Installation, Operation, and Maintenance Manual

for

B&B Electromatic, Inc.

XL Series
Hydraulic Sliding Gate Operators

Model #: _____

Serial #: _____

Last Modified: 08/01/01

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IMPORTANT SAFETY INSTRUCTIONS

WARNING – To reduce the risk of injury or death:

1. READ AND FOLLOW ALL INSTRUCTIONS PROVIDED IN THIS MANUAL.
2. Keep children away from gate movement area and off of the gate operator
3. Never let children operate or play with the gate controls. Keep any remote control devices away from children.
4. Test and adjust the gate operator and all related safety devices monthly. The gate must reverse when a safety device is tripped. Failure to adjust and retest the gate operator properly can increase the risk of injury or death.
5. Use the emergency manual release only when the gate is not in motion.
6. Keep the gate panels connected to the gate operator properly maintained. Have qualified service personnel make adjustments or repairs to the gate hardware as needed.
7. This gate operator is designed for vehicles only. Pedestrians should never be allowed to use the entrance equipped with this gate operator.
8. SAVE THESE INSTRUCTIONS. THIS MANUAL SHOULD BE LEFT WITH A RESPONSIBLE INDIVIDUAL AT THE INSTALLATION SITE AND KEPT IN A DESIGNATED LOCATION FOR MAINTENANCE OR TROUBLESHOOTING OPERATIONS.

LIMITED WARRANTY

B&B Electromatic, in connection with apparatus sold, warrants same to be free from defects in material and workmanship under normal use and service. B&B will, at its option, repair or replace any part which, upon inspection by B&B, appears to be defective.

This warranty shall not apply if the article has been subjected to abuse in handling or installation, or has been misused or misapplied, or has been disassembled, repaired, altered, neglected or used in any way which, in the opinion of B&B, adversely affects the products.

For components such as motors, tanks, controllers, fuses, and power cords, supplied but not manufactured by B&B, B&B reserves the right to limit the warranty period to the warranty period of the component manufacturer.

VT-40 traffic warning gate operators, navigation lights, and XL series hydraulic slide gate operators are warranted for 5 full years against all part failures due to defective materials or workmanship. B&B 5-year (20,000 hour) navigation lamps are also warranted for 5 years against burnout.

All other B&B products are warranted for 2 full years against all part failures due to defective materials or workmanship.

The warranty period begins on the date of shipment from B&B facility. In order to receive the warranty, the purchaser must return the defective part, prepaid, to B&B. B&B will ship, prepaid, a replacement at no cost. Maximum liability will in no case exceed the value of the B&B unit involved. Costs associated with removing and replacing defective materials or parts are not covered by this warranty.

B&B maintains original shipment records to help you determine the warranty status of your products.

B&B reserves the right to change specifications and designs without notice, and assumes no responsibilities for making these modifications on any equipment previously sold.

This warranty is in lieu of all other warranties, expressed or implied. B&B disclaims any warranties of merchantability or fitness for a particular purpose, and expressly disclaims all responsibility for special, incidental or consequential damages.

XL Series General Description

The B&B Electromatic, Inc. XL Series Hydraulic Sliding Gate Operators are designed to reliably operate many styles of sliding gates, including overhead track, ground track, and cantilever style gate panels. B&B's XL Series of operators are specifically designed to operate in two of the four UL325 classes of operators: Class III (industrial) and Class IV (restricted access). The operator is unobtrusive in appearance yet durable under heavy use. The design of the XL Series incorporates many excellent features intended to improve safety, maintain security, increase reliability, and reduce maintenance time.

The most current version of UL325 (4th Edition) of the standards was fully implemented prior to March 1, 2000 and contains many safety and construction improvements over the previous editions. In addition to UL325, UL991-Standard for Tests for Safety-Related Controls Employing solid-state devices, regulates the design and construction of fully solid-state devices when used in controls that must provide safety to the public. B&B's XL Series operators are all fully tested and approved by ITS (Intertek Testing Service) to meet or exceed the most current safety and construction standards as defined by Underwriters Laboratories standards UL325 and UL991.

Controls operate on safe and reliable 24VAC voltage (24VDC on battery backup units). A transformer, completely pre-wired and adjustable to compensate for low voltages, is installed in each operator to step down the input voltage.

The operator actuates the gate by rotating two wheels (the XLS operator uses one wheel, and the XLR operator uses a pinion gear). A drive rail bolted to the gate is drawn between the two wheels by friction. The wheels are spring loaded against the drive rail to produce a positive friction feed in both directions. Spring loading these wheels also serves to correct for wheel wear. The drive wheels are rotated by series-connected hydraulic motors to minimize uneven rotation between the wheels.

Rotation direction is determined by the hydraulic valve system, not by the rotational direction of the electric motor. Independence from the electric motor rotation has the advantage that the direction of gate travel can be instantly reversed without the use of brakes. Also, the hydraulic valve, when not energized, rests in a neutral position; this effectively locks the hydraulic system, drive wheels, and the gate in the stopped position.

B&B is located just outside of Baton Rouge, Louisiana. The company was founded in 1925 and has built a reputation over the years of responsive customer service and the highest quality products. B&B is proud of its reputation in the market and strives to renew it with each operator it manufactures.

Features of the XL Series Gate Operators

- User-Programmable right-hand to left-hand conversion: no wiring changes, limit switch swapping, hose swapping, etc.
- Safe 24 volt controls standard on all operators
- Low maintenance – no sprockets, chains, brackets, or pulleys to adjust
- Direct position feedback for motion control
- Wear-compensating, spring-loaded, friction-feed drive system
- Built-in, fully adjustable (up to 600 seconds) maximum run timer
- Proximity limit switches, eliminates false tripping due to mis-aligned drive rail
- Instant reverse capability during close cycle during safety and obstruction detection
- Laminated, gate specific wiring drawing inside the electrical cubical of every operator
- Standard units available in 115/208-230 single phase and 208/230/480 three phase
- Built-in low voltage compensation capability
- Rigid, lightweight aluminum drive rail for easy gate mounting
- Increased security over chain drive units (no chains to cut or pins to remove)
- Drive wheels lock automatically when de-energized making it almost "pry-proof"
- Clearly illustrated installation, maintenance, and operation instructions
- Hand operated quick release drive system for manual operations
- UL325 and UL991 listed to provide the highest degree of safety
- Solid-state control with no plug-in modules
- User defined output for a wide range of optional accessories
- Built-in hydraulic soft-shift for increased life of the hydraulic system
- ALL previous manufacturer options, including single button control, obstruction detection, time delay to close, master-slave control, free-exit, emergency open, timed-gate locks, radio control, warning light, fail-open/fail-closed (in battery backup only), and intermediate open function —in EVERY operator; you select what you need!!
- Ability to integrate most other options, including loop detectors, gate edge detectors, emergency remote release, etc…

Models Available

Only a partial list of the more popular models in the XL Series is given below. Contact your authorized dealer or a B&B distributor for assistance in selecting the best operator for your installation.

To order any of the following models, with the exception of the XLB,, substitute the required input voltage for the "v" and required input voltage phase for "p." Input voltage and phase are specified for the XLB model separately at order placement. Recommended gate opening size is specified for B&B gate panels only; for non-B&B gates use the "Rated Pull" information.

XL-10vp
- Standard model
- Travel Speed: 1.2 foot per second (fps)
- Recommended gate opening: up to 50 feet
- Rated Pull: 300 pounds

XL-20vp
- Standard high speed model
- Travel Speed: 2.2 fps
- Recommended gate opening: up to 50 feet
- Rated Pull: 300 pounds

XLH-20vp
- Standard heavy-duty model
- Travel Speed: 1 fps
- Recommended gate opening: up to 75 feet
- Rated Pull: 400 pounds

XLD-20vp
- Extra heavy-duty model (4 hydraulic drive wheels)
- Travel Speed: 1fps
- Recommended gate opening: up to 150 feet
- Rated Pull: 500 pounds

XLT-30v3
- Super heavy-duty model (6 hydraulic drive wheels)
- Travel Speed: 1 fps
- Recommended gate opening: up to 300 feet
- Rated Pull: 700 pounds
- Only available in 3 phase due to motor restrictions

XLS-10vp
- Lighter service model
- Travel Speed: 1.2 fps
- Recommended gate opening: up to 24 feet
- Rated Pull: 200 pounds

XLB-0720
- Battery Backup model
- Travel Speed: 1.2 or 2.2 fps
- Recommended gate opening: up to 50 feet
- Rated Pull: 200 pounds
- Maintains normal operation during power failure

Other Models

B&B manufactures many other types and models of operators, including over 50 types of sliding gates and accessories; we are continually developing more. Custom jobs pose no problem for our experienced sales and engineering staff. Contact the factory or an authorized B&B representative for more information on this or any of our other product lines.

UL325 Gate Operator Definitions

This section is intended to define and describe the different operator classes as laid out by the Underwriters Laboratories, Inc., Standard for Safety, Door, Drapery, Gate, Louver, and Window Operators and systems. This standard is otherwise known as UL325, Fourth Edition.

The fourth edition of UL325 is very comprehensive and covers many aspects of operator design and construction. The last revision of this edition went into effect on March 1, 2000 and covers safety related issues.

Gate Operator (Class I) – A vehicular gate operator (or system) intended for use in a home of one-to four single-family dwellings, or a garage or parking area associated therewith.

Gate Operator (Class II) – A vehicular gate operator (or system) intended for use in a commercial location or building such as a multi-family housing unit (five or more single-family units), hotel, garage, retail store, or other building servicing the general public.

Gate Operator (Class III) – A vehicular gate operator (or system) intended for use in an industrial location or building such as a factory or loading dock area or other locations not intended to service the general public.

Gate Operator (Class IV) – A vehicular gate operator (or system) intended for use in a guarded industrial location or building such as an airport security area or other restricted access location not servicing the general public, in which unauthorized access is prevented via supervision by security personnel.

All B&B XL Series Hydraulic Sliding Gate Operators are intended to meet the requirements of Class III or Class IV operation by installing non-contact safeties as the Primary Safety and an audio alarm as the Secondary Safety. However, it is the responsibility of the installer to confirm that the operator meets the requirements of the installation. ***The XL Series Gate Operators are intended for use at access/egress points that will not be traveled by pedestrians. The XL Series does not meet the requirements of pedestrian gate operators.***

In order to meet the stringent requirements of these specifications all operators must have installed, and functioning, two infrared beams. One of these safety devices should be installed so that the beam spans the roadway side of the gate operator; the other beam should cover the "back-plane" of the gate panel. These safety devices meet, or exceed the requirements of UL325 or these classes of operators and provide a degree of safety to life and property.

Installation of Gate Operator

- **Supplied Parts**

  Your new XL Series Hydraulic Gate Operator should be inspected immediately after unpacking for any possible damage that may have occurred during shipping or storage. Also, check that all of the following parts, as they are standard with every operator:

  - Two (2) limit switch trip plates (for a high-speed or low speed operator)
  - 3-Station pushbutton (Open-Close-Stop)
  - Two (2) Infrared Transmitter/Receivers
  - Two (2) gate panel warning placards
  - Four (4) Mounting Posts
  - Vent cap for hydraulic pump
  - Quality Assurance Checklist

In addition to the above materials, check all shipping documentation or order forms for other, optional, accessories that may have been supplied. These items may have been packaged and/or shipped separately from the operator.

Before You Begin

Some of the following items may be highlighted by the following "attention" logo.  These instructions are very important to ensure the safe and reliable operation of the gate operator and the gate system. Failure to correctly follow these items is especially dangerous and may result in injury or death.

As with any electrical or mechanical device, installation should be done only by qualified individuals who understand the correct procedures and the current application. All local, regional, state, and national electrical codes should be followed when installing this gate operator.

All B&B gate operators have been designed and built to ensure safe and reliable operation for many years to come. However, the gate operator is only one part of the overall **gate system**. Each gate system (and its application) is unique; therefore, installers, designers, and users must evaluate each installation for all of the possible hazards that the system may encounter in the course of its life. If these jobs are done incorrectly potential hazards to life or property may result from the gate system. These instructions provide a framework to help evaluate and install the B&B XL Series Gate Operator. However, because of the nature of these installations, they cannot and are not intended to be comprehensive. **It is the responsibility of the designer, installer and end-user to make sure that the gate system is safe for its intended usage.**

Installation Checklist

- ❑ Confirm that the gate operator meets the intended application (e.g.- Class 1, Class 2, etc.). See *UL325 Operator Types.*

- ❑ Confirm that all items necessary for a safe installation have been provided (see *Supplied Parts*, above)
- ❑ The gate panel that is attached to the gate operator should move freely by hand before the operator is installed.

- ❑ The gate panel and related hardware should be free of "pinch" points and all areas that a by-stander may become entrapped by the equipment.
- ❑ Write the model number and serial number in the spaces provided on the first page of this manual for easy future reference. This information may be found on the gate operator nameplate.

- ❑ Confirm that pedestrians will not use the opening guarded by the gate operator.
- ❑ Confirm that the controls for activating the gate will be placed in a location that is far enough away that a risk of entrapment by the moving gate is minimized to the person controlling the access point. (If the operator is to be "manned" by a guard).

- ❑ Confirm that the Gate Warning Placards are installed on the gate panel and are visible in both directions to traffic.
- ❑ If a person is monitoring the gate installation, the controls for actuating the operator must be placed so that this person has a full, unobstructed view of the entire movement path of the gate panel.
- ❑ If the gate system is to be monitored by a person, there should **never** be an automatic closing device (e.g.- loop, timer, etc.) installed or enabled.
- ❑ If the gate system is to be employed as a monitored system, there should only be one activation device connected to the operator.
- ❑ Confirm that the operator will be installed **inside** the fence line of the installation. A gate operator should never be installed on the side of the fence with unrestricted, public access.

SECTION 1: MECHANICAL INSTALLATION & DRAWINGS

The most important component in the life and performance of the XL Series gate operator is the installation. As with anything mechanical, the operator must be installed properly to be able to do what it was designed for. Too many times a person will assume that the operator works one way, when in reality, it may work completely opposite. Never assume anything. Always read the instructions or contact the dealer with any questions. Can't get in touch with the dealer? Then call us at **800-367-0387**. We welcome your questions and will get you in touch with the right people that can help solve any problems you may encounter.

Although this is an instruction manual on proper installation of the gate operator, the first thing to insure is that the gate panel is properly installed. It is important to make sure the gate panel is level and rolls freely. A bad panel has caused many technicians to spend hours looking for problems, when it is being caused from the operator not being able to move the panel. Always ensure the panel is not bent or twisted, and rolls free in both directions for the entire length of travel.

Concrete Pad

The concrete pad on which the operator will mount should be sized to provide support for the weight forces the operator will exert. It is important to remember that the operator pulls and pushes the gate panel and force is transferred directly into the pad. The size and depth of the pad will depend on the geological area where the operator is being installed. It is recommended that you contact a local concrete contractor for this information. At a minimum, the pad should be a least 6" below the frost line or 24" in the ground, which ever is appropriate. In all installations, the pad should be a minimum of 2" above ground. Make sure that the pad has been allowed to cure completely before mounting the operator.

Anchor Bolts

The gate operator is mounted to the concrete pad with four (4) anchor bolts. These bolts are placed in the pad according to the dimensions shown on the appropriate drawing found in "Section 9 - Installation Drawing". The anchor bolts should be ½" in diameter and mounted in the concrete pad at least 6 " deep. Install the anchors with approximately 1 ¼" of the bolt extending out of the concrete.

Conduit

The conduit opening in the base of the operator is 4 " x 6 " and is more than adequate for multiple conduit runs. The exact number of conduit runs will always depend on the particular installation, but at the very minimum, conduit must be run for the main power leads and low voltage control wires. These two sets of wires must run in separate conduits to avoid 60HZ interference on the control signal.

The recommended conduit size for the operator is ¾". This will ensure enough room for multiply wire runs. All conduits should be UL approved for use to fit the application required.

Mounting The Operator

Once the concrete pad has cured and the anchor bolts have been installed, it is time to set the operator. Lift the operator over the anchor bolts and position it so that the bolts are approximately in the center of the slotted holes in the base of the operator. Install lock washers and the nuts for the anchors. Tighten the bolts until they are snug. Once the drive rail has been installed, the operator will probably have to be moved in or out to reach the proper spacing between the rail and the wheels.

- **Remove the operator cover and release the drive wheels**
  There are five (5) stainless steel hex head bolts that hold the cover to the operator. Using a 3/8" nut driver, loosen each bolt about halfway out and remove the cover.

  As stated earlier, the drive wheels contact or "pinch" the drive rail creating friction. The wheels are spring loaded on the rail and can be released by using the manual release handle that is installed with every operator. This handle is located near the main power disconnect in the operator. Place the handle on the linkage and push it toward the wheels until it breaks over (*Figure 1*). This will separate the wheels by forcing the arms away from each other. **Caution: The quick release is NOT locked in this position. A sudden jar to the mechanism could cause it to snap back to the locked position. Always keep hands and fingers clear of the mechanism to avoid injury.**

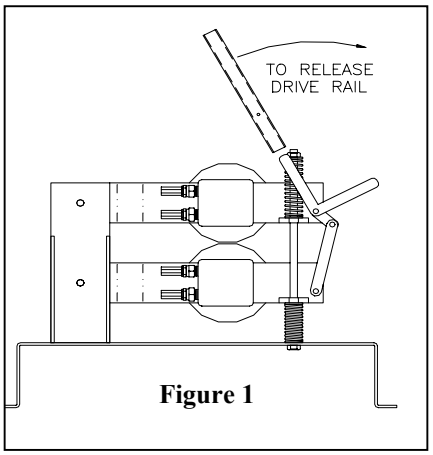


Figure 1

- **Install the drive rail.**
  With the wheels open, install the drive rail through the wheels the full length of the panel. Clamp the rail in position using large "C" clamps. Starting from one end, bolt the rail to the panel keeping the rail equally centered between the drive wheels. This spacing is critical to ensure that the drive rail will properly track with the wheels. Depending on the length of the panel, a splice plate may be required for the drive rail. *Figure 2* shows the proper installation of the splice plate.

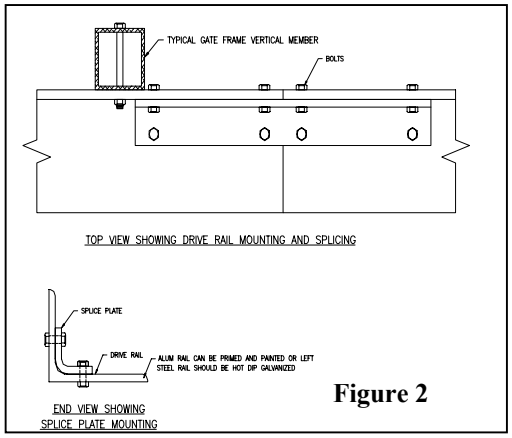


Figure 2

- **Position the operator.**

The operator must be positioned so that the wheels will completely contact the drive rail (*Figure 3*). The mounting holes in the operator have been slotted to allow in and out positioning. The operator must also be square to the panel so that the wheels will stay in their position through the complete travel of the gate. Loosen the anchor bolts so that you can slide the operator. Use a tape measure and measure the distance from the centerline of the wheels to the inside of the gate panel. (Do not measure to the inside of the drive rail.) This dimension should be 3". If it isn't, slide the operator in or out until 3" dimension is reached. Once the distance between the centerline of the wheels and the panel has been set, measure each end of the operator to the inside of the panel and adjust it until each end is equally spaced. Tighten the anchor bolt to the recommended torque specifications and re-check all the dimensions.

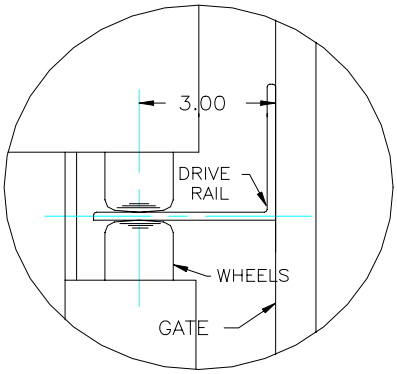


Figure 3

- **Install the hydraulic reservoir vent cap.**

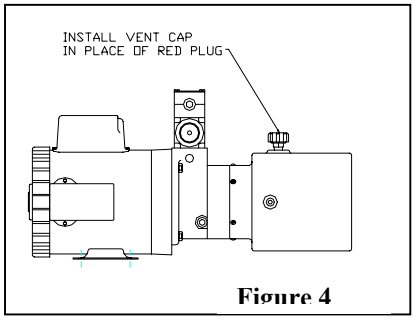


Figure 4

Remove the brass thumbscrew holding the electrical cubicle to the mounting bracket. Pull the cubicle up and toward you, rotating it to the service position. At this point the hydraulic pump assembly is easily accessible. Remove the **red** plug from the pump assembly and replace it with the vent cap (*Figure 4*) that has been supplied with the operator. Move the electrical cubicle back to the operating position and retighten the thumbscrew.

- **Mount the Proximity Limit Switch Plates**

This step cannot be performed until after electrical connections have been made. The proximity limit switch trip plates (provided) are mounted to the bottom of the drive rail on opposite ends. When the gate panel is in the full open or full closed position, the corresponding trip plate will be positioned in front of the proximity switch. To mount the plates, refer to the steps listed below:

1) Place the power disconnect switch to the off position and release the wheels with the manual release mechanism.

2) Place the gate panel in the full closed position. Make a mark on the drive rail approximately in the center of the of the panel. This is a reference line that will be used to measure the drift of the gate panel.

3) Line the front edge of the trip plate with the reference line and use a C-clamp to attach the trip plate to the rail. Orient the clamp so it will clear any obstruction during the normal course of travel (mounting posts, bottom guides, etc.).

4) Move the gate panel towards the full open position until the trip plate is positioned in front of the open proximity switch (switch closest to the opening).
Adjust the spacing between the trip plate and the switch so there is 1/4 to 3/8 of an inch between them. Once adjusted, move the gate panel back to the full closed position.

5) Place the power disconnect switch to the on position and lock the wheels with the manual release mechanism. Place a jumper wire between the **Open Input, TB1-Pin1** and an input common. The operator will begin moving toward the full open position.

