

INTRODUCTION

Welcome

Congratulations on your purchase of an AutoGate, Inc. *Shield*® model vehicle gate. You have selected one of the world's most advanced vehicle gate designs. The *Shield*® replaces the steel beam and massive counterweights used in conventional beam gates with an aluminum beam/gate and a unique-to-the-industry spring balanced, 24-volt electric operator. The *Shield*® achieves its stopping power from lightweight, ultra strong synthetic fiber inside the hollow aluminum beam/gate. Your *Shield*® model gate is engineered to withstand the U.S. Department of State's K4/ASTM M30* vehicle crash test rating, and will give you years of smooth, trouble-free operation. A K4/ASTM M30* rating will stop a 15,000 pound truck traveling at 30 mph. *Engineered under FEA.

This manual describes how to install, operate, maintain, and troubleshoot your vehicle gate. It is an important resource, so be sure to keep this manual readily available for future reference. Immediately following this *Introduction* is a detailed *Table of Contents* that will help you find the information you need.

Safety

Your safety is important to us. If you have any questions or are in doubt about any aspect of the equipment, please contact us. While AutoGate, Inc. does not assume responsibility for injury to persons or property during installation, operation, or maintenance, we can provide verbal guidance, additional written instructions, or the services of a factory engineer. We're here to help you operate your vehicle gate safely and effectively.

As the user, you are responsible for correct and safe installation, operation, and maintenance of this equipment. Users must follow the specific instructions and safety precautions located in this manual. In addition they must:

- Be aware of and follow the safety standards of the Occupational Safety and Health Administration (OSHA), as well as other applicable federal, state, and local safety regulations and industry standards and procedures. For installation outside the United States, users must also follow applicable international, regional, and local safety standards.

- Engage only trained and experienced staff to install, operate, and maintain the equipment.
- Ensure that all repairs are performed correctly, using properly trained staff and the right tools and equipment.

Warranty

AutoGate, Inc. vehicle gates are guaranteed against defects in materials and workmanship for three years from the date of shipment from the factory. AutoGate's obligation under this limited warranty shall be limited to the repair or replacement only of such products that, upon AutoGate's inspection, and in AutoGate's sole discretion, are determined to be defective in materials or workmanship. The warranty applies when the gate is installed, operated, and maintained according to the instructions in this manual, and when it is operated within the service conditions for which it was specifically sold. In the event of a malfunction during the warranty period, contact AutoGate, Inc. and we will pursue prompt corrective action. ***This is a warranty summary only. The specific warranty supplied with your equipment is the governing document.***

How to Contact Us

If you have any questions or experience any problems with your vehicle gate—or if we can help you with any other facility security issues—please contact us directly at:

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7306 Driver Road
PO Box 50
Berlin Heights, Ohio 44814 USA
Telephone: (800) 944-4283
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Email: sales@autogate.com
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1. ORIENTATION

1.1 Overview

The *Shield*® model anti-terrorism vehicle gate is what is commonly called an “active” vehicle gate. That is, this gate is designed to be installed across a roadway to control vehicle passage. The most common operating mode for the *Shield*® is to leave it in the beam/gate down (or road closed) position where it will stop an attacking vehicle, and only raise it to the “up” (or road open) position after security personnel have cleared a vehicle for passage. However, some customers operate the *Shield*® in the normally up position, and only lower the gate during periods of heightened security. The *Shield*® is suitable for either operating mode.

The *Shield*® has many features that make it effective, reliable, and easy to use, and some of these important features are summarized in the table below. Note that not all *Shield*® model gates are identical, but may vary in width, finish, and ancillary component options. The most common option is a **FULL** size gate to restrict pedestrian access. This may be an ornamental, industrial, or high-security and anti-climb fence.

Table 1-1: Shield® Gate Features

Feature	Explanation
K4/ASTM M30 Engineered	Engineered analysis to meet the U.S. Department of State requirements to stop a 15,000-pound truck traveling at 30 mph (4080-kg at 48 kmph).
Advanced Non-Metallic, Energy Absorbing Materials	Heavy steel beam used in conventional beam gates are replaced with a hollow aluminum beam containing lightweight, ultra-strong synthetic fiber for improved stopping power.
All Electric Operation	24 volt DC with any input voltage (120-volt or 240-volt single phase are standard). Built-in battery backup for continued operation during power outages. Solar power for remote locations without AC power. No hydraulic fluids (for environmentally sensitive areas).
Many Fence Options	Ranging from highly decorative architectural pickets (Victorian, Gothic, Prairie, etc.) to a simple industrial look, to anti-climb high-security gates for military or correctional facilities.

Feature	Explanation
Opens Completely	The beam/gate opens a full 90°, so even high loads can pass unobstructed.
Extra Wide Option	Gate openings wider than one traffic lane (12-feet or 3.7-m) are possible.
Aesthetic Finishes	Over 250 colors available, including high-durability paints or powder coatings. Digital finish option allows the gate beam/gate to mimic any architectural material. Add graphics or logos.
Foundation Survives Impact	The in-ground foundation and above-ground bolsters survive a K4/ASTM M30 impact intact, so the beam/gate can be replaced without excavation.
Low Maintenance	Requires only periodic lubrication and annual tension adjustment.

Your safety is extremely important to us!



The sections immediately following are for component orientation only. Do not operate the equipment until you have read and thoroughly understand this entire manual. You are responsible for the correct and safe installation, operation, and maintenance of this equipment.

