Operator models contained in this manual conform to UL325 standard for use in Class I, II, III, and IV applications.

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![WARNING](image)

**ONLY QUALIFIED TECHNICIANS SHOULD WORK ON LINEAR BARRIER GATE OPERATORS**
Pre-installation Information

Before You Begin...

Before unpacking, inspect the carton for exterior damage. If you find damage, advise the delivery carrier of a potential claim. Inspect your package carefully. You can check your accessory box parts with the enclosed packing slip for your convenience. Claims for shortages will be honored for only 30 days from the date of shipment.

Before installing the operator, read this manual completely to ensure all requirements for proper installation are present. Verify that the voltage to be used matches the voltage of the operator.

If you have any questions about the requirements for proper installation of this gate operator contact technical support at 800-421-1587

Gate Operator Classifications

All gate operators can be divided into one of four different classifications, depending on their design and usage. Install this gate operator only when the operator is appropriate for the construction and usage class as defined below:

- **Class I Residential Vehicular Gate Operator**
  A vehicular gate operator intended for use in a home or for one to four single family dwellings with a common garage or parking area associated with these dwellings.

- **Class II Commercial / General Access Vehicular Gate Operator**
  A vehicular gate operator intended for use in a commercial location or building such as a multi-family housing unit of five or more single family units, hotel, retail store or other building servicing the general public.

- **Class III Industrial / Limited Access Vehicular Gate Operator**
  A vehicular gate operator 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 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.

Linear barrier gate operator models SG and SG-D meet the requirements for all four classifications.

Recommended Obstruction Detection Devices

The following contact or non-contact obstruction detection devices have been approved for use with this swing gate operator as part of a UL325 compliant installation:

- **Contact Edges**
  Miller Edge Models: MGO20, MGR20, MSG20

- **Wireless Contact Adapter**
  GTO Models: SGEKAC, SGEKDC, SGET, SGER

- **Obstruction Input Expansion**
  Miller Edge Model: MIM-62

- **Photoeyes**
  Omron Model: E3K-R10K4-NR
  Miller Edge Models: RG-K-R, PG-K-R50
  EMX Models: IRB-MON, IRB-RET

Safety Information and Warnings

The following formats are used for safety notes in these instructions.

![CAUTION](image1)

**CAUTION**

This type of warning note is used to indicate the possibility of damage to the barrier arm or gate operator.

![WARNING](image2)

**WARNING**

This type of warning note is used to indicate possible mechanical hazards that may cause serious injuries or death.

![WARNING](image3)

**WARNING**

This type of warning note is used to indicate possible electrical shock hazards that may cause serious injuries or death.

Regulatory Warnings

Read the following before beginning to install this swing gate operator:

### IMPORTANT INSTALLATION SAFETY INSTRUCTIONS

**WARNING**

TO REDUCE THE RISK OF SEVERE INJURY OR DEATH TO PERSONS, REVIEW THESE INSTALLATION SAFETY STEPS BEFORE PROCEEDING

1. READ AND FOLLOW ALL INSTALLATION INSTRUCTIONS.
2. Read the blue “Safety Instructions” brochure enclosed with the packet of information. If any pages are missing or are unreadable, or you do not have the safety instructions, please call Linear at 1-800-333-1717 to request additional copies.
3. ALL ELECTRICAL CONNECTIONS TO THE POWER SUPPLY MUST BE MADE BY A LICENSED ELECTRICIAN AND MUST OBSERVE ALL NATIONAL AND LOCAL ELECTRICAL CODES.
4. A separate power-disconnect switch should be located near the operator so that primary power can be turned off when necessary.
5. Never connect a button station within reach of the barrier gate or on the side of the gate operator.
6. Do not adjust the operator controller’s current sensing feature too high. It should be adjusted high enough to keep the gate from falsely triggering the sensing, but no higher than necessary for the gate to operate. DO NOT DEFEAT THE PURPOSE OF THIS FUNCTION!
7. You must install all required safety equipment.
8. UL325 Compliance requires the use of contact edges or photoelectric controls on all automatic or remotely-controlled gate operators.
9. 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 into contact with the vehicular gate during the entire path of travel of the vehicular gate.
## Wiring Specifications

Refer to the following steps for details on power and accessory wiring for the operator.

### WARNING

**ALL AC ELECTRICAL CONNECTIONS TO THE POWER SOURCE AND THE OPERATOR MUST BE MADE BY A LICENSED ELECTRICIAN AND MUST OBSERVE ALL NATIONAL AND LOCAL ELECTRICAL CODES.**

**USE COPPER WIRE ONLY!**

### AC Power Wiring

1. Find the listing on this page corresponding to the model, voltage and horsepower rating of your operator.
2. The distance shown in the table is measured in feet from the operator to the power source. **DO NOT EXCEED THE MAXIMUM DISTANCE.**
   - These calculations have been based on standard 115 V and 230 V supplies with a 10% drop allowable. If your supply is under the standard rating, the runs listed may be longer than what your application will handle, and you should not run wire too near the maximum distance for the gauge of wire you are using.
3. When large-gauge wire is used, a separate junction box (not supplied) may be needed for the operator power connection.
4. Wire length calculations are based on the National Electrical Code, Article 430 and have been carefully determined based on motor inrush, brake solenoids, and operator requirements.
5. Connect power in accordance with local codes. **The green ground wire must be properly connected.**
6. Wire insulation must be suitable to the application.
7. Electrical outlets are supplied in all 115 VAC models for convenience with occasional use or low power consumption devices only. If you choose to run dedicated equipment from these devices, it will decrease the distance for maximum length and the charts will no longer be accurate.

### DC Control and Accessory Wiring

1. All control devices are now 24 VDC, which can be run up to 2000 feet with 14 AWG wire.
2. Control wiring must be run in a separate conduit from power wiring. Running them together may cause interference and faulty signals in some accessories.
3. A three-wire shielded conductor cable is required to connect two operators together for dual operation. You must use Belden 8760 Twisted Pair Shielded Cable (or equivalent) only – P/N 2500-1982, per foot). See Page 19 for details of this connection. **Note: The shield wire should be connected in both the operators.**

### AC Power Wiring Table

<table>
<thead>
<tr>
<th>VOLTS &amp; HP</th>
<th>MODEL SG POWER WIRING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MAXIMUM DISTANCE (FEET)</td>
</tr>
<tr>
<td>SINGLE</td>
<td>DUAL</td>
</tr>
<tr>
<td>115 VOLTS</td>
<td></td>
</tr>
<tr>
<td>1/2-HP</td>
<td>222</td>
</tr>
<tr>
<td></td>
<td>354</td>
</tr>
<tr>
<td></td>
<td>566</td>
</tr>
<tr>
<td></td>
<td>900</td>
</tr>
<tr>
<td>230 VOLTS</td>
<td></td>
</tr>
<tr>
<td>1/2-HP</td>
<td>894</td>
</tr>
<tr>
<td></td>
<td>1422</td>
</tr>
<tr>
<td></td>
<td>2264</td>
</tr>
<tr>
<td></td>
<td>3600</td>
</tr>
</tbody>
</table>

### DC Control and Accessory Wiring Table

<table>
<thead>
<tr>
<th>VOLTS &amp; HP</th>
<th>MODEL SG-D POWER WIRING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MAXIMUM DISTANCE (FEET)</td>
</tr>
<tr>
<td>SINGLE</td>
<td>DUAL</td>
</tr>
<tr>
<td>115 VOLTS</td>
<td></td>
</tr>
<tr>
<td>1/2-HP</td>
<td>222</td>
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<tr>
<td></td>
<td>354</td>
</tr>
<tr>
<td></td>
<td>566</td>
</tr>
<tr>
<td></td>
<td>900</td>
</tr>
</tbody>
</table>
Installation on Concrete Curb

The barrier gate operator bolts to a concrete island or curb.

1. Un-crate the gate. Avoid damaging the cabinet finish.
2. Leave the machine bolted to the bottom pallet until ready to install.
3. Open the cabinet door.
4. Remove the bolts holding the gate to its pallet and place the machine in position on the curb. Refer to your Equipment Layout (EL) drawing for proper positioning of your gate.
5. With a pencil, mark the location of the mounting holes on the concrete.
6. Set the gate aside. Drill all four mounting holes using a 3/4" diameter rotary hammer percussion drill bit. Insert lag screw anchors for 1/2" lag bolts. Place the gate back in position, and anchor it with 1/2" lag bolts and flat washers. Lubricate the bolts before installation. Flat washers have been supplied to go between pavement and cabinet. Linear highly recommends using the corner mounting holes when mounting barrier gates.
7. Proceed with the rest of the installation process.

**WARNING**
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 into contact with the vehicular gate during the entire path of travel of the vehicular gate.

**WARNING**
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.

**WARNING**
Do not adjust the force setting to compensate for an improperly installed, improperly functioning, or damaged gate.

