Get a new update card.
	Cannot find Device Algo-rithm file. Check your Job card.	• Try making a new job card by recreating the job in TaskLink. • The required software is on the RoadRunner3 compact disk (CD) that is supplied with new adapters. Install the CD for the new adapter, (or device or algorithm) onto the computer con-taining TaskLink. *NOTE: The CD has the TaskLink Version and RoadRunner3 System Software version written on the face of it. If the RoadRunner3 System Software version is different from the version shown on the RoadRunner3 startup screen, then you must also update the RoadRunner3 firmware.* Then make a new job card by recreating the job in TaskLink.
	Cannot load device algo-rithm from Job card.	• Make a new job card by recreating the job in TaskLink. • Update the RoadRunner3 firmware by making a System Update card with TaskLink.
	Cannot open Boot.bin.	Create a new System Update card with TaskLink and update RoadRunner3.
	Cannot open sockets.	• Make sure supply air is connected. • Verify that the supply air pressure is within the specified lim-its. See specifications at the end of Chapter 1. Also, see "Adjusting the Low Air Pressure Sensor" on page 4-21.
	Cannot open SysFlash.bin.	Create a new System Update card with TaskLink and update RoadRunner3.
. . .blue lamp is on . . .	Checksum error in Image.bin file	The checksum that RoadRunner3 calculates doesn't match the checksum contained within the job. • Reload the job onto the card in TaskLink. • Try a new PC card. • Try a different brand of PC Card reader/writer to load the job. • If the job file has had any handling, such as going through e-mail, then try a fresh job file (transfer by FTP or Network)
	CRC error in file	Make a new job card by recreating the job in TaskLink. If this does not correct the error, call Data I/O Customer Service.

LAMP COLOR	ERROR MESSAGE	RESOLUTION
	Comparator/DAC error.	Contact Data I/O Customer Service.
	Controller board not supported by software.	Contact Data I/O Customer Service.
	Cover tape broken.	CAUSE **A**: COVER TAPE TAKE-UP REEL IS FULL • Empty the cover tape reel and rethread the cover tape. CAUSE **B**: THERE IS NO MORE INPUT MEDIA AVAILABLE • Install new input media. CAUSE **C**: COVER TAPE SENSOR IS MALFUNCTIONING • Contact Data I/O Customer Service. CAUSE **D**: COVER TAPE MODULE IS BROKEN • Replace the Cover Tape Take-Up Module. CAUSE **E**: COVER TAPE MODULE DRIVE BELT IS SLIPPING. • Remove the Cover Tape Module, re-tension the belt and replace the Module, or contact Data I/O Customer Service. CAUSE **F**: COVER TAPE IS NOT ROUTED CORRECTLY • Reroute tape per diagram on the unit.
	Data file is too large to fit in memory.	The device loaded may not be supported.
	Device continuity error.	• Clean the sockets (See the daily maintenance schedule in chapter 5.) • Replace the socket adapter with a new one. • Increase the Place delay.
. . .blue lamp is on . . .	Device dropped from head *n*.	CAUSE **A**: TAPE POCKET IS MISALIGNED • Align the pocket tape. CAUSE **B**: HEAD IS MISALIGNED • Reteach the “Tape” parameter and/or the “Skt1” parameter. CAUSE **C**: WRONG OR MISALIGNED PRECISOR • Install the correct precisor (or position it correctly on the dowel pins); precisors are marked for corresponding device packages. CAUSE **D**: VACUUM SENSORS ARE OUT OF ADJUSTMENT • Adjust the vacuum sensors. CAUSE **E**: PROBE TIP IS NOT SEATED • Reinstall probe tip or replace. • Clean probe tip with damp cloth and then dry it. To continue, select *Start* on the keypad.

LAMP COLOR	ERROR MESSAGE	RESOLUTION
	Device pick failure at input, with probe 1.	To continue, select *Start* from the keypad. This will temporarily disable the probe. The next able probe will attempt to pick. CAUSE **A**: THE POCKET IS EMPTY. • Verify there are devices in the tape. CAUSE **B**: WRONG OR MISALIGNED PRECISOR • Install the correct precisor (or position it correctly on the dowel pins); precisors are marked for corresponding device packages. CAUSE **C**: MISALIGNMENT OF POCKET. • Select `Align Tape` from the top level menu. CAUSE D: MISALIGNMENT OF HEAD • Align the Pick and Place Head. CAUSE **E**: VACUUM SENSORS ARE OUT OF ADJUSTMENT • Check the vacuum sensors; reset if necessary. CAUSE **F**: PROBE TIP NOT SEATED • Verify that the rubber cup is on the probe. • Remove and replace the rubber probe tip. • Clean probe tip with damp cloth and then dry it. CAUSE **G**: THE *PICK* OR *TRAVEL* DELAY VALUES ARE TOO LOW • Reset the *Pick* delay. See the Service Manual. • Reset the *Travel* delay. See the Service Manual.
	Device pick failure at input, with probe 1. (continued)	CAUSE **H**: PROBE SPEED IS TOO FAST OR TOO SLOW • Verify that the system air pressure is within specified limits. Adjust as required; see specifications at the end of Chapter 1. • Verify that the Probe speed is within limits; readjust if necessary. • Reset the probe *travel* delay.
. . . blue lamp is on . . .	Device pick failure at input, with probe 2.	(No device is on probe 1.) To continue, select *Start* from the keypad. This will temporarily disable the probe. The next probe will attempt to pick . • See above. ↑
	Device pick failure at input, with probe 3.	(No device is on probe 1or 2.) To continue, select *Start* from the keypad. This will temporarily disable the probe. The next probe will attempt to pick . • See above. ↑
	Device pick failure at input, with probe 4.	(No device is on probe 1, 2, or 3.) See above. ↑
	Emergency Stop is activated.	Ensure that the RoadRunner3 is safe to start and then restore power by twisting the Emergency Stop button to release it.

