

INSTALLATION AND OPERATION INSTRUCTIONS  
FOR THE  
**MODEL BG 3000-X1**  
BARRIER GATE OPERATOR  
(- 73 BOARD)

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Sentex Systems  
Chatsworth, CA

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# THE SENTEX MODEL BG 3000-X1

The Sentex model BG 3000-X1 Barrier Gate Operator is a full featured commercial gate operator with a master/slave wiring capability. The BG 3000-X1 contains the following standard features:

- **Dynamic motor braking** limits gate overtravel.
- **Alternate action OPEN/CLOSE inputs.**
- **Manual switch inputs** override other commands.
- **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** indicates when the motor is not drawing any current.
- **Senses obstructions** through adjustable Peak motor current senses.
- **Two separate peak motor current sense adjustments;** one for upward motion and the other for downward motion of the arm.
- **Initial inrush current sense adjustment** offsets initial inrush current to the motor.
- **Automatic OPEN/CLOSE and Alert Call schedules** include holidays.
- **Cycle counter** is able to initiate a service request call at a predetermined number.
- **Event recording memory** keeps track of all commands and actions. Data is maintained 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 modem 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.
- **Relay output** can be programmed to operate on a variety of conditions including gate moving, service requested, and system failure.
- **Automatic fault Re-Try** causes the gate operator to retry an operation twice following a fault condition. The retry can include a timed reversal of direction to release or move an obstacle.
- **Selectable Automatic Gate Closure feature** closes the gate when power is restored after an outage unless gate is at the open limit.
- **Two 115 VAC accessory plugs** provided.
- **24 VAC accessory power** provided.
- **60:1 worm gear reduction.**
- **Opens any gate weighing up to 10 pounds** and up to 12 feet in length in 4.3 seconds.
- **Diagnostic LEDs** on controller board indicate gate operator actions and assist in troubleshooting.
- **Power Fail Operation option** automatically opens (Fail Safe) or closes (Fail Secure) the gate (user's choice) if AC power fails.
- **Optional Loop detector add-on boards** plug into controller board for Interrupts, shadow and exit loops.
- **Remote Telephone interface** permitting gate operator programming and diagnostics.
- **Inside and Outside Interrupt Loops** enhance gate control and distinguish between entering and exiting traffic.
- **Optional arm** for safe and long service life.

DIMENSIONS		WEIGHT	ELECTRICAL
Height	44"	242 Lbs.	115 VAC, Single Phase, 60 Hz., 8 amp (A separate 20 AMP circuit is Required by most codes.)
Width	17"	(257 Lbs. With Power	
Depth	17"	Fail Operation option.)	

# SAFETY SUMMARY

It is important for everyone involved in the installation and operation of the Sentex model BG 3000-X1 Barrier Gate Operator to read the following warnings

## WARNING!

- 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.
- Improper installation of a gate operator can result in a dangerous system.
- Gate operators can present serious hazards to persons in the immediate area when not controlled in a safe manner. Choose one or more controls which 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.
- All controls must be kept out of reach of small children. Serious injury or death can result from children playing with the controls.
- All controls should be located so the person operating them can see the full area of gate movement.
- Gate operators and associated control equipment should be installed by qualified professional installers who should observe the following safe installation procedures:
  1. Power should always be disconnected whenever installing, wiring or servicing a gate operator. Moving chains and belts in gate operators can catch clothing or fingers and cause severe injury.
  2. Installation of wiring should comply with all local building and electrical codes.
  3. 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.
  4. All operator controls and safety equipment should be tested at the conclusion of installation to be sure they are functioning properly.
  5. 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.
  6. Moving gates have pinch points and entrapment zones which can be extremely dangerous to pedestrians, especially small children.

# BASIC INSTALLATION HINTS AND RULES

PLEASE READ THIS SECTION CAREFULLY BEFORE BEGINNING YOUR INSTALLATION.

The sections that follow contain detailed procedures for the installation of a model BG 3000-X1 system. In addition to these specific procedures, there are a number of general hints and rules which will help ensure that your installation will be done correctly and efficiently. These are discussed below.

1. **UNDERSTAND THE SYSTEM AND INSTALLATION SITE THOROUGHLY.** The BG 3000-X1 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.** U.L. specifications require the BG 3000-X1 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. **GROUND THE SYSTEM.** The system contains parts which may be damaged by static discharge. A proper earth ground connected to the gate operator housing (see Figure 3) 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 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.

4. **PROVIDE POWER FROM A DEDICATED SOURCE.** The outlet into which you connect the Gate Operator should be wired to its own circuit breaker. This will reduce the line noise introduced into system power and minimize the risk of having other equipment interrupt system operation. **In a Master/Slave system, Master and Slave must each have separate circuits.** See Installation and Operation of Master/Slave Systems for Series X1 Gate Operators.

