Safety Notice

**WARNING!**

Before performing any equipment maintenance or repair, set the equipment power to OFF, set the main circuit breaker to OFF, and lockout and tag the main circuit breaker; failure to follow this warning can result in injury or death to personnel and damage to equipment.

Note: Damage to equipment that occurs as a result of performing maintenance or repairs while power is ON, is not covered by the warranty.

Note: Before performing any equipment maintenance or repair, refer to the equipment operation and maintenance manuals.

**Equipment Safety**

- **Inspection**—frequently inspect the equipment to ensure that it is operating properly.
- **Maintenance**—ensure that maintenance is performed by an authorized technician at least twice a year.

**System Safety**

- **Vibrant Colors**—use vibrant colors on parking equipment at entrance and exit lanes, to make it more visible to patrons.
- **Signage**—provide clear signage on the roadway and other equipment, to assist patrons in easily and safely moving through the facility.
- **EquipmentWarnings**—maintain manufacturer’s warning stickers on gate arms and other equipment, to ensure that operators and patrons are aware of potential hazards.
- **Safety Devices**—encourage the use of safety devices (e.g., buzzers, flashing lights), to ensure that operators and patrons are alerted to potential hazards.
- **Sidewalks**—should be parallel to entrance and exit lanes, to eliminate the need for pedestrians to cross the lanes. This decreases the risk of pedestrian accidents in the lanes.
- **Monitor Lanes**—operators must monitor remote entrance and exit lanes, to be aware of patron activity in these areas, especially when raising and lowering gates or operating other remote equipment.

**Icons (Pictograms)**

3M strongly recommends the use of universally identifiable icons (pictograms), for all entrance and exit lanes, roadways, posts, and walls. It is recommended that the following icons be displayed on the roadway, immediately adjacent to the parking barrier gate:

- No Pedestrians
- No Wheelchairs
- No Bicycles
- No Motorcycles
- No Trucks

**Safety Is Good Business**

It is important to be aware of the potential liabilities that can occur during normal parking operations. Adopting a “Safety First” policy provides you and your patrons with a safer environment!
**Product Use Statement**

**Product Use:** Many factors beyond 3M’s control and uniquely within user’s knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user’s method of application.

**Warranty, Limited Remedy, and Disclaimer:** Unless a different warranty is specifically stated on the applicable 3M product packaging or product literature, terms of sale or software license agreement, 3M warrants that the 3M product will be free from substantial defects in material and workmanship under normal use and service, wear and tear excepted, for two (2) years from the original date of purchase, and (ii) for software products, for ninety (90) days from the original date of purchase, the software will materially perform the functions described in the accompanying documentation. 3M MAKES NO OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY IMPLIED WARRANTY OR CONDITION ARISING OUT OF A COURSE OF DEALING, CUSTOM OR USAGE OF TRADE. If the 3M product does not conform to this warranty, then the sole and exclusive remedy is, at 3M’s option, to replace or repair any defective part or parts.

**Limitation of Liability:** Except where prohibited by law, 3M will not be liable for any loss or damage arising from the 3M product, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted, including warranty, contract, negligence or strict liability.
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Chapter 1: Overview of Ramp Controller Components

The 3M Ramp Controller works in conjunction with the ScanNet Central Management System to count vehicles entering or exiting ramps and/or lanes in a parking facility.

Capable of tracking either one-way or two-way traffic, each Ramp Controller will support as many as five unidirectional or two bidirectional lanes. The device communicates count information to ScanNet, which maintains an accurate, real time vehicle inventory for each of the facilities’ parking areas, lots and zones.

In addition to counting vehicles, Ramp Controllers may be used to direct traffic into or away from parking areas by turning “full” signs on and off.

The Ramp Controller consists of a controller board in a steel enclosure and a separate power supply unit, also in a steel enclosure. This chapter describes the components of the Ramp Controller.

Note: This manual may reference legacy part numbers and product names. Please refer to the 3M Parking Price Book for current product names or contact your customer service representative with questions.

Overview of the Ramp Controller Enclosure

The Ramp Controller enclosure is a NEMA type 12 steel enclosure with the following dimensions: 17.25 inches (438 mm) H x 15.25 inches (387 mm) W x 3.4 inches (86 mm) D.

The enclosure houses the Ramp Controller board along with four high-voltage relays. Its cover is attached with screws to insure water tightness. Figure 1.1 illustrates the enclosure.
Overview of the Controller Board

Figure 1.2 illustrates the Ramp Controller’s controller board, and descriptions of the board’s components follows.
Note: Other board components not mentioned here are not used for the Ramp Controller. They are used in the PosiDRIVE Model 50 Gate.

- **SW1 - Hardware Reset Button.** When a condition arises that affects the operation of the Ramp Controller, such as a detector loop or full sign locks up, or communication with ScanNet is lost, you may need to reset the Ramp Controller. This button restarts the Ramp Controller processor. It does not erase any programming that you have sent to it.

- **LED 32 - Loop Presence and Tuning Indicators.** LED 32 consists of 10 LED lights that indicate loop presence and tuning. Each loop A-E has one LED for presence and one for tuning. The tuning LED pulses as the loop is tuning. A functional loop should tune itself every 8 seconds as long as a vehicle is not present. If a vehicle drives on to the loop, it stops tuning and the presence LED will light.

- **SW2 - Termination and Device Address DIP Switches.** DIP switch 8 is used to indicate whether this Ramp Controller is the last device on the RS-422 ScanNet.
communication line. DIP switches 1 - 5 indicate the device address for Ramp Controller. Switches 6 and 7 are not used. For information on how to set these DIP switches see “Setting the Device Address DIP Switch,” page 25 and “Setting the ScanNet Termination DIP Switch,” page 27.

- **S1 - Tune Loops Button.** Press this button to tune all 5 loops, A through E, simultaneously. Loops automatically tune themselves during periods of inactivity; however, if the loops remain in Presence mode (see LED 32 - Loop Presence and Tuning Indicators) for some reason, such as temperature change, you will need to press this switch to begin re-tuning. See “Tuning Loops,” page 14.

---

**Warning!** Do not attempt to tune the loops when vehicles are present. Tuning a loop will cause the vehicle to be undetected, and the gate arm could lower, causing bodily injury or damage to the vehicle.

- **J15 - Ethernet 10-Base-T Port.** Port used for performing firmware upgrades with an Ethernet connection and the FlashProgrammerE program. See Chapter 8: “Updating Firmware for the Ramp Controller.”

- **J12 - Power Connector.** Connector for the 24 Volt power supply, wired to the NEG and +24 terminal blocks in the Ramp Controller.

- **J1 - CPU Debug RS-232 Port.** Port is used for performing firmware upgrades with a serial connection and the FlashProgrammer program. See Chapter 8: “Updating Firmware for the Ramp Controller.”

- **LED 27 - Power On Indicator.** When lit, the Power On LED indicates the Ramp Controller is receiving +24V power.

- **J5 & J6 - K1-K8 Relay Outputs.** The connectors for the 1 Form C relay outputs, K1-K8. Outputs 1-4 (on J5) on the Ramp Controller are wired at the factory to the Ramp Controller’s four high voltage relays, each rated for 120 V AC at 10 Amps. If you are wiring a high voltage device to the Ramp Controller, such as a large incandescent full sign, use one of the outputs 1-4. You may also use outputs 1-4 for low voltage devices (up to 42 V AC each).

- **LED 31 - Loop Power Indicator.** When lit, indicates the presence of +12 power for the loops.

- **J17 - Loop Input Connectors.** Connectors for each of the 5 lane loops, A through E.

- **S3 - Loop Frequency DIP switches.** Use these DIP switches to select the desired loop frequency for each loop. These switches are initially set to low. Set a loop frequency DIP switch to high if there is crosstalk between two loops. See “Crosstalk and Loop Coil Frequency,” page 12.

- **LED 1 - Communication Status.** Indicates the communication status for various ports and processes. The following apply to the Ramp Controller:
  - RXB and TXB are the ScanNet communication status indicators.
  - RXC and IRTXC are the transmit and receive status indicators for the PDA (personal digital assistant).
  - CS3 is the indicator for transmissions between the UART and the processor.
  - Exar IRQ is the indicator for the UART interrupt request.
Infrared Port. This port is used to program the Ramp Controller using the PDA (personal digital assistant). See Chapter 4: “Getting Started Using the PDA” for more information.

J3 - ScanNet Connection. RS-422 connection to the ScanNet communication network.

Overview of the Power Supply Unit

The Ramp Controller utilizes a universal input 24 volt power supply. The power supply, circuit breaker, and terminal block are housed in an enclosure separate from the Ramp Controller enclosure. Figure 1.3 illustrates the power supply.

The power supply can accept input voltages anywhere from 85 VAC to 264 VAC at 47-63 Hz @ 2 Amperes and produces an output of 24 VDC. The power supply unit is capable of delivering power to 10 Ramp Controller units. The Ramp Controller unit can accept voltage input of 24 VDC +/- 10%. Current consumption is 0.5 Amps or less.

The power supply enclosure is a NEMA type 12 steel enclosure with the following dimensions: 13.35 inches (339 mm) H x 12.12 inches (309 mm) W x 6.25 inches (159 mm) D.
Refer to “Connecting the Ramp Controller to the Power Supply,” page 21, for information on the connection of the Ramp Controller to the power supply.

**Figure 1.3**
Power Supply Unit
Chapter 2: Loop Components and Installation

Loop Overview

Ramp Controller loop detectors detect the presence of a vehicle within a specific zone around and above the loop. Before you install Ramp Controllers in your parking facility, you must install the loops.

The loop or coil of wire is embedded in the ground. The Ramp Controller’s internal loop detector circuit generates an electronic signal that passes through loops. When the signal is applied to the loop coil, an electromagnetic field is generated around the loop. Metal passing through this field causes a change in the signal. The Ramp Controller detects this change and the controller generates an output that indicates vehicle presence on the loop.

Hardware Requirements

The loop coil consists of a number of turns of insulated, stranded wire embedded in a sawslot cut into the pavement. The wire should have a minimum insulation thickness of 0.045 in (1.13 mm), and exhibit a stable dielectric constant. A 16-18 gauge stranded, THHN insulation wire is recommended. Other wire types may not be able to withstand the chemical attack and environmental stress exerted on loops. This is especially important in areas where temperature extremes cause the pavement to expand and contract. In areas where loops are exposed to these extreme conditions, a PVC pre-formed loop is recommended for greater longevity and more reliable service.

**Note:** Wire with improper insulation will eventually break down, which can cause false detections, impaired sensitivity, or complete inoperability of the loop detector circuit.

Loop Detector Operation

The loop coil is the inductive component of an oscillator located in the electronic module. The oscillator generates a signal whose frequency is dependent on internal components and the external loop.

Metal passing over the inductance loop alters the frequency of the loop. When this occurs, the electronic module in the controller detects the change in frequency. This indicates that a vehicle is present on the loop. The controller then generates an output signal.

The loop detector generates a pulse output representing each vehicle passing over the loop, along with a constant presence output that stays on as long as the vehicle remains on the loop. The pulse output, which “closes” for about a 1/4 second, is generally used for vehicle counts, whereas the presence output closes for the duration a vehicle is on the loop.

Loop Installation

Your lane layout determines where you place the loop in a lane. Refer to the equipment layout drawings provided in your engineering package for specific instructions on positioning the loops.
Warning! Be sure of the loop location! Loops that are installed improperly can cause problems with the normal operation of the lane.

