

CHAMBERLAIN®

**LiftMaster®**  
**PROFESSIONAL**

ESTATE SERIES



## INSTALLATION MANUAL

**MODEL SW 2000-X3**

HEAVY DUTY, HIGH CYCLE SWING GATE OPERATOR



***MODEL SW 2000-X3 IS FOR VEHICULAR PASSAGE GATES ONLY, NOT INTENDED FOR PEDESTRIAN PASSAGE GATE USE***

### **3 YEAR WARRANTY**

Serial # \_\_\_\_\_  
(located on electrical box)

Installation Date \_\_\_\_\_





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# The LiftMaster Gate Operator Model SW 2000-X3

The LiftMaster Gate Operator model SW 2000-X3 is a full featured, commercial swing gate operator with a telephone interface. The gate operator contains the following features:

- **Satisfies U.L. 325 requirements** for primary (motor current) and secondary (photo) obstruction senses.
- **Five different open inputs** are available for a variety of devices.
- **Dynamic motor braking** limits gate overtravel.
- **Separated arm segment joints** reduce the risk of injury to users.
- **Alternate action OPEN/CLOSE inputs.**
- **Manual Open/Close/Stop inputs** are provided for three-button station.
- **Programmable Reclose timer.**
- **Gate lock relay** can be used for electromagnetic locks and CCTV cameras or lights.
- **Master-Slave operation** for two operators on bi-part gates and vehicle trap gates.
- **Selectable anti-tailgate function** prevents two cars from entering on one open command.
- **Open motor detection** in case of motor thermal overload.
- **Maximum Run Time** feature stops run-away motor in case of belt breakage.
- **Senses obstructions** through adjustable peak and fixed average motor current sense.
- **Two separate peak motor current sense adjustments** for reversing direction or stopping; one for clockwise motion and the other for counterclockwise motion.
- **Start-up current sense adjustment** offsets initial inrush current to the motor.
- **Obstruction Alarm** sounds off the second time the gate is obstructed.
- **Interrupt Bar input** is included for use with edge sensors.
- **Cycle counter** is able to initiate a service request call at a predetermined number.
- **Event recording memory** keeps track of all commands and actions even during power interruptions. This is very helpful in troubleshooting the system. Can be retrieved by modem into your computer.
- **Automatic service request call** is activated in the event of a fault or warning condition. A call can be made to any telephone or pager and will include system ID number and fault condition code.
- **12-button keypad and 7-segment display** to facilitate programming, service and operation.
- **Automatic OPEN/CLOSE and Alert Call schedules include holidays.**
- **Two 115 VAC accessory plugs** provided.
- **24 VAC** accessory power provided.
- **True ½ HP high starting torque motor** reduces stalling.
- **80:1 worm gear reduction.**
- **Handles any gate weight** up to 1000 pounds and length up to 18 feet.
- **Diagnostic LEDs** on controller board show gate operator actions and assist in troubleshooting.
- **Remote telephone interface** permitting gate operator programming and diagnostics.
- **Inside and Outside Interrupt Loops and Photo Sensor Inputs** enhance gate control and distinguish between entering and exiting traffic.
- **Quick disconnect arm cap** for fast and easy release of gate arm.
- **Cover access door** provides easy access to the control box.
- **Optional loop detector add-on boards** plug into the controller board, reducing wiring.

<b>DIMENSIONS</b>	<b>WEIGHT</b>	<b>ELECTRICAL</b>
Height 24"	159 Lb.	115 VAC, 60 Hz. Single Phase 15 amp (A separate 20 AMP circuit is required by most codes.)
Width 20"		
Depth 23"		



# SAFETY SUMMARY

It is important for everyone involved in the installation and operation of the Gate Operator to read the following warnings.

## WARNING!

1. **READ AND FOLLOW ALL INSTRUCTIONS.** Improper installation of a gate operator can result in a dangerous system. **SAVE THESE INSTRUCTIONS.**
2. A vehicle gate is a large, heavy object that is moved by an electric motor. A moving gate can cause serious injury or death! The safety and well-being of others depends on the installation of a safe system.
3. The entrance is for **VEHICLES ONLY**. Pedestrians must use a separate entrance. Always keep people and objects away from the gate. **NO ONE SHOULD CROSS THE PATH OF THE MOVING GATE.**
4. Choose one or more controls that together will allow complete control of the gate. Most importantly, the gate must be able to be stopped at all times in case of emergency, and the emergency control should be conveniently located, clearly marked and visible.
5. All controls must be kept out of the reach of small children. Serious injury or death can result from children playing with the controls.
6. All controls should be located so the person operating them can see the full area of gate movement.
7. Use the emergency release only when the gate is not moving.
8. **KEEP GATES PROPERLY MAINTAINED.** Have a qualified person make repairs to the gate hardware.
  - Test the gate operator safety features 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 damage, injury or death.
9. Gate operators and associated control equipment should be installed by qualified professional installers who should observe the following safe installation procedures:
  - Power should always be disconnected whenever installing, wiring or servicing a gate operator. Moving chains in gate operators can catch clothing or fingers and cause severe injury.
  - Installation of wiring should comply with local building and electrical codes.
  - All manual gate locks should be disabled to avoid damage to the gate or gate operator should the lock become engaged after the operator is installed.
  - All operator controls and safety equipment should be tested at the conclusion of installation to be sure they are functioning properly.
  - The operation of the gate controls and safety equipment should be reviewed with the owner and/or end user of the automated gate system. They should also be informed of the need to maintain control and safety equipment on a regular basis. Safety equipment should be checked monthly to ensure it is working properly. All installation manuals and safety information should be left with the owner.
  - Moving gates have pinch points and entrapment zones which can be extremely dangerous to pedestrians, especially small children.

# BASIC INSTALLATION HINTS AND RULES

READ THIS SECTION CAREFULLY BEFORE BEGINNING YOUR INSTALLATION.

1. **UNDERSTAND THE SYSTEM AND INSTALLATION SITE THOROUGHLY.** The SW 2000 is a flexible and reliable gate operator system, but the quality of service depends directly on the quality of installation. Please read these instructions carefully and study the applicable diagrams before planning your installation. In particular, understand any site characteristics that may affect the system installation.

## WARNING

2. **INSTALL PERMANENT WIRING.** UL specifications require the SW 2000 system to be permanently wired. Refer to your local wiring code for specific information.  
**WARNING:** Damage caused by faulty wiring is not covered by warranty.

3. **U.L. OBSTRUCTION-SENSING REQUIREMENTS.** To maximize safety, U.L. 325 standards require primary obstruction sensing (gate sensitivity to impact) and secondary obstruction sensing (photo-sensors) be in operation at all times.

4. **GROUND THE SYSTEM.** The system contains parts which may be damaged by static discharge. A proper earth ground connected to the gate operator housing at the lower left grounding screw (see Figure 12) will significantly reduce the chances of damage or improper operation. The shielding in the cables specified for all remote sensors and controls should also be connected to earth ground at the controller end of the cable only. To be effective, the ground connection must be made by running 12 AWG copper wire to a good ground point (e.g., an electrical panel, a metallic cold water pipe that runs into the earth, or a grounding rod at least 10 feet in length that is driven into the earth) within 12 feet of the system. Even if you have a good earth ground, you should try to discharge any static before handling the circuit boards.

**WARNING:** Damage caused by static discharge and lightning is not covered by warranty.

5. **PROVIDE POWER FROM A DEDICATED SOURCE.** The outlet into which you connect the Gate Operator should be wired to its own circuit breaker to reduce line noise and minimize the risk of having other equipment interrupt system operation. In a Master/Slave system, Master and Slave must each have separate circuits.
6. **DO NOT OVERLOAD THE TERMINAL BLOCKS.** The terminal blocks are removable and the pins are soldered into the boards. To connect your wires, remove the "head" from the correct terminals and loosen the screws. Insert the wire into the correct opening on the front and tighten the screw until the wire is held firmly. When you have made all connections for a given "head", plug it back onto the pins designated for that terminal block.

Stranded wire must be between 16 and 24 AWG. Solid wire must be between 18 and 24 AWG. This is the total thickness measurement so, if you are putting two wires in, the combined thickness must fall within this range. **NEVER** try to insert more than two wires per terminal.

7. **ENSURE GOOD CONNECTIONS.** A light tug on the wire will tell you if the connection is secure. When reconnecting system components, make sure all pins are straight on chips, connectors, and terminal block heads.
8. **READ THE MARKINGS CAREFULLY.** The connection points are marked on the boards clearly. Before making any connection, be sure to read the marking and check it against the corresponding figure in these instructions.
9. **TRAIN YOUR CUSTOMERS THOROUGHLY.** Although customer responsibility is limited to proper installation, the quality of service is determined by the care of system setup. Ensure that the customer has a copy of this manual to guide them.



# PART 1 SITE PREPARATION

## A. LOCATION AND LAYOUT

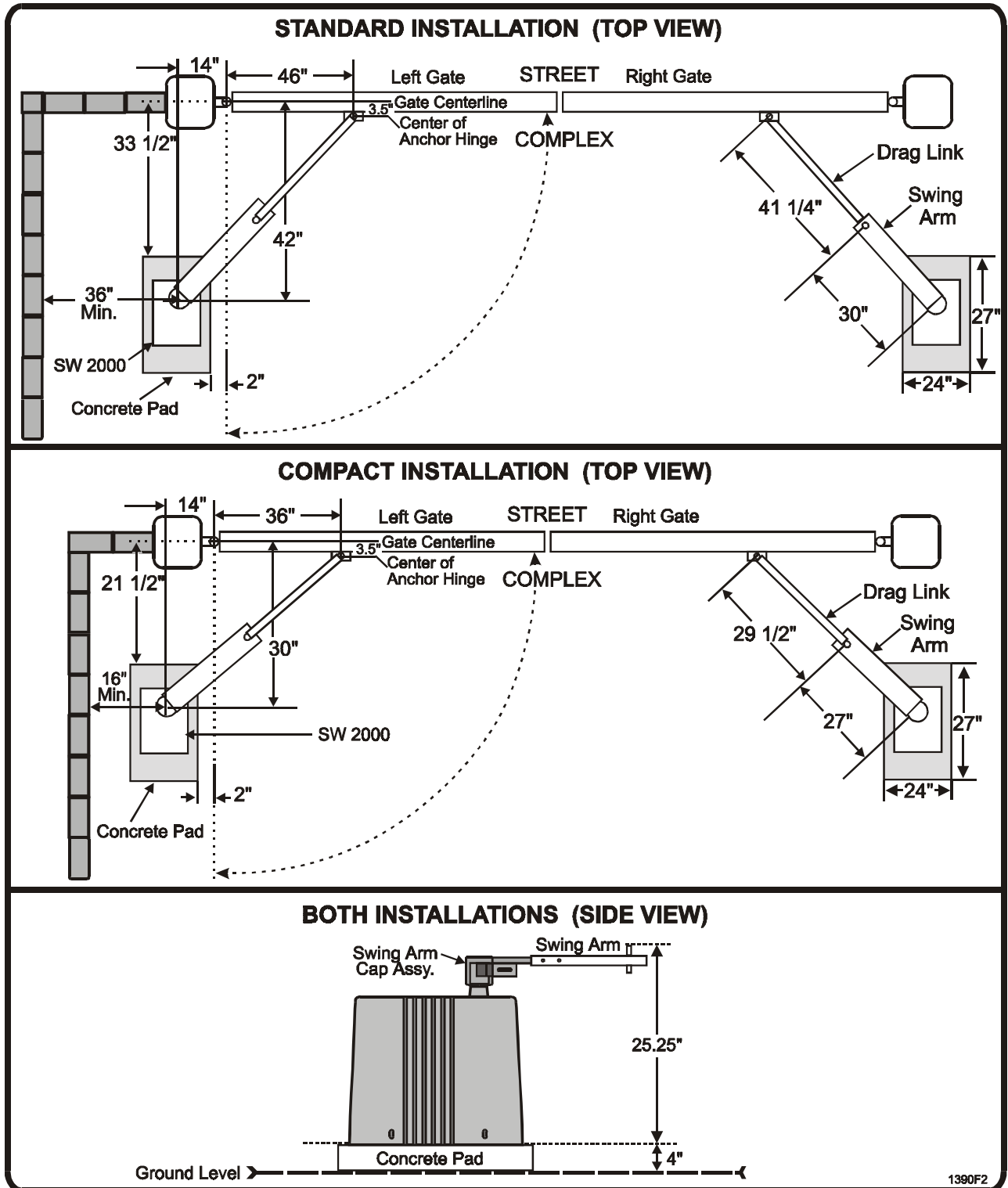


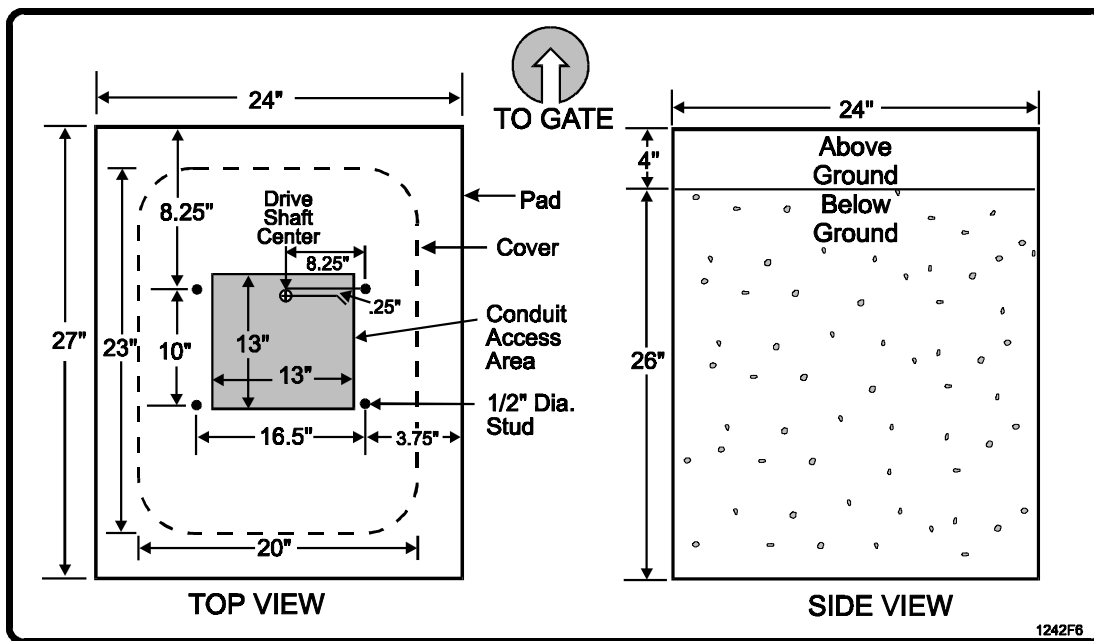
Figure 1. Gate Operator Layout Options

## NOTES

- Left Gate and Right Gate are determined by looking from *inside* the complex toward the street.
- Figure 1 shows a typical Bi-Parting gate in standard and compact installations.