---

**Figure 1. Concrete Lag Anchor Detail**

**Figure 2. Barrier Gate Mounting Specifications**
Barrier Gate Arm Installation

The barrier gate arm connects to the operator with the arm attachment channel and gate arm flange. Counterweights in the attachment channel balance the gate arm for smooth operation.

✓ NOTE: Numbered items in these drawings are for instructional reference only. For actual part numbers, go to the parts lists in the back of this booklet.

Attaching the Gate Arm
1. Assemble the SG arm on the ground first, making sure to leave all fasteners loose, including the spreader arms (Parts #4 & #7).
2. Make sure the barrier gate is in the full closed position.
3. With someone’s assistance, lift the arm up to a height even with the barrier gate flange. The far end should either be supported by something of equal height as the flange, or be held by someone throughout the next steps.
4. Assemble the wood arms (#10) between the attachment channels (#8) and the flange and bolt together. Tighten these bolts (#9) firmly.
5. Tighten all bolts (#3) where the three pieces of wood arm come together.
6. Tighten up the nuts (#6) on the spreader arms (#4 & #7) until the plates (#5) are tight against the wood.
7. The arm should have a curved, wishbone appearance once finished.

Installing the Counterweights
1. Align the holes in the counterweights (#11) with the holes in the barrier gate attachment channels (#8).
2. Fasten the counterweights (#11) to the barrier gate attachment channels (#2) using the hardware provided (#12).

Figure 3. Wishbone Arm Assembly

Figure 4. Gate Arm Attachment
Operator Preparation

**Gear Reducer Vent Plug**
In order to keep gear oil from spilling out during shipping, gear reducers used in the SG and SG-D barrier gate operators have a sealed vent plug installed at the factory. Leaving the vent plug installed, remove the vent plug’s breather pin to allow the gear box to vent (see Figure 5). The breather pin can be discarded.

**Limit Cam Adjustments**
The limit cams for all models of barrier gate operators have been pre-set at the factory for approximately 90 degrees of motion. If you need to adjust this further, see Figure 6 and follow the directions below.

1. For **more downward travel**, loosen the wingnut on the LSC-1 (down) limit cam and rotate the cam slightly in the “B” direction.
2. For **less downward travel**, loosen the wingnut on the LSC-1 (down) limit cam and rotate the cam slightly in the “A” direction.
3. For **more upward travel**, loosen the wingnut on the LSO-1 (up) limit cam and rotate the cam slightly in the “A” direction.
4. For **less upward travel**, loosen the wingnut on the LSO-1 (up) limit cam and rotate the cam slightly in the “B” direction.

✓ **NOTE:** If the barrier gate operator has been custom configured by the factory for reverse arm operation (where the closed barrier arm sticks out from the service door side of the operator) the limit switches shown in Figure 6 will be reversed. The top limit switch will be the open limit, the bottom limit switch will be the close limit.

![Figure 5. Vent Plug Installation](image1)

![Figure 6. Limit Cam Adjustment](image2)
Operator Setup

Controller Access
The Controller in models SG and SG-D is located under the operator's top cover.

To access the Controller, from inside the operator, flip the two cover release latches up to unlock the operator's top cover. Remove the cover to expose the Controller.

The Controller is protected by a plastic dust cover. To remove the dust cover, loosen the cover's wing-screw and lift the cover off.

AC Power Connection
All Linear gate operators are supplied with a power disconnect switch to turn on and off the power available to the operator (see Figure 8). Following wiring specifications on Page 2, incoming power should be brought into the operator and connected to the labeled pigtails from the disconnect box.

NOTE: For Solar Powered Units Only: The APeX Controller’s AC power disconnect switch does not turn off the Apex DC power when connected to solar panels. It will however, disconnect DC motor power. Unplug the solar panel input on the front of the Apex Controller prior to servicing the unit.

Proper thermal protection is supplied with the operator. The motor contains a thermal overload protector to guard from overheating the motor due to overload or high-frequency operation. To reset the motor after an overload, press the red button on the end of the motor after the motor has cooled down.

Earth Ground
Install a ground rod and connect it to the operator's frame in every gate operator installation. A good earth ground is necessary to allow the Controller’s built-in surge and lightning protection circuitry to work effectively. The physical bolting of the operator to the mounting pad is not sufficient for a good earth ground.

NOTE: Do not splice the ground wire. Use a single piece of solid copper 12 AWG wire between the ground rod and the operator.

1. Install an 8-foot long copper ground rod next to the operator mounting pad within three feet of the operator.
2. Use a clamp to connect a solid copper 12 AWG ground wire to the ground rod.
3. Route the ground wire to the operator.
4. Connect the ground wire to the operator’s frame.

WARNING
All AC electrical connections to the power source and the operator must be made by a licensed electrician and must observe all national and local electrical codes. Power supply must be of correct voltage and phase.

NOTE: For Solar Powered Units Only: The APeX Controller’s AC power disconnect switch does not turn off the Apex DC power when connected to solar panels. It will however, disconnect DC motor power. Unplug the solar panel input on the front of the Apex Controller prior to servicing the unit.

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2. Use a clamp to connect a solid copper 12 AWG ground wire to the ground rod.
3. Route the ground wire to the operator.
4. Connect the ground wire to the operator’s frame.

WARNING
Always disconnect power from operator before servicing. Always keep clear of gate arm during operation.
Figure 9. Controller Features
### Indicator Descriptions

<table>
<thead>
<tr>
<th>INDICATOR DEFINITION</th>
<th>INDICATION WHEN LIT DURING NORMAL OPERATION</th>
<th>INDICATION WHEN LIT DURING PROGRAMMING</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 VOLT INPUT POWER</td>
<td>LOW VOLTAGE AC POWER IS PRESENT</td>
<td></td>
</tr>
<tr>
<td>24 VOLT DC ACCY POWER</td>
<td>LOW VOLTAGE DC POWER IS PRESENT</td>
<td></td>
</tr>
<tr>
<td>OPEN</td>
<td>OPEN SIGNAL PRESENT FROM THE INTERNAL RECEIVER OR AN EXTERNAL DEVICE CONNECTED TO THE OPEN INPUT TERMINAL</td>
<td></td>
</tr>
<tr>
<td>CLOSE</td>
<td>CLOSE SIGNAL IS PRESENT FROM A DEVICE CONNECTED TO THE CLOSE INPUT TERMINAL</td>
<td></td>
</tr>
<tr>
<td>STOP</td>
<td>STOP INPUT TERMINAL IS OPEN AND NOT CONNECTED TO COMMON</td>
<td></td>
</tr>
<tr>
<td>PROGRAM</td>
<td></td>
<td>CONTROLLER IS IN PROGRAMMING MODE</td>
</tr>
<tr>
<td>REVERSE</td>
<td>DELAY SET</td>
<td>SET REVERSE DELAY TIME</td>
</tr>
<tr>
<td>LOCKOUT</td>
<td>ALARM SET</td>
<td></td>
</tr>
<tr>
<td>RADIO</td>
<td>BUILT-IN RECEIVER IS DETECTING A RADIO SIGNAL FROM A REMOTE CONTROL</td>
<td>TRANSMITTERS CAN BE ENTERED INTO MEMORY (UP TO 40 TRANSMITTERS)</td>
</tr>
<tr>
<td>OPEN CURRENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPEN/RESET</td>
<td>OPEN/RESET INPUT ACTIVATED BY LOOP OR SWITCH</td>
<td></td>
</tr>
<tr>
<td>OPEN RELAY</td>
<td>OPEN RELAY IS ACTIVATED</td>
<td></td>
</tr>
<tr>
<td>OPEN LIMIT</td>
<td>BRAKE DELAY</td>
<td>OPEN LIMIT SWITCH IS ACTIVATED</td>
</tr>
<tr>
<td>CLOSE CURRENT</td>
<td>SET</td>
<td>MOTOR CURRENT HAS EXCEEDED THE CLOSE CURRENT SETTING WHILE CLOSING</td>
</tr>
<tr>
<td>CLOSE OBSTR</td>
<td>MGT 1 SET</td>
<td>CLOSE OBSTRUCTION TERMINAL CONNECTED TO COMMON BY BEAM OR SAFETY EDGE, OR SIGNAL FROM MGT OBSTACLE TRANSMITTER</td>
</tr>
<tr>
<td>CLOSE RELAY</td>
<td>AUTO CLOSE SET</td>
<td>CLOSE RELAY IS ACTIVATED</td>
</tr>
<tr>
<td>CLOSE LIMIT</td>
<td>AC DC SET</td>
<td>CLOSING LIMIT SWITCH IS ACTIVATED</td>
</tr>
<tr>
<td>SINGLE</td>
<td>SET</td>
<td>SINGLE TERMINAL CONNECTED TO COMMON BY AN EXTERNAL PUSHBUTTON OR RADIO</td>
</tr>
<tr>
<td>MAX RUN</td>
<td>SET</td>
<td>MAXIMUM RUN TIMER HAS BEEN EXCEEDED</td>
</tr>
<tr>
<td>COMM LINK</td>
<td>SET</td>
<td>DUAL OPERATOR CONNECTION DETECTED, BLINKS IF CONNECTION HAS FAILED</td>
</tr>
<tr>
<td>MAINT ALERT</td>
<td>SET</td>
<td>MAINTENANCE IS REQUIRED ON OPERATOR</td>
</tr>
</tbody>
</table>

