

CHAMBERLAIN®

LiftMaster®
PROFESSIONAL



MODEL HS670
HEAVY DUTY HYDRAULIC SLIDE GATE OPERATOR

2 YEAR WARRANTY

Serial # _____
(located on electrical box cover)
Installation Date _____

**MODEL HS670 IS FOR VEHICULAR PASSAGE GATES ONLY AND
ARE NOT INTENDED FOR PEDESTRIAN PASSAGE GATE USE**



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IMPORTANT NOTE

- BEFORE attempting to install, operate or maintain the operator, you MUST read and fully understand this manual and follow all safety instructions.
- DO NOT attempt repair or service of your commercial door and gate operator unless you are an Authorized Service Technician.

CARTON INVENTORY

Before beginning your installation check that all components were supplied and received undamaged. Refer to list below for factory supplied parts.

HARDWARE KIT

Description	Qty.
Bolt 1/4-20 (for Limit Shoe)	4
Lockwasher 1/4	4
Hex Nut 1/4-20	4
Screw #10-24 (for Gate Stop)	4
Lockwasher #10	4
Hex Nut #10-24	4
Limit Shoe	2
Gate Warning Sign	2
Vent Cap	1
Gate Stops	2
PBS, Stop	1

WARNING

Mechanical

WARNING

Electrical

CAUTION

When you see the above Safety Symbols and Signal Words on the following pages, they will alert you to the possibility of **SERIOUS INJURY** or **DEATH** if you do not comply with the warnings that accompany them. The hazard may come from something mechanical or from electric shock. Read the warnings carefully.

When you see this Signal Word on the following pages, it will alert you to the possibility of damage to your gate and/or the gate operator if you do not comply with the cautionary statements that accompany it. Read them carefully.

OPERATOR SPECIFICATIONS

OPERATOR FEATURES

A. MOTOR 1 AND 2 HP

The motors used in the HS670 GC and HS670 GI are T.E.F.C. (totally enclosed, fan cooled) and operate at 3450 R.P.M. They incorporate a built-in manually resettable thermal overload.

B. DIRECTIONAL VALVE

Directional valve is 3 position, 4 way. It incorporates 2 solenoids which are 24 VDC. The power required for operation is rectified from 24 VAC.

C. HYDRAULIC BRAKE

Dual valve system limits gate over travel.

D. BYPASS VALVE

Incorporates a handle at side of pump. When positioned downward, it will allow manual operation of the gate.

E. RELIEF VALVE

Built into pump. Set at 600 p.s.i. for HS670 1HP and 1500 p.s.i. for HS670 2HP.

F. VENT CAP

When removed, you may add hydraulic oil. Must be on during operator operation.

G. LIMIT SWITCH

All limit switches are oil tight and watertight, and of NEMA 3, 4, and 13 construction. Open switch for right hand, close switch for left hand.

H. DRIVE WHEELS

Drive wheels are constructed of polyurethane material on a steel hub and have a hardness factor of 95. HS670 1HP = 1 1/2" wide, 6" diameter; HS670 2HP= 2" wide, 6" diameter.

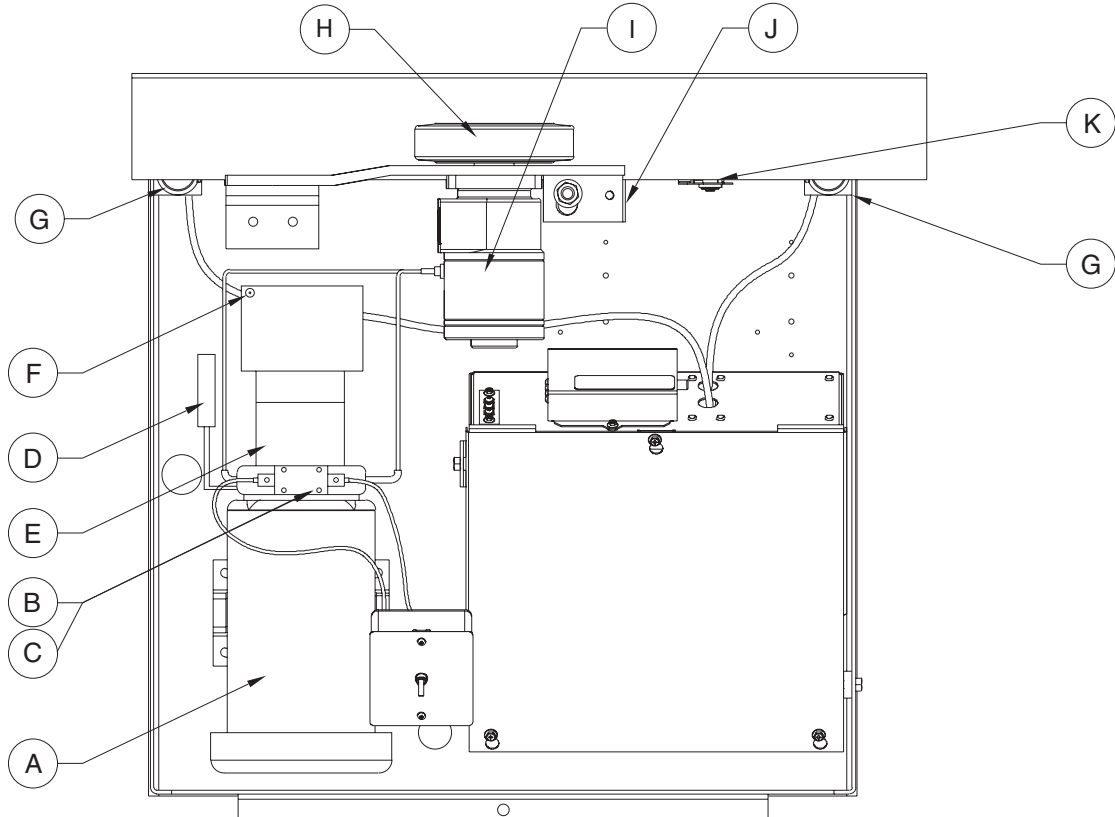
I. HYDRAULIC MOTOR

Roller vane, free wheeling type with a displacement of 12 cubic inches per revolution.

J. SUSPENSION SYSTEM

Incorporates two compression springs. HS670 1HP and HS670 2HP use different compression springs. See also page 11.

K. HALL EFFECT (RPM) SENSOR ASSEMBLY



OPERATOR SPECIFICATIONS

OPERATOR DIMENSIONS AND HORSEPOWER CHART

MODEL HS670 GC

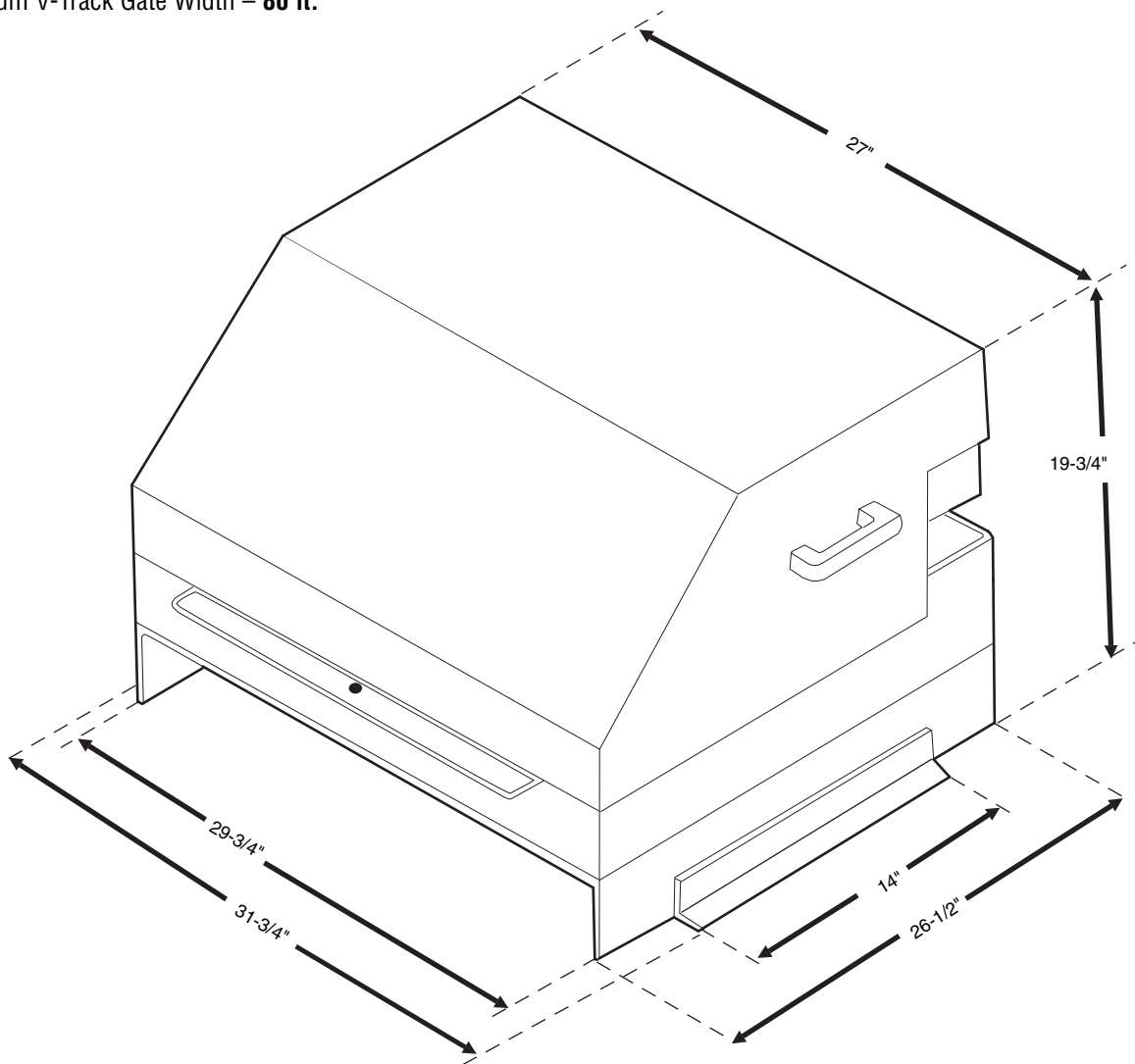
- **1 HP Motor**
Gate Speed – **12"/sec.**
Maximum Gate Weight – **3000 lbs.**
Maximum V-Track Gate Width – **80 ft.**

MODEL HS670 GI

- **1 HP Motor**
Gate Speed – **18"/sec.**
Maximum Gate Weight – **3000 lbs.**
Maximum V-Track Gate Width – **80 ft.**

MODEL HS670 GI

- **2 HP Motor**
Gate Speed – **18"/sec.**
Maximum Gate Weight – **5000 lbs.**
Maximum V-Track Gate Width – **80 ft.**



OPERATOR SPECIFICATIONS

UL325 MODEL CLASSIFICATIONS

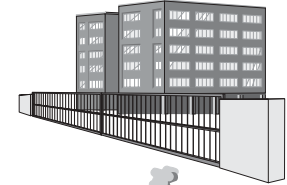
CLASS I – RESIDENTIAL VEHICULAR GATE OPERATOR

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.



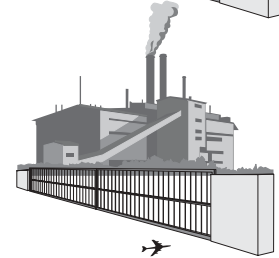
CLASS II – COMMERCIAL/GENERAL ACCESS VEHICULAR GATE OPERATOR

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.



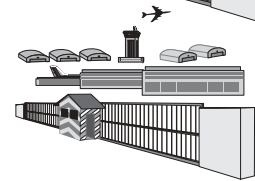
CLASS III – COMMERCIAL/GENERAL ACCESS VEHICULAR GATE OPERATOR

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 location not intended to service the general public.



CLASS IV – RESTRICTED ACCESS VEHICULAR GATE OPERATOR

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 locations not servicing the general public, in which unauthorized access is prevented via supervision by security personnel.



SAFETY ACCESSORY SELECTION

All UL325 compliant LiftMaster gate operators will accept external entrapment protection devices to protect people from motorized gate systems. UL325 requires that the type of entrapment protection correctly matches each gate application. Below are the six types of entrapment protection recognized by UL325 for use on this operator.

ENTRAPMENT PROTECTION TYPES

Type A: Inherent obstruction sensing system, self-contained within the operator. This system must sense and initiate the reverse of the gate within two seconds of contact with a solid object.

Type B1: Connections provided for a non-contact device, such as a photo eye can be used as a secondary protection.

Type B2: Connections provided for a contact sensor. A contact device such as a gate edge can be used for secondary protection.

Type C: Inherent adjustable clutch or pressure relief valve.

Type D: Connections provided for a control requiring continuous pressure to operate the operator open and close.

Type E: Built-in audio alarm (e.g., sirens, horns or buzzers).

NOTES:

UL requires that all installations must have warning signs placed in plain view on both sides of the gate to warn pedestrians of the dangers of motorized gate systems.

Model HS670 meets the following specifications:



MODEL	CLASS 1	CLASS 2	CLASS 3	CLASS 4
HS670 GC	✓	✓	✓	✓
HS670 GI	N/A	N/A	✓	✓

UL325 ENTRAPMENT PROTECTION REQUIREMENTS

GATE OPERATOR ENTRAPMENT PROTECTION

UL325 Installation Class	Slide Gate Operator		Swing & Gate Barrier (Arm) Operator	
	Primary Type	Secondary Type	Primary Type	Secondary Type
Class I & II	A	B1, B2 or D	A or C	A, B1, B2 C or D
Class III	A, B1 or B2	A, B1, B2, D or E	A, B1, B2 or C	D or E
Class IV	A, B1, B2 or D	A, B1, B2, D or E	A, B1, B2, C or D	A, B1, C, D or E

In order to complete a proper installation you must satisfy the entrapment protection chart shown above. That means that the installation must have one primary means of entrapment protection and one independent secondary means of entrapment protection. Both primary and secondary entrapment protection methods must be designed, arranged or configured to protect against entrapments in both the open and close directions of gate travel.

For Example: For a slide gate system that is installed on a single-family residence (UL325 Class I) you must provide the following: As your primary type of entrapment protection you must provide Type A inherent (built into the operator) entrapment sensing and at least one of the following as your secondary entrapment protection: Type B1- Non-contact sensors such as photo-eyes, Type B2- Contact sensors such as gate edges or Type D- Constant pressure control.

OPERATOR WARNINGS

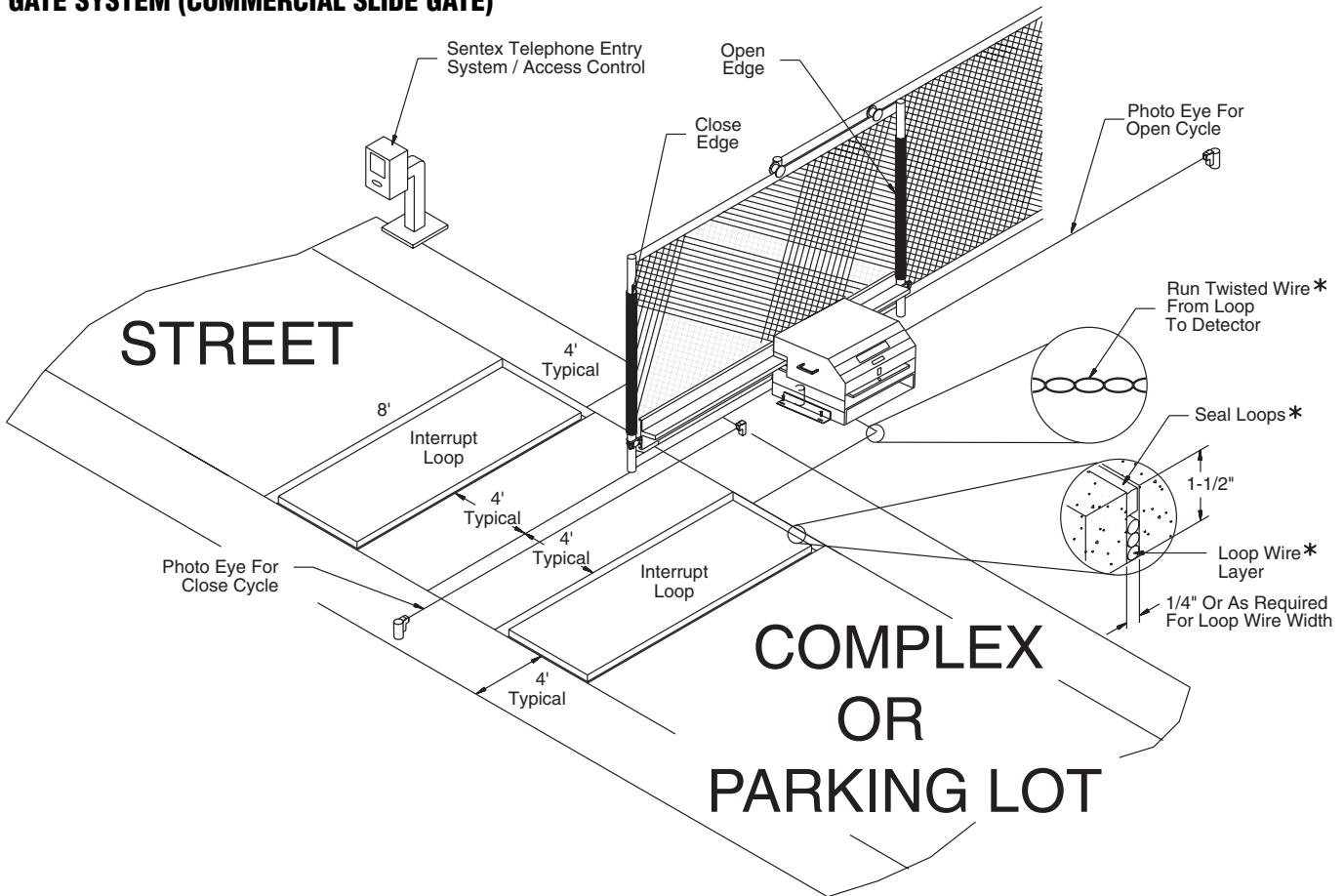
SAFETY INSTALLATION INFORMATION

1. Vehicular gate systems provide convenience and security. Gate systems are comprised of many component parts. The gate operator is only one component. Each gate system is specifically designed for an individual application.
2. Gate operating system designers, installers and users must take into account the possible hazards associated with each individual application. Improperly designed, installed or maintained systems can create risks for the user as well as the bystander. Gate systems design and installation must reduce public exposure to potential hazards.
3. A gate operator can create high levels of force in its function as a component part of a gate system. Therefore, safety features must be incorporated into every design. Specific safety features include:
 - Gate Edges
 - Guards for Exposed Rollers
 - Photoelectric Sensors
 - Screen Mesh
 - Vertical Posts
 - Instructional and Precautionary Signage
4. Install the gate operator only when:
 - a. The operator is appropriate for the construction and the usage class of the gate.
 - b. All openings of a horizontal slide gate are guarded or screened from the bottom of the gate to a minimum of 4' (1.2 m) above the ground to prevent a 2 1/4" (6 cm) diameter sphere from passing through the openings anywhere in the gate, and in that portion of the adjacent fence that the gate covers in the open position.
 - c. All exposed pinch points are eliminated or guarded, and guarding is supplied for exposed rollers.
5. The operator is intended for installation only on gates used for vehicles. Pedestrians must be supplied with a separate access opening. The pedestrian access opening shall be designed to promote pedestrian usage. Locate the gate such that persons will not come in contact with the vehicular gate during the entire path of travel of the vehicular gate.
6. The gate must be installed in a location so that enough clearance is supplied between the gate and adjacent structures when opening and closing to reduce the risk of entrapment. Swinging gates shall not open into public access areas.
7. The gate must be properly installed and work freely in both directions prior to the installation of the gate operator.
8. Controls intended for user activation must be located at least six feet (6') away from any moving part of the gate and where the user is prevented from reaching over, under, around or through the gate to operate the controls. Outdoor or easily accessible controls shall have a security feature to prevent unauthorized use.
9. The Stop and/or Reset (if provided separately) must be located in the line-of-sight of the gate. Activation of the reset control shall not cause the operator to start.
10. A minimum of two (2) WARNING SIGNS shall be installed, one on each side of the gate where easily visible.
11. For a gate operator utilizing a non-contact sensor:
 - a. Reference owner's manual regarding placement of non-contact sensor for each type of application.
 - b. Care shall be exercised to reduce the risk of nuisance tripping, such as when a vehicle trips the sensor while the gate is still moving.
 - c. One or more non-contact sensors shall be located where the risk of entrapment or obstruction exists, such as the perimeter reachable by a moving gate or barrier.
12. For a gate operator utilizing a contact sensor such as an edge sensor:
 - a. One or more contact sensors shall be located where the risk of entrapment or obstruction exists, such as at the leading edge, trailing edge and post mounted both inside and outside of a vehicular horizontal slide gate.
 - b. One or more contact sensors shall be located at the bottom edge of a vehicular vertical lift gate.
 - c. A hard wired contact sensor shall be located and its wiring arranged so the communication between the sensor and the gate operator is not subject to mechanical damage.
 - d. A wireless contact sensor such as the one that transmits radio frequency (RF) signals to the gate operator for entrapment protection functions shall be located where the transmission of the signals are not obstructed or impeded by building structures, natural landscaping or similar obstruction. A wireless contact sensor shall function under the intended end-use conditions.
 - e. One or more contact sensors shall be located on the inside and outside leading edge of a swing gate. Additionally, if the bottom edge of a swing gate is greater than 6" (152 mm) above the ground at any point in its arc of travel, one or more contact sensors shall be located on the bottom edge.
 - f. One or more contact sensors shall be located at the bottom edge of a vertical barrier (arm).

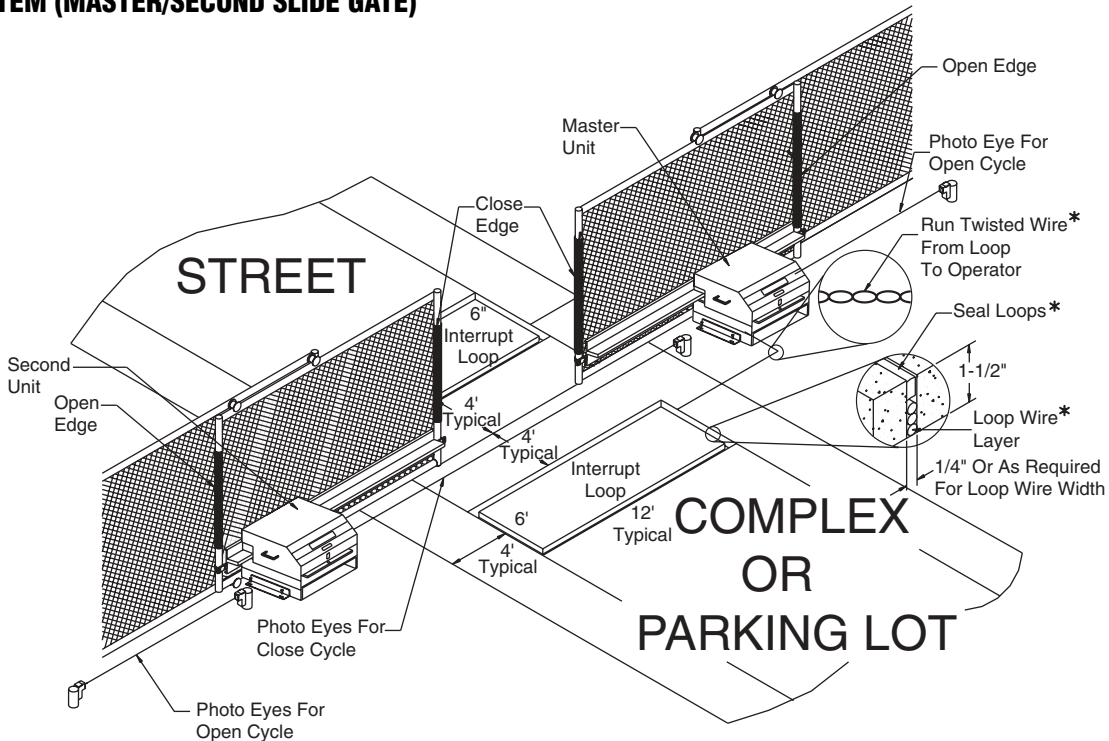
OPERATOR WARNINGS

SUGGESTED ENTRAPMENT PROTECTION DEVICE LOCATIONS

GATE SYSTEM (COMMERCIAL SLIDE GATE)



GATE SYSTEM (MASTER/SECOND SLIDE GATE)



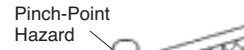
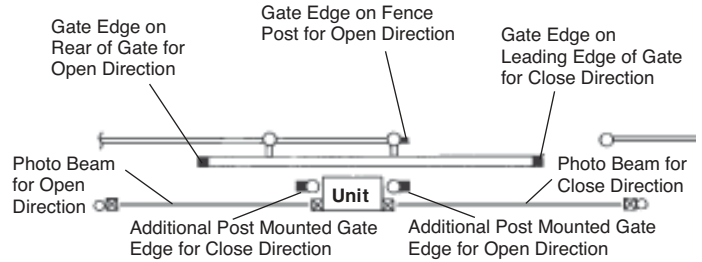
*Refer to loop manufacturer's instructions for detailed installation and loop wiring instructions.

OPERATOR WARNINGS

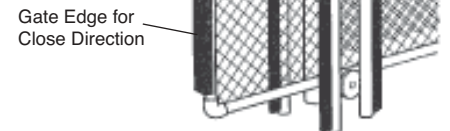
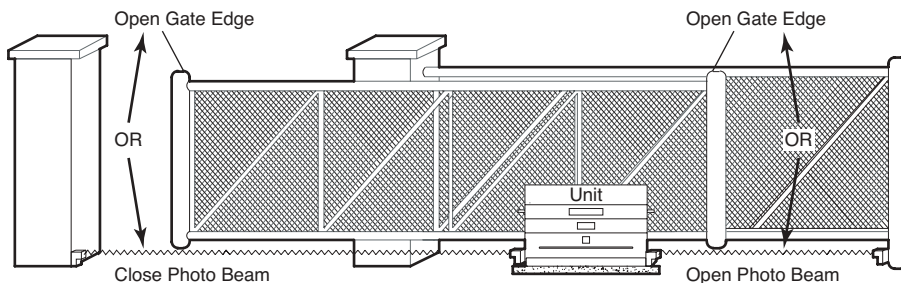
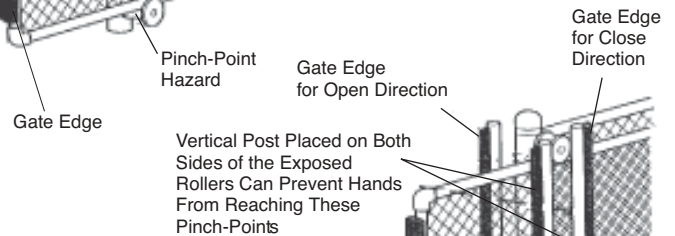
SAFETY PRECAUTIONS FOR OPEN ROLLER GATES AND ORNAMENT "GRILL TYPE" GATES

⚠ WARNING

- Injuries occur when people get their hands or feet caught between the top or bottom of the gate and the gate roller. These potential pinch-points should be guarded against at all times. Enclosed style gate tracks are available for refitting of these rollers from many fence suppliers. Also, roller guards are available for installing over the rollers.
- UL325 requires that, when used, contact sensors shall be located at the leading edge, trailing edge, and be post mounted both inside and outside of a vehicular horizontal slide gate. Non-contact sensors such as photo eyes must protect during both open and close gate cycles.
- Injuries occur when people put their hands and arms through openings in the grill while the gate is operating. They cannot retract their arm and it gets caught between the moving gate grill and the stationary fence post or fence. This potential hazard can be averted by placing a 4' screen mesh on the gate to prevent access through openings anywhere the gate may travel. See Safety Brochure for details. To prevent entrapment injuries, mount controls at least 6' from the gate or any moving parts of the gate.



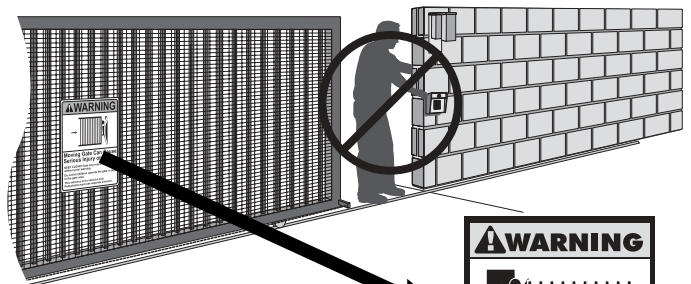
Always Test Gate Edges and Photo Beams Anytime They Are Adjusted or Serviced



WARNING SIGN PLACEMENT

⚠ WARNING

- To prevent SERIOUS INJURY or DEATH from a moving gate:
- Install Warning signs on EACH side of gate in PLAIN VIEW.
 - Permanently secure each Warning sign in a suitable manner using fastening holes.
 - Do NOT mount accessories that are accessible through gate.



NOT FOR USE AS PEDESTRIAN PASSAGE! This operator is intended for vehicular use only. To prevent INJURY to pedestrians, a separate pedestrian access should be supplied, visible from the gate. Locate the pedestrian access where there is not a chance of INJURY at any point during full movement of the gate.

INSTALLATION

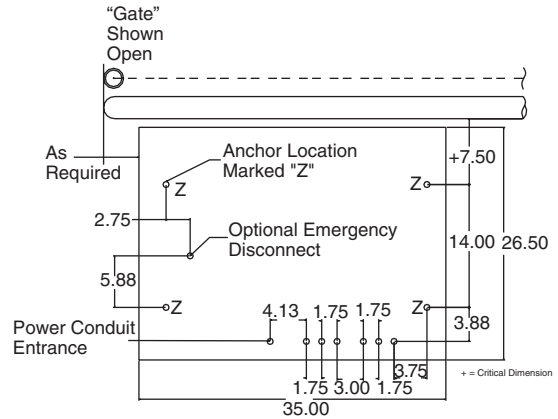
NOTES: Installation shown is for a right-handed unit (on right side of gate opening when inside looking out). Left-handed is opposite. For left-handed conversion, see page 17.

If there is suitable existing concrete at area of unit mounting, use dimensioning procedure described in step 1. Conduit locations may require modifications to suit your application.

CONCRETE PAD

1. Layout concrete pad as detailed.
2. Locate conduit, as required, prior to pouring concrete.
3. Pour concrete pad. The pad must be level and above the ground line. Pad must be a minimum of 24" in depth or below the frost line, whichever is greater.
4. Allow concrete to set at least 2 days before installing unit.
5. Locate (4) 1/2" concrete anchors (not provided) or other means of fastening as shown. Anchors must be positioned accurately and secure in the concrete.

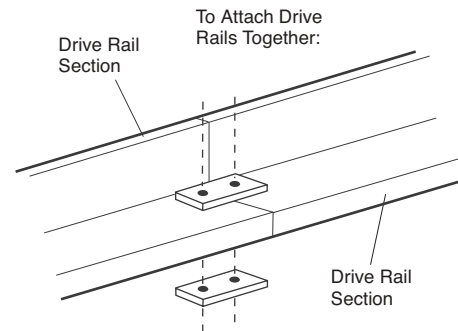
NOTE: Always use separate conduits for power wiring and control wiring. You may want to install extra conduit for future wiring considerations. For detailed information on the emergency disconnect system, see instructions provided with it. This is only a suggested layout, other pad layouts are possible.



DRIVE RAIL

1. Mark the location to install drive rail 11-1/2" from the top of concrete pad. The drive rail should be the gate opening width plus 3' to 4'. The drive rail must be level and parallel to the gate and operator.
2. Fasten the drive rail securely to the gate and backframe.

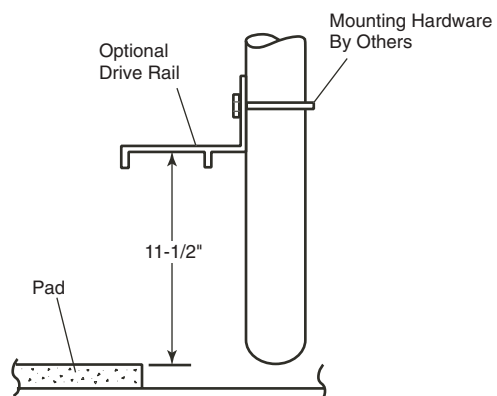
IMPORTANT NOTE: Make sure that the drive rail and wheels are aligned properly.



OPERATOR MOUNTING

1. Remove cover by loosening bolts on each side of cover and remove bolt from the front of the cover. Lift cover off.
2. Secure operator to the concrete pad using (4) 1/2" concrete anchors (not provided) with the drive wheels facing the gate. The operator must be level and parallel with the gate and drive rail.

NOTE: Loosen the bolts that secure the mounting legs to the unit. The distance between the operator and the rail can then be slightly adjusted. After adjustment, retighten the bolts.



INSTALLATION

VENT CAP

1. Remove the threaded plug from the pump tank.
2. Install the vent cap.

NOTE: Never run the operator without the vent cap installed.

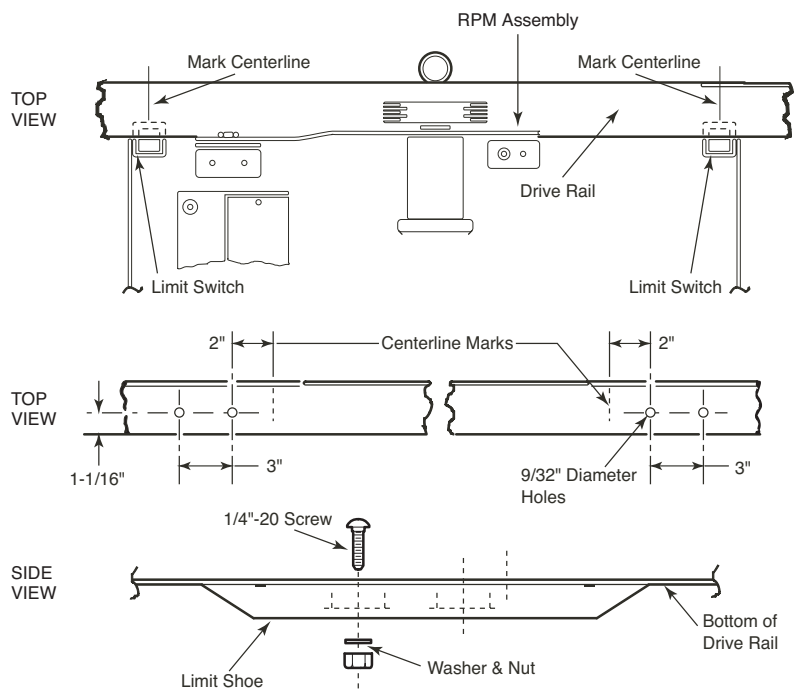
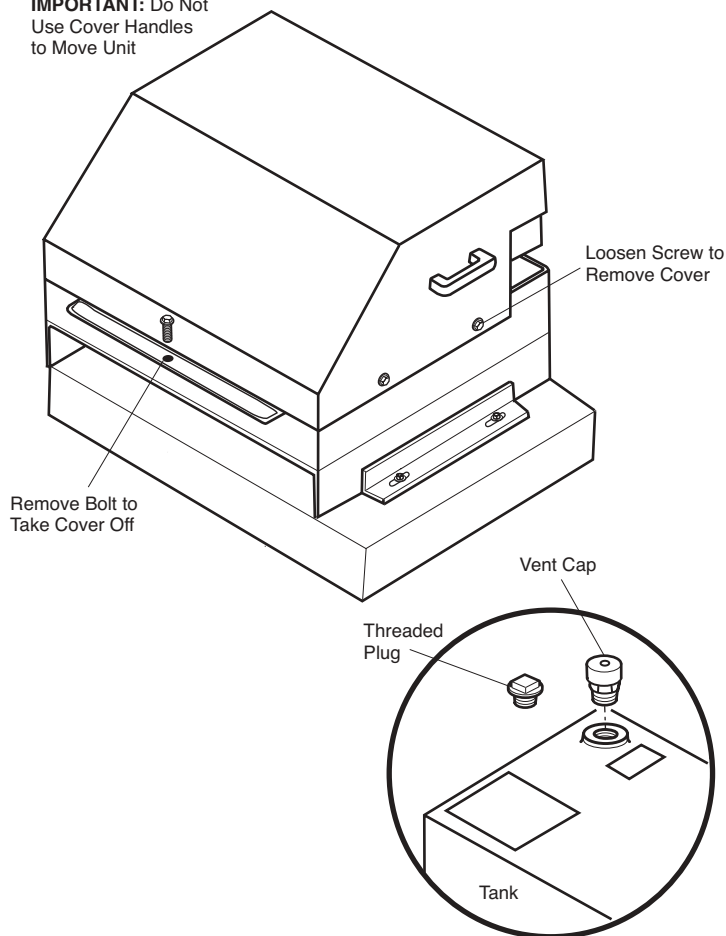
LIMIT SHOES

NOTE: The limit shoes are slotted, so minor adjustments may be made later for the fine tuning of the fully open and close positions. Also, note that the limit switches themselves may be slightly adjusted up or down.

1. Cut wire ties to release limit switch levers and RPM assembly to the up right position. These items are held down by wire ties to facilitate for initial gate installation.
2. Manually open the gate to the full position.
3. Locate the open limit switch lever and mark its position.
4. Manually close the gate to the full close position.
5. Locate the close limit switch lever and mark its position on the drive rail.
6. Manually open the gate about halfway. Measure and drill holes to mount limit shoes
7. Secure both limit shoes to underside of drive rail.

NOTE: It is highly suggested that gate stops be installed to the gate at the fully open and closed positions. See next page for installation instructions.

IMPORTANT: Do Not Use Cover Handles to Move Unit

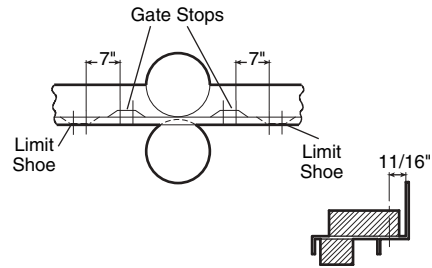


INSTALLATION

GATE STOPS

1. When properly installed the gate will open or close in approximately 3" to 4" after limit shoe shuts the unit off, the "gate stop" will contact the upper drive wheel stopping the gate.
2. After operator has been installed the limit shoes have been attached to the top of the drive rail, locate and install the (2) "gate stops" to the top of the drive rail.

NOTE: The 7" dimension is a reference. You may have to adjust this slightly for your particular application.



SUSPENSION SYSTEM

1. The suspension system is semi-factory set; simply loosen the suspension separator bolt completely. This will allow both wheels to pinch the drive rail.

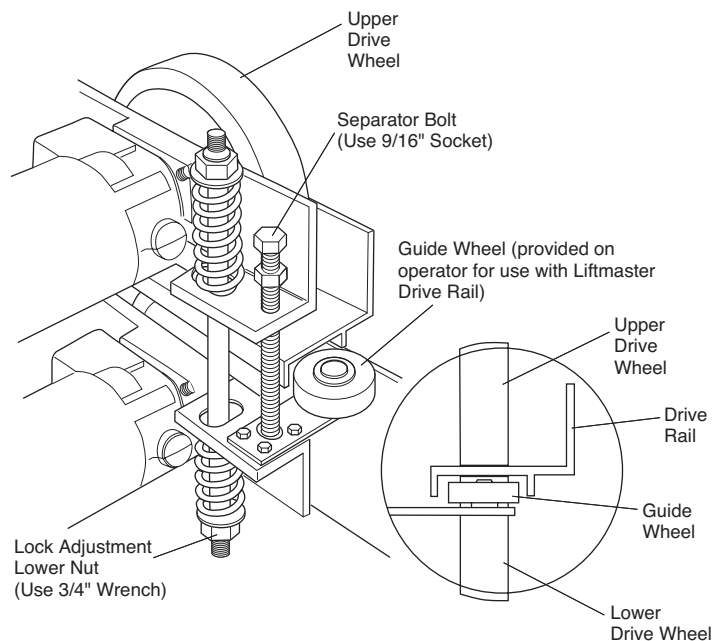
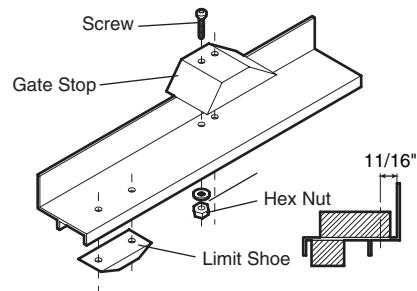
NOTE: It is suggested that the separator bolt be removed and left with unit. If it is not removed, make sure that it can not interfere with suspension system.

2. If more or less pressure is required, adjust both upper and lower suspension spring lock nuts as desired. Both springs should apply about the same amount of pressure.

IMPORTANT:

If using the LiftMaster drive rail, make sure that the drive rail guide wheel is positioned properly.

It is very important that the suspension system is adjusted properly. This system puts pressure on the drive wheels so they can pinch together on the drive rail. This system also allows the drive wheels to "float" so they can follow any slight misalignment of the drive rail. If the springs are over tightened, it will reduce their life span. But, on the other hand, if they are under tightened, the drive wheels may slip on the drive rail.

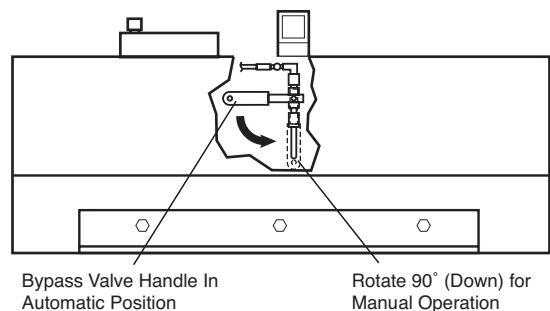


MANUAL OPERATION

NOTE: When manually opening or closing the gate, it is not, in the beginning, easy to get the gate started. Since fluid has accumulated in the drive motors, it may take more force to get the gate started.

The pump is equipped with a manual bypass valve. By positioning the valve handle down (manual operation), the gate can be manually opened or closed.

NOTE: A back-up to this is the suspension separator bolt. By tightening this bolt, the drive wheels will be pushed off by the drive rail.



WIRING

WARNING

To reduce the risk of SEVERE INJURY or DEATH:

- ANY maintenance to the operator or in the area near the operator MUST not be performed until disconnecting the electrical power and locking-out the power via the operator power switch. Upon completion of maintenance the area MUST be cleared and secured, at that time the unit may be returned to service.
- Disconnecting power at the fuse box BEFORE proceeding. Operator MUST be properly grounded and connected in accordance with local electrical codes. **NOTE:** *The operator should be on a separate fused line of adequate capacity.*
- ALL electrical connections MUST be made by a qualified individual.
- DO NOT install any wiring or attempt to run the operator without consulting the wiring diagram. We recommend that you Install an optional reversing edge BEFORE proceeding with the control station installation.
- ALL power wiring should be on a dedicated circuit and well protected. The location of the power disconnect should be visible and clearly labeled.
- ALL power and control wiring MUST be run in separate conduit.
- BEFORE installing power wiring or control stations be sure to follow all specifications and warnings described below. Failure to do so may result in SEVERE INJURY to persons and/or damage to operator.

POWER WIRING INSTALLATION

Wiring Specifications (STRANDED COPPER WIRE)

On a Dual Gate System, each unit must be installed on ITS OWN separate circuits.

WIRE GAUGE 6	SINGLE PHASE		THREE PHASE		
	115 VAC	230 VAC	230 VAC	460 VAC	575 VAC
• 1/3 HP Motor -----	615 ft.	2769 ft.	4263 ft.	12789 ft.	31974 ft.
• 1/2 HP Motor -----	425 ft.	1845 ft.	2557 ft.	12789 ft.	15987 ft.
• 3/4 HP Motor -----	291 ft.	1107 ft.	1827 ft.	6394 ft.	10657 ft.
• 1 HP Motor -----	213 ft.	852 ft.	1278 ft.	5115 ft.	7993 ft.
• 1-1/2 HP Motor ----	142 ft.	583 ft.	852 ft.	3654 ft.	5328 ft.
• 2 HP Motor -----		393 ft.	639 ft.	2557 ft.	4441 ft.

WIRE GAUGE 8	SINGLE PHASE		THREE PHASE		
	115 VAC	230 VAC	230 VAC	460 VAC	575 VAC
• 1/3 HP Motor -----	388 ft.	1747 ft.	2671 ft.	8072 ft.	20179 ft.
• 1/2 HP Motor -----	269 ft.	1165 ft.	1614 ft.	8072 ft.	10089 ft.
• 3/4 HP Motor -----	183 ft.	699 ft.	1152 ft.	4035 ft.	6726 ft.
• 1 HP Motor -----	134 ft.	537 ft.	807 ft.	3228 ft.	5044 ft.
• 1-1/2 HP Motor ----	90 ft.	368 ft.	530 ft.	2305 ft.	3363 ft.
• 2 HP Motor -----		269 ft.	403 ft.	1614 ft.	2525 ft.

WIRE GAUGE 10	SINGLE PHASE		THREE PHASE		
	115 VAC	230 VAC	230 VAC	460 VAC	575 VAC
• 1/3 HP Motor -----	243 ft.	1096 ft.	1688 ft.	5064 ft.	12661 ft.
• 1/2 HP Motor -----	168 ft.	730 ft.	1012 ft.	5064 ft.	6330 ft.
• 3/4 HP Motor -----	115 ft.	438 ft.	723 ft.	2532 ft.	4220 ft.
• 1 HP Motor -----	84 ft.	337 ft.	506 ft.	2025 ft.	3165 ft.
• 1-1/2 HP Motor ----	55 ft.	230 ft.	337 ft.	1447 ft.	2110 ft.
• 2 HP Motor -----		168 ft.	252 ft.	1012 ft.	1582 ft.

WIRE GAUGE 12	SINGLE PHASE		THREE PHASE		
	115 VAC	230 VAC	230 VAC	460 VAC	575 VAC
• 1/3 HP Motor -----	170 ft.	686 ft.	1057 ft.	3171 ft.	7929 ft.
• 1/2 HP Motor -----	105 ft.	458 ft.	634 ft.	3171 ft.	3964 ft.
• 3/4 HP Motor -----	72 ft.	274 ft.	503 ft.	1585 ft.	2643 ft.
• 1 HP Motor -----	53 ft.	211 ft.	316 ft.	1269 ft.	1982 ft.
• 1-1/2 HP Motor ----	35 ft.	144 ft.	211 ft.	903 ft.	1321 ft.
• 2 HP Motor -----		105 ft.	157 ft.	634 ft.	990 ft.

NOTE: Calculated using NEC guidelines. Local codes and conditions must be reviewed for suitability of wire installation. All power wiring should be dedicated and protected. Location of primary power disconnect should be labeled.

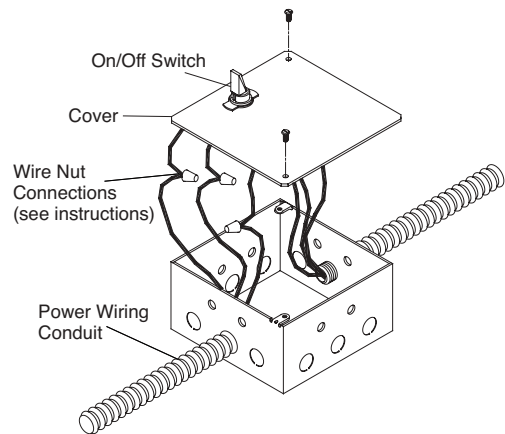
WIRING

ON/OFF SWITCH POWER WIRING

NOTES:

Before running power wiring refer to wiring specifications on previous page for correct wire gauges.

Secure all electrical power connections inside the disconnect switch electrical box. Refer to electrical wiring diagram on pages 30 and 31.



SINGLE PHASE

All single phase **115V/230V** operators will have the following:

- L1 WHITE
- L2 BLACK
- GROUND, GREEN

THREE PHASE

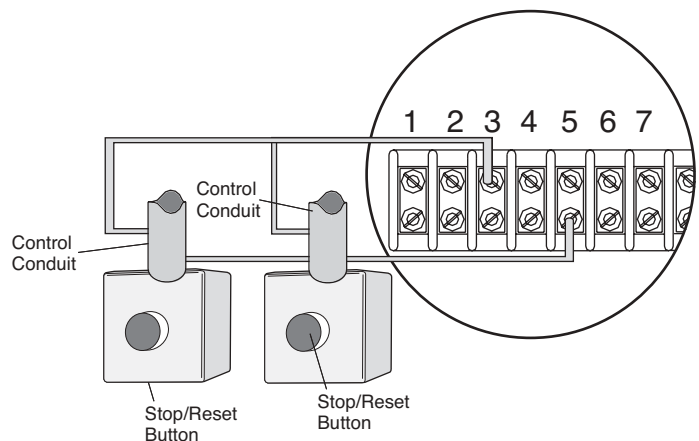
All three phase operators will have the following:

- L1 BLACK
- L2 BLACK
- L3 BLACK
- GROUND, GREEN

IMPORTANT NOTE: On three phase operators, power connections must be properly phased. If phased incorrectly, the gate operator will run reversed. To correct this situation, shut off power at main power source and at the operators electrical disconnect switch. Then reverse any two of the three power leads.

REMOTELY MOUNTED STOP/RESET CONTROL WIRING (REQUIRED)

- This control will function as a Stop/Reset command and is to be wired within line of sight of the gate.
- Wire Stop/Reset control station to terminals 3 and 5 on the control box on the operator. **Make sure that all Stop/Reset controls are wired in series.**



ADJUSTMENT

HALL EFFECT SENSOR ADJUSTMENT

NOTE: Normally the hall effect sensor does not need adjustment, but may go out of alignment due to shipping vibration or rough handling.

These operators use an internal entrapment protector system. This system consists of the control board, magnet, and hall effect sensor. It may become necessary to adjust the sensor for correct alignment. To do so please perform the following steps:

1. The hall effect sensor must be centered over the magnet. Adjust with horizontal screws.
2. The hall effect sensor must be level.
3. The hall effect sensor air gap should be adjusted to .010 - .015 of an inch. (The thickness of a business card may be used to gauge the correct distance). Adjust with vertical screws.

FORCE ADJUSTMENT

MOTOR LEARN FUNCTION (FORCE PROFILE)

This function is preprogrammed at factory. If either board or motor is replaced, the controller will need to be programmed to "LEARN" the specific motor RPM profile of your operator. Switch "S3" is provided for this. This is important for accurate force control. Failure to do so may result in improper and unsafe operation.

NOTE: Motor Learn must be performed in stand alone mode.

1. Detach the unit from the gate, the motor needs to be learned without a load. (Do not use the manual release, the limit shaft must be turning during learn sequence.)
2. Press the motor learn button. The yellow LED should start to flash rapidly.
3. Push and hold down either the open or the close buttons. The motor will run for a few seconds and then stop. If the LED goes out the motor is learned. If the unit activates a limit before completing the learn or some other error occurs the LED will go back to on continuously. If this happens try learning while running in the opposite direction.
4. Reconnect the unit to the gate, reset the limits and adjust the force control.

FORCE CONTROL

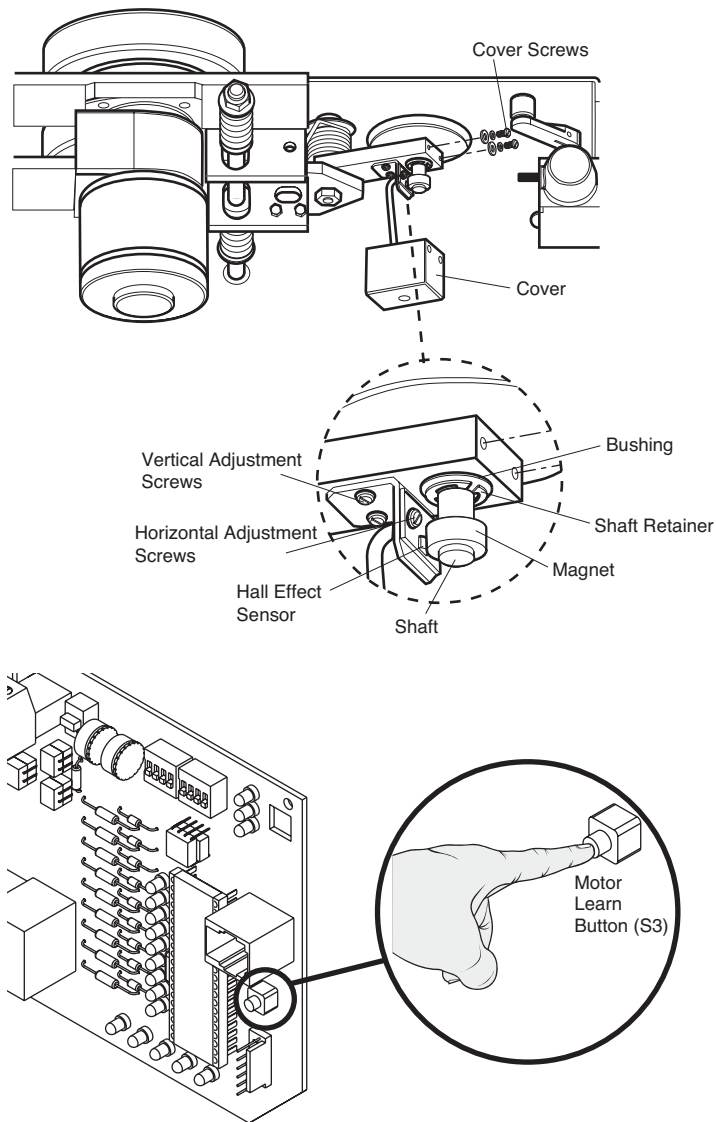
Set the force control pot such that the unit will complete a full cycle of gate travel but can be reversed off an obstruction without applying an unreasonable amount of force. On most operators this will be around the middle of the range.

NOTE: For LED location refer to illustration on page 16.

⚠ WARNING

To reduce the risk of SEVERE INJURY or DEATH:

- Disconnect power BEFORE performing ANY adjustments.



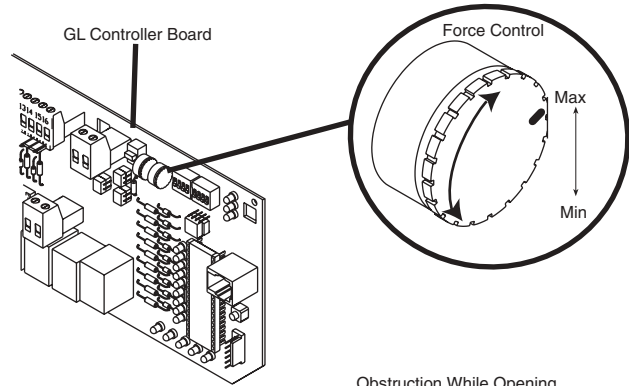
PROGRAMMING

UL325 ENTRAPMENT PROTECTION

PRIMARY ENTRAPMENT PROTECTION ADJUSTMENTS

Force Control

Set the force control pot such that the unit will complete a full cycle of gate travel but can be reversed off an obstruction without applying an unreasonable amount of force. On most operators this will be around the middle of the range.



SECONDARY ENTRAPMENT PROTECTION ADJUSTMENTS

Terminals 9 & 5 - Obstruction While Opening (Edge/Photo Eye Input)

Edge Input: See Programming Section on page 18.

This input will reverse an opening gate to the close limit. Activating this input when the gate is closing will have no effect.

NOTE: If upon reversal a second separate obstruction is detected (gate edge or RPM sensor), gate will stop and alarm.

Photo Eye Input: See Programming Section on page 18.

This input will pause an opening gate. Once the input (photo eye) is cleared, the gate continues to open. Activating this input when the gate is closing will have no effect.

Terminals 10 & 5 - Obstruction While Closing (Edge/Photo Eye Input)

Edge Input: See Programming Section on page 18.

This input will reverse a closing gate to the open limit. When reaching the open limit the timer to close, if enabled, will be disabled until another command is given. Activating this input when the gate is closing will have no effect.

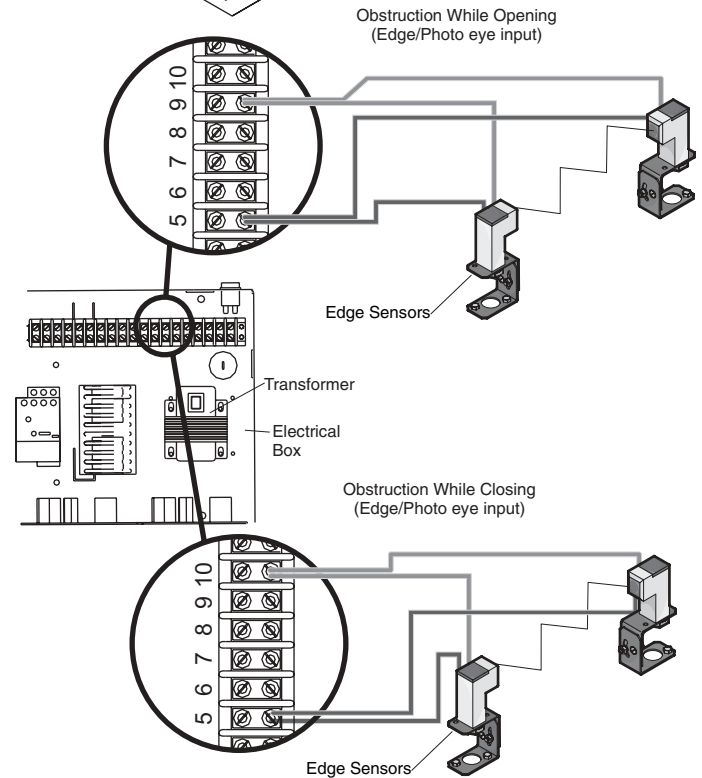
NOTE: If upon reversal a second separate obstruction is detected (gate edge or RPM sensor), gate will stop and alarm.

Photo Eye Input: See Programming Section on page 18.

This input will reverse a closing gate to the open limit. This input will not affect the timer to close. Activating this input when the gate is closing will have no effect.

Photo Eye Input: See Programming Section on page 18.

This input will reverse a closing gate to the open limit. This input will not affect the timer to close. Activating this input when the gate is closing will have no effect.

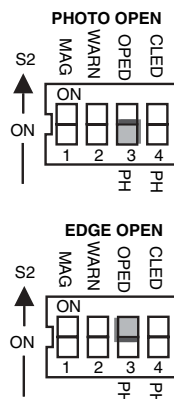


EDGE/PHOTO OPEN

This switch (S2-3) selects edge or photo sensor for the gate opening protection input.

Open Photo Eye (Pause): When the controller is configured for photo eyes, the input functions to pause the gate during the opening cycle. Once the input is cleared the gate continues to open.

Open Edge: When the controller is configured for safety edges, the input functions to reverse the gate to the close limit when the edge is activated during the opening cycle.



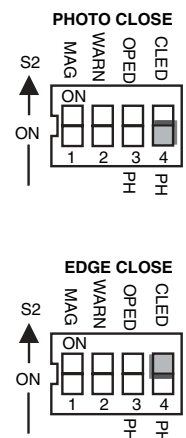
EDGE/PHOTO CLOSE

This switch (S2-4) selects edge or photo sensor for the gate closing protection input.

Close Photo Eye (Reverse): When the controller is configured for photo eyes, the input functions to reverse the gate to the open limit when activated during the close cycle.

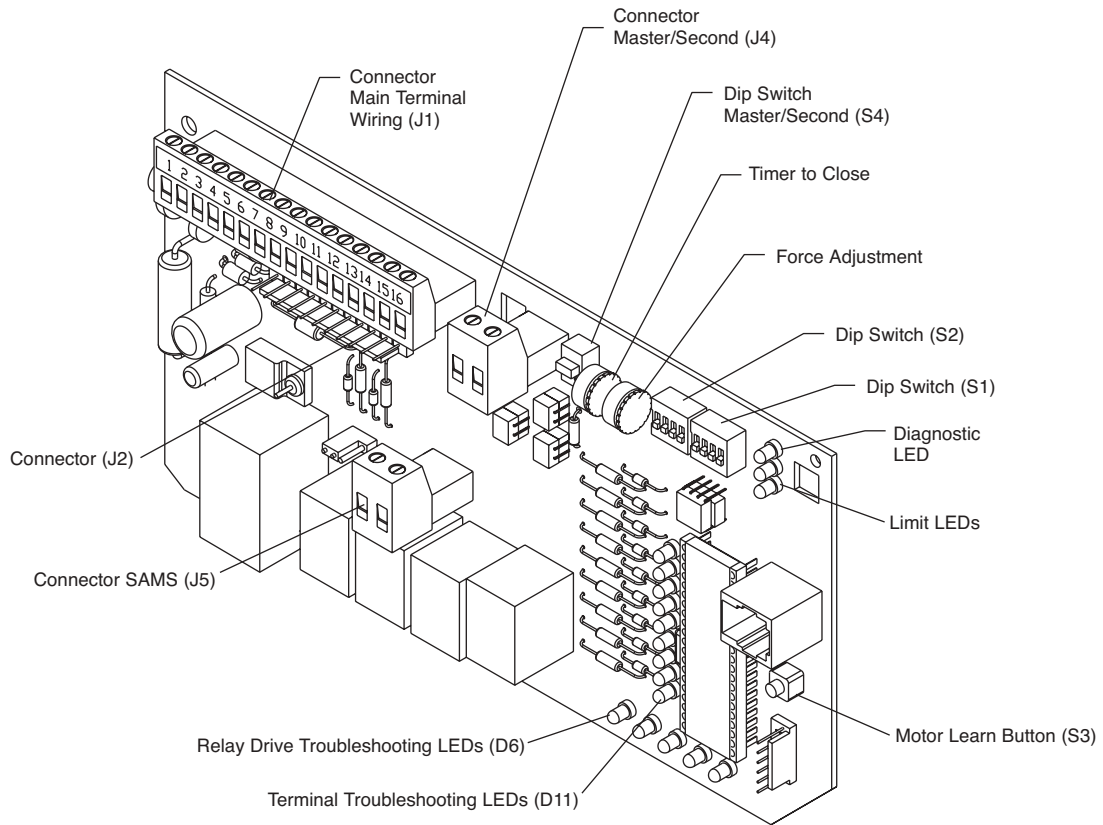
Note: Timer to close will reset if enabled.

Close Edge: When the controller is configured for safety edges, the input functions to reverse the gate to the open limit when activated during the close cycle. The entrapment is not cleared at the limit and the timer to close will be disabled. The timer to close may be enabled by activating the interrupt loop, open or override open inputs.



PROGRAMMING

CONTROL BOARD ILLUSTRATION



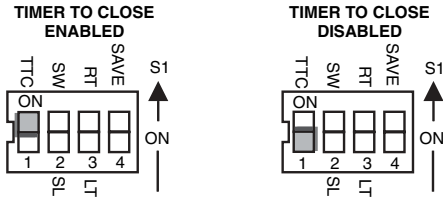
PROGRAMMING

PROGRAM SETTINGS (DIP SWITCH S1)

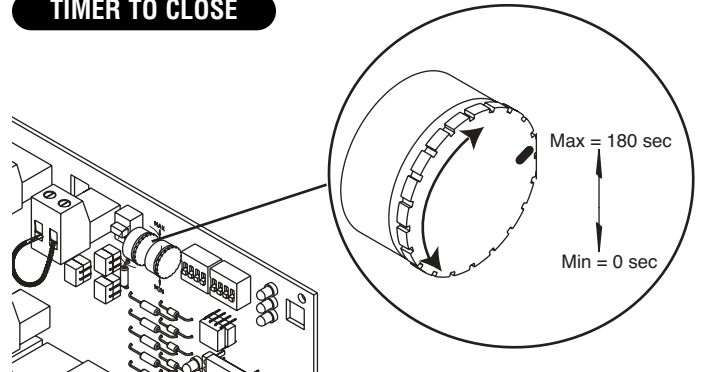
NOTE: For all S1, S2 and S4 switch settings to take effect, the Save Mode switch must be set to the off position.

TIMER TO CLOSE ENABLE

This switch (S1-1) enables the auto close timer. The timer to close feature works in conjunction with the potentiometer located on the board.



TIMER TO CLOSE

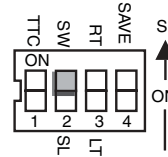


SLIDE/SWING

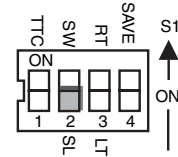
This switch (S1-2) selects slide or swing gate operation, in order to optimize gate behavior for specific application.

SL = Slide, 1 second delay
SW = Swing, 1.5 second delay

SWING GATE



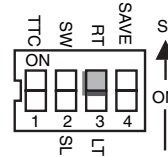
SLIDE GATE



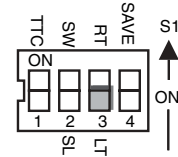
RIGHT/LEFT OPERATION

This switch (S1-3) selects the gate opening direction, to the left or to the right. Right/Left operation is determined from the inside of fence looking out.

RIGHT HAND



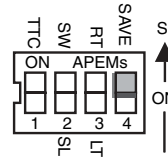
LEFT HAND



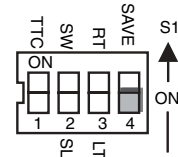
“SAVE” SWITCH

This switch (S1-4) stores all settings into memory and locks out changes. **NOTE:** For any programming changes to take effect this switch must be in OFF position. When switch is ON, no settings can be changed.

LOCKED



UNLOCKED



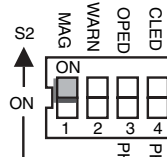
PROGRAM SETTINGS (DIP SWITCH S2)

NOTE: For all S1, S2 and S4 switch settings to take effect, the Save Mode switch must be set to the off position.

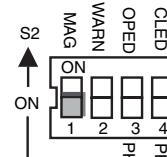
MAGLOCK ENABLE

This switch enables the Maglock feature. On an open command there will be a half second delay after the maglock relay is released before the motor starts.

MAGLOCK ENABLED



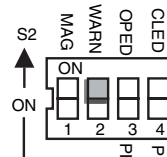
MAGLOCK DISABLED



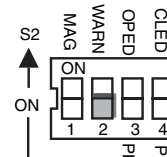
WARNING ENABLE

This switch enables the gate “in motion” alarm feature. The alarm will beep 3 seconds prior to movement and throughout movement.

WARNING ENABLED



WARNING DISABLED



PROGRAMMING

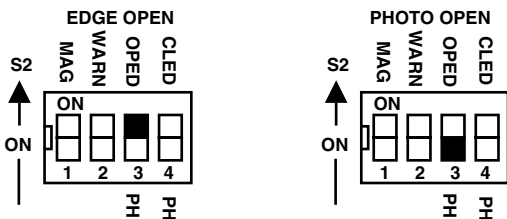
PROGRAM SETTINGS (DIP SWITCH #2) CONT'D

EDGE/PHOTO OPEN

This switch (S2-3) selects edge or photo sensor for the gate opening protection input.

Open Photo Eye (Pause): When the controller is configured for photo eyes, the input functions to pause the gate during the opening cycle. Once the input is cleared the gate continues to open.

Open Edge: When the controller is configured for safety edges, the input functions to reverse the gate to the close limit when the edge is activated during the opening cycle.



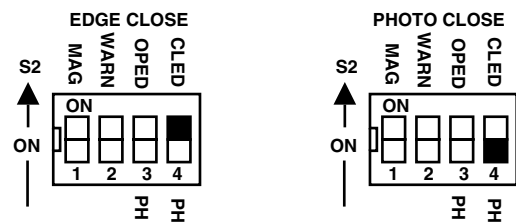
EDGE/PHOTO CLOSE

This switch (S2-4) selects edge or photo sensor for the gate closing protection input.

Close Photo Eye (Reverse): When the controller is configured for photo eyes, the input functions to reverse the gate to the open limit when activated during the close cycle.

NOTE: Timer to close will reset if enabled.

Close Edge: When the controller is configured for safety edges, the input functions to reverse the gate to the open limit when activated during the close cycle. The entrapment is not cleared at the limit and the timer to close will be disabled. The timer to close may be enabled by activating the interrupt loop, soft open or hard open input.



PROGRAM SETTINGS (DIP SWITCH #4)

DUAL GATE COMMUNICATIONS

The controller is capable of running the operator in a master or second mode depending on (S4) switch setting.

Before initiating any command the master unit queries for the presence of a "second unit" for a time period of one second. If the master gets no response the operator will operate in a stand alone mode. **NOTE:** For single unit applications, a jumper must be placed between TB11 and TB12. In this mode no further communications will take place during travel. If the master detects the presence of a second unit the master will continue to query the second unit during travel. The second unit will send a response to the master for every query. The second operator will stop if there is a period of one second or more of no communications.

When two operators are connected in dual gate configuration accessories may be connected to either the master or second.

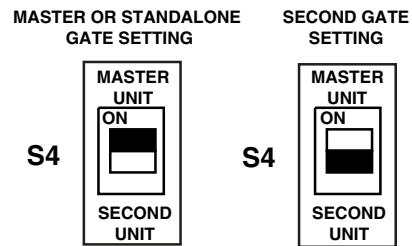
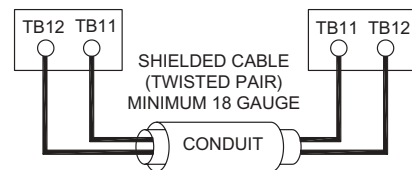
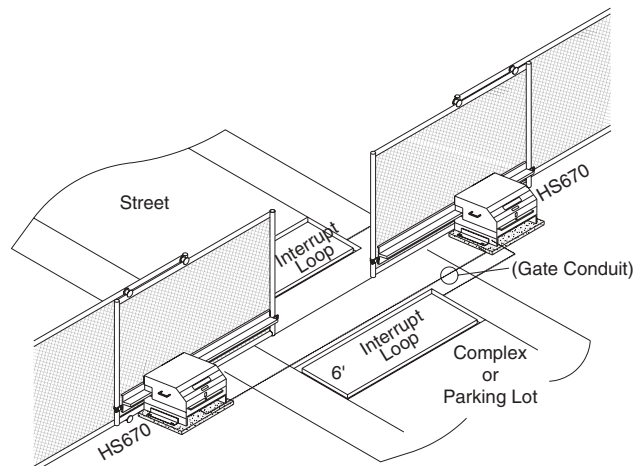


FIGURE 1



NOTES:

- Do not run Master/Second communication wiring in the same conduit as the power and control wiring.
- The Second unit will require a normally close stop circuit for proper system operation.
- After Master/Second wiring has been completed and the S4 switch programmed, both units must have their power cycled to initiate proper Master/Second communication.
- The motor learn function must be completed in stand alone mode prior to Master/Second wiring.



PROGRAMMING

PROGRAMMING THE RADIO RECEIVER

SET SECURITY MODE

The Universal Receiver can be used with up to 15 rolling code transmitters or passwords in HIGH security mode. Alternately, it can be used with up to 31 of any type transmitter in NORMAL security mode, including any combination of rolling code, billion code, or dip switch remotes.

The jumper must be set at the HIGH position for the receiver to operate in HIGH security mode. It must be set at NORMAL position to operate at the NORMAL mode (Figure 1).

When changing from NORMAL to HIGH security mode, any previous transmitter codes must be erased. Repeat Steps 2 and 3 in the Programming Section below to reprogram the receiver for each remote control transmitter in use.

The receiver is factory set at HIGH.

SET OUTPUT DURATION

⚠ WARNING

To prevent possible SERIOUS INJURY or DEATH, the use of CONSTANT OPERATION on residential openers is PROHIBITED.

For commercial applications, the receiver can be set for either constant or momentary closure on the output contacts. Use of constant closure is prohibited on residential garage door openers because it overrides the safety reversal devices.

With the jumper in the "M" (Momentary) position, the contacts will close for 1/4 second regardless of the length of radio transmission. With the jumper in "C" (Constant) position, the contacts will stay closed as long as the radio continues transmitting (Figure 2).

The receiver is factory set at M.

PROGRAMMING THE REMOTE TO THE RECEIVER

1. Pry open the front panel of receiver case with a coin or a screwdriver. Re-connect power to operator (Figure 3).
2. Press and release the "learn" button on the receiver. The learn indicator light will glow steadily for 30 seconds.
3. Within 30 seconds, press and hold the button on the hand-held remote that you wish to operate your gate operator.

The opener will now operate when the push button on either the receiver or the remote control is pressed.

Repeat Steps 2 and 3 for each remote control that will be used to operate the gate operator.

TO ERASE ALL REMOTE CONTROL CODES

Press and hold the "learn" button on the receiver panel until the indicator light turns off (about 6 seconds). All remote codes are now erased. Then follow the steps above to reprogram each remote control.

NOTICE: To comply with FCC and/or Industry Canada (IC) rules, adjustment or modifications of this receiver and/or transmitter are prohibited, except for changing the code setting or replacing the battery. THERE ARE NO OTHER USER SERVICEABLE PARTS.

Tested to Comply with FCC Standards FOR HOME OR OFFICE USE. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

⚠ WARNING

To prevent possible SERIOUS INJURY or DEATH from electrocution:

- Be sure power is not connected BEFORE installing the receiver.
- To prevent possible SERIOUS INJURY or DEATH from a moving gate or garage door:
- ALWAYS keep remote controls out of reach of children. NEVER permit children to operate, or play with remote control transmitters.
 - Activate gate or door ONLY when it can be seen clearly, is properly adjusted, and there are no obstructions to door travel.
 - ALWAYS keep gate or garage door in sight until completely closed. NEVER permit anyone to cross path of moving gate or door.

FIGURE 1

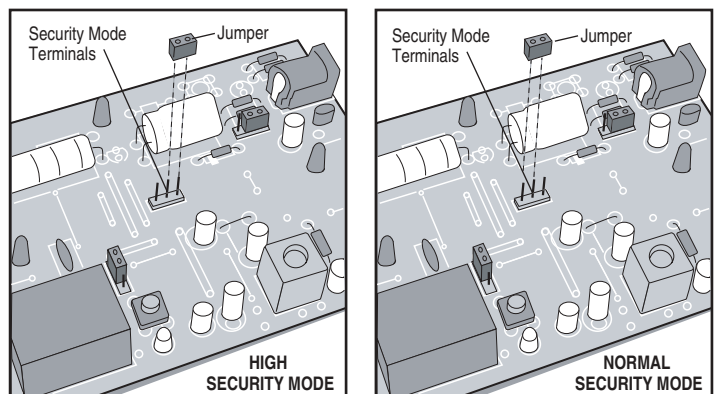


FIGURE 2

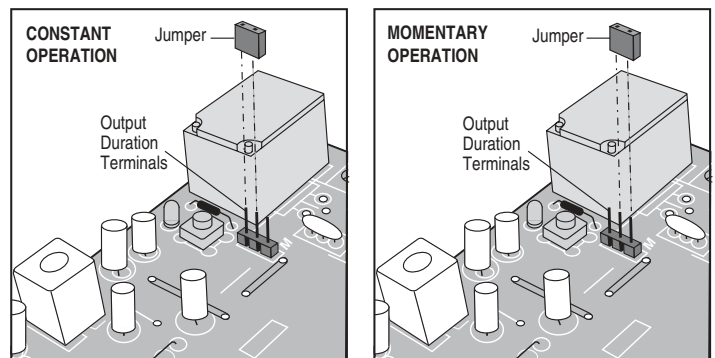
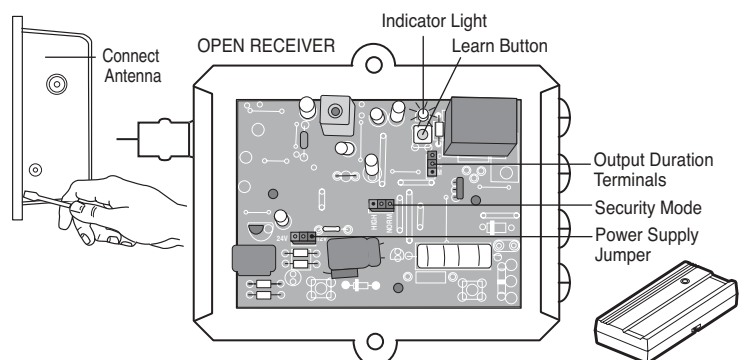


FIGURE 3

OPENING RECEIVER



OPTIONAL CONTROL DEVICES

SEQUENCED ACCESS MANAGEMENT SYSTEM (SAMS)

SAMS DEFINITION

The Sequenced Access Management System or SAMS allows the customer more control when managing vehicular entrances to areas such as industrial complexes, businesses and airports. The basic concept of the system is that traffic is controlled by two gates installed in tandem, a fast moving gate such as a barrier gate operator and a slower moving more secure or ornamental gate such as a single or pair of slide/swing gate operator. The design of this gate system balances the demands of speed during high traffic periods with security during low traffic periods. Barrier gates typically have the fastest open times of the many gate operator types and the slide or swing gates allow you to effectively seal off the perimeter of the complex you are planning to secure.

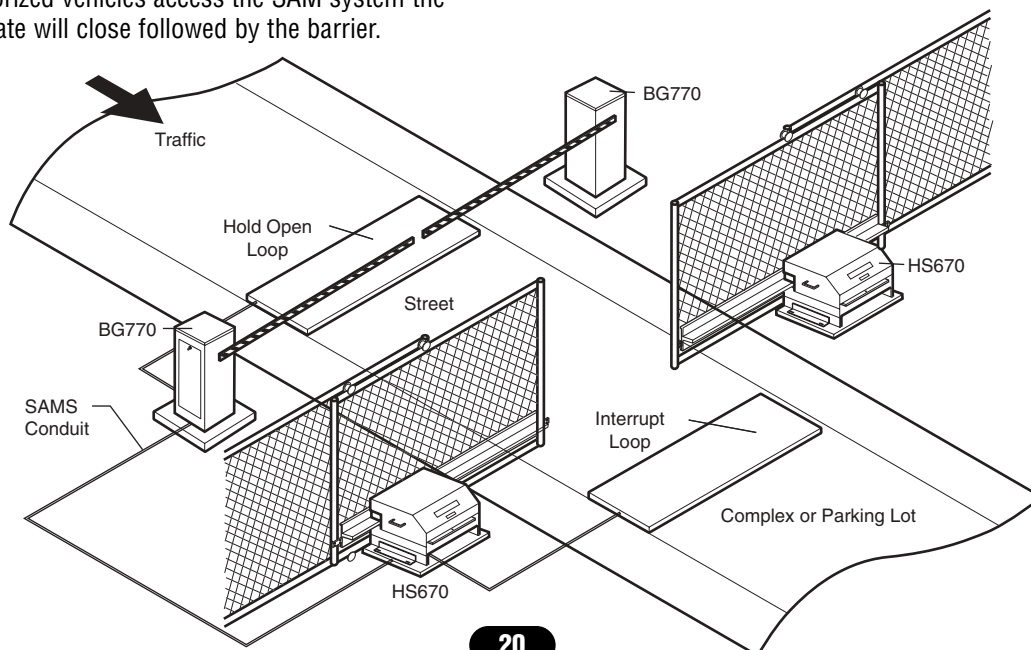
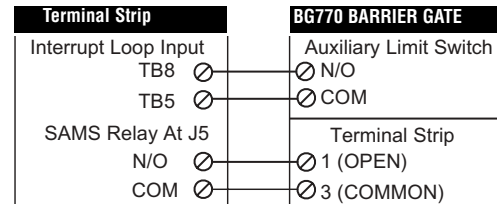
NOTE: Connect all entry devices to the slide or swing gate. If using a device, such as a 7-day timer, to latch the slide or swing gate open during high traffic times, connect the device's N/O relay output to the GL board's Interrupt Loop input. Once the device activates the Interrupt Loop input, the next vehicle to access the SAM system will lock the gate in the open position until the device deactivates. When the device deactivates, the timer to close will automatically close the gate.

SAMS OPERATION

1. When an authorized vehicle accesses the gate system, the SAM system responds by first opening the gate farthest from the vehicle, the swing or slide gate.
2. Once the swing or slide gate is open, the barrier gate begins its open cycle.
3. Once the barrier is open the vehicle may pass through the SAM system. At this point you have two options in how you would like to initiate the SAM systems closure. You may chose to:
 - a) Use a timer to close system to automatically close the barrier gate after a preset amount of time or
 - b) Use a loop system to close the barrier gate after the vehicle has passed through the SAM system.
4. Once the barrier gate is closed the slide or swing gate will activate its internal timer to close and begin closing.
5. If another authorized vehicle accesses the SAM system before the slide or swing begins to close the barrier will open and allow the vehicle to pass through the SAM system.
6. If another authorized vehicle accesses the SAM system during the slide or swing gates closing cycle the SAM system will reopen the slide or swing gate. Once the slide or swing gate reaches the open position the barrier will then open to allow the vehicle to pass through the SAM system.
7. If no other authorized vehicles access the SAM system the swing or slide gate will close followed by the barrier.

SAMS WIRING

1. Install conduit between the BG770 and the HS670 for SAMS control wiring.
2. Run a 4-conductor cable in the conduit between the BG770 HS670.
3. Locate the SAMS relay terminals (J5) on the GL board in the HS670 and locate the auxiliary limit switch in the BG770.
4. Attach a wire from the SAMS relay terminal (J5) on the GL board to terminal 1 on the BG770 terminal strip.
5. Attach a wire from the SAMS relay terminal (J5) on the GL board to terminal 3 on the BG770 barrier gates terminal strip.
6. Attach a wire from terminal TB5 to the common (COM) on the auxiliary limit switch in the barrier gate.
7. Attach a wire from terminal TB8 to the normally open (NO) on the auxiliary limit switch.
8. Test for correct functionality of the SAM system.



OPTIONAL CONTROL DEVICES

ACCESSORY WIRING

STOP/RESET AUXILIARY CONTROL WIRING

Terminals 6 & 5 (Com) - Open

These terminals are intended for use as a general open control. Accessories that may be wired to this input include: Telephone Entry Systems, Radio Receiver (Commercial Applications), Exit Loop Detector, Keypads, 7-Day Timer. **NOTE:** Will not override a double entrapment (signalled by the gate stopped and entrapment alarm on).

Terminals 7 & 5 (Com) - Open Override Control Input

These terminals are intended for use only with the open control of a three-button station that is installed within line of sight of the gate. A momentary activation of this input will cause the gate to open. Activation of this input for longer than three seconds will enable the control to be used as a constant pressure override device. This will allow the user, in emergencies, to override a failed accessory such as a loop detector or photo-eye.

Terminals 4 & 5 (Com) - Close Override Control Input

These terminals are intended for use only with the close control of a three-button station that is installed within line of sight of the gate. A momentary activation of this input will cause the gate to close. Activation of this input for longer than three seconds will enable the control to be used as a constant pressure override device. This will allow the user, in emergencies, to override a failed accessory such as a loop detector or photo-eye.

Terminals 8 & 5 (Com) - Interrupt (Safety) Loop Input

These terminals are intended for use with a loop detector. This input functions to reverse a closing gate to the open limit. Latching this input will reset the timer to close.

Terminals 2 & 5 (Com) - Shadow Loop Input

These terminals are intended for use with a loop detector and is primarily used on swing gate operators. This input protects cars by preventing the gate from moving off of the open or close limit when the shadow loop input is active.

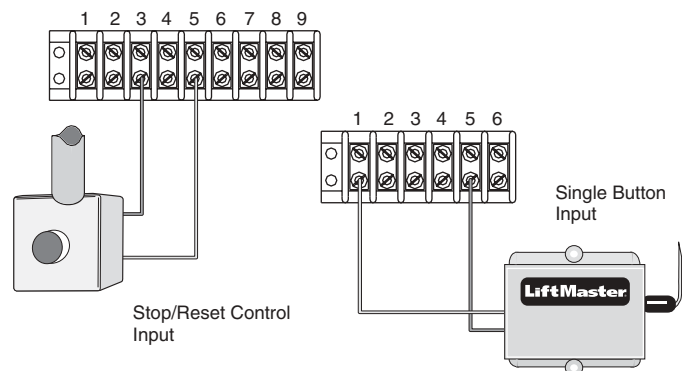
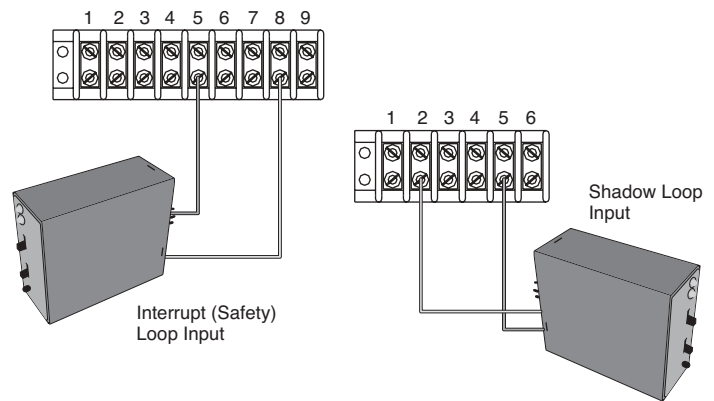
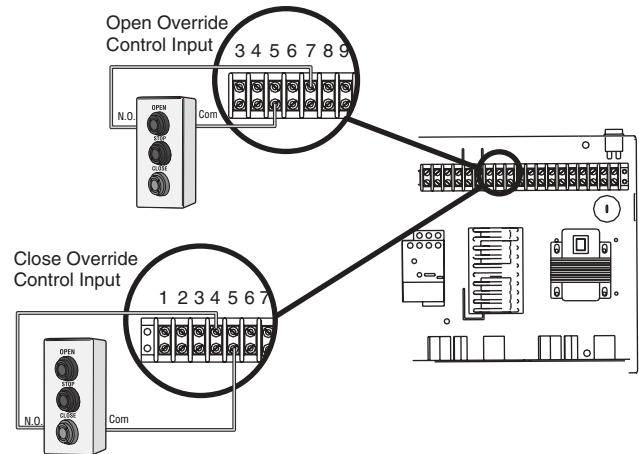
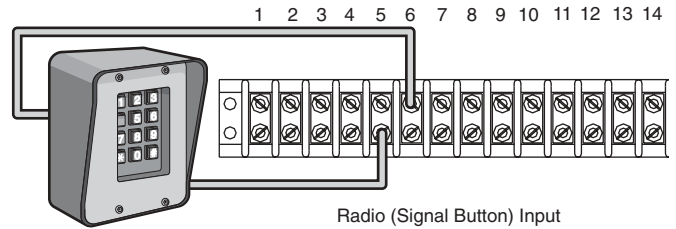
The GL operator controller board senses commands using +24VDC from terminal #3. Commands are seen when +24VDC are applied to the controller's input terminals. **NOTE:** The GL controller has built in surge suppression circuitry however please take precautions when adding any additional surge protection.

Terminals 1 & 5 (Com) - Single Button Input

These terminals are intended for use with a radio receiver in a residential application or as a single button control. This allows the user to open the gate by activating the transmitter when the gate is closed or between limits. This input also gives the user the ability to close the gate by activating the transmitter when the gate is on the open limit.

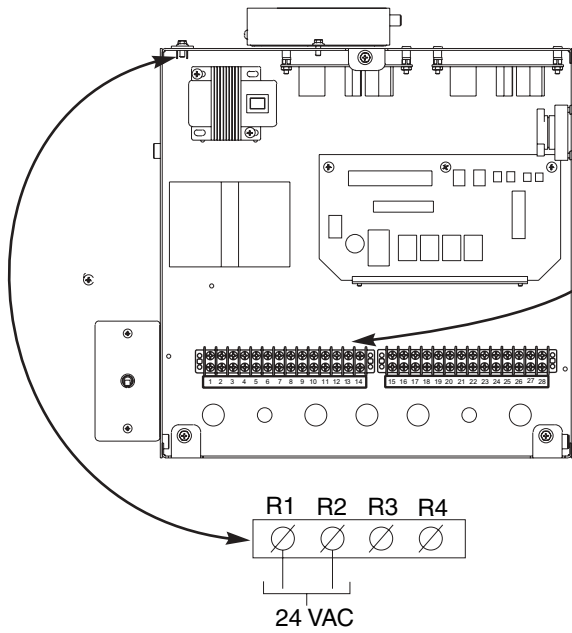
Terminals 3 & 5 (Com) - Stop/Reset Control Input

These terminals are intended for use with a single stop/reset button or the stop control of a three-button station that is installed within line of site of the gate. This input functions to stop the gate or to reset the gate after an entrapment fault. Note: This input uses a normally closed circuit and the operator will not run until a stop control is installed. **NOTE:** It is strongly recommended that a jumper be used for testing purpose only and not for normal operation.



OPTIONAL CONTROL DEVICES

CONTROL CONNECTION DIAGRAMS



24VAC ACCESSORY POWER

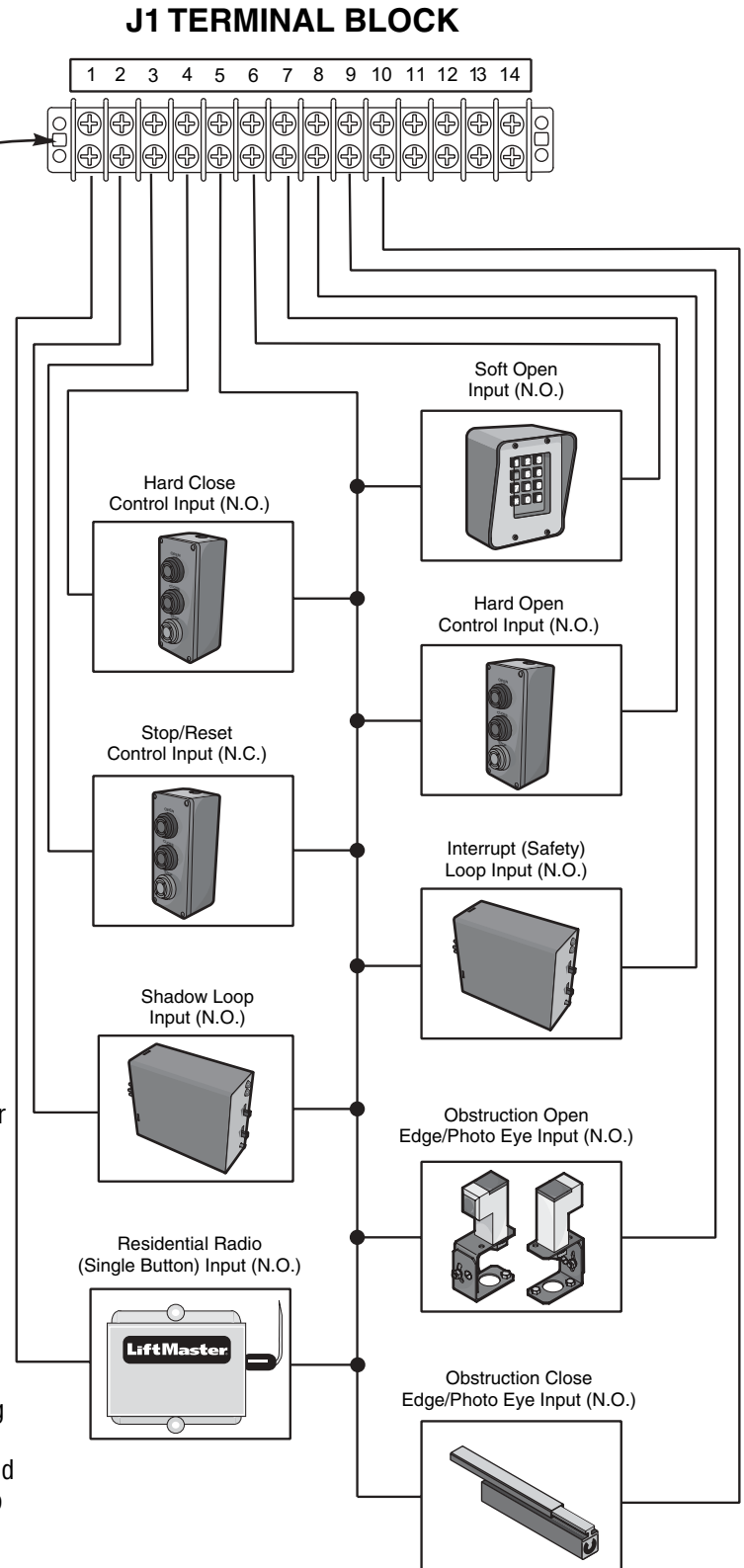
Can be found at terminals R1 and R2 located on radio terminal block.

NOTE: See wiring diagrams shipped with kit for additional information. See owner's manual for wiring distances and wire gauge information.

WARNING: All controls that are to be used to operate the gate system, must be installed where the user cannot come into contact with the gate while operating the controls where the user has full view of gate operation.

All inputs are normally open and momentary, except the stop (N.C.). The following instructions are based upon UL325, and include recommendations for significant increase in safety.

*We strongly recommend that you follow the UL guidelines presented throughout the manual. Refer to instructions shipped with optional control devices for mounting, wiring, programming and adjustment. **Installation device instructions:** Always follow the instructions provided by the manufacturer when installing and adjusting any control device. If these instructions are contrary to the advice given here, call for assistance.



OPERATION AND MAINTENANCE

IMPORTANT SAFETY INSTRUCTIONS

WARNING

To reduce the risk of SEVERE INJURY or DEATH:

1. READ AND FOLLOW ALL INSTRUCTIONS.
2. NEVER let children operate or play with gate controls. Keep the remote control away from children.
3. ALWAYS keep people and objects away from the gate. NO ONE SHOULD CROSS THE PATH OF THE MOVING GATE.
4. Test the gate operator monthly. The gate MUST reverse on contact with a rigid object or stop when an object activates the non-contact sensors. After adjusting the force or the limit of travel, retest the gate operator. Failure to adjust and retest the gate operator properly can increase the risk of INJURY or DEATH.
5. Use the emergency release ONLY when the gate is not moving.
6. KEEP GATES PROPERLY MAINTAINED. Read the owner's manual. Have a qualified service person make repairs to gate hardware.
7. The entrance is for vehicles ONLY. Pedestrians MUST use separate entrance.
8. Disconnect ALL power BEFORE performing ANY maintenance.
9. ALL maintenance MUST be performed by a LiftMaster professional.
10. **SAVE THESE INSTRUCTIONS.**

CHECK AT LEAST ONCE EVERY

DESCRIPTION	TASK	3 MONTHS	6 MONTHS	12 MONTHS
Hall Effect (RPM) Sensor	Check for wear, oil damage and proper operation	X		
External Entrapment Protection Systems	Check for proper operation	X		
Gate Caution Signs	Make sure they are present	X		
Manual Disconnect	Check and operate bypass valve		X	
Drive Rail	Check for damage and wear		X	
Gate	Inspect for wear or damage	X		
Accessories	Check all for proper operation		X	
Electrical	Inspect all wire connections		X	
Frame Bolts	Check for tightness		X	
Fluid Level	Keep at least 3/4 Full		X	
Fittings	Check for leaks		X	
Total Unit	Inspect for wear or damage		X	

COMPLETE CHECK OUT

NOTES:

1. Severe or high cycle usage will require more frequent maintenance checks.
2. Inspection and service should always be performed anytime a malfunction is observed or suspected.
3. Limit switches may have to be reset after any major drive chain adjustments.
4. If lubricating chain, use only a proper chain lube spray or a lightweight motor oil. Never use grease or silicone spray.
5. When servicing, please do some "house cleaning" of the operator and the area around the operator. Pick up any debris in the area. Clean the operator as needed.
6. It is suggested that while at the site voltage readings be taken at the operator. Using a Digital Voltmeter, verify that the incoming voltage to the operator it is within ten percent of the operators rating.

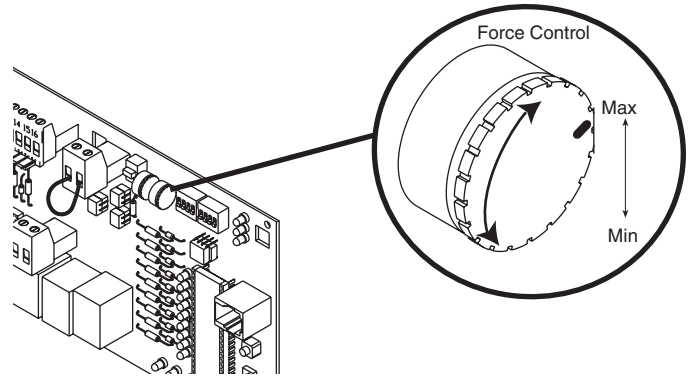
TROUBLESHOOTING

GL BOARD FEATURES

DIAGNOSTICS (LEDS AND CODES)

There are three diagnostic LEDs. Two red LEDs (OL, CL) are indicators for the open and close limits. The LEDs are illuminated when the limit switch contacts are closed.

The third amber LED (DIA) is used to blink out diagnostic codes. The number is the count of the number of times the LED is on in an 8 second period. The LED is on for approximately 1/2 second and repeats every second until the number is reached. There will be a pause following each pulse cycle (1-6 pulses) to differentiate between the different diagnostic codes.



LED Code Flashed	Diagnostic Meaning	Cleared By
OFF	Normal operation	N/A
1	Single entrapment sensed	Control Input
2	Double entrapment	Hard Input*
3	Failed or no hall effect sensor	Removal of problem
4	Exceed maximum motor run time	Hard Input*
5	Limit fault	Control Input
6	Loss of communications between master and second during run mode	Removal of problem
On No Flash	Motor not learned	Completion of Motor Learn Routine

*Hard inputs include open override, close override and stop inputs.

RELAY DRIVE TROUBLESHOOTING LEDES

There are 5 troubleshooting LEDs on relay drives K1 through K5. These LEDs will be illuminated when the microcontroller relay drive is activated.

LED	LED NAME	DESCRIPTION
D6	Contactor A	On when Contactor A is activated
D5	Contactor B	On when Contactor B is activated
D4	SAM	On when SAM relay is activated
D3	Lock	On when Mag Lock relay is activated
D2	Alarm	On when Alarm Relay is activated

TROUBLESHOOTING LEDES

There are 9 troubleshooting LEDs.

LED	LED NAME	DESCRIPTION
D11	Radio	On when Radio switch is activated
D13	Shadow	On when Shadow Loop is activated
D15	Hard Close	On when Close switch is activated
D17	Stop	On when Stop switch is not activated
D19	Soft Open	On when Open switch is activated
D21	Hard Open	On when Open switch is activated
D24	Interrupt Loop	On when Interrupt/Safety Loop activated
D29	Obstruction Open	On when Edge is activated or when Photo Eye Beam is broken
D31	Obstruction Close	On when Edge is activated or when Photo Eye Beam is broken

TROUBLESHOOTING

FAULT	POSSIBLE CAUSE	FIX
OPERATOR FAILS TO RUN	1) No stop control	<ul style="list-style-type: none"> ➤ Check the green LED (D17) on GL board. If the green LED is off, check to make sure a stop control has been installed across terminals TB1-3 and TB1-5 of the Terminal Strip.
	2) Fault in the operator <i>check the yellow diagnostic LED at the top right of the GL board next to the programming dip switches.</i>	<ul style="list-style-type: none"> ➤ If the yellow LED blinks six times, there is a master/second unit communication failure. If operator is a single unit, make sure there is a jumper across terminals TB1-11 and TB1-12. If operator is in a dual gate configuration, make sure that the communication wiring between the two units is undamaged and complete. ➤ If the yellow light is solid, the board needs to learn the motor. Follow the directions on page 14.
	3) An accessory is active or malfunctioning <i>check the red input status LEDs, D11-D31</i>	<ul style="list-style-type: none"> ➤ If any red LEDs are on, check the corresponding input. An installed accessory may be wired incorrectly or malfunctioning. Remove the accessory and test the operator. ➤ If the open or interrupt loop LED is on, make sure factory plug-in loop detectors are working properly and appropriate loops are installed on the loop input terminals.
	4) Low or no high voltage power.	<ul style="list-style-type: none"> ➤ Measure the incoming voltage at the unit's on/off switch. It should be within 5% of the operator's rating when running. Make sure that the proper wire gauge was used for the distance between breaker and operator by consulting the wiring specifications section on page 12 of this manual.
	5) Low or no secondary voltage power	<ul style="list-style-type: none"> ➤ Measure the voltage at terminals R1 and R2 in the operator. This voltage should be within 5% of 24VAC. If the high voltage power is good and the secondary voltage power is bad, check to make sure the circuit fuse is not blown and that the correct primary tap is used on the transformer. If fuse and tap are correct replace the transformer.
	6) Improper TB11/TB12 wiring (Master/Second)	<ul style="list-style-type: none"> ➤ Stand-alone Operators: Make sure there is a jumper installed across TB11 and TB12. ➤ Master/Second Operation: Make sure that the master/second wiring is installed correctly and is intact (not damaged).
	7) No LEDs illuminated on GL board	<ul style="list-style-type: none"> ➤ If both primary and secondary power is good, check to make sure that the J2 connector is making good contact with the pins on the GL board. If all is good, replace GL board.
CONTACTOR CHATTERS WHEN OPERATOR BEGINS TO MOVE	1) Transformer's secondary is overloaded	<ul style="list-style-type: none"> ➤ Remove all accessory devices and test the operator. If the contactor stops chattering, find an alternate power source for some of the devices.
	2) Low primary (high voltage) power	<ul style="list-style-type: none"> ➤ Measure the incoming line voltage at the unit's on/off switch. It should be within 5% of the operator's rating when running. Make sure that the proper wire gauge was used for the distance between breaker and operator by consulting the wiring specifications section on page 12 of this manual.
OPERATOR RUNS SLOW AND/OR TRIPS THE INTERNAL OVERLOAD	1) Low primary (high voltage) power	<ul style="list-style-type: none"> ➤ Measure the incoming line voltage at the unit's on/off switch as well as the meter base or sub panel. Make sure there is not a major change in voltage. The voltage at the operator should be within 5% of the operator's rating when running. ➤ Check the number of amps currently being drawn from the panel. Make sure that the total power being drawn does not exceed the panel's rating. ➤ Make sure that the proper wire gauge was used for the distance between breaker and operator by consulting the wiring specifications section on page 12 of this manual.
	2) Problem in the motor	<ul style="list-style-type: none"> ➤ Perform a visual inspection of the motor. Examine the motor's labels for any distortion or signs of overheating. Replace the motor if it is humming, grinding or making excessive noise. Note: Repeated motor problems indicate poor primary power.
	3) Problem in the contactor	<ul style="list-style-type: none"> ➤ Examine the contactor for sparking, smoke or burn marks. Remove the wires from one side of the contactor, then measure the contact points for high resistance (above 1 ohm). Replace the contactor.
	4) Rail slippage	<ul style="list-style-type: none"> ➤ Observe the drive wheels as they move the gate. If the wheels slip on the rail, tighten the compression springs until the rail no longer slips.

TROUBLESHOOTING

FAULT	POSSIBLE CAUSE	FIX
MASTER OR SECOND OPERATOR IS NOT FUNCTIONING PROPERLY	<ol style="list-style-type: none"> 1) Failure to cycle power after setup 2) Communication wiring may be damaged or improperly wired for dual gate operation 3) Master or second unit is not programmed correctly 	<ul style="list-style-type: none"> ➤ The power to each unit must be cycled in order to initiate proper master/second communication if the operators were previously in stand-alone mode. ➤ Make sure that the communication wire that is used is twisted pair and not run in the same conduit with any power wiring. Failure to do so will result in interference across the master/second communication line. ➤ Review program settings on page 18 and check both the master and second for proper programming.
OPERATOR RUNS BUT THEN STOPS AND REVERSES DIRECTION	<ol style="list-style-type: none"> 1) Entrapment (force pot) incorrectly set 2) Gate is binding or not running smoothly 3) Rail slippage 4) Brake is not functioning properly 5) Observe red LEDs D29 and D31 6) Hall Effect Sensor is not aligned/adjusted correctly 	<ul style="list-style-type: none"> ➤ This pot must be set so that the gate will run smoothly normally and reverse when encountering an obstruction. ➤ Disengage the manual release and roll gate open and close by hand at normal operating speed. Make sure that the gate runs smoothly and does not bind. If the gate is hard to move or binds, repair the gate. ➤ Observe the drive wheels as they move the gate. If the wheels slip on the rail, tighten the compression springs until the rail no longer slips. ➤ Make sure that the brake operates correctly. The brake should disengage when the contactor activates and engage when the contactor releases. ➤ Both LEDs will indicate the activation of entrapment protection devices on terminals TB1-9 and TB1-10 on the GL board. Remove the devices and retest. If the operator now runs without fault, check those accessories as well as their wiring. ➤ Make sure that the sensor is adjusted so that it is centered over the limit shaft's magnet and is 10-15 thousandths of an inch (business card thickness) from the magnet. ➤ Replace the sensor if it is adjusted correctly but continues to fail.
MOTOR RUNS BUT GATE DOES NOT MOVE; OPERATOR STOPS AND ALARMS	<ol style="list-style-type: none"> 1) Operator's manual release is engaged. 2) Operator's main power is out of phase (three phase only). 	<ul style="list-style-type: none"> ➤ Make sure that the unit's manual release is not engaged. The unit's manual release, when disengaged, will set off the entrapment sensor if the gate is given a command to move. See page 11. ➤ Turn off the unit's main power at the breaker and swap any two power leads at the operator's main power switch. Apply power and retest the operator. See important note on page 13.
OPERATOR OPENS IMMEDIATELY UPON POWER UP AND DOES NOT CLOSE	<ol style="list-style-type: none"> 1) Active or malfunctioning accessory <i>check the red input status LEDs, D11-D13</i> 	<ul style="list-style-type: none"> ➤ If any red LEDs are on, check the corresponding input. An installed accessory may be wired incorrectly or malfunctioning. Remove the accessory and test the operator. ➤ If the soft open or interrupt loop LED is on, make sure factory plug-in loop detectors are working properly and appropriate loops are installed on the loop input terminals.
OPERATOR HAS TROUBLE LEARNING THE MOTOR	<ol style="list-style-type: none"> 1) Operator's manual release is engaged 	<ul style="list-style-type: none"> ➤ Make sure the the unit's manual release is not engaged. The unit's manual release, when engaged, will not allow the entrapment sensor to provide feedback to the GL board when the operator is moving.
PROGRAMMING CHANGES DO NOT EFFECT THE GATE	<ol style="list-style-type: none"> 1) Check the save switch on switch S1-1 	<ul style="list-style-type: none"> ➤ If the switch S1-1 is in the on position, any subsequent programming changes will not affect the gate. To make programming changes, switch S1-1 off, make desired changes, and then switch S1-1 on.
GATE EDGE PAUSES GATE WHEN STRUCK DURING OPENING	<ol style="list-style-type: none"> 1) Open obstruction input is programmed incorrectly 	<ul style="list-style-type: none"> ➤ The open obstruction input has been programmed to function with photo eyes, not gate edges. Refer to page 18 and reprogram the obstruction inputs for correct operation.
GATE DOES NOT ACTIVATE TIMER TO CLOSE AFTER THE CLOSE PHOTO EYE IS BROKEN	<ol style="list-style-type: none"> 1) Close obstruction input is programmed incorrectly 	<ul style="list-style-type: none"> ➤ The close obstruction input has been programmed to function with gate edges, not photo eyes. Refer to page 18 and reprogram the obstruction inputs to match the accessories that are installed on operator.
RADIO CONTROLS WILL NOT CLOSE THE GATE FROM THE OPEN LIMIT	<ol style="list-style-type: none"> 1) Radio terminals R1-4 are factory configured for single button radio function 	<p>Configure terminals R1-4 for single button radio function by performing the following modification:</p> <ul style="list-style-type: none"> ➤ Locate and disconnect the end of the wire running to terminal J1-6 from R4. ➤ Connect the end of the wire removed from terminal J1-6 to terminal J1-1. Refer to pages 30 and 31.

TROUBLESHOOTING

HYDRAULIC SYSTEM TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSES
UNIT SOUNDS LIKE IT'S WORKING BUT WHEELS DON'T TURN	A, B, F, H, or I
RUNS BACKWARDS	D or C
RUNS SLOW	A, B, or I
JERKING MOTION	B
WON'T OPEN	C
FLUID LEAKS	D, E or G

- (A) **BYPASS VALVE:**
It MUST be in the "automatic" position (horizontal). If it is in the manual position, no fluid gets to the drive motors, so they won't turn. If the bypass lever is between positions, fluid will be bled off, so motors will turn slower.
- (B) **PUMP:**
Air may be in the system, allow about 15 seconds for air to dissipate. Filter may be clogged. Check fluid level.
- (C) **DIRECTION VALVE:**
Press and hold the manual override button on valve. If unit works okay, check valve for proper wiring. See page 31.
- (D) **HOSES:**
Double-check hose routings between pump and motors. If wrong, fluid will flow in the wrong direction. Check for leaks and/or pin holes.
- (E) **FITTINGS:**
Tighten if required. See page 29.
- (F) **CHECK VALVE:** See page 29.
- (G) **SEALS:**
- (H) **RELIEF VALVE:** See page 29.
- (I) **FLUID:** Check fluid level in tank.
- (J) **THREE PHASE MOTOR MISWIRED**
See page 26, "Motor runs but gate does not move."

MECHANICAL TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSES
UNIT SOUNDS LIKE IT'S WORKING BUT GATE DOESN'T MOVE	A, C or G
JERKING GATE MOVEMENT	A, C, D, F or G
SQUEALING SOUND WHEN GATE MOVES	B, E or G
GATE WON'T STOP IN ONE DIRECTION	H
DAMAGED DRIVE RAIL	B, D, F or G
EXCESSIVE WHEEL WEAR	C, F, G, I or A

- (A) **DRIVE WHEELS:**
Are the drive wheels slipping? Check the spring tension.
Are the drive wheels wearing excessively? Check the spring tension.
Make sure that the key and bolt holding the drive wheels on are secured.
- (B) **GUIDE WHEEL:**
Check for wheel mis-alignment.
Check guide wheel assembly for interference with drive rail.
- (C) **DRIVE RAIL:**
Check for damage, severe bending or misalignment.
If drive rails were spliced together, check for improper splicing or damaged splices.
- (D) **PIVOT ARMS:**
Make sure that both, upper and lower pivot arms move freely.
- (E) **SEPARATOR BOLT:**
Make sure it's not interfering with the drive rail.
- (F) **OPERATOR MOUNTING:**
Make sure operator is fastened to pad securely. Check for operator misalignment.
- (G) **GATE:**
Check the gate and its hardware for damage and/or bad rollers.
- (H) **LIMIT SWITCHES:**
Has a lever on one of the limit switches moved or broken. Verify the presence of limit shoes.
- (I) **SPRINGS:**
Check for proper spring tension.

TROUBLESHOOTING

HYDRAULIC SYSTEM INFORMATION

FLUID

1. If and when adding fluid, use ONLY hydraulic oil.
2. The tank capacity is: one (1) gallon maximum.
3. To measure the fluid in the tank, it is suggested that a ruler be used like a dip stick. Insert it into the tank until it touches the bottom, then remove. When tank is full, the fluid mark should be around six inches.

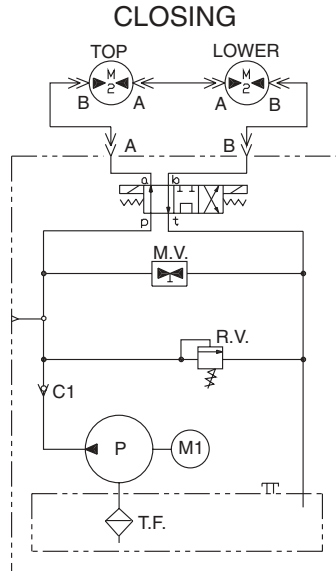
DO NOT let the fluid level get below 3 to 4 inches.

PUMP

The pump on the HS670 has a built in relief valve. If the P.S.I. should exceed its factory setting, it will bleed off the excess. The HS670-100 is set at approximately 600 P.S.I. the HS670-200 is set at approximately 1500 P.S.I.

1. Both models have a 4 way, 3 position, dual solenoid activated directional valve. It operates on 24 VDC, with a built-in rectifier on each solenoid. Reference hydraulic circuit.
2. Both models have a bypass valve with handle. When this valve is positioned for manual operation, it will redirect the fluid back into the tank and not through the motors. Reference hydraulic circuit.
3. Both models have a check valve built into the pump. This valve will not allow fluid to go in the wrong direction. Reference hydraulic circuit.

HYDRAULIC CIRCUIT



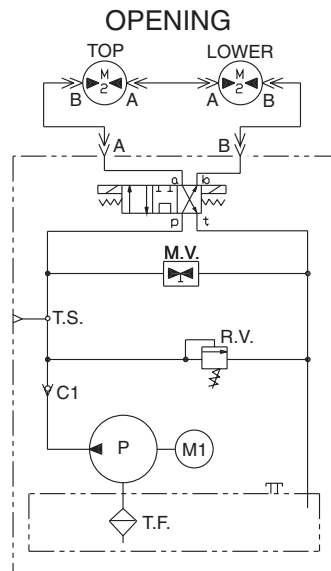
- M1 A.C. Motor Pump
- P Pump
- T.F. Tank and Filter
- M2 Hydraulic Motor
- D.V. Directional Valve
- M.V. Manual Valve (Bypass)
- T.S. Test Station Connect Point
- R.V. Relief Valve
- C1 Check Valve

HYDRAULIC MOTORS

1. The two hydraulic motors are "ROLLER VANE" type and are machined to be free wheeling. Each motor has a displacement of 12 in³/rev.
2. The speed of each is approximately 55 RPM which equates to a gate speed of approximately 18"/sec. for classes 3 and 4. For classes 1 and 2, the motor's speed is 37 RPM and gate speed of 12"/sec.
3. The drive wheels are: HS670 1HP (1-1/2" w. x 6" dia.) HS670 2HP (2" w. x 6" dia.)
Circumference of both: 18.84"
Both have a hardness of approximately 70 "A" shore.

HOSES - FITTINGS - THREADS

1. All hoses are: S.A.E. 100 R1, type AT, single wire braid, 3/8" I.D. (Rated working P.S.I. of 2250 and a rated burst P.S.I. of 9000).
2. For information on fittings and threads, see page 29.



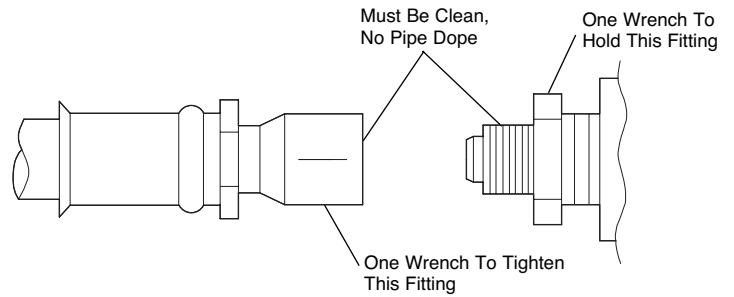
NOTES:

1. A and B are port destinations.
2. Double arrowheads designate bi-directional.
3. Single arrowhead designates one directional.

TROUBLESHOOTING

HYDRAULIC DON'TS

- DO NOT** use only one wrench to lighten hose swivel fittings. Use two wrenches, one to tighten and one to hold back opposite fitting. See illustration above.
- DO NOT** pour detergent oil, mineral spirits, diesel fuel, fuel oil or gasoline into the tank. **NEVER USE BRAKE FLUID.** Only use hydraulic oil.
- DO NOT** put pipe dope or teflon tape on any part of hose fittings.
- DO NOT** remove vent cap except to fill tank with fluid.
- DO NOT** attach hoses to fittings that have dirt on them. Clean hoses, fittings and fitting seats carefully.



HOSES REMOVAL

NOTE: Wear adequate eye protection when performing this step.

To minimize loss of fluid when removing hoses, remove power, position bypass valve to manual operation, and press and hold directional valve manual override for about 30 seconds.

You will need to insert a small tool into hole and push, to activate manual override.

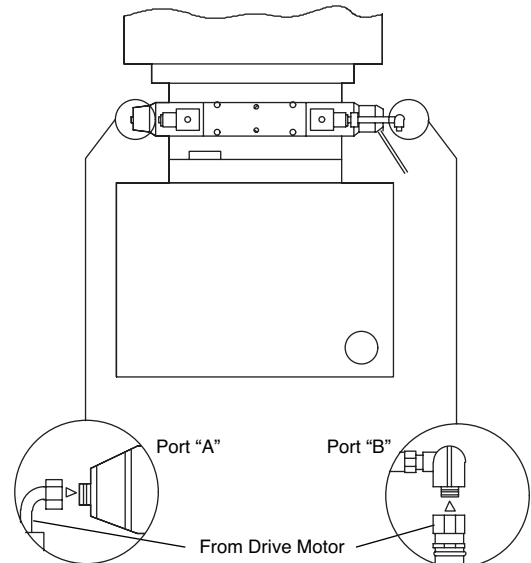
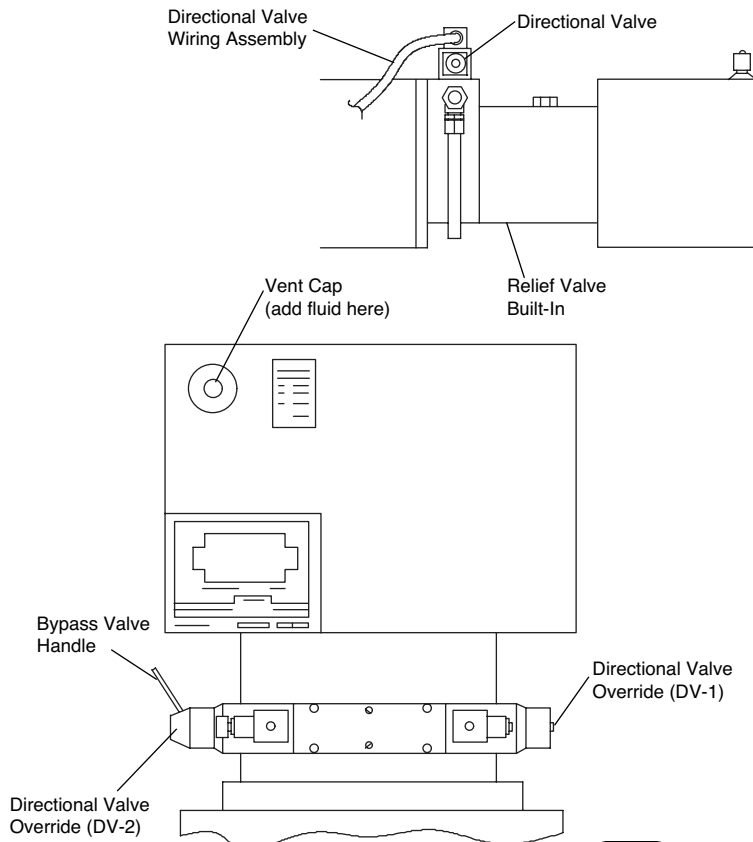
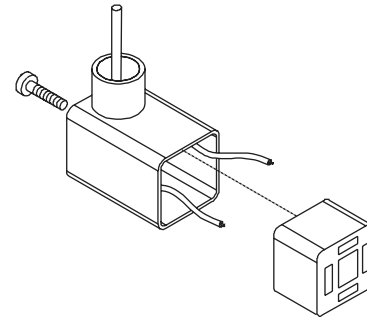
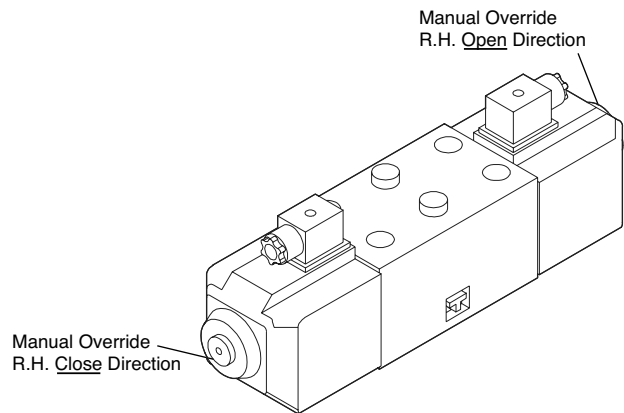
HYDRAULIC PUMP DIRECTIONAL VALVE CONNECTORS

(2) One for open direction and one for closed direction.

IMPORTANT:

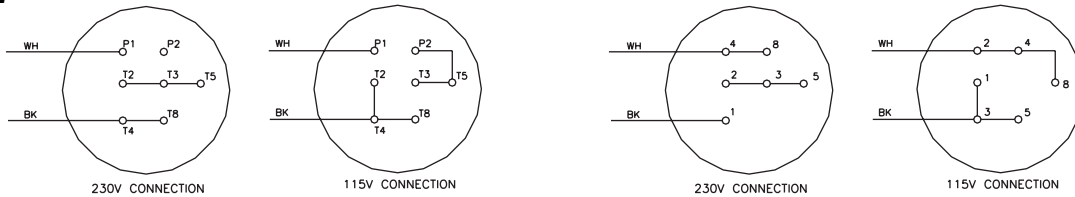
In directional valve solenoid (DV-1) the two brown wires attach to terminals #1 and #2 in the connector.

In directional valve solenoid (DV-2) the two purple wires attach to terminals #1 and #2 in the connector.



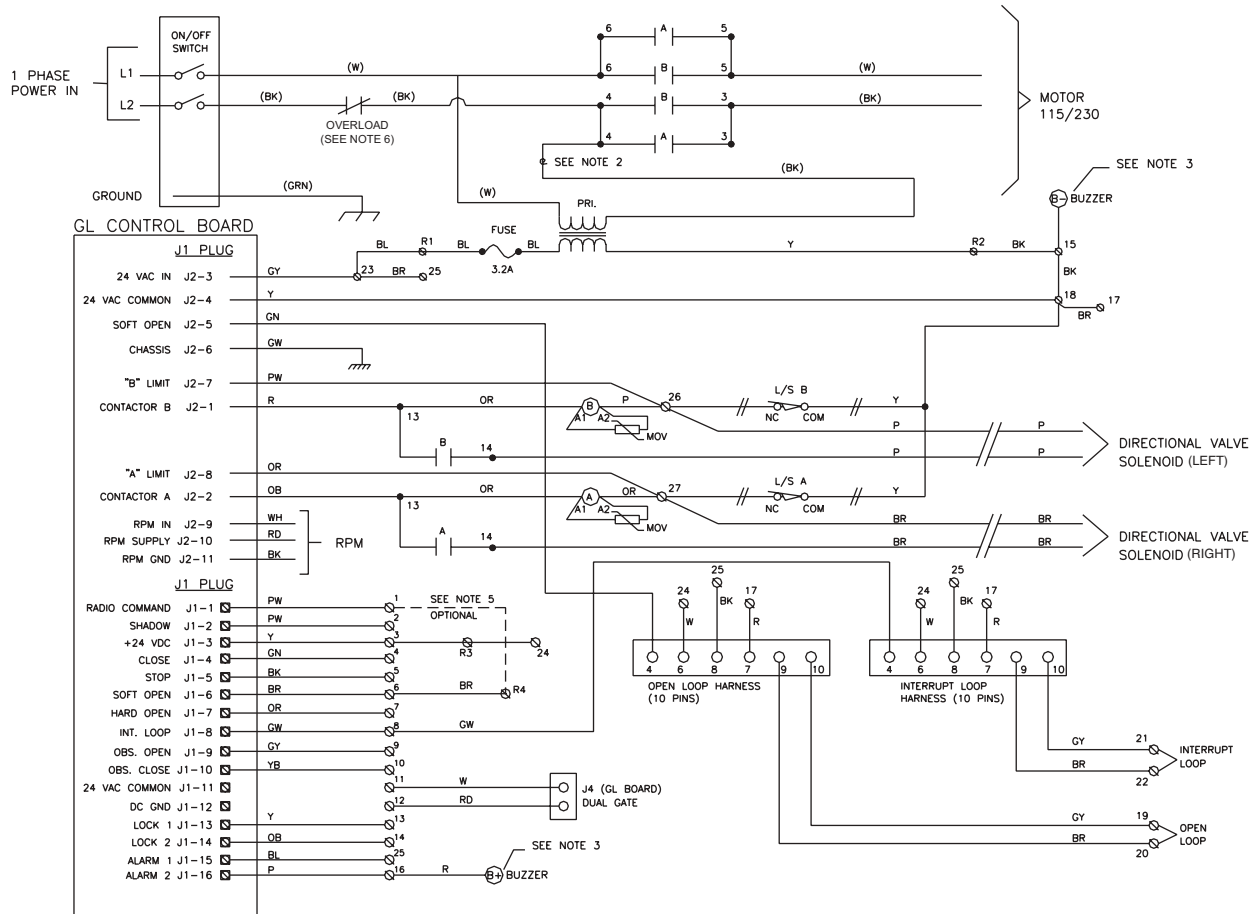
SINGLE PHASE WIRING DIAGRAM

01-G10028-1



EMMERSON MOTOR CONNECTIONS

BALDOR MOTOR CONNECTIONS

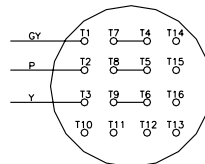


NOTES:

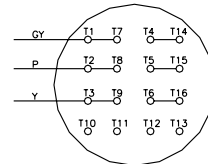
1. Transformer primary voltage same as operator line voltage 24V secondary 60VA.
2. Wire color: 120V black, 230V orange.
3. Coil voltage same as line voltage.
4. (B+) and (B-) are 100db safety alarms.
5. For single button radio function, perform optional wire change.

THREE PHASE WIRING DIAGRAM

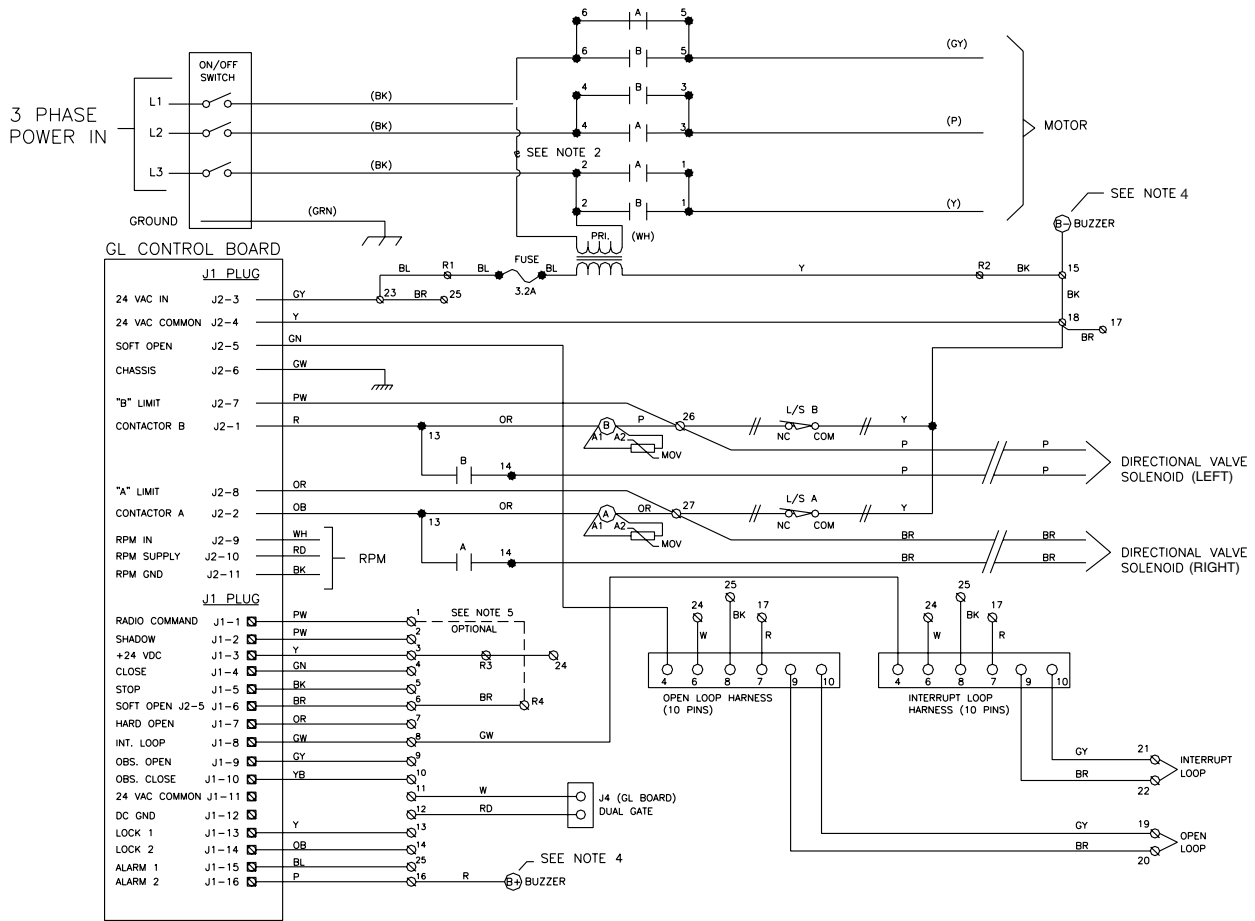
01-G10028-3



460V CONNECTION



230V CONNECTION



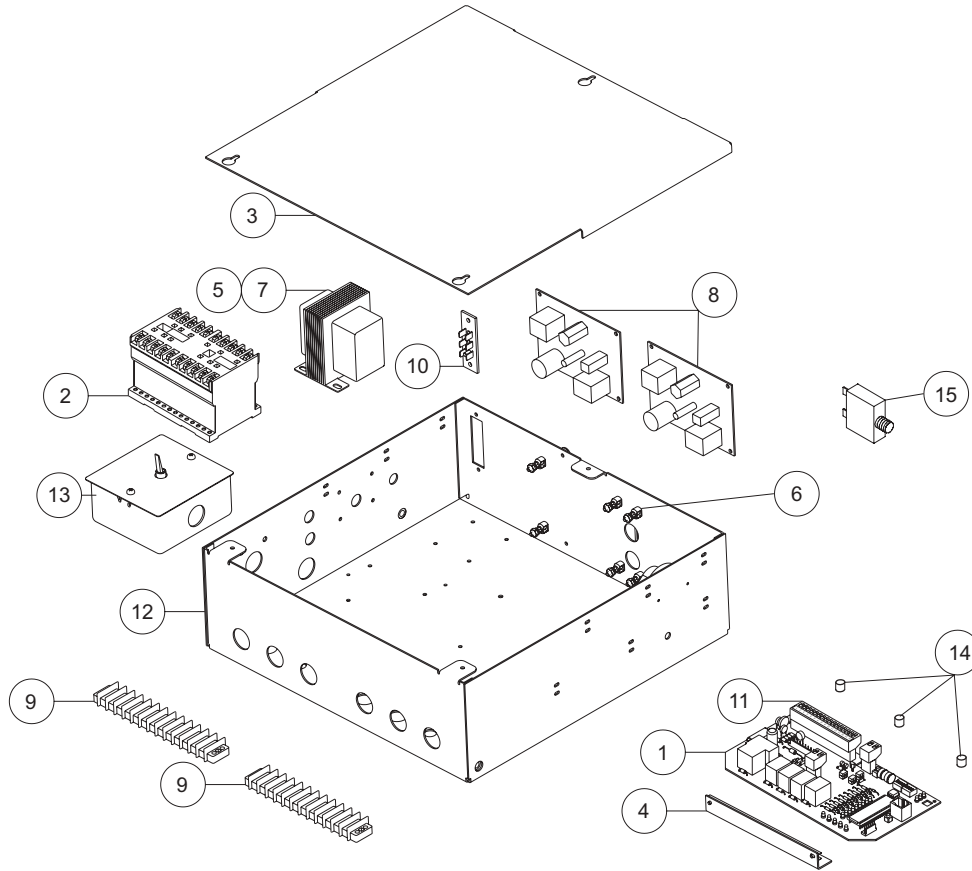
NOTES:

1. Transformer primary voltage same as operator line voltage 24V secondary 60VA.
2. Wire color: 230V orange, 460V violet.
3. Coil voltage same as line voltage.
4. (B+) and (B-) are 100db safety alarms.
5. For single button radio function, perform the optional wire change.

ELECTRICAL BOX

COMPLETE ELECTRICAL BOX REPLACEMENT KITS

To order a complete electrical box replacement kit, add a K-prefix to the model number of your operator. For example:
 HS670-100-21 (Operator) = K-HS670-100-21 (Electrical Box Kit)

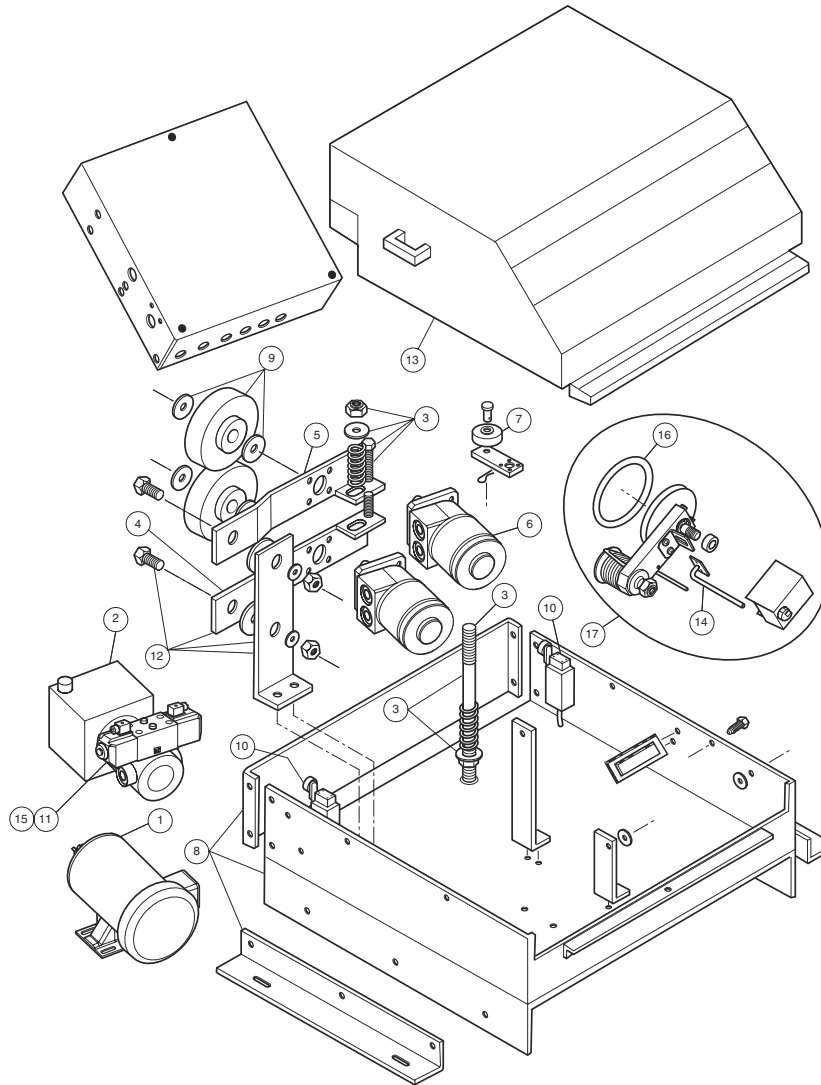


INDIVIDUAL PARTS AND KITS

ITEM	PART #	DESCRIPTION	QTY	NOTES	PROVIDED IN KIT
1	K001A5566	Control Board	1		Individual Part
2	03-8024-K	Contactor, 3 Pole Reversing	1		Individual Part
3	10-19198	Control Box Cover	1		Individual Part
4	10-19199	Mounting Bracket	1		Individual Part
5	21-3260-1	Transformer, 50/60HO, 60VA	1		Individual Part
6	31-13703	Standoffs for Optional Loop Detector	8	Optional	
7	35-310-032	Fuse, Glass Body 3.2AMP 3AG	1		Individual Part
8	G71-416-7NH	Loop Detector	2	Optional	
9	42-114-2	Terminal Strip, 14 Poles	1		Individual Part
10	42-19200	Radio Block 4 Pole	1		Individual Part
11	42-8116-1	Terminal Strip, PCB 16 Pole	1		Individual Part
12	74-19201	Control Box	1		Individual Part
13	23-3001	Switch 1n	1	1PH Units	Complete Assembly
	23-3005	Switch 3n		3PH Units	
14	31-G055	Standoffs for GL Board	3		Individual Part
15	25-2015	Overload, 15AMP (230V 1PH)	1		Individual Part
	25-2006	Overload, 6AMP (115V 1PH)			

NOTE: Single phase units are equipped with either an external line break device or an internal pilot-duty thermal O/L device.

ILLUSTRATED PARTS



INDIVIDUAL PARTS AND KITS

ITEM	PART #	DESCRIPTION	QTY	NOTES	PROVIDED IN KIT
1	K20-1100	Motor, 1HP 115/230V 1PH	1	1HP 1PH Units	Individual Part
	K20-3100C-4	Motor, 1HP 230/460V 3PH		1HP 3PH Units	
	K20-3200C-4	Motor, 2HP 230/460V 3PH		2HP 3PH Units	
2	K32-19007	Hydraulic Pump, Class 3&4	1	18 I.P.S.	Individual Part
	K32-19008	Hydraulic Pump, Class 1&2		12 I.P.S.	
3	K75-19103	Tension Rod, 1HP	1	1HP Units	Tension Rod, Tension Spring and Mounting Hardware
	K75-19102	Tension Rod, 2HP		2HP Units	
4	K75-19101	Arm, Lower Pivot	1		Pivot Arm and Mounting Hardware
5	K75-19100	Arm, Upper Pivot	1		Pivot Arm and Mounting Hardware
6	K75-19099	Motor, Hydraulic	2		Individual Part
7	K75-19098	Guide Assembly	1		Guide and Mounting Hardware
8	K75-19097	Base Assembly	1		Base, Mounting Legs and Shield
9	K75-19096	Drive Wheel, 1HP	2	1HP Units	Drive Wheel and Mounting Hardware
	K75-19095	Drive Wheel, 2HP		2HP Units	
10	K75-19094	Limit Switch	1	(2 Required)	Limit Switch and Limit Arm
11	29-19202	Directional Valve	1		Individual Part
12	MG49130	Arm Bushings Kit	1		Mounting Hardware
13	K75-19090	Operator Cover	1		Cover, Handle and Labels
14	K74-G0589	Hall (RPM) Effect	1		Hall Effect Board, Cable and Mounting Hardware
15	29-19203	Rectifier (for D.V.)	1		Individual Part
16	80-19011	Traction Ring, H.E. Wheel	1		Individual Part
17	K75-19104	RPM Assembly	1		Complete Assembly

WARRANTY POLICY

LIFTMASTER® TWO YEAR LIMITED WARRANTY

The Chamberlain Group, Inc. warrants to the final purchaser of this product, for the structure in which this product is originally installed, that it is free from defect in materials and/or workmanship for a period of two years from the date of purchase. The proper operation of this product is dependent on your compliance with the instructions regarding installation, operation, maintenance and testing. Failure to comply strictly with those instructions will void this limited warranty in its entirety.

If, during the limited warranty period, this product appears to contain a defect covered by this limited warranty, call 1-800-528-2806, toll free, before dismantling this product. Then send this product, pre-paid and insured, to our service center for warranty repair. You will be advised of shipping instructions when you call. Please include a brief description of the problem and a dated proof-of-purchase receipt with any product returned for warranty repair. Products returned to Seller for warranty repair, which upon receipt by Seller are confirmed to be defective and covered by this limited warranty, will be repaired or replaced (at Seller's sole option) at no cost to you and returned pre-paid. Defective parts will be repaired or replaced with new or factory-rebuilt parts at Seller's sole option.

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