LAMP COLOR	ERROR MESSAGE	RESOLUTION
. . .blue lamp is on . . .	Error encountered reading file.	Make a new job card by recreating the job in TaskLink.
	Errors encountered in SECTPROT.TXT file for job	Make a new job card by recreating the job in TaskLink.
	Field Update failed. Onboard FLASH is in unknown state.	Programmer Module requires repair or replacement. Contact Data I/O Customer Service.
	Incompatible boards in Programmer.	Programmer Module requires repair or replacement. Contact Data I/O Customer Service.
	Incorrect Programmer board configuration for Job.	The Job parameters are not compatible with the Programmer. Check the Job parameters or Contact Data I/O Customer Service.
	Invalid Job name.	Make a new job card by recreating the job in TaskLink.
	Invalid LCA file.	Reload the Job onto the card.
	Invalid parameter name in file:...	Reload the Job onto the card using the current version of TaskLink.
	Invalid parameter value in file:...	Reload the Job onto the card using the current version of TaskLink.
	Job card not present.	Insert a card into the PCMCIA slot.
	Job in progress. End current job in order to proceed.	Using the keypad, select `End` from the top level Job menu.
	Missing parameter in file:...	• Reload the job. • Contact Data I/O Customer Service.
	Motor controller not responding.	Make sure Emergency Stop is not depressed.
	No Adapter installed.	Install the socket adapter for the devices being programmed.
	No Job Selected.	• Select a Job (Supervisor Mode). • Verify that the job card has a job written on it.
	NVRAM Battery Failed.	Programmer Module requires repair or replacement. Contact Data I/O Customer Service.
	PNP motor controller not responding.	Make sure Emergency Stop is not depressed.
	Programmer continuous over-current error.	No operator intervention required.
	Programmer FPGA Failure.	Programmer Module requires repair or replacement. Contact Data I/O Customer Service.
. . .blue lamp is on . . .	Programmer Shift Chain Failure.	Contact Data I/O Customer Service.

LAMP COLOR	ERROR MESSAGE	RESOLUTION
. . .blue lamp is on . . .	Reject bin full.	CAUSE **A**: REJECT BIN IS FULL • Empty device reject bin. CAUSE **B**: THE SENSOR IS DEFECTIVE OR NEEDS ADJUSTMENT • Verify that the sensor is working; adjust or replace.
	Reject Bin not detected.	Install the reject bin. Ensure that it is correctly in place.
	SECTPROT.TXT file not found for job.	Reload job onto card.
	Size of Image.bin file incorrect.	Ensure the correct data file is being specified in TaskLink.
	SysFlash.bin is too big to fit in the on-board FLASH.	Programmer Module requires repair or replacement. Contact Data I/O Customer Service.
	SysFlash.bin is too big. Call Data I/O service.	Programmer Module requires repair or replacement. Contact Data I/O Customer Service.
	SysFlash.bin programmed in FLASH has failed check-sum verification.	Programmer Module requires repair or replacement. Contact Data I/O Customer Service.
	SysFlash.bin was not read correctly. This file may be corrupted.	Contact Data I/O Customer Service. A new SysFlash.bin file may be required.
	System and device algorithm are not version compatible.	• Reload the Job onto the card. • Check that your Job card algorithm files are compatible with the current system version.
	The Adapter board is not installed.	Install the Adapter board.
	The checksum of the loaded Boot.bin is bad. Update is not done.	Repeat update operation or contact Data I/O Customer Service. A new Boot.bin file may be required.
	The checksum of the loaded SysFlash.Bin is bad. Update is not done.	Contact Data I/O Customer Service. A new SysFlash.bin file may be required.
	Unable to advance tape.	• Make sure the Emergency Stop is not depressed. • Check the tape path for obstruction. • Verify that the Tape-In Sensor is working properly; check connection at both ends of the cable.

LAMP COLOR	ERROR MESSAGE	RESOLUTION
. . .blue lamp is on . . .	Unable to home PNP head.	CAUSE **A**: EMERGENCY STOP IS PRESSED (activated). • Twist the emergency-stop button to release it. CAUSE **B**: THE HOME SENSOR IS DEFECTIVE • Replace the Home Sensor. CAUSE **C**: THE POSITIVE OR NEGATIVE OVER-TRAVEL SENSOR IS DEFECTIVE • Replace the Over-Travel Sensor CAUSE **D**: THE MOTION CONTROLLER PCB OR CABLE IS DEFECTIVE • Contact Data I/O Customer Service.
	Unable to load and/or start the internal serial port driver.	• Turn the power off and back on. • Contact Data I/O Customer Service.
	Unable to lower probe *n*.	CAUSE **A**: INSUFFICIENT AIR PRESSURE OR AIR FLOW • Verify that the supply air is connected. • Verify that the supply air pressure is within the specified limits (see specifications at the end of Chapter 1). • Verify that the input air line is not kinked preventing full flow. (The air pressure will still show correct pressure but a kinked line will not provide the needed air flow for the vacuum.) CAUSE **B**: PROBE SPEED IS TOO FAST OR TOO SLOW • Verify that the system air pressure is within specified limits. Adjust as required; see specifications at the end of Chapter 1. • Verify that the Probe speed is within limits; readjust if necessary. CAUSE **C**: THE *PICK* OR *TRAVEL* DELAY VALUES ARE TOO LOW • Reset the *pick* delay. • Reset the *travel* delay. CAUSE **E**: HEAD-UP SENSOR IS NOT ADJUSTED OR NOT WORKING PROPERLY • Check that the probe Head-up Sensor is working. • Realign the probe Head-up Sensor. CAUSE **F**: A PINCHED AIR LINE OR MALFUNCTIONING SOLENOID VALVE • Verify that the air lines are not pinched. • Verify correct solenoid operation.
	Unable to raise probe *n*.	The solenoid switch in the Pneumatic Module may be stuck. Replace the Pneumatic Module.
	Unable to read Adapter board ID consistently. Reinsert Adapter.	Reinsert the Adapter.
	Unable to read Jobs directory.	• Try a different Job card. • Try a different brand of PC Card reader/writer to load the job. • If the job has had any handling, such as going through e-mail, then try a fresh job file (transfer by FTP or Network).