### Apex Function Display Indications

- **RL**: Left or Right Hand Operation
- **PM**: Single or Dual Gate
- **AC**: Auto Close Timer
- **RP**: Run Alarm Pre-Start Alarm
- **CC**: Maximum Close Current
- **AD**: Advanced Programming
- **RT**: Maximum Run Timer
- **SB**: Single Button Input Setup
- **SM**: Stagger Mode
- **ST**: Stagger Time
- **AR**: Auxiliary Relay Mode
- **RD**: Reverse Delay Time
- **LP**: Low Power Mode
- **FS**: Power Failure Mode
- **SS**: Soft Start/Stop Duration
- **CT**: Reset Cycle Count
- **MA**: Maintenance Alert Trigger
- **OR**: Open/Reset Input
- **TG**: Anti Tailgate
- **RA**: Radio Enable
- **TL**: Learn Transmitters
- **TD**: Delete Transmitters
- **ML**: Learn MGT Transmitters
- **MD**: Erase MGT Transmitters
- **MO**: Motor Type Selection
- **CL**: Reset to Factory Defaults
<table>
<thead>
<tr>
<th>TERMINAL</th>
<th>GROUP</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC N</td>
<td>24 VOLT INPUT</td>
<td>FACTORY CONNECTED TO 24 VAC FROM TRANSFORMER OR 24 VDC FROM CONTINUOUS DUTY DC SUPPLY.</td>
</tr>
<tr>
<td>AC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC -</td>
<td>ACCESSORY POWER</td>
<td>PROVIDES 24 VOLT DC POWER FOR ACCESSORIES. (.5A MAX)</td>
</tr>
<tr>
<td>DC +</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RESET</td>
<td></td>
<td>NOT USED IN BARRIER GATES.</td>
</tr>
<tr>
<td>COMMON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>COMM LINK</td>
<td>FOR 3-WIRE NETWORK CONNECTION TO SECOND OPERATOR IN DUAL GATE INSTALLATIONS.</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>COMMON</td>
<td></td>
</tr>
<tr>
<td>COMMON</td>
<td>SINGLE BUTTON INPUT</td>
<td>CONNECT TO NORMALLY OPEN SWITCH FOR SINGLE BUTTON OPERATION. ALTERNATES BETWEEN OPEN-CLOSE OR OPEN-STOP-CLOSE DEPENDING ON PROGRAMMING.</td>
</tr>
<tr>
<td>SINGLE</td>
<td>FIRE BOX INPUT</td>
<td>CONNECT TO NORMALLY OPEN SWITCH IN FIRE BOX FOR FIRE DEPARTMENT ACCESS.</td>
</tr>
<tr>
<td>COMMON</td>
<td>COMMON</td>
<td></td>
</tr>
<tr>
<td>COMMON</td>
<td>OPEN INPUT</td>
<td>CONNECT TO 3-BUTTON STATION FOR OPEN-CLOSE-STOP CONTROL. A CONSTANT OPEN INPUT WILL OVERRIDE THE MID-TRAVEL STOP AND HALT THE AUTO CLOSE TIMER UNTIL RELEASED.</td>
</tr>
<tr>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLOSE</td>
<td>3-BUTTON STATION INPUT</td>
<td>CONNECT TO 3-BUTTON STATION FOR OPEN-CLOSE-STOP CONTROL. A CONSTANT OPEN INPUT WILL OVERRIDE THE MID-TRAVEL STOP AND HALT THE AUTO CLOSE TIMER UNTIL RELEASED.</td>
</tr>
<tr>
<td>COMMON</td>
<td>STOP</td>
<td></td>
</tr>
<tr>
<td>COM</td>
<td>OPEN/RESET INPUT</td>
<td>PROGRAMMABLE FOR STANDARD RESET LOOP, OPEN COUNTER MODE USING THE SHADOW/RESET LOOP, OR OPEN SUPERVISED MODE. See page 15.</td>
</tr>
<tr>
<td>OPEN/RESET</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C-OBS</td>
<td>CLOSE OBSTRUCTION INPUT</td>
<td>CONNECT TO NORMALLY OPEN DEVICES (GATE EDGE, PHOTO BEAM) TO DETECT AN OBSTRUCTION DURING CLOSING. WHILE GATE IS MOVING, ANY CLOSE OBSTRUCTION SIGNAL WILL CAUSE THE GATE TO STOP. THEN REVERSE AND TRAVEL TO THE FULL OPEN POSITION. SHOULD A OPEN OBSTRUCTION INPUT OR AN OPEN DIRECTION INHERENT ENTRAPMENT CONDITION OCCUR PRIOR TO THE GATE REACHING THE OPEN LIMIT, THE OPERATOR WILL LOCKOUT AND SOUND THE CONTINUOUS TONE ALARM. IF THE AUTO CLOSE TIMER IS SET, WHEN THE CLOSE OBSTRUCTION INPUT IS CLEARED, THE GATE WILL CLOSE WHEN THE AUTO CLOSE TIMER EXPIRES.</td>
</tr>
<tr>
<td>COM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COM</td>
<td>REVERSE</td>
<td>CONNECT TO NORMALLY OPEN DEVICES TO CAUSE A REVERSAL WHEN THE GATE IS TRAVELING CLOSED. THE GATE WILL REVERSE TO THE FULL OPEN POSITION. TYPICALLY NOT USED IN BARRIER GATES.</td>
</tr>
<tr>
<td>REV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPEN LOOP</td>
<td>OPEN LOOP</td>
<td>CONNECT TO OPEN LOOP/FREE EXIT LOOP. THE GATE WILL OPEN WHEN THE LOOP IS TRIGGERED, AND REMAIN OPEN AS LONG AS THE LOOP IS TRIGGERED. REQUIRES LOOP DETECTOR.</td>
</tr>
<tr>
<td>OPEN LOOP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>REVERSE LOOP</td>
<td>REVERSE LOOP</td>
<td>CONNECT TO REVERSE LOOP. TRIGGERING THE LOOP WILL CAUSE A REVERSAL WHEN THE GATE IS TRAVELING CLOSED. THE GATE WILL REVERSE TO THE FULL OPEN POSITION. REQUIRES LOOP DETECTOR. TYPICALLY NOT USED IN BARRIER GATES.</td>
</tr>
<tr>
<td>SHADOW/RESET LOOP</td>
<td>SHADOW/RESET LOOP</td>
<td>CONNECT TO RESET LOOP TO KEEP THE GATE IN ITS FULLY OPEN POSITION AS LONG AS THE SIGNAL IS PRESENT. USED TO KEEP GATE OPEN WHILE VEHICLE IS PASSING THROUGH. REQUIRES LOOP DETECTOR. ALSO USED FOR OPEN COUNTER MODE IN BARRIER GATES.</td>
</tr>
<tr>
<td>-</td>
<td>ALARM</td>
<td>NOT USED IN BARRIER GATES.</td>
</tr>
<tr>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N.O.</td>
<td>AUX RELAY</td>
<td>FOR CONNECTION TO AUXILIARY DEVICES (MAGNETIC LOCK, SOLENOID LOCK, STROBE LIGHT) FOR ACTIVATION (OR DEACTIVATION) DURING GATE OPERATION.</td>
</tr>
<tr>
<td>N.C.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+</td>
<td>24 VOLT SOLAR PANEL</td>
<td>FOR CONNECTION TO 24 VOLT SOLAR PANEL FOR BATTERY CHARGING.</td>
</tr>
<tr>
<td>-</td>
<td>24 VOLT BATTERY</td>
<td>FACTORY CONNECTED TO BATTERIES IN DC MODEL OPERATORS.</td>
</tr>
</tbody>
</table>
Operator Accessory Connections

3-BUTTON STATION

TELEPHONE ENTRY

PHOTOEYE FOR REVERSE

KEYSWITCH

KEYPAD

PHOTOEYE FOR CLOSE OBSTRUCTION

FIRE ACCESS SWITCH

SINGLE-CHANNEL RADIO RECEIVER

COUNTS AS SECONDARY ENTRAPMENT SENSOR

OPEN/RESET LOOP DETECTOR

MGR RECEIVER

WARNING STROBE OR AUDIBLE SOUNDER

OPEN/RESET LOOP DETECTOR

MGR-2 RECEIVER

OPTIONAL HEATER
(With built-in switch and thermostat)
115 VOLT HEATER (P/N 2510-262)
230 VOLT HEATER (P/N 2510-273)

WIRED GATE EDGE SENSOR

WIRELESS GATE EDGE SENSOR

MGT TRANSMITTER

MGTRANSMITTER

SENDSCLOSEOBSTRUCTION
SIGNALTOCHANNEL #2
OFMGR-2 RECEIVER

Figure 10. Operator Accessory Connections
Basic Controller Programming

Programming Overview
The Controller can be programmed with various options for the operator. The programming fields are defined as “functions” that have “options”. To make setup easier for the installer, the Controller’s programming is divided into two groups: basic and advanced. The basic programming group contains the functions commonly used in most swing gate installations. The advanced programming group contains functions less commonly used (i.e. dual gate stagger delay, maximum run timer, etc.).