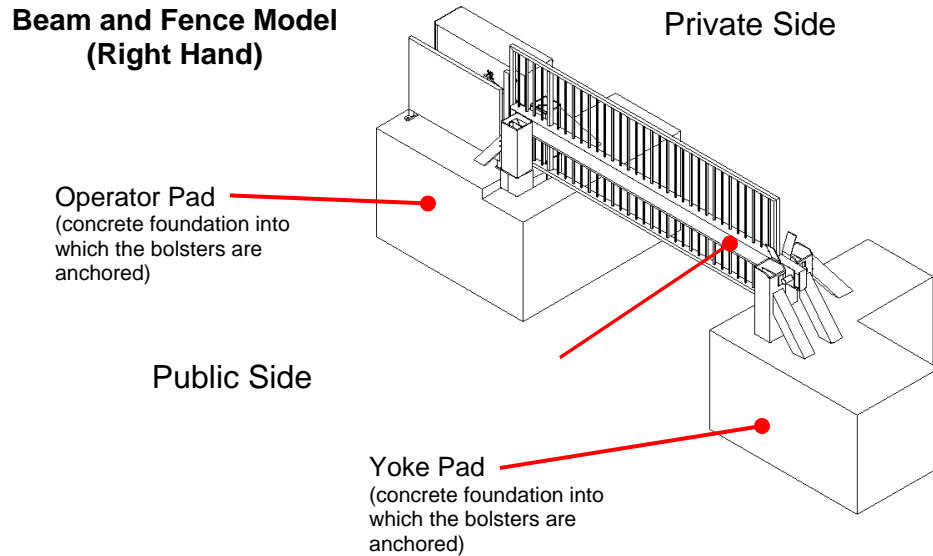
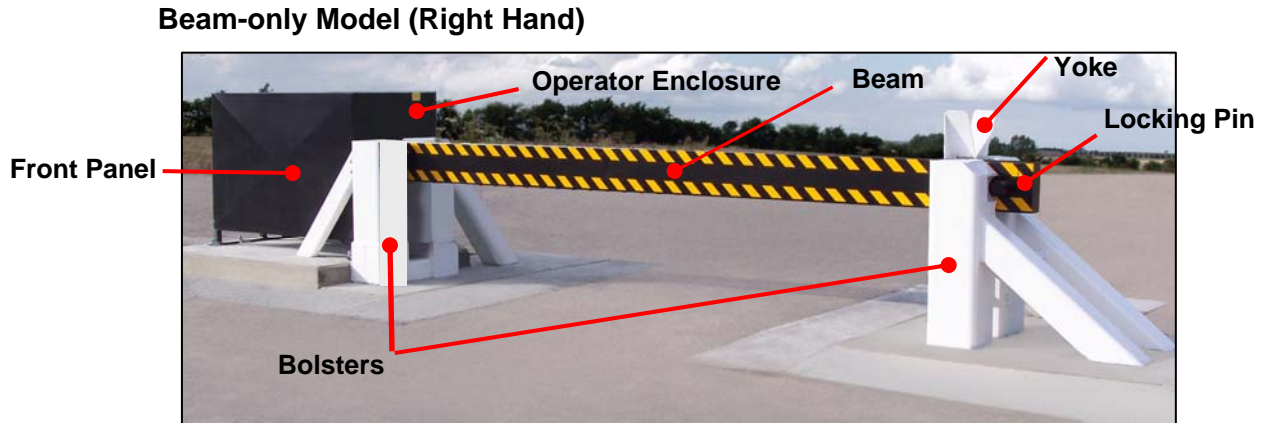
1.2 Shield® Gate Orientation

Figure 1-1 will orient you to the basic components of the *Shield*® model vehicle gate. Most of the terms are self-explanatory; however the following will help you understand certain components and terms.

- In this manual we often refer to the beam (or the beam plus the attached fence) as the *gate*. Being the portion that blocks the road, it is common to think of them as such. Of course it is the *Shield*®'s entire structure—both above and below ground components—that constitute the actual vehicle gate. Nonetheless, it is convenient to use this shorthand term.
- The yoke is built into a portion of the bolster. It includes a guide plate that positions the beam in front of a detent that captures the locking pin located on the beam in the event of an impact.
- The *Shield*® comes in either a right-hand or left-hand model. This refers to the location of the operator enclosure relative to the beam/gate, when viewed from the

private side(that is, the secure, non-public side). To illustrate, the two gates shown in the figure below are both right-hand models.

Figure 1-1: Basic Components of the Shield®



Note: In both images, the viewer is looking from the public (non-secure) side of the Shield®. This is the side from which vehicles approach the protected facility.

1.3 Operator Enclosure Orientation

All of the *Shield*®'s mechanical, electrical, and electronic components are housed inside the operator enclosure (see Figure 1-2). The enclosure is a lockable steel cabinet that mounts on a raised concrete pad adjacent to the beam/gate. A separate electrical enclosure is also housed inside the operator enclosure. The electrical enclosure contains the master control circuit board and the terminal blocks/wire management system. It may also house a variety of optional electrical components, such as: loop detector amplifiers, cycle counters, traffic signal controls, and access control electronics.

Figures 1-2 and 1-3 will orient you to the basic components housed inside a typical operator enclosure and electrical enclosure, respectively.

Figure 1-2: Components Housed in the Operator Enclosure (typical)