LAMP COLOR	ERROR MESSAGE	RESOLUTION
. . .blue lamp is on . . .	Unable to reset programming electronics.	Programmer Module requires repair or replacement. Contact Data I/O Customer Service.
	Unrecognized Programmer board.	Update to the latest RoadRunner3 software.
	VCC DAC calibration error.	Programmer Module requires repair or replacement. Contact Data I/O Customer Service.
	VIH DAC calibration error.	Programmer Module requires repair or replacement. Contact Data I/O Customer Service.
	VPP DAC calibration error.	Programmer Module requires repair or replacement. Contact Data I/O Customer Service.
	VSense DAC calibration error.	Programmer Module requires repair or replacement. Contact Data I/O Customer Service.
	Waveform board not supported by software.	Update to the latest RoadRunner3 software. If the error is not resolved, the Programmer Module requires repair or replacement. Contact Data I/O Customer Service.
	Wrong Adapter board installed for the Job selected.	Install the correct Adapter board.

Unlisted Error Messages

Errors that are uncommon are not listed. If you get an error message not listed above, contact Data I/O Customer Service.

Problems, but no Error Message

Use this chart if you experience problems for which no error message is displayed, or an error message appears to be incorrectly displayed.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Conveyor Belt is empty but does not stop running.	Fibers are sticking up at the edges of the belt.	• Trim belt edge fibers using small scissors or melt them off with a soldering iron.
	The End-of-Belt Sensor needs adjustment.	• Adjust the End-of-Belt Sensor. See "Adjusting the End-of-Belt Sensor" on page 4-30.
Conveyor belt stops when no devices are present at the pick point.	The End-of-Belt Sensor optic is adjusted too low and is triggering on high spots on the belt.	• Adjust the conveyor End-of-Belt Sensor optic. See ""Adjusting the End-of-Belt Sensor" on page 4-30.
Conveyor does not operate.	Conveyor belt motor malfunction or loose connection.	• Inspect the connection. Replace the Conveyor Module if necessary or contact Data I/O Customer Service.
	Conveyor belt is damaged or misaligned.	• Replace the Conveyor Module or contact Data I/O Customer Service.
	The End-of-Belt Sensor optic is malfunctioning, is out of adjustment (too low), or has loose connection.	• Adjust the conveyor End-of-Belt Sensor optic. See "Adjusting the End-of-Belt Sensor" on page 4-30. Inspect the optic connection. Replace the Conveyor Module or contact Data I/O Customer Service.
	Robot I/O Board malfunction.	• Replace Robot I/O Board or Contact Data I/O Customer Service.
Conveyor Belt slips on pulleys or devices bounce about on the belt.	Room temperature is below 20° C (68° F)	• Raise room temp and allow time for conveyor casting to adjust.
	Conveyor belt has stretched.	• Adjust the Conveyor Belt tension. See "Adjusting Belt Tension" on page 4-34.
	Conveyor has sat for more than a few days and is stiff.	• Run the unit in Dry Run Mode to even out the belt.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Cover tape does not peel and store properly.	Cover Tape is not routed correctly.	• Reroute the cover tape as described on the label on the unit.
	Cover Tape Take-Up Reel is broken or binding.	• Inspect and replace if necessary. See "Removing the Cover Tape Module" on page 4-25.
	The Cover Tape Module clutch assembly is malfunctioning.	• Inspect and replace if necessary. See ""Removing the Cover Tape Module" on page 4-25.
	Cover Tape Module drive belt is loose and slipping.	• Adjust drive belt tension or remove module and replace.
	Cover tape broken or twisted or slipping.	• Remove and reload cover tape. Use adhesive tape if slipping.
	Loose or bad connection to the Take-Up Motor.	• Inspect and replace Cover Tape Module if necessary
	The Broken Tape Sensor is malfunctioning.	• Inspect connection; replace sensor if necessary.
Cover tape jams into Tape-In Module.	Cover tape not pulled tight when loading.	• Pull cover tape tightly when loading it onto the Cover Tape Reel. Ensure cover tape is fully removed from exposed tape in the Tape-In Module.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Device leads are getting bent more often than expected.	You may be using the wrong precisor.	• Contact Data I/O Customer Service.
	Device tape is not aligned with RoadRunner3 pick point.	• Try re-aligning the device tape. See "Aligning the Device Tape—All RoadRunner3 Models" on page 3-14.
	Ensure that Socket Adapter is not worn or malfunctioning.	• Visually inspect the sockets on the Socket Adapter. Try a new Socket Adapter to determine if it makes a difference.
	PNP probes may be bent.	• Visually check for bent probes. If a probe is bent replace the PNP Head. See "Removing the PNP Head" on page 4-54.
	The Programmer Module is misaligned.	• See "Aligning the Programmer Module" on page 4-59. (A Programmer Alignment Tool is required.) • Contact Data I/O Customer Service.
	The Tape-In Module is misaligned.	• See "Aligning the 4-position, Adjustable Tape-In Module" on page 4-13. • • Reteach the Tape and Skt1 parameters, see "Setting Operational Parameters" on page 3-25.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Device tape does not index properly.	Tape is damaged.	• Inspect tape. Remove and cut tape or use new reel.
	The tape pocket pitch is non-standard, or the software value for pocket pitch is incorrect.	• Change the Pocket Pitch for this job in TaskLink, Version 4.6 or greater. 1. Open TaskLink, 2. Select the job, 3. Click Edit, 4. Click the Media tab, 5. Change the pitch, 6. Click OK, and 7. Load the job. Then notify Data I/O of the possible device Algorithm error.