1. Always install gate operators inside of the fence line, NEVER on the public side of the fence.
2. Mount all manual controls and activating devices at least 6 ft. away from the gate for safety.
3. Allow enough clearance around the gate and the gate operator for installation and service.

## B. PAD AND MOUNT



**Figure 2. Pad and Mount.**

1. The concrete pad must be sufficient to support the gate operator and the dynamic forces created by the moving gate. LiftMaster recommends a pad 24" wide by 27" long by 30" deep.
2. The operator must be level and parallel to the gate, so the pad should be level and about 4" above grade to prevent water entrance.
3. Four anchor bolts are required to secure the gate operator to the pad. The mounting holes in the gate operator are 5/8" in diameter. Red Head bolts 1/2" x 3 1/2" are recommended.
4. Be sure to provide access for wiring conduits. In Master/Slave systems, remember to include conduit stubs for separate inputs (if any) and for the Master/Slave connection cable between gate operators. For more information about Master/Slave systems, see Master/Slave Systems for X3 Series Gate Operators.

**NOTE:** *Shading indicates conduit stub access areas.*

## C. POWER WIRING

1. Provide a separate conduit stub for the AC power.
2. Each gate operator requires a 115 VAC 20 AMP single phase circuit  
**NOTE:** Master and Slave units each require separate circuits to prevent false overcurrent faults (see X3 Series Master/Slave Systems).
3. Wiring must comply with the local Electrical Code for operating a 1/2 HP motor. 12 AWG for up to 300' and 10 AWG for up to 500' long wire runs is suggested.
4. Be sure to pull a ground wire in the conduit for the connection to the gate operator.  
**NOTE:** Do not rely on metallic conduit for earth ground.

## D. LOOP DETECTORS AND PHOTO-SENSORS

1. A shelf is provided (10" x 11" x 18" high) to support non-LiftMaster loop detector electronics. Power for the loop detector can come from the auxiliary 115 VAC plugs in the gate operator or from the 24 VAC provided by the gate operator control board.  
**NOTE:** The auxiliary plugs have power regardless of the unit power switch setting.
2. Conduit provisions should be made for the "loop" wire entrance to the loop detector.
3. Wiring should be 16-24 AWG stranded or 18-24 AWG solid.  
**NOTE:** Optional LiftMaster-supplied loop detector add-on boards are available, both pre-installed and for installation in the field. See Part 3, Gate Operator Options.

## E. TELEPHONE CONNECTION

1. A conduit entrance into the gate operator should be provided for the telephone line.
2. A single twisted pair wire 18 AWG to 24 AWG, will be connected from the telephone company termination block through the conduit to J9 on the control board. Polarity is not important.  
**NOTE:** Do not run telephone and AC power wires in the same conduit.

## F. MASTER/SLAVE INTERCONNECTION (MASTER/SLAVE SYSTEM ONLY)

1. A conduit between the Master and Slave units should be provided for the Master/Slave interconnection cable.
2. Two shielded twisted pair wire 16 AWG to 24 AWG will be connected between the two units at TB1 on the controller board.  
**NOTES:** 1. Do not run the Master/Slave cable and AC power wires in the same conduit.  
2. Master/Slave interconnection cable should not exceed 3000' in length.

## G. OTHER CONNECTIONS

1. Provisions should be made for conduit entrance into the gate operator for external activation devices such as key switches, telephone entry systems, loops, etc.
2. Wire size requirement: 16-24 AWG stranded or 18-24 AWG solid wire should be used.

## H. GROUNDING

1. The system contains parts which may be damaged by static discharge. A proper earth ground connected to the gate operator housing will significantly reduce the chances of damage or improper operation. The shielding in the cables specified for all remote sensors and controls should also be connected to earth ground at the controller end of the cable only.
2. To be effective, the ground connection must be made by running 12 AWG copper wire to a good ground point (e.g., an electrical panel, a metallic cold water pipe that runs into the earth, or a grounding rod at least 10' in length that is driven into the earth) within 12' of the system. Even if you have a good earth ground, you should try to discharge any static before handling the boards.

# PART 2 SYSTEM INSTALLATION

## A. GATE AND PHOTO-SENSOR LAYOUT

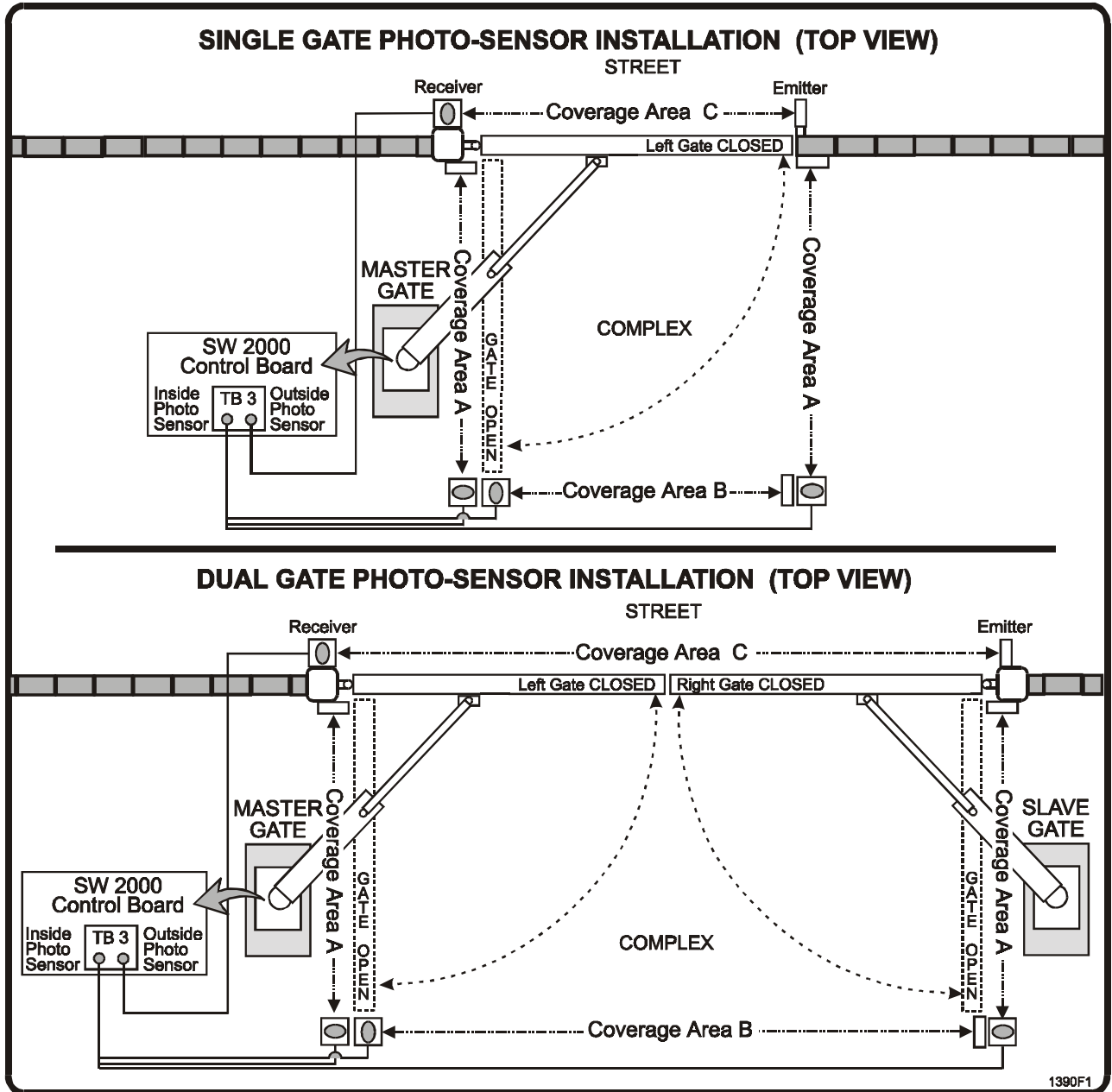


Figure 3. Photo-Sensor Layout

### IMPORTANT NOTE

The installation shown in Figure 3 is a suggested layout using emitters and receivers. Any UL-approved photo-sensors are acceptable, **but they must cover the entire area of gate travel to be effective.**

1. Install photo-sensors in three **Coverage Areas** as shown in Figure 3.  
**Coverage Area A-** Inside-Open Coverage:  
Inside the gate, from the gate post(s) to the gate fully open position(s).  
**Coverage Area B-** Inside-Closed Coverage:  
Inside the gate, from the gate open position across full arc of gate travel.  
**Coverage Area C-** Outside-Closed Coverage:  
Single Gates: Outside the gate, from the gate post to the fence.  
Dual Gates: Outside the gate, from gate post to gate post.
2. For wiring instructions, see Paragraph K, Connecting Input Wiring, below.  
**NOTE:** If you are installing a Master/Slave system, refer to Series X3 Master/Slave Systems for additional layout information.

## B. MOUNTING GATE OPERATOR

### WARNING

**To avoid injury, always turn off the unit power switch before working on gate.**

1. Pull red release lever to disengage and remove quick disconnect arm cap from the output shaft (see Figure 7).
2. Remove 4 protective bolts holding the cover on, lift off the cover and set aside.
3. Remove the assembly kit and parts.
4. Remove the 4 bolts that attach the gate operator to the shipping pallet.
5. Mount gate operator on cement pad using the previously installed anchors. Be sure the operator is mounted level and square, with the control box facing away from the gate.
6. Connect the power conduit into the switch box.
7. Reinstall gate arm assembly onto output shaft/hub. Close red release lever until engagement pin fully seats into hub and ball plunger engages on handle. This may require slight side-to-side motion – **HANDLE WILL CLOSE WHEN PIN IS PROPERLY ALIGNED – DO NOT FORCE SHUT.**

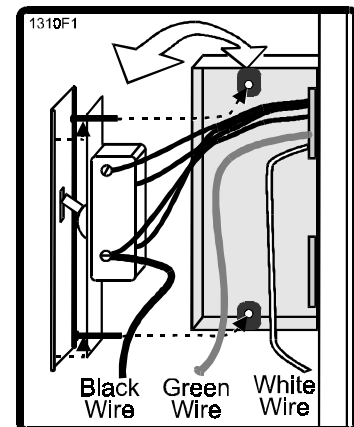
## C. CONNECTING POWER

### CAUTION

Ensure that the AC power circuit breaker is turned off before wiring power to the switchbox.

Run power cables through the conduit to Gate Operator, then connect wires to the switch box as shown in Figure 4:

1. Wire nut the hot (black) wire to the black pig tail.
2. Wire nut the neutral (white) wire to the white pig tail.
3. Wire nut the ground (green) wire to the green pig tail.
4. Dress all wiring inside the switch box and install cover.



**Figure 4. AC Wiring**

## D. RUNNING INPUT WIRING

### WARNING

Route but do not connect input wires at this time. If inputs are connected now, the gate operator may activate at random during installation, potentially injuring installation personnel.

1. Remove the plastic control box cover.
2. Run wires from input components conduits and Master/Slave conduits into control box.
3. For Master/Slave wiring, refer to Master/Slave Systems for X3 Series Gate Operators, Part 2.