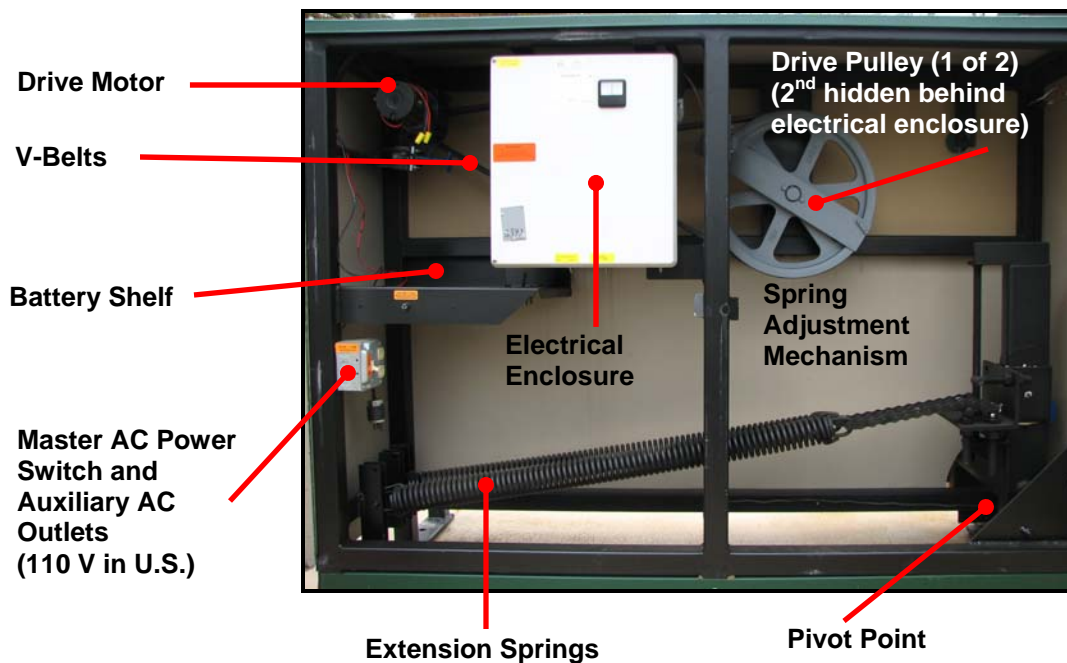
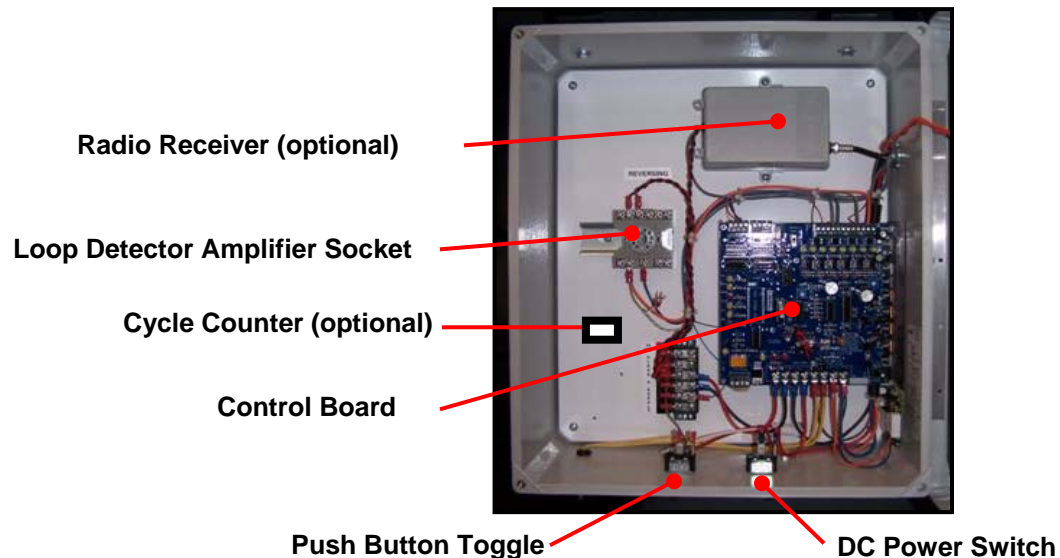


Figure 1-3: Electrical Enclosure Components (typical)

1.4 Control Panel Orientation

The *Shield*® can easily be operated by security personnel from a control panel that is located in a nearby guardhouse. From this control panel, the operator can lower the gate to block vehicle access, or raise the gate to allow vehicles to pass. Each *Shield*® model gate can have a custom designed control panel, based on the particular requirements for each installation, such as:

- Control of one or more gates
- Integration with access control systems
- Presence of an Emergency Close function that overrides safety systems
- Language specified for control panel labels

Because of the custom nature of the control panels, this section does not have an orientation graphic. However, the important features available on *Shield*® control panels include:

- Master Power Switch (may be key lockable)
- Gate Up switch (may be called Road Open)

- Gate Down switch (may be called Road Closed)
- Emergency Close (may be called Emergency Down)
- Various diagnostic lights

1.5 Options

Shield® model vehicle gates are available with a broad array of options, the most common of which are listed below. See Section 3 (*Ancillary Components*) for additional information on these options.

- Traffic signal lights
- Card readers, wireless receivers, or other access control devices
- Special finishes

2. INSTALLATION

2.1 Introduction & Installation Planning

The *Shield*® model vehicle gate is easy to install. Sometimes site-specific terrain features may complicate the installation, so if you need help or are unclear about any of these instructions, contact AutoGate, Inc. for assistance.

Before beginning site excavation and gate installation, note the following important considerations.

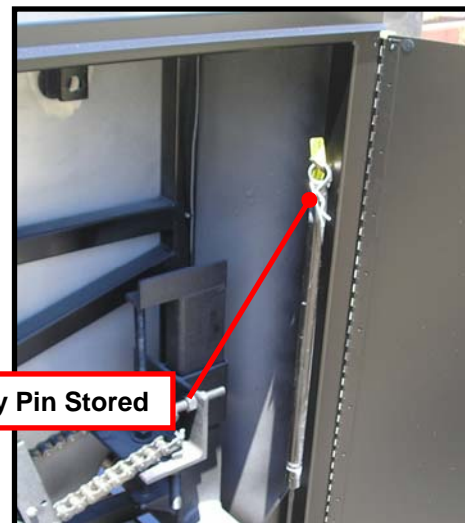
- When you receive your *Shield*® model gate, it has a safety device called a *T/M Safety Pin* installed (see pictures below). (T/M stands for transportation and maintenance, because the pin must be installed during shipping and whenever maintenance is being performed.) Do not remove this pin until the instructions below tell you to do so.



Do not remove the T/M Safety Pin until instructed to do so. The gate is under extreme spring tension, and accidental or premature release could cause severe injury.