Figure 2.1 illustrates the loop installation in concrete. A saw slot is cut 1/4 inch wide by 1 inch deep. The saw slot is a rectangular shape fitted to the specified loop dimensions plus a slot for lead conduit. (See “Setting the Size of the Loop,” page 9.) The saw slot is grouted with Bondo P-606 detector loop sealant or equivalent.

Figure 2.1
Loop Installation in Concrete

Use these guidelines when installing the loop:

- Keep loop leads to maximum length of 100 ft. (30.5 m). See “Setting the Loop Lead Length,” page 11.
- Typically, primary and secondary loops are positioned approximately 2 ft. - 4 ft. apart; however the specific locations of the loops depend upon the application.
- Loop lead in wires must be twisted a minimum of 10 turns per foot.
Loop leads must not share conduit with any other power or signal conductors.

Loop wire must be 16-18 THHN type insulation, single conductor stranded wire.

Loop must be constructed from a single continuous conductor without splicing.

The sides of any loop must be positioned a minimum of 2 inches from parallel lengths of reinforcement rod whose diameter is larger than 1/4 inch.

Stationary reinforcement metal, if necessary, may be positioned below the horizontal plane of the detector loop. The presence of stationary metal in the field will decrease the sensitivity of the loop. If sensitivity problems occur, settings may have to be set higher to compensate for the change. For information about setting loop sensitivity, see “Loop Sensitivity,” page 14.

Do not splice wire.

Do not fracture wire insulation. Loops shorted to ground will cause detector malfunction.

Do not use a screwdriver or other sharp tool to place the wire into the slot.

Do not place the loop over expansion joints.

Do not connect the loop directly to wire mesh.

Install the loop wires so that loop wire movement is eliminated. Any movement could cause false detects. Remove all sharp bends and corners in the sawslot before the wire is inserted. Be very careful not to score or abrade the insulation jacket.

Loops installed in concrete typically outlast those installed in asphalt. Asphalt, being softer, tends to move or slide in the path where vehicles stop, particularly where the base is not stable or may be subject to water retention. Loops will appear stretched in the direction of the traffic flow, sometimes three to four inches beyond their original outline. Loops exposed to this type of stress are subject to premature failure.

Remember the loop coil is an integral part of the detector circuit. Install it carefully.

**Setting the Size of the Loop**

The Loop Detector in the Ramp Controller works with various sizes of loops. In general, a larger loop size will increase the height and width of the electromagnetic field generated by the loops, enabling the detector to detect a wide range of vehicles.

Table 2.1 shows standard, recommended loop sizes for different applications.
Table 2.1: Standard Loop Sizes

<table>
<thead>
<tr>
<th>Loop Size (L x W)</th>
<th>Area</th>
<th>Perimeter</th>
<th>Lane Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feet</td>
<td>Meters</td>
<td>Feet</td>
<td>Meters</td>
</tr>
<tr>
<td>2.5 x 6</td>
<td>.76 m x 1.8 m</td>
<td>15 sq. ft.</td>
<td>1.35 m²</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Standard size passenger vehicles.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Use this loop size to ensure tailgate detection (a second vehicle following</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>within six inches of another vehicle).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>With this loop size, if the conditions of the installation are not optimal,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>some higher bed vehicles may not be consistently detected.</td>
</tr>
<tr>
<td>4 x 6</td>
<td>1.2 m x 1.8 m</td>
<td>24 sq. ft.</td>
<td>2.23 m²</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Standard size passenger vehicles.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- High bed vehicles.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>In some applications tailgate detection may not work as consistently as the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.5 ft. x 6 ft. loop size. Tailgate sensitivity must be adjusted to achieve</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>optimal performance.</td>
</tr>
<tr>
<td>5 x 9</td>
<td>1.5 m x 2.7 m</td>
<td>45 sq.ft.</td>
<td>4.05 m²</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Tractor trailers - Oil tankers - Dump trucks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tailgate detection within six inches of another vehicle typically will not</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>work for a loop this size.</td>
</tr>
</tbody>
</table>

The size of the loop used depends on the application. For example, if standard size passenger vehicles as well as high bed vehicles use the lane, use the 4 ft. x 6 ft. loop size. If you use the 2.5 ft. x 6 ft. (.76 m x 1.8 m) loop size, the height of the electromagnetic field may be too short to continuously detect high bed vehicles such as modified pickup trucks.

Note: If you use a loop size longer than 2.5 ft. (.76 m) you may lose the tailgate option.

Figure 2.2 illustrates the shape of the field that the loop coil generates. The field strength is greatest along the edges of the loop and decreases toward the middle of the loop. In general, as the perimeter of the loop increases, the size of the electrical field along the loop wire also increases.

In lanes that have motorcycle or bicycle traffic, loops may not continuously detect vehicles due to the minimal amounts of metal and the decreased sensitivity in the middle of the loop.
Setting the Loop Lead Length

A lead-in cable should be used when the lead-in length exceeds 30 ft. (9.1 m). The length of the loop lead-in cable depends on the inductance of the loop itself, but the length should not exceed 100 ft. (30.49 m). The inductance of the lead-in cable should not be more than 20 percent of the total inductance seen at the loop lead input of the detector module.

Use a 16-18 AWG stranded, twisted-pair wire. The cable should have a minimum twist of six turns per foot.

Splicing is not recommended, but if you splice the lead cable, twist and solder the wires before sealing. This will ensure that the cable is waterproof.

Lead cable has approximately 0.1 to 0.2 microhenries inductance per foot (.3 m) and 24 picofarads capacitance per foot (.3 m). Table 2.2 shows maximum lead lengths for various loop inductances.

<table>
<thead>
<tr>
<th>Total Inductance (microhenries)</th>
<th>Max Lead-in Inductance (microhenries)</th>
<th>Loop Inductance (microhenries)</th>
<th>Loop Lead-in Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>10</td>
<td>40</td>
<td>66.6</td>
</tr>
<tr>
<td>55</td>
<td>11</td>
<td>44</td>
<td>73.3</td>
</tr>
<tr>
<td>60</td>
<td>12</td>
<td>48</td>
<td>80</td>
</tr>
</tbody>
</table>

Table 2.2: Loop Lead Table
Warning! These instructions and specifications are based on laboratory conditions and are subject to change depending on actual field situations, existing layouts, and pavement and soil conditions as well as any unique circumstances of traffic flow.

Crosstalk and Loop Coil Frequency

Crosstalk may occur when two coil loops are placed within close proximity of each other and are operating at or near the same frequency. Crosstalk causes the detectors to operate incorrectly and detect vehicle presence on the adjacent loop. To avoid crosstalk, frequencies of loops installed in adjacent lanes should be separated by at least 20 KHZ.

If you think you are experiencing crosstalk, use the PDA (personal digital assistant) to view the current loop frequencies. See “Viewing the Current Loop Frequencies,” page 64.

Each loop frequency DIP switch on the Ramp Controller (S3 DIP switch bank) has two possible frequency settings: high and low. When you receive the Ramp Controller from the factory, the loop frequency DIP switches are set to low frequency. Normally, you should not need to change the frequency settings for the loops, but if you are experiencing crosstalk, you can use the DIP switches to change the frequency of adjacent loops that are operating within 20 KHZ of each other. Refer to Figure 1.2 on page 3 for the location of the S3 DIP switch bank.

Table 2.3 shows the DIP switch settings for loop frequency.

Table 2.3: S3 DIP Switch Settings for Loop Frequency

<table>
<thead>
<tr>
<th>S3 DIP Switch</th>
<th>Loop</th>
<th>Frequency When DIP Switch OPEN</th>
<th>Frequency When DIP Switch CLOSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loop A</td>
<td>A</td>
<td>High Frequency</td>
<td>Low Frequency</td>
</tr>
<tr>
<td>Loop B</td>
<td>B</td>
<td>High Frequency</td>
<td>Low Frequency</td>
</tr>
<tr>
<td>Loop C</td>
<td>C</td>
<td>High Frequency</td>
<td>Low Frequency</td>
</tr>
<tr>
<td>Loop D</td>
<td>D</td>
<td>High Frequency</td>
<td>Low Frequency</td>
</tr>
<tr>
<td>Loop E</td>
<td>E</td>
<td>High Frequency</td>
<td>Low Frequency</td>
</tr>
</tbody>
</table>

Once you know the current loop frequencies, you can also check to make sure that the loops are operating within the optimum frequency range. Refer to Table 2.4 on page 13.
Table 2.4: Loop Sizes and Operating Frequency

<table>
<thead>
<tr>
<th>Loop Size (Recommended)</th>
<th>Perimeter</th>
<th>Turns</th>
<th>Typical Inductance (micro-henries)</th>
<th>Frequency (kHz) +/- 10%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Feet</td>
<td>Meters</td>
<td>Feet</td>
<td>Meters</td>
</tr>
<tr>
<td>2.5 x 6</td>
<td>.76 x 1.8</td>
<td>17</td>
<td>5.2</td>
<td>3*</td>
</tr>
<tr>
<td>2.5 x 6</td>
<td>.76 x 1.8</td>
<td>17</td>
<td>5.2</td>
<td>4</td>
</tr>
<tr>
<td>2.5 x 6</td>
<td>.76 x 1.8</td>
<td>17</td>
<td>5.2</td>
<td>5</td>
</tr>
<tr>
<td>4 x 7</td>
<td>1.2 x 2.1</td>
<td>22</td>
<td>6.7</td>
<td>2</td>
</tr>
<tr>
<td>4 x 7</td>
<td>1.2 x 2.1</td>
<td>22</td>
<td>6.7</td>
<td>3*</td>
</tr>
<tr>
<td>5 x 9</td>
<td>1.5 x 2.7</td>
<td>28</td>
<td>8.5</td>
<td>2*</td>
</tr>
<tr>
<td>5 x 9</td>
<td>1.5 x 2.7</td>
<td>28</td>
<td>8.5</td>
<td>3</td>
</tr>
<tr>
<td>8 x 8</td>
<td>2.4 x 2.4</td>
<td>32</td>
<td>9.8</td>
<td>2*</td>
</tr>
</tbody>
</table>

* Recommended number of turns

You can estimate loop inductance by using the following formula:

Inductance = (N x P) x (N + 1)/4, where N = Number of Turns and P = Perimeter of Loop.
Loop Sensitivity

You can program the sensitivity of the loop detectors to determine the distance at which a vehicle is detected as it approaches the loop coil. Sensitivity settings range from 0 to 9, with 0 being the most sensitive and 9 being the least sensitive. To program the loop sensitivity settings using the PDA, see “Setting the Loop Vehicle Detection Sensitivity,” page 45.

To determine the correct sensitivity setting, take into account the amount of metal in the environment, as well as the type of vehicles that will be using the lane. For example, if you use 2 ft. 6 in. x 6 ft. (.76 m x 1.8 m) loops that are in close proximity, such as in multiple entrance lanes in a parking garage, you should use a mid-level sensitivity setting. This would minimize adjacent lanes affecting each other. If small pick-up trucks are being detected, a high sensitivity setting may be used.

**Note:** If you set the sensitivity too high, you may get unnecessary detect situations or the detector may lock up. Also, when you increase the loop size, you increase the range of sensitivity, but you lower the level of sensitivity.

If crosstalk occurs, and the frequencies have been offset, the next lowest sensitivity may have to be used. See “Crosstalk and Loop Coil Frequency,” page 12.

**Note:** Reinforcement rods in the concrete in the area of the loop will decrease the loop sensitivity.

Detecting Vehicles that Tailgate

The tailgate detection feature allows the Ramp Controller to detect the presence of a second vehicle following as close as six inches of another vehicle passing over a 2 ft. 6 in. x 6 ft. (.76 m x 1.8 m) loop coil. By detecting this condition as a tailgate, the Ramp Controller can accurately count this as two vehicles instead of one. Tailgate detection maintains the integrity of any vehicle counting system, even in high traffic volume.