6) Once the trip plate reaches the proximity switch, the gate panel will stop. Place the power disconnect switch in the off position. Make another mark on the drive rail, even with the side of the operator housing. Measure the dimension from the original mark and the "stop position" mark. Record the dimension here: _____

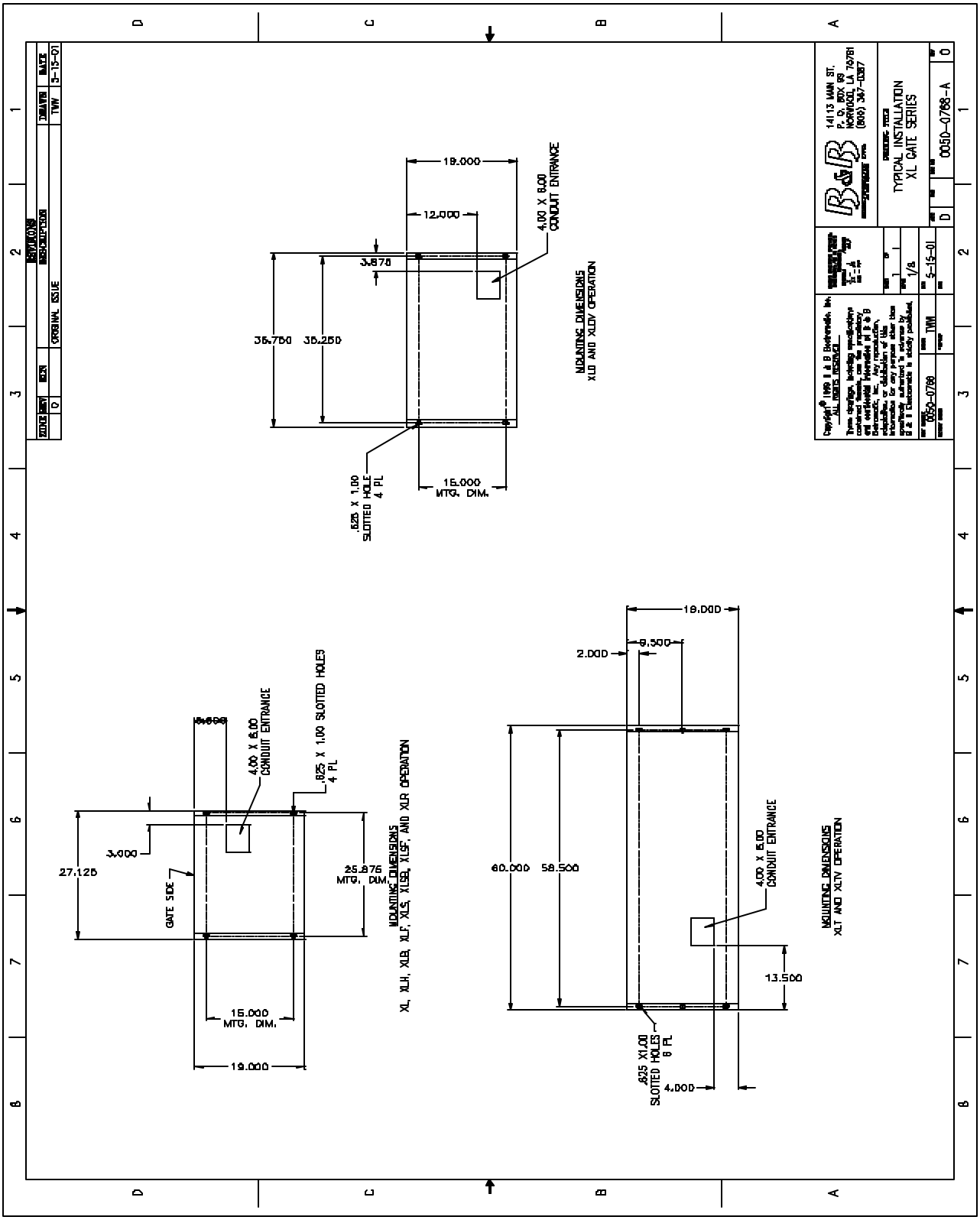
7) Release the wheels with the manual release mechanism and move the gate panel to allow clearance to remove the C-clamp and trip plate.

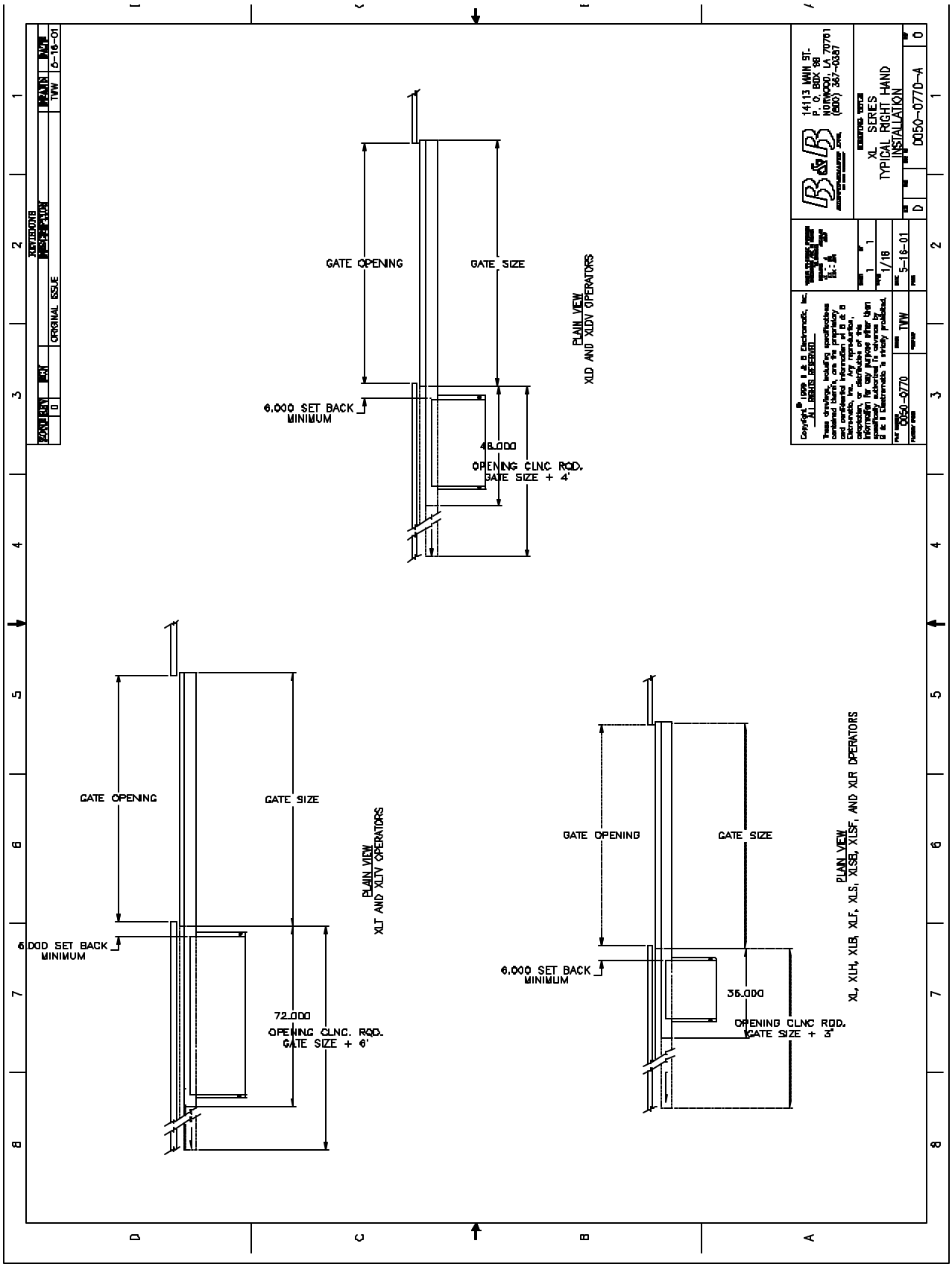
8) After removing the clamp and trip plate, place the gate panel to the position that will be full open (this may vary depending on the installation). Using the same side of the operator housing in Step #6, make a mark on the drive rail even with the side of the operator housing. Measure from this mark (toward the opening) the distance recorded in Step #6. Mark this position on the drive rail.

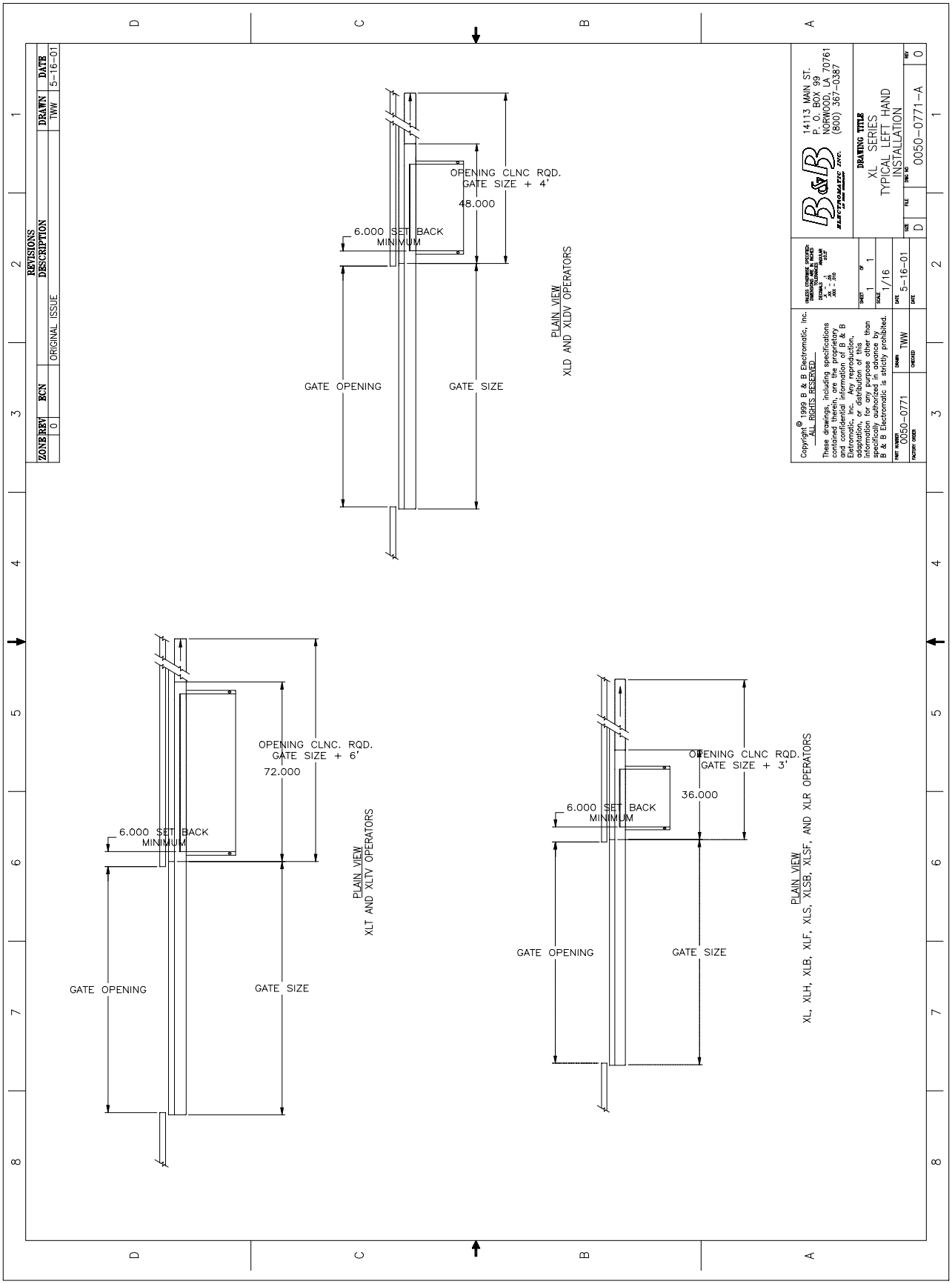
9) Align the front edge of the trip plate on this mark and mount the plate to the drive rail. An easy way to mount the plate is by placing the plate upside down on the top of the rail with the small edge butted against the back of the rail. Drill and tap the mounting holes for the ¼ -20 bolts provided. After drilling and tapping, mount the plate to the bottom of the rail and adjust the proximity switch approximately 1/4 to 3/8 of an inch from the front of the plate.

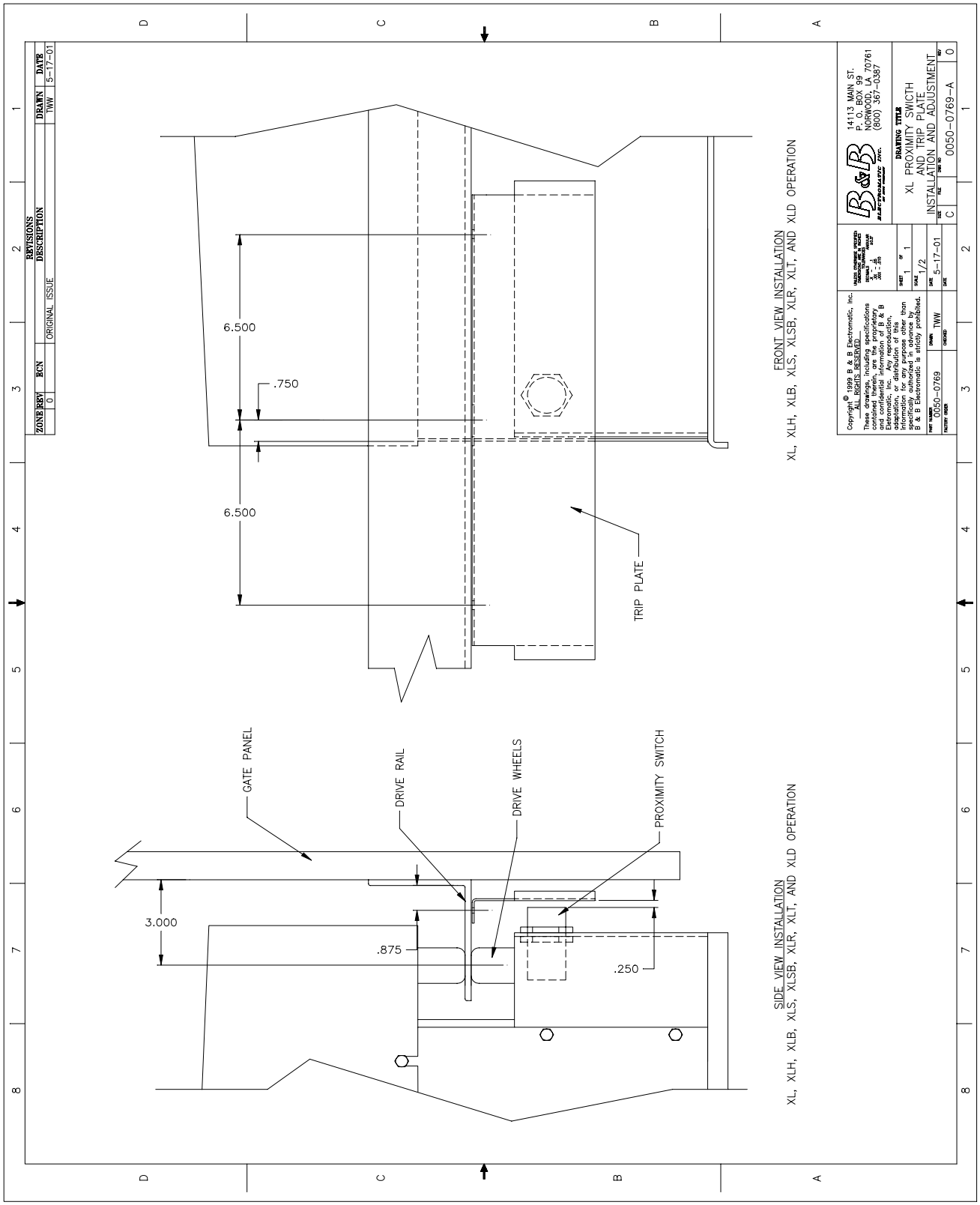
10) Move the gate panel to the full closed position and lock the wheels with the manual release mechanism. Test run the operator with an OPEN command. The gate panel should stop in the desired position. The mounting holes in the plate are slotted if minor adjustments are required.

11) Repeat this procedure for the full closed trip plate. The dimension in Step #6 will be used to locate the end point of the plate. Be sure to orient the marks correctly for the full closed position; they are mirrored from the full open position above.









SECTION 2: ELECTRICAL CONNECTIONS

In order to comply with UL325 Forth Edition, the XL Series Gate Operator has two safeties built in to the control board. This is required by UL and can not be changed or by-passed. The primary safety for this operator is infrared (IR) beams protecting the roadway (opening) and the back plane (area behind the operator equal to the distance of the gate panel in the full open position). The operator is shipped from the factory with two sets (2 receivers/2 transmitters) of IR beams. These beams provide protection for the roadway and back plane during the opening/closing cycles of the gate. **The XL operator will not function without both of the safeties installed and working properly.** As with the gate panel and operator, it is critical that these beams be installed correctly.

Mount the IR Beams

Mount the aluminum "T" posts that have been provided with the operator in a position that will provide a clear, unrestricted area from the operator across the roadway and from the operator to the end of the back plane. It is recommended that a minimum of 18" of the post be buried in the ground.

Connect the Control Leads

The basic input connections needed to operate the gate; open, close, and stop are connected to the corresponding input receiver on the input terminal block, **TB1-Pins 1-4**. A normally open (NO) contact closure is all that is required to cause the operator to open or close the gate. A normally closed (NC) contact is required for the stop button. For more information on the input of XL, refer to "Section 4-Description of Input".

Connect the Ground Wire

THIS IS NOT AN OPTION!!!! An earth ground is critical to ensure long life and optimum performance of the solid state controller. More problems will be eliminated by a simple earth ground than anything else. Locate a ground rod as close to the operator as possible and drive it *at least 36" into the soil*.

- The ground wire should be a #10AWG solid copper conductor running from the rod to the operator. Connect the wire to ground lug on the main power disconnect switch or to the body of the operator. **Remember**-- use an earth ground and not an electrical ground.

- On the XLB (battery back-up) there is a silver double-wire lug in the auxiliary cubicle and the main electrical cubicle of the operator specifically for the attachment of the ground wires.

Connect Main Power Leads

Before starting this step, make sure the main power is turned off at the source and that the main power disconnect switch mounted in the operator is in the off position. Also, this is a good time to make sure that the main power voltage and phase are the same that is listed for the operator. There are two types of main power connections for the XL series operator. On AC voltage models, power is connected to the main power disconnect switch. This switch is located on the inside wall of the operator next to the manual release handle. The second type of connection is for the XLB (battery back-up) models. In the case of the XLB, main power is connected inside the auxiliary electrical cubicle. All of the cables needed to interconnect the auxiliary cubicle to the operator are supplied from the factory. Refer to the drawing provided for all connection points for the XLB. Once all the connections have been made, reconnect the main power. Again, make sure the main power disconnect switch is in the "OFF" position.

Turn on the Main Power Disconnect Switch in the Operator

As soon as the main power switch is turned on, the audible alarm will sound and four (4) LEDs will be lit on the main control board. Also, depending on what has been programmed into the PDM board, there will be LEDs lit as well. This is a normal function of the unit, and will be discussed in a later section. Using a voltmeter, check the secondary voltage of the control transformer (AC units) for 24VAC. Refer to the drawing provided to identify the particular transformer your unit has. On the XLB (battery back-up), check for 24VDC at the main disconnect switch inside the operator. In each case, checking this voltage should be done immediately after turning the main disconnect switch on. The solid state XL control board is designed to operate on voltages of 24AC, but can tolerate brief voltages of up to 48VAC. If the secondary transformer exceeds 24VAC, reconfirm that the input voltage of the operator matches the supplied voltage. On the XLB, if the voltage exceeds 28.9VDC, reconfirm the correct primary voltage.

Test the Gate Operator

Release the drive wheels and move the gate panel to the mid-travel position. If installed, use a pushbutton to test the operator. If a pushbutton (option) is not installed, place a jumper wire from the stop input, **TB1-Pin2**, to the common input **TB1-Pin4**. Once the jumper wire is installed, use a momentary jumper wire from any of the input commons to the open input, **TB1-1**. The audible alarm should sound and the gate operator will begin to cycle towards the open position. The gate will not move because the wheels are released. Also, when you jump the common to the open input, notice the corresponding LED lights to indicate the control board is receiving the open input. The operator will run until the full open limit switch is tripped. Since the wheels are released, you must place a metallic object in front of the proximity switch to stop the operator. Repeat this step using the close input and the full close limit switch.