Entering Programming Mode
Enter programming mode by pressing the UP and DOWN buttons together for one second. While in programming mode the PROGRAM indicator will light.

Exiting Programming Mode
Exit programming mode at any time by pressing the UP and DOWN buttons together. The Controller will automatically exit programming mode after three minutes of inactivity.

Programming Keystrokes (Typical Programming Method)
While in programming mode, press the UP or DOWN buttons to scroll through the programming functions. When the desired function is displayed press the ENTER button to display the currently set option for the function. When an option is displayed, the decimal points are lit.

To change the option, press and hold the ENTER button for 1 second. To indicate that an option is ready to be changed, the display will flash. While the display is flashing, press the UP or DOWN button to display the other options available for that function.

When the desired option is displayed, press the ENTER button to store it into memory. To select another function, press ENTER, UP, or DOWN.

Left or Right Hand Operation
The function is not used with barrier gates.

Dual Gate Enable
The factory default is for single gate operation. For dual gate operation, wire the two gate controllers together through the COMM LINK terminals (see Page 19) and enable dual gate operation with this programming step.

Auto Close Timer
The factory default turns off the Auto Close Timer. The timer can be set from 1 to 59 seconds and from 1 to 9 minutes. When the Auto Close Timer is set, after opening, the gate will wait for the length of the Auto Close Timer then close automatically.

Run Alarm and Pre-start Alarm
The function is not used with barrier gates.
Basic Controller Programming (Cont.)

Maximum Close Direction Current Setting
To detect obstacles or mechanical problems with the gate, the operator can monitor its motor current. If the close current load exceeds the programmed maximum load range number, the gate arm will stop, reverse, and travel to the full open position. Another close request will be required to start the operator again. If after restart, the overload or a close obstacle happens again before the close limit is reached, the operator will lockout and activate the alarm output. If the auto close timer is set, when the close obstruction input is cleared, the gate arm will close when the auto close timer expires.

The factory default setting of “OF” disables the close direction current sensing for the operator. The maximum close direction current setting can be adjusted using the following procedure:

Using the + and - buttons, set the programmed range number so that a minimal force will activate a reversal should an obstruction occur, but high enough to keep the gate arm operating under normal conditions without interruption.

Advanced Controller Programming

Entering Advanced Programming Mode
To access and program the Advanced Programming functions, for each programming session, Advanced Programming must be enabled.

After exiting programming, the Advanced Programming functions will be available on the programming display during the next programming session unless the operator has run 50 or more cycles. After that, Advanced Programming must be enabled again.

Maximum Run Time
The factory default for the Maximum Run Time (MRT) is 10 seconds. When the operator starts, a timer will begin counting. If a open or close limit is not reached or an obstacle or reversing input is not received before the timer expires, the operator will stop, the unit locks out and the alarm sounds. The timer can be set for 10 to 99 seconds, but should be left at 10 seconds in most applications. Setting it too close to the actual run time may cause the time to expire with changing ambient temperature, gate conditions, etc…

If AC is present and an open or close limit is not reached or an obstacle or reversing input is not received before this timer exceeds MRT, the operator will stop, the unit locks out and the alarm sounds.

In the case that AC is not present and MRT expires, it will be ignored as long as the actual run time is under 10 seconds. When the gate reached full open or full close position, MRT will be interpreted as fail safe/secure. EN05 will occur. If FS as set to fail safe, the gate will open. If FS is set to fail secure, the gate will close. However, if the actual run time is higher than 10 seconds, it will be interpreted as a physical mechanical problem, EN01 will occur and the gate will stop immediately.
Advanced Controller Programming (Cont.)

Single Button Input Setup
This function is used for selecting the operation for single button controls and radio receivers.

The factory default sets the SINGLE input terminal so successive inputs will cycle the operator in OPEN-STOP-CLOSE-STOP order.

Alternately, the SINGLE input can be set to cause the gate to OPEN unless the gate is fully open. If the gate is closing, the input will cause the gate to reverse. If the gate is fully open, the input will cause the gate to CLOSE.

Stagger Mode
This function is not used in dual barrier gate installations.

✓ NOTE: This function will only be displayed if dual gate operation is selected.

Stagger Delay Time
This function is not used in dual barrier gate installations.

✓ NOTE: This function will only be displayed if dual gate operation is selected.

Auxiliary Relay Mode
The Auxiliary Relay has normally open and normally closed contacts. The factory setting disables the Auxiliary Relay. The relay can be set for:

- Maglock: To deactivate a magnetic or solenoid gate lock, the relay will energize during any pending or actual gate motion (open only).
- M4: To deactivate a magnetic or solenoid gate lock, the relay will energize during any pending or actual gate motion (open only). 3 seconds after the gate starts to move, the relay will de-energize. This option is used for higher current solenoid locks.
- Ticket Dispenser: The relay will energize while the gate is moving in the open direction and at the full open limit, or in an entrapment condition.
- Strobe: To activate a warning strobe light, the relay will energize during any pending or actual gate motion (either open or close).
- Alarm: The relay will energize if the gate is manually forced open from the full closed position.

Reverse Delay Time
The factory default sets the Reverse Delay to 0 seconds. The operator will wait the length of the delay before reversing direction. This feature will not change the reversal time when the operator is responding to an entrapment condition from an obstruction input or inherent entrapment protection sensor. The Reverse Delay can be set from 0 to 9 seconds. Heaver gates require a longer delay to allow time for the gate to stop. The Reverse Delay is active when the gate first stops on either limit or in between limits.
Advanced Controller Programming (Cont.)

Low Power Mode
This function is only used with DC barrier gate Model SG-D. The factory default disables the Low Power Mode. When Low Power Mode is enabled, and AC power fails, the controller will assume Low Power Mode after 60 seconds of gate inactivity. Low power mode turns off all accessory power and indicators. Only inputs from the radio receiver, reverse loop, open loop (optional by programming), fire department input, or restoring AC power will wake the Controller from Low Power Mode. Programming Mode can still be accessed while the Controller is awake in Low Power Mode.

✓ NOTE: This function will only be displayed in Model SG-D operators.

Power Failure Mode
This function is only used with DC barrier gate Model SG-D. The factory default is set for Fail Safe, alternately the Controller can be set for Fail Secure, Open Immediate, or Close Immediate.

- Fail Safe: If the AC power fails and the battery voltage drops below approximately 22 Volts, 5 seconds later the operator will cycle open if not already open. When AC power is restored, or the battery gets charged by solar panels, the operator will resume normal operation and auto-close if programmed to do so.
- Fail Secure: If the AC power fails and the battery voltage drops below approximately 22 Volts, 5 seconds later the operator will cycle closed if not already closed. When AC power is restored, or the battery gets charged by solar panels, the operator will resume normal operation.

✓ NOTE: Fail Safe and Fail Secure are disabled if Stagger Mode is enabled.
- Open Immediate: If the AC power fails, the operator will cycle open if not already open and cease operation. When AC power is restored, the operator will resume normal operation and auto-close if programmed to do so.
- Close Immediate: If the AC power fails, the operator will cycle closed if not already closed and cease operation. When AC power is restored, the operator will resume normal operation.

✓ NOTE: This function will only be displayed in Model SG-D operators.

Soft Start/Stop Duration
This function is only used with DC barrier gate Model SG-D. This function causes the operator to start and stop the DC motor slowly reducing gate wear and tear (at the full open or closed positions only). The factory default sets the Soft Start/Stop Duration to 3 seconds. The Soft Start/Stop Duration can be set from 1 to 10 seconds.

✓ NOTE: Changing the Soft Start/Stop Duration will reset the open and close current setting value to zero. It will be necessary to reprogram maximum open and close current settings.

✓ NOTE: This function will only be displayed in Model SG-D operators set for DC motor operation with soft start motor selection.

Reset Cycle Count
The Controller counts of the number of times the operator has been cycled full open and close. The cycle count can be displayed. The display will scroll the cycle count number, flashing two digits at a time from left to right.

To reset the Cycle Count, press and hold the ENTER button for 2 seconds while the Cycle Count is displayed.

If the Maintenance Alert has been triggered, resetting the Cycle Count will also reset the Maintenance Alert indicator.

✓ NOTE: Press Enter for 2 seconds while the "CT" function is displayed to reset the cycle count to zero.
**Advanced Controller Programming (Cont.)**

**Maintenance Alert Trigger**
The Controller has a MAINT ALERT indicator that can be programmed to light when the number of activations exceeds a set number of cycles.

The factory default sets the Maintenance Alert Trigger to 10,000 cycles. The Maintenance Alert Trigger can be programmed for 5, 10, 15, or 25 thousand cycles.

The Maintenance Cycle Count can be reset independently from the operator’s absolute Cycle Count.

**Open/Reset Input**
✓ **NOTE:** For use in single gate installations only.

The Controller can be programmed to partially or fully open the gate with an OPEN/RESET input, or to count the number of open commands and leave the gate open until an equal number of SHADOW/RESET loop triggers occur.

The OPEN/RESET terminals can connect to a loop detector or normally open switch (see accessory wiring in Figure 10 on Page 10). The SHADOW/RESET loop uses a plug-in loop detector.

The factory default is setting is Off (OF).
- **OF Open Mode Off:** The OPEN/RESET input acts as a standard RESET loop and holds the gate arm open as long as a vehicle is on the loop. If the gate arm is opening or fully open when the vehicle exits the loop, the gate arm will close.
- **CT Open Counter Mode:** The Controller can count and remember the number of open commands received, and will count the same number of SHADOW/RESET loop triggers before the gate will close.

✓ **NOTE:** Set the Auto Close Timer to OFF when using the CT option.

- **SU Open Supervised Mode:** The OPEN/RESET input opens the gate arm fully on the initial command. Once open, the arm will close on the removal of the command.

**Anti-tailgate**
The Controller can be programmed to have the barrier gate arm prevent “tailgating” when a second vehicle attempts to drive through closely following a prior vehicle that has been granted access.

The factory default disables this feature. If the SHADOW/RESET loop is activated while the gate arm is closing, the gate arm will stop. When anti-tailgate is enabled, the SHADOW/RESET loop will be ignored once the arm begins traveling downward.

**Radio Enable**
The Controller contains a built-in MegaCode® radio receiver to allow activation from up to 40 access control transmitters and two Model MGT (gate edge) transmitters. The factory default enables the internal radio receiver. Alternately, the internal receiver can be disabled.

**Antenna Installation**
A local whip antenna is included for use with the operator as a remote antenna. If using a remote antenna, connect coax cable from the antenna to the ANTENNA connector.
Advanced Controller Programming (Cont.)

Radio Transmitter Learn
The Controller’s built-in MegaCode® radio receiver can store the IDs of up to 40 transmitters. Refer to the figure for the steps required to learn transmitters.

✓ NOTE: This function will NOT be displayed if the transmitter memory is full, or if the radio receiver is disabled.

Radio Transmitter Delete
Transmitters can be deleted from the Controller’s memory either individually, or all at the same time. Refer to the figure for the steps required to delete transmitters.

✓ NOTE: This function will NOT be displayed if no transmitters are stored in memory, or if the radio receiver is disabled.

MGT Obstacle Transmitter Learn
The Controller supports one or two Model MGT Obstacle Transmitters. The transmitters can be programmed to function as Open Obstruction, Close Obstruction, Reverse, or Stop. Refer to the figure for the steps required to learn MGT transmitters.

✓ NOTE: This function will NOT be displayed if two MGT transmitters are already stored in memory, or if the radio receiver is disabled.

MGT Obstacle Transmitter Delete
MGT transmitters can be deleted from the Controller’s memory either individually, or all at the same time. Refer to the figure for the steps required to delete MGT transmitters.

✓ NOTE: This function will NOT be displayed if no MGT transmitters are stored in memory, or if the radio receiver is disabled.

Motor Type Selection
The factory sets the default for the Controller to match the type of motor in the operator. If required, change the motor selection option to a different type of motor used in the operator. The only two options used for barrier gates are:
- Ac - AC Motor
- dz - DC Motor with Electronic Soft Start/Stop

Reset Controller to Factory Defaults
The Controller can be reset with this function. ALL PROGRAMMED DATA WILL BE LOST, and the factory defaults will be loaded. This function will not erase radio transmitters, current sense values, or motor type. Transmitters must be deleted with the two functions above.
THIS SYSTEM IS TYPICALLY USED AS AN ENTRANCE OR EXIT IN CONJUNCTION WITH A CONTROLLED ENTRANCE OR EXIT.

OPERATION OF FREE GATE SYSTEM:

WHEN VEHICLE PASSES OVER OPEN DETECTOR LOOP, THE ARM RAISES.

WHEN VEHICLE PASSES OVER AND OFF OF RESET DETECTOR LOOP, THE ARM LOWERS.

LOCATE BARRIER GATE EQUIPMENT 35' FROM ROADWAY SO THAT APPROACHING VEHICLES ARE ABLE TO COMPLETE RIGHT TURN BEFORE REACHING ACTUATING DEVICE.
Pay Gate Loop Layout Illustration

Operation of Pay Gate System:
When driver inserts card into cardlock, key into keylock, etc., the gate arm will raise to allow passage of the vehicle.
When vehicle passes over and off reset detector loop, the gate arm will lower.

This system is suitable for daily, monthly, or preferred parking and is widely used by hospitals, medical clinics, universities, office buildings, factories, etc., when there is need for controlled parking.

Location of Barrier Gate Equipment:
Locate barrier gate equipment 35' from roadway so that approaching vehicles are able to complete right turn before reaching actuating device.

Pay Gate Layout:
When vehicle passes over and off reset detector loop, the gate arm will lower.

Refer to loop installation notes for details.

When driver inserts card into cardlock, key into keylock, etc., the gate arm will raise to allow passage of the vehicle.
When vehicle passes over and off reset detector loop, the gate arm will lower.

This system is suitable for daily, monthly, or preferred parking and is widely used by hospitals, medical clinics, universities, office buildings, factories, etc., when there is need for controlled parking.

Refer to loop installation notes for details.

Pay Gate Loop Layout Illustration

Location of Barrier Gate Equipment:
Locate barrier gate equipment 35' from roadway so that approaching vehicles are able to complete right turn before reaching actuating device.

Pay Gate Layout:
When vehicle passes over and off reset detector loop, the gate arm will lower.

Refer to loop installation notes for details.
**Dual Gate Installations**

Two operators can be used in dual gate installations. The operators communicate with each other through the 3-wire COMM LINK terminals.

When one operator activates, the COMM LINK connection signals the other operator to activate. Each operator functions independently, controlling its gate and monitoring its inputs and accessories.

A three-wire shielded conductor cable is required to connect two operators together for dual operation. Use Belden 8760 Twisted Pair Shielded Cable (or equivalent) only – P/N 2500-1982, per foot).

✓ **NOTE:** The shield wire should be connected COMM LINK terminal “C” in both operators.

Three of the programming functions available are only used for dual gate installations:

- **Dual Gate Enable**
  Dual Gate Enable must be set for all dual gate installations.

- **Stagger Mode (Typically not used with barrier gates)**
  The Stagger Mode function determines if the operator has a delayed open or a delayed close. In dual swing gate installations, typically one operator is programmed for delayed open, and the other operator is programmed for delayed close.

- **Stagger Delay Time (Typically not used with barrier gates)**
  The Stagger Time sets the length of the delay for the Stagger Mode.

See Pages 11 & 13 for details on these three dual gate programming functions.

Set the following parameters in each gate operator individually in a single gate mode before connecting the network cable and operating in dual gate mode.

1. Open and Close Limit settings
2. Open and Closed direction inherent entrapment protection (OC & CC)

After these parameters have been set, and each operator has been tested independently and is functioning correctly in single gate mode, then set BOTH operators to dual gate (dg) in the Paired Mode setup step under Basic Programming steps.

**Gate Operation**

**Open Button**
Opens the gate. If the Auto Close Timer is set, it will be suspended until the OPEN button is released.

**Close Button**
Closes the gate if the gate is open. Also closes the gate if the gate is in the process of opening.

**Stop Button**
Stops the gate from opening or closing at any time.

**Single Input**
Opens the gate if it’s closed and closes the gate if it’s open (open-close programming option). Activating the input while the gate is moving will reverse the gate.

Can be programmed to stop the gate while the gate is moving (open-stop-close programming option).

**Fire Department Input**
Fully opens the gate when the input is activated. Overrides the Mid-travel Stop and Auto Close Timer (if either is programmed for the gate). The gate will lockout in the open position without sounding the alarm. Press the STOP button to release the lockout.

**Open Input**
Functions the same as the OPEN button.

**Open/Reset Input**
Programmable for standard reset loop, Open Counter Mode, or Open Supervised Mode. See Page 15.

**Close Obstruction Input**
While the gate is closing, any close obstruction signal will cause the gate to stop, reverse, and travel to the full open position. Should a open obstruction input or an open direction inherent entrapment condition occur prior to the gate reaching the open limit, the operator will lockout and sound the continuous tone alarm. Another close request will be required to start the operator again. If after restart, the overload or a close obstacle happens again before the close limit is reached, the operator will lockout and sound the alarm. If the auto close timer is set, when the close obstruction input is cleared, the gate will close when the auto close timer expires.

**Reverse Input**
If the reverse input is triggered while the gate is closing, the gate will reverse to the full open position. If the Auto Close Timer is set, when the reverse input is cleared, the gate will close when the Auto Close Timer expires. Not typically used with barrier gates.

**Open Loop**
Functions the same as the OPEN button.

**Reverse Loop**
Functions the same as the reverse input. Not typically used with barrier gates.

**Reset Loop**
Holds the gate fully open while triggered.
Operation Indications

During normal operation, the Controller’s displays will indicate current operating conditions and status.

Power-up Display

When the Controller powers up, dashes will show on the display, then the firmware version number, then the gate type (bg for barrier gates).

Exiting programming restarts the Controller. The power-up display will show upon the restart.

Idle Condition

While the Controller is idling, waiting for a command, the display will show circulating dashes.

For DC models only - Clockwise: Batteries discharging, Counterclockwise: Batteries charging.

Last Gate Position/Condition

When the gate moves or stops, the display will show the status for up to one minute.

- Stop is displayed as St
- Full Close is displayed as FC
- Full Open is displayed as FO
- Entrapment is displayed as En

Reverse Delay

If the gate travel direction is reversed from a user activation or reversing device, and a reverse delay is set, the display will count down the delay time in seconds before the operator restarts.

Run Timer

While the gate is opening or closing, the number of seconds running time is displayed.

Error Indications

During abnormal operation, the Controller’s displays and beeper will indicate the error condition that has occurred.

Entrapment

If an entrapment condition occurs detected by two repeated open or close obstruction triggers, the Controller will lock the operator out. To reset the Controller press the STOP button.

WARNING

The Stop and/or Reset button must be located in the line-of-sight of the gate. Activation of the reset control shall not cause the operator to start.

COMM LINK Connection Failure

In dual gate installations, if there is a connection failure between the two operators, the COMM LINK indicator will blink once a second. During this condition the gate will not operate, except if triggered by the FIRE DEPT input, which functions normally.

MGT Obstacle Transmitter Trouble

If any MGT transmitters are used with the operator, their supervision feature will alert the Controller if there is any trouble with the transmitter. MGT transmitters send hourly status reports and will send low battery reports when the transmitter has a low battery. The MGT transmitters also have a tamper detection switch that will trigger when their case is opened.

When the Controller detects a low transmitter battery, a tamper signal, or missing transmitter status reports, the gate will still operate normally, but the beeper will change as follows:

- The Pre-start Alarm will beep twice as fast.
- The Run Alarm will beep twice as fast and continue for five minutes after the gate stops.
- The sounder will “chirp” every five seconds when the gate is idle.

Correct the trouble (close case, replace battery, or replace transmitter) to clear the obstacle transmitter trouble indications.

Maximum Run Time Exceeded

If the Maximum Run Time is exceeded, the Controller stops the operator the same as if a double obstacle has occurred in an entrapment condition. The condition is cleared by pressing the STOP button.

<table>
<thead>
<tr>
<th>ERROR CAUSE</th>
<th>ERROR INDICATION</th>
<th>HOW TO CLEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWO SAFETY REVERSALS ON SINGLE GATE OR ON EITHER DUAL GATE</td>
<td>En 00, CONTINUOUS ALARM BEEPER, GATE DISABLED</td>
<td>PRESS STOP BUTTON</td>
</tr>
<tr>
<td>MAXIMUM RUN TIMER EXCEEDED ON OPENING</td>
<td>En 01 AND MAX RUN LED, CONTINUOUS ALARM BEEPER, GATE DISABLED</td>
<td>PRESS STOP BUTTON, CLEARS CONTINUOUS ALARM, THEN DOUBLE BEEP EVERY 5 SECONDS UNTIL NEXT OPERATION</td>
</tr>
<tr>
<td>MAXIMUM RUN TIMER EXCEEDED ON CLOSING</td>
<td>En 02 AND MAX RUN LED, CONTINUOUS ALARM BEEPER, GATE DISABLED</td>
<td>PRESS STOP BUTTON, CLEARS CONTINUOUS ALARM, THEN DOUBLE BEEP EVERY 5 SECONDS UNTIL NEXT OPERATION</td>
</tr>
<tr>
<td>COMM LINK FAILURE</td>
<td>En 03 AND COMM LINK LED, CONTINUOUS ALARM BEEPER FOR 1 MINUTE, GATE DISABLED (EXCEPT FOR FIRE DEPT INPUT)</td>
<td>PRESS STOP BUTTON, CLEARS CONTINUOUS ALARM</td>
</tr>
<tr>
<td>GATE FULL OPEN RESULTING FROM FIRE DEPT INPUT</td>
<td>En 04, GATE DISABLED</td>
<td>PRESS STOP BUTTON</td>
</tr>
<tr>
<td>FAIL SAFE OR FAIL SECURE BECAUSE OF BATTERY VOLTAGE DROP BELOW 21.6 VDC DUE TO AC POWER LOSS</td>
<td>En 05, GATE DISABLED</td>
<td>BATTERY VOLTAGE MUST RISE ABOVE 24 VDC</td>
</tr>
<tr>
<td>OTHER CONTROLLER IN ENTRAPMENT (SINGLE GATE)</td>
<td>En 06, GATE DISABLED</td>
<td>CLEAR ENTRAPMENT ON OTHER CONTROLLER (PRESS STOP)</td>
</tr>
<tr>
<td>LOW AC VOLTAGE AT CONTROLLER LEVEL</td>
<td>En 07, GATE DISABLED</td>
<td>RESTORE AC POWER TO NORMAL LEVEL</td>
</tr>
<tr>
<td>INPUT TRIGGERED DURING ENTRAPMENT LOCKOUT</td>
<td>En 08, GATE DISABLED</td>
<td>PRESS STOP BUTTON</td>
</tr>
<tr>
<td>COMPATIBILITY PROBLEM</td>
<td>En 09, GATE DISABLED</td>
<td>UPDATE FIRMWARE AND RESET BOTH PAIRED CONTROLLERS</td>
</tr>
<tr>
<td>EEPROM PROBLEM</td>
<td>En 10, GATE DISABLED</td>
<td>TRIM RESET, CALL TECH SUPPORT</td>
</tr>
<tr>
<td>DC MOTOR MISMATCH</td>
<td>En 11, GATE DISABLED</td>
<td>REPROGRAM MOTOR TYPE OR CHANGE DC MOTOR BOARD, NEXT GATE MOVEMENT WILL RETRY DC MOTOR CHECK</td>
</tr>
<tr>
<td>MOTOR FAILURE</td>
<td>En 12, GATE DISABLED</td>
<td>CALL TECH SUPPORT</td>
</tr>
<tr>
<td>AC POWER LOSS IN OPEN OR CLOSE IMEDIATE POWER FAIL MODE</td>
<td>En 13</td>
<td>REAPPLY AC POWER</td>
</tr>
<tr>
<td>MAXIMUM RUN TIMER EXCEEDED AFTER AC POWER LOSS</td>
<td>En 14</td>
<td>BATTERY VOLTAGE MUST RISE ABOVE 24 VOLTS</td>
</tr>
<tr>
<td>MGT SUPERVISORY CONDITION (DAMPS, LOW BATTERY, MISSING Hourly STATUS)</td>
<td>FAST BEEPS DURING PRESTART, FAST BEEP RUN ALARM, CHIRP EVERY 5 SECONDS AT IDLE</td>
<td>CLEARS WHEN MGT CONDITION CLEARS</td>
</tr>
</tbody>
</table>
Troubleshooting

Contacting Technical Support
For technical questions regarding Linear gate operators, contact the Technical Services Department at:

1-800-421-1587 from 5:00 AM to 4:30 PM Pacific time

Operator fails to start
A. If the operator has been running a large number of cycles, the motor may have become too hot and tripped its thermal overload breaker. Allow the motor to cool down and the thermal overload breaker will reset automatically.
B. Make sure you have power at the master distribution panel and that the power has not been turned off.

Motor operates, but gate does not move
A. In operators with torque limiters and friction pad clutches, check for signs of slipping. You can mark the sprocket and clutch with a yellow or white grease pen and watch for the lines to move apart if slipping is taking place. Adjust the torque limiter tighter if this is the problem.
B. Check for broken chain or worn belts.
C. Check all setscrews on pulleys and sprockets and tighten them if necessary, and check for keys which may have fallen loose from keyways.

Motor sounds like it is working harder than normal
A. Make sure the gate is moving freely and without binding throughout its entire travel.
B. Check the drive chain for obstructions (if the operator has one).
C. If the operator has an internal brake mechanism, make sure it is releasing.

Limit switch getting out of time
A. Check the setscrews in limit cams for tightness. Replace if necessary.

Gate stopping part way open or closed (but no visible obstruction)
A. The Controller may have received a false obstruction input triggered by current sensing set too low. Make sure the gate moves freely through its entire travel before adjusting the current sensing.
B. The Maximum Run Timer may have counted down and expired. This can be caused by having the timer set too low, if a chain or belt is broken, or if a sprocket or pulley is slipping. When the timer expires, the gate stops.
C. An obstruction signal from an accessory wired to the obstruction input may have triggered falsely. Check the control board for lit indicators for any of the following inputs: safety, shadow/reset, open obstruction, close obstruction, stop, etc. If any are lit when the operator should be running, remove all devices hooked to that function and hook them up one at a time and try to run the operator until the problem device is found. Refer to Page 8 for details on the control board indicators.

Gate staying open with automatic system
A. If there are vehicle detectors used with the operator, one of the loops or loop detectors may be sending a false signal or needs to be reset. Observe the indicators on the loop detector. Unplug the detector and try running the operator.
B. An opening or reversing device may be stuck or malfunctioning. Try disconnecting these devices and hook them back up one at a time and try running the operator until the malfunctioning device is found.
C. Make sure the close limit switch isn’t activated. If it is, the operator will think the gate is already closed.

How to Order Replacement Parts
Use the part numbers listed on the following pages.
Contact your local Linear dealer or distributor to order parts.

1. Supply the model number and serial number of your operator.
2. Specify the quantity of pieces needed and order by part number and name of part.
3. State whether to ship by freight, truck, parcel post, UPS or air express.
4. State whether transportation charges are to be prepaid or collect.
5. Specify name and address of person or company to whom parts are to be shipped.
6. Specify name and address of person or company to whom invoice is to be sent.
### Model SG Exploded View

#### MODEL SG MECHANICAL PARTS LIST

<table>
<thead>
<tr>
<th>REF. #</th>
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<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2110-780</td>
<td>Enclosure only (without door)</td>
</tr>
<tr>
<td>2</td>
<td>2100-2142</td>
<td>Removable Enclosure Top</td>
</tr>
<tr>
<td>3</td>
<td>2110-318</td>
<td>Louvered Door Assembly with Lock</td>
</tr>
<tr>
<td>4</td>
<td>2100-2141</td>
<td>Latch for Enclosure Top</td>
</tr>
<tr>
<td>5</td>
<td>2220-008</td>
<td>Lock Assembly with Keys</td>
</tr>
<tr>
<td>6</td>
<td>2110-746</td>
<td>Bearing Block Assembly Kit</td>
</tr>
<tr>
<td>7</td>
<td>2110-034</td>
<td>Drive Shaft Assembly</td>
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<tr>
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</tr>
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<td>2100-1925-B1</td>
<td>Arm Attachment Channel</td>
</tr>
<tr>
<td>10</td>
<td>2100-1926-B1</td>
<td>Counterweight</td>
</tr>
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<td>11</td>
<td>2200-136</td>
<td>Flange Bearing only</td>
</tr>
<tr>
<td>12</td>
<td>2110-441</td>
<td>Connecting Link with Bearings</td>
</tr>
<tr>
<td>13</td>
<td>2100-780</td>
<td>Enclosure only (without door)</td>
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<tr>
<td>14</td>
<td>2100-2142</td>
<td>Removable Enclosure Top</td>
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<td>15</td>
<td>2110-318</td>
<td>Louvered Door Assembly with Lock</td>
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<td>16</td>
<td>2100-2141</td>
<td>Latch for Enclosure Top</td>
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<tr>
<td>17</td>
<td>2500-2307</td>
<td>1/2 HP 115 VAC, 1 PH</td>
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<td>18</td>
<td>2500-2308</td>
<td>1/2 HP 208/230 VAC, 1 PH</td>
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<td>19</td>
<td>2500-2336</td>
<td>Capacitor for 2500-2307 Motor</td>
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<td>2500-2337</td>
<td>Capacitor for 2500-2308 Motor</td>
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<tr>
<td>21</td>
<td>2100-364</td>
<td>Intermediate Shaft</td>
</tr>
<tr>
<td>22</td>
<td>2110-117</td>
<td>Gear Reducer and Crank Arm Assembly</td>
</tr>
<tr>
<td>23</td>
<td>2200-917</td>
<td>Reducer Pulley, 7&quot; (2 required)</td>
</tr>
<tr>
<td>24</td>
<td>2200-918</td>
<td>Intermediate Pulley, 2&quot; (2 required)</td>
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<tr>
<td>25</td>
<td>2200-936</td>
<td>V-Belt, (2 required) 25&quot; Cogged</td>
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<td>26</td>
<td>2200-235</td>
<td>Motor Pulley, 1-5/8&quot;</td>
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<tr>
<td>27</td>
<td>2200-011</td>
<td>Intermediate Pulley, 6&quot; (2 required)</td>
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<tr>
<td>28</td>
<td>2200-937</td>
<td>V-Belt, (2 required) 26&quot; Cogged</td>
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<td>2400-178</td>
<td>Carriage Bolt, 3/8&quot; x 1/2&quot; x 1/2&quot;</td>
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<td>2400-015</td>
<td>Hex Nut, 3/8&quot; -16</td>
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<td>2400-017</td>
<td>Flat Washer, 3/8&quot;</td>
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<tr>
<td>32</td>
<td>2400-182</td>
<td>Wing Nut, #10-32</td>
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<td>2200-314</td>
<td>Set Collar, 1-1/4&quot;</td>
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<td>2400-474</td>
<td>Spring Pin, 3/8&quot; x 2&quot;</td>
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<td>2400-043</td>
<td>Star Washer, #10</td>
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<td>2400-032</td>
<td>Hex Nut, #10-32</td>
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<td>37</td>
<td>2400-049</td>
<td>Screw, #8-32 x 3/8&quot;, Self-tap</td>
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<tr>
<td>38</td>
<td>2200-764</td>
<td>Limit Switch</td>
</tr>
<tr>
<td>39</td>
<td>2400-346</td>
<td>Screw, #6-32 x 2-1/4&quot;, Pan-head</td>
</tr>
<tr>
<td>40</td>
<td>2400-069</td>
<td>Keps Nut, #6-32</td>
</tr>
<tr>
<td>41</td>
<td>2400-236</td>
<td>Limit Cam</td>
</tr>
<tr>
<td>42</td>
<td>2400-238</td>
<td>Key, 3/16&quot; x 3/16&quot; x 1-1/4&quot;</td>
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<tr>
<td>43</td>
<td>2400-254</td>
<td>Key 3/16&quot; x 3/16&quot; x 3&quot;, Intermediate Shaft</td>
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<td>44</td>
<td>2400-188</td>
<td>Thrust Washer</td>
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<tr>
<td>45</td>
<td>2400-165</td>
<td>Shoulder Bolt, 1/2&quot; - 13 x 2&quot;</td>
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<tr>
<td>46</td>
<td>2200-222</td>
<td>Bearing, Pillow Block</td>
</tr>
<tr>
<td>47</td>
<td>2400-133</td>
<td>Key 1/4&quot; x 1/4&quot; x 2-1/4&quot;, Intermediate Shaft</td>
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<tr>
<td>48</td>
<td>2400-1804</td>
<td>Rear Accessory Shelf</td>
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<td>2100-1879</td>
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<tr>
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<td>2510-422</td>
<td>115 VAC Power Box Assembly</td>
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<td>2510-430</td>
<td>230 VAC Power Box Assembly</td>
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<td>56</td>
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<tr>
<td>58</td>
<td>2510-423</td>
<td>Knob Kit</td>
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<tr>
<td>59</td>
<td>2400-343</td>
<td>1/4-20 Tinnerman Clip</td>
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### Motors & Capacitors

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<th>PART #</th>
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<td>2400-069</td>
<td>Keps Nut, #6-32</td>
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<td>Limit Cam</td>
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<td>2400-254</td>
<td>Key 3/16&quot; x 3/16&quot; x 3&quot;, Intermediate Shaft</td>
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<td>Thrust Washer</td>
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### Model SG-D Exploded View

**MODEL SG-D MECHANICAL PARTS LIST**

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<td>Removable Enclosure Top</td>
</tr>
<tr>
<td>3</td>
<td>2110-318*</td>
<td>Louvered Door Assembly with Lock</td>
</tr>
<tr>
<td>4</td>
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<td>Latch for Enclosure Top</td>
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<tr>
<td>5</td>
<td>2220-008</td>
<td>Lock Assembly with Keys</td>
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<tr>
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<td>2110-746</td>
<td>Bearing Block Assembly Kit</td>
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<td>Drive Shaft Assembly</td>
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<td>Arm Attachment Channel</td>
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<td>Gear Reducer and Crank Arm Assembly</td>
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<td>Intermediate Pulley, 6&quot; (2 required)</td>
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<td>V-Belt, 2 required 26° Cogged</td>
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<td>2400-175</td>
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<td>Hex Nut, 3/8&quot; x 1-1/2&quot;</td>
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<td>Set Screw, 1-1/4&quot;</td>
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<td>32</td>
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<td>Screw, #8-32 x 3/8&quot;, Self-tap</td>
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<td>33</td>
<td>2500-764</td>
<td>Limit Switch</td>
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<td>2400-246</td>
<td>Screw, #8-32 x 2-1/4&quot;, Pan-head</td>
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### Reference Parts

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<td>2400-069</td>
<td>Keps Nut, #6-32</td>
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<td>2300-028</td>
<td>Limit Cam</td>
</tr>
<tr>
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<td>2400-238</td>
<td>Key, 3&quot; x 3/16&quot; x 3/16&quot; x 1/2&quot;</td>
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<tr>
<td>45</td>
<td>2400-254</td>
<td>Key 3/16&quot; x 3/16&quot; x 3&quot;, Intermediate Shaft</td>
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<tr>
<td>46</td>
<td>2400-188</td>
<td>Thrust Washer</td>
</tr>
<tr>
<td>47</td>
<td>2400-185</td>
<td>Shoulder Bolt, 1/2&quot; x 2&quot;</td>
</tr>
<tr>
<td>48</td>
<td>2200-222</td>
<td>Bearing, Pillow Block</td>
</tr>
<tr>
<td>49</td>
<td>2400-133</td>
<td>Key 1/4&quot; x 1/4&quot; x 2&quot;</td>
</tr>
<tr>
<td>50</td>
<td>2100-1995</td>
<td>Power Disconnect Box and Transformer Mounting Bracket</td>
</tr>
<tr>
<td>51</td>
<td>2510-432</td>
<td>Power Box Assembly</td>
</tr>
<tr>
<td>52</td>
<td>2500-2411</td>
<td>Power Switch</td>
</tr>
<tr>
<td>53</td>
<td>2500-2413</td>
<td>Power Outlet</td>
</tr>
<tr>
<td>54</td>
<td>2500-2473</td>
<td>Relay, 24 VDC</td>
</tr>
<tr>
<td>55</td>
<td>2500-1768</td>
<td>Bridge Rectifier</td>
</tr>
<tr>
<td>56</td>
<td>2500-1819</td>
<td>Fuse Holder</td>
</tr>
<tr>
<td>57</td>
<td>2500-1748</td>
<td>Fuse, 10 Amp, Slow-Blow</td>
</tr>
<tr>
<td>58</td>
<td>2100-1804</td>
<td>Rear Accessory Shelf</td>
</tr>
<tr>
<td>59</td>
<td>2100-1820</td>
<td>Front Accessory Shelf</td>
</tr>
<tr>
<td>60</td>
<td>2510-182</td>
<td>Battery Assembly (Linear supplied - some distributors supply other batteries)</td>
</tr>
<tr>
<td>61</td>
<td>2500-1118</td>
<td>Battery, 12V (2 required)</td>
</tr>
<tr>
<td>62</td>
<td>2520-524</td>
<td>Wiring Harness Assembly (not shown)</td>
</tr>
<tr>
<td>63</td>
<td>2100-2143</td>
<td>Power Box Mounting Strap</td>
</tr>
<tr>
<td>64</td>
<td>2510-439</td>
<td>ApeX Module and DC Motor Board Assembly</td>
</tr>
<tr>
<td>65</td>
<td>2500-2393</td>
<td>ApeX Module</td>
</tr>
<tr>
<td>66</td>
<td>2500-2399</td>
<td>ApeX DC Motor Module</td>
</tr>
<tr>
<td>67</td>
<td>2100-2104</td>
<td>ApeX Mounting Plate</td>
</tr>
<tr>
<td>68</td>
<td>2300-1025</td>
<td>Plastic Cover Only</td>
</tr>
<tr>
<td>69</td>
<td>2510-423</td>
<td>Knob Kit</td>
</tr>
</tbody>
</table>

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SG • SG-D Barrier Gate Operator Installation Guide - 23 -
## Model SG & SG-D Arm Parts List

<table>
<thead>
<tr>
<th>REF. #</th>
<th>PART #</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2700-082</td>
<td>Arm Assembly, complete with hardware</td>
</tr>
<tr>
<td></td>
<td>2700-082-NOHDWE</td>
<td>Arm Assembly, less hardware</td>
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<tr>
<td></td>
<td>2110-756</td>
<td>Hardware only</td>
</tr>
<tr>
<td>1</td>
<td>2100-495</td>
<td>Wood Arm, 1&quot; x 6&quot; x 16' (2 required)</td>
</tr>
<tr>
<td>2</td>
<td>2100-496</td>
<td>Wood Extension Arm, 1&quot; x 6&quot; x 10'</td>
</tr>
<tr>
<td>3</td>
<td>2400-108</td>
<td>Screw, 3/8&quot;-16 x 3&quot; hex head</td>
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<tr>
<td>4</td>
<td>2400-017</td>
<td>Flat Washer, 3/8&quot;</td>
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<td>5</td>
<td>2400-016</td>
<td>Lock Washer, 3/8&quot;</td>
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<td>6</td>
<td>2400-015</td>
<td>Hex Nut, 3/8&quot; - 16</td>
</tr>
<tr>
<td>7</td>
<td>2400-418</td>
<td>Nylon Lock Nut, 1/2&quot; - 13</td>
</tr>
<tr>
<td>8</td>
<td>2400-376</td>
<td>Flat Washer, 1/2&quot;</td>
</tr>
<tr>
<td>9</td>
<td>2100-1917</td>
<td>Mechanical Tube, 8&quot; long</td>
</tr>
<tr>
<td>10</td>
<td>2100-1963</td>
<td>Threaded Rod, 1/2&quot; - 13 x 12&quot; long</td>
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<tr>
<td>11</td>
<td>2100-1916</td>
<td>Mechanical Tube, 18&quot; long</td>
</tr>
<tr>
<td>12</td>
<td>2100-1962</td>
<td>Threaded Rod, 1/2&quot; - 13 x 22&quot; long</td>
</tr>
<tr>
<td></td>
<td>2300-663</td>
<td>Yellow/Black 2’ Caution Tape, per yard</td>
</tr>
</tbody>
</table>
Battery Maintenance
The gel-cell batteries in this operator require no routine maintenance. For assured continued performance, they should be replaced every year. If power is to be removed for one week or more, disconnect the negative wire from the batteries as this will prevent deep discharging. Fully charge before use after storage or upon initial installation.

Preventative Maintenance

General
Linear gate operators are designed for many years of trouble-free operation and, under recommended operating conditions, will require only minimal maintenance. To ensure that a unit is ready for operation at all times, and to preclude serious damage or failure, inspect the unit systematically. Proper adjustments and lubrication should be made as recommended.

Lubrication
✓ Bearings — For models which have pillow block style bearings with grease fittings, lubricate at least twice a year with a lithium complex based, petroleum oil NLGI 2 rated grease. Oilite and precision sealed bearings do not require additional lubrication.
✓ Motor — Motors have sealed ball bearings and do not require further lubrication. If bearing noise develops after several years of operation, bearings should be replaced by a motor repair company, or the motor should be replaced if necessary.
✓ Barrier Gate Arm — Check all bolts for proper tension and tighten if necessary. If the arm has been warped or damaged, replace as necessary.

6-Month Preventative Maintenance
1. For operators which utilize torque limiting clutches, check for proper tightness. If there appears to be dust from wear on the pads, inspect the pads and replace if necessary. If the clutch cannot be adjusted tightly enough to move the gate without slipping, the pads must be replaced.
2. For operators with V-belts, inspect for wear and replace as necessary. Check for proper tension and adjust if required. Check all pulley setscrews for tightness and tighten if necessary.
3. For operators with internal chain drives, inspect chain and sprockets for wear and replace if necessary. Check for proper tension and alignment, and adjust if required. Check all hub sprocket setscrews and tighten if required.
4. Check limit switches and limit actuators (cams, limit nuts, etc.) for wear and replace as required. In rotary limit switch assemblies, wipe the limit shaft clean and apply a light coating of dry lubricant.
5. Inspect all nuts and bolts for proper tightness and tighten as necessary.
6. Check all reversing devices for proper function. Inspect all contact edges for wear and replace if required. Check photoeyes for proper alignment and function.
7. Check current sensing for proper adjustment when finished with inspection and maintenance.
8. Inspect the installation area. Are all the warning signs intact and visible? If they are missing or need replacing, contact Linear. Be sure there are no control stations mounted within reach of the gate. Review safety literature with the customer and advise them to remove any such stations found.

FCC Notice
This device complies with FCC Rules Part 15 and Industry Canada Rules & Regulations. 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.
## Gate Operator Installation Checklist

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>INSTALLER</th>
<th>CUSTOMER</th>
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<tbody>
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<td>12.</td>
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</table>

By signing this installation checklist, I/we hereby certify that each item listed and checked above has been covered by the installer and is clearly understood by the customer.