	Device tape is incompatible with the Tape-In Module.	• Use correct tape or install correct Tape-In Module
	Empty tape is binding in the discharge path.	• Remove tape, trim up tape if necessary and reload.
	Tape-In Sensor is loose or malfunctioning.	• Inspect and tighten or replace. See "Removing the 4-position, Adjustable Tape-In Module" on page 4-11.
	Tape-In drive motor malfunction.	• Inspect connection; replace Tape-In Module if necessary. See "Removing the 4-position, Adjustable Tape-In Module" on page 4-11.
	Robot I/O Board malfunction.	• Replace Robot I/O Board or contact Data I/O Customer Service.
Devices are dropped from the probes but the machine fails to recognize that they were dropped.	The probe vacuum sensors are not properly adjusted.	• Adjust the probe vacuum sensor. See "Adjusting Probe Vacuum Sensors" on page 4-51.
Devices bounce out of the carrier tape during the pick event.	Probes travel too fast.	• Adjust and balance the probe speed. See "Adjusting and Balancing Probe Speed" on page 4-46.
Devices hit Socket Adapter (and possibly fall off the probe) as the head starts to move.	Probe-raising speed is too slow.	• Adjust the probe-raising speed. See "Adjusting Probe-Raising Speed" on page 4-48. • Travel Delay is too short. See "Resetting the Pick Delay and Travel Delay Times" on page 4-50.
Devices rotate excessively on the conveyor belt.	• Dust or dirt on the conveyor belt.	• Clean the conveyor belt. See the daily maintenance schedule on page 5-2.
	• Conveyor drop-height is incorrect	• Adjust conveyor drop height. See "Reinstalling the Conveyor Module" on page 4-30.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Devices run off the end of the belt.	The End-of-Belt Sensor optic is adjusted too high and is allowing devices to pass under it, or it is malfunctioning.	• Adjust the conveyor End-of-Belt Sensor optic. See "Adjusting the End-of-Belt Sensor" on page 4-30. Inspect the optic connection. Replace the Conveyor Module or contact Data I/O Customer Service.
Emergency Stop release causes RoadRunner3 to emit a high pitched squeal.	The PNP head has been moved a long distance from its position prior to pushing the E-Stop and cannot recover.	• Push the E-Stop again and return the head to its previous position, then release the E-Stop, or turn the power switch Off [0] and then back On.
Error message "Device pick failure on probe X at input" is displayed when the pocket is empty.	The probe vacuum sensors are not properly adjusted.	• Adjust the probe vacuum sensor. See "Adjusting Probe Vacuum Sensors" on page 4-51.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
PNP Head fails to transport devices.	A cylinder is stuck or spring is broken.	• Replace the PNP Head. See "Removing the PNP Head" on page 4-54.
	The incoming air pressure or volume is insufficient.	• Check that the air regulator supplied by Data I/O is being used and is set correctly. See air specifications at "Specifications" on page 1-16.
	Pneumatic tubes leaking or disconnected.	• Inspect and repair.
	Malfunctioning pneumatic valve or insufficient air flow.	• Replace pneumatic filters. Inspect or replace the Pneumatic Module or contact Data I/O Customer Service.
	A vacuum pressure switch is out of adjustment or malfunctioning.	• See "Adjusting Probe Vacuum Sensors" on page 4-51. Replace the Pneumatic Module; see "Removing the Pneumatic Module" on page 4-18.
	Damaged or worn probe tip.	• Replace probe tip.
	Excessive puff (blow-off) air.	• Contact Data I/O Customer Service.
	Incorrect Precisor installed.	• Replace Precisor.
	The Precisor does not locate device center within tolerance.	• Contact Data I/O Customer Service.
	Values for probe pick, place puff or travel delay are out of adjustment.	• See ""Resetting the Pick Delay and Travel Delay Times" on page 4-50.
	Robot I/O Board malfunction.	• Replace Robot I/O Board or contact Data I/O Customer Service.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
PNP Head position accuracy suffers.	Positions for Tape, socket, reject, and belt are programmed incorrectly.	• Reteach the head positions. See "Setting Operational Parameters" on page 3-25.
	PNP Head limit sensors (on the casting) are malfunctioning.	• Contact Data I/O Customer Service.
	The Sensor Flag is out of adjustment.	• Adjust. The Limit Sensor Flag is on top of the head. See Figure 4-4-39 on page 4-54.
	The Linear Stage Encoder is loose or malfunctioning.	• Inspect connection. Replace Robot I/O Board or contact Data I/O Customer Service.
	Linear Stage Motor malfunction.	• Replace Robot I/O Board or contact Data I/O Customer Service.
	Motion Controller Board malfunction.	• Contact Data I/O Customer Service.
	Main Controller Board to Motion Controller Board cable is damaged or disconnected.	• Inspect cable and connection. Contact Data I/O Customer Service.
	Linear Stage Motor or sensor cables are damaged or disconnected.	• Inspect cables and connection. Replace or contact Data I/O Customer Service.
	Linear Stage Motor stalls.	• Check for excessive drag. Contact Data I/O Customer Service.
Power up fails —After turning power On, the display is blank and/or the machine emits a high-pitch tone.	Bad Socket Adapter	• Turn power Off. Remove the Socket Adapter. Turn the power On.
	Bad programmer	• Contact Data I/O Customer Service.
Probe does not extend fully when placing devices on the belt	The probe is not straight on the PNP Head.	• Contact Data I/O Customer Service.
	The precisor is not in place accurately.	• Check the precisor position.
	Probe speed is too slow.	• Adjust probe speed. See "Adjusting and Balancing Probe Speed" on page 4-46.
	Conveyor height is too low.	• Adjust the conveyor height. See "Reinstalling the Conveyor Module" on page 4-30.
Programming Errors; See Socket Failure		