## E. SETTING GATE OPEN DIRECTION SWITCHES S2 AND S3

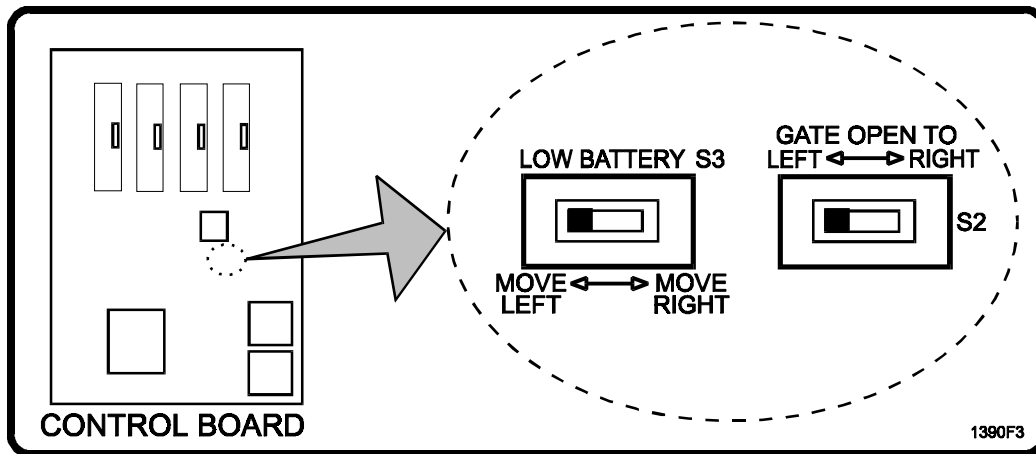


Figure 5. Gate Direction and UPS Low Battery Switch Locations.

**NOTE:** For swing gate operation, controls are Left/Clockwise and Right/Counterclockwise.

- Switch S2 sets gate opening direction (open to left or open to right).
  - Switch S2 is sensed only on power up, it should be set when the power is off, or power should be cycled after setting the switch.
1. Set switch S2 to the Left for Clockwise Gate Opening, or to the Right for Counterclockwise Gate Opening as required.
  2. Set switch S3 to the direction you wish the gate to move (left or right) and remain when the LOW BATTERY input is activated by an Uninterruptible Power Supply (UPS).

## F. POWER UP PROCEDURE

### CAUTION

If gate is positioned at the 'open' limit, gate will automatically close if Relclose Timer is enabled and power is switched on. Position gate either at the closed limit or at no limit when preparing to switch power on. Always use extreme caution and follow all warning in the Safety Summary.

1. Turn on circuit breaker that provides power to gate operator.
2. Turn on gate operator power switch and verify that the seven-segment LED display above the keypad sequentially spells out "HELLO". The only LEDs that should remain on are MAGLOCK and CLOSE LIMIT or OPEN LIMIT, if one of the limit switches is engaged.

**NOTE:** If the LEDs do not follow this pattern, the controller board may not be working correctly. Stop installation and call LiftMaster Technical Support for assistance.

## G. USING MANUAL CONTROLS

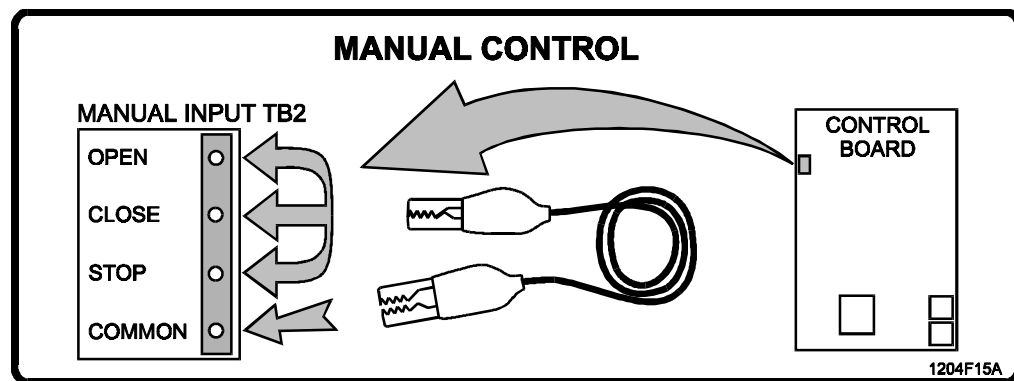


Figure 6. Manual Controls, Location and Use.

If necessary, use the manual controls on Manual Input Terminal TB2 (OPEN, CLOSE, and STOP, as shown in Figure 6), to move the gate arm during system installation.

- **To open the gate:** connect the OPEN and STOP terminals to the COMMON terminal.
- **To close the gate:** connect the CLOSE and STOP terminals to the COMMON terminal.
- **To stop the gate:** disconnect the STOP terminal to the COMMON terminal.

### IMPORTANT NOTE

If the STOP terminal is disconnected from the COMMON terminal, the gate is prevented from moving and no command will affect the gate.

## H. GATE ARM INSTALLATION

### NOTES:

1. All dimensions are measured from one pivot point to the next pivot point.
2. The dimensions shown above are only recommended settings. Your installation may require different dimensions.
3. The SW 2000-X3 can be installed without welding. The anchor, swing arm and drag link may be attached using the supplied hardware only, welded, or bolted and welded.
4. Paint or other anti-rust coating must be applied to the cut areas of the swing arm and/or drag link pipe to prevent rust.

1. Attach gate anchor to gate by welding or using hardware (not supplied).
2. Using manual controls, move the swing arm cap assembly until it points roughly to the anchor. See Figure 7.
3. Measure and cut the swing arm to length. Attach swing arm to swing arm cap assembly **with gate stop on driveway side**, using supplied hardware or by welding.  
**WARNING:** Installing gate stop on the wrong side will cause damage to the gate operator.
4. Measure and cut Drag Link pipe to length, then insert spherical rod end assembly into pipe and tighten locking nut.
5. Attach welded end of Drag Link Assembly to Anchor and unwelded end to Swing Arm.

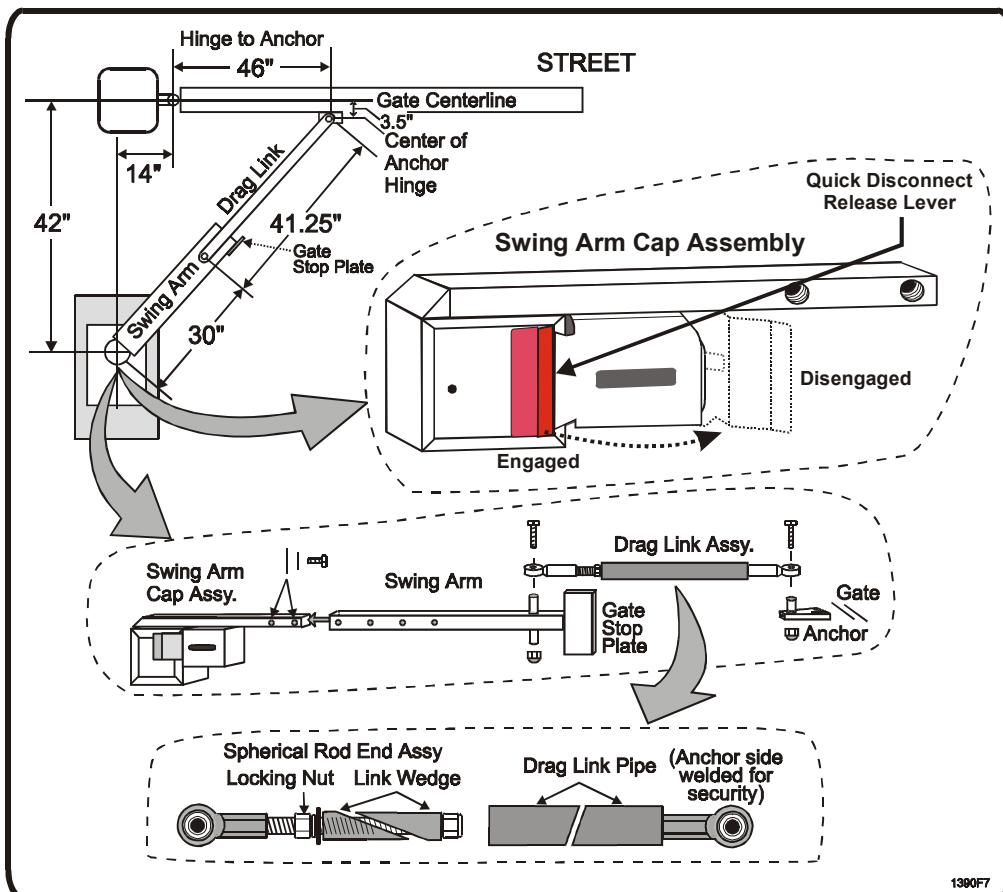


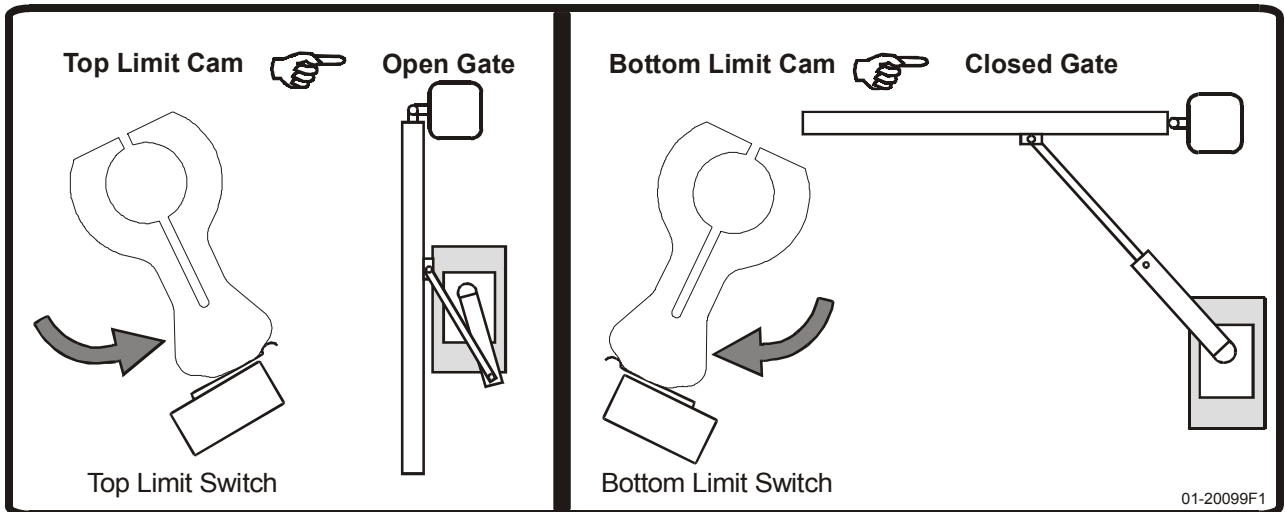
Figure 7. Gate Arm Installation



## I. SETTING LIMIT CAMS

- Adjust the limit cams by loosening the clamp and rotating the cams. The cams rotate with the swing arm shaft, so small adjustments are magnified by the length of the gate.
- Use manual controls to move the gate during limit cam adjustment.
- To avoid damage to the gate and gate operator due to the gate overrunning its limits, perform the following steps carefully:

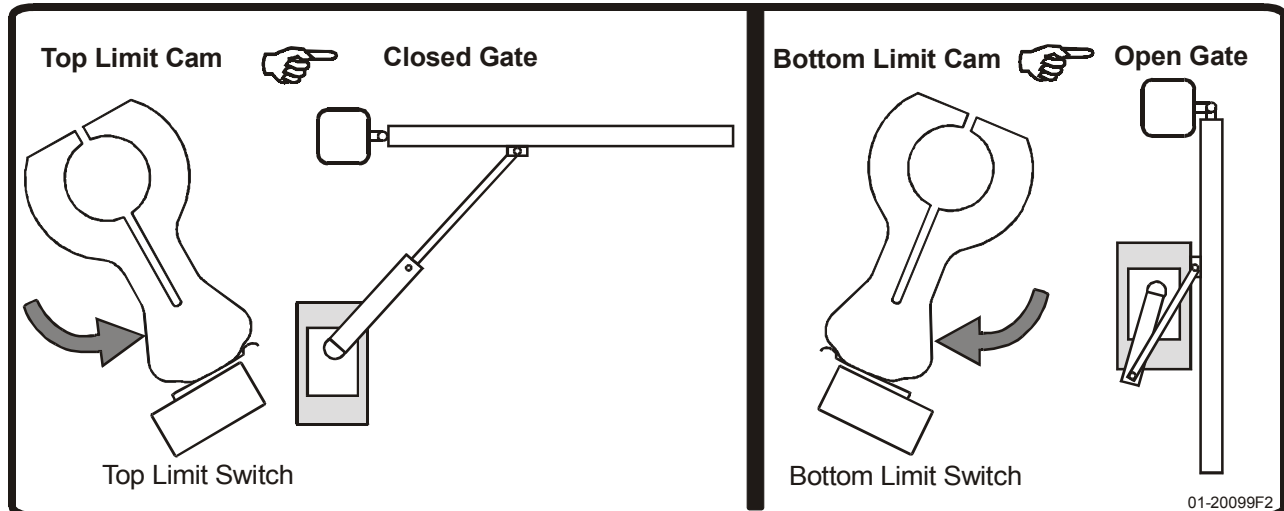
### 1. SETTING RIGHT GATE LIMIT CAMS



**Figure 8. Setting Right Gate Limit Cam**

1. Make sure that switch S2 is set to the "Right" position.
2. Turn on gate operator power switch.
3. Using manual CLOSE and STOP, move the gate to its proper closed limit position.
4. Loosen the clamp on the bottom limit cam and turn the cam clockwise until it just barely closes the limit switch.
5. Retighten the clamp. Do not overtighten.
6. Using manual OPEN and STOP, move the gate to its proper open limit position.
7. Loosen the clamp on the top limit cam and turn the cam counterclockwise until it just barely closes the limit switch.
8. Retighten the clamp. Do not overtighten.
9. Open and close the gate to check the limit cam settings. If required, readjust the limit cams until they are set properly.