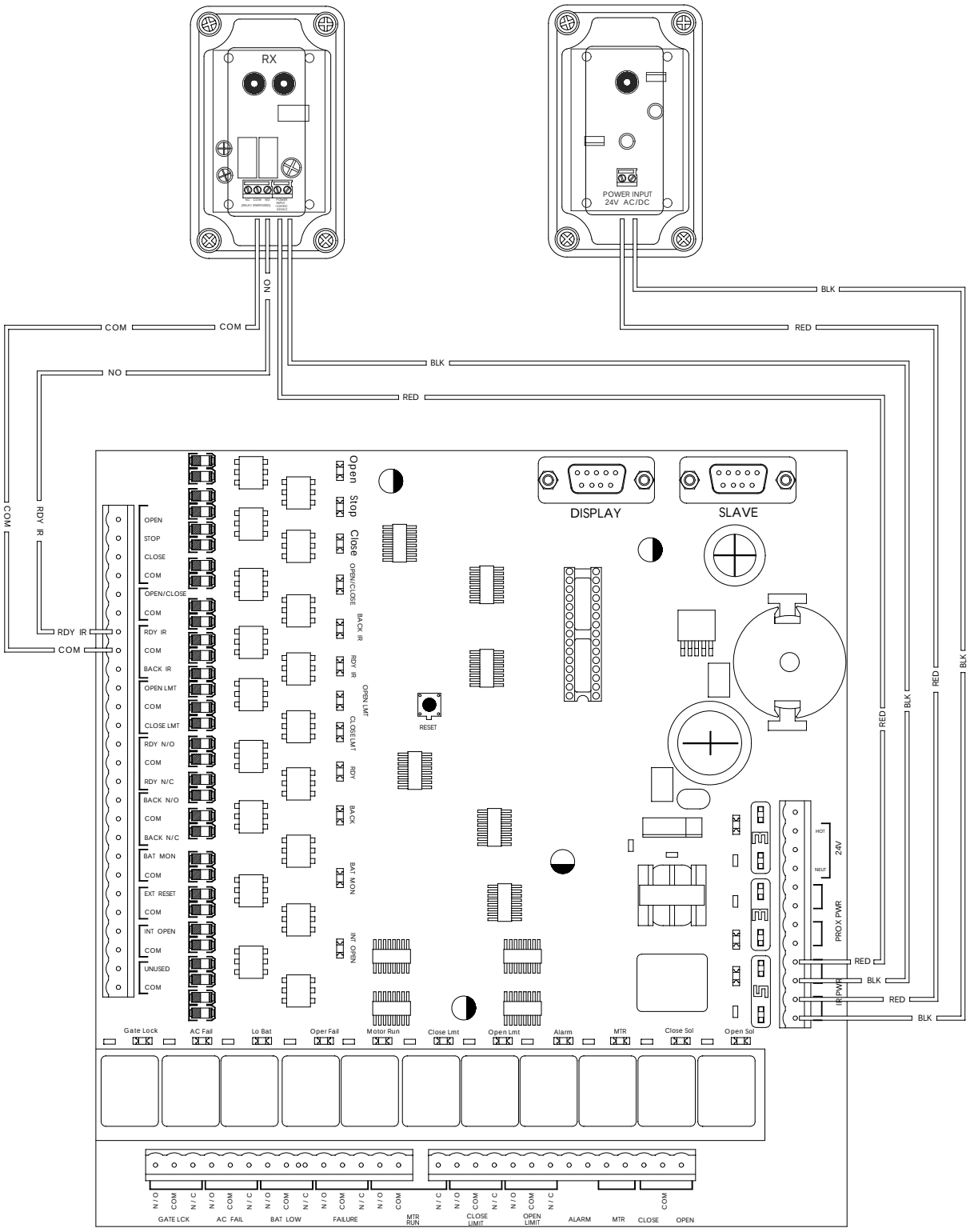
Program the Operator

Refer to "*Section 3 – Option Setup"* in this manual.

Engage Wheels and Re-Test Operator

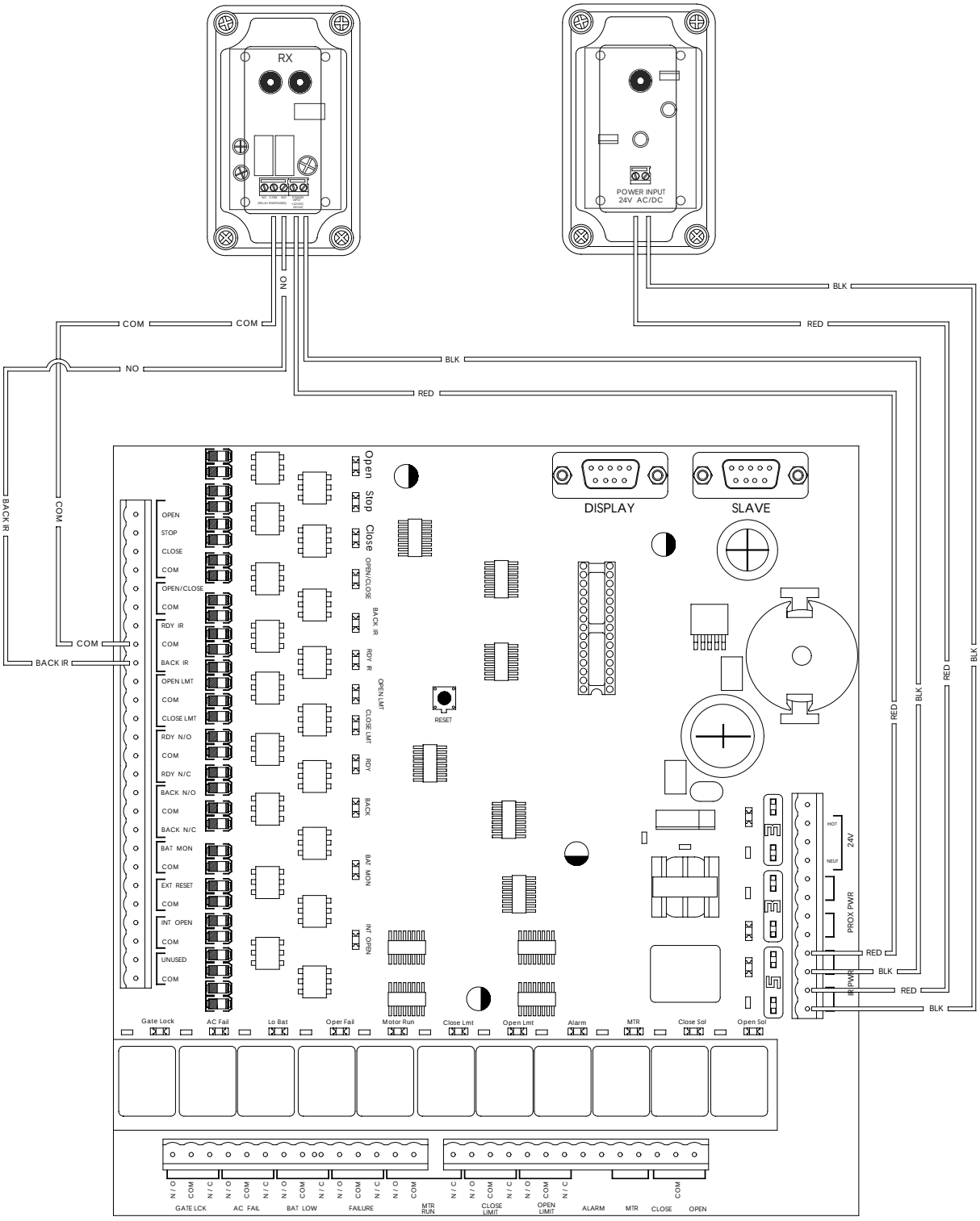
Engage wheels using the manual release handle and place the handle back in its holder. Make sure that the entire surface of both wheels are in contact with the drive rail. If the wheels are not contacting the drive rail, adjust the spring tension on the drive arms until both wheels are touching. Repeat the steps for testing the operator and observe the "track" of the wheels. If the wheels run off of the drive rail, check the alignment of the operator to the gate panel.

- **Test safety IR beams.**
  With power on, check the IR receivers and transmitters to ensure that the "power" LEDs are lit. Open the gate to the full open position. (Once the full open position initiates a close cycle and the gate is in motion, place this manual in front of the roadway IR receiver.) The gate should stop immediately, wait two seconds, then begin to reverse to the full open limit. During this reverse, place the manual in front of the back plane receiver. The operator will automatically shut down and the audible alarm will continue to sound. Looking at the control board, the following LEDs will be lit; Gate Stopped, Safety Trip, Closing and the three (3) LEDs discussed above (the alarm LED will be off). Reset the operator by pressing the manual reset button located in the center of the control board. Once reset, the audible alarm will stop and the LEDs will go out.



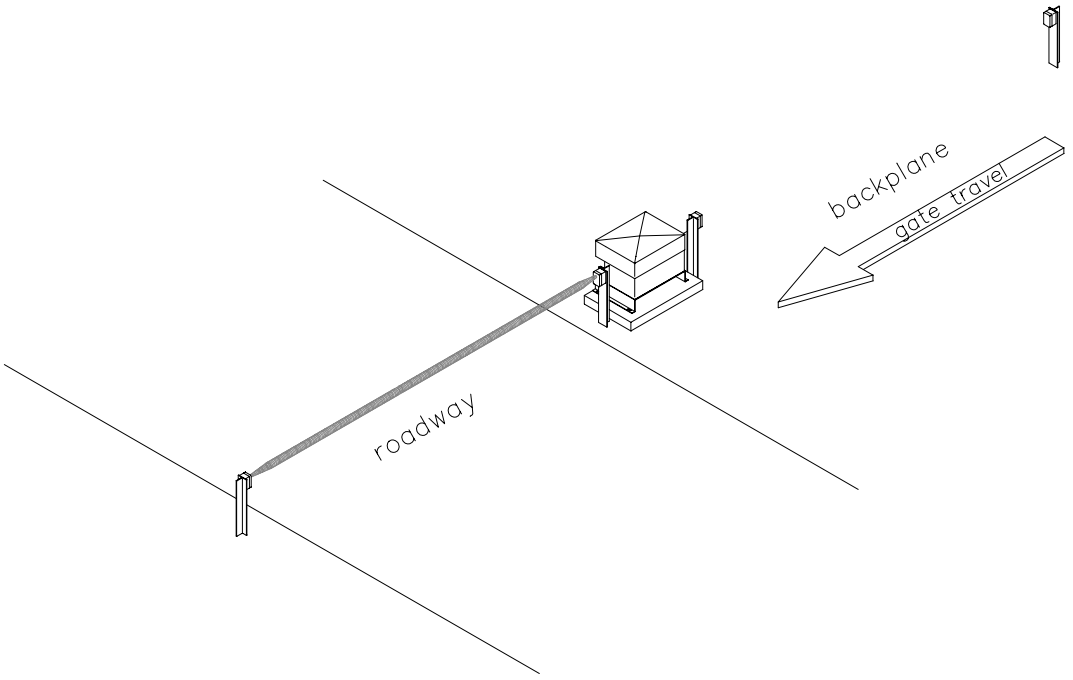
ROADWAY IR BEAM

Note: Do Not Remove The Resistors In The IR Beams.

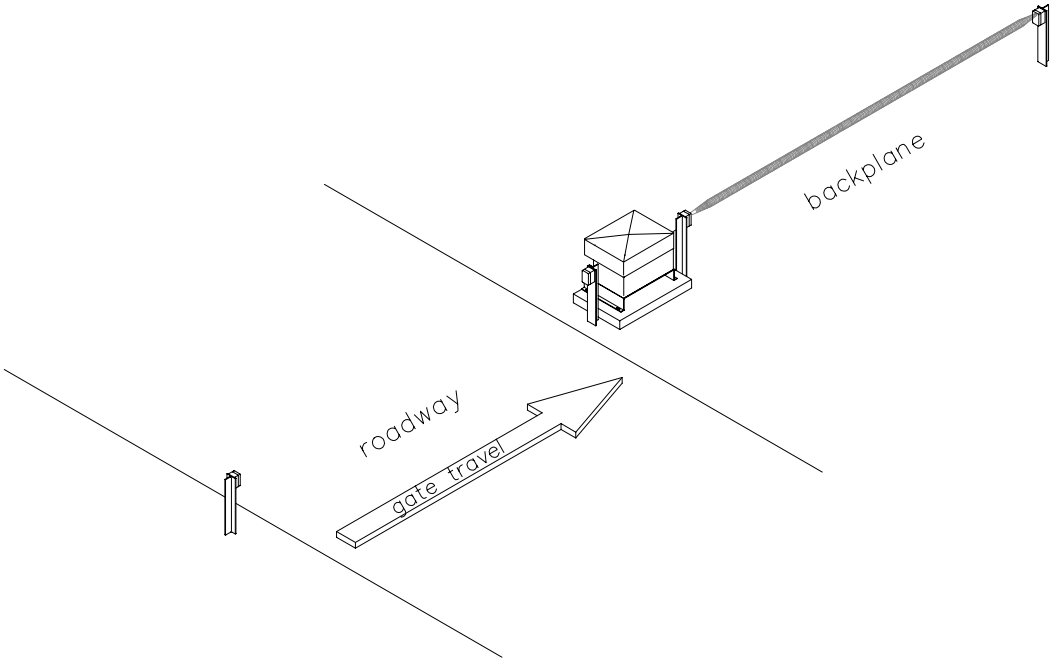


BACKPLANE IR BEAM

Note: Do Not Remove The Resistors In The IR Beams



ir safety beam operation – close cycle



ir safety beam operation – open cycle

SECTION 3: OPTIONS SETUP

The installer (or end-user) sets all features of the XL series controller from the Programming/Diagnostics/Maintenance (PDM) Board, see *Figure 5*. This board is mounted to the inside cover of the electrical cubicle and attached to the control board by a DB-9 connector and cable. In addition to the setup of features on this board, several diagnostic tools and status indicators are available for troubleshooting. The PDM board has two modes: operation mode and programming mode. The state of the board is indicated by the program mode LED (not shown in *Figure 5*) that is located just below the middle numerical LED. When the PDM board is in program mode, this LED will be lit.

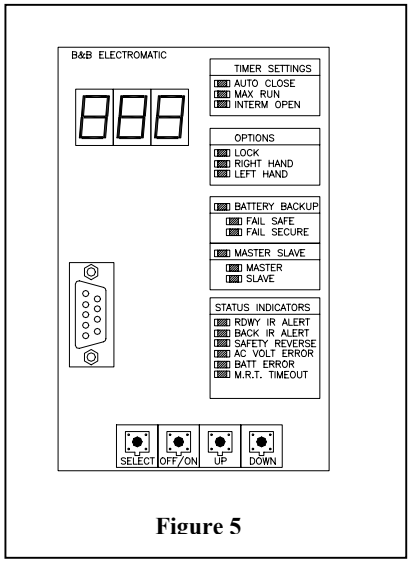


Figure 5

The Programming/Diagnostics/Maintenance (PDM) board is provided for the programming of the options and to show the status of the operator at all times. The board is located on the inside cover of the electrical cubicle and is attached to the main control board by a DB-9 connector and cable. The PDM has four (4) program sections, Timer Settings, Options, Battery Backup, and Master/Slave Enable. In addition, it also has a section that gives the status of the operator using high intensity LEDs. The four (4) pushbuttons at the bottom of the board are used to set the PDM to the program mode and to turn on or off, change the status, or set the timers of the various options.

Programming Mode

To go from operation mode to programming mode, press the "Select" pushbutton at the bottom of the board. The amber "Program Mode" LED will light, and the first red LED (auto close) will light. Also, notice that the large LED display will be lit and displaying the status of the "Auto-Close" timer. As you press the "Select" pushbutton, the PDM will move down through the various options. Once you get to the last option, Master/Slave Enable, pressing the "Select" again will place the PDM back in operation mode and write the program changes to the main control board

Auto Close

The auto close timer (ACT) when enabled, will automatically close the gate from the full open position in a pre-determined time. This time can be set from 1 second to over 600 seconds. The ACT is shipped in the OFF position and must be set in the program mode to activate it. Once activated, the ACT will count down when the gate has reached the full open limit to the user defined time value and initiate a close cycle. *Note- any time the control board is powered, a STOP input will override any active timer or motion. If the STOP is given before the ACT has timed out, the gate will remain in the full open position indefinitely.*

To Enable:

Press “SELECT” – The PDM program mode LED will light, the Auto Close LED will light, and the display will show the status of the ACT (on/off).

Press “OFF/ON” - The display will cycle from on to off. Place the ACT in the “ON” position.

Press “SELECT”- The display will indicate the time, in seconds, that the ACT is currently set for. Change this setting by pressing the “UP” or “DOWN” pushbuttons.

Press “SELECT” until the “Prog.” light goes out. The PDM is now in the operating mode.

Max Run

The Maximum Run Timer (MRT) allows the operator to only run a specific amount of time during the open or close cycle. This time is determined by using the following formula:

MRT = (opening length (in ft.) of the gate panel / gate speed in FPS) x 2 .

This is a built-in safety feature to protect the operator, wheels, etc. in the event the gate panel travels past the respective proximity switch. This feature will ensure that, in unattended operation, the operator will not continually run if it does miss the switch. The amount of time, in seconds, may be set from 1 second to over 600 seconds.

To change the time value: (the MRT can not be disabled)

Press “SELECT” three (3) times- The PDM will scroll through the ACT function, light the Max Run LED, and the display will show the time value that is currently set. Change this time value by pressing the “UP” or “DOWN” pushbuttons.

Press “SELECT” until the “Prog.” LED goes out. The PDM is now in the operating mode.

Intermediate Open

The Intermediate Open, when enabled, allows the operator to open either to the full open position or to a partial open. The position at which the gate will stop is set in the program through the PDM. This is a time value, in seconds that can be derived by dividing the size of the opening by the speed of the operator. Like the other timers, the intermediate open timer may be set from 1 second up to over 600 second. The Intermediate Open is shipped from the factory in the "OFF" position and must be set in the program mode to enable it. Also, the Intermediate Open has a separate input that must be used to signal the control board that it is a partial opening and not a full opening. This input is discussed in "Section 4 - Description of Inputs" in this manual.

To Enable:

Press "SELECT" four (4) times- The PDM will scroll down to until the "Intermediate Open" LED is lit, and the display shows "OFF".

Press "OFF/ON" – Place the "Intermediate Open" in the "ON" position.

Press "SELECT" – The display now shows the time, in seconds, the "Intermediate Open" is currently set for. Change this setting by pushing the "UP" or "DOWN" pushbuttons.

Press "SELECT" until the Prog. LED goes out. The PDM is now in the operating mode.

Lock

The Lock option, when enabled, allows the use of an electrical lock (solenoid or magnetic) to automatically lock the gate panel in the full closed position. Prior to opening, the control board will energize the Gate Lock (N/O and N/C) relays one (1) second before the gate begins to move. *The Normally Open (N/O) contact and the Normally Closed (N/C) contact are provided to be able to use various types of locks. Always install the lock in accordance with the manufacturer's specifications and move the gate panel to the mid-travel position before testing.*

To Enable:

Press "SELECT" five (5) times – The PDM will scroll down until the Lock LED is lit, and the display shows "OFF".

Press "OFF/ON" – Place the Lock in the "ON" position.

Press "SELECT" until the Prog LED goes out. The PDM is now in the operating mode.

Right Hand / Left Hand

Although the Right Hand (R/H) and Left Hand (L/H) options are listed separate, they function together during the programming of the operator. Once you have determined the direction in which the operator will operate, program the PDM for that "hand ". *Note: B & B determines the hand direction by which side of the opening the operator is located when looking from the* ***non secured side*** *(Figure 6).*

To set Right or Left Hand:

Press "SELECT" six (6) times – The PDM will scroll down until the Right Hand LED is lit and the display shows "nnn". The Right hand set is preset at the factory prior to shipping.

Press "UP" or "DOWN" – The display will show "nnn" and the respective LEDs will cycle from RH to LH mode. Set the desired direction.

Press "SELECT" until the Prog LED goes out. The PDM is now in the operating mode.

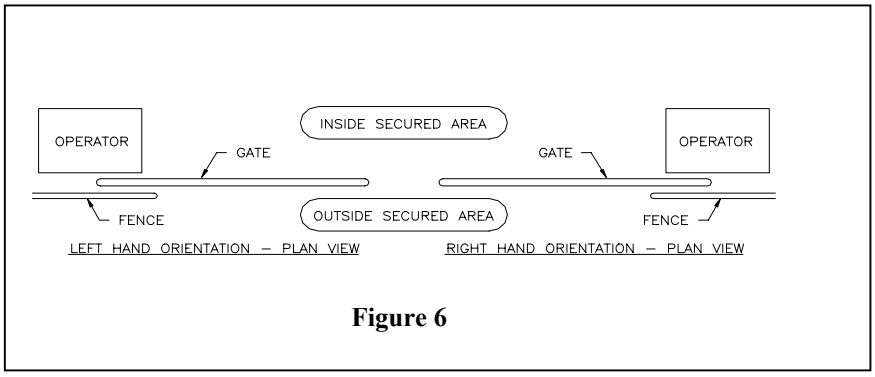


Figure 6

Battery Backup

This option is only available on the XLB (battery backup) models. The Battery Backup option, when enabled, allows selection of fail-safe (open) or fail-secure (closed) operation. A battery monitor (not provided) may be used to sense approaching failure of the batteries and signal the control board to shut down the operator in the open or closed position.

This option is triggered by the "AC Fail" input which should be wired into the "K6" relay in the auxiliary enclosure. When the operator receives a contact closure from the "K6" relay (during commercial power failure). The control moves the gate to the full-open position and temporarily disables the auto-close timer. After reaching the full-open position (in a fail-safe move), a close command will restore the gate back to normal operation and re-enable all timers, including the auto-close timer.

Fail Safe (OPEN)

The Fail Safe option is a sub-set of the Battery Backup option. This means that the Battery Backup option must be enabled in order for this option to work. If enabled, upon failure of commercial power the operator will move the gate to the full open position if it is not already there. Once commercial power has been restored, the operator will remain in the full open position until the control board receives a close signal.

To Enable:

Press "SELECT" seven (7) times - The PDM will scroll down until the battery backup LED is let and the display show "OFF".

Press "OFF/ON" – Place the battery backup in the "ON" position.

Press "SELECT" one (1) time and the "Fail-Safe" LED will light up.

Press "SELECT" until the Prog LED goes out.

Fail Secure (CLOSE)

Like the Fail -Safe, Fail Secure is a sub-set of the Battery Backup and can not be enabled without the Battery Backup in the ON position. If enabled, upon failure of commercial power the operator will move the gate to the full closed position if it is not already there. Once commercial power has been restored, the operator will remain in the full closed position until the control board receives an open signal.

To Enable:

Press "SELECT" seven (7) times - The PDM will scroll down until the battery backup LED is let and the display show "OFF".

Press "OFF/ON" – Place the battery backup in the "ON" position.

Press "SELECT" one (1) time and the "Fail-Safe" LED will light up.

Press down one (1) time and the "Fail-Safe Secure" LED will light up.

Press "SELECT" until the "Prog." LED goes out.

Master Slave Enable

The Master Slave Enable option, when enabled, allows two operators to function together from the same set of access controls. Once programmed, one of the operators will receive all access signals (Master) and transmit them to the other operator (Slave) through a J9 connector and cable. You will only need to designate one of the operators as the Master and program it. Once the options have been programmed into the operator, the control board will automatically download the information to the Slave operator and set the "hand" direction (the control board will set the Slave in the opposite direction as the Master).