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Socket failure: sockets fail to program devices successfully (red light on the Socket Adapter illuminates).	Dirty or worn Socket Adapter.	• See "Device continuity error" in the "Error Messages" chart in the Blue Lamp section.
	Waveform Board or Backplane Board malfunction.	• Perform the DAB test. See "Diagnosing with the Adapter Board" on page 5-4.
	Incorrect programming parameters.	• Review the Job Statistics in TaskLink to identify problem. For example: if the wrong devices are used for the selected job, TaskLink will show an Electronic ID Error.
	Socket Actuator fails to open sockets properly due to low air pressure.	• Check the air regulator.
	Socket Actuator position sensor is loose or malfunctioning.	• Inspect sensor. Tighten or replace. For location, see "Component List" on page 4-5.
	Malfunctioning Waveform Board, Backplane Board, or CPU Board.	• Replace the Programmer Module. See "Removing the Programmer Module" in the Service Chapter.
	Incompatible device data.	• Recreate the job in TaskLink
	Faulty devices.	• Use new reel of device tape.
Sockets disabled or continuity errors (excessive).	Dirty or worn Socket Adapter.	• Remove and clean the Socket Adapter in an ultrasonic cleaning tank. Replace the Socket Adapter. See "Changing the Socket Adapter" on page 3-5.

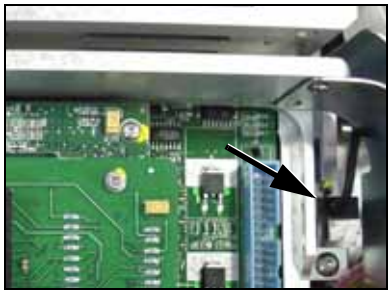


Figure 6-1—Socket Actuator Sensor. Some programmer parts have been removed. Your unit may look different.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Squeal; loud and high pitched audible squeal whenever PNP head moves. (Not the head homing sound.)	The PNP head velocity and acceleration are too aggressive.	• Contact Data I/O Customer Service.
	The black cable carrier is binding.	• Ensure that the cable carrier can move freely.
	There is some obstruction contacting the head or Linear Stage Module.	• Visually check for obstructions. Push the E-Stop and then push the head along its path while noticing if you feel any difficult spots. • Contact Data I/O Customer Service.
	PNP Head limit sensors (on the casting) are malfunctioning.	• Contact Data I/O Customer Service.

Schematics

Pneumatic and electrical schematics are reproduced on labels inside the RoadRunner3 as well as below.

Confidential
For Data I/O customers only. Do not share this information.

Pneumatic Schematic

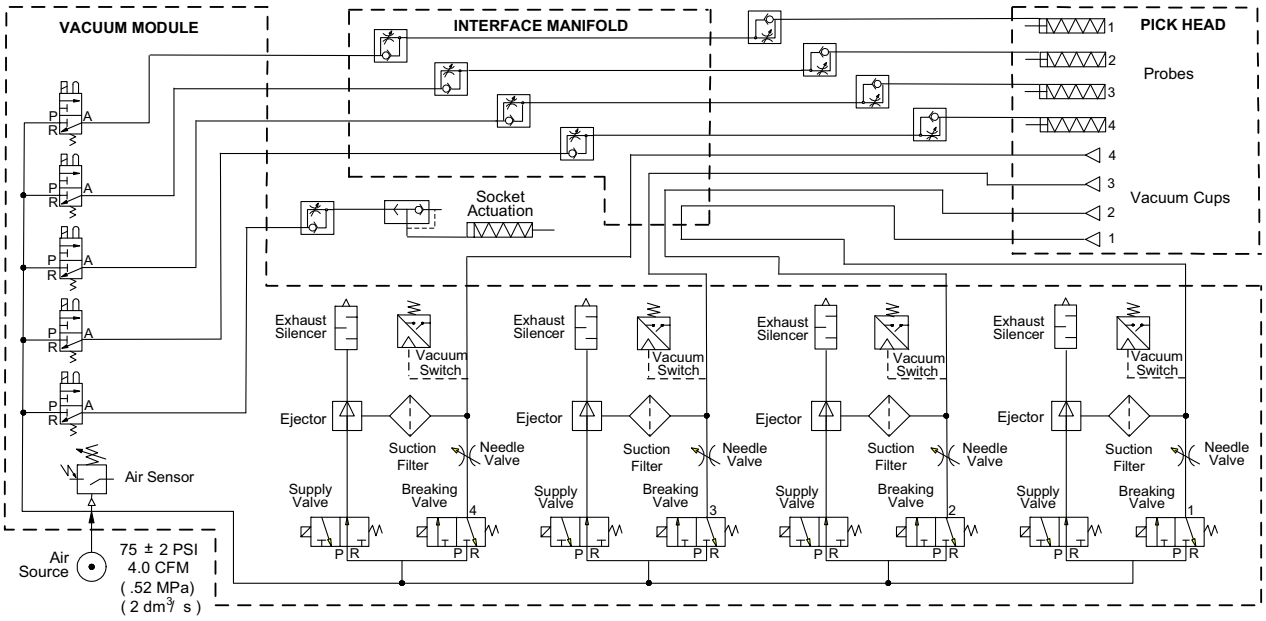


Figure 6-2—RoadRunner3 pneumatic schematic. (Subject to change without notice.)

The pneumatic system of the RoadRunner3 consists of a PNP Head, Pneumatic Module, and an Interface Manifold. The pick head uses four pneumatic cylinders and compliant vacuum probes to move devices through the unit. The Programmer Module has three pneumatic cylinders. The electrically controlled Pneumatic Module creates a vacuum at the pick head and pressurized air supplied at both the PNP Head and Programmer Module. The Interface Manifold is a partition between the PNP Head and Pneumatic Manifold providing flow control to the PNP Head cylinders.