**T/M Safety Pin
Installed**



T/M Safety Pin Stored

- When you purchased your *Shield*®, you specified either a right-hand model or a left-hand model. See Section 1 (*Orientation*) for an explanation of these terms. Make sure you install your gate correctly.
- If you ordered your *Shield*® with optional aesthetic finishes, it is delivered with the gate and certain other components encased in protective wrap. Do not remove this wrap as it protects the finish during installation.
- The *Shield*® gate and operator are finished as you specified. However, we have found from experience that the installation process will usually damage any finish pre-applied to the bolsters. Therefore, the bolsters are normally delivered finished in primer paint and the installer or customer should finish paint the bolsters after installation. We recommend any industrial grade paint that can be applied by brush or roller.
- Plan the site layout. Decide exactly where the *Shield*®, the operator control panel, and the cable trenches connecting them will be located.
- If possible, locate the *Shield*® away from routine foot traffic to reduce the chance for pedestrian injury from the moving gate. A separate pedestrian gate is always recommended.
- Determine if there are any ancillary components to be installed with your gate, such as traffic signal lights, in-ground loop detectors, and so on, and factor them into your site layout and installation plan. Inspect the site and verify there are no underground utilities, overhead wires, or other obstructions in any of the above excavation areas.
- The *Specifications Sheet* in this manual lists the approximate weight of your *Shield*® gate. Plan how you will move the *Shield*® to the installation site and how you will lift it for placement on its concrete pad. Lifting is usually done with a mobile crane or forklift, though other lifting devices can be used. Verify that the path the lifting equipment will traverse in moving the *Shield*® from its storage location to the installation site has no overhead wires or other obstructions.



Electrical installations must be in accordance with the National Electrical Code, the Canadian Electrical Code, or other applicable codes. Review code requirements prior to installation.

2.2 Shield® Bolsters Installation

This section addresses the in-ground installation of the *Shield*® vehicle gate bolsters. Sections 2.3 and 2.4 describe the installation of the operator enclosure and the operator control panel, respectively.

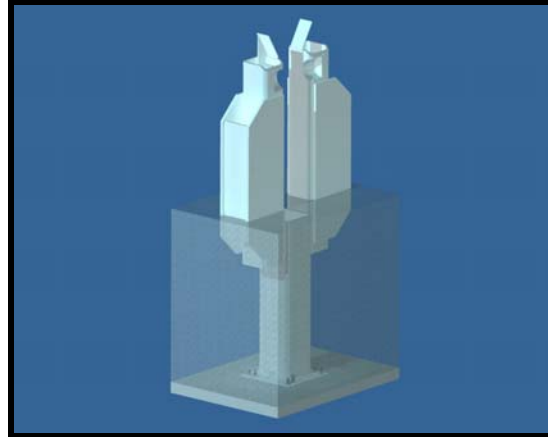
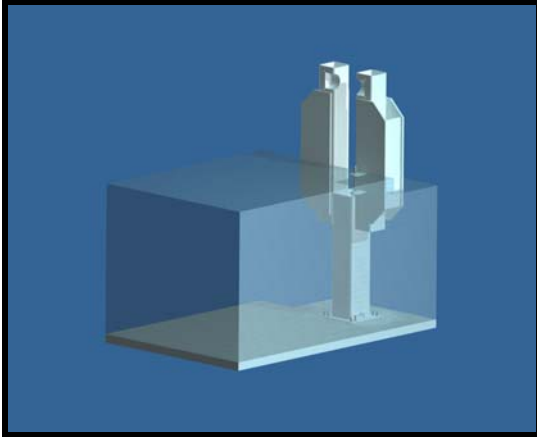
Any ancillary components—such as traffic signal lights or vehicle loop detectors—may be installed concurrent with the *Shield*® installation or later. However, look at all of the components that came with your gate and consider how they will be used and where they will be located before deciding to delay installation. For example, if a traffic light will be installed you may want to install it now and excavate the cable trench at the same time you are excavating for the *Shield*®. Consult the *Specifications Sheet* in this manual for a list of ancillary components and decide which, if any, should be installed concurrent with the *Shield*®. See Section 3 (*Ancillary Components*) for instructions on how to install these components.

Table 2.1 lists the items required or recommended for *Shield*® installation.

Table 2-1: Items Required or Recommended for Shield® Gate Installation

Item	Comment
Fork lift, crane, or alternative	For lifting the <i>Shield</i> ® Bolsters.
Backhoe or alternative	For excavating the <i>Shield</i> ®'s trench
Measuring tape, pavement marking paint, and chalk line	For laying out the trenches
Hammer drill, including ½" and ¾" bits x 12" long	For component installation
Hand tools, including hammer, screwdrivers (flat & Phillips), ½" drive socket set, open end wrench set	For component assembly and adjustment
Wire cutters & strippers, electrical connectors, 18 gauge stranded wire, & electrical tape	For equipment electrical hookup
Multimeter	For testing electrical components
Shovels, rakes, etc.	For concrete backfilling and other trench work
Lifting slings or chains	For rigging the <i>Shield</i> ® for trench emplacement
Theodolite or equivalent	For trench layout and for leveling the <i>Shield</i> ®
Concrete finishing tools (trowels, screeds, brooms, etc.)	For concrete finishing
Concrete vibrator	To remove concrete entrapped air
Concrete	4,000 psi with non-shrinking additives

The first phase of the installation is to excavate for the Operator Pad and the Yoke Pad. The *Shield® Foundation Layout* drawings in Section 7 (*Engineering Drawings*) have the dimensions and installation notes for these excavations. You may find one or more additional layout drawings in Section 7 that is specific to your installation.



For efficiency, you may want to excavate for other components concurrent with the pad excavations, such as:

- Trench for the power lines running to the operator enclosure (see below).
- Trench for a conduit or wires to run between the operator and the yoke end bolster for the infrared detection device
- Trench for the operator control panel cables running from the guardhouse housing the operator control panel to the operator enclosure. If operator power originates from the guardhouse, then a single trench for both operator and power cables may be used.
- Trench for any ancillary components, such as signal lights.

2.2.1 Layout and mark the location of the *Shield®*'s operator pad and yoke pad on the ground and excavate the two trenches to the required depth. Depending on the soil conditions at your location, you may excavate the trenches to the exact size required, or you may make them oversize and form the required dimensions inside the larger excavation.

2.2.2 Create a leveling floor or footer for the bolsters by pouring concrete to a depth of 3" into each excavation.



Remember, *Shield*® gates are either left-hand or right-hand models (see Note on Figure 1-1). Make sure you install the operator and yoke bolsters correctly.

- 2.2.3 Place the operator-side bolster and the yoke-side bolster into their respective excavations. Consult the *Shield*® *Foundation Layout* drawings for the correct orientation of each bolster. Shim the pads under each bolster as necessary so they are level and aligned properly. Once properly aligned, bolt the bolsters to the concrete footers using the provided ½ inch anchor bolts.



Pay close attention to the “hold” dimensions and tolerances!
Use laser leveling devices for accuracy.



Use a qualified rigger to rig the bolsters for lifting. **Improper rigging may cause injury or component damage!**

- 2.2.4 Use rebar to reinforce the foundation per the details on the *Shield*® *Foundation Layout* drawings.
- 2.2.5 You are now ready to pour the concrete. AutoGate, Inc. recommends 4,000 psi concrete with non-shrinking additives. The approximate amount of concrete required is:
- | | |
|---------------|---------------|
| Operator Pad: | 8 cubic yards |
| Yoke Pad: | 2 cubic yards |
- 2.2.6 If needed, paint the bolsters with good quality paint.

2.3 Operator Enclosure Installation & Setup

This section addresses the installation of the electric operator enclosure and related components. The operator bolts to the raised concrete pad. Table 2.2 lists the items required or recommended for installing the operator enclosure and its related components.

Table 2-2: Items Required or Recommended for Operator Enclosure Installation

Item	Comment
Fork lift with side shift or Gradall type lift	For lifting and placing the operator enclosure
Concrete hammer drill motor and bits	For drilling mounting holes
Bolts, washers, concrete anchors (provided with the gate)	For attaching the enclosure to the concrete pad
Hand tools, ½" drive socket set, open end wrench set	For bolting down the enclosure
Electrical conduit, per local codes	For protecting the electrical cables

- 2.3.1 Before the operator enclosure can be located on the raised concrete pad, the gate must be attached to the operator (if not already attached when received). Set the channel on the pivot end of the beam/gate over the inverted channel on the operator. Firmly attach the beam/gate/gate using the bolts provided. Attach the linkage arm.

PLACING THE GATE AND OPERATOR ASSEMBLY ON THE CONCRETE PAD

- 2.3.2 Be sure the linkage attached to the beam/gate is in the locked (or over-center) position. Press down on the linkage to push it into the locked position.
- 2.3.3 Open the enclosure doors with the supplied keys and pull the Manual Release lever located by the motor.
- 2.3.4 Remove the T/M Safety Pin and insert it in the second set of brackets.
- 2.3.5 Close the door and latch or lock the door so it won't swing open while placing the operator.
- 2.3.6 Using a forklift or Gradall type lift, with side shift if possible, insert the forks into the channel receivers on the door side of the operator.





Use the forklift to restrain the operator to prevent it from tipping as the beam/gate is raised or lowered in the following steps.

- 2.3.7 Lift the Linkage Arm at the center point 4 – 6 inches to release the gate.



- 2.3.8 Push the gate open until it rests against the T/M Pin.
2.3.9 From the public side, position the gate assembly in front of the raised concrete pad.
2.3.10 Carefully raise the gate assembly enough to clear the Bolsters.



- 2.3.11 Slowly advance and lower once the gate (beam is shown in this picture) centered between the Bolsters. Be certain the $\frac{3}{4}$ " locating stud is through the front footpad mounting tab once the operator is fully down on the pad.



2.3.12 LEAVE THE FORKLIFT IN PLACE!



Continue to use the forklift to restrain the operator to prevent it from tipping as the gate is raised or lowered in the following steps.

POSITIONING THE GATE ASSEMBLY

- 2.3.13 Pull the gate down to the closed position. Push down on the linkage assembly to lock the gate in the closed position.
- 2.3.14 Adjust the Operator to center the gate between the Bolsters.
- 2.3.15 Manually move the gate up and down to make sure there are no interferences and the gate can operate freely.
- 2.3.16 Drill and install concrete anchor bolts ($\frac{3}{4}$ " x12 bolts provided) to fasten the enclosure to the raised pad. Also install a washer and nut on the one front locating stud.
- 2.3.17 Power and control cables can be run in conduit up along the back side of the concrete pad and into a field installed enclosure.
- 2.3.18 Optional Step: Place two deep-cycle marine batteries on the battery shelf inside the operator enclosure. For shipping reasons, batteries are usually procured locally and not supplied with the *Shield*®. Once the batteries are **connected in series**, the gate may be operated and tested.



Check the tightness of all the pre-wired terminals, as they may have loosened during shipment.

2.4 Control Panel Installation

Note: If you purchased your *Shield*® gate(s) without control panels, please refer to the DC Control Board Layout and the 24V DC Control Board Wiring Diagram in Section 7 for the power and signal input and output schematic. Even though control panels are not provided, please review the text immediately following, particularly Step 2.4.1.

This section addresses the installation of the control panel used to operate the *Shield*® gate. The control panel typically mounts on a wall, desk, or pedestal inside a guardhouse that is close to the *Shield*® gate. Your control panel is pre-wired, with the exception of the power cables and the control cables, which come from the operator enclosure. You will need to dig the trench for these cables, if you have not already done so, before you can complete the control panel installation. Table 2.3 lists the items required or recommended for installing the control panel.

Table 2-3 Items Required or Recommended for Operator Control Panel Installation

Item	Comment
Sheet metal punches	For punching holes in the panel enclosure for cables and mounting
Drill motor and bits	For mounting the operator control panel
Fasteners	For mounting the panel to a desk, wall, or pedestal
Electrician's hand tools	For wiring the panel
Plastic or metal electrical conduit	For protecting the power and control cables

- 2.4.1 Decide where you will mount the control panel. It must be installed in a guardhouse protected from the weather, and in a location from which the operator has a clear view of the gate when he or she is operating it. In addition, make sure the panel's height and position allow the operator easy and comfortable access to the controls. Wall mounting, desk mounting, and pedestal mounting are all acceptable.



It is essential that the operator can clearly observe the gate and any nearby vehicles when operating the gate's controls. Be sure to mount the control panel such that the operator has a clear and unobstructed view at all times.

- 2.4.2 Unless you gave us specific instructions for placing the cable penetration and the mounting holes in your control panel enclosure, your enclosure will be

delivered without these openings. Decide on where the holes should be located on the enclosure and punch or drill them as appropriate.

2.4.3 Mount the control panel securely using appropriate fasteners.

2.4.4 If not already completed, dig the trench for the power and control cables that will run between the guardhouse housing the control panel and the operator enclosure. Use local best practices for the trench depth.

2.4.5 Run the power and control cables from the terminal strip in the control panel to the terminal strip in the electrical enclosure located inside the operator enclosure. See the *24V DC Control Board Wiring Diagram* schematic in Section 7 (*Engineering Drawings*) for the cables required for your installation. Inside the trench, run the cables in approved plastic conduit. If allowed by local codes, you may run the power and control cables inside the same conduit. Use conduit as necessary to protect the cables from where they exit the trench to their terminations in the operator control panel.

3. ANCILLARY COMPONENTS

3.1 Introduction

If your *Shield*® model vehicle gate came with ancillary or optional components and systems that require installation or setup, you will be directed to the instructions provided by the component manufacturer, which you will find in Section 8 (*Supporting Documents*). In general, those instructions provide all of the guidance needed for installing and using these ancillary components.


The following table lists the ancillary components that may have been provided with your *Shield*® model vehicle gate.

Table 3-1: Ancillary Components & Systems

Component or System	Comments
NOTE: Certain ancillary components should be considered mandatory for all anti-terrorism vehicle gates, including the Shield® models. These are noted below and should be procured and installed before operating the gates.	
Vehicle loop detectors	These are required to restrict or limit gate operation under certain vehicle detection conditions. A socket for the loop detector electronic control modules are pre-installed in the electrical enclosure. Customer must fabricate and install loops in the roadway, install the control module, complete the hookup, and program the interaction of the loops and the gate.
Infrared Photo Electric Sensors	Used to stop and reverse the gate when closing. If an object passes through or blocks the beam, the gate will remain open while the beam is blocked.
Traffic signal lights	Used to warn of gate’s presence and operation. AutoGate recommends a red stop light at all times, except when the gate is fully raised to allow vehicles to enter, in which case we recommend a yellow (amber) flashing light.
Warning signs	Drivers should be alerted to the presence of a high-stopping power gate, and that striking the gate will cause injury or death. Speed limits should also be posted. Contact AutoGate, Inc. for specific warning sign recommendations.

3.2 Vehicle Loop Detectors

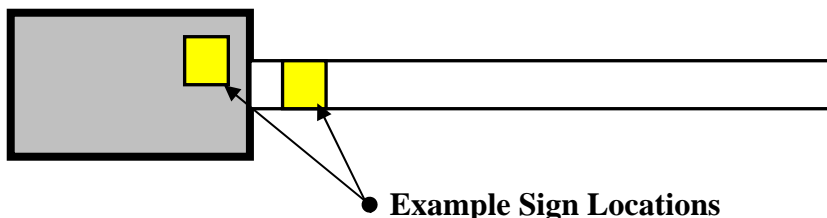
The customer should install vehicle detector loops in the roadway on both sides of the gate, so that vehicles in either location will be detected. The customer must decide what actions he wants the loop detectors to initiate.



Never use the emergency-close function as a “shortcut” way to lower the gate!

3.3 Warning Signs

We recommend any additional signage be installed between the operator and the center of the barrier arm. **DO NOT DRILL OR PIERCE THE BARRIER ARM.** This will allow undesired water, ice, and condensation to enter the barrier arm.



4. OPERATION

4.1 Preliminary Steps

Before operating your *Shield*® model vehicle gate, go through the checklist below and verify that each of these steps has been completed.



For your safety and to protect the equipment from damage, complete each of these steps before operating the gate!

- The optional infrared reversing beam has been attached to the steel bolsters.
- The T/M Safety Pin has been removed.
- Any separate electrical boxes serving the gate (such as for traffic signal lights) have been properly wired, labeled, and the terminations verified to be tight.
- The Master Power Switch on the Auxiliary AC Outlets box inside the operator enclosure is turned off (see Figure 1-2).
- The control panel power switch (if present) is turned off.
- All required electrical power, control, and ancillary component cables have been properly attached inside the electrical enclosure and verified against the *24V DC Control Board Wiring Diagram* schematic in Section 7 (*Engineering Drawings*). All cables are properly labeled. All terminal strip connections and other electrical connections are verified to be tight.
- If the back-up batteries have not yet been installed, place two 12 VDC batteries on the battery shelf inside the operator enclosure. We recommend (2) 100 amp deep cycle marine batteries for maximum battery back up. For shipping reasons, batteries are usually procured locally and not supplied with the *Shield*®. The batteries are **connected in series** and the gate may be operated at this point. The DC power switch must be switched to “ON” for the back-up system to work.

4.2 Initial Operation

- 4.2.1 Remove lockouts if present and turn on the power to the operator enclosure and any other electrical boxes serving the gate.



Have an electrician remain at the main breaker location and in communication with the gate startup team in case there is a malfunction requiring the electrical power to be turned off.

- 4.2.2 Open the door on the operator enclosure and turn the Master Power Switch to ON. **CAUTION: The gate may automatically open upon powering up.**

- 4.2.3 Cycle the gate up and down a few times to verify proper operation. Time the up and down cycles and verify they meet your operational needs. (Typical cycle times are 12-14 seconds to raise the gate and 12-14 seconds to lower the gate.)
- 4.2.4 The *Shield*® has an infrared sensor that opens the gate if it senses interference while closing. Verify this system is working by placing an object to block the sensor while the gate is moving down. The gate should reverse direction and return to the full gate open position.

4.3 Supplementary Tasks to be Completed After Initial Operation

Before beginning routine operation of your *Shield*® gate, you must complete several other tasks to ensure the gate is ready for service and is operating correctly.

- 4.3.1 Verify the T/M Safety Pin is properly stowed and readily available on the stowage hook inside the operator enclosure
- 4.3.2 Attach the kickplate to the door side of the operator enclosure using #12 x 3/4" TEK (self-drilling screws) (provided).
- 4.3.3 Mount the gate guard to the back of the operator cabinet to cover the opening at the end opposite the beam/gate. using #12 x 3/4" TEK (self-drilling screws) (provided).
- 4.3.4 Verify Vehicle Loop Detector Performance



Vehicle loop detectors were an option when you purchased your *Shield*® gate, but you should not operate your gate without these important reversing/safety devices. If you did not purchase them from AutoGate, Inc., you should nonetheless purchase and install vehicle loop detectors or other vehicle proximity detectors.

- If you have multiple loop detectors in your installation, verify they are interacting correctly and that you are achieving the desired performance when various vehicles are present at all the loop locations.
- Test the loop detectors in as many vehicle position scenarios as possible to confirm correct loop detector operation. Be sure to check not only the scenarios you expect (vehicles stopping where appropriate), but also unexpected or unusual vehicle operations.

If the loop detectors are not working correctly, consult the manufacturer's literature in Section 8 (*Supporting Documents*) for instructions on how to program the vehicle loop detector control modules. If you need assistance, contact AutoGate, Inc.. You may also contact a local company specializing in access control, as they will install and service vehicle loop detectors.

- 4.3.5 Verify the Operation of Ancillary Components

If your *Shield*® installation includes options such as traffic lights or alternate operator control panels, verify these devices are operating correctly. As necessary, consult the manufacturer's literature in Section 8 (*Supporting Documents*) or other sections of this manual for instructions on how to operate or adjust these devices.

4.4 Gate Operation During a Power Outage

The *Shield*®'s battery backup system remains constantly charged and ready to operate the gate if a power outage occurs. The control board automatically senses the loss of AC power and engages the battery backup. You can continue to operate your gate in the normal manner during the power outage.

The length of time the batteries will last before losing their charge depends on the duty cycle (the number of openings and closings), the number of accessories deriving power from the batteries, and the amp hour size of batteries. AutoGate recommends 100 amp hour deep cycle marine batteries, and in *most* but not *all* cases, users will be able to operate for at least 24 hours on the battery backup system. All gate functions should continue as normal until the batteries run low. In the event of a prolonged power outage, if the *Shield*®'s batteries lose their charge, standard vehicle batteries can be used to temporarily continue operation.

5. MAINTENANCE



Do not attempt maintenance or repairs to the vehicle gate unless you are trained and qualified. Improper operation or maintenance of the gate can cause equipment damage and severe injury.

5.1 Introduction

Shield® model vehicle gates are designed to be largely maintenance free. However, as with any complex electromechanical device, they must be periodically inspected and serviced to ensure they are operating correctly. Maintenance levels will depend on both gate usage and site conditions. The gate is designed for a continuous duty cycle. Harsh conditions at the site—such as extreme temperatures, blowing sand, and salt air—will mean more frequent service. Initially, follow the maintenance guidelines below. But you may want to adjust these recommendations based on your usage, site conditions, and experience.

5.2 Personnel Safety & Gate Lockout

Whenever you work on or around the gate, you must follow both common sense safety rules and the procedures described below and throughout this manual. The gate and its control systems can cause injury or death from electrical shock or from the movement of the heavy components. Anyone working on the gate must be trained, qualified, and familiar with both the gate's hazards and its safety features. Always put safety first, and stop work and seek guidance if you are unsure about the safety of any activity in and around the gate.

When you work on the gate or its controls you should generally do the following. However, depending upon the work being performed, certain electrical circuits or hydraulic components may have to remain energized.

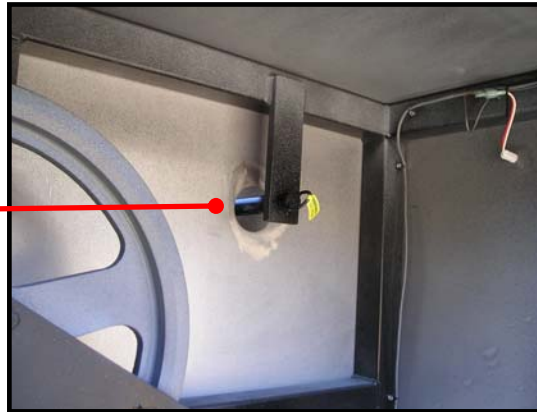
- Decide if the work you will perform should be done with the gate down (road closed) or gate up (road open), and put the gate in either the full down or full up position. Most maintenance is done with the gate down.
- Turn the power switch on the control panel to OFF.
- Turn the Master Power Switch inside the operator enclosure to OFF.

- Disengage the battery backup system by moving the DC power switch to OFF.
- As appropriate, de-energize and lockout any other electrical circuits serving the gate and its systems.
- Install the T/M Safety Pin. See Section 5.3 below.

5.3 Installing and Removing the T/M Safety Pin

- 5.3.1 The T/M (for transportation/maintenance) Safety Pin must be installed so that the gate is locked whenever maintenance is performed, unless it is specifically stated that the pin must be removed to perform the required task. The T/M safety Pin must be removed and stored before returning the gate to service.

T/M Safety Pin Installed



T/M Safety Pin stored





The control system is designed to withstand any attempted gate operation while the T/M Safety Pin is installed. However, it is good practice to not attempt to operate the gate while it is locked.

5.4 Routine Maintenance

AutoGate, Inc. recommends the following maintenance and inspection cycles. Increase the frequency if your gate has a high duty cycle or operates under harsh conditions.

5.4.1 Routine Inspection (perform daily or as needed based on your site conditions)

- With the gate down, walk around the gate and look for and remove windblown paper, plastic, or other debris from around the operator enclosure, yokes, and bolsters.



Do this inspection from a distance. Do not place your head, torso, or limbs in these areas.

- Remove snow and ice accumulations from the beam/gate and other components. Heavy snow and ice accumulations can alter the beam/gate balance and impact gate operation.

5.4.2 Weekly Inspection and Service (most of these require the gate to be energized)

- Clean the lenses on the photoelectric transmitter and receiver as required.
- Clear vehicles and pedestrians away from the gate. Raise and lower the gate and observe its motion. Verify the motion is smooth and the up and down times are within the normal range.
- Clear vehicles and pedestrians away from the gate. Confirm the photoelectric sensor is working by blocking the sensor while the gate is operating and verifying that the gate reverses direction and returns to its full open or closed position.

5.4.3 Every Six Months (or 10,000 cycles) Inspection and Service

Note: Lubrication locations are shown on the 24V Gate Operator Details drawing in Section 7. (10 fittings)

- Install the T/M Safety Pin.
- Grease the pivot pins on the linkage assembly using Lubriplate Low Temperature grease.
- Grease the two bearings on the operator arm and the two bearings on each of the two bullwheel shafts.
- Grease the chain tension bolt (two places) and lubricate the chain.
- Check belts for wear and tightness. Belt flex should be 1/2" (using hand pressure) on the top and bottom between the bullwheel and output sheaves.
- Check battery water level and fill as required with distilled water. This is not required on sealed, maintenance-free batteries.
- Unlock the gate before resuming gate operation.

5.4.4 Gate Balancing: Perform Four Months after Initial Operation, then Annually Thereafter

Note: This balancing procedure must be performed if the *Shield®*'s balance springs are ever replaced.

- 5.4.4.1. Remove the wire nut on the red motor lead and attach an amp meter between the red wire and the orange wire.
- 5.4.4.2. Cycle the gate up and down and record the highest amp reading in both directions. The high readings should be in the range of 2–6 amps and should be almost identical (1 amp or less difference). If they are not, the slide assembly requires adjustment. (See the *Shield®* – Balancing Slide Assembly drawing in Section 7.)
- 5.4.4.3. To adjust the slide assembly, loosen the 1-1/8" adjustment nuts on either side of the Spring Adjustment Mechanism on the threaded rod. If the amps are high when the gate is opening, move the slide assembly up to help the gate open (this is the most common adjustment). If the gate is opening easily but closing with difficulty, move the slide assembly down. Only adjust the slide assembly about 1/4" (3–4 turns) at a time. After each adjustment, check the amp readings.
- 5.4.4.4. Continue this process until the amp readings are nearly identical (within 0.5 amps) and within the range of 2-6 amps. The gate will now be in balance. Tighten both adjustment nuts on the slide assembly's threaded rod. Operate the gate to verify it moves easily in both directions.

5.5 If the Gate is Damaged by Vehicle Impact

If a vehicle strikes the gate, even accidentally and at low speed, some component damage is likely. If this occurs, contact AutoGate, Inc.. We will help you assess the consequences and make sure there is no hidden damage that will compromise safety or the gate's effectiveness. In addition, we will help you determine which components should be replaced. We can also provide pricing on those replacement components, and offer advice to repair the damage.

Actual crash testing has shown that the *Shield*®'s in-ground foundation can withstand a design basis vehicle impact (15,000-pound truck traveling at 30 mph) without structural damage. The above-ground gate can be replaced and no excavation is required. Contact AutoGate, Inc. for instructions on how to remove the damaged gate, how to install a replacement, and how to test your repaired system to ensure it is operating correctly.

6. TROUBLESHOOTING

The table below provides guidance on identifying and correcting any problems with your *Shield*® model vehicle gate. If you are unsure about the component terminology, review Section 1 (*Orientation*). If you encounter problems that you cannot fix, contact AutoGate, Inc. and we will gladly work with you to correct them.

Shield® Gate Troubleshooting Guide

Symptom	Actions
Gate does not rise	<ol style="list-style-type: none"> 1. Verify batteries are fully charged. 2. Check for AC power loss at D14 on control board. 3. Check fuses – there are three on control board and one on battery shelf. 4. Test switch S3 manual open switch on control board.
Gate does not lower	<ol style="list-style-type: none"> 1. Check for any active inputs, AC power loss, AC power switch is OFF, or weak batteries. 2. Verify batteries are connected properly. 3. Determine if switch S3 is in the ON position (this is the manual open switch and it should be in the OFF position for normal operation). 4. Check if S2 switch number 8 is in the ON position and if AC power is lost. See LED D14. Standard operation is in the OFF position. 5. Check if LED D12 (battery low light) is lit; if so, AC power is off. Batteries need to be charged or replaced.

Symptom	Actions
Gate is dead (does not rise or lower)	<ol style="list-style-type: none"> 1. Check LED D14 for AC power indication and check that AC power switch is ON. 2. Check LED D11 for Heart Beat pulses, if none and D14 (AC) and D5 (BRAKE) are on, then gate has repeatedly sensed obstructions. Clear obstructions, then clear with next new input. 3. Instant Reversing Device (IRD) (D2) LED is flashing, MRT (Maximum Run Timer) has expired. Gate was unable to reach the closed limit switch. Check that fast run timer is set to run as long as possible.
Fuses are blown F3 (10 AMP AC) and/or F4 (15 AMP DC)	<ol style="list-style-type: none"> 1. Check for shorts in wiring. If F3 AC fuse is blown, then batteries may also be dead. 2. WARNING: For continued protection against fire, replace only with fuse of the same type and rating.
Gate closes then reverses	<ol style="list-style-type: none"> 1. See IRD adjustments, also check for obstacles in gate travel, such as trees, sticks, etc. 2. Charge voltage to batteries is too low, adjust at R63, LED D13 should go off for a few seconds. With batteries disconnected, set to 27.5.
General service	<ol style="list-style-type: none"> 1. Belt loose or needs replacement. 2. Charge voltage for batteries should be 27.5 VDC with batteries disconnected (set at R63).

7. ENGINEERING DRAWINGS

See the following pages.

8. SUPPORT DOCUMENTS

See the following pages, if applicable.