Remove the jumper on TB1 between Pins 2 & 4 on the Slave. Connect the cable between the Master and Slave operator (as wired per wiring configuration shown in "*Section 9 – Installation Drawings; Dwg.# "Accessory Connections"*.

To Enable:

Designate which operator will be the Master by connecting all the control devices (pushbutton, loops, etc.).

Press "SELECT" eight (8) times – The PDM will scroll down until the Master Slave Enable LED is lit and the display shows "OFF".

Press "OFF/ON" – Place the Master Slave Enable in the "ON" position.

Press "SELECT" – The Master LED will stay lit (it blinks in the operation mode) and display will show "OFF".

Press "OFF/ON" – Place the Master in the "ON" position.

Press "SELECT" until the "Prog" LED goes out. The PDM is now in the operating mode. Turn power on the Slave unit and the PDM will automatically set up the operator.

SECTION 4: DESCRIPTION OF INPUT

LOCATION	DESCRIPTION	FUNCTION	OPTIONS
Open Input **TB1-Pin 1**	This functions as the primary open input for the gate operator. The open input sends a signal to the control board to open the gate. In addition, a maintained contact will act as a "Hold Open" device to hold the gate in the open position until the contact has opened.	A normally open (NO) contact, wired in series with one of the common terminals, is used to send the signal to the control board.	Push button, PLC, timer, keypad, or loop detector are just some of the devices that may be used to provide this signal.
Stop Input **TB1-Pin2**	This input will stop **ANY** movement the gate system is making, including a safety reverse or an active timer. The operator will remain in the "pause" mode indefinitely. An open, close, or fail safe/secure (if active) input is required to return to normal operation.	A normally closed (NC) contact, wired in series with one of the common terminals, is used to send the signal to the control board.	Push button, PLC, are some of the devices that may be used to provide this signal.
Close Input **TB1-Pin 3**	This functions as the primary close input for the gate operator. The close input sends a signal to the control board to close the gate. This input can be activated manually with a push button or by programming the Auto Close timer on the PDM board. The Auto Close timer will automatically close the gate after counting to a user-defined time.	A normally open (NO) contact, wired in series with one of the common terminals, is used to send the signal to the control board.	Push button, PLC, timer, keypad, or loop detectors are some of the devices used to provide this signal.
If the gate is in motion towards the open position, and a close signal is given, the control board will disregard the close input. The gate will continue to move to the full open position. This is a safety feature that is built in the control board. In order to override the open cycle, a "STOP" input must be given, followed by the close input.			
Open/Close Input **TB1-Pin 5**	This input is used when single signal input is required to operate the gate. When the control board receives this input it will determine the position of the gate (open or closed) and then move to the opposite position. If the gate is closed, it will open. If the gate is open, it will close.	A normally open (NO) contact, wired in series with one of the common terminals, is used to send the signal to the control board.	Single push button but, typically used as the connection point of a radio receiver.

LOCATION	DESCRIPTION	FUNCTION	OPTIONS
Roadway IR Input **TB1-Pin7**	This is the primary input for the roadway safety. The roadway is defined as the gate opening. During the closing cycle, the control board will power the roadway IR beam to protect against entrapment in the gate. If the beam is "broken", the signal is present on this input and activates a safety reverse (the gate will pause four seconds and then move to the open position before it begins to open again).	The normally open (NO) contact of the IR Receiver, wired in series with one of the common terminals, is used to send the signal to the control board. The control board also provides power to the IR beam transmitter and receiver from **TB3-IR PWR**.	Only the IR beam that is included with the operator is used to provide this signal.
Back IR Input **TB1-Pin9**	This is the primary input for the back plane safety. The back plane is defined as the area from the back of the operator to the full length of the gate panel in the open position. During the open cycle, the control board will power the back plane IR beam to protect against entrapment in the gate. If the beam is "broken", the signal is present on this input and activates a safety reverse (the gate will pause four seconds and then move to the **closed** position before it begins to open again).	The normally open (NO) contact of the IR Receiver, wired in series with one of the common terminals, is used to send the signal to the control board. The control board also provides power to the IR beam transmitter and receiver from **TB3-IR PWR**.	Only the IR beam that is included with the operator is used to provide this signal.
Open Lmt Input **TB1-Pin10**	This input is pre-wired at the factory. When the gate panel reaches the full open position, the proximity limit switch detects the trip plate mounted on the bottom of the drive rail. This closes the switch, sending a signal to the input, and "tells" the control board that the gate is now in the full open position.	The normally open (NO) contact of the proximity limit switch, wired in series with one of the common terminals, is used to send the signal to the control board. The control board also provides power to the proximity limit switch from **TB3-PROX PWR**.	Only the proximity limit switch that is mounted on the front service plate is used to provide this signal.
Close Lmt Input **TB1-Pin12**	This input functions the same as the open limit input, with the exception that it detects the close gate position by using the full close proximity limit switch.	Same as above.	Same as above.
Rdy N/O Input **TB1-Pin13**	This input is used with an additional safety device that utilizes a normally open (NO) contact to provide a signal to the control board. When the control board receives a signal on this input, it will stop the close cycle and reverse to the full open.	A normally open (NO) contact, wired in series with one of the common terminals, is used to send this signal to the control board.	Loop detector, safety edge, or IR beams are some of the devices that may be used to provide this signal.

LOCATION	DESCRIPTION	FUNCTION	OPTIONS
Rdy N/C Input **TB1-Pin15**	This input is used in the same way as the Rdy N/O Input above with the exception of utilizing a normally closed contact instead of a normally open contact.	A normally closed (NC) contact, wired in series with one of the common terminals, is used to send this signal to the control board.	Loop detector, safety edge, or IR beams are some of the devices that may be used to provide this signal.
Back N/O Input **TB1-Pin16**	This input is used with an additional safety device that utilizes a normally open (NO) contact to provide a signal to the control board. When the control board receives a signal on this input the gate will stop, pause, reverse for six seconds, pause for ten seconds then resume the open cycle.	A normally open (NO) contact, wired in series with one of the common terminals, is used to send this signal to the control board.	Safety edge or additional IR beams are some of the devices that may be used to provide this signal.
Back N/C Input **TB1-Pin18**	This input is used in the same way as the Back N/O Input above with the exception of utilizing a normally closed contact instead of a normally open contact.	A normally closed (NC) contact, wired in series with one of the common terminals, is used to send this signal to the control board.	Safety edge or additional IR beams are some of the devices that may be used to provide this signal.
Bat Mon Input **TB1-Pin19**	This input is only used on the XLB series (battery back-up) gate operator. When the control board receives a signal on this input, the gate operator will shut down regardless of the gate position and deactivate the "Bat Mon" and "Failure" outputs. Commercial power being restored or recharging the batteries will cause the operator to return to normal operation.	A normally open (NO) contact, wired in series with one of the common terminals, is used to send this signal to the control board.	The signal is provided to the input through an external battery monitor (not supplied).
Ext Rst Input **TB1-Pin21**	This input is an extension of the System Reset button located in the center of the control board. When the control board receives a signal on this input, it clears all errors and restarts the logic sequence. ***In order to comply with UL325, the push button must be located to allow full view (roadway and back plane) of the gate.***	A normally open (NO) contact, wired in series with one of the common terminals, is used to send this signal to the control board.	A single push button is used to provide this signal.
Int Open Input **TB1-Pin23**	This input is used to activate the intermediate open option. Programming the PDM board activates this option. When the control board receives a signal on this input, gate will only open to the pre-set width, based on the time value set.	A normally open (NO) contact, wired in series with one of the common terminals, is used to send this signal to the control board.	Push button, PLC, loop detector, or keypad are some of the devices used to provide this signal.

LOCATION	DESCRIPTION	FUNCTION	OPTIONS
AC Fail Input **TB1-Pin25**	This input is used only on the XLB series (battery back-up) gate operator, and is used to alert the control board that the unit has lost commercial power. The signal to this input is provided by K6 relay in the back-up power panel. When the operator is programmed for Fail Safe or Fail Secure and receives a signal on this input, the control board will either close or open the gate depending on the program.	A normally open (NO) contact wired in series with one of the common terminals is used to send this signal to the control board.	Battery back-up units.
Common Inputs **TB1-Pin4 Pin6, Pin8, Pin11, Pin14, Pin17, Pin20, Pin22, Pin24, Pin26**	These inputs are all the common inputs that are used. Any of these inputs may be inter-changed with each other if one terminal is becoming crowded with wires.		

SECTION 5: DESCRIPTION OF OUTPUT

LOCATION	DESCRIPTION	FUNCTION
Open Output **TB2-Pin1**	This is the connection point for the open side of the two-way solenoid valve (in R/H mode). When the control board receives an open command, this output energizes prior to the hydraulic pump starting. This allows the valve to be in the open position before the operator begins hydraulic flow. This output is pre-wired at the factory during assembly and should not require modification.	The voltage on this output is 24VAC on standard models and 24VDC (+) on battery backup models. The neutral side of the solenoid is connected to the common terminal **TB2-Pin2**.
Close Output **TB2-Pin3**	This is the connection point for the close side of the two-way solenoid valve (in R/H mode). When the control board receives a close command, this output energizes prior to the hydraulic pump starting. This allows the valve to be in the close position before the operator begins hydraulic flow. This output is pre-wired at the factory during assembly and should not require modification.	The voltage on this output is 24VAC on standard models and 24VDC (+) on battery backup models. The neutral side of the solenoid is connected to the common terminal **TB2-Pin2**.
Mtr Output **TB2-Pin4**	This is the connection point of the motor contact. When the control board receives a move command, this output energizes the motor contact allowing the motor to begin operation. This output is pre-wired at the factory during assembly and should not require modification.	The voltage on this output is 24VAC on standard models and 24VDC (+) on battery backup models. The neutral side of the motor contact is connected to **TB2-Pin5**.
Alarm Output **TB2-Pin6**	The alarm output is pre-wired at the factory with every gate operator. When the control board receives a move command or initiates a safety shut down, this output energizes allowing the alarm to activate. **This output is used as the Secondary Safety for compliance with UL325 4th Edition, and should **never** be removed. Removal of the alarm will void the warranty and UL certification of the operator.*	The voltage on this output is 24VAC on standard models and 24VDC (+) on battery backup models. The neutral side of the alarm ou.tput is connected to **TB2-Pin7.**
Open Limit Normally Closed N/C Output TB2-Pin8	When the gate has reached the full open position, this output relay will energize and close the contact.	The output contact is in series with the common terminal **TB2-Pin9**. There is no voltage present on the common terminal; it must be supplied from another source.

LOCATION	DESCRIPTION	FUNCTION
Open Limit Normally Open N/O Output **TB2-Pin10**	When the gate has reached the full open position, this output relay will energize and open the contact.	The output contact is in series with the common terminal **TB2-Pin9**. There is no voltage present on the common terminal; it must be supplied from another source.
Close Limit Normally Closed N/C Output **TB2-Pin11**	When the gate has reached the full closed position, this output relay will energize and open the contact. This output is useful as a source to energize a device that signals the gate is, or soon will be, in motion (strobe light, flashing light, etc.)	This output is a normally closed (N/C) contact that is in series with the common terminal **TB2-Pin12**. There is no voltage present on the common terminal; it must be supplied from an external source.
Close Limit Normally Open N/O Output **TB2-Pin13**	When the gate has reached the full close position, this output relay will energize and close the contact. This output is useful as a source of signal to a PLC, indicator light or other device that the gate has reached the full close limit and is waiting for instructions.	This output is a normally open (N/O) contact that is in series with the common terminal **TB2-Pin12**. There is no voltage present on the common terminal; it must be supplied from an external source.
Motor Run Normally Closed N/C Output **TB2-Pin14**	When the gate is in motion (electric motor running), this output relay will energize and open the contact. This output is useful to any device that needs to know when the gate has stopped any movement.	This output is a normally closed (N/C) contact that is in series with the common terminal **TB2-Pin15**. There is no voltage present on the common terminal; it must be supplied from an external source.
Motor Run Normally Open N/O Output **TB2-Pin16**	When the gate is motion (electric motor running), this output relay will energize and close the contact. This output is useful to any device that needs to know when the gate is in motion.	This output is a normally open (N/O) contact that is in series with the common terminal **TB2-Pin15**. There is no voltage present on the common terminal; it must be supplied from an external source.
Failure Normally Closed N/O Output **TB2-Pin17**	If a failure has occurred at the gate operator, this output relay will energize and open the contact. Although there is a corresponding LED on the control board, this output may be used to connect an external alarm or light to notify of a failure. Possible failures include Max Run Timeout, Safety Fault, Program Error, or Low Voltage Error.	This output is a normally closed (N/C) contact that is in series with the common terminal **TB2-Pin18**. There is no voltage present on the common terminal; it must be supplied from an external source.
Failure Normally Open N/O Output **TB2-Pin19**	This output functions the same as the normally closed above, except the relay will close the contact in the event of a failure.	This output is a normally open (N/O) contact that is in series with the common terminal **TB2-Pin18**. There is no voltage present on the common terminal; it must be supplied from an external source.

LOCATION	DESCRIPTION	FUNCTION
Bat Low Normally Closed N/C Output **TB2-Pin20**	This output is used only when the operator is an XLB (battery backup) model. If an external battery monitor (not provided) has been installed, this relay will energize if the control board receives a signal on the Batt Mon input **TB1-Pin19** and open the contact. This output is useful as an external alarm when the backup battery voltages have dropped below operating levels.	This output is a normally closed (N/C) contact that is in series with the common terminal **TB2-Pin21**. There is no voltage present on the common terminal; it must be supplied from an external source.
Bat Low Normally Open N/O Output **TB2-Pin22**	Like the normally closed output, this output is only used with XLB (battery backup) models, and also requires an external battery monitor (not provided) be installed. When the control board receives a signal on the Batt Mon input **TB1-Pin19**, the relay will energize and close the contact. This output is useful as an external alarm when the backup battery voltages have dropped below operating levels.	This output is a normally open (N/O) contact that is in series with the common terminal **TB2-Pin21**. There is no voltage present on the common terminal; it must be supplied from an external source.
AC Fail Normally Closed N/C Output **TB2-Pin23**	When the control board detects a low source voltage (brownout) and can not continue normal operation, this output relay will energize and open the contact. In XLB (battery backup) models this output relay will energize when commercial power has failed and the control board switches to battery backup operation. Once commercial power has been restored, this output relay will go back to the closed position.	This is a normally closed (N/C) contact that is in series with the common terminal **TB2-Pin24**. There is no voltage present on the common terminal; it must be supplied from an external source.
AC Fail Normally Open N/O Output **TB2-Pin25**	This output functions the same way as the normally closed output above, with the exception that the contact closes when the relay is energized.	This is a normally open (N/O) contact that is in series with the common terminal **TB2-Pin24**. There is no voltage present on the common terminal; it must be supplied from an external source.
Gate Lock Normally Closed N/C Output **TB2-Pin26**	When the control board receives an open signal, this output relay energizes and opens the contact. There is a one (1) second delay of the open cycle to allow the relay to energize. When the gate is in the full closed position, this output relay is de-energized and remains in the closed position to provide power to a magnetic lock.	This is a normally closed (N/C) contact that is in series with the common terminal **TB2-Pin27**. There is no voltage present on the common terminal; it must be supplied from an external source.

LOCATION	DESCRIPTION	FUNCTION
Gate Lock Normally Open N/O Output **TB2-Pin28**	When the control board receives an open signal, this output relay energizes and closes the contact. There is a one (1) second delay of the open cycle to allow the relay to energize and provide power to a solenoid lock. When the gate is in the full closed position, this output relay is de-energized removing power from the solenoid and allowing the lock pin to drop back into position.	This is a normally open (N/O) contact that is in series with the common terminal **TB2-Pin27**. There is no voltage present on the common terminal; it must be supplied from an external source.

SECTION 6: OPERATOR MAINTENANCE

Hydraulic System

(Check the following items once per month.)

- Remove the vent/fill plug and check the fluid level. The vent is located on the reservoir assembly, underneath the electrical cubicle as shown in *Figure 7*. After removing the vent plug, a visual inspection should show the fluid level no more than 1" below the vent plug. If fluid needs to be added, use Exxon Univis #J26 hydraulic fluid, Texaco Aircraft Oil #15, Mobile DTE 24, or an equivalent.

  Exxon Univis #J26 is supplied in all B&B XL operators. If another hydraulic oil is substituted, the old oil must be drained first to avoid mixing. *Never mix hydraulic fluids*.

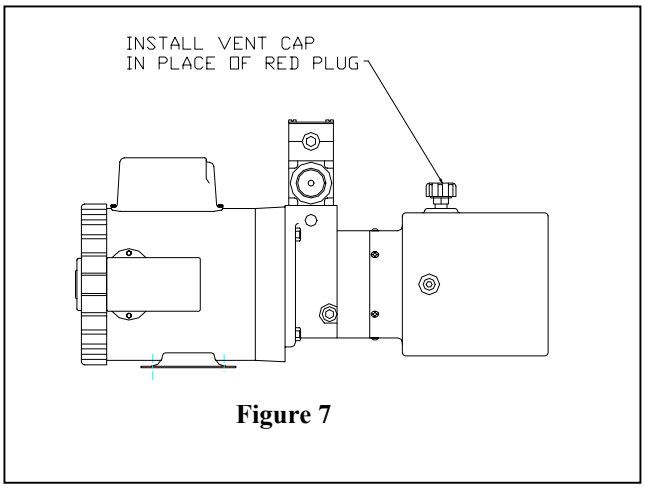


Figure 7

- Check for leaks in the hydraulic system. This includes the hydraulic lines, reservoir, and fittings. Leakage could occur in the fittings after a period of use. If it does, moderate tightening of the hose fittings should stop the leakage. If the leak persists, replace the leaking hose assembly.

- Manually shift the 4-way hydraulic solenoid valve. Manually shifting the valve spool in both directions will clear the buildup of any debris that may have become entrapped in the valve spool. This is done by pushing the small pin in each end of the solenoid coil. See the drawing in *Figure 8*.

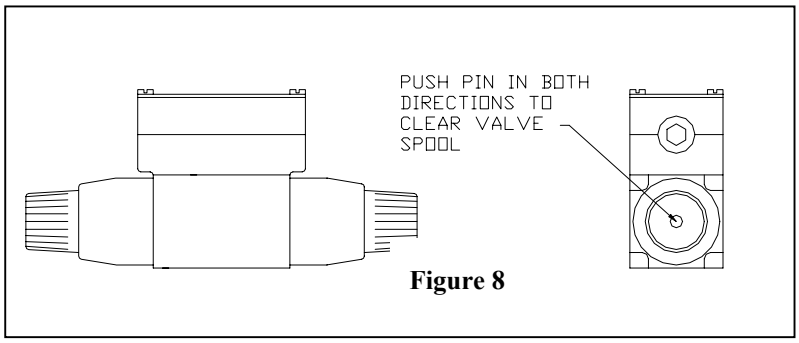


Figure 8

Mechanical System

(Check the following items once per month.)

- Check for loose or broken fasteners. This check should also include the fasteners on the gate panel. A broken fastener on the gate panel could cause undue stress on the operator. Also, inspect the fasteners that hold the gate operator in position. While inspecting these fasteners (bolts), check for signs that the operator has "walked" out of its original mounting position.

- Check for normal wheel wear. Look for large cracks or pieces of polyurethane (the rubber-like tread of the wheel) which may have broken off. The drive wheels require periodic replacement under normal service when the wheels become out-of-round or have cracked. Overtightening the wheel clamping spring will shorten wheel life of the wheel. Refer to the *Troubleshooting* section for info on correct adjustment of the wheel clamping spring.

- Confirm that the Gate Warning Placards are installed and are visible to both directions of travel. The typical placard is shown in *Figure 9*. Two of these are supplied with every gate operator and should be installed on each gate panel.

- Cycle test the operator. Run the gate through several cycles to confirm that there is no binding of the gate panel and that the drive rail is properly aligned with the gate operator. Also, monitor the wheels for allowable slippage. If the wheels slip, tighten the spring adjustment nut until no slippage occurs during normal gate travel. Momentary slippage when starting, stopping, or reversing is acceptable. Tighten the spring only enough to eliminate slippage during normal travel. ***Overtightening will shorten the life of the wheel.*

Figure 9

Electrical System

(The following items should be checked once per month.)

- Check for loose or frayed wires.

- Check gate actuation devices for proper function. These devices include pushbuttons, keypads, loops, etc. These user supplied devices should function as they were intended.

- Test the Safeties for correct operation. See "Test the Safeties," in Section 1 – Mounting the Operator". Test both the roadway and backplane safeties. In addition to the Primary Safeties (infrared beams), confirm that the Secondary Safety (audio alarm) is installed and working correctly.

- Check limit switch alignment. The *minimum* distance between the limit switch and the housing is ¾". Less distance will cause the limit switch to give a false indication. Refer to the *"Section 1 – Mechanical Installation & Drawing, Mounting the Proximity Limit Switch Plates"* for the procedure for properly setting the distance.

Long Term Maintenance

The hydraulic fluid requires infrequent replacement. The frequency of fluid replacement is highly dependent upon operating conditions. The oil's operating temperature, which is determined by a combination of outside air temperature, number of cycles, gate length, pressure required to move the gate, and so on, is the most critical factor in determining oil life. Replace the oil any time it becomes dark, discolored, contaminated with small trash particles, or opaque.

As a general rule, on high cycle installations (300+ cycles per day) the fluid should be replaced at least every 2-3 years. For normal installations, replace the fluid every 3-5 years.

SECTION 7: LED DESCRIPTION

The following is a list of the LEDs on the control board. These LEDs are listed in three (3) sections on the control board. There are three (3) snap-in terminal connectors on the control board **TB1**, **TB2**, and **TB3**. Looking at the control board, **TB1** will be on the left-hand side, **TB2** will be on the bottom, and **TB3** will be on the right hand side.