## 2. SETTING LEFT GATE LIMIT CAMS



**Figure 9. Setting Left Gate Limit Cam**

1. Make sure that switch S2 is set to the "Left" position.
2. Turn on gate operator power switch.
3. Using manual OPEN and STOP, move the gate to its proper open limit position.
4. Loosen the clamp on the bottom limit cam and turn the cam clockwise until it just barely closes the limit switch.
5. Retighten the clamp. Do not overtighten.
6. Using manual CLOSE and STOP, move the gate to its proper closed limit position.
7. Loosen the clamp on the top limit cam and turn the cam counterclockwise until it just barely closes the limit switch.
8. Retighten the clamp. Do not overtighten.
9. Open and close the gate to check the limit cam settings. If required, readjust the limit cams until they are set properly.

## J. GATE SENSITIVITY ADJUSTMENTS

The gate operator monitors both average and peak motor current. When the gate encounters an obstruction, the gate operator senses the change in motor current and reverses the gate. Three sensitivity adjustments must be set for each installation:

- Right gate motion (R69)
- Left gate motion (R160)
- Inrush current (R203)

**NOTE:** For swing gate operation, controls are Left/Clockwise and Right/Counterclockwise.

- ◆ If your installation requires setting switch S2 to the "Open to Right" position, use the "Open to Right" adjustment procedures below. If your installation requires setting S2 to the "Open to Left" position, use the "Open to Left" adjustments following the "Open to Right" procedures.
- ◆ The minimum sensitivity is full clockwise and maximum sensitivity is full counterclockwise. These adjustments must be made while the gate is in motion.
- ◆ Before starting the adjustments, verify that the Left and Right reverse pots are set fully clockwise, and the Inrush pot is set to the 11 o'clock position.
- ◆ Make all adjustments in the order listed.

**NOTE:** Current flow varies with temperature. Do not tune the sensitivity measurements too finely, or they may cause false overcurrent faults to occur during cold weather.

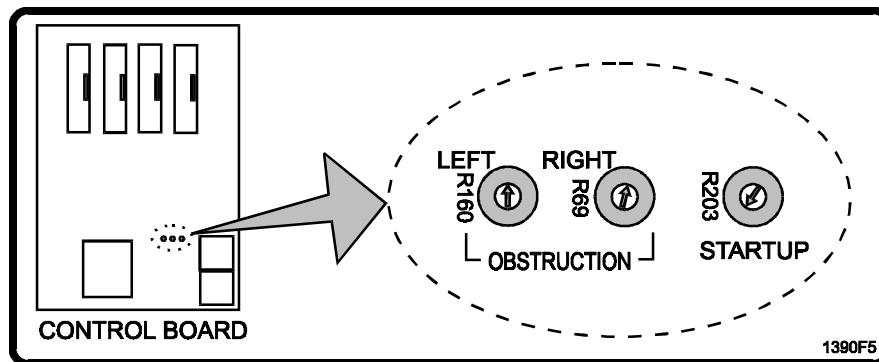


Figure 10. Gate Sensitivity Adjustments Location.

### "OPEN TO RIGHT" ADJUSTMENT PROCEDURES

#### Right Gate Motion Adjustment (R69)

1. Initiate opening the gate.
2. Wait 4 to 5 seconds, then lightly "tug" against the edge of the gate to simulate an obstacle.
3. If the gate does not stop or back up, reclose gate and adjust the pot slightly counterclockwise.
4. Repeat steps 1-3 until gate stops or backs up when tugged and has the desired sensitivity.

**Left Gate Motion Adjustment (R160)**

1. Open the gate fully, then initiate closing the gate.
2. Wait 4 to 5 seconds, then lightly "bump" the leading edge of the gate to simulate an obstacle.
3. If the gate does not stop or back up, reopen the gate and adjust the pot slightly counterclockwise.
4. Repeat steps 1-3 until the gate stops or backs up when bumped and has the desired sensitivity.

**"OPEN TO LEFT" ADJUSTMENT PROCEDURES****Left Gate Motion Adjustment (R160)**

1. Initiate opening the gate.
2. Wait 4 to 5 seconds, then lightly "tug" against the edge of the gate to simulate an obstacle.
3. If the gate does not stop or back up, reclose the gate and adjust the pot slightly counterclockwise.
4. Repeat steps 1-3 until the gate stops or backs up when tugged and has the desired sensitivity.

**Right Gate Motion Adjustment (R69)**

1. Open the gate fully, then initiate closing the gate.
2. Wait 4 to 5 seconds, then lightly "bump" the leading edge of the gate to simulate an obstacle.
3. If the gate does not stop or back up, reopen the gate and adjust the pot slightly counterclockwise.
4. Repeat steps 1-3 until the gate stops or backs up when bumped and has the desired sensitivity.

**INRUSH CURRENT ADJUSTMENT (R203)**

1. Turn the pot fully counterclockwise.
2. Open the gate.
3. If the gate stops due to a fault condition, slightly adjust the pot clockwise.
4. Repeat steps 2 and 3 until the gate cycles without a fault.
5. Open gate fully, then initiate closing the gate.
6. If the gate stops or backs up due to a fault condition, slightly adjust the pot clockwise.
7. Repeat steps 6 and 7 until the gate cycles without a fault and has the desired sensitivity.

# K. CONNECTING INPUT WIRING

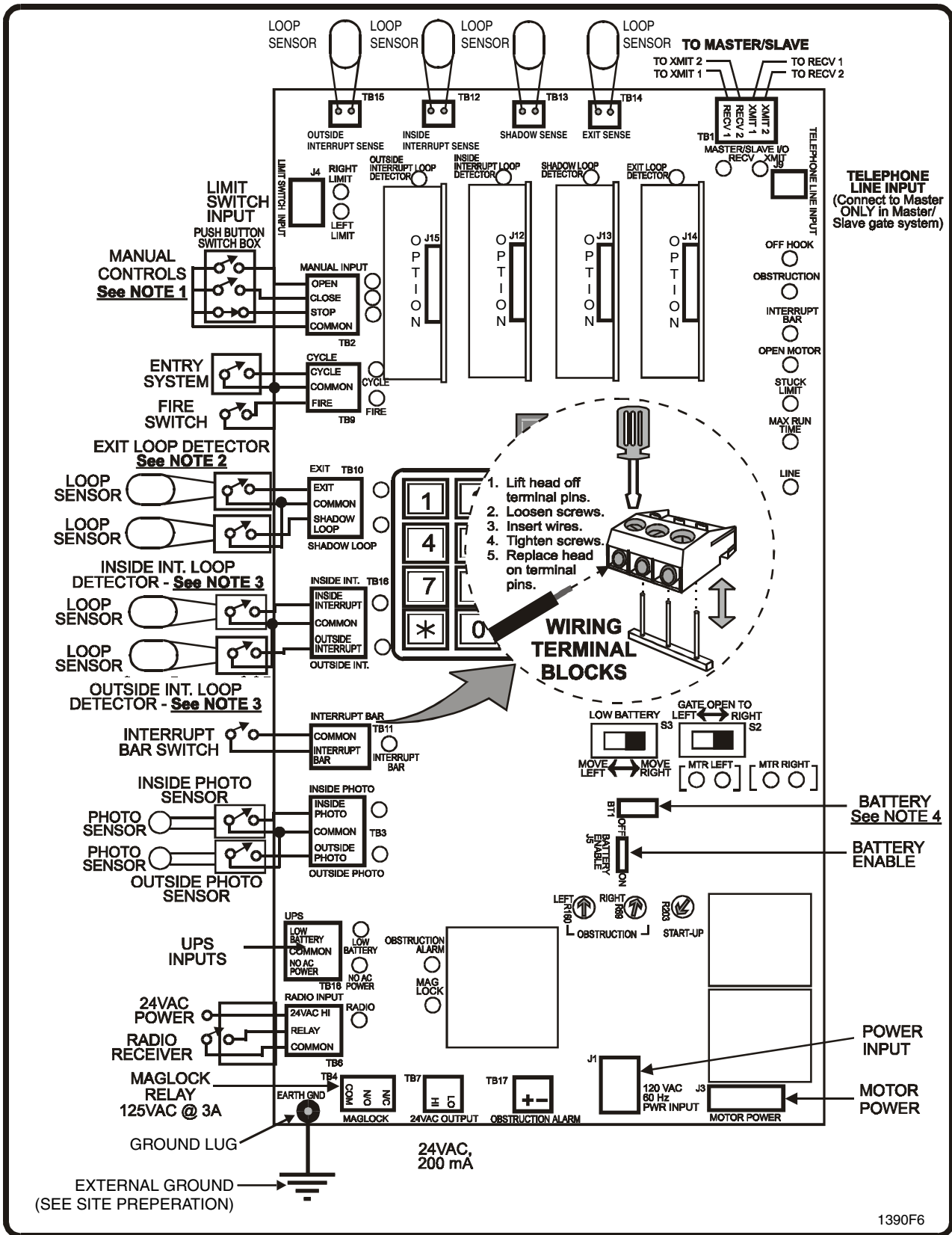


Figure 11. Control Board Wiring

**IMPORTANT:** Before proceeding, see NOTES below.

1. Wire all external control devices to their connections on the control board as shown. See Appendix A for details on how each control input affects the gate operator.
2. Connect the Master/Slave interconnect cable (see Master/Slave Systems for X3 Series Gate Operators, Part 1).

#### NOTES

1. Disconnecting the STOP terminal from the COMMON terminal stops the gate and prevents all commands from having any effect. Manual Open does not activate the Reclose Timer.

**IMPORTANT:** As per UL325 standards, install the Manual Input and Fire switches in the line of sight with the gate.

2. If gate(s) are used for bi-directional traffic, the Exit Loop should be a directional loop detector.
3. Inside and Outside Interrupt Loops:
  - ◆ For maximum safety, Inside and Outside Interrupt loops require separate loop detectors.
  - ◆ **Bi-part or Bi-part Latch:** If only one loop detector is used, connect Outside loop to the Inside loop detector.
4. Battery is used to store date and time.

## L. BASIC GATE OPERATOR PROGRAMMING

Even if you plan to program the gate operator by telephone, you may want to enter some immediate instructions during installation. The following list of instructions will help you set basic controls so the gate will operate properly until you have time for full programming, either directly or by telephone. For complete programming instructions, refer to "SL 1000, SW 2000, and BG 3000-X3 Programming (-173 bd)".

**To access** programming mode: enter \*\*\*000000 (3 asterisks, 6 zeroes)

**To program** a command: **a)** enter step number **b)** enter required data **c)** enter # (pound sign)

**To exit** programming mode: enter 00# (2 zeroes, 1 pound sign)

Step	Purpose	Step	Default	Acceptable Input
01	Gate Type	1	1	0 = Slide, 1 = Swing, 2 = Barrier, 3 = Linear
02	Operator Type	1	0	0 = Single, 1 = Master, 2 = Slave
03	Pair Type	1	0	0=Bipart, 1=Latch, 2=Not Used, 3=Tandem
04	Not Used	-	-	-
05	Not Used	-	-	-
06	Anti-Tailgate Enable (ATG)	1	0	0 = Disabled, 1 = Enabled
07	Latch Delay Time	3	6	0 – 250 Seconds (.4 sec. Increments)
08	Reclose Time (RT)	Up to 3	30	0 – 250 Seconds (0 = Disabled)
09	Not Used	-	-	-
10	Not Used	-	-	-
11	Obstruction Sense Backup Closing	Up to 3	12	12 – 499 Inches See note below.●
12	Obstruction Sense Backup Opening	Up to 3	12	12 – 499 Inches See note below.●
13	Interrupt Bar Backup If Closing	Up to 3	12	12 – 499 Inches See note below.●
14	Interrupt Bar Backup If Opening	Up to 3	12	12 – 499 Inches See note below.●
15	Return to Factory Set Defaults	6	N/A	101010 (partial), 191919 (full)

### ● IMPORTANT NOTE: SWING GATE BACKUP DISTANCES

Slide gates move at about one foot per second, so backup distances (Obstruction Senses and Interrupt Bar Backup) are easy to enter. To move the gate one foot, you enter 12 inches.

Swing gates, however, move in degrees per second, so it is the length of the gate that determines how far the gate moves each second. For instance, a twenty foot gate will move twice as far as a ten foot gate in the same amount of time. As a result, entering backup distances for swing gates is different than for slide gates. Use the following table to enter swing gate backup distances:

I want my gate to move this far out at the end:	And my gate length is:		
	10'	15'	20'
One foot	Enter 9"	Enter 6"	Enter 3"
Two feet	Enter 18"	Enter 12"	Enter 6"
Three feet	Enter 27"	Enter 18"	Enter 9"

## M. POST INSTALLATION PROCEDURES

### 1. Setup

1. Turn on the **main power** at the gate operator's circuit breaker.
2. Verify that **switch S2** (the Gate Open Direction switch) is set to the correct position.
3. Turn on the **unit power** switch.

### 2. Manual Inputs

1. Verify that Manual Open fully opens the gate and that the open limit switch stops the gate.
2. Verify that Manual Close fully closes the gate and that the close limit switch stops the gate.
3. Verify that Manual Stop stops the gate.

**Note:** If the gate stops due to an obstruction Fault, readjust the gate sensitivity pots.

### 3. Mechanical

Use the Manual Input commands to verify that:

1. The gate swings open and closed smoothly.
2. There is no squeak or vibration in the gate when it is moving .
3. There is no belt slippage when the gate moves or stops.
4. There is no slack in the closed gate due to loose chain or parts.
5. Both gates open and close at the same time (Bi-Parting gates only).

### 4. Gate Sensitivity and Obstruction Alarm (Primary Obstruction Sensing per UL 325 Requirements)

1. Left/Right Obstruction sensitivity:  
Apply a bump to the opening and closing gate and verify that the gate stops or reverses.
2. Start-Up Sensitivity:  
Apply a bump to the gate as it starts moving and verify that the gate responds to the bump within a second.
3. Obstruction Alarm:  
Cause two obstruction faults before the gate reaches its open or closed limit and verify that the Obstruction Alarm sounds.

### 5. Entry inputs

1. Activate the CYCLE input (entry system), RADIO input (radio transmitter), and EXIT Loop input (driving over the exit loop) and verify that they fully open the gate. If Reclose Timer is enabled, it will close the gate.
2. Activate the FIRE input (fire department switch) and verify that the gate fully opens and then closes after 5 seconds. If Reclose Timer is enabled, it will close the gate.



## 6. Alternate Action

If Alternate Action has been selected so that CYCLE or RADIO commands both open and close the gate:

Activate the CYCLE command, wait until the gate is fully open, then activate the CYCLE command again. The gate should close, verifying Alternate Action operation.

**Note:** If you select Alternate Action, you can't enable ATG and RT in procedures 6 and 8.

## 7. Reclose Timer

If Reclose Timer has been enabled in programming step 8, verify Reclose Timer as follows:

1. Activate any entry command (except Manual OPEN) to open the gate.
2. Start timing when the gate reaches fully open and verify that the Reclose Timer recloses the gate after the desired interval.

**NOTE:** Reclose Timer is not functional when the Manual OPEN command is used.

## 8. Interrupt Loop and Anti-Tailgating (ATG) When Exiting

Gate Type is SWING (Enter 1 in Programming Step 01):

- ✓ **Inside Interrupt Loop:** When a vehicle drives on the Interrupt Loop a moving gate will stop. When the vehicle drives off the Interrupt loop, the gate will open.
- ✓ **Outside Interrupt Loop:** When a vehicle drives on the Interrupt Loop a closing gate will open (an opening gate will not be affected).

**NOTE:** ATG will not function with a Gate Type of SWING.

## 9. Shadow Loop

1. Ensure the gate is fully closed (the close limit switch and Maglock LED's will be ON).
2. Park a car, while it is running, on the Shadow Loop but clear of the Safety Loop.
3. Activate an Open command and verify that the gate does not open

**CAUTION:** *If the gate begins to open, move the car immediately.*

4. Remove the car from the Shadow Loop and verify that the Open command opens the gate.

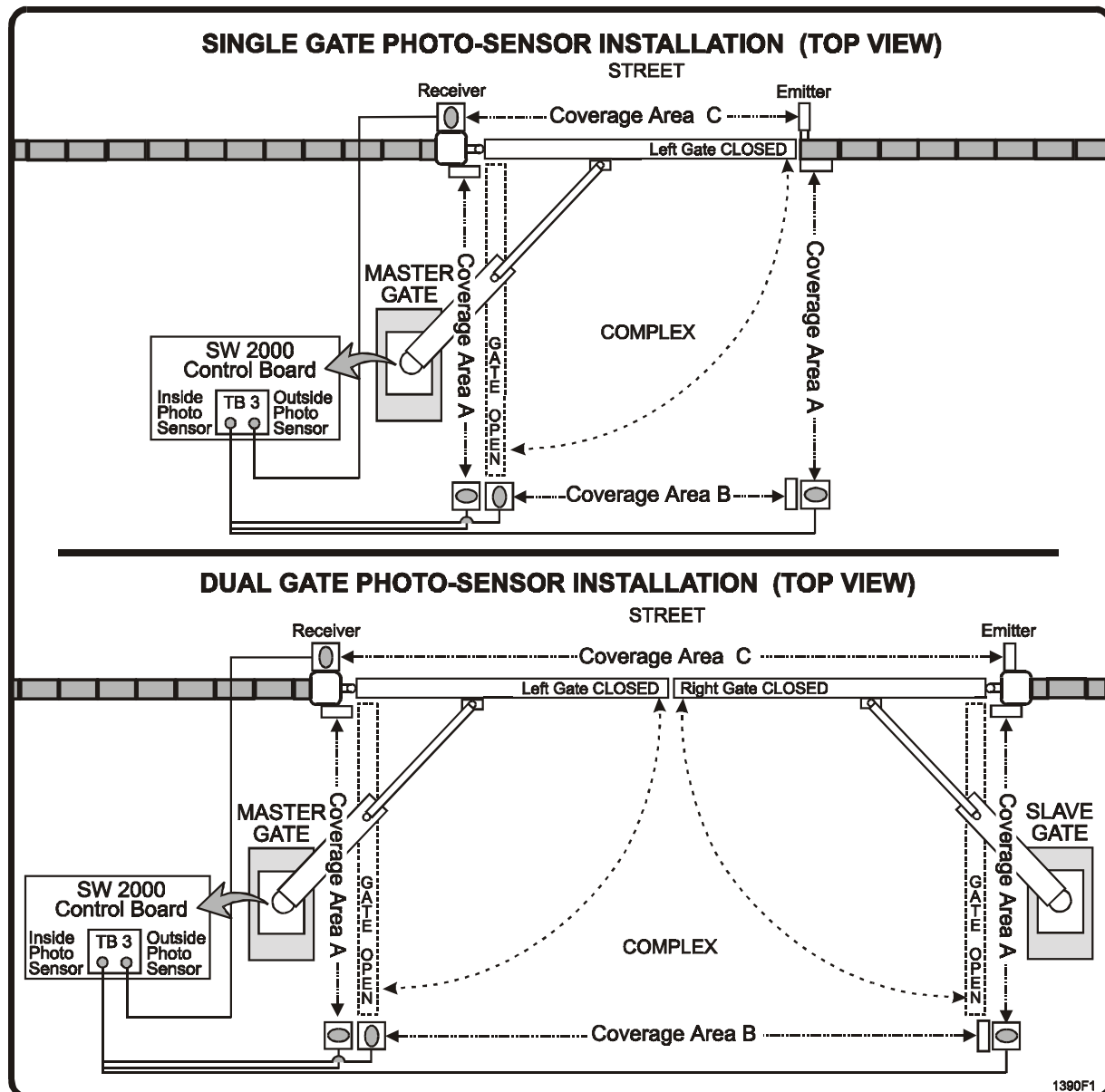


Figure 12. Photo-Sensor Coverage Areas

### 10. Photo-Sensors (Secondary Obstruction Sensing per UL 325 Requirements)

Refer to above figure for Photo-Sensor coverage areas.

**Coverage Area A (Inside-Open Coverage):** While the gate is moving, put your hand or arm through the Inside Photo-Sensor beam. The gate should stop. The gate should restart when the obstruction (your hand) is removed.

**Coverage Area B (Inside-Closed Coverage):** Stand inside the fence line. While the gate is moving, put your hand or arm through the Outside Photo-Sensor beam. The gate should stop. The gate should restart when the obstruction (your hand) is removed.

**Coverage Area C (Outside-Closed Coverage):** Stand outside the fence line. While the gate is closing, put your hand or arm through the Outside Photo-Sensor beam. The gate should stop. The gate should restart when the obstruction (your hand) is removed.

### **11. Interrupt Bar (Edge Sensor)**

While the gate is opening, push on the Interrupt Bar (Edge Sensor). The gate should stop and reverse a few inches.

### **12. Maglock**

Verify that the Maglock activates when the gate is fully closed.

## N. FINAL ASSEMBLY OF GATE OPERATOR

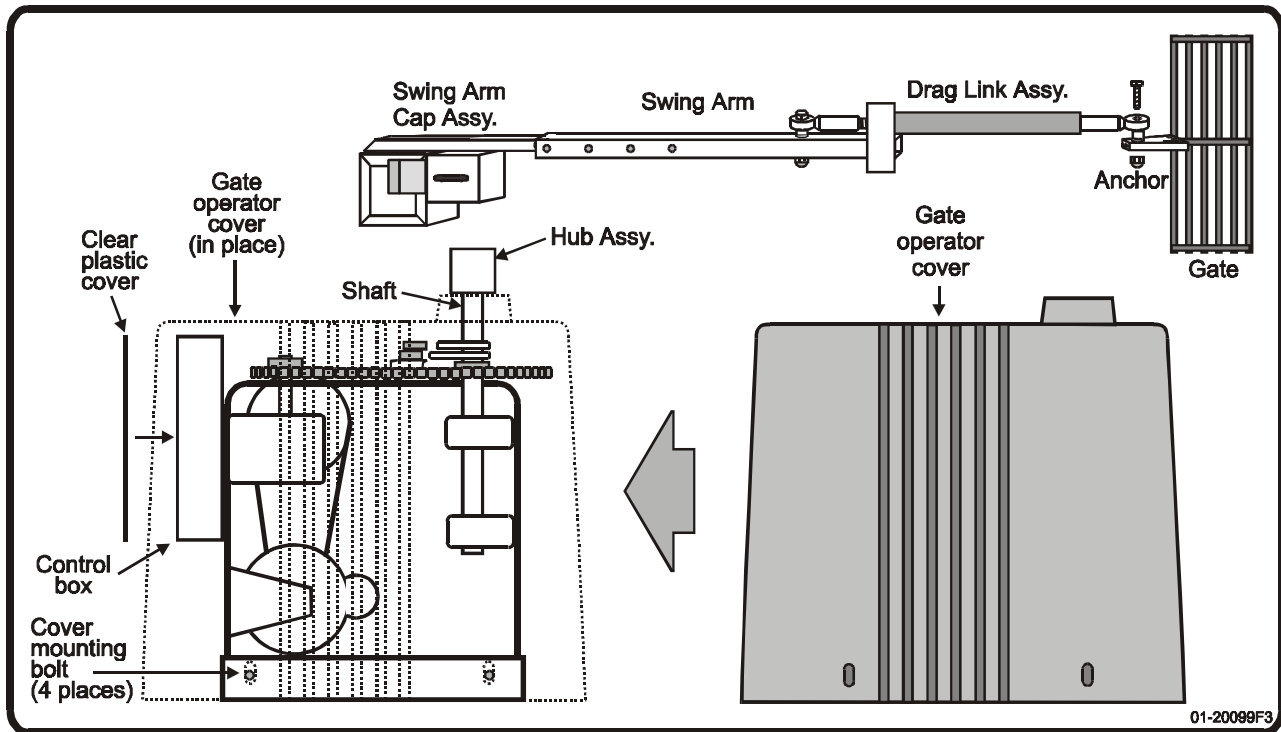


Figure 13. Gate Operator Final Assembly

### IMPORTANT SAFETY PROCEDURE

1. Turn off power to the gate operator at the circuit breaker and wait for one minute.
  - ◆ Refer to Figure 13, above, to perform the following instructions.
2. Disconnect Drag Link from Anchor. Then disengage quick disconnect by pulling the release lever on the Swing Arm Cap Assembly. Remove Swing Arm Cap Assembly and Drag Link Assembly from drive shaft. Set this assembly aside.
3. Install clear cover on gate operator control box.
4. **Make sure that gate operator unit power switch is turned on.**
5. Install gate operator cover and secure with four bolts.
6. Replace Swing Arm Cap Assembly and Drag Link Assembly on drive shaft, then reconnect Drag Link to gate Anchor.
7. Reinstall gate arm assembly onto output shaft/hub. Close red release lever until engagement pin fully seats into hub and ball plunger engages on handle. This may require slight side-to-side motion – HANDLE WILL CLOSE WHEN PIN IS PROPERLY ALIGNED – DO NOT FORCE SHUT.
8. Turn on power to the gate operator at the circuit breaker.
9. Cycle the gate to ensure it is operating properly.

## O. PROGRAMMING THE 412HM RADIO RECEIVER

### SET SECURITY MODE

The 412HM 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 14)

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 15)

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 opener.
- (Figure 16)
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 garage door.

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

Repeat Steps 2 and 3 for each remote control that will be used to operate the garage door opener.

### 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 transmitter codes are now erased. Then follow the steps above to reprogram each remote control.

#### **⚠ ⚠ 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.

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.

Figure 14

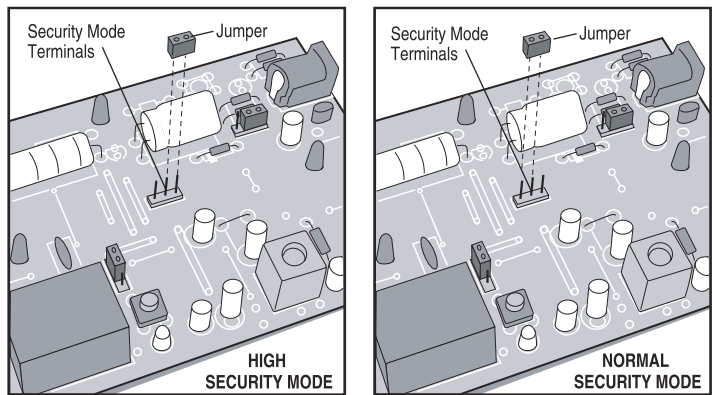


Figure 15

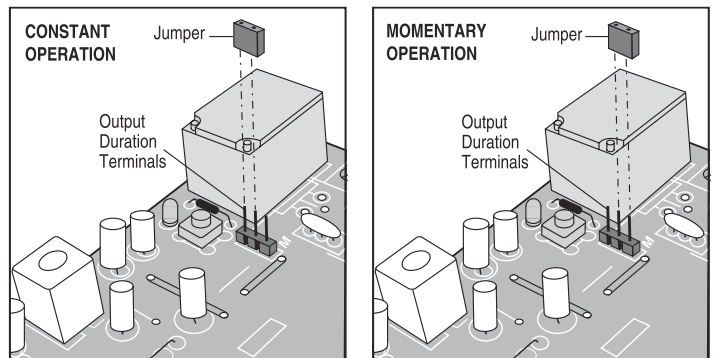
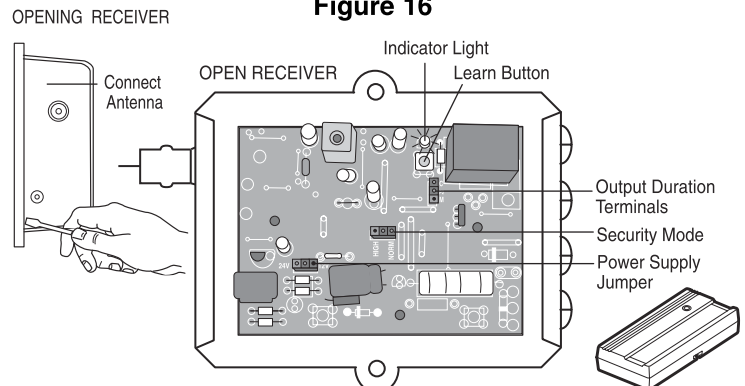


Figure 16



# PART 3

## LIFTMASTER LOOP DETECTOR BOARDS (OPTIONAL)

The gate operator model SW 2000-X3 has connectors for four LiftMaster-supplied loop detector add-on boards. These boards simply plug into the control board and interface with Interrupt, Shadow and Exit loop sensors. The add-on boards can be ordered pre-installed, or can be installed in existing model SW 2000-X3 units.

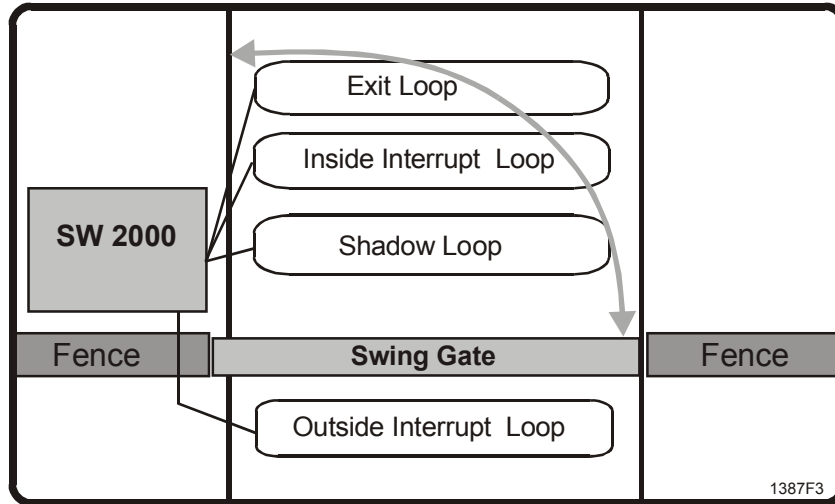


Figure 17. Typical Swing Gate Loop Detector Configuration.

# PART 4

## TROUBLESHOOTING AND MAINTENANCE

### A. TROUBLESHOOTING

This section is designed to help you troubleshoot your unit(s) with a minimum. Below are some hints to help:

- Test the Operator
- Quick Reference List of Faults and Methods to Resolve
- Quick Reference List of Faults and Causes

**Testing Control Board inputs:** To test an input, connect the input terminal to the COMMON terminal on the Control Board and verify that its LED turns on momentarily. Normally, the Close limit switch and Maglock LED's are on if the gate is fully closed, and Open limit switch is on if the gate is fully open. The Manual STOP LED is always on.

**Low input AC voltage:** The voltage across connector J1 pins 1 (red wire) and 3 (white wire) on the Control Board must measure 100VAC to 130VAC.

**CAUTION HIGH VOLTAGE. Measure with care.**

**Fault Causes:** Refer to the end of trouble shooting section.

#### 1. OPERATOR IS DEAD

***When the unit power switch is cycled, the 7-segment display does not spell out "HELLO" sequentially.***

1. The main circuit breaker or unit power switch is off.
2. The input power connector is not connected securely to the Control Board.
3. Low input AC voltage.
4. Bad Control Board.

#### 2. OPERATOR DOES NOT RUN

***When the unit power switch is turned on, the 7-segment display spells out "HELLO" sequentially.***

1. An input is continuously activated (stuck).
2. Both limit switches are stuck closed.
3. Manual Stop is disconnected from its common.
4. Stalled motor.

#### 3. MOTOR DOES NOT RUN

***Motor is dead:***

1. The resettable motor thermal overload switch has popped.
2. The interconnecting cable between the motor and the control board is disconnected.
3. Bad control board or motor.

***Motor is stalled:***

1. Frozen motor, gearbox or gate.
2. V-belt is too tight.

#### 4. THE CONTROL BOARD RESETS RIGHT AFTER GATE STARTS MOVING

1. Low AC voltage.
2. Inadequate and undersized power wiring between the main circuit breaker and the gate operator.

#### 5. GATE STOPS AND REVERSES IMMEDIATELY AFTER IT STARTS

1. A Fault has occurred.  
***Mostly in cold weather or mornings:***
2. A Fault has occurred; Inrush pot adjustment is set too low.

#### 6. GATE STOPS A FEW SECONDS AFTER IT STARTS

1. Stuck limit switch.
2. A Fault has occurred.

#### 7. GATE SUDDENLY REVERSES WHILE MOVING

A Fault has occurred.

#### 8. OPENING GATE STOPS WHEN A VEHICLE APPROACHES FROM INSIDE

Setting the Gate Type to SWING or LINEAR, causes Interrupt loops or photo-sensors to stop the gate when a vehicle approaches from the inside. **For safety reasons**, the gate normally operates this way.

#### 9. GATE OPENS BUT DOES NOT CLOSE

1. Reclose Timer is disabled.
2. One of the inputs is continuously activated (a stuck input).
3. Entry system is connected to the Manual Open input.

#### 10. GATE DOESN'T STOP AT THE LIMIT

1. Limit cams are out of adjustments.
2. Limit switch cable is disconnected either from the control board or the limit switches.
3. Bad limit switch or limit cam or limit switch bracket.

#### 11. GATE IS TOO SLOW

1. Low input AC voltage
2. Hardened or frozen gate hinges.
3. Slipping belt.

#### 12. GATE DOESN'T STAY OPEN WHEN USING FIRE INPUT

Fire was only activated momentarily—not continuously.



### **13. GATE DOES NOT CLOSE AUTOMATICALLY**

1. Reclose timer is disabled.
2. The entry system is connected to Manual Open input.
3. An input is continuously activated (stuck).

### **14. ALTERNATE ACTION DOES NOT WORK**

1. ATG and Reclose Timer are enabled.
2. Entry system is connected to the Manual Open input.

### **15. GATE DOES NOT OPEN TO THE CORRECT DIRECTION**

1. The power was not cycled after changing the setting of switch S2.

### **16. THERE IS SLACK OR PLAY IN THE GATE**

1. Chain is too loose.
2. The hardware interconnecting the operator to the gate is not tight.
3. The large mounting bolt or the jam nut for the cap arm are not tight.
4. Set screws on the sprocket is not tight.

### **17. ATG (ANTI-TAILGATE) DOES NOT WORK**

For safety reasons, ATG is not functional with Gate Types SWING and LINEAR.

### **18. INTERRUPT LOOP DOES NOT ACT PROPERLY**

1. Improper Gate Type setting (programming step 1).
2. Bad loop sensor or loop detector.
3. Bad connection between the loop sensor, loop detector and the Control Board.

### **19. SHADOW LOOP IS INEFFECTIVE**

1. The gate is not at either the open or close limit.
2. Bad loop sensor or loop detector.
3. Bad connection between the loop sensor, loop detector and the Control Board.

### **20. Maglock does not work**

1. Bad connection between Maglock, its power supply and the Control Board.
2. Bad Control Board (relay on the Control Board does not close).
3. Bad Maglock or Maglock power supply.
4. Large gap between gates.

### **21. MASTER/SLAVE SYSTEM**

#### ***Units work as stand-alone:***

1. Miswired or disconnected Master/Slave interconnect cable.
2. Improper Master/Slave program settings.
3. Bad control board.

***Units are not synchronized:***

Improper Master/Slave program settings.

***One gate braking to stop causes a fault in the other (moving) gate:***

1. Both units are wired to the same circuit breaker.
2. Undersized power wires.

## B. FAULT LIST

**The following conditions can cause a fault:**

1. **Instantaneous motor overcurrent** (left/right obstruction sense) due to an object physically obstructing the gate or gate track (UL325 requirement).
  2. **Average motor overcurrent** (overload) caused by excessive motor current (UL325 requirement).
  3. **Interrupt Bar activation** (edge sensor) due to physical contact with the edge sensor.
  4. **Inoperative motor** caused by an open motor winding, broken or disconnected input motor wires, thermal overload, or unsupervised motor (UL325 requirement).
  5. **Limit switch staying closed when gate is supposed to move**, caused by a broken V-belt, defective limit switch, or defective limit cams.
  6. **Maximum motor run time** exceeding 75 seconds.
- A. **If faults 1 through 3 occur** only once during opening or closing, the gate reverses a few inches and stops. Fault may be cleared by removing the obstruction and cycling any command (Manual Inputs, FIRE, Cycle, Radio, EXIT).
- B. **If two sequential faults (a combination of faults 1 through 3 and Photo-Sensor activation) occur** during opening or closing, gate stops and Obstruction Alarm sounds off for 5 minutes. Fault may be cleared by removing the obstruction and cycling Manual Inputs or FIRE.
- C. **If fault 4 occurs**, gate stops and Obstruction Alarm sounds off for 5 minutes. Fault may be cleared by cycling Manual Inputs or FIRE.
- D. **If faults 5 through 6 occur**, gate stops. Fault may be cleared by cycling any command.

## C. FAULTS AND THEIR CAUSES

### 1. IF OBSTRUCTION LED IS ON

1. The gate is blocked by an object.
2. OBSTRUCTION or STARTUP adjustment is set too low.
3. Cold weather: frozen motor or frozen gate wheels.
4. The Maglock does not disengage from the gate at the start of gate opening.
5. A sudden increase in input power.
6. Bad Control board.
7. Belt is too tight.

### 2. IF INTERRUPT BAR LED IS TURNED ON

Edge Sensor is activated. Clear obstruction and cycle the gate.

### 3. IF OPEN MTR LED IS TURNED ON

1. The motor thermal overload switch is popped.
2. The wires connecting the motor to the Control Board are disconnected
3. Bad motor.
4. Bad Control Board.

### 4. IF STUCK-LIMIT LED IS TURNED ON

1. A limit switch is stuck closed.
2. The belt was broken before the start of the gate movement.
3. Stalled motor at open or close limit.
4. Bad limit switch.

### 5. IF MAX RUN TIME LED IS TURNED ON

1. Limit cams do not engage the limit switches.
2. The belt or chain has been broken.
3. The belt slips during gate movement.
4. Limit switch cable is disconnected.
5. Bad limit switch.
6. Stalled motor.

**WARNING**

**To avoid injury, always turn off the unit power switch before working on gate.**

Regularly performance of preventive maintenance is essential for reliable system operation because it corrects small problems before they turn into emergencies. LiftMaster recommends performing preventive maintenance every 6 to 12 months, depending upon the amount of gate usage.

- If the gate is installed in a private residence or small apartment house where usage is not severe, yearly preventive maintenance is acceptable.
- If the gate is installed in a high-traffic application, semi-annual preventive maintenance is essential.

**PREVENTIVE MAINTENANCE TASKS**

1. **Gate Arm:** Check for wear in the moving parts. Check for hardware tightness.
2. **Gate:** must swing freely without any impediment. Check hinges, grease if necessary.
3. **Chain:** Check for wear and tension. If loose, adjust tension with chain tensioner. Do not oil chain.
4. **Sprocket:** must not be loose in the shaft. Tighten set screws if loose ❶.
5. **Limit switches:** contacts must bounce back rapidly when they are pressed and released.
6. **Belt:** Check for wear and tension (25 to 30 lb.). Adjust the AC motor up or down to set proper tension.
7. **Pulleys:** must all line up and be firmly secured to their shafts. Tighten set screws if loose ❶.
8. **Gear Box:** Check for no oil leakage around the bushings. Do not oil gearbox.
9. **Control board:** Check for water damage or burned spots. All connectors secured to the board.
10. **Wiring:** Check all wiring for any insulation damage. Check for loose wire connections.
11. **No Rust:** Check for rust throughout the unit. Check corners for water entrapment.
12. **Fire Open:** Activate Fire department switch to verify emergency gate opening.
13. **Gate Sense:** Check for the gate sensitivity (refer to Part 2, System Installation, paragraph J, Gate Sensitivity Adjustments).
14. **Photo-Sensors:** Ensure that sensor emitters/receivers are aligned and clean. Verify that inputs stop gate.
15. **Obstruction Alarm:** Check for proper operation. Alarm must sound after two consecutive gate obstruction faults.

**NOTES:**

- ❶: To prevent loosening, two set screws are used in each hole and Loctite threadlocker 242 is applied.

## PREVENTIVE MAINTENANCE INSTRUCTIONS

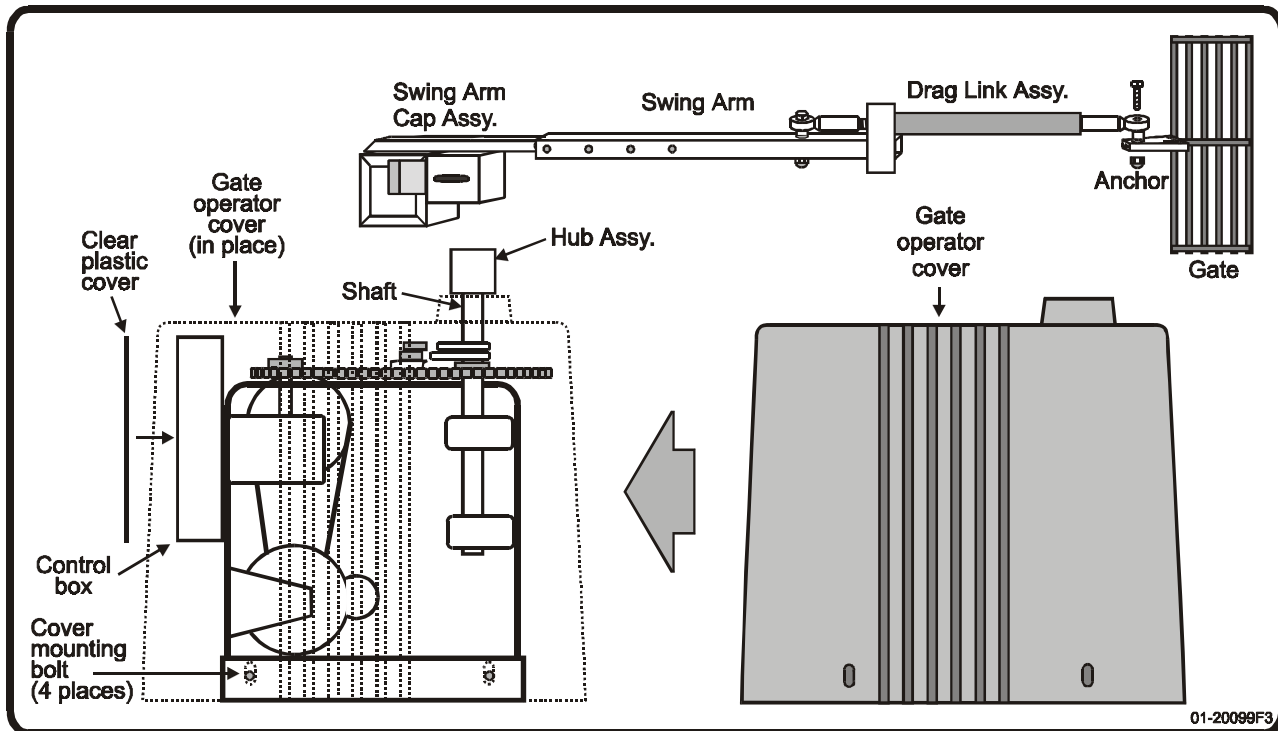


Figure 18. Gate Operator Disassembly and Assembly.

- ◆ Refer to Figure 18, above, to perform the following instructions.
- 1. Turn off power to the gate operator **at the circuit breaker** and wait for one minute.
- 2. Inspect Gate Arm (Swing Arm Cap Assembly, Swing Arm and Drag Link Assembly) for wear and hardware tightness. Check (✓) its box in the Maintenance Schedule.
- 3. Disconnect Drag Link from Anchor, then loosen mounting bolt and remove Swing Arm Cap Assembly and Drag Link Assembly from drive shaft. Set this assembly aside.
- 4. Push and pull the Gate to ensure it swings freely (grease if necessary). Check (✓) its box in the Maintenance Schedule.
- 5. Remove the cover mounting bolts and remove the gate operator cover.
- 6. Reinstall the Drag Link, Swing Arm and Swing Arm Cap Assemblies.
- 7. Perform preventive maintenance tasks 3 to 15.
- 8. After completing all checks, perform the procedure found in Part 2, System Installation, paragraph N, Final Assembly of Gate Operator.



# APPENDIX A

## SYSTEM OPERATION REFERENCE

### CONTROLS, INDICATORS, INPUTS AND ADJUSTMENTS

For control and indicator locations, refer to Figure 11. For detailed explanations of the Gate Operator's various, controls, indicators, inputs and adjustments, refer to the following pages.

#### CONTROLS

<b>KEYPAD</b>	The 12-key keypad is used for local operation, programming and service.
<b>SWITCH S2</b>	
GATE OPEN TO LEFT/RIGHT	Selects the direction the gate will open (LEFT/RIGHT).
<b>SWITCH S3</b>	
LOW BATTERY LEFT/RIGHT	Selects the direction the gate will move and remain when the LOW BATTERY input is activated by an Uninterruptible Power Supply (UPS).

#### INDICATORS

LED indicators light when controls and inputs are active. Additional indicators are as follows:

DISPLAY	This is a seven segment character display that gives numerical response to service personnel during programming and operation.
LEFT LIMIT	Indicates that the LEFT limit switch is activated.
RIGHT LIMIT	Indicates that the RIGHT limit switch is activated.
MTR LEFT	Indicates the gate is moving to the left.
MTR RIGHT	Indicates the gate is moving to the right.
RECV	Indicates data is being received from the other unit in a Master/Slave system.
XMIT	Indicates data is being sent to the other unit in a Master/Slave system.
OFF HOOK	Indicates the gate operator is off hook and using the phone line.
OBSTRUCTION	Indicates the peak or average motor current threshold was reached and the motor was stopped. See Fault List.
INTERRUPT BAR (EDGE SENSOR)	Indicates Interrupt Bar (Edge Sensor) switch was activated and the motor was stopped.
OPEN MTR	Indicates the motor is engaged, but is not drawing any current. The thermal overload switch on the motor may need to be reset. See Fault List.
STUCK LIMIT	Indicates that a limit switch is stuck closed.
MAX RUN TIME	Indicates the motor ran for 75 seconds without reaching a limit switch and was stopped. Usually requires mechanical service. See Fault List.
LINE	Indicates an incoming telephone call ring detect and whether the phone line is available when the gate operator wants to initiate a call.
MAG LOCK	Indicates the MagLock is engaged.
OBSTRUCTION ALARM	Indicates the Obstruction Alarm has sounded after two consecutive gate obstruction faults.

## FUNCTIONAL INPUTS

- NOTES:**
- ❶ The term "activation" means closing an input circuit (via a relay or switch), and may be momentary or continuous. Momentary activations are superceded by any command. Continuous activations are superceded only by an overriding command.
  - ❷ Activating any command when gate is at the open limit stops the Reclose Timer. When the command (except Manual CLOSE and STOP) is cleared, the Reclose Timer is reset.

### MANUAL INPUTS: OPEN, CLOSE, AND STOP (TB2)

MAN OPEN	Activation fully opens the gate. <b>Continuous activation holds gate open.</b> MAN OPEN overrides Anti-Tail-gate (ATG), Reclose Timer, and all controls but MAN STOP.
MAN CLOSE	Activation fully closes the gate. <b>Continuous activation holds gate closed.</b> MAN CLOSE overrides all controls but MAN STOP, MAN OPEN and FIRE.
MAN STOP	De-activation stops opening and closing gates. MAN STOP overrides Reclose Timer and all other controls, manual or automatic. <b>If MAN STOP is disconnected from its COMMON, no commands affect the gate.</b>

### ENTRY SYSTEM/FIRE SWITCH INPUTS (TB9)

CYCLE	Reclose Timer disabled: <u>Alternate Action</u> allows a single command to both open and close the gate. Activation opens the gate, <b>which remains open until another command is received.</b> A CYCLE command when the gate is fully open closes the gate. CYCLE also opens a closing gate. If Anti-Tailgating (ATG) is enabled, Alternate Action is disabled. With ATG enabled, the gate begins closing as soon as the INTERRUPT LOOP clears. Reclose Timer enabled: Activation opens the gate, <b>then the Reclose Timer closes the gate.</b> A CYCLE command also opens a closing gate, but will not close a fully open gate if the Reclose Timer is enabled. If Anti-Tailgating (ATG) is enabled, the gate closes as soon as the INTERRUPT LOOP clears.
FIRE	Activation opens the gate. <b>Continuous activation holds the gate open.</b> If the Reclose Timer is disabled and FIRE is deactivated, the gate closes after 5 seconds. If Reclose Timer is enabled, when FIRE is deactivated, the Reclose Timer starts. FIRE overrides all commands but Manual STOP.

### EXIT LOOP/SHADOW LOOP DETECTOR INPUTS (TB10)

EXIT LOOP	Same as CYCLE, but does not close the gate when it is fully open.
SHADOW LOOP	Activation prevents the gate from opening or closing so the gate won't hit a vehicle. If the gate is already moving, or if the gate is not fully opened or closed, this input has no effect.



## **INSIDE/OUTSIDE INTERRUPT LOOP DETECTOR (TB16)**

IF GATE TYPE IS **SWING** OR **LINEAR** (ATG IS NOT FUNCTIONAL):

### Inside Interrupt Loop:

Activation stops an opening or closing gate and deactivation opens the gate.

### Outside Interrupt Loop:

Activation opens a closing gate.

IF GATE TYPE IS **SLIDE** OR **BARRIER** AND ATG IS DISABLED:

### Inside Interrupt Loop:

Activation opens a closing gate.

### Outside Interrupt Loop:

Activation opens a closing gate.

IF GATE TYPE IS **SLIDE** OR **BARRIER** AND ATG IS ENABLED:

### Inside Interrupt Loop:

Activation/deactivation closes an opening gate. Activation stops a closing gate and deactivation closes the gate.

### Outside Interrupt Loop:

Activation stops a closing gate and deactivation closes the gate.

## **INSIDE/OUTSIDE PHOTO-SENSOR (TB3)**

IF GATE TYPE IS **SWING** OR **LINEAR**:

### Inside Photo Sensor:

Activation stops a moving gate and deactivation restarts the gate.

### Outside Photo Sensor:

Activation stops a closing gate and deactivation restarts the gate.

IF GATE TYPE IS **SLIDE** OR **BARRIER**:

### Inside Photo Sensor:

Activation stops an opening gate and deactivation restarts the gate.

### Outside Photo Sensor:

Activation stops a closing gate and deactivation restarts the gate.

## **INTERRUPT BAR INPUTS (TB11)**

INTERRUPT BAR Activation causes gate to stop and reverse a few inches.

## **INS./OUTS. INT. SENSE / SHADOW SENSE / EXIT SENSE (TB12/TB13/TB14/TB15) INPUTS**

INSIDE  
INTERRUPT  
SENSE

Input from an Inside Interrupt loop provides the signal for an optional LiftMaster loop detector add-on board. Operation is the same as the Interrupt Loop input, above.

OUTSIDE  
INTERRUPT  
SENSE

Input from an Outside Interrupt loop provides the signal for an optional LiftMaster loop detector add-on board. Operation is the same as the Interrupt Loop input, above.

SHADOW  
SENSE

Input from shadow loop provides signal for optional LiftMaster loop detector add-on board. Operation is the same as Shadow Loop input, above.

EXIT  
SENSE                      Input from exit loop provides signal for optional LiftMaster loop detector add-on board. Operation is the same as Exit Loop input, above.

**RADIO INPUT (TB6)**

RADIO RECV              Convenience terminals provide power and contact connection for a radio receiver. Activation is the same as CYCLE.

**OBSTRUCTION ALARM (TB17)**

Relay contacts close to provide 24DC alarm power if the gate has two consecutive obstruction faults.

**LOW BATTERY/ NO AC POWER (TB18)**

LOW BATTERY            Activation fully opens or closes the gate, depending the setting of Switch S3.

NO AC POWER            Activation registers the date and time of power outages in the gate operator transaction buffer.

**24VAC OUTPUT (TB7)**    Terminals provide power (24VAC, 200mA) for peripheral devices.

**MAGLOCK INPUT (TB4)**

MAGLOCK                Relay contacts close when the gate is fully closed.

**MASTER/SLAVE I/O INPUT (TB1)**

MASTER/SLAVE I/O    Input/output terminals are used to control a second gate operator in a Master/Slave system.

**PHONE LINE (J9)**        Terminals connect the telephone line to the gate operator.

## ADJUSTMENTS

OBSTRUCTION RIGHT (R69) Adjustable pot controls gate sensitivity to blockages by the instantaneous rise in motor current. When the limit is exceeded, the gate stops and reverses a programmed distance (a minimum of 2 inches).

OBSTRUCTION LEFT (R160) Adjustable pot controls gate sensitivity to blockages by the instantaneous rise in motor current. When the limit is exceeded, the gate stops and reverses a programmed distance (a minimum of 2 inches).

**NOTE:** LiftMaster gate operators have two obstruction sense adjustments (left and right) where other gate operators have only one. This allows greater flexibility of installation. For instance, you can install a gate on an incline and not worry about sacrificing downhill gate sensitivity.

INRUSH (R203) Adjustable pot controls the delay in sensitivity to gate obstructions. This delay in sensitivity prevents the initial motor inrush current from causing an obstruction fault. The weight of the gate determines this setting.

## CONNECTORS

LIMIT SWITCH (J4) Connector for the left/right limit switch cable.

PWR INPUT (J1) Connector for AC input power.

MOTOR POWER (J3) Connector for the motor cable.

LOOP DETECTOR (J15) Connector for the optional LiftMaster Outside Interrupt Loop detector add-on board.

LOOP DETECTOR (J12) Connector for the optional LiftMaster Inside Interrupt Loop detector add-on board.

LOOP DETECTOR (J13) Connector for optional LiftMaster Shadow Loop detector add-on board.

LOOP DETECTOR (J14) Connector for optional LiftMaster Exit Loop detector add-on board.

OBSTRUCTION ALARM Connector for factory-installed alarm.

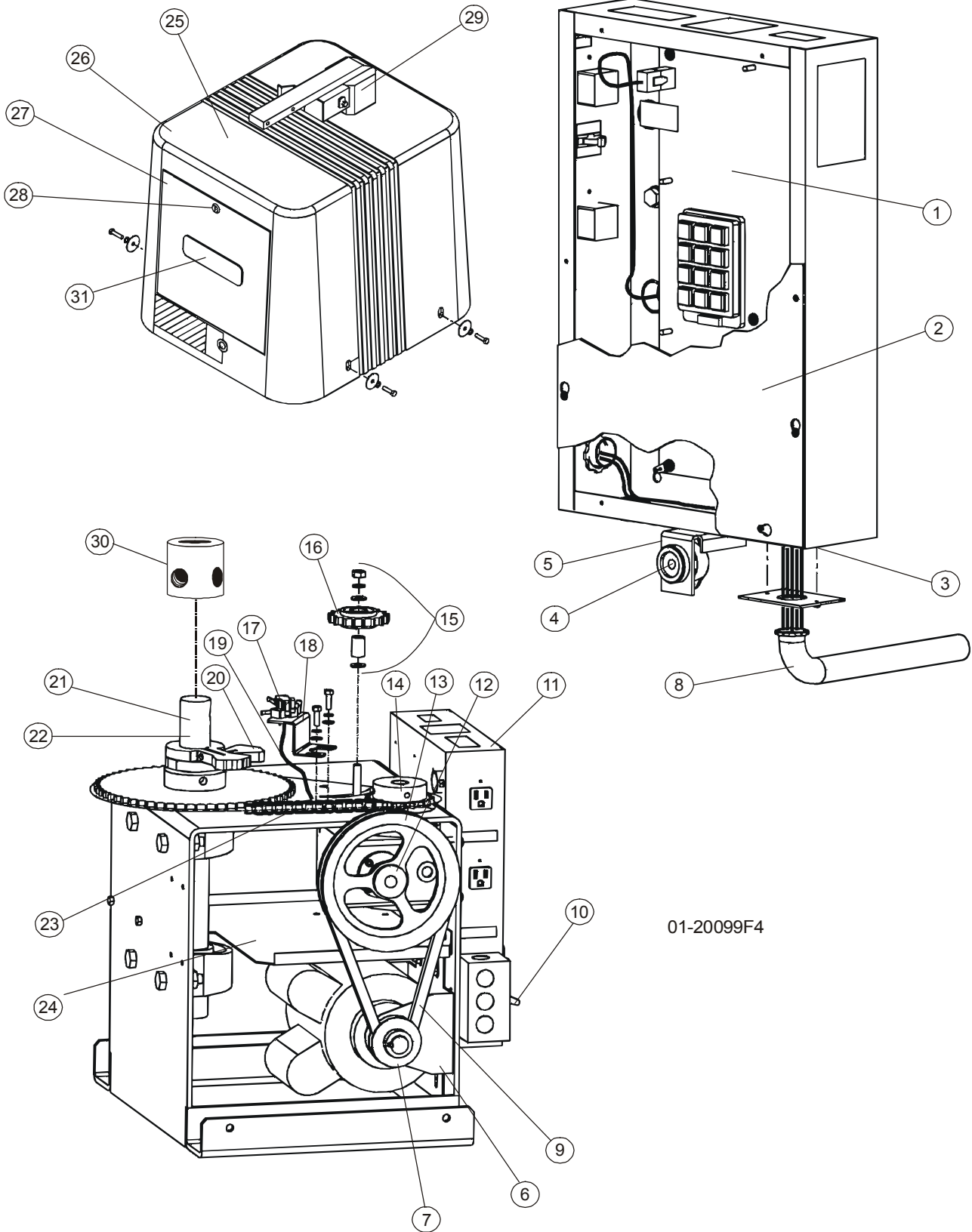
## APPENDIX B: SW 2000-X3 PARTS LIST

ITEM #	PART NAME	PART NUMBER
1	X3 CONTROLLER BOARD	SN1190173
2	CONTROL BOX COVER	41-20066
3	C WASHER 3/4" OD, 7/8" ID	85-FW-87C
4	<b>ALARM ASSY.</b>	76-20012
5	• ALARM BRACKET	10-20051
6	<b>SW 2000 MOTOR ASSY.</b>	75-20028
7	• 2.5" PULLEY	17-20115
8	<b>MOTOR CABLE ASSY.</b>	94-20025
9	31" V-BELT 1/2" WIDE	16-20077
10	DPST SWITCH	23-20088
11	<b>CONTROL BOX ASSY.</b>	76-20018
12	<b>SW2000 GEAR BOX ASSY.</b>	75-20158
13	• 7" PULLEY	17-20124
14	• SPROCKET, CHAIN, #40, 20T, 7/8 BORE	15-20159
15	<b>CHAIN TENSIONER KIT ASSY.</b>	77-20155
16	• IDLER SPROCKET (1)	15-40C17EX
17	<b>LIMIT SWITCH ASSY.</b>	76-20023
18	• LIMIT SWITCH SUPPORT BRACKET	10-20046
19	• LIMIT SWITCH CABLE	94-20160
20	<b>LIMIT CAM ASSY.</b>	75-20011
21	<b>SHAFT ASSY.</b>	72-18512
22	• SW2000 MAIN SHAFT	11-18140
23	#40 NICKEL PLATED CHAIN	19-40081-N
24	SW2000 SHELF	10-20049
25	<b>COVER W/ACCESS DOOR ASSY.</b>	75-20029
26	• COVER	13-18136
27	• DOOR ASSY.	75-18469
28	• LOCK ASSY.	75-18468
29	<b>QUICK RELEASE ARM CAP ASSY.</b>	70-18494
30	<b>QUICK RELEASE ARM CAP HUB ASSY.</b>	75-18479
31	DORCMA GATE OP. WARNING LABEL	40-3504

PARTS NOT SHOWN		
	• WOODROOF KEY (SHAFT ASSY.)	80-20123
	• STAINLESS STEEL E-RING (SHAFT ASSY.)	80-20145
	MASTER LINK #40	19-40001M
	DORCMA WARNING PLACARD	40-3505
	SW2000 –X3 INSTALLATION MANUAL	01-20099
	X3 PROGRAMMING MANUAL	01-20100
	X3 MASTER/SLAVE MANUAL	01-20101
	<b>SW2000 ACCESSORY KIT</b>	77-20128
	• SW2000 ACCESSORY HARDWARE	77-20020
	• SW2000 ROD END ASSY.	75-20015
	• SW2000 SWING ARM EXTENSION	10-20050
	• SW2000 GATE ANCHOR	08-20052
	GATE SAFETY BROCHURE	01-G0582

**Bold = Assembly**

**• = Assembly Part**



01-2009F4

**Figure 19. Exploded View**

# GLOSSARY

**AC:** Alternating Current. An electric current or voltage that reverses direction at regular intervals.

**Alternate Action:** Ability to open and close the gate with one command.

**Arc:** The area that is swept by a swing gate from fully closed to fully open position.

**ATG:** Anti-tailgating refers to a method of immediately closing an opening gate behind a vehicle so that an unauthorized vehicle can not follow the authorized vehicle through the gate.

**DC:** Direct Current. An electric current of constant value flowing in one direction only.

**Dynamic braking:** Stopping the gate by activating the forward and reverse windings of the gate operator motor in each half AC cycle.

**Fault:** An abnormal condition which causes the gate to stop to protect the gate and the user.

**Gate sensitivity:** The response of the gate operator to an exerting force to the gate.

**Gear reducer:** A device that changes the speed and power of its driving force (motor).

**Inrush current:** Initial current drawn into an electrical device due to its capacitive or inductive nature.

**Interrupt Bar:** A switch that is installed on the leading edge of a gate to protect objects caught (**Edge Sensor**) between the gate and the gate frame.

**LED:** Light Emitting Diode. LEDs indicate an action in the system when lit.

**Limit switch:** A switch which its closure indicates the gate has reached its open or close limit, causing the gate to stop. There are two limit switches, open and close.

**Limit cam:** An object which its excursion corresponds to the gate traveling distance and closes the limit switch at the open or close limit of the gate.

**Loop sensor:** A wire embedded in the ground for magnetically sensing large metallic objects (cars).

- ✓ **Exit or Open Loop:** activation opens the gate.

- ✓ **Interrupt or Reverse or Reopen Loop:** activation reverses or stops the gate.

- ✓ **Shadow Loop:** activation prevents a fully open or closed gate from moving while a vehicle is inside the arc of a swing gate.

**Loop detector:** An electronic device that is activated by a loop sensor sensing a metallic object.

**Master/Slave:** A synchronized system containing a pair of gate operators.

**Maglock:** An electric magnet which is used to secure the closed gate.

**Uninterruptible Power Supply:** A battery backup system which powers the gate operator during a power outage.

**Pulley:** A grooved wheel which transfers power via a belt.

**Reclose Timer:** An electronic timer which closes the fully open gate automatically.

**RPM:** Revolutions Per Minute indicates the rotational speed of an object.

**Sprocket:** A toothed wheel which transfers power via a chain.

**Thermal overload:** A condition at which a heat producing device shuts off automatically when it reaches a critical and damaging temperature level.

**Torque:** A force that causes rotation.

# FCC REQUIREMENTS

## **INSTALLATION**

When you are ready to install this system, call your telephone company and give them the following information:

1. The telephone number of the line to which you will connect the system.
2. The FCC registration number for the system, which is **DS83E7 - 17196 - ALE**.
3. The ringer equivalence number (REN) which is **0.1B**.

This system connects to the telephone line by means of a standard jack called the USOC RJ11C. If this type of jack is not available where you want to install the system, you will need to order it from the telephone company.

## **TYPE OF SERVICE**

Your LiftMaster Model SW 2000-X3 operator is designed to be used on standard-device telephone lines. They should not be used on coin service or party lines. If you have any questions about your telephone line, such as how many pieces of equipment you can connect to it, the telephone company will provide this information upon request.

## **TELEPHONE COMPANY PROCEDURES**

The goal of the telephone company is to provide you with the best service it can. In order to do this, it may occasionally be necessary for them to make changes in their equipment, operations, or procedures. If these changes might affect your service or operation of your equipment, the telephone company will give you notice, in writing, to allow you to make any changes necessary to maintain uninterrupted service.

## **IF PROBLEMS ARISE**

If any of your telephone equipment is not operating properly, you should immediately remove it from your telephone line, as it may cause harm to telephone network. If the telephone company notes a problem, they may temporarily discontinue service. When practical, they will notify you in advance of this documentation. If advance notice is not feasible, you will be notified as soon as possible. When you are notified, you will be given the opportunity to correct the problem and informed of your right to file a complaint with the FCC.

In the event that any repairs are ever needed on your system, they should be performed only by an authorized representative of LiftMaster, Inc.

## **DISCONNECTION**

If you should ever decide to permanently disconnect your operator from its present line, please call the telephone company and let them know of this change.

## **RADIO FREQUENCY**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the FCC helpful: "How to Identify and Resolve Radio-Television Interface Problems". This booklet is available from the United States Government Printing Office, Washington, D.C., 20402. Stock No. 004-000-00345-4.

## NOTICE TO CANADIAN USERS

**NOTICE:** The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operation and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

**Caution:** Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or an electrician, as appropriate.

**NOTICE:** The **Ringer Equivalence Number** (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on any interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.



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**FOR TECHNICAL SUPPORT OR TO ORDER REPLACEMENT PARTS, CALL OUR TOLL FREE NUMBER:**

(800) 528-2806  
Monday thru Friday 5 AM – 6 PM, Saturday, 7 AM – 3:30 PM (PST)

Visit us at [www.liftmaster.com](http://www.liftmaster.com)