**Note:** Disable the tailgate option in lanes where vehicles pulling trailers are using the lane, such as at campgrounds and boat launching areas. Also, if your loop size is larger than 2 1/2 ft. (.76 m) in the direction of travel, you may lose the tailgate function. To disable the tailgate option using the PDA, see “Enabling Tailgate Detection,” page 47. For more information about loop size and optimal performance, see “Setting the Size of the Loop,” page 9.

When you choose to have tailgate detection turned on, you may program tailgate sensitivity settings from 0 to 8, with 0 being the least sensitive and 8 being the most sensitive. To program the tailgate sensitivity settings using the PDA, see “Setting Tailgate Sensitivity,” page 48.

Tuning Loops

Periodically, the loops self-tune in order to track frequency changes caused by temperature changes. Changes in the environment can cause the frequency to drift. The tuning process sets the current loop frequency as the new base frequency (called the free run frequency) and calculates the new detection points based on the new frequency. Self-tuning occurs only when the loop does not detect the presence of a vehicle (called presence mode). If a loop remains in presence mode, even
when a vehicle is not present, you may need to manually tune the loops by pressing the Tune Loops button (S1) on the controller. See “Overview of the Controller Board,” page 2.

When a vehicle stays on the loop longer than usual, the loop’s non-presence frequency setting may drift upward. When the vehicle leaves, the loop might remain in presence mode, even though there is no vehicle present. If this happens, the loop will self-correct the situation if the loop frequency remains below the system-specified drift detection point and remains stable for a system-specified period of time.

Troubleshooting the Loop Detector

Several factors, such as climatic conditions, crosstalk, hidden inductors, etc., may cause your loop detector or loop itself to function improperly. You can take certain preventive measures to maintain the integrity of the loop.

Verifying a Loop is Operational

To verify that a loop is operational, check the following:

- Make sure that the loop is enabled. See “Enabling and Disabling Loops,” page 44.
- Verify that the Tune Loop LED (on LED 32 for Loop Presence and Tuning) on the Ramp Controller flashes every 8 seconds. An operational loop will tune itself every 8 seconds as long as a vehicle is not present. When a vehicle is present, the Presence LED (located below the Tune LED) will light.

Loop Detector Malfunction

Breakdown of wire insulation allows water to penetrate to the wire, causing loop failure. A typical sawcut in cement should last three to four years. However, one or more of the following factors may cause a defective loop:

- Sharp objects such as screwdrivers were used to install the loop.
- THHN cross-linked polyethylene wire was not used for the loop.
- Faulty loop sealant was used, exposing wires to tire abuse.
- The loop was punctured by debris, such as sharp rocks, nails, etc., caught in the saw slot.
- Lightening or induced voltage surges occurred.
- The road surface around or through the loop’s circumference or lead-in cracked or shifted.

For installation guidelines, see “Loop Installation,” page 7.

You can test the integrity of your loop’s insulation with a Megohm meter or “megger.” The megger produces a 500 volt potential between the loop wire and a good earth ground.
Warning! If your megger has a 500 volt and 1200 volt setting, make sure it has been set to 500 volt. If you test a good loop with the 1200 volt setting, you may damage the insulation (rated for only 600 volt) and cause the loop to fail.

Follow the instructions on the megger and make sure you disconnect both loop wires from the terminal or detector unit before proceeding with the test. If you are checking loops suspected of intermittent failure or in dry climates, soak the area around the loop with water one hour prior to testing. Doing so will ensure an accurate reading. The meter should indicate a reading in excess of 100 megohms of resistance to ground. Record the readings for future reference.

**Shorted Loops**

The loop’s environment can affect loop life. Damaged loops installed in dry climates may operate several months before a problem is detected, as there is no water to short the loop out to earth ground. However, soon after a good rain, the loop will begin to fail as water penetrates the insulation, shorting it out.

Diagnosing a shorted loop can be difficult, particularly when the problem is intermittent. Symptoms of a shorted loop may include the following:

- Erratic detector behavior as vehicles pass over the loop
- Failure to consistently detect cars
- Failure to detect high bed vehicles
- Detector starts failing shortly after a rain shower

Additionally, having the proper diagnostic tools such as megger, DVM, loop locator, and inductance meter with a 0-200 pH scale will make it easier to detect a shorted loop.

**Note:** A shorted loop must be removed and replaced.

**Crosstalk**

Another less common cause for loop failure is crosstalk from adjacent loops. Crosstalk usually occurs when two loops in close proximity are operating in the same frequency range. Crosstalk can be corrected by adjusting the frequency settings of the detectors so that adjacent loops do not operate within the same frequency range. For information on adjusting the frequency setting, see “Crosstalk and Loop Coil Frequency,” page 12. If you have changed the frequencies and are still experiencing crosstalk, you may need to change the loop sensitivity. For instructions on setting loop sensitivity, see “Setting the Loop Vehicle Detection Sensitivity,” page 45.

**Hidden Inductors**

Reinforcement bars or mesh may affect the operation of a loop detector if the bars or mesh exist in the form of a closed loop located in close proximity of the active loop. Occasionally, you may encounter a situation where mutual coupling is occurring due to a shorted abandoned loop or grid of rebar that is acting like a shorted or “closed” loop. The closed loop reduces an active loop’s sensitivity and causes intermittent lane failure.
The condition created by the closed loop, sometimes referred to as swamping, causes the active loop’s field to induce eddy currents into the nearby closed loop. The eddy currents in turn create a magnetic field in the closed loop. This diminishes the active loop’s field and raises its base operating frequency. The closed loop draws the magnetic flux of the active loop down toward itself, effectively reducing the height of the active loop’s magnetic lines of flux. Figure 2.3 illustrates the signal strength of a typical loop as compared to the effect of a hidden inductor on signal strength.

Figure 2.3
Loop with Shorted Inductor Nearby

Using a Loop Locator

Use a loop locator such as the Intersection Development Corporation’s Model 505 Loopfinder to locate the loop and find its field strength. The loop locator also indicates the presence of hidden, “closed loops.”
To test the strength of the loop, follow these directions:

1. Run the tester probe perpendicularly across the loop edges.

2. As you pass the probe tip over the loop perimeter, there should be a linear rise in signal strength.

---

**Note:** The linear rise in strength starts at about 10 in (25.40 cm) from either side of the loop, and peaks at about one inch (2.5 cm) from the loop. Refer to Figure 2.3 for the signal strength of a typical loop.

---

3. As you pass the probe directly over the active loop wires, the meter will drop to zero. It stays at zero as you pass the probe between the opposing magnetic fields.

4. As you move the probe past the center line, the meter should rise, peaking immediately. As you continue to move the probe away from the loop edge, the meter should decrease in a linear fashion.
Chapter 3: Installing the Ramp Controller

Typical Field Connections

Figure 3.1 illustrates the connections that must be made in a typical installation of the Ramp Controller.

The recommended minimum size to be used for field connection signal control wires is #16 gauge.
Figure 3.1
Typical Field Connections
Connecting the Ramp Controller to the Power Supply

Figure 3.2 shows the connection from the Ramp Controller to the power supply. To connect wiring, insert a 1/8 inch straight blade screwdriver into the square hole to release the clamp. Insert the wire into the round hole, and remove the screwdriver.

Warning! Make sure that no input power is supplied to the power supply while you are making connections.

Figure 3.2
Ramp Controller to Power Supply Wiring

The maximum length of wire from the Ramp Controller to the Power Supply varies depending on the gauge of wire and whether each Ramp Controller is connected to the power supply directly, or if multiple Ramp Controllers are daisy-chained to the power supply. Table 3.1 gives the stranded wire run specification, and Figure 3.3 and Figure 3.4 illustrates this for the two different ways of wiring the Ramp Controller to the power supply.

Note: The minimum acceptable voltage at the controller from the power supply is 16.8 volts DC.
## Table 3.1: Wire Run Specification Between Ramp Controller and Power Supply

<table>
<thead>
<tr>
<th>Wire Gauge</th>
<th>No. of Ramp Controllers</th>
<th>Maximum Distance - Ramp Controller to Power Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>#16 AWG (1.50 mm²)</td>
<td>10 daisy-chained</td>
<td>550 feet (168 meters) from power supply to last Ramp Controller</td>
</tr>
<tr>
<td>#14 AWG (2.50 mm²)</td>
<td>10 daisy-chained</td>
<td>880 feet (268 meters) from power supply to last Ramp Controller</td>
</tr>
<tr>
<td>#12 AWG (4.00 mm²)</td>
<td>10 daisy-chained</td>
<td>1,400 feet (427 meters) from power supply to last Ramp Controller</td>
</tr>
<tr>
<td>#16 AWG (1.50 mm²)</td>
<td>1 directly to power supply. Up to 10 can be connected this way. Ten COM and ten +24 VDC connections for this are provided in the power supply terminal block.</td>
<td>2,800 feet (853 meters)</td>
</tr>
<tr>
<td>#14 AWG (2.50 mm²)</td>
<td>“</td>
<td>4,500 feet (1,372 meters)</td>
</tr>
<tr>
<td>#12 AWG (4.00 mm²)</td>
<td>“</td>
<td>7,000 feet (2,134 meters)</td>
</tr>
</tbody>
</table>
**Figure 3.3**  
Wiring Distances of Ramp Controllers  
Directly to Power Supply

![Diagram of wiring distances of ramp controllers](#)

Maximum distances between power supply and each Ramp Controller:

<table>
<thead>
<tr>
<th>Wire</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>#16 AWG (1.50 mm²)</td>
<td>2,800 feet (853 meters)</td>
</tr>
<tr>
<td>#14 AWG (2.50 mm²)</td>
<td>4,500 feet (1,372 meters)</td>
</tr>
<tr>
<td>#12 AWG (4.00 mm²)</td>
<td>7,000 feet (2,133 meters)</td>
</tr>
</tbody>
</table>
Figure 3.4
Wiring Distances of Ramp Controllers in a Daisy Chain to Power Supply

Maximum distance between power supply and last Ramp Controller:

<table>
<thead>
<tr>
<th>Wire</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>#16 AWG (1.50 mm²)</td>
<td>550 feet (168 meters)</td>
</tr>
<tr>
<td>#14 AWG (2.50 mm²)</td>
<td>880 feet (268 meters)</td>
</tr>
<tr>
<td>#12 AWG (4.00 mm²)</td>
<td>1,400 feet (427 meters)</td>
</tr>
</tbody>
</table>
Typical Output Wiring

Figure 3.5 illustrates the typical wiring of outputs on the Ramp Controller. Outputs 1-4 are prewired at the factory to the four high-voltage relays (120 VAC @ 10 Amps). Outputs 5-8 must be wired directly to low-voltage full signs or counters (up to 42 VAC each) if you have no spare high-voltage relays.

Figure 3.5
Wiring of the Ramp Controller Outputs

Setting the Device Address DIP Switch

DIP switches 1-5 on the DIP switch bank labeled SW2 are used to set the device number. Assign a device number to the Ramp Controller by opening one or more of DIP switches 1-5 on the DIP switch bank. Figure 3.6 shows the location of the DIP switch bank. Refer to Table 3.2 for the value of the DIP switches when they are open.

Table 3.2

<table>
<thead>
<tr>
<th>DIP Switch</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1</td>
<td>24</td>
</tr>
<tr>
<td>K2</td>
<td>24</td>
</tr>
<tr>
<td>K3</td>
<td>14</td>
</tr>
<tr>
<td>K4</td>
<td>14</td>
</tr>
<tr>
<td>K5</td>
<td>24</td>
</tr>
<tr>
<td>K6</td>
<td>14</td>
</tr>
<tr>
<td>K7</td>
<td>24</td>
</tr>
<tr>
<td>K8</td>
<td>11</td>
</tr>
<tr>
<td>K9</td>
<td>11</td>
</tr>
<tr>
<td>K10</td>
<td>12</td>
</tr>
<tr>
<td>K11</td>
<td>22</td>
</tr>
<tr>
<td>K12</td>
<td>22</td>
</tr>
<tr>
<td>K13</td>
<td>12</td>
</tr>
<tr>
<td>K14</td>
<td>22</td>
</tr>
<tr>
<td>K15</td>
<td>12</td>
</tr>
</tbody>
</table>
For Lane 1, the Lane Device Address is set with DIP switches at the device and is not editable at the PDA. To set the Lane Device Address for lanes 2 - 5, see “Setting Up Lane Loops and Outputs,” page 50. When you retrieve Lane Layout programming from the Ramp Controller, the device address displays on the screen in the PDA.

Each device on a port controller or NetPort must have a unique device address. Be sure to select a device address (from 0 to 31) that is not used by another lane on the Ramp Controller or another device on the port controller or NetPort.

Table 3.2: DIP Switch Settings for Device Address

<table>
<thead>
<tr>
<th>SW2 DIP Switch Bank</th>
<th>Value When Open (“OPEN” on switch bank)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIP Switch</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>16</td>
</tr>
</tbody>
</table>

For example, to assign device number 5 to the Ramp Controller, you would open DIP switches 1 and 3.

Figure 3.6
SW2 DIP Switch Bank Location
**Setting the ScanNet Termination DIP Switch**

DIP switch 8 on the DIP switch bank labeled SW2 is used to indicate whether or not this Ramp Controller is the last device on the RS-422 ScanNet communication line. Figure 3.6 shows the location of the DIP switch bank. Set DIP switch 8 to the closed position (labeled “YES” on enclosure) to indicate that this is the last device on the RS422 ScanNet communication line. Open the DIP switch (“NO” position) if this is not the last device.

<table>
<thead>
<tr>
<th>SW2 DIP Switch Bank, DIP Switch 8</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed (&quot;YES&quot;)</td>
<td>The Ramp Controller is the last device on the ScanNet communication line.</td>
</tr>
<tr>
<td>Open (&quot;NO&quot;)</td>
<td>The Ramp Controller is not the last device on the ScanNet communication line.</td>
</tr>
</tbody>
</table>

**Ramp Controller Installation Considerations**

---

**Warning!** When you install your 3M equipment, it becomes permanently connected to a power source. As a result, the equipment must have a readily accessible disconnect device incorporated in the fixed wiring. The disconnect must have a control separation of at least 3 mm (0.12 inch).

---

The Ramp Controller must be mounted within 100 feet of the detector loop, and must not exceed the maximum distance from the power supply as specified in Table 3.1 on page 22. One power supply may be used for up to 10 Ramp Controllers.

When installing the Ramp Controller, keep in mind that to program the device with the PDA you must be able to remove the cover of the Ramp Controller to access the infrared port and hold the PDA between 4 and 39 inches (10 centimeters and 1 meter) directly in front of the Ramp Controller infrared port. The path between the two devices must be clear of obstacles.

Mount the Ramp Controller and Power Supply to surfaces sturdy enough to withstand the weight of the units, securing them at the mounting feet with the appropriate hardware for the application. See Figure 1.1 and Figure 1.3 for the location of the mounting feet on the units.
Chapter 4: Getting Started Using the PDA

This chapter gives you the instructions you need before you begin to use a PDA (personal digital assistant, such as a Palm™ handheld, not included with the purchase of a Ramp Controller) to interface with the Ramp Controller. Interfacing with the Ramp Controller allows you to send programming to and get programming from the Ramp Controller, and also view information in the Ramp Controller such as vehicle counts and diagnostics information.

PDA Device Minimum Requirements

The PDA device that you use to interface with the Ramp Controller must meet the following minimum requirements:

- 8 MB internal memory or higher
- Palm OS® Software v4.0 or higher
- Capability to synchronize data between the PDA and a PC, for the installation of the Ramp Controller Programming Utility. For example, if you are using a Palm PDA, you will use the Palm Desktop software with HotSync® Manager and a HotSync cradle.

Palm Handheld models M125, M500, Zire, and Tungsten E have been tested with the Sign Controller for compatibility. Other Palm models and other PDA brands may also be used if found to be compatible.

For instructions on setting up and performing basic tasks on your PDA, refer to the user manual that came with the device. This Ramp Controller manual does not provide information about performing tasks on your PDA or with your PDA desktop software, other than those that pertain to interfacing with the Ramp Controller.

Using the Infrared Communication

Infrared communications uses the built-in infrared transceivers of the PDA and the Ramp Controller to transfer information. When communicating with the Ramp Controller, you must follow these guidelines:

- Keep the Ramp Controller enclosure open.
- Hold the PDA between 4 and 39 inches (10 centimeters and 1 meter) directly in front of the Ramp Controller infrared port.
- Keep the path between the two devices clear of obstacles.

Installing the Ramp Controller Programming Utility

To install the Ramp Controller Programming Utility on your PDA, do the following:
1. Obtain the Ramp Controller Programming Utility program files from the 3M web site, your
distributor, or your 3M support technician, and copy the files to your computer.

2. Install the Ramp Controller Programming Utility to your PDA from your computer following
the PDA manufacturer’s instructions for installing software on the PDA.

Logging On to the Ramp Controller Programming Utility

To work with the Ramp Controller Programming Utility, you must first log on to the application at
the PDA.

To open the Ramp Controller Programming Utility on the PDA, do the following:

1. Tap the Ramp Palm icon.

The Ramp Controller splash screen displays momentarily. To disable this screen, see
“Disabling the Splash Screen,” page 35.
After a few seconds, the Password Required window displays.

2. Enter the password for the Ramp Controller Programming Utility application.

Note: The first time you log on, enter FAPD (all uppercase letters) as the password. For security reasons, you should change the application password from the default value. See “Editing the Application Password,” page 34.

3. Tap OK.

The Ramp Controller main menu displays.

Before you log on to the Ramp Controller, the word OFFLINE displays in the upper right hand corner of the Ramp Controller main menu. After you log on to the Ramp Controller, the word ONLINE displays. See the next section, “Logging On to the Ramp Controller.”

Logging On to the Ramp Controller

To program the Ramp Controller with the PDA when it is directly connected (via infrared communications) to the Ramp Controller, you must log on to the Ramp Controller.

To log on to the Ramp Controller, do the following:
1. From the Ramp Controller main menu, tap **Login**.

The Password Entry screen displays.

2. Enter the Ramp Controller’s password.

   **Note:** The default password is **FAPD** (all uppercase letters). For security reasons, you should change the Ramp Controller password from the default value. See “ Editing the Ramp Controller Password,” page 34.

3. Tap **OK**. The word **ONLINE** displays in the upper right hand corner of the Ramp Controller main menu.

   **Note:** If no activity occurs with the PDA after approximately 5 minutes, you will automatically be logged off, and you will be prompted to re-enter the Ramp Controller password before you can communicate with the device. You may still complete certain tasks on the PDA while working offline; however, you cannot send or receive information between the PDA and the Ramp Controller.

### Setting Passwords

Passwords allow you to control who can program and access data contained in the PDA and Ramp Controller. There are two types of passwords in the Ramp Controller Programming Utility:

- **Application Password.** This password provides access to the Ramp Controller Programming Utility. The application password is stored in the PDA. There is one application password per PDA. The default password is FAPD (all uppercase letters); use the instructions in this section to change it.

- **Ramp Controller Password.** This password provides access to Ramp Controller programming when the PDA is directly connected to the Ramp Controller. The Ramp Controller password is stored in the Ramp Controller. If no activity occurs with the PDA after approximately 5 minutes, the system will log you off and you will be prompted to re-enter the Ramp Controller password before you can
communicate with the Ramp Controller. When logged on to the Ramp Controller, the word ONLINE displays in the upper right hand corner of the Ramp Controller main menu; when logged off, the word OFFLINE displays. There is one Ramp Controller password per Ramp Controller. The default password is FAPD (all uppercase letters); use the instructions in this section to change it.

**Editing the Ramp Controller Password**

To edit the password used to access the Ramp Controller device, do the following:

1. From the Ramp Controller main menu, tap **Commands**.
   
   The Commands menu displays.

   ![Commands Menu](image)

2. Tap **Set Passwd**.
   
   The Change Device Password screen displays.

   ![Change Device Password](image)

3. Enter the **Old Password**.
4. Enter the **New Password**.
5. Enter the new password again in the **Verify New Password** field.
6. Tap **OK**.

**Editing the Application Password**

To edit the password for accessing the Ramp Controller Programming Utility, do the following:

1. From the Ramp Controller main menu, tap **Options**.
   The Application Options screen displays.

2. Tap **Change Password**.
   The password fields display.

3. Enter the **Old Password**.
4. Enter the **New Password**.
5. Enter the new password again in the **Confirm Password** field.
6. Tap **OK**.
Disabling the Splash Screen

When you access the Ramp Controller Programming Utility, a splash screen displays showing the program icon, as follows:

![RAMP CONTROLLER PROGRAMMING UTILITY](image)

If you do not want the splash screen to display, you can disable it so that when you access the program, the Password Required screen will be the first screen to display.

1. From the Ramp Controller main menu, tap **Options**.
   
The Application Options screen displays.

   ![Application Options](image)

2. Tap the **Splash Screen** drop-down to display both the Enable and Disable options, and then tap **Disable**.

3. If you want to enable the splash screen again, tap the **Splash Screen** drop-down to display both the Enable and Disable options, and then tap **Enable**.

4. Tap **OK**.
Logging Off the Ramp Controller Programming Utility

1. From the Ramp Controller Programming Utility main menu, tap **Done**.
2. Turn off the PDA as instructed in the device’s user manual.
Chapter 5: Programming the Ramp Controller

This chapter provides instructions on using the Ramp Controller Programming Utility on a PDA to program the Ramp Controller.

Overview of Ramp Controller Programming

Some of the programmable features included with the Ramp Controller are: vehicle and tailgate sensitivities, counter and latched output assignments, extended presence time threshold, setting the device date and time, and resetting and initializing the device.

The Ramp Controller must be programmed using a PDA. In order to program the Ramp Controller using a PDA, you must install the 3M Ramp Controller Programming Utility on your PDA and connect to the Ramp Controller via infrared communications (see Chapter 4: “Getting Started Using the PDA”). The programming data is sent to the Ramp Controller and stored in its battery-backed static RAM. If a power failure occurs, the Ramp Controller is capable of retaining memory for approximately one year.

Ramp Controller programming is performed from the Commands and Program options from the Ramp Controller Programming Utility main menu on the PDA. Commands and Program functions are used similarly to send configuration data to the Ramp Controller. With Program options, however, you can also save the data on the PDA. With all Program options and some Commands, you can also retrieve current programming from the device.

The following options are used on various screens in the Ramp Controller Programming Utility:

- **Get From Device.** Allows you to retrieve existing programming from a Ramp Controller to the PDA where you can view and modify it and then either send it to a Ramp Controller or save it to the PDA. In order to get existing programming, you must be online with the Ramp Controller. See “Logging On to the Ramp Controller,” page 31.

- **Send To Device.** Allows you to send programming to the Ramp Controller that you have created or modified. In order to send existing programming, you must be online with the Ramp Controller. See “Logging On to the Ramp Controller,” page 31.

- **Save.** Allows you to save Ramp Controller programming to the PDA after you have created new programming or modified existing programming. This enables you to retrieve data without having to download it from a Ramp Controller. Ramp Controller programming is saved in the PDA until you overwrite it with new information and save it again. Once saved, programming data remains in the PDA even after the PDA has been turned off.

- **Refresh.** Used in Diagnostics options and similar to the Get From Device option, allows you to retrieve the current information from the Ramp Controller, refreshing the screen with this information. See Chapter 7: “Diagnostics and Troubleshooting.”
Setting the Ramp Controller’s Date and Time

In order for your system to function properly, you must set the correct time and date in each device in your parking system. First, you must set the correct time and date on the PDA according to the instructions that came with your device. Then, you must set the correct date and time for each of the connected Ramp Controllers.

To set the correct date and time for the Ramp Controller, do the following:

1. From the Ramp Controller Programming Utility main menu, tap **Commands**.

   The Commands menu displays.

   ![Commands Menu](image)

   ![Set Device Clock](image)

   2. Tap **Set Clock**. The Set Device Clock screen displays.

   3. To set the date in the Ramp Controller, do one of the following:

      - To set the Ramp Controller to the current date in the PDA, leave **Current Handheld Date** displayed in the Date field.

      - To set a date other than what is stored in the PDA, or if you do not know the current date stored in the PDA:
a. Tap **Current Handheld Date**.

The Select Date screen displays.

![Select Date Screen](image)

b. Select the appropriate **year**, **month**, and **day**. To select today’s date, tap **Today**.

The Set Device Clock screen displays showing the date you selected.

![Set Device Clock Screen](image)

4. To set the time in the Ramp Controller, do one of the following:

   - To set the Ramp Controller to the current time in the PDA, leave **Current Handheld Time** displayed in the Time field.

   - To set a time other than what is stored in the PDA, or if you do not know the current time stored in the PDA:

     a. Tap **Current Handheld Time**.
The Select Time screen displays.

![Select Time Screen](image)

b. Select the appropriate time.

c. Tap **OK**.

5. When the desired date and time are displayed in the Date and Time fields, tap **Send To Device**.

   The following program message displays.

![Program Message Screen](image)

6. Tap **OK**.

7. Tap **Done**.

**Resetting the Ramp Controller**

When a condition arises that affects the operation of the Ramp Controller, such as a detector loop or full sign locks up, or communication with ScanNet is lost, you may need to reset the Ramp Controller. If the Ramp Controller must be restarted for any reason, you can send the Reset command from the PDA. You can also reset the Ramp Controller by pressing the Reset button on the Ramp Controller. (See “Resetting the Ramp Controller,” page 40.) Resetting the Ramp Controller does not erase any programming that you have sent to it. It does log you off the Ramp
Controller device, so you must log on again if you want to continue programming or sending commands.

To reset the Ramp Controller, do the following:

1. From the Ramp Controller Programming Utility main menu, tap **Commands**.

   The Commands menu displays.

   ![Commands Menu](image1)

   2. Tap **Reset Device**.

      The following program message displays.

      ![Program Message](image2)

   3. Tap **OK**.

**Initializing the Ramp Controller and/or PDA**

If you experience problems with the current programming or wish to reprogram the PDA and/or the Ramp Controller, you can erase all programming in memory and initialize the PDA and/or Ramp Controller to the default parameters.
To initialize the Ramp Controller, PDA, or both devices, do the following:

1. From the Ramp Controller Programming Utility main menu, tap **Commands**.

   The Commands menu displays.

   ![Commands Menu](image)

2. From the Commands menu, tap **Initialize**.

   The Initialize prompt displays.

   ![Initialize Prompt](image)

   Do one of the following:

   - To initialize the PDA only, tap **Palm**.
   - To initialize the Ramp Controller only, tap **Ramp**.
   - To initialize both the PDA and the Ramp Controller, tap **Both**.
A program message displays indicating data has been initialized.

3. Tap **OK**.

If you chose to initialize both the PDA and the Ramp Controller, another program message displays indicating data has been initialized in the other device.

**Programming Extended Presence Time**

Extended presence is a method of informing the system when a vehicle has stayed on a loop longer than a specified number of seconds. When an extended presence is detected, the system sends a message to ScanNet. The default extended presence time is 90 seconds.

Programming the extended presence time does not affect the functionality of the Ramp Controller. It only allows you to set the length of time after which you want to be informed of a vehicle’s presence.

1. From the Ramp Controller main menu, tap **Program**.

The Program menu displays.

2. Tap **Ramp Options**.
The Ramp Options screen displays.

3. If you want to retrieve the extended presence time currently programmed in the Ramp Controller, tap **Get From Device**. The current setting displays on the screen.

4. Use the slider to adjust the extended presence time to the desired number of seconds, from 0 to 3600, or enter the desired value in the field.

5. Either send the programming to the Ramp Controller (**Send To Device**), or save the programming in the PDA (**Save**).

**Programming Loop Options**

You must use the PDA to enable the loops and program the loop settings. You can also load the existing loop settings from the Ramp Controller to the PDA.

**Enabling and Disabling Loops**

You must enable the loops to make them functional. Until the loops are enabled, they will not function within the lane. You may enable up to five loops for one Ramp Controller.

1. From the Ramp Controller Programming Utility main menu, tap **Program**.

   The Program menu displays.
2. Tap **Loop Options**.

The Loop Options screen displays.

3. If you want to retrieve the loop options currently programmed in the Ramp Controller, tap **Get From Device**. The current settings display on the screen.

4. Tap the loop name displayed after **Settings for** to display the list of loops.

5. Tap the loop you want to program the options for.

6. To enable the loop, tap the **Enabled** box so that a check mark displays in the check box. To disable the loop, tap the **Enabled** box to remove the check mark from the check box.

7. Either send the programming to the Ramp Controller (**Send To Device**), or save the programming in the PDA (**Save**).

   **Note:** All Loop Options for all loops will be sent or saved as they are selected on the screen.

---

**Setting the Loop Vehicle Detection Sensitivity**

The loop vehicle detection sensitivity determines at what distance from the loop coil that the loop detector detects the presence of a vehicle. Sensitivity settings range from 0 to 9, where 0 is the most sensitive and 9 is the least sensitive. The default value is 3. For more information about loop sensitivity, “Loop Sensitivity,” page 14.

1. From the Ramp Controller Programming Utility main menu, tap **Program**.
The Program menu displays.

2. Tap **Loop Options**.

The Loop Options screen displays.

3. If you want to retrieve the loop options currently programmed in the Ramp Controller, tap **Get From Device**. The current settings display on the screen.

4. Tap the loop name displayed after **Settings for** to display the list of loops.

5. Tap the loop you want to program the option for.

6. To display the range of vehicle detection sensitivity settings, tap the number displayed after **Vehicle Detect Sensitivity**.

7. From the drop-down list, tap the sensitivity you want to set for the loop. 0 is the most sensitive and 9 is the least sensitive.

8. Either send the programming to the Ramp Controller (**Send To Device**), or save the programming in the PDA (**Save**).

**Note:** All Loop Options for all loops will be sent or saved as they are selected on the screen.
Enabling Tailgate Detection

Tailgate detection is the feature that enables a loop detector to detect the presence of a second vehicle following within six inches of another vehicle over a 2 ft. 6 in. x 6 ft. (.76 m x 1.8 m) loop coil. For more information about detecting tailgating, see “Detecting Vehicles that Tailgate,” page 14.

Tailgate detection is disabled by default. Follow these instructions to enable and disable it.

1. From the Ramp Controller Programming Utility main menu, tap Program.

   The Program menu displays.

   ![Program Menu](image)

2. Tap Loop Options.

   The Loop Options screen displays.

   ![Loop Options Menu](image)

3. If you want to retrieve the loop options currently programmed in the Ramp Controller, tap Get From Device. The current settings display on the screen.

4. Tap the loop name displayed after Settings for to display the list of loops.

5. Tap the loop you want to program the option for.

6. To enable tailgate detection, tap the Detect Tailgating box so that a check mark displays. To disable the tailgate detection option, tap the Detect Tailgating box to remove the check mark from the check box.
7. Either send the programming to the Ramp Controller (Send To Device), or save the programming in the PDA (Save).

**Note:** All Loop Options for all loops will be sent or saved as they are selected on the screen.

### Setting Tailgate Sensitivity

The tailgate sensitivity determines how sensitive the loop detector is at detecting the presence of a second vehicle following within six inches of another vehicle over a 2 ft. 6 in. x 6 ft. (.76 m x 1.8 m) loop coil. Tailgate settings range from 0 to 8, where 0 is the least sensitive, and 8 is the most sensitive. The default value is 6. For more information about detecting tailgating, “Detecting Vehicles that Tailgate,” page 14.

1. From the Ramp Controller Programming Utility main menu, tap Program.

   The Program menu displays.

   ![Program Menu](image)

2. Tap Loop Options.

   The Loop Options screen displays.

   ![Loop Options](image)

3. If you want to retrieve the loop options currently programmed in the Ramp Controller, tap Get From Device. The current settings display on the screen.
4. Tap the loop name displayed after **Settings for** to display the list of loops.

5. Tap the loop you want to program the option for.

6. To display the range of tailgate sensitivity settings, tap the number displayed after **Tailgate Sensitivity**.

7. From the drop-down list, tap the sensitivity you want to set for the loop. 0 is the least sensitive and 8 is the most sensitive.

8. Either send the programming to the Ramp Controller (**Send To Device**), or save the programming in the PDA (**Save**).

---

**Note:** *All Loop Options for all loops will be sent or saved as they are selected on the screen.*
Setting Up Lane Loops and Outputs

Each Ramp Controller can control up to 5 loops.

Each Ramp Controller can control up to a total of 8 outputs, either pulsed, latched, or any combination of the two. Outputs are typically used for forward and reverse counts (pulsed outputs) and full sign activation (latched outputs).

You can set up these outputs and loops in various combinations among 1-5 lanes.

Here are some examples of how a Ramp Controller’s loops and outputs may be set up:

Ramp Controller Example A:

- Lane 1: Bi-directional with Loop A and B (A to B is forward count; B to A is reverse count). Output 1 for full sign. Outputs 5 and 6 for counts.
- Lane 2: Bi-directional with Loop E and C. Output 2 for full sign. Outputs 7 and 8 for counts.

Ramp Controller Example B:

- Lane 1: Uni-directional with Loop A. Output 1 for count.
- Lane 2: Uni-directional with Loop E. Output 2 for count.
- Lane 3: Uni-directional with Loop C. Output 3 for count.
- Lane 4: Uni-directional with Loop D. Output 4 for count.

Note: Outputs 1-4 on the Ramp Controller are wired at the factory to the Ramp Controller’s four high voltage relays, each rated at 120 VAC at 10 Amps. If you are wiring a high voltage device to the Ramp Controller, such as a large incandescent full sign, use one of the outputs 1-4. If you have no high voltage devices, you may still use outputs 1-4 for low voltage devices (up to 42 VAC each).

To set up lanes, including loops and outputs, follow these steps:

1. From the Ramp Controller Programming Utility main menu, tap Program.

The Program menu displays.
2. Tap **Lane Layout**.

The Lane Layout screen displays.

![Lane Layout Screen](image)

3. To retrieve the lane layout currently programmed in the Ramp Controller, tap **Get From Device**. The current settings display on the screen as shown in step 6.

4. To select a lane other than the one displayed, tap the lane name in the upper right corner of the screen to display the list of lanes.

5. Tap the **Enabled** check box to enable the lane.

6. Tap the **Enabled** check box to enable the lane.

The Lane Layout options display.

![Lane Layout Options](image)

7. For Lane 1, the Lane Device Address is set with DIP switches at the device and is not editable at the PDA. To set the Lane Device Address for lanes 2 - 5, tap the **Lane Device Address** drop-down list to display the device addresses, and then tap the address you want to assign to the lane.

Each device on a port controller or NetPort must have a unique device address. Be sure to select a device address (from 0 to 31) that is not used by another lane on the Ramp Controller or another device on the port controller or NetPort.
8. To set the primary loop, tap the **Primary Loop** drop-down list to display the loops, and then tap the loop you want to set as the primary loop.

The primary loop indicates direction of traffic flow in the lane. Flow from the primary loop to the secondary loop is a forward count; flow from the secondary loop to the primary loop is a reverse count.

**Note:** You may name only one Loop “A,” one Loop “B,” etc. for each Ramp Controller. For example, if you name Loop “A” and Loop “B” for Lane 1 and you want to set up a second lane, you must use Loop “C,” etc.

9. To set the secondary loop (used for bi-directional lanes), tap the **Secondary Loop** drop-down list to display the loops, and then tap the loop you want to set as the secondary loop. If there is no secondary loop in the lane (lane is uni-directional), select **Unused**.

10. To select an output on the Ramp Controller that will be used for a pulsed output, such as forward counts, tap the **Fwd Count Pulse Output** drop-down list to display the outputs, and then tap the output you want to set. If you do not want to use a pulsed output in this lane, select **Unused**.

11. To select an output on the Ramp Controller to be used for a second pulsed output, such as reverse counts (vehicle travels from secondary loop to primary loop), tap the **Rev Count Pulse Output** drop-down list to display the outputs, and then tap the output you want to set. If you do not want to use a second pulsed output in this lane, select **Unused**.

**Note:** The Rev Count Pulse Output option will not display if you have not enabled a secondary loop, because you must use two loops to track reverse counts.

12. To select an output on the Ramp Controller that will be used for a latched output for this lane, such as a full sign, tap the **Latched Output I** drop-down list to display the outputs, and then tap the output you want to set. If you do not want to set a latched output for this lane, select **Unused**.

This output will be controlled from ScanNet as Controlled Output 1.

**Note:** Outputs 1-4 on the Ramp Controller are wired at the factory to the Ramp Controller’s four high voltage relays, each rated at 120 VAC at 10 Amps. If you are wiring a high voltage device to the Ramp Controller, such as a large incandescent full sign, use one of the outputs 1-4. If you have no high voltage devices, you may still use outputs 1-4 for low voltage devices (up to 42 VAC each).

13. To select an output on the Ramp Controller that will be used for a second latched output for this lane, such as a second full sign, tap the **Latched Output II** drop-down list to display the
outputs, and then tap the output you want to set. If you do not want to set a second latched output for this lane, select Unused.

14. When you are done setting the lane layout options, send the programming to the Ramp Controller (Send To Device), or save the programming in the PDA (Save).

Note: All Lane Layout options for all lanes will be sent or saved as they are selected on the screen.

Turning Latched Outputs On and Off

After you have set up a latched output, such as a full sign (see “Setting Up Lane Loops and Outputs,” page 50), you can turn them on and off by sending a command from the PDA. For example, if you have set up a latched output to control a full sign, setting the output “on” will cause the full sign to display “Full.”

1. From the Ramp Controller Programming Utility main menu, tap Commands.

The Commands menu displays.

2. Tap Latched Outputs.
The Latched Outputs screen displays.

![Latched Outputs Screen](image)

3. If you first want to know which latched outputs are currently on and off, retrieve that from the Ramp Controller by tapping **Get From Device**.

The screen displays the current on and off status of the Ramp Controller’s latched outputs.

![Latched Outputs Screen](image)

4. To enable a latched output, tap **On**. To disable it, tap **Off**.

Keep in mind that the only latched outputs operating are the ones you have programmed to work with one of the Ramp Controller’s outputs. If you want to know which lanes are set up to use latched outputs, see “Setting Up Lane Loops and Outputs,” page 50.

5. When you are done selecting which latched outputs you want to enable and disable, either send the programming to the Ramp Controller (**Send To Device**), or save the programming in the PDA (**Save**).

### Loading All Programming from the Ramp Controller to the PDA

You can retrieve all programming from the Ramp Controller and load it on the PDA using the Load/Send option from the Ramp Controller Programming Utility main menu. This option loads all items programmable under the **Program** option on the main menu.
1. From the Ramp Controller Programming Utility main menu, tap **Load/Send**.

The screen displays the prompt allowing you to select whether you want to load programming from the Ramp Controller or send programming to the Ramp Controller.

2. Tap **Load**.

A message displays, indicating whether the load was successful.

3. Tap **OK**.

If the configuration was not received, repeat these steps to attempt it again.

---

**Sending All Programming from the PDA to the Ramp Controller**

You can send all programming from the PDA to the Ramp Controller using the Load/Send option from the Ramp Controller Programming Utility main menu. This option sends all items programmed under the **Program** option on the main menu.

---

**Caution:** When you do this you overwrite all programming in the Ramp Controller with the programming you have set up in the PDA!

---

1. From the Ramp Controller Programming Utility main menu, tap **Load/Send**.
The screen displays the prompt allowing you to select whether you want to load programming from the Ramp Controller or send programming to the Ramp Controller.

2. Tap **Send**.

*Caution:* When you do this you overwrite all programming in the Ramp Controller with the programming you have set up in the PDA!

One of the following messages display, indicating whether the send was successful.

3. Tap **OK**.

If the configuration was not sent, repeat steps 1 - 3 to attempt it again.
Chapter 6: Viewing Counts and Status Messages

Viewing Vehicle Counts Using the PDA

Using the PDA you can retrieve vehicle counts from a Ramp Controller, and you can also clear counts for one or more lanes (set them to 0).

1. From the Ramp Controller Programming Utility main menu, tap **Commands**.

   The Commands menu displays.

   ![Commands Menu](image)

2. Tap **Vehicle Counts**.

   The Vehicle Counts screen displays.

   ![Vehicle Counts Screen](image)

3. To retrieve vehicle counts from the Ramp Controller:
   
   a. The screen displays either forward or reverse counts, depending on which is selected at the top right corner of the screen. To change what is displayed, tap Forward/Reverse to display both, and then tap the one you want to retrieve.

   b. Tap **Get From Device**.
The screen displays the vehicle counts you retrieved.

![Vehicle Counts Table]

4. To set vehicle counts for one or more lanes to 0:
   a. Tap **Clear** for each lane you want to set to 0. The count for that lane will change to 0.
      The count will not change at the Ramp Controller until you complete the next step to send it to the device. If you have cleared a count in error, repeat the Get From Device command before tapping Send to Device.
   b. Tap **Send To Device**.

**Viewing Vehicle Counts in ScanNet**

When you have set up the Ramp Controller to communicate with ScanNet and have set up the outputs to send vehicle count information to ScanNet, you can view current vehicle counts in the ScanNet Counts Monitor window.

*Note:* ScanNet will report on the Ramp Controller with a device type as a Barrier Gate.

For more information about setting up the device in ScanNet and viewing vehicle counts, see the *ScanNet Operator Manual*.

**Reviewing Status Indicators in ScanNet**

When you have set up the Ramp Controller to communicate with ScanNet, you can view device information in the ScanNet System Activity Monitor window, including device online, offline, and extended loop presence messages. The device information area of the screen also indicates lane presence with the vehicle icon.

Device information such as loop presence and loop frequency display in the Counts Monitor.

Extended loop presence messages display in the System Activity Monitor window.

*Note:* ScanNet will report on the Ramp Controller with a device type as a Barrier Gate.
For more information about setting up the device in ScanNet and viewing vehicle counts, see the *ScanNet Operator Manual.*
Chapter 7: Diagnostics and Troubleshooting

You can use the PDA to view diagnostic information for the Ramp Controller, such as loop status, current loop frequencies, forward and reverse counts, loop presence detected, and latched outputs on/off.

Note: For instructions on troubleshooting a loop, see “Troubleshooting the Loop Detector,” page 15.

Viewing the Loop Status

Using the PDA, you can view information about the status of a loop controlled by the Ramp Controller, including: whether it is functioning, whether a vehicle is present, the maximum frequency detected, whether it is unstable, its free run frequency, and its current frequency. These indicators are described in Table 7.1. To view the status of a loop, follow these steps:

1. From the Ramp Controller Programming Utility main menu, tap Commands.

   The Commands menu displays.

   ![Commands Menu]

2. Tap Diagnostics.
The Diagnostics menu displays.

![Diagnostics Menu](image)

3. Tap **Loop Status**.

   The Loop Status screen displays.

   ![Loop Status Screen](image)

4. Tap the loop name displayed after **Status for loop** to display the list of loops.

5. Tap the loop you want to status information for.

6. Tap **Refresh**.
The current loop status figures display for the selected loop.

Table 7.1 describes the information on the Loop Status screen.

**Table 7.1: Loop Status Screen Field Descriptions**

<table>
<thead>
<tr>
<th>Field/Checkbox</th>
<th>Indicates:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional</td>
<td>If checked, indicates the loop is functioning.</td>
</tr>
<tr>
<td>In-Presence Mode</td>
<td>If checked, indicates a vehicle is present on the loop.</td>
</tr>
<tr>
<td>Minimum Frequency Detected</td>
<td>Minimum frequency for this loop. For more information on acceptable loop frequencies, see “Crosstalk and Loop Coil Frequency,” page 12.</td>
</tr>
<tr>
<td>Maximum Frequency Detected</td>
<td>Maximum frequency for this loop. For more information on acceptable loop frequencies, see “Crosstalk and Loop Coil Frequency,” page 12.</td>
</tr>
<tr>
<td>Unstable</td>
<td>If checked, indicates that the physical integrity of the loop may be compromised.</td>
</tr>
<tr>
<td>Free Run Frequency</td>
<td>Expected frequency of the loop when no vehicle is present. This frequency is reset when the Tune Loops button is pressed. The Free Run Frequency is used as the basis of all of the other detection points.</td>
</tr>
<tr>
<td>Current Frequency</td>
<td>Current frequency reading on the selected loop.</td>
</tr>
</tbody>
</table>

7. If you want the Ramp Controller to continually refresh the loop status figures while you are viewing this screen, tap **Auto Refresh**. You must hold the PDA in the correct position directly in front of the Ramp Controller’s infrared port in order for the information to continually refresh.

8. Minimum Frequency Detected, Maximum Frequency Detected, and Unstable are flags in the loop that occur when these conditions are reached. To clear the flags from the loop tap **Clear Status**. The flags will clear from the loop until the condition occurs again.

9. Tap **Done**.
Viewing the Current Loop Frequencies

Using the PDA, you can view the current loop frequency for each loop controlled by the Ramp Controller. This may be helpful when troubleshooting malfunctioning loops. For more information on loop frequencies, see “Crosstalk and Loop Coil Frequency,” page 12.

To view the current loop frequencies, do the following:

1. From the Ramp Controller Programming Utility main menu, tap **Commands**.

   The Commands menu displays.

   ![Commands Menu]

2. Tap **Diagnostics**.

   The Diagnostics menu displays.

   ![Diagnostics Menu]

3. Tap **Loop Frequencies**.

   ![Loop Frequencies Menu]
The Loop Frequencies screen displays.

4. Tap **Refresh**.

The current loop frequencies display.

5. If you want the Ramp Controller to continually refresh the loop frequencies while you are viewing the screen, tap **Auto Refresh**. You must hold the PDA in the correct position directly in front of the Ramp Controller’s infrared port in order for the information to continually refresh.

6. When you are done viewing the loop frequencies, tap **Done**.

**Viewing the Lane Status**

Using the PDA, you can view the current lane status for each loop controlled by the Ramp Controller. This information includes counts, frequencies, presence detection, and Output I and Output II “on” indicators. For a description of the fields on the Lane Status screen, see Table 7.2. To view the lane status information, do the following:

1. From the Ramp Controller Programming Utility main menu, tap **Commands**.
The Commands menu displays.

<table>
<thead>
<tr>
<th>Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>INITIALIZE</td>
</tr>
<tr>
<td>SET CLOCK</td>
</tr>
<tr>
<td>SET PASSWD</td>
</tr>
<tr>
<td>RESET DEVICE</td>
</tr>
<tr>
<td>DIAGNOSTICS</td>
</tr>
<tr>
<td>LATCHED OUTPUTS</td>
</tr>
<tr>
<td>VEHICLE COUNTS</td>
</tr>
</tbody>
</table>

2. Tap **Diagnostics**.

The Diagnostics menu displays.

<table>
<thead>
<tr>
<th>Diagnostics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loop Status</td>
</tr>
<tr>
<td>Loop Frequencies</td>
</tr>
<tr>
<td>Lane Status</td>
</tr>
</tbody>
</table>

3. Tap **Lane Status**.

The Lane Status screen displays.

<table>
<thead>
<tr>
<th>Lane Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>▼ Lane 1</td>
</tr>
<tr>
<td>Forward Count: 0</td>
</tr>
<tr>
<td>Loop 1 Frequency: 0</td>
</tr>
<tr>
<td>Loop 1 Presence Detected</td>
</tr>
<tr>
<td>Output I On</td>
</tr>
<tr>
<td>[Auto Refresh] [Refresh]</td>
</tr>
<tr>
<td>[DONE]</td>
</tr>
</tbody>
</table>
4. Tap the lane name displayed in the upper right corner of the screen to display the list of lanes.
5. Tap the lane you want to view the status information for.
6. Tap **Refresh**.

The lane status information displays for the selected lane.

![Lane Status Screen](image)

Table 7.2 describes the fields on the Lane Status screen.

**Table 7.2: Lane Status Screen Field Descriptions**

<table>
<thead>
<tr>
<th>Field/Checkbox:</th>
<th>Indicates:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward Count</td>
<td>Count of vehicles that traveled forward in the lane, or from the primary loop to the secondary loop.</td>
</tr>
<tr>
<td>Reverse Count</td>
<td>Count of vehicles that traveled in the reverse direction in the lane, or from the secondary loop to the primary loop.</td>
</tr>
<tr>
<td>Loop 1 Frequency</td>
<td>Current frequency reading for Loop 1.</td>
</tr>
<tr>
<td>Loop 2 Frequency</td>
<td>Current frequency reading for Loop 2.</td>
</tr>
<tr>
<td>Loop 1 Presence Detected</td>
<td>If checked, indicates a vehicle is present on Loop 1.</td>
</tr>
<tr>
<td>Loop 2 Presence Detected</td>
<td>If checked, indicates a vehicle is present on Loop 2.</td>
</tr>
<tr>
<td>Output I On</td>
<td>If checked, indicates the first latched output, such as a full sign, is on.</td>
</tr>
<tr>
<td>Output II On</td>
<td>If checked, indicates the second latched output, such as a full sign, is on.</td>
</tr>
</tbody>
</table>

7. If you want the Ramp Controller to continually refresh the lane status information while you are viewing the screen, tap **Auto Refresh**. You must hold the PDA in the correct position directly in front of the Ramp Controller’s infrared port in order for the information to continually refresh.

8. When you are done viewing the lane status information, tap **Done**.
Reviewing LED Indicators

The Ramp Controller has several LED indicator lights that provide certain information about the state of the Ramp Controller. Figure 7.1 shows the location of these LEDs.

**Note:** Other LEDs on the controller are not used for the Ramp Controller.

**LED 32 - Loop Presence and Tuning.** LED 32 consists of 10 LED lights that indicate loop presence and tuning. Each loop A-E has one LED for presence and one for tuning. The tuning LED pulses as the loop is tuning. A functional loop should tune itself every 8 seconds as long as a vehicle is not present. If a vehicle drives on to the loop, it stops tuning and the presence LED will light.

**LED 27 - Power On.** When lit, the Power On LED indicates the Ramp Controller is receiving +24V power.

**LED 31 - Loop Power.** When lit, the Loop Power LED indicates the loops are receiving +12V power.

**LED 12 - Relay Output Status.** LED12 consists of 10 LED lights. Lights 1-8, when lit, indicate that the relay output is active. Light 9 and 10 are not used.

**LED 1 - Communication Status.** LED 1 indicates the communication status for various ports and processes. The following apply to the Ramp Controller (others not noted here do not apply):

- RXB and TXB are the ScanNet communication status indicators.
- RXC and IRTXC are the transmit and receive status indicators for the PDA (personal digital assistant).
- CS3 is the indicator for transmissions between the UART and the processor.
- Exar IRQ is the indicator for the UART interrupt request.
Resetting the Ramp Controller

When a condition arises that affects the operation of the Ramp Controller, such as a detector loop or full sign locks up, or communication with ScanNet is lost, you may need to reset the Ramp Controller.

If the Ramp Controller must be restarted for any reason, you can reset it using the Reset button on the Ramp Controller board, or you can send the Reset command from the PDA (see “Resetting the Ramp Controller,” page 40).

Resetting the Ramp Controller restarts it. It does not erase any programming that you have sent to it. It does log you off the Ramp Controller device, so you must log on again if you want to continue programming or sending commands.

To reset the Ramp Controller, press the Reset button on the board, labeled SW1, as shown in Figure 7.2.
Figure 7.2
Reset Button

SW1 - Reset Button
Chapter 8: Updating Firmware for the Ramp Controller

For many 3M devices, including the Ramp Controller, firmware is stored in a Flash memory device on the controller board, allowing you to load or update firmware via a serial or Ethernet connection from a computer with the 3M firmware update program.

Before You Start

You may update device firmware via a serial connection at the device or via an Ethernet connection at the device. Updating with an Ethernet connection is usually much quicker.

For a serial connection, to load firmware to the Ramp Controller, you must have the following:

- Laptop or desktop computer with a serial port
- RS232 serial cable (with special pin-out, available for purchase from 3M). See Figure 8.1.
- FlashProgrammer program installed on the computer, available from the 3M web site or authorized 3M technician (instructions included in this chapter)
- Firmware flash file, available from the 3M web site or authorized 3M technician

For an Ethernet connection, to load firmware to the Ramp Controller, you must have the following:

- Laptop or desktop computer with an Ethernet port
- Ethernet crossover patch cable
- FlashProgrammerE program installed on the computer, available from the 3M web site or authorized 3M technician (instructions included in this chapter)
- Firmware flash file, available from the 3M web site or authorized 3M technician
Updating Firmware Using a Serial Connection

Installing the FlashProgrammer Program

The FlashProgrammer program allows you to update firmware for 3M devices. You must install this program on the computer you will be using to load the firmware to the Ramp Controller. If you do not already have this program installed, install it as follows:

1. Obtain the FlashProgrammer Program files from the 3M web site, your distributor, or your 3M support technician, and copy the files to your computer.

2. Double-click the setup.exe file from the folder where you copied the FlashProgrammer files. The following window is displayed.

3. Click OK.

4. The program will be installed to the C:\Program Files\FlashProgrammer folder. To use this default, click the installation button. If you want to change the destination, click Change.
Directory, find and select the folder you want to install to, and then click the installation button.

5. Select the program group this application will reside in, and then click Continue.

6. After the program is installed and the above message box is displayed, click OK.

Connecting the Computer to the Ramp Controller

Connect the computer with the FlashProgrammer program to the Ramp Controller using an RS-232 serial cable.

The cable connects to a communications port on the computer and to the J1 CPU DEBUG connection on the Ramp Controller. See Figure 8.2 for the location of this connection. Make sure the connection cable has the following pin-out:
**Loading Firmware to the Ramp Controller**

After you have installed the FlashProgrammer program and connected the computer to the Ramp Controller, follow these steps to load the Ramp Controller firmware:

1. Copy the firmware flash file from the 3M web site to the hard drive on the computer you are using to load the firmware.
2. Disconnect the RS-422 communication cable from the Ramp Controller (J3 connector), so that the rest of the system is not affected by the data being transmitted to the Ramp Controller from the computer.

3. Start the FlashProgrammer program by clicking Start>Programs>FlashProgrammer. An introduction window is displayed and then the following window is displayed:

![Flash Programmer Window]

4. From the Serial Port menu, click Setup, and make sure that the correct COM port is selected, typically COM 1.

5. From the Options menu, select 68332 Flash Program.

6. Either click the Select File button; or from the File menu, click Select File.
   A warning window will be displayed. Make sure you consider it carefully. You must select the correct firmware file for the equipment you want to update, or the device may be inoperative.
Click the warning window to close it, and then a window similar to the following will be displayed:

![Load File Window](image)

7. Select the desired Ramp Controller firmware file. The file must end with the “.flash” extension. Then, click **Open**.

8. A window will be displayed, confirming your selection. Either click **Continue** to accept your selection, or click **Cancel** to return to the Flash Programmer window.

9. After you click Continue, the program will attempt to connect to the device. The message box in the window will display “Connecting...”

   Once a connection is established, the message box in the window will display “Downloading...” and it will download the selected firmware file. Do not click Cancel or Exit during the download unless absolutely necessary. The firmware will not be properly updated. If you do click Cancel or Exit, you must start the procedure again with step 4.

   If an error occurs during the download, one of the following two error messages will display in the message box in the window:

   - **Download Error.** An error occurred downloading the file or burning the flash. In this case, click **Cancel** and start the procedure again at step 4.

   - **Error.** An error occurred in the connection between the device and the PC. Make sure the cables are connected securely. Click **Cancel**, and start the procedure again at step 4.

10. When the firmware download is complete, the message box in the window will display “Download Complete.” When the download is completed, click **Exit** to close the FlashProgrammer program.
Updating Firmware Using an Ethernet Connection

Although the option to update the Ramp Controller over a network is not currently available, you can connect a Ramp Controller to a computer using an Ethernet connection between the two.

Installing the FlashProgrammerE Program

The FlashProgrammerE program allows you to update firmware for 3M devices with an Ethernet connection. You must install this program on the computer you will be using to load the firmware to the Ramp Controller. If you do not already have this program installed, install it as follows:

1. Obtain the FlashProgrammerE program from the 3M web site, your distributor, or your 3M support technician.
2. Copy the FlashProgrammerE.exe file to the computer.

Connecting the Ramp Controller

Connect the Ramp Controller to the desktop or laptop computer using an Ethernet crossover patch cable connected to the J15 Ethernet 10-Base-T (RJ-45) connection on the Ramp Controller. See Figure 8.3 for the location of the connection.

Figure 8.3
Ethernet Connection on Controller for Firmware Update

Loading Firmware to the Ramp Controller

After you have installed the FlashProgrammerE program and the Ramp Controller is connected to the computer, follow these steps to load the Ramp Controller firmware:
1. Copy the firmware flash file to the hard drive on the computer you are using to load the firmware.