Control Board

TB1: **Input Terminals**

D57 Open

D56 Stop

D51 Close

D58 Open/Close

D59 Rdy IR

D64 Back IR

D53 Open Limit

D54 Close Limit

D63 Rdy N/O N/C

D52 Back N/O N/C

D49 Bat Mon

D50 Int Open

TB2: **Output Terminals**

D65 Open Solenoid

D66 Close Solenoid

D44 Motor (contactor)

D43 Alarm

D42 Open Limit

D41 Close Limit

D45 Mtr Run (running)

D69 Failure (operator)

D68 Bat Low – XLB

D67 AC Fail

D70 Gate Lock

TB3: Power Terminal

D71 5amp Open, Close, Motor, Alarm

D40 3amp Proximity Power, IR Power

D39 3amp Control Board Circuit Protection

SECTION 8: TROUBLESHOOTING GUIDE

***Safety note—Servicing of the gate control system should only be performed by experienced electrical technicians. Many safety features have been built in to protect service personnel. However, as with any electrical equipment, severe injury from electrical shock or damage to control components can result from improper servicing of the controls.*

All troubleshooting operations should begin by examining the LED's found on the PDM board and control board. These LED's are vital in determining the failure-state and current status of the controller. Many times a brief examination of these visual displays will quickly resolve the problem without technical support from the factory.

- **The power unit runs, but the wheels do not turn.**
  - Check the hydraulic fluid level. Maintain the fluid to within 1" of the vent cap with Exxon Univis #J-26 hydraulic oil, Texaco aircraft oil 15, Mobil DTE24, or equivalent. B&B ships all operators from the factory with Exxon Univis #J-26. ***Never mix hydraulic oils!***
  - If the operator has undergone a field conversion to accept an alternate supply power, check the motor winding to be sure it is wired correctly for counter-clockwise rotation. See the motor wiring drawing of the appropriate phase in "Section 9 – Installation Drawings" for the motor wiring schematics.
  - Manually operate the 4-way hydraulic solenoid valve several times by pushing the pins in the center of the solenoid coils. See *Figure 12* for an illustration of the pins and solenoid valve.
  - Confirm that the LED on the directional solenoid output comes on **with the operator running**. This will be either D65 (RH-open/ LH-close) or D66 (LH-open/ RH-close).
  - Check the output voltage at the solenoid terminal block **with the operator running**. With a voltmeter check the voltage across pins 1 and 2 (for RH-open or LH-close) or pins 2 and 3 (for RH-close or LH-open). There should be 24 volts present; DC for XLB operators and AC for all others.
  - Open the manual release mechanism on the drive wheels. If the drive wheels begin to spin when the mechanism is not clamped on the drive rail, try to move the gate panel by hand. The panel should move freely without binding; correct if needed. Also, if the panel is bound, **the wheels should have slipped**; since they did not adjustment of the wheel tightening nut should be done to allow proper wheel slippage.
  - If the above steps do not solve the problem, check the hydraulic pressure by inserting a pressure gauge into the pressure port. The pressure port is located at roughly 12 o'clock on the pump section of the power unit (the "neck" section). The plug can be removed with a 5/16" Allen wrench. The port accepts 3/8" male pipe threads. With the gate attempting to run, measure the pressure and note the pattern of pressure build-up, if any. Record this information and call for technical support.

- **The power unit runs and the wheels turn, but the gate does not move.**
  - Check the gate for free movement. Remove the housing cover and release the drive wheels with the manual release mechanism. Pull the gate manually through the full travel in both directions to be sure there is no binding of the gate panel.
  - Check the drive wheel spring tension. For most applications the tension bolt should extend approximately 1/4" to 1/2" beyond the top surface of the tension nut.
  - Check the drive rail for ice, oil, or slick spots. Clean the rail if oil or some other slick deposit is causing the problem. If the problem is ice, try tightening the spring pressure on the drive wheels to crunch through the ice. For moderate to heavy icing conditions, an XLR operator is recommended.
  - Check the condition of the drive wheels. After many cycles the wheels do wear out. This is inherent in compression drive systems. If the wheels are wearing out excessively fast, proper adjustment of the spring tension nut should be required.
  - If the above steps fail to resolve the problem, call for your local distributor or the installer for technical support.
  - Confirm that the drive rail is positioned correctly between the wheels of the operator. If the drive rail is not fully "seated" between the wheels, release the drive wheels and manually pull the gate panel through a full cycle of movement. Notice the position of the drive rail; if the operator and panel are mounted correctly the drive rail should track between the wheels without running out. If the operator/gate panel interface is not square, see "Section 1 – Mechanical Installation: Mounting the Operator". The mounting position of the operator may not be the problem, if the panel is old or the mounting hardware is working loose, the panel position or tracking may be causing the drive rail to run out of the drive wheels. Consult the documentation on your gate panel for adjustment instructions.
  - Confirm that the drive wheel release mechanism is locked on the drive rail.

- **The gate does not fully open or fully close.**
  - Check the Maximum Run Timer (MRT) setting. On the PDM board, push the "SELECT" button until the "MAX RUN" LED is lit. On the 3-digit numerical display will show the current value (default is 100 seconds) of the MRT. The value of this setting is in seconds and should be set according to the following formula:

    MRT Setting ≅ (opening length of gate panel (ft) ÷ operator speed (ft per second)) * 2

  - Check the gate panel for obstructions or bindings by releasing the manual drive wheel release.
  - With the manual release engaged, check the drive rail for a loose connection and correct if necessary.
  - Note the ambient temperature. The hydraulic oil that is shipped in all B&B XL operators has a pour point of -75°F (-59°C). This should be more than adequate in almost all applications, but with extended use, the oil may deteriorate and this minimum temperature value my increase.

- Check the proximity limit switches and their respective trip plates for proper alignment and placement. Release the drive wheels with the operator powered. Move the gate panel manually through a full open and close cycle. Monitor the proximity limit switches for the red LED indicator (located in the back of the switch near the cable entrance into the switch) or on the control board for a full-open or close indication. If the proximity switch is detecting anything other than the trip plates, such as a vertical member of the gate panel, correct the problem by adjusting the proximity switch or removing the inadvertent trip point.
- On the PDM board, confirm that the Intermediate Open function is not turned on.

- **The operator does not cut off when the full open or full close position in reached.**
  - Check the proximity limit switches and their respective trip plates for proper alignment and placement.
  - Release the drive wheels by operating the quick-release mechanism. Check for faulty limit switches. With the operator power and the gate panel in an intermediate position, pass a metallic object in front of both proximity limit switches one at a time. Check for a red indicator light on the back of the switch (near the cable entrance into the switch) and confirm that the "OPEN LMT" and "CLOSE LMT" LED's light on the input side of the control board. If either of these LED's do not light replace the faulty limit switch.

- **The power unit does not run.**
  - Check the PDM board and control board for a fault indication. Of particular interest are the "SAFETY REVERSE" and "GATE STOPPED" (on the control board) and "MAX RUN TIMEOUT" (on the PDM board) LED's. If either the "GATE STOPPED" or "SAFETY REVERSE" LED's are lit, a safety error has occurred; clear the obstruction and press the "RESET" button on the control board. If the "MAX RUN TIMEOUT" LED is lit, an adjustment of the MRT may be needed; refer to "Section 3 – Maximum Run Set-Up".
  - Check all three of the automotive type system fuses. A LED will light if the fuse is blown. A qualified electrician should check all accessory wiring for shorts or connection errors.
  - Check the motor overloads. All single-phase motors used on XL operators have built-in manual reset overloads. Pressing the rubber button on the side of the motor junction box will reset the overload. All three-phase motors used on XL operators utilize a separate overload that is mounted directly to the motor contactor. ***Safety Note – Both of these types of motor overloads do not break the power circuit. The control and all input power connections are still "hot", use extreme caution.*
  - Confirm that the "MTR" output on the control board activates approximately two seconds after giving a move command to the operator. Activation of this output can be confirmed by watching for the MTR LED (D44) to light.
  - With a voltmeter set to read 24 VAC (VDC for XLB operators) check the voltage on the MTR output with the operator attempting a move.
  - After giving the operator a move command and the "MTR" output energizes confirm that the motor contactor energizes. This can be done visually by watching for the top buttons on the contactor to pull down.

- ***Safety Note – Extreme caution should be used in this step. High-voltage is present just below the buttons of the contactor on the terminal block screws. Never touch these with the power on to the operator.* Check the contacts of the motor contactor by giving the operator a move command. After the "MTR" output energizes, press in the button on the top of the motor contactor **with a non-conductive object**.

- **The gate moves too slowly.**
  - Check the gate panel for ease of movement. Release the wheels and manually operate the gate, making sure there is no binding and that he gate moves freely over its full travel in both directions.
  - Note the ambient temperature. If the ambient temperature is at or below 0°F, confirm that the heater in both the cubicle and operator (if installed) are working properly.
  - Check the wheels for excessive slipping. If the excessive slipping is the cause, tighten the spring adjustment nut.
  - Operate the gate with the wheels released. If the wheels now turn at normal speed, adjust the relief valve. Insert a pressure gauge (max pressure of 2000 psi) into the pressure port. The pressure port is located at roughly the 12 o'clock position of the pump section of the power unit. Locate the relief fitting on the side of the pump (the center section or "neck"); it resembles a setscrew with a jam nut locking it in position. Break the jam nut without moving the setscrew. With the operator running and the wheels released, gradually tighten the relief fitting screw a fraction of a turn at a time. Observe the pump pressure on the gauge at the same time. As the pump pressure tops out above 1200 psi, stop tightening the relief fitting. Retighten the jam nut and re-engage the drive wheels. Observe the gate operation for the correct speed. ***Note – Overtightening the relief valve setting can result in damage to the operator. Therefore, proceed with caution when adjusting the relief fitting. Never bottom out the screw. If small adjustments of the relief fitting do not appear to make a difference in the pressure setting, contact your dealer or technical support.*

- **The motor contactor "chatters."**
  - Check the incoming power for the correct voltage. If the voltage is low consult the Wiring Run Requirements Chart in the *Installation Drawings* section for the proper wire size and confirm that the wire used is at least this size or larger.
  - Check the contacts on the motor contactor. If they are burned out, replace the contactor.

- **The gate opens and then will not close.**
  - Check the auto-close timer (ACT) setting. In order for the gate to automatically close this feature must be enabled in the software.
  - Check the time value setting on the ACT. This setting has a maximum value of over 600 seconds (or 10 minutes). The value might be set too high.

- Confirm that there is no safety condition holding the gate in the full open position. There should be no LED lit on any of the roadway or backplane safety inputs. If the operator senses an obstruction in the roadway it will not allow the auto-close timer to close the operator.
- Examine the "OPEN" and "OPEN/CLOSE" input on the control board. There should be no signal present on either input. Again, if either of the LED's for the inputs are lit, the ACT will not start.

- **Remote Pushbutton or other remote device does not work.**
  - Check the wiring specification found on the wiring run requirement page in "Section 9 – Installation Drawings". Verify that the correct gauge wire was used for the distance required.
  - Monitor the input LED's on the XL controller control board that the remote device is attached to. If the device is sending a signal (normally a contact closure), the LED will light when the device is actuated. If no LED lights then the XL controller is not receiving the signal. Recheck the wiring configuration and the remote device for proper connection.

  - With the gate in the closed position, place a jumper between an input "COM" and the "OPEN" input terminals on the control board. The LED beside the "OPEN" input should light and the gate should begin its open cycle. If the LED does not light up, contact technical support for assistance.

- **The gate operator does not respond to an input signal.**
  - Confirm that the operator controller is receiving the signal from the device. The remote device should be connected between an input "COM" and the specified input. Upon actuation of the device the appropriate LED for that input should light. If it does not light, check the wiring configuration at the device and the wiring run requirements for the proper wire size.
  - Confirm that the operator is not in an error condition. Examine the LED's on the PDM board and the control board. If an error condition has occurred, clear the error (e.g.- obstruction, MRT trip, etc.) and press the "RESET" button located near the center of the control board.

- **The wheels "walk" on the drive rail.**
  - Re-adjust the wheel-tensioning nut on the drive mechanism. With the operator running back off of the nut until either the wheels track straight or the wheels begin to slip. If the wheels slip, retighten the nut approximately 3 turns and proceed to the next step.
  - Check for correct alignment of the drive rail and gate panel with the gate operator. If the wheels are not parallel with the gate panel and its drive rail adjust the operator for proper alignment. Refer to "Section 1 – Mechanical Installation; Mounting the Operator".
  - Examine the wheel and drive shaft connection and confirm that the wheel has not been "wallowed" out. Replace the wheel if needed.

- **The "GATE STOPPED" LED is flashing.**
  - Check the roadway and backplane safeties and any other safety devices connected to the operator to confirm that none are sensing an obstruction. This can be done by examining the input LED's on the control board or the Status Indicator Lights on the PDM board. Clear obstruction if any exist.
  - Check the "MAX RUN TIMEOUT" indicator on the PDM board. If this is lit adjustment of the MRT may be needed.
  - On an XLB operator only, check that there is no signal present on the "BAT MON" input. If this input is actuated the controller has detected an input from an external battery monitor announcing that the batteries have reached a critical state and the operator has shut down. Recharge or replace the batteries.
  - A program error could cause this error as well. Program errors are VERY rare and should not occur twice. Reset the operator and resume operation.

- **Power to an external device "cycles" just before a move is executed.**
  - If this occurs the device is connected to the "IR PWR" block. This is incorrect and the power for the device should be moved to either the "PROX PWR" (if the device is not internally fused) or pins 2 and 4 of the power terminal block (if the device is internally fused).

- **The solenoid, motor, and/or alarm do not have voltage present during a move cycle.**
  - Fuse #3 (fuse closest to the back of the operator) should be blown. The LED located nearest to this fuse can confirm this. Replace with a 5-amp automotive type fuse.
  - If fuse #3 LED is not lit, remove the fuse and visually inspect the fuse. If it is not blown reseat the fuse in it's holder firmly.

- **The "RDY" (D63) and/or "BACK" (D52) LED's are lit on the control board and the gate will not run, but there is no obstruction present.**

  ***Note – This section deals ONLY with the auxiliary safety input: RDY N/O, RDY N/C, BACK N/O, and BACK N/C. This section does NOT deal with the input for the infrared devices supplied by B&B.*
  - If there is no safety device using either the "RDY **N/C**" or "BACK **N/C**" input there should be jumpers installed between these input and a "COM" input. If there are no wires in these inputs install a small jumper wire.
  - If there are wires installed in either the "RDY **N/O**" or "BACK **N/O**" input from an auxiliary safety device (e.g.- loop detector, gate edge detector, etc.), remove them from the input terminal block. If the LED indicator(s) go out, skip to the next step. If there are no wires installed in the terminal block on this input and the LED indication remains, contact your dealer or the factory for assistance.

- If, when the wires are removed from the terminal block, the LED indicator goes out, replace the wires. Examine the wiring to the auxiliary safety device for proper configuration. If the device **closes** a contact during a safety condition the wires from the device should be tied into an input "COM" and either the "BACK" or "RDY N/O" input. If the device **opens** a contact during a safety condition, the wires from the device should be tied into an input "COM" and either the "BACK" or "RDY N/C" input.
- Examine the power running to the auxiliary safety device. Is it the correct voltage? Is the polarity correctly wired to the device? Is a fuse blown on the device? Refer to the documentation on the device for more troubleshooting options.
- If the auxiliary device is a loop detector, check that the sensitivity setting is correct.

- **There are four or five LED's on at the bottom of the board.**
  - This is correct during normal operation if the gate is not in motion. The following LED's should be on in this state: "AC FAIL" (D67), "LO BAT" (D68), "OPER FAIL" (D69), and "ALARM" (D43). All of these relays are "fail-safe" type; the controller needs to activate one of these particular output it de-activates the relay and the LED goes out. For example, if the controller wishes to turn on the alarm output, it turns off the relay. This closes a contact completing the circuit, and the alarm comes on.
  - Also, one of the position indicator LED's will be lit during normal operation: "OPEN LMT" (D42), or "CLOSE LMT" (D41). If the gate is in motion, the "MOTOR RUN" (D45) LED will be on and the "ALARM" (D43) LED will be off.

- **The "RDY IR" and/or "BACK IR" LED's are on and the operator will not move.**
  - Confirm that there is no obstruction or alignment problem with the infrared beam spanning the roadway or the backplane. This can be verified by examining the infrared receiver (RX); if there is an obstruction or an alignment problem the two red LED's near the detector's "eyes" (near the top of the board) will be on.
  - There should be a resistor bridged across the "COM" and "NO" terminal blocks in the receiver (RX). This resistor should have the following color bands on it (in this order): brown, black, orange, and gold. These resistors **must** be installed at the receiver, **not the control board**.
  - There should be 24VAC (24VDC on an XLB) present at the receiver. **This power must come from the "IR PWR" terminals on the power terminal block,TB3.** This voltage is not polarity sensitive.
  - There should be a wire connected to the "COM" and "NO" terminals of the receiver (in the same terminals as the resistor). These two wires **must** terminate on the "RDY IR" or "BACK IR" input terminal block of the control board.
  - The maximum separation between the infrared transmitter and receiver is 65 feet *under optimal conditions*. In very bright light conditions or if the ground is covered with snow, this distance will decrease.

- The contacts between the backplane receiver and roadway receiver **cannot** be connected in series. Verify that all wiring is done according to "Section 2 – Electrical Connections; IR Beam Installation" of this manual.
- If this is a master/slave installation, consult the Master/Slave Safety Wiring Configuration in "Section 9 – Installation Drawings".

- **The Auto-close Timer will not respond.**
  - Examine the PDM board and confirm that the "AUTO CLOSE" LED is lit. If not the ACT is not enabled. Refer to "Section 3 – Options Setup; Auto Close".for the procedure to enable the ACT.
  - Confirm that an earth ground (not an electrical ground) grounds the operator and that the ground rod is at least 36" in the ground. The ground wire should be bonded to one of the mounting bolts of the operator or a user-mounted ground terminal on the side of the operator.

- **The operator experiences intermittent failures.**
  - Confirm that an earth ground (not an electrical ground) grounds the operator and that the ground rod is at least 36" in the ground. The ground wire should be bonded to one of the mounting bolts of the operator or a user-mounted ground terminal on the side of the operator.
  - Check all input wiring to confirm that all connections are tight and made well. Also, check the connections at the device that connect to these input.
  - All of the LED's, on both the control board and PDM board, should be examined immediately after a failure occurs. Do not turn power off and then back on or press the "RESET" button Until a thorough examination of all the LED's are noted.

- **The IR Alert LED's show the wrong alert on the PDM board.**
  - This is a bug in an old version of the PDM software (before version 2.2). Contact the factory for the latest version of the display board software.

- **The full-closed position varies over five to six ".**
  - This is a bug in version 2.0 of the control board software. Contact the factory for the latest version of the control board software.

- **Giving the controller a command on the "AC FAIL" input will not cause the XLB to move to the failure position.**
  - On the PDM board, confirm that the "BATTERY BACKUP" LED is lit and that the proper failure move is enabled (e.g.-- "FAIL SAFE" or "FAIL SECURE").

- Check the wire run between the "AC FAIL" input on the control board and the K6 relay in the auxiliary control enclosure. There should be two wires connecting these devices: one wire connecting a "COM" on the control board input terminal block and terminating on Terminal 2 on the K6 relay socket, another wire should be ran from the "AC FAIL" input to Terminal 6 on the K6 relay socket.
- Confirm that the controller is receiving a signal on the "AC FAIL" input. Turn off commercial power disconnect in the auxiliary control enclosure. You should hear and see the K6 relay de-energize. When this relay turns off, confirm that the "AC FAIL" input LED is lit.

- **The "SLAVE" LED is on, but it is very dim and my operator is not a master or a slave. The operator functions normally.**
  - This is correct; there is no problem with the controller.

- **The "MAX RUN" LED is not lit on the PDM board.**
  - This was a bug in an older version of the PDM software (before version 2.0). Contact the factory for the most current software.
  - The Maximum Run Timer cannot be disabled, so even if the LED is not lit this function is still active.
  - This bug will have no adverse affect on the operation of the gate system.

- **A move command is given and the input LED is lit, but the operator does not begin a move cycle.**
  - Confirm that there is no safety obstruction in the movement direction of the gate panel.
  - Confirm that the "STOP" LED is not lit. A stop command will override **all** move commands.
  - If the command being given is a close command, confirm that the "OPEN" LED is not lit. An open command will always override a close command.
  - Check the grounding of the operator. Confirm that an earth ground (not an electrical ground) grounds the operator and that the ground rod is at least 36” in the ground. The ground wire should be bonded to one of the mounting bolts of the operator or a user-mounted ground terminal on the side of the operator.

- **Hydraulic fluid is leaking from the reservoir.**
  - Make sure that the red shipping plug has been removed and the vent cap is installed in the tank fill hole. If the plug is not removed before normal operation begins, it could cause the pressure inside the reservoir to "push" out the hydraulic fluid.
  - Check the tank for any visible damage that might cause the leak.

- There is an O-ring seal between the tank and the mounting sleeve. Remove the motor, pump, and reservoir assembly from the operator housing leaving the hoses connected to the pump. With a screwdriver, loosen the clamp holding the tank in place and drain the oil from the tank. Completely remove the tank and examine the O-ring for damage.

- **The "OPEN" LED (D65) comes on during a close cycle and the "CLOSE" LED (D66) comes on during an open cycle.**
  - This is correct. The text on these two output is for right hand operation. When the operator is switched to left hand operation it is backwards. This was an unavoidable necessity during the design phase. The text will be re-labeled in future revisions of the board to more accurately reflect the state of these outputs.

Gate Panel Types & Safety Precautions

As with any moving device, there exists the possibility of entrapment of hands and feet in the equipment. The B&B XL Series Gate Operator contains several safety devices to prevent entrapment in the gate panel, but caution should always be used whenever you are in the vicinity of a moving gate.

The pinch points are highlighted in *Figure 10.* Take care to keep hands and feet away from these areas during servicing, installation or maintenance.