Electrical Schematic

Confidential
For Data I/O customers only. Do not share this information.

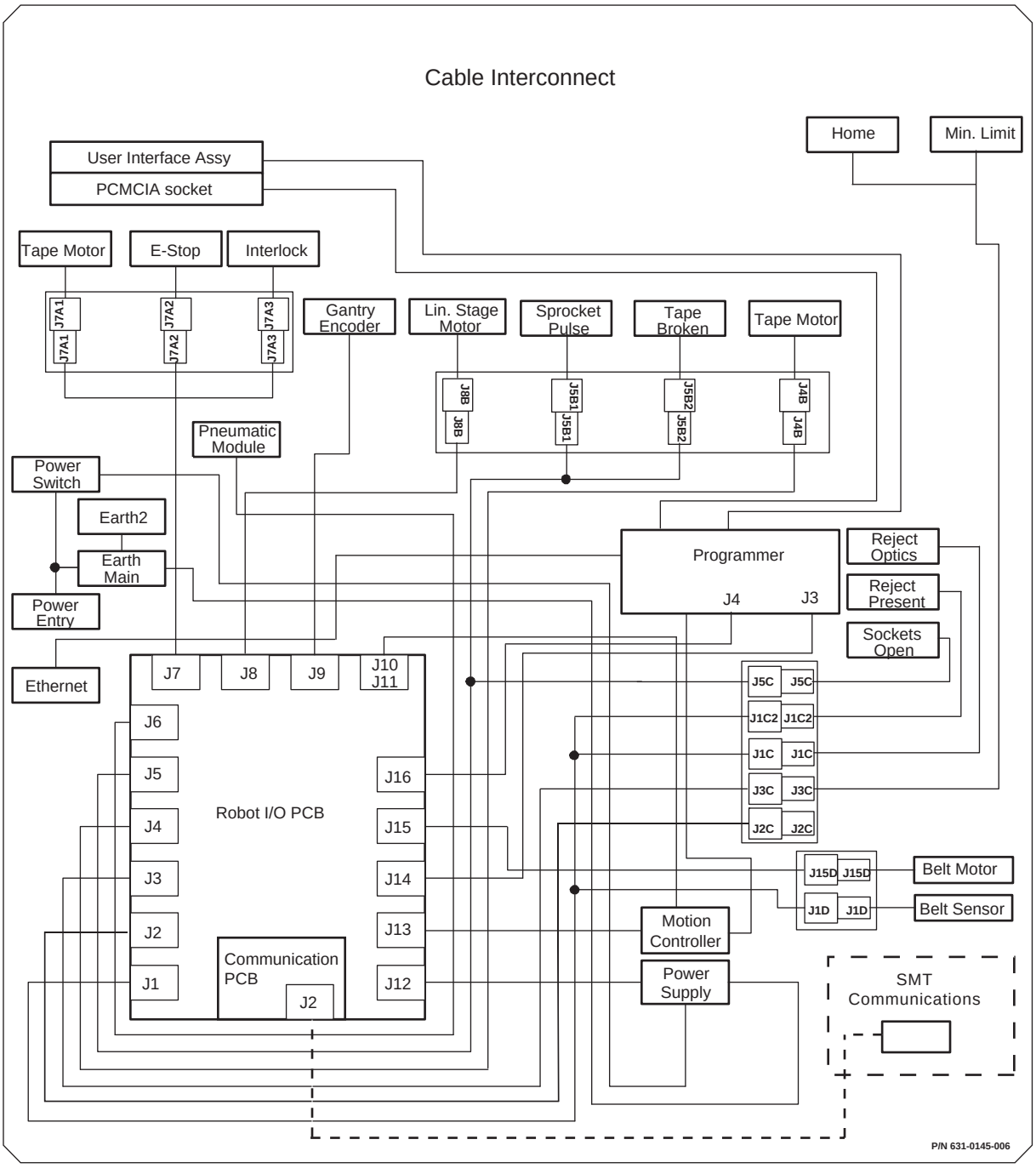


Figure 6-3—Electrical Schematic for all RoadRunner3 Models. (Subject to change without notice.)

Glossary of Terms

This glossary defines terms and acronyms used in this manual.

A	
Actuator Plate	~ A plate that opens a socket(s) for loading a device(s).
algorithm	~ A software file containing specific step-by-step calculations required by the programmer to program a device.
Allen Wrench	~ Hex Key
ATA	~ **A**dvanced **T**echnology **A**ttachment. The specification for a disk drive interface standard based on the IBM PC ISA 16-bit bus interface.
ATA flash card	~ A read/writable card with flash memory that uses the ATA interface.
B	
Backplane Board	~ A printed circuit board that connects the Waveform Board to the Socket Adapter Board.
bit	~ The smallest unit of storage that can take one of two values, such as true and false or 0 and 1.
boot	~ To load and initialize the operating system on a computer.
bus	~ A set of connections for connecting various functional units in a computer.
C	
CAN Network	~ A serial bus network that can handle communication between many pieces of equipment.

CFM	~ **C**ubic **F**eet per **M**inute, a volume/time measure of the rate of air flow. One CFM = 28.32 liters per minute.
checksum	~ A computed value which is transmitted or stored along with the data in order to detect corruption of the data.
chip	~ See Device.
communication parameters	~ The various settings that determine the I/O characteristics of your equipment. The parameters include baud rate, stop bits, data bits, handshaking, and others.
Communications Module Interface Board	~ A circuit board that allows communication with the host handler.
contacts	~ The electrically conductive metal leads on a socket module which conduct programming signals from the programmer to the pins on the device in the socket.
continuity check	~ A preprogramming test that checks the device for electrical connections to the socket. (No electrical connection to the die). Not all pins are checked during this test.
CPLD	~ **C**omplex **P**rogrammable **L**ogic **D**evice
CPU	~ **C**entral **P**rocessing **U**nit
D	
DAB	~ **D**iagnostic **A**dapter **B**oard
DAC	~ **D**igital to **A**nalog **C**onverter.
device	~ A programmable integrated circuit. You may have heard other terms such as chip, microchip, semiconductor device, PROM, or DUT (Device Under Test).
device package	~ The protective container or housing for an electronic device with external terminals to provide electrical access to the components inside.
device tape	~ The device pocket tape, the devices, and the cover tape before they are separated.
Diagnostic Adaptor	~ A circuit board that replaces the Socket Adapter Board for performing programmer hardware diagnostics.
DIP	~ **D**ual **I**nline **P**ackage.
dm^3/s	~ cubic **d**eci**m**eter per **s**econd
DRAM	~ **D**ynamic **R**andom **A**ccess **M**emory
dry run	~ A state or action in which the RoadRunner3 will operate without all the necessary information or devices to run. Synonymous with trial run.
DUT	~ **D**evice **U**nder **T**est, referring to the device that will be programmed or verified.
E	
ESD	**E**lectro**s**tatic **D**ischarge. ESD can damage programmable devices and other static sensitive electronic components.
Ethernet	~ The most popular type of local area network, which sends its communications through radio frequency signals carried by a coaxial cable. Software protocols used by Ethernet systems vary, but include Novell Netware and TCP/IP.

F

FC II ~ FlashCORE II is the name of the second generation of FlashCORE programmers with more flexibility and supports more microcontrollers.

FC III ~ FlashCORE III is the name of the third generation of FlashCORE programmers (Jan. 2010) with faster file download speeds and support for files greater than 4 GBytes (up to 32 Gbits).

FEPROM ~ **F**lash **E**rasable **P**rogrammable **R**ead **O**nly **M**emory. Similar to EEPROM but erasing can be done in blocks or to the whole chip.

Feeder Bank Adapter ~ See *SMT Adapter*.

firmware ~ Software stored in ROM or PROM; essential programs that remain even when the system is turned off.

FLASH ~ See FEPROM.

G

gantry ~ The ball screw that supports the pick and place head and moves it horizontally (in the X direction only in this case).

GFI ~ Generic Feeder Interface, an adapter for the MYDATA SMT

GND ~ Ground

graphical user interface (GUI) ~ All the predefined on-screen elements (for example, dialog boxes, menus, icons, buttons, fields) used to interact with the system software.

H

Hex Key ~ Allen Wrench.

HIC Socket Adapters ~ Socket Adapters with High Insertion Count sockets.

I

ID ~ **I**nside **D**iameter

I/O ~ **I**nput/**O**utput.

I/O Module ~ An input or output (I/O) unit which presents unprogrammed devices to the system (input) or collects devices after they have been programmed and marked (output).

IDE ~ **I**ntegrated **D**rive **E**lectronics. An interface for connecting additional hard drives to a computer.

ISA ~ **I**ndustry **S**tandard **A**rchitecture. A bus standard for IBM compatibles.

J

JEDEC ~ **J**oint **E**lectron **D**evice **E**ngineering **C**ouncil.

job ~ A set of instructions, used by the RoadRunner, containing all the device programming parameters required to set up and program a specific set of semiconductor devices. Used interchangeably with *task*.

JTAG	~ **J**oint **T**est **A**ction **G**roup
K	
kit	~ A collection of RoadRunner3 tasks that are run successively.
kgf/cm^2	~ **kilograms f**orce per square **c**enti**m**eter.
L	
laptop	~ A portable computer.
LCA	~ **L**ogic **C**onfigure-able **A**rray. A logic device using RAM for programming.
LCD	~ **L**iquid **C**rystal **D**isplay
lead	~ The connection legs that extend from the body of a device.
LED	~ **L**ight **E**mitting **D**iode.
M	
mA	~ milliampere
MB	~ **M**ega**b**yte; 1,048,576 bytes (1,024 x 1,024, or 1024^2).
MCBI	~ **M**ean **C**ount **B**etween **I**nterruption
µBGA	~ **M**icro **B**all **G**rid **A**rray. Sometimes written as MBGA.
menu	~ A screen display that lists available command choices.
Motion Controller Board	~ A printed circuit board that controls the gantry motor for pick and place movement. It interfaces with the PC Controller Board and the Robot I/O Board.
N	
NVM	~ **N**on-**V**olatile **M**emory
NVRAM	~ **N**on-**V**olatile **R**andom **A**ccess **M**emory
O	
odometer	~ Meters hours and devices—information used for calculating yields.
OD	~ **O**utside **D**iameter
OEM	~ **O**riginal **E**quipment **M**anufacturer.
open collector outputs	~ Outputs can be wire OR'ed—only one logic level.
operation parameters	~ Parameters that a supervisor sets to restrict the operations of the RoadRunner.
operational statistics	~ Statistics for a specific operation.

P

PC	~ **P**ersonal **C**omputer.
PC-card	~ See PCMCIA card
PCI	~ **P**eripheral **C**omponent **I**nterconnect. A standard for connecting peripherals to a personal computer.
PCMCIA card	~ **P**ersonal **C**omputer **M**emory **C**ard **I**nternational **A**ssociation card. Also called PC-card, it is a lightweight, removable flash memory module about the size of a credit card. It is a plug and play module which uses a 16-bit socket and a 68-pin connector. Format is FAT.
PGM	~ Used in the menu to mean Programmer.
pick position	~ The physical position where the pick-and-place head picks up devices.
Pick and Place Head	~ The mechanism that supports the probe that picks up and places devices. Also called PNP Head.
pindriver	~ Waveform Board circuitry that determines the function of the contact pins.
PLCC	~ **P**lastic **L**eaded **C**hip **C**onnector.
PNP	~ **P**ick a**n**d **P**lace head. Also referred to as P&P.
pocket parameters	~ The pitch of the device tape pockets. The pocket tape pitch is the number of sprocket holes between the pocket centers.
pocket tape	~ The pocketed film that carries the devices. This term usually implies that the cover tape has been removed. Also called device pocket tape.
precisor	~ A mechanical part that attaches to the pick-and-place head to align parts as they are taken from tape.
probe	~ A device attached to the pick and place head that picks up, carries, and releases devices. Each probe has a rubber tip on the end that allows it to create a good vacuum seal on the device.
programming	~ The process of electronically writing data into a device. (Burning is another term used to describe this operation.) “Input devices” are usually blank or un-programmed; “output devices” are usually programmed devices.
programming module	~ Module that contains the programming electronic circuit boards required to program a device in the socket.
PSI	~ **P**ounds per **S**quare **I**nch; a measurement of pressure. One PSI = 0.07031 kg per cm^2.
Puff	~ A surge of air through the pick and place probes to release a device.

Q

QFP	~ **Q**uad **F**lat **P**ack.

R

register	~ A high-speed memory location in a computer's CPU.
Robot I/O Board	~ A printed circuit board that provides an interface between the Waveform Board and the Motion Controller Board and robot sensors. It controls power distribution.

G

S

SCFM ~ **S**tandard **C**ubic **F**eet per **M**inute, a measurement of flow.

SCSI Interface ~ **S**mall **C**omputer **S**ystem **I**nterface. A processor-independent standard for system-level interfacing between a computer and intelligent devices.

semiconductor ~ A programmable integrated circuit. Also called "devices," they are made of a material whose electrical conductivity is between that of a conductor and that of an insulator.

SMA ~ **S**urface **M**ount **A**ssembly; An assembly or machine that utilizes technology for mounting devices onto circuit boards by connecting leads on the surface of the board rather than through a hole on the board.

SMD ~ **S**urface **M**ounted **D**evice.

SMT ~ **S**urface **M**ount **T**echnology.

SMT Adapter ~ Also called Feeder Bank Adapter, this is hardware that allows RoadRunner3 to mate with different SMT Assembly Machines. Generally, there is an adapter for each SMT that RoadRunner3 mates to, with one adapter supplied by Data I/O with the initial RoadRunner3 purchase. SMT Adapter Kits can be purchased individually.

SNS ~ Serial Number Server

socket adapter ~ A part that allows a socket to fit the programmer.

Socket Adapter Board ~ A printed circuit board that connects to the Backplane Board to supply the electrical connections for programming devices.

socket module ~ The device-specific part of the programmer that holds a device in place so that it can be programmed.

SRAM ~ **S**tatic **R**andom **A**ccess **M**emory

system parameters ~ System-wide parameters that are metered are real clock time and odometer information.

T

Tape-In Module ~ The subassembly on the RoadRunner3 that controls the feed rate of the pocket tape.

TaskLink ~ Data I/O's software for creating programming jobs for RoadRunner3 (as well as FlashPAK, FLX500, PS Systems, Sprint™ Family Programmers and UniSite™ family Programmers). It is a Windows® based program that simplifies task management.

teach ~ To communicate your directives to the RoadRunner.

throughput ~ The rate at which correctly-programmed devices are produced.

tip ~ A rubber fitting inserted onto the end of a probe that allows it to achieve the vacuum seal required to pick and hold a device.

TPn ~ Test Point [number].

TSOP ~ **T**hin **S**mall **O**utline **P**ackage.

V

vacuum chamber block ~ The toric metal at the end of each probe. The vacuum chamber block aids the precisor in centering a device.

vacuum tool	~ A hand tool that uses suction to manipulate objects. “Handy-Vac” is such a tool.
V_{CC} DAC	~ **V**oltage **C**ollector **C**ommon **D**igital to **A**nalog **C**onverter. Used to generate the supply power for the devices to be programmed or verified.
VDC	~ **V**olts (of) **D**irect **C**urrent
verify	~ A device operation that compares data in a programmed device with data in RAM or in a disk file. With logic devices, verifying can also include functional testing.
VPP DAC	~ **V**oltage **P**rogramming **P**ower **D**igital to **A**nalog **C**onverter. A DAC that controls the programming power supply for devices.

Index

C

D

E

I

F

G

H

I

J

K

L

M

P

"I don't see angostura in here! It should be here."

Let us know about any items you can't find by e-mailing:
userdocs@dataio.com

N

O

I

R

S

T

U

V

I

W

X

Y

Sales and Technical Support

World Wide

Data I/O Corporation
Redmond, WA USA 98052

Telephone: 425-881-6444
inside US 1-800-332-8246
USA Fax: 425-867-6972

Contact your local Data I/O representative or see the contacts below. To find your local representative on our Web site, go to www.dataio.com and click Contact Us (right-most tab), then click Representative Search (center). Then follow the instructions.

The best way to get support is by using our online form.

Web sites may have changed since the instructions below were writen.

www.dataio.com

Data I/O United States

Technical Support: click Technical Support on the Home page or the Support page.

Sales: click Contact Sales on the Home page or the Contact Us page.

www.dataio.cn

Data I/O China

Technical Support: click 技术支持 on the Home page.

Sales: click 联系我们 on the Home page

www.dataio.de

Data I/O Germany

Technischer Support: Klicken Sie auf Support > Supportanfrage auf der Startseite, klicken Sie dann auf Online-Formular.

Vertrieb: Klicken Sie auf Kontakt > Adressen auf der Startseite.

When calling or writing, please provide the following information:

- RoadRunner3 Serial number
- Software Version displayed on the keypad screen at start-up (turn power off and then on again)
- TaskLink Version
- Name, telephone number and address
- Detailed description of the problem you are experiencing (if any)
- If error-related: Error messages (if any)
- If error-related: FDRROOT > System > *eventlog.txt* file
- If error-related: FDRROOT > System > *errout.txt* file
- If device-related: Device manufacturer, part number, package style and number of pins

programmable media experts