2. Start the FlashProgrammerE program by opening the **FlashProgrammer.exe** file.

3. Click the **Single** option.
   
   **Note:** The Multiple option is currently not available for the Ramp Controller.

4. Enter the device’s IP address as **192.168.0.1** in the **Single** box. To enter the 1 after the last decimal, either type a period or click the mouse to move there.

   **Note:** You must use this device address for all Ramp Controllers! The computer must be configured to see the device at this address. For assistance with this configuration, see your network administrator.

5. Click the **Select** button.

6. Browse to and select the firmware flash file you want to update the device(s) with.
The file name displays in the File box.

7. Click the **Program** button to start the firmware update.

   If data becomes corrupted before the download takes place, the system aborts the download and displays the message “Device x.x.x.x download CRC failed. Update FAILED!” where x.x.x.x is the IP address of the device. If this happens, attempt the download again.

   If you have selected a firmware flash file that is invalid for the device, for example: the TD-300 firmware file is selected for download to a Ramp Controller, a message displays prompting you to cancel the update. If you selected the wrong firmware flash file, cancel the update and select the correct file.

   When the download is in progress, the word “Idle” changes to “Downloading.” Also, the Current Device box displays the IP address of the device currently being updated, and the message box at the bottom of the window displays the status of the update.

   When the application finishes updating the device(s), a message box displays indicating the results.

8. Click **OK** to clear the window.

9. When you are done updating firmware, click **Exit**.
Appendix A: Repairs, Parts, and Ordering

Repair Procedure

If a problem occurs with a product part, in many cases you can return the part to the Repair Center for repair. All repairs require the following:

- Returned Materials Authorization (RMA) form.

- Purchase order (PO) number. A PO number is required whether the repair is under warranty or not.

To request a repair:

1. Contact Product Support at 877-777-3571; the 3M global number is 512-984-9255.
2. Acquire a PO number from your company.
3. Fill out the RMA form. In addition to the Customer and Product information, be sure to include the following information:
   - In the Customer PO Number field, enter the PO number assigned by your company. A PO number is required whether the repair is under warranty or not.
   - If the part is under warranty, enter the original sales order number in the Warranty box.
   - If the part is no longer under warranty, check the Billable box.
   - To expedite the repairs, check Yes next to Expedited Service Requested.
      Note: The cost of expedited service is indicated on the RMA form.
4. E-mail or fax the form to the e-mail address or fax number provided on the bottom of the form. Within 36 hours, you will receive an RMA number from 3M Customer Support.
5. Ship the part to the address indicated on the RMA approval.

SHIPPING/RECEIVING NOTICE
Include the RMA number on the shipping label. 3M cannot accept packages without RMA numbers.
Part Numbers

The following part numbers may be used when ordering replacements for the Ramp Controller:

<table>
<thead>
<tr>
<th>Part</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply (power unit only)</td>
<td>21-11927</td>
</tr>
<tr>
<td>Controller Board</td>
<td>12-10423</td>
</tr>
</tbody>
</table>

Placing an Order

To place an order:

Locate the applicable part number. Refer to “Finding a Part Number.”

If the part number is not included in this manual, contact 3M Customer Support for part names, part numbers, prices, and delivery information at one of the following telephone numbers:

USA and Canada: 877-777-3571
Global support: 512-984-9255

Fill out a purchase order from your company.

For U.S. orders:

Fax, email, mail, or telephone the purchase order to:

3M Company - MVSS
3M Center, Bldg 235-3A-09
St. Paul, MN 55144-1000

Email: parkingorderprocessing@mmm.com
Phone: 1-877-777-3571
Fax: 1-800-591-9293

For International orders not through a 3M subsidiary:

Fax, email, mail, or telephone the purchase order to:

3M Company
3M Center, Global Channel Services
I-94 & McKnight Rd
Saint Paul, MN 55144-1000

Email: 3MGCSOrders@mmm.com
Office: 1-651-736-5381
Fax: 1-651-736-5672
Finding a Part Number

Contact a 3M Parking Customer Support representative for part number information. For the United States and Canada, call 877-777-3571; the 3M global number is 512-984-9255.
If you have a product question that is not addressed in the documentation, contact your 3M Parking Value Added Reseller (VAR). If you are a VAR or you do not have a VAR, call 3M Product Support at one of the telephone numbers listed in the table below.
Whether you call, write, or fax, please have the following information available:

- A description of the events and the order in which they occurred
- The type of hardware you are using, with serial number and model number
- Firmware version, if applicable
- The type and configuration of software you are using
- Original sales order number
- Any messages that appear on your display screen and the exact wording
- Project name
- Returned Materials Authorization (RMA) number, if applicable

| Table 1.1 3M Product Support Phone Numbers |
|-------------------------------|-----------------|-----------------|
| **Location**                  | **Phone**       | **Fax**         |
| United States                 | (877) 777-3571  | (512) 984-3367  |
| Canada                        | (877) 777-3571  | (512) 984-3367  |
| Central America               |                 |                 |
| South America                 | (512) 984-9255  | (512) 984-3367  |
| Asia                          |                 |                 |
| Australia                     |                 |                 |
| China                         |                 |                 |
| Hong Kong                     |                 |                 |
| India                         |                 |                 |
| Indonesia                     |                 |                 |
| Korea                         |                 |                 |
| Malaysia                      |                 |                 |
| New Zealand                   |                 |                 |
| Philippines                   |                 |                 |
| Singapore                     |                 |                 |
| Taiwan                        |                 |                 |
| Thailand                      |                 |                 |
| Vietnam                       |                 |                 |
| Bahrain                       |                 |                 |
| Egypt                         |                 |                 |
| Europe                        |                 |                 |
| Greece                        |                 |                 |
| Greenland                     |                 |                 |
| Iceland                       |                 |                 |
| Jordan                        |                 |                 |
| Saudi Arabia                  |                 |                 |
| Turkey                        |                 |                 |
| UAE                           |                 |                 |
| Bahrain                       | (512) 984-9255  | (512) 984-3367  |
Accessing the 3M Parking VAR Resource Center

If you are a 3M Parking Value Added Reseller (VAR), please request the link to the VAR resource center by emailing:

parkingtechsupport@mmm.com.

The resource center site will contain the following:

- Product information
- Software upgrades when they are available
- Frequently Asked Questions
- Explosion drawings and product part numbers for some products
Glossary

Crosstalk. A condition that occurs when two loops in close proximity are operating in the same frequency range, causing loop failure. Crosstalk can be corrected by adjusting the frequency settings of the detectors so that adjacent loops do not operate within the same frequency range.

DIP Switches. Set of small on-off switches mounted on the controller board used to configure the Ramp Controller’s device address and loop frequency.

Extended Presence. A method of informing the system when a vehicle has stayed on a loop longer than a specified (user-defined) number of seconds. When an extended presence is detected, the system sends a message to ScanNet.

Flash Programmer Program. A 3M software program that allows you to update firmware on the Ramp Controller and other 3M devices via a serial connection from a computer.

Inductance Loop. See “Loop Detector.”

Infrared Port. Port on the Ramp Controller and PDA that allows the use of infrared communications to transfer information, using the built-in infrared transceivers of the PDA and the Ramp Controller.

Initialize. A command selectable from the PDA, with which you can erase all programming in memory and set either the PDA and/or the Ramp Controller to the default parameters. This is used if you experience problems with the current programming or wish to reprogram the PDA and/or the Ramp Controller.

Latched Output. A signal generated by the Ramp Controller that is enabled and remains enabled until disabled. Latched outputs on the Ramp Controller are typically programmed for full sign activation.

LEDs. Light emitting diodes contained on the controller board that serve as indicators for certain conditions relating to power, communications, outputs, presence and tuning.

Loop. Coil of wire embedded in the ground that works with the Ramp Controller’s internal loop detector circuit to detect vehicle presence. The loop detector circuit generates an electronic signal that passes through loops. When the signal is applied to the loop coil, an electromagnetic field is generated around the loop. Metal passing through this field causes a change in the signal. The Ramp Controller detects this change and the controller generates an output that indicates vehicle presence on the loop.

Loop Detector. The Ramp Controller’s internal loop detector circuit generates an electronic signal that passes through loops. When the signal is applied to the loop coil, an electromagnetic field is generated around the loop. Metal passing through this field causes a change in the signal. The Ramp Controller detects this change and the controller generates an output that indicates vehicle presence on the loop.

Loop Locator. A device, such as the Intersection Development Corporation’s Model 505 Loopfinder, used to locate the loop and find its field strength. The loop locator also indicates the presence of hidden, “closed loops.”

Loop Presence. The condition that occurs when a vehicle is present on the loop.

Loop Sensitivity. See “Vehicle Detector Sensitivity.”
**Output.** See “Latched Output” and “Pulsed Output.”

**Palm.** A brand of PDA. Screen examples in this manual were taken from a Palm PDA.

**PDA.** (personal digital assistant) A handheld computer, usually used as a personal organizer or to run software programs designed for PDA use. Used with the Ramp Controller to store, retrieve, view, and send Ramp Controller programming.

**Power Supply Unit.** The device containing a power supply, circuit breaker, and terminal block in a steel enclosure, which provides power for up to 10 Ramp Controllers.

**Presence Mode.** The mode of Ramp Controller operation in which the loop detectors detect the presence of a vehicle within a specific zone around and above the loop.

**Pulsed Output.** A signal generated by the Ramp Controller that is sent one time and does not remain enabled. Pulsed outputs on the Ramp Controller are typically programmed for forward and reverse counts.

**Ramp Controller Programming Utility.** 3M software installed on the PDA that allows you to interface with the Ramp Controller to send programing to and get programming from the Ramp Controller and also view information in the Ramp Controller such as vehicle counts and diagnostics information.

**Reset.** Restart of the Ramp Controller processor by either pressing the Reset button on the controller board or sending the Reset command from the PDA. This is used when a condition arises that affects the operation of the Ramp Controller, such as a detector loop or full sign locks up, or communication with ScanNet is lost. Restarting does not erase any programming that you have sent to the Ramp Controller.

**Tailgate.** The tailgate detection feature detects the presence of a second vehicle following within six inches of another vehicle passing over a 2 ft. 6 in. x 6 ft. (.76 m x 1.8 m) loop coil. This option maintains the integrity of any vehicle counting system. The tailgate feature ensures that the Ramp Controller operates normally, even with heavy traffic volume.

**Tailgate Detection.** A programmable feature on the Ramp Controller that allows it to detect the presence of a second vehicle following as close as six inches of another vehicle passing over a 2 ft. 6 in. x 6 ft. (.76 m x 1.8 m) loop coil.

**Tailgate Sensitivity.** A feature on the Ramp Controller that determines how sensitive the loop detector is at detecting the presence of a second vehicle following within six inches of another vehicle over a 2 ft. 6 in. x 6 ft. (.76 m x 1.8 m) loop coil. Tailgate settings range from 0 to 8, where 0 is the most sensitive, and 8 is the least sensitive.

**Tune Loops.** Periodically, the inductance loops self-tune in order to track frequency changes caused by temperature changes. Changes in the environment can cause the frequency to drift. The tuning process sets the current loop frequency as the new base frequency (called the free run frequency) and calculates the new detection points based on the new frequency. Self-tuning occurs only when the loop does not detect the presence of a vehicle (called Presence Mode). If a loop remains in Presence Mode, even when a vehicle is not present, you may need to manually tune the loops by pressing the Tune Loops button (S1) on the controller.

**Vehicle Detector Sensitivity.** A programmable feature on the Ramp Controller that determines the distance at which a vehicle is detected as it approaches the loop coil. Sensitivity settings range from 0 to 9, with 0 being the most sensitive and 9 being the least sensitive. *Same as “Loop Sensitivity.”*
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