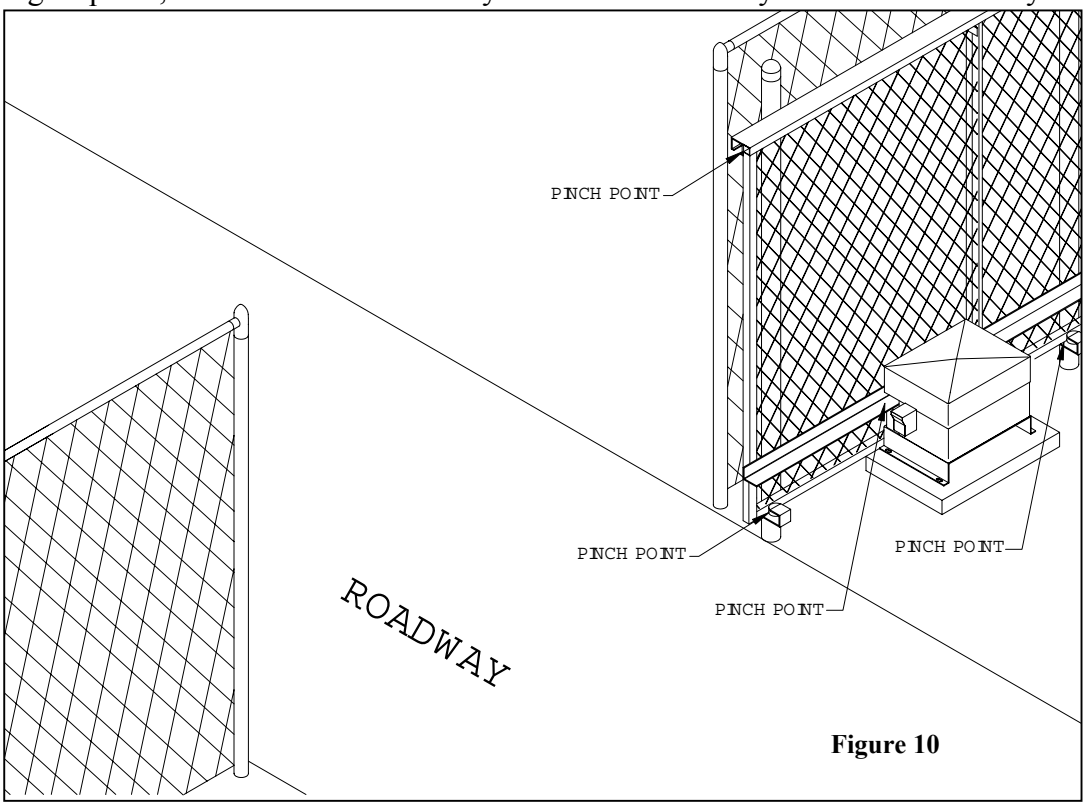


Figure 10

The drawing in *Figure 11* shows a typical picket type gate panel. Injuries associated with these types of gate panels occur when hands and arms are stuck through the openings between the pickets and the gate is actuated.

This danger can be eliminated by placing fencing (chain-link fence) material on the gate panel to prevent hands or arms from penetrating the gate.

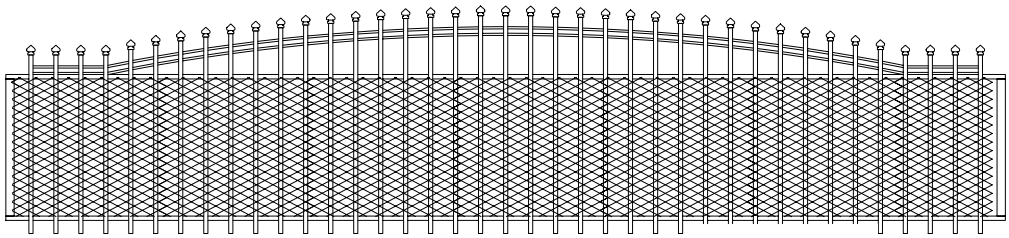
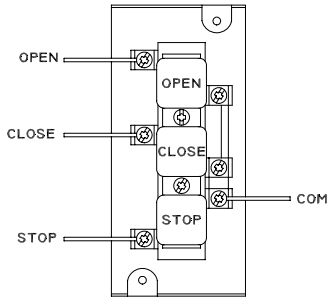


Figure 10

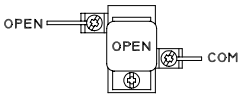
The gate panel shown in Figure 10 is typical of a B&B gate panel. The track is totally enclosed to eliminate as much of the pinch point as possible. Other manufacturers gate panels may differ in design (e.g.- open track) and should be examined for additional pinch points before normal operation begins.

SECTION 9 – INSTALLATION DRAWINGS

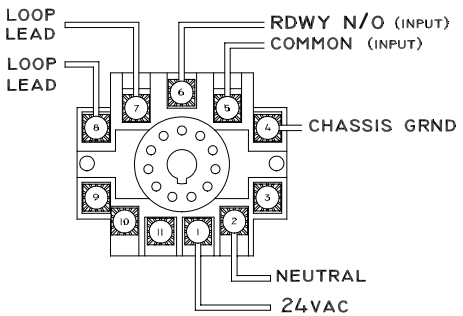
The following section contains several drawings that detail the installation, maintenance, and normal operation of the XL Series Hydraulic Sliding Gate Operator. Some of the drawings will not pertain to your specific operator as this is a general section covering many types of gate operators. Refer to the nameplate on your gate operator for the specific model; this model number can be used to identify the drawings that pertain to your installation.



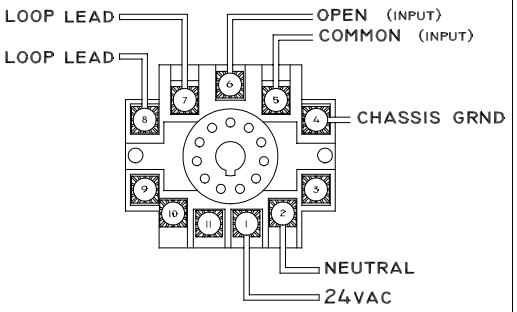
3-BUTTON PUSHBUTTON



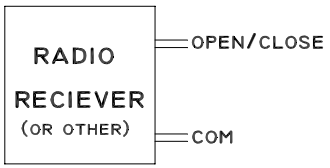
OPEN ONLY-
HOLD OPEN



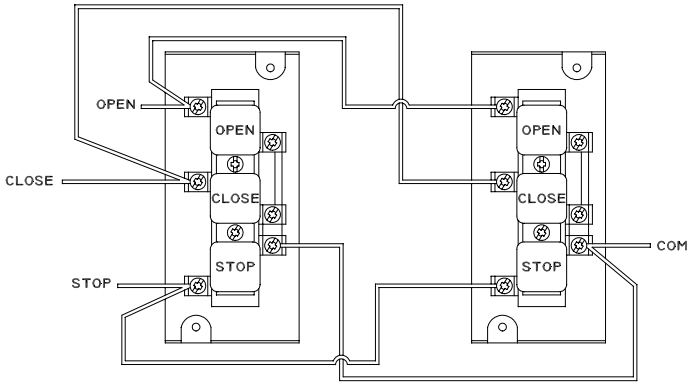
SAFETY LOOP



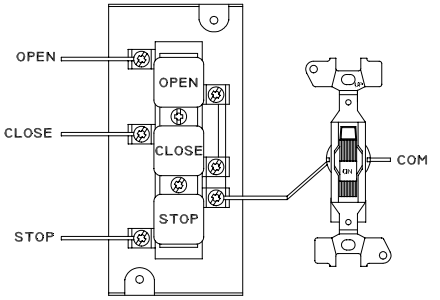
FREE EXIT



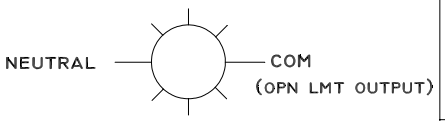
SINGLE BUTTON CONTROL



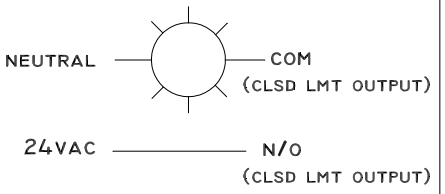
MULTIPLE PUSHBUTTONS



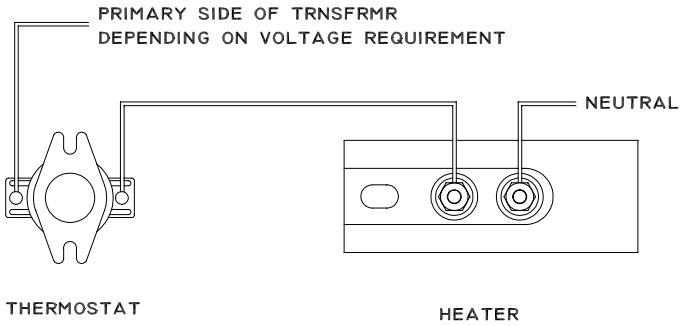
PUSHBUTTON WITH
ON / OFF SWITCH



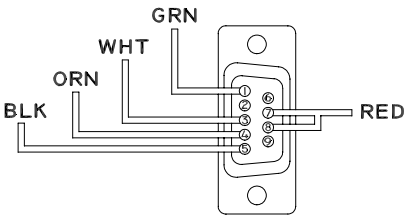
FULL OPEN INDICATION



FULL CLOSED INDICATON



THERMOSTAT AND HEATER



NOTE: REMOVE STOP TO COM
JUMPER IN SLAVE UNIT

MASTER/SLAVE DATA
CONNECTOR PIN LOCATION

WIRING RUN REQUIREMENTS

1ø POWER WIRING

HP	VOLTAGE / AMPS	WIRE GAGE	MAX. DISTANCE (FT) SINGLE OPERATOR	MAX. DISTANCE (FT) DUAL OPERATORS
1/2	115V 7.5A	12	70	–
		10	110	55
		8	180	90
		6	290	145
1/2	208V 3.9A	12	240	120
		10	380	190
		8	600	300
		6	960	480
1/2	230V 3.7A	12	290	145
		10	460	230
		8	740	370
		6	1180	590
3/4	115V 10.4A	12	50	–
		10	90	–
		8	140	70
		6	230	115
3/4	208V 5.8A	12	180	90
		10	290	145
		8	470	235
		6	750	375
3/4	230V 5.2A	12	220	110
		10	360	180
		8	580	290
		6	900	450
1 HP	115V 12.0A	12	45	–
		10	80	–
		8	120	60
		6	200	100
1 HP	208V 6.4A	12	170	85
		10	270	135
		8	430	215
		6	680	340
1 HP	230V 6.0A	12	200	100
		10	320	160
		8	500	250
		6	800	400
2 HP*	115V, 24.0A*	12	–	–
		10	–	–
		8	60	–
		6	100	50
2 HP	208V 13.2A	12	90	–
		10	140	70
		8	220	110
		6	360	180
2 HP	230V 12.0A	12	110	–
		10	170	85
		8	270	135
		6	440	220
3 HP	208V 18.7A	12	–	–
		10	100	–
		8	160	80
		6	260	130
3 HP	230V 17.0A	12	80	–
		10	120	–
		8	200	100
		6	320	160

* IT IS RECOMMENDED THAT A SUPPLY VOLTAGE OTHER THAN 115V 1ø BE USED FOR 2 HP UNITS WHENEVER POSSIBLE DUE TO THE HIGH CURRENT DRAW

3ø POWER WIRING

HP	VOLTAGE / AMPS	WIRE GAGE	MAX. DISTANCE (FT) SINGLE OPERATOR	MAX. DISTANCE (FT) DUAL OPERATORS
1/2	208V 2.0A	12	400	200
		10	650	325
		8	1000	500
		6	1600	800
1/2	230V 2.0A	12	460	230
		10	740	370
		8	1180	590
		6	1800	900
1/2	460V 1.0A	12	1800	900
		10	2800	1400
3/4	208V 2.6A	12	340	170
		10	540	270
		8	860	430
		6	1300	650
3/4	230V 1.5A	12	550	275
		10	880	440
		8	1400	700
		6	2200	1100
3/4	460V 1.3A	12	1500	750
		10	2400	1200
		8	3800	1900
		6	6000	3000
1 HP	208V 3.6A	12	270	135
		10	430	215
		8	680	340
		6	1000	500
1 HP	230V 3.2A	12	330	115
		10	530	265
		8	850	425
		6	1300	650
1 HP	460V 1.6A	12	1300	650
		10	2000	1000
		8	3300	1650
		6	5200	2600
2 HP	208V 6.2A	12	170	85
		10	280	140
		8	440	220
		6	700	350
2 HP	230V 5.6A	12	210	105
		10	340	170
		8	540	170
		6	860	430
2 HP	460V 2.8A	12	850	425
		10	1300	650
		8	2100	1050
		6	3400	1700

3ø POWER WIRING (CONT)

HP	VOLTAGE / AMPS	WIRE GAGE	MAX. DISTANCE (FT) SINGLE OPERATOR	MAX. DISTANCE (FT) DUAL OPERATORS
3 HP	208V 7.8A	12	140	–
		10	230	115
		8	360	180
		6	580	290
3 HP	230V 7.4A	12	170	85
		10	270	135
		8	430	215
		6	680	340
3 HP	460V 3.7A	12	670	335
		10	1050	525
		8	1700	850
		6	2700	1350
5 HP	208V 15A	12	–	–
		10	120	–
		8	200	100
		6	320	160
5 HP	230V 13.2A	12	100	–
		10	160	–
		8	250	125
		6	400	200
5 HP	460V 6.6A	12	400	200
		10	630	315
		8	1000	500
		6	1600	800

BATTERY BACKUP INPUT (1ø)

HP	VOLTAGE / AMPS	WIRE GAGE	MAX. DISTANCE (FT) SINGLE OPERATOR	MAX. DISTANCE (FT) DUAL OPERATORS
.4	115V 4.6AAC (22ADC)	12	100	50
		10	160	80
		8	260	130
		6	420	210
.4	208V 2.5AAC (22ADC)	12	350	175
		10	560	280
		8	880	440
		6	1400	700
.4	230V 2.3AAC (22ADC)	12	500	250
		10	790	395
		8	1260	630
		6	2000	1000
3/4	115V 6.9AAC (33ADC)	12	70	–
		10	120	60
		8	200	100
		6	310	155
3/4	208V 3.8AAC (33ADC)	12	260	130
		10	410	205
		8	660	330
		6	1050	525
3/4	230V 3.4AAC (33ADC)	12	320	160
		10	510	255
		8	810	405
		6	1250	625
1.3	115V 13AAC (62ADC)	12	–	–
		10	70	–
		8	120	60
		6	190	95
1.3	208V 7.2AAC (62ADC)	12	150	75
		10	240	120
		8	390	195
		6	620	310
1.3	230V 6.7AAC (62ADC)	12	180	90
		10	290	145
		8	460	230
		6	740	370

NOTES:

1. MAXIMUM DISTANCE IS MEASURED FROM POWER SOURCE TO OPERATOR
2. MAXIMUM DISTANCE FOR CONTROLS IS MEASURED FROM OPERATOR TO PUSHBUTTON OR OTHER DEVICE
3. IF DISTANCE TO POWER SOURCE IS GREATER THAN VALUE SHOWN USE A HIGHER VOLTAGE OR THREE PHASE UNIT OR CONTACT UTILITY COMPANY FOR A SERVICE FEEDER
4. IF DISTANCE TO REMOTE CONTROL DEVICE IS GREATER THAN 200 FT, USE RANGE EXTENDER OPTION.
5. TABLE IS BASED ON STRANDED COPPER WIRE AND ALLOWS UP TO 2% VOLTAGE DROP
6. CONNECT POWER PER LOCAL CODES
7. RUN POWER AND CONTROL WIRING SEPARATELY
8. AMPERE RATING IS MOTOR FULL LOAD; DRAW MAY BE HIGHER ON STARTUP
9. 250VA ALLOWED FOR CONTROLS & HEATER
10. RESISTANCE VALUES FROM ELECTRONICS VEST POCKET REFERENCE BOOK BY H. THOMAS, PRENTICE HALL, 1988.

CONTROL WIRING

VOLTAGE	WIRE GAGE	MAX. DIST. (FT.)
24V	16	100
24V	14	150
24V	12	200

WIRE GAGE	RESISTANCE PER 1000 FEET
12	1.588
10	.9989
8	.6282
6	.3951

NO	DATE	REVISION	DWN	CKD	APV
1	12–89	RANGE EXT. OPTION NOTE	RWM		
2	7–90	EXPANDED CHART	DCL		
3	9–90	REVISED NOTES	DCL		
4	3–91	EXPANDED CHART, ADDED AMPS	DCL		
5	10–91	CHG. 2HP, 208V 1ø DISTANCES	RER		
6	1–92	GENERAL ADJUSTMENTS	DCL		
7	2–93	EXPANDED; CONTROLS ALLOWANCE	DCL	DCL	RDC

PART NUMBER

W O NUMBER

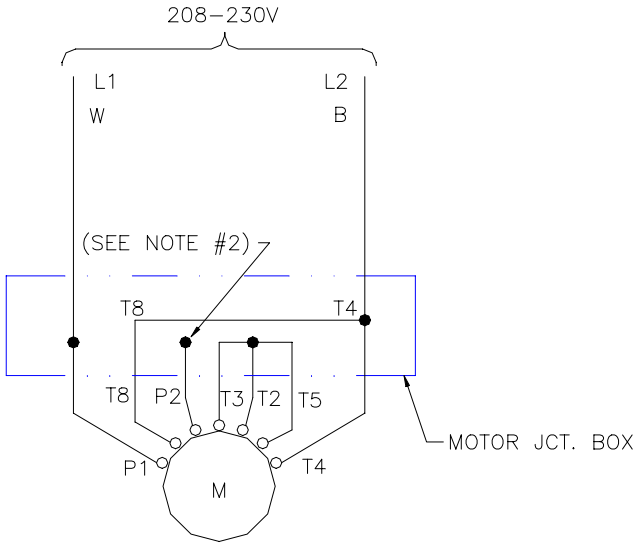
F O NUMBER

B & B ELECTROMATIC
MANUFACTURING SINCE 1925
P O BOX 99, 700 N MAIN ST
NORWOOD, LA. 70761
PH.(504) 629–5234

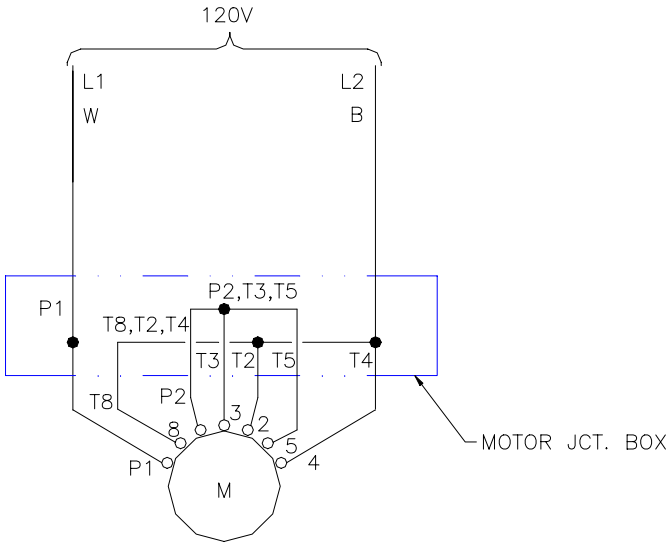
TITLE: WIRING REQUIREMENTS

SCALE	MATERIAL	FILE	DRAWING NUMBER	REV
NONE			0050BL0053	7

TERMINAL MARKINGS AND CONNECTIONS FOR 1ø GATES



MOTOR LEAD CONNECTIONS
208/230V, 1ø



MOTOR LEAD CONNECTIONS
115V, 1ø

NOTES:
1. VERIFY MOTOR LEAD CONNECTIONS BY COMPARING TO DIAGRAM ON POWER UNIT MOTOR
2. PLACE A WIRE NUT ON THE P2 WIRE IN THE JUNCTION BOX OF THE MOTOR WHEN HIGH VOLTAGE (208–230V) POWER IS USED
3. TRANSFORMER WIRING MUST ALSO BE CHANGED. SEE TRANSFORMER WIRING FOLLOWING.
4. SOME MOTORS ARE COLOR CODED; OTHERS ARE NUMBER CODED.
5. MOTORS HAVE AN INTERNAL OVERLOAD

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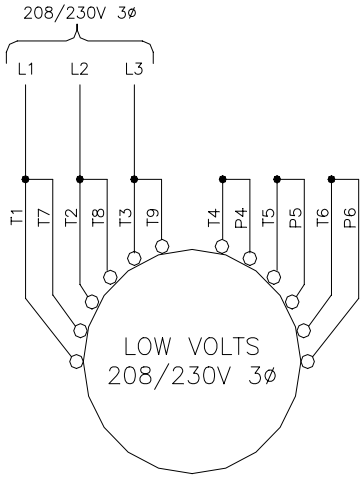
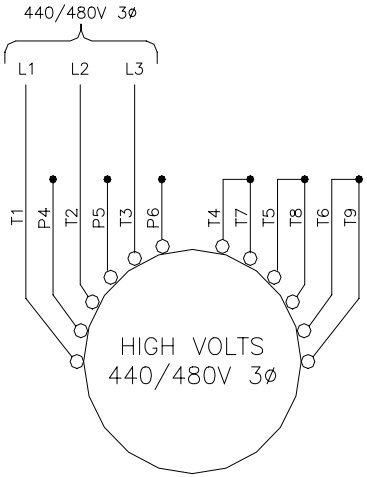
TITLE			
VOLTAGE CONVERSION, 1ø			
SCALE	MATERIAL	FILE	DWG NUMBER / REV
			0050AE0009 / 8/92

TERMINAL MARKINGS AND CONNECTIONS FOR 3ø MOTORS



LEAD CONNECTIONS
208–220V, 3ø

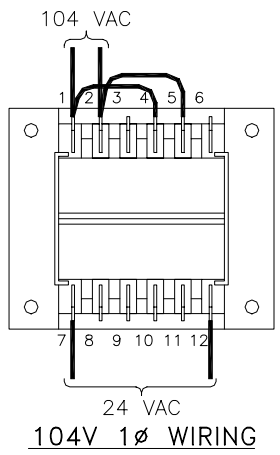


LEAD CONNECTIONS
440–480V, 3ø

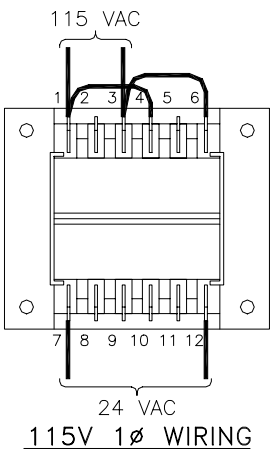
NOTES:

1. VERIFY MOTOR LEAD CONNECTIONS BY COMPARING TO DIAGRAM ON POWER UNIT MOTOR
2. TRANSFORMER WIRING MUST ALSO BE CHANGED. SEE TRANSFORMER WIRING FOLLOWING.
3. MOTOR MUST BE WIRED TO TURN COUNTERCLOCKWISE VIEWED FROM THE SHAFT END.
4. MOTORS HAVE AN INTERNAL OVERLOAD

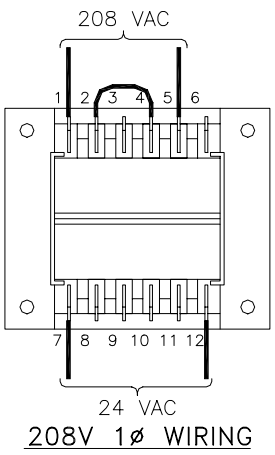
B&B ELECTROMATIC MANUFACTURING SINCE 1925			P.O. BOX 99, 700 N MAIN ST NORWOOD, LA 70761 PHONE (504) 629–5234	
TITLE VOLTAGE CONVERSION, 3ø				
SCALE	MATERIAL	FILE	DWG NUMBER	REV
			0050AE0010	5/92



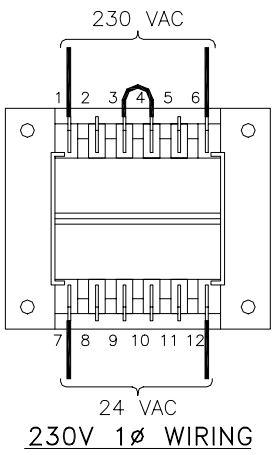
104V 1ø WIRING



115V 1ø WIRING

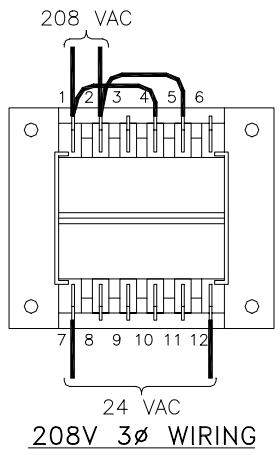


208V 1ø WIRING

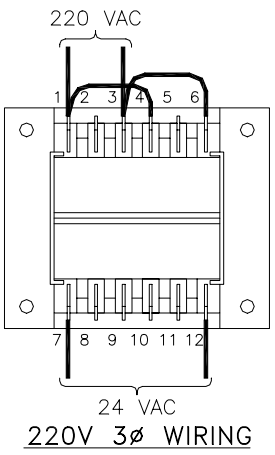


230V 1ø WIRING

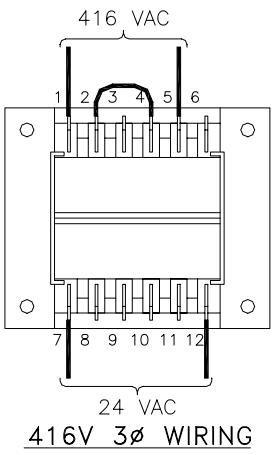
1ø TRANSFORMER



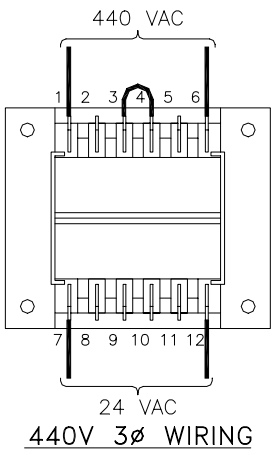
208V 3ø WIRING



220V 3ø WIRING

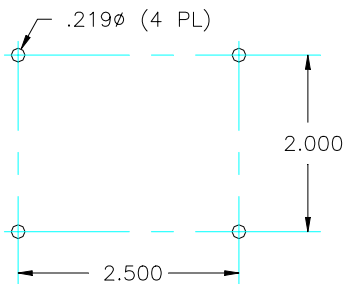


416V 3ø WIRING



440V 3ø WIRING

3ø TRANSFORMER



MOUNTING DIMENSIONS

NOTES

1. TRANSFORMERS ARE RATED FOR 80VA
2. THESE TRANSFORMERS USED ON ALL XL/CS OPERATORS AFTER 5-90
3. USE TRANSFORMER YT654-A41801276 ON ALL 1ø OPERATORS
4. USE TRANSFORMER YT654-A41801296 ON ALL 3ø OPERATORS
5. USE CARE DISCONNECTING WIRES (DO NOT PULL CONNECTORS OUT OF TRANSFORMER)

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TITLE

TRANSFORMER WIRING

SCALE	MATERIAL	FILE	DWG NUMBER	REV
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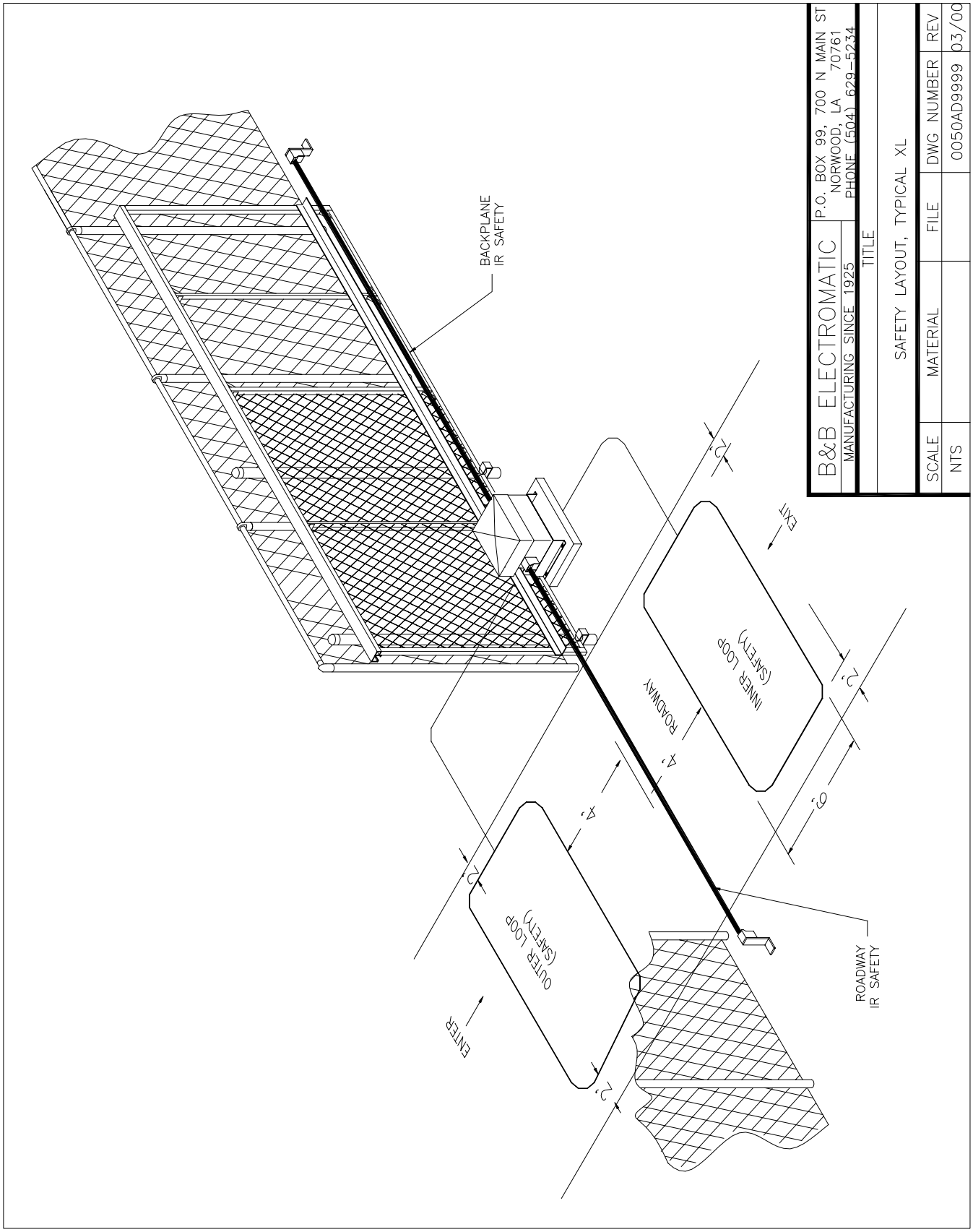
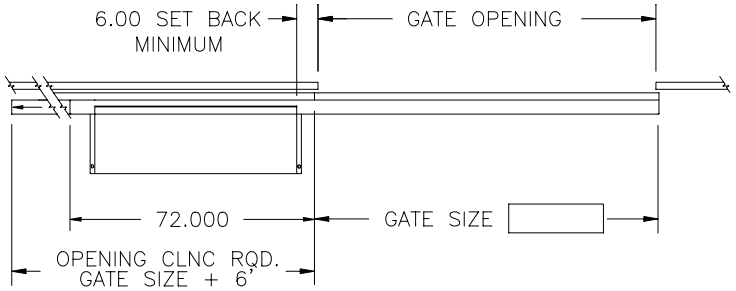
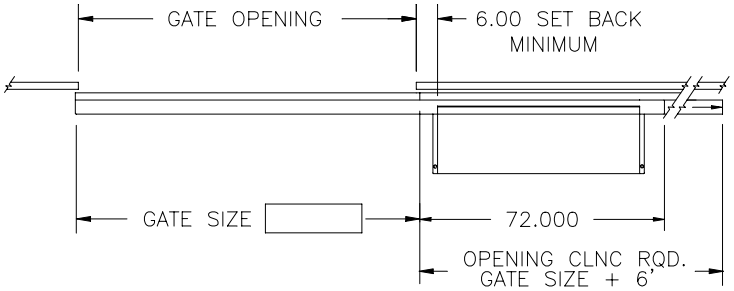
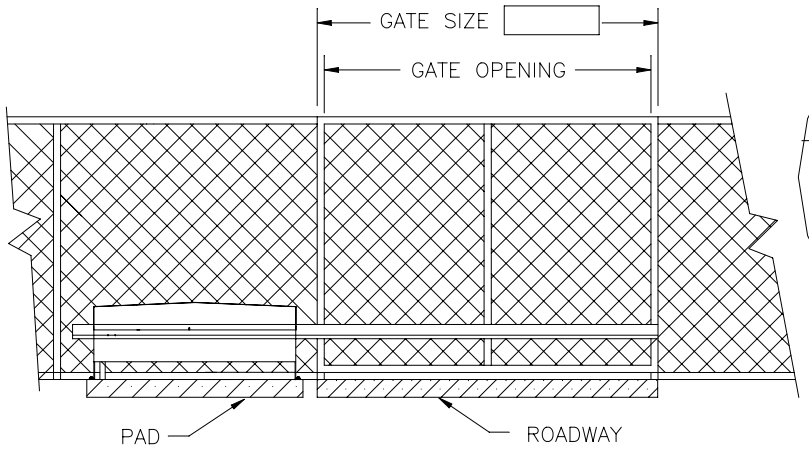




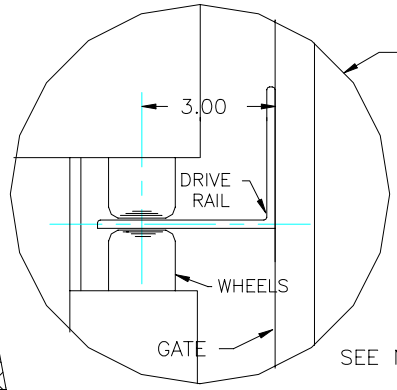
RIGHT HAND GATE PLAN VIEW



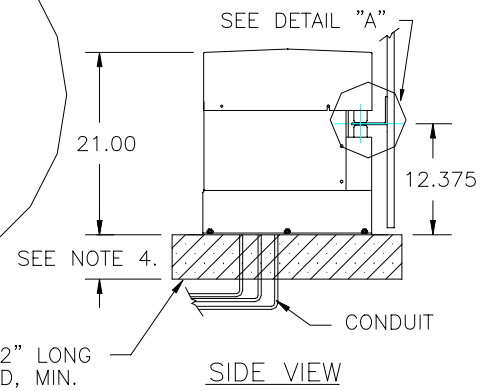
LEFT HAND GATE PLAN VIEW



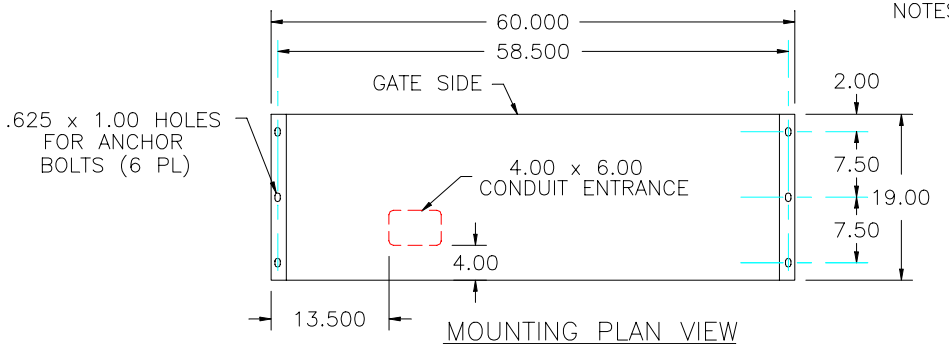
INSIDE VIEW



DETAIL "A"



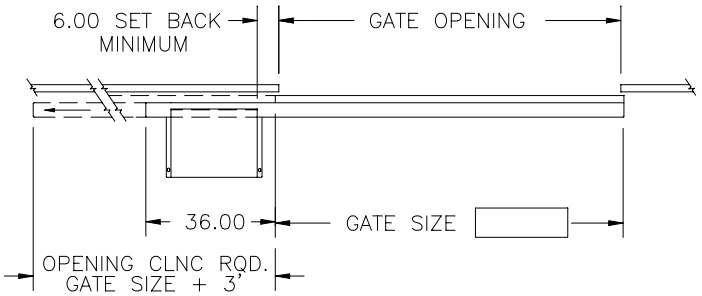
SIDE VIEW



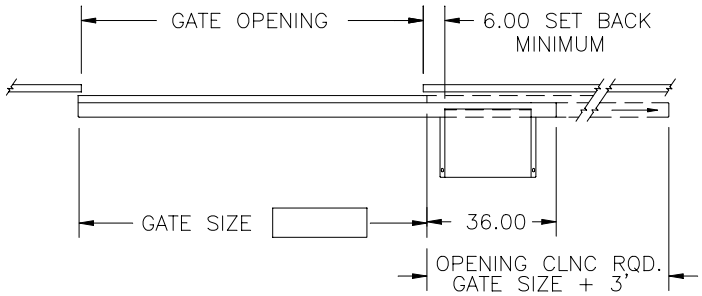
MOUNTING PLAN VIEW
(SCALE 1/20)

NOTES:
1. TYPICAL GATE AND FENCE SHOWN FOR REFERENCE ONLY
2. CONCRETE PAD BY INSTALLER
3. 1/2"ø x 12" ANCHOR BOLTS (MIN) BY INSTALLER
4. PAD TO BE 6" BELOW THE FROSTLINE OR 30" DEEP MIN

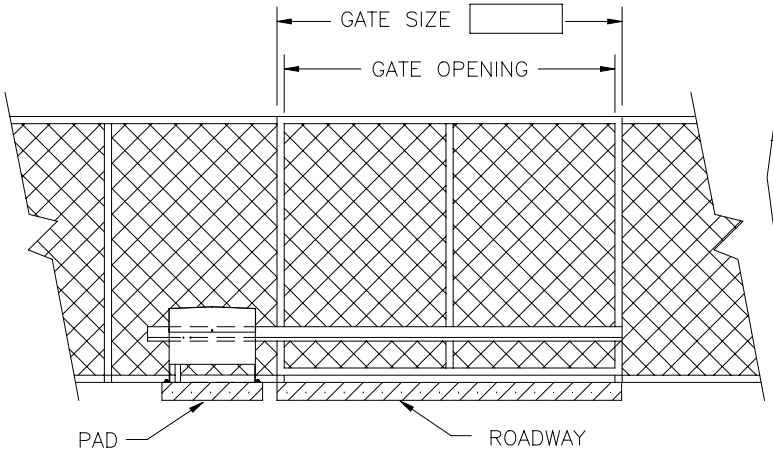
B&B ELECTROMATIC MANUFACTURING SINCE 1925	P.O. BOX 99, 700 N MAIN ST NORWOOD, LA 70761 PHONE (504) 629-5234			
TITLE				
TYPICAL INSTALLATION – XLT AND XLTV OPERATORS				
SCALE	MATERIAL	FILE	DWG NUMBER	REV
1/50			0050AI0115	11/95



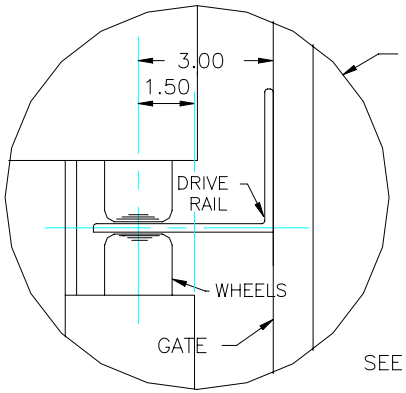
RIGHT HAND GATE PLAN VIEW



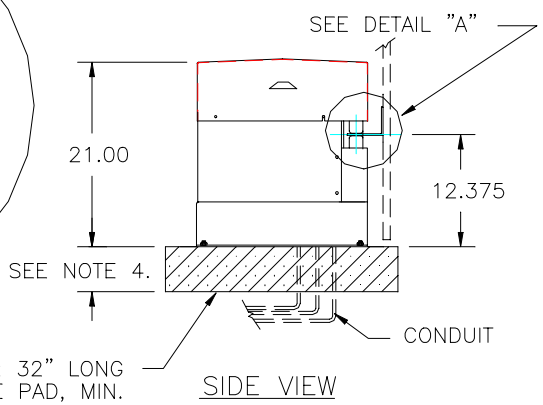
LEFT HAND GATE PLAN VIEW



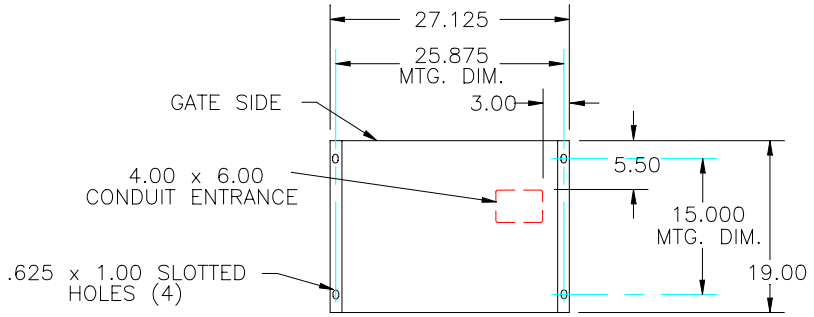
INSIDE VIEW



DETAIL "A"



SIDE VIEW



MOUNTING PLAN VIEW

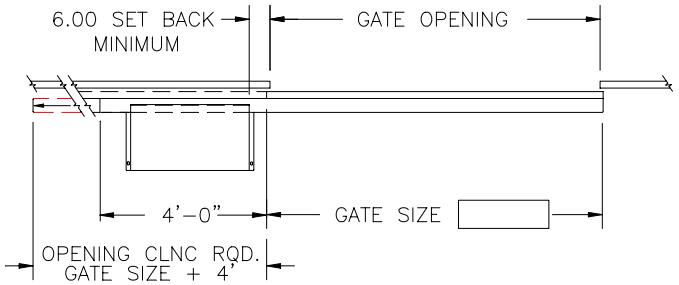
NOTES:
1. TYPICAL GATE AND FENCE SHOWN FOR REFERENCE
2. CONCRETE PAD BY INSTALLER
3. 1/2"ø x 5.00 ANCHOR BOLTS (MIN) BY INSTALLER
4. PAD TO BE 6" BELOW FROSTLINE OR 24" DEEP MIN.