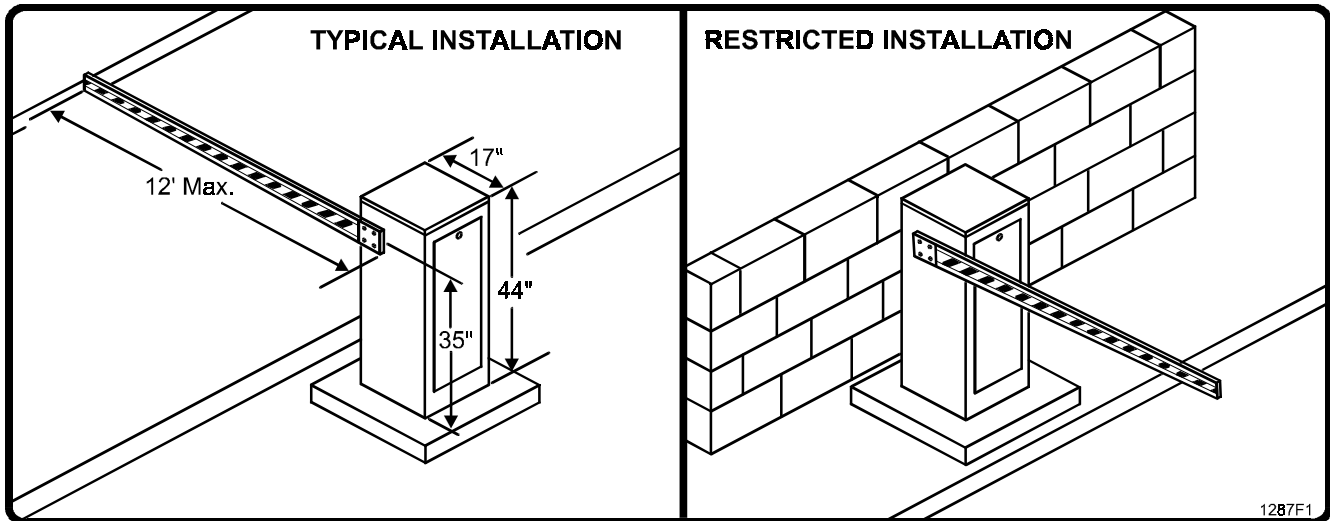
5. **DO NOT OVERLOAD THE TERMINAL BLOCKS.** The terminal blocks used in the gate operator are removable and the pins are soldered into the boards. To connect the wires, remove the "head" from the correct terminals and open the screws. Insert the wire into the correct opening on the front and tighten 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.

6. **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.
7. **READ 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 so that you understand the connection you are making.
8. **TRAIN YOUR CUSTOMERS THOROUGHLY.** Although customer responsibility is limited to proper installation, the quality of service is determined by the care of system set up. Ensure that the customer has a copy of this manual to guide them. It will save you and them lots of inconvenience and aggravation later.

# PART 1 SITE PREPARATION

## A. LOCATION AND LAYOUT



**Figure 1. Barrier Gate Operator Layout.**

### NOTE

Figure 1 shows two different single gate installations. For location and layout details of Bi-Parting, Bi-Parting Latch, Trap and Tandem gates, see Installation and Operation of Master/Slave Systems for Series X1 Gate Operators, Document Number 6001376, Part 1.

1. Always install the gate operator on the inside of the fence line. NEVER install on the public side of the fence.
2. All manual controls and activating devices should be mounted at least 6 feet away from the gate to provide safety.
3. Allow enough clearance around the gate and the gate operator for installation and service.

### INSTALLATION NOTES

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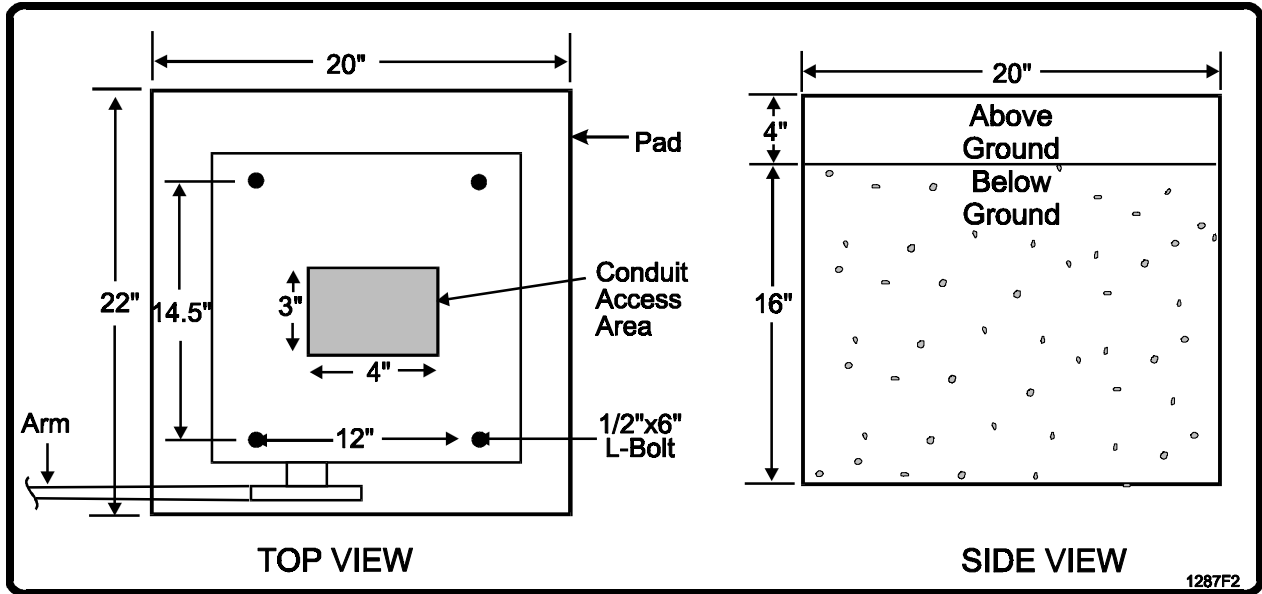


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**B. PAD AND MOUNT**



**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. Sentex recommends a pad 20" wide by 22" long by 20" deep.
2. 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. L-bolts 1/2" X 6" are recommended.
3. The pad should be level and about 4" above grade to prevent water entrance. Allow concrete to set at least two days before installing gate.
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 see Installation and Operation of Master/Slave Systems for Series X1 Gate Operators, Document Number 6001376.

**NOTE:** The only access area for the conduit stub is at the center of the pad, indicated as the shaded area in Figure 2 Top View. Allow a minimum three-foot-long conduit stub.

**INSTALLATION NOTES**

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## 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.
3. Wiring must comply with the local Electrical Code for operating a ½ HP motor (suggest 12 AWG for up to 300' and 10 AWG for up to 500' long wire runs).
4. Be sure to pull a ground wire in the conduit for the connection to the gate operator. Do not rely on metallic conduit for earth ground.

## D. LOOP DETECTORS

1. The gate operator has a shelf that can support non-Sentex 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. The shelf space provided is approximately 7" x 6" x 32" high. Shelf space on systems without the Power Fail Operation Option is about 12" x 6" x 32".
4. Wiring should be 16-24AWG stranded or 18-24AWG solid.

**NOTE:** Optional Sentex-supplied loop detector add-on boards are available, both pre-installed and for installation in the field. See Part 4, BG 3000-X1 Options.

## E. TELEPHONE CONNECTION

- A conduit entrance into the gate operator should be provided for the telephone line.
  - 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 controller 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)

- A conduit between the Master and Slave units should be provided for the Master/Slave interconnection cable.
- Two shielded twisted pair wire 16 AWG to 24 AWG will be connected between the two units at TB5 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 feet in length.

## G. OTHER CONNECTIONS

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

# PART 2

## SYSTEM INSTALLATION

### A. MOUNTING GATE OPERATOR

#### WARNING

For safety reasons, the Power Fail Operation Option is shipped with the battery unconnected to the system. **Do not connect the battery until all other installation and alignment procedures have been completed.** Failure to observe this warning may result in the Power Fail Operation Option moving the gate at unexpected moments.

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

#### WARNING

After attaching the conduits to the control box, make sure that: a) the conduits fold to the **right** during control box closure; and b) the control box swings freely open or closed.

1. Mount the cabinet on the cement pad using the previously installed anchors. Be sure the operator mounting is level and square, and that the gate operator access door faces away from the driveway (see Typical Installation, Figure 1).
2. Slightly loosen the mounting screws of the control box clear plastic cover. Slide the cover out.
3. Swing the control box open fully to allow connection of the conduits. Run the conduits through the bracket in the lower back of the control box.
4. Cut excess conduit and use 90 degree conduit fittings to attach conduits to the control box.  
**Note:** the input power conduit need not go through the bracket and can be attached to the control box directly.

### B. 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 (see Figure 3).

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.

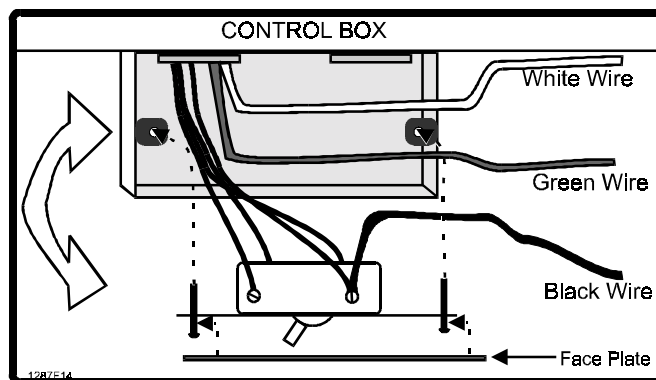


Figure 3. AC Wiring.

## C. RUNNING INPUT WIRING

1. Remove the plastic control box cover.
2. Run wires from input components and Master/Slave conduits into control box.
3. For Master/Slave wiring, refer to Installation and Operation of Master/Slave Systems for X1 Series Gate Operators, Document Number 6001376, Parts 1 and 2.

### 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.

## D. SETTING GATE OPEN DIRECTION SWITCHES S1 AND S2

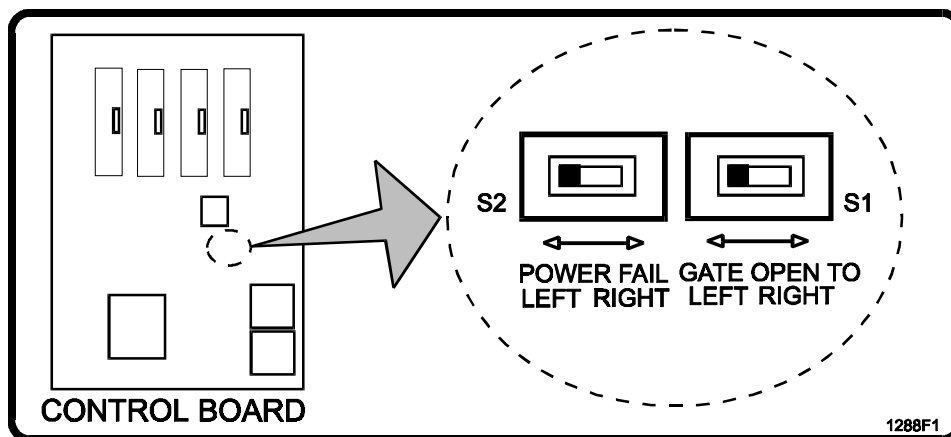


Figure 4. Gate Direction, Power Fail Option Switch Location.

1. Gate opening direction is set by switch S1, located on the control board. The switch is sensed only on power up, so it should be set when the power is off.
2. Ensuring power is off, set switch S1 to the *left* if the cabinet access door faces away from the driveway (typical installation), or to the *right* if the access door faces the driveway (restricted installation).

### If the system was ordered with the Power Fail Operation option:

3. The power failure gate opening direction is set by switch S2, located next to switch S1 on the control board. Set switch S2 to *left* to fully open (Fail Safe) or to *right* to fully close (Fail Secure) the gate during power outage (typical installation).

## E. POWER UP PROCEDURE

1. Turn on the 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 are engaged.

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

## F. USING MANUAL CONTROLS

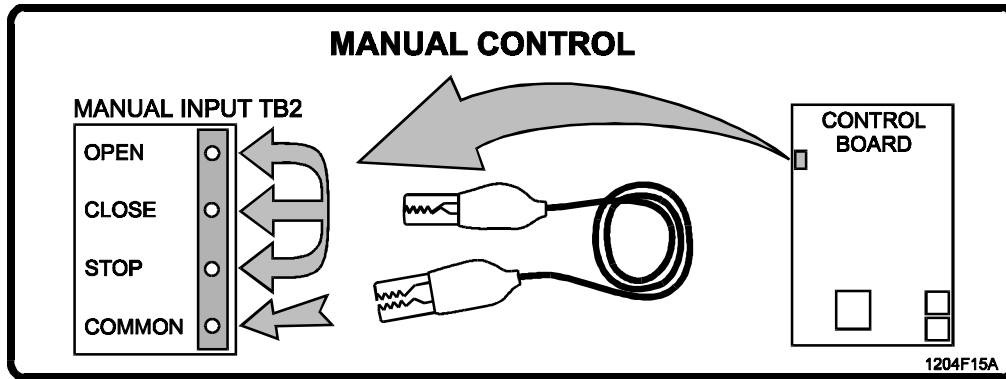


Figure 5. Manual Controls, Location and Use.

If necessary, use the manual controls on Manual Input Terminal TB2 (OPEN, CLOSE, and STOP, as shown in Figure 5), 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 from 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.

## G. GATE ARM INSTALLATION

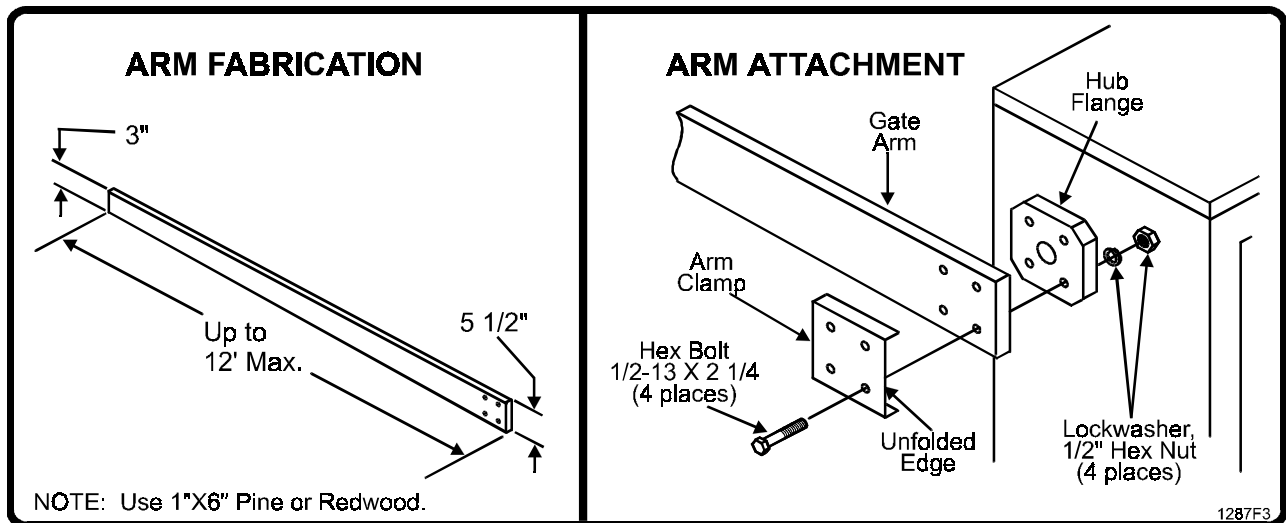


Figure 6. Gate Arm Installation.

### 1. ARM FABRICATION

1. Use 1" x 6" clear pine or redwood (not supplied).
2. Cut arm to the desired length (up to 12 feet), then taper to dimensions shown in Figure 6. Tapering the arm reduces weight and reduces warping.
3. Using the arm clamp as a template, drill four 1/2" diameter holes in the wide end of the arm.
4. Finish the arm using an exterior grade paint. Add striping with paint or tape.

### CAUTION

The total weight of the gate arm must not exceed ten (10) pounds. The lighter and/or shorter the gate arm, the longer the life of the gear reducer and motor.

## 2. ARM ATTACHMENT

1. Secure hub flange to the output shaft with two set screws and the key from accessory kit.
2. Align the holes in the gate arm with the attachment holes on the hub flange and arm clamp.
3. Install and tighten the four supplied hex bolts, lock washers and hex nuts (see Figure 6).

**NOTE:** Make sure the arm clamp is oriented as shown in the figure.

## H. GATE ARM ADJUSTMENT FOR TYPICAL INSTALLATION

Although preset at the factory, the turnbuckle may have to be adjusted to ensure the gate arm is level. If required, adjust the turnbuckle as follows:

1. Make sure the unit power switch is off.
2. Rotate the gearbox pulley by hand until the crank arm is parallel with the turnbuckle shaft at its lowest point of travel (see Figure 7).
3. If the gate arm is not level, loosen both turnbuckle jam nuts and rotate the shaft until the gate arm is parallel with the ground, then retighten the two jam nuts.

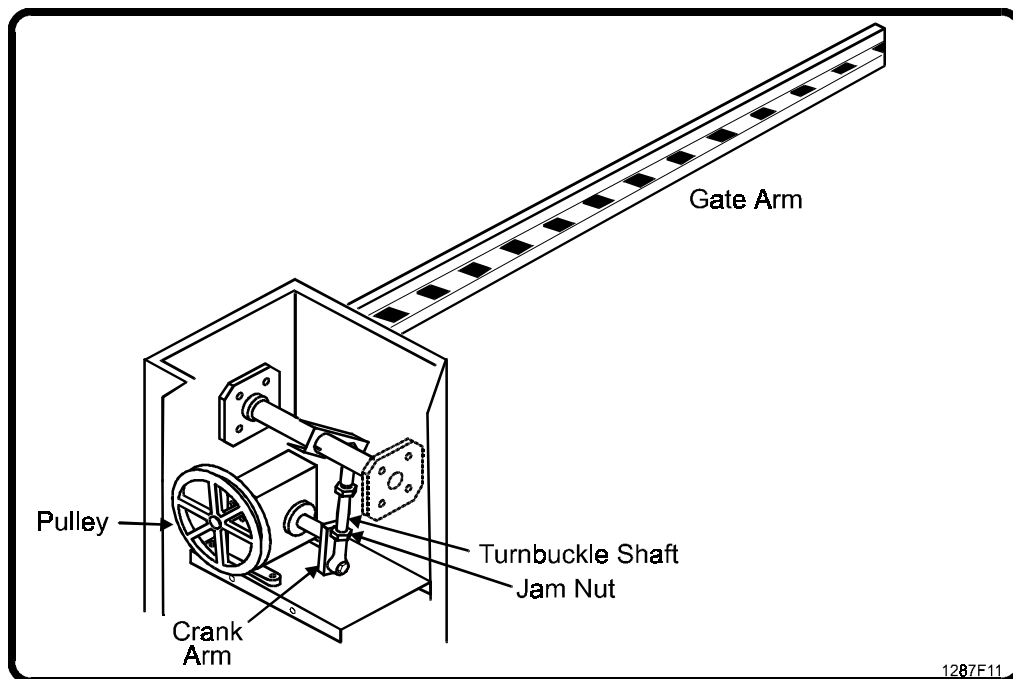


Figure 7. Gate Arm Adjustment.

## I. LIMIT CAMS

Gate operator limit cams are factory adjusted for 90 degree arm swing and are not to be adjusted in the field except during limit cam or limit switch bracket replacement.

## 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 stops or reverses the gate. Three sensitivity adjustments are factory-set for most installations:

- Right gate motion (R69) @ 11:00 o'clock
- Left gate motion (R160) @ 11:00 o'clock
- Inrush current (R203) @ 9:00 o'clock

If your installation requires different sensitivity adjustments, use the following procedures:

- ◆ For Typical Installation, set switch S1 to "Open to Left" position and use the "Typical Installation" adjustment procedures below. For Restricted Installation, set S1 to "Open to Right" position and use the "Restricted Installation" adjustment procedures.
- ◆ The minimum sensitivity is full clockwise and maximum sensitivity is full counter clockwise. 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 9 o'clock position (see (Figure 8)).

**IMPORTANT:** Current flow varies with temperature. Do not tune the sensitivity measurements too finely, or they may change with the time of day or seasons.

- ◆ Make all adjustments in the order listed.

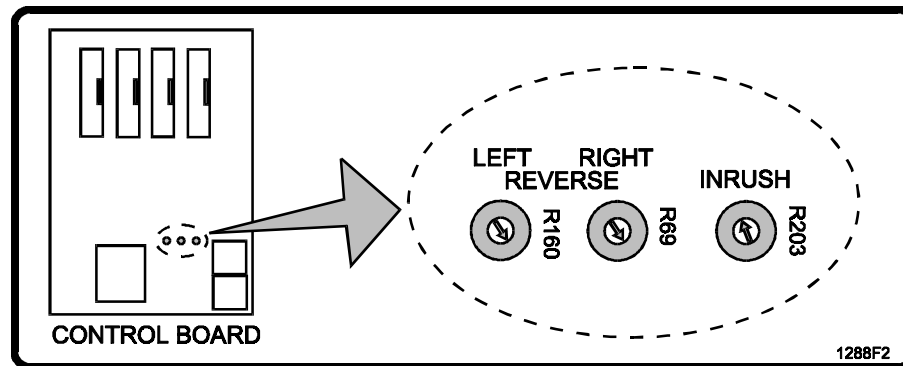


Figure 8. Gate Sensitivity Adjustments Location.

### 1. TYPICAL INSTALLATION ADJUSTMENTS

#### “Left Reverse” Adjustment (R160)

1. Initiate opening the gate.
2. Wait 1 to 2 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 Reverse” Adjustment (R69)

1. Open the gate fully, then initiate closing the gate.
2. Wait 1 to 2 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 gate stops or backs up when bumped and has the desired sensitivity.

## 2. RESTRICTED INSTALLATION ADJUSTMENTS

### **“Right Reverse” Adjustment (R69)**

1. Initiate opening the gate.
2. Wait 1 to 2 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.

### **“Left Reverse” Adjustment (R160)**

1. Open the gate fully, then initiate closing the gate.
2. Wait 1 to 2 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.

## 3. INRUSH CURRENT ADJUSTMENT (R203)

1. Turn the pot fully counterclockwise.
2. Initiate opening 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 the 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. POWER FAIL OPERATION OPTION CONNECTION

### a) Power Fail Operation Option Connection

#### CAUTION

Perform the next step (battery hookup) with care. Interchanging battery wires temporarily opens the resettable fuse on gate operator board, disabling the power fail option.

To ensure a safe installation, the gate operator is shipped with the battery partially disconnected from the Power Fail Option electronics. To enable this option:

- Connect white/red wire of option harness to positive (+) battery terminal.

### b) Power Fail Operation Option Test

#### NOTES:

- The following procedures require turning main power to the gate operator off and on at its dedicated circuit breaker. **DO NOT shut off the Gate Operator Power switch unless specifically directed by the procedure**, since this will shut off everything, including the Power Fail Operation option.
- Because the battery may not be fully charged at the time of the test, we strongly suggest moving the gate only one foot when performing the power fail test.

1. Set Power Fail switch S2 to the same position as switch S1 (Figure 4).
2. Turn on gate operator power switch.
3. Using the manual controls (Figure 5), initiate gate opening, then stop the gate about one foot short of its fully open position.
4. Turn off main power to the gate operator. After about one minute the gate should start opening and stop at its fully open limit.
5. Turn on main power to the gate operator.
6. Set Power Fail switch S2 to the opposite position.
7. Using the manual controls, initiate gate closing, then stop the gate about one foot short of its fully closed position.
8. Turn off main power to the gate operator. After about one minute the gate should start closing and stop at its fully closed limit.
9. Turn on main power to the gate operator.
10. Set Power Fail switch S2 to the direction you desire the gate to move after a power outage.

## L. CONNECTING INPUT WIRING

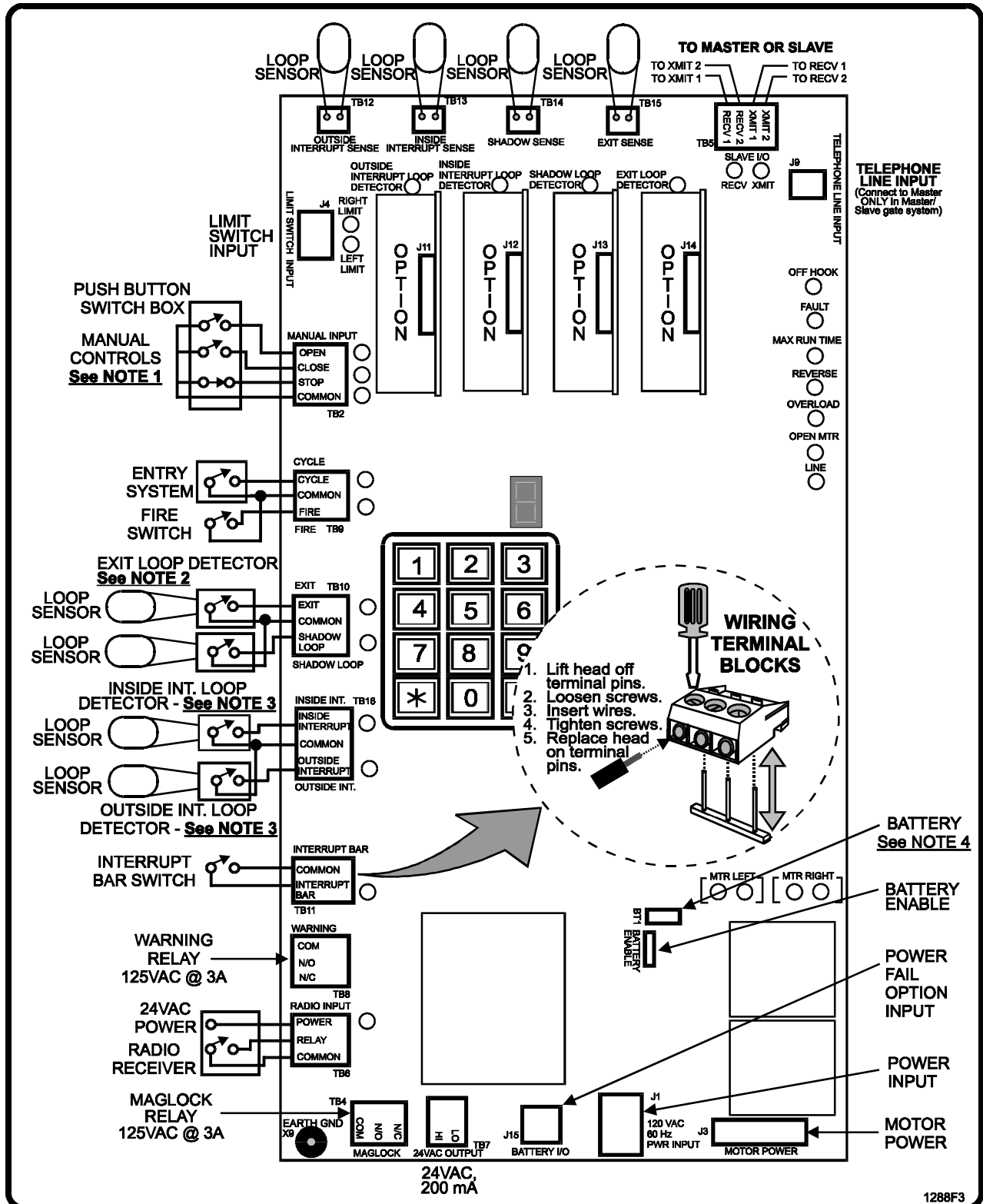


Figure 9. Control Board Wiring.

**IMPORTANT:** Before proceeding, see NOTES on the next page.

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 Installation and Operation of Master/Slave Systems for X1 Series Gate Operators, Document Number 6001376).

## 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.
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.
  - ◆ If only one loop detector is used, the Outside loop must also be connected to the Inside loop detector.
  - ◆ To enhance system safety in Bi-Parting and Bi-Parting Latch Master/Slave systems, the Interrupt loops, Shadow loops and Interrupt Bar switches may be connected to both gates. If this is done, when connecting the two control boards, *do not interchange input and common terminals*. If terminals are interchanged, inputs will not be detected and controller boards may be damaged. See Installation and Operation of Master/Slave Systems for X1 Serier Gate Operators, Document Number 6001376.
4. If AC power to the controller board is cut off, the battery will retain the correct time and date.

## M. 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 the enclosed manual "SL 1000, SW 2000, BG 3000 and BG 3100-X1 Programming (-73 Bd)," Doc. No. 6001312.

**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	# of Digits	Default	Acceptable Input
01	Gate Type	1	1	0 = Slide, 1 = Swing, 2 = Barrier
02	Operator Type	1	0	0 = Single, 1 = Master, 2 = Slave
03	Pair Type	1	0	0=Bipart, 1=Latch✓, 2=Trap, 3=Tandem
04	Warn When	1	0	0 = Moving, 1 = Closing, 2 = Not Closed, 3 = Alerts Only
05	Warn Time Before Moving	2	0	0 – 30 Seconds
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	Maximum Retry Count	1	0	0 – 2 (0 = Do not retry)
10	Retry Pause Time	Up to 2	30	30-99 Seconds
11	Reverse Sense Backup Closing	Up to 3	3	0 – 499 Inches See note below.*
12	Reverse Sense Backup Opening	Up to 3	3	0 – 499 Inches See note below. *
13	Safety Bar Backup If Closing	Up to 3	12	0 – 499 Inches See note below.*
14	Safety Bar Backup If Opening	Up to 3	0	0 – 499 Inches See note below.*
15	Return to Factory Set Defaults	6	N/A	101010 (partial), 191919 (full)

### \* IMPORTANT NOTE: BARRIER GATE BACKUP DISTANCES

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

Barrier gates, however, move in *degrees* per second, so it is the length of the gate that determines how far the edge of the gate moves each second. As a result, entering backup distances for barrier gates is different than for slide gates. Use the following table to enter barrier gate backup distances:

I want my gate to move This far out at the end:	And my gate length is:		
	8'	10'	12'
One foot	Enter 5"	Enter 4"	Enter 3"
Two feet	Enter 10"	Enter 8"	Enter 6"
Three feet	Enter 15"	Enter 12"	Enter 9"

## N. POST INSTALLATION PROCEDURE

### 1. Setup

1. Turn on the **main power** at the gate operator's circuit breaker.
2. Verify that **switch S1** (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 a Reverse 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. Both gates open and close at the same time (Bi-Parting gates only).

### 4. Gate Sensitivity

1. Left/Right Reverse sensitivity:  
Apply a bump to the opening and closing gate and verify that the gate stops or reverses.
2. Inrush (Gate response time):  
Apply a bump to the gate as it initiates opening and closing and verify that the gate responds to the bump within a second.

### 5. Maximum Retry Count

1. If you want the gate to resume operation automatically after an occurrence of a Fault, program for Max Retry Count and Retry Pause Time.
2. If you do not want the gate to resume automatically after a Fault, disable Max Retry Count.
3. Give the opening gate a quick bump to generate a fault and verify retry operation.

### 6. 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 immediately. If Reclose Timer is enable, it will close the gate.

## 7. Alternate Action

1. If you want the CYCLE input (Entry system) or RADIO input (Transmitter) to both open and close the gate, disable RECLOSE TIMER and ATG.
  2. 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 cannot enable the ATG and RECLOSE TIMER in procedures 8 and 9 that follow.

## 8. Reclose Timer

1. If you want a fully open gate to automatically close after a period of time, enable the RECLOSE TIMER.
  2. If you don't want the gate to close automatically, disable the RECLOSE TIMER.
  3. Activate any entry command (except Manual OPEN) to open the gate and verify the Reclose Timer operation.
- Note:** Reclose Timer is not functional when the Manual OPEN command is used.

## 9. Inside Interrupt Loop and ATG (when exiting)

1. If you want the gate to stop when a vehicle drives onto the Interrupt Loop and to restart when the vehicle drives off the Interrupt Loop, set Gate Type = Swing and disable the ATG.
2. If you want the gate to stop when a vehicle drives onto the Interrupt Loop and to close when the vehicle drives off the Interrupt Loop, set Gate Type = Swing and enable the ATG.
3. If you want a closing gate to open when a vehicle drives on the Interrupt Loop, set Gate Type = Barrier and disable the ATG.
4. If you want a closing gate to stop when a vehicle drives on the Interrupt Loop and an opening or closing gate to close when the vehicle drives off the Interrupt Loop, set Gate Type = Barrier and enable the ATG.
5