B&B ELECTROMATIC	P.O. BOX 99, 700 N MAIN ST NORWOOD, LA 70761 PHONE (504) 629-5234
MANUFACTURING SINCE 1925	

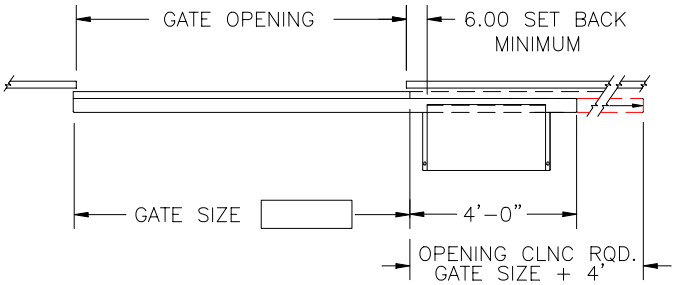
TITLE

TYPICAL INSTALLATION
XL, XLH, XLB, XLF, XLS, XLSB, XLSF AND XLR OPERATORS

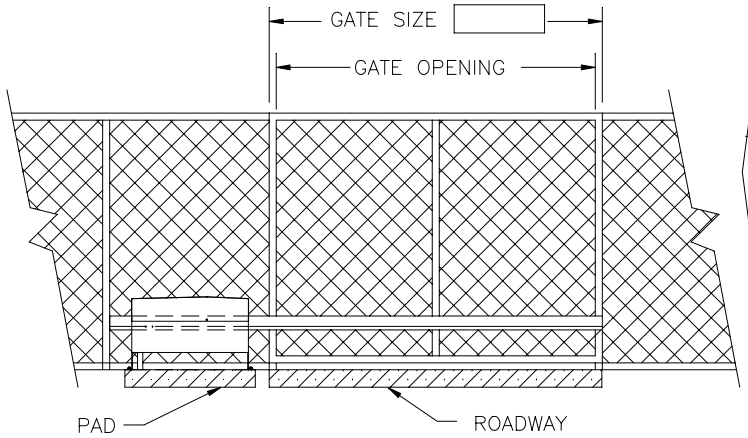
SCALE	MATERIAL	FILE	DWG NUMBER	REV
1/50			0050AI0002	12/95



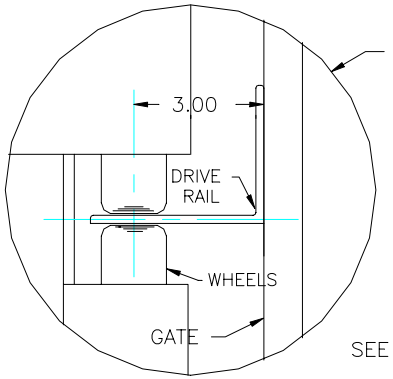
RIGHT HAND GATE PLAN VIEW



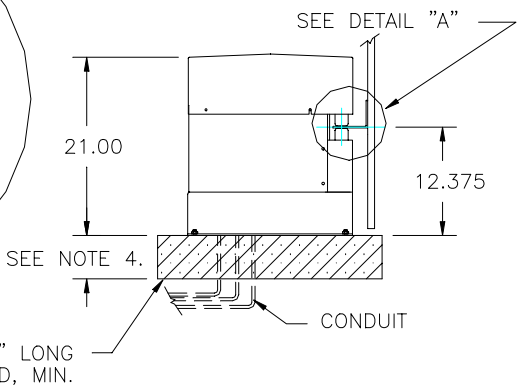
LEFT HAND GATE PLAN VIEW



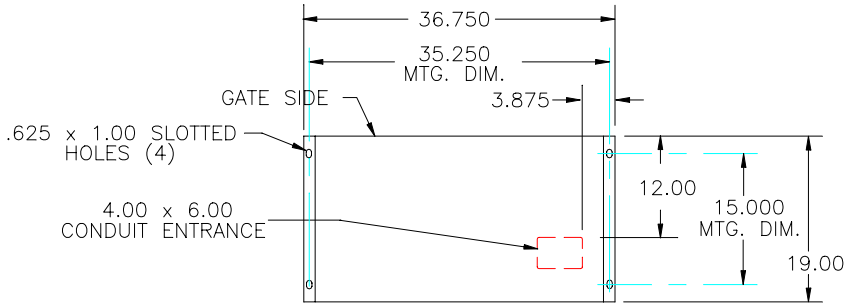
INSIDE VIEW



DETAIL "A"



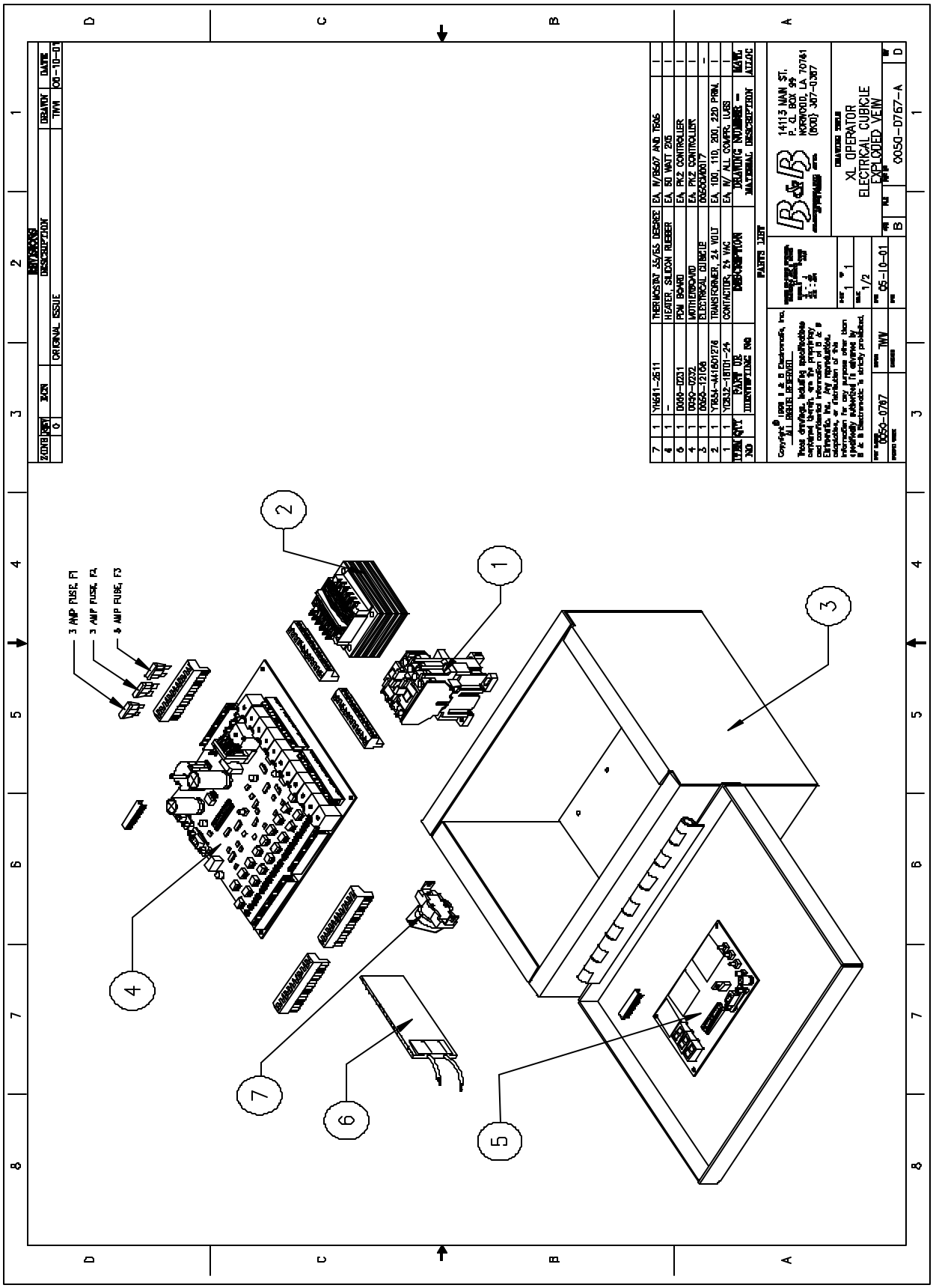
SIDE VIEW



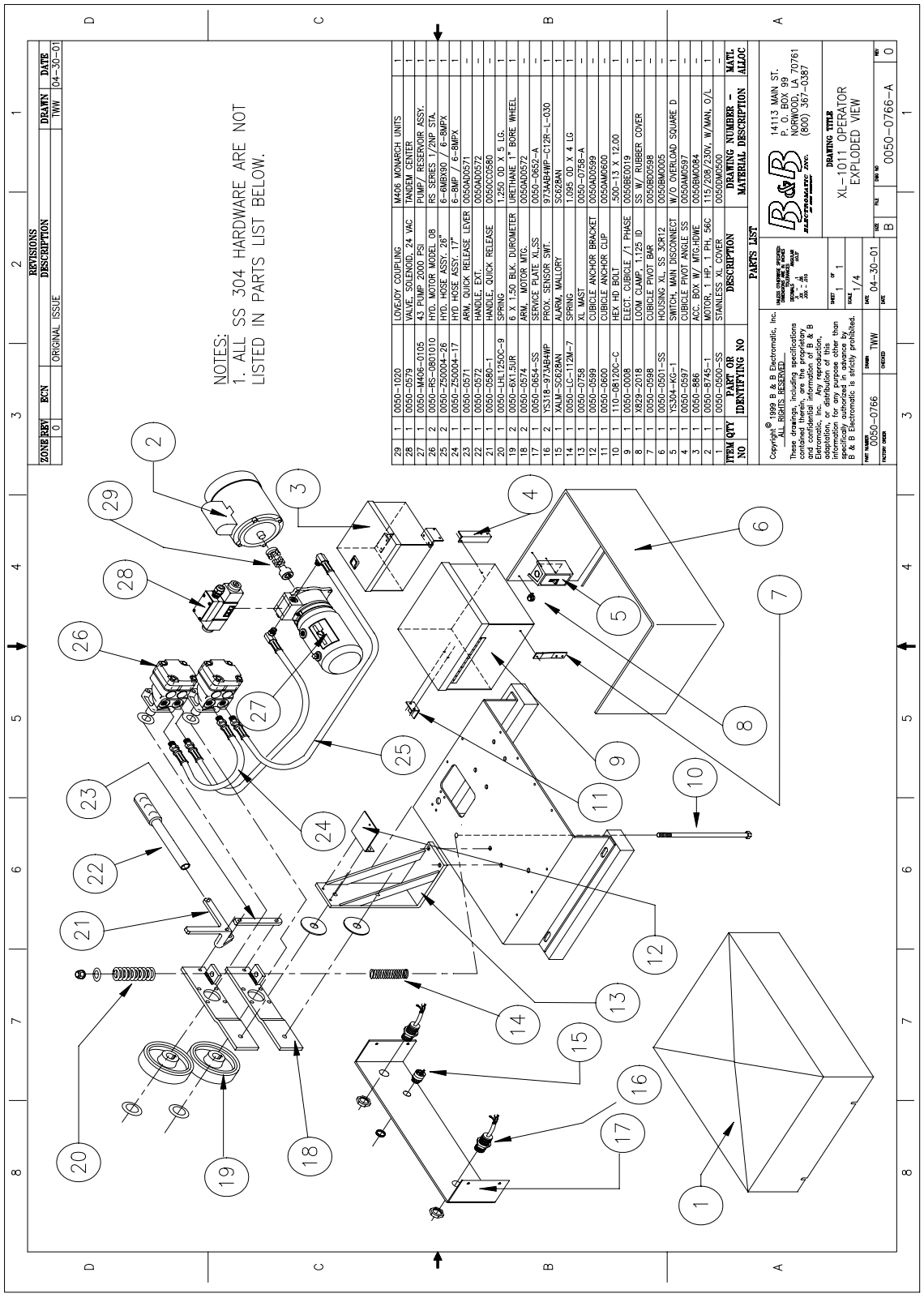
MOUNTING PLAN VIEW

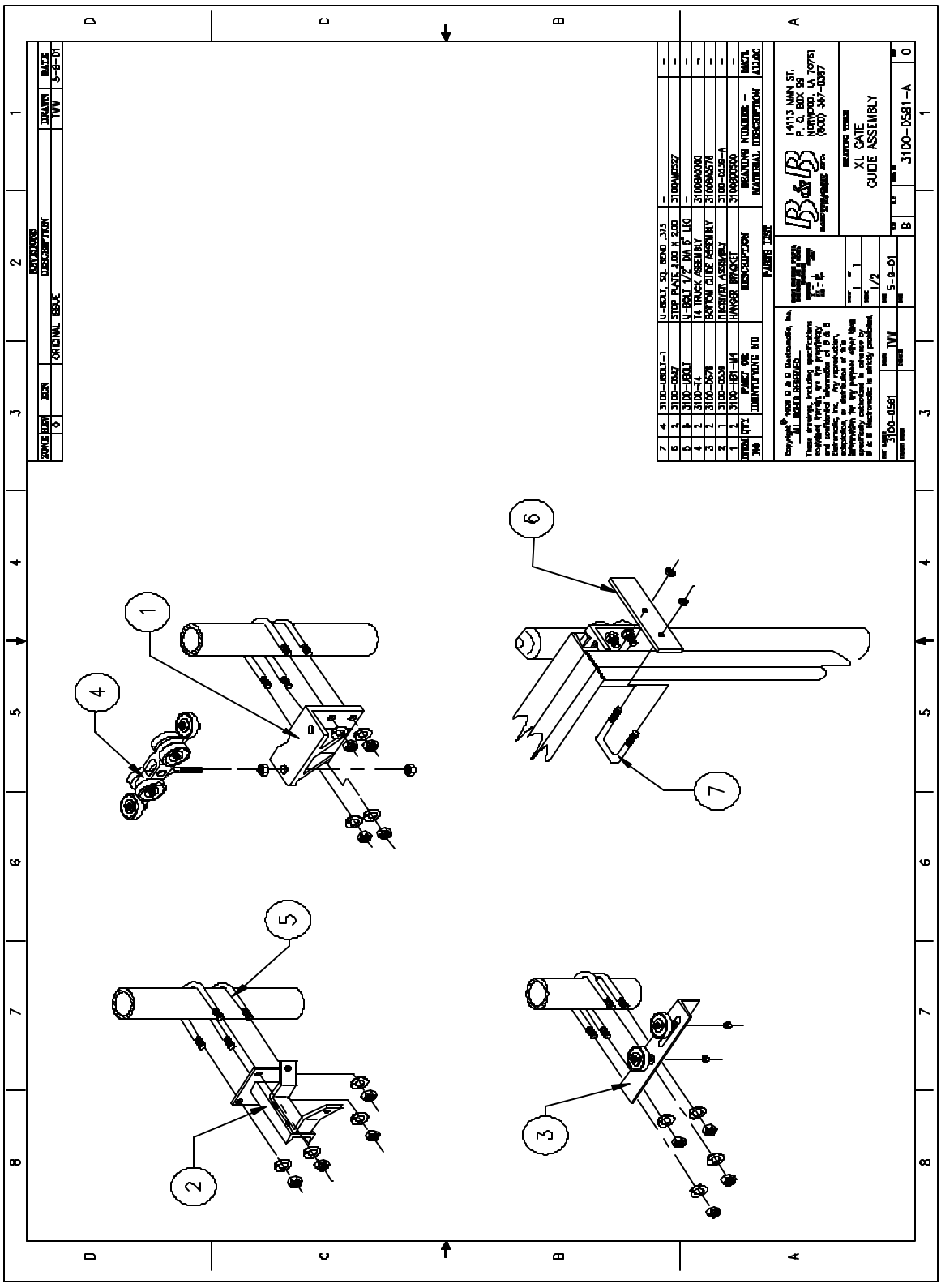
NOTES: 1. TYPICAL GATE AND FENCE SHOWN FOR REFERENCE ONLY
2. CONCRETE PAD BY INSTALLER
3. 1/2"ø x 12" ANCHOR BOLTS (MIN) BY INSTALLER
4. PAD TO BE 6" BELOW THE FROSTLINE OR 24" DEEP MIN

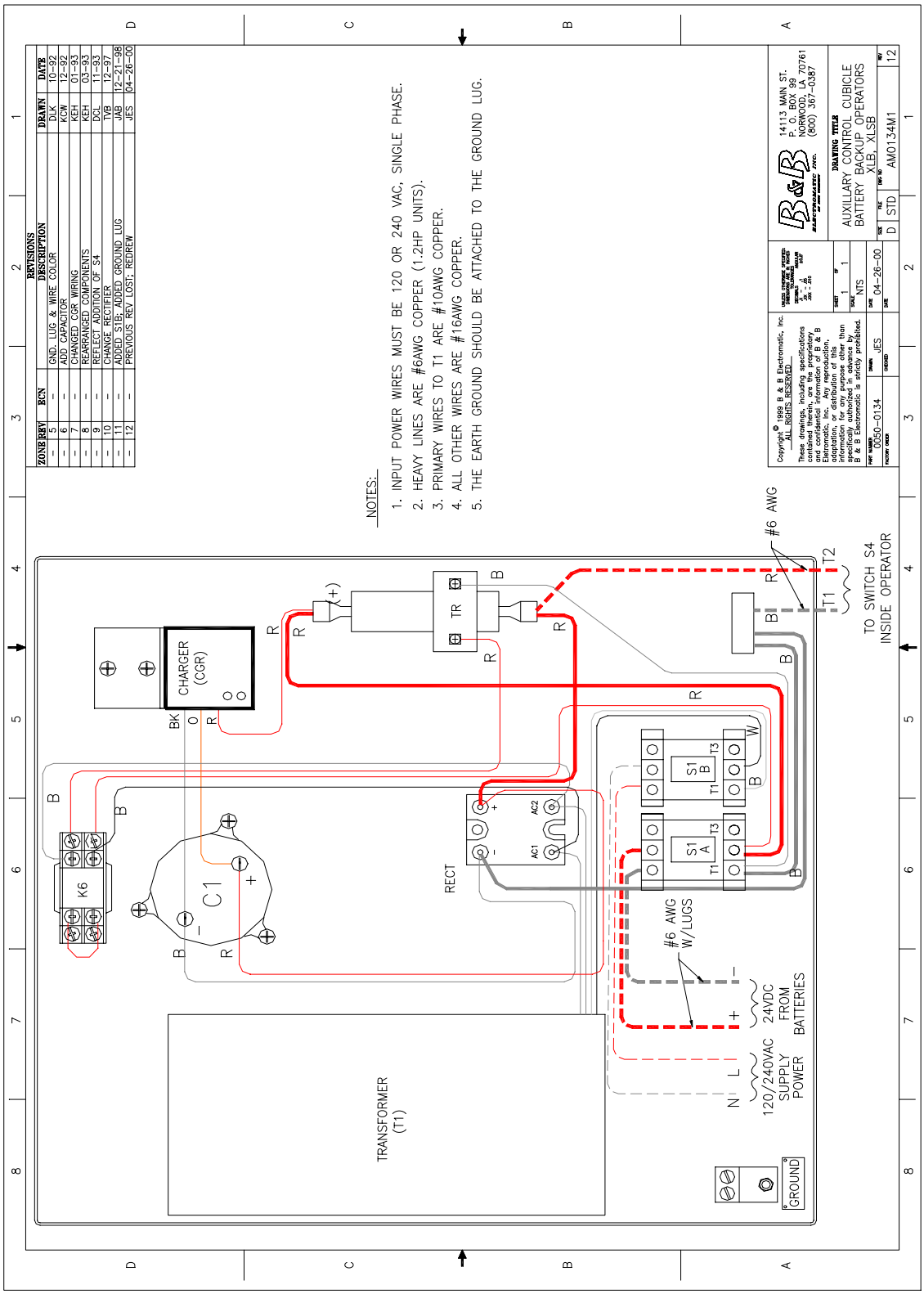
B&B ELECTROMATIC MANUFACTURING SINCE 1925			P.O. BOX 99, 700 N MAIN ST NORWOOD, LA 70761 PHONE (504) 629-5234	
TITLE				
TYPICAL INSTALLATION – XLD AND XLDV OPERATORS				
SCALE	MATERIAL	FILE	DWG NUMBER	REV
1/50			0050AI0114	11/95

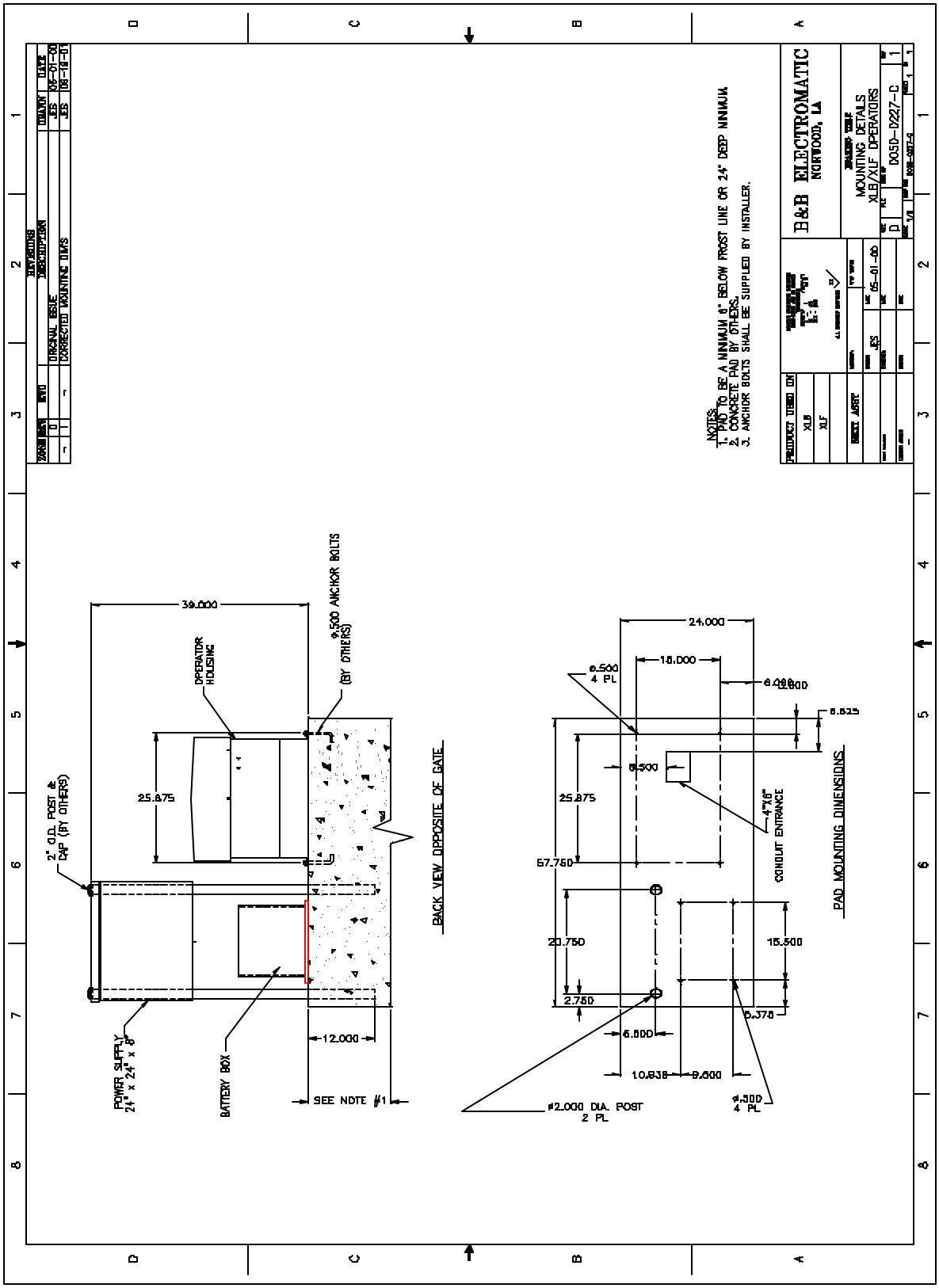


http://www.bbgates.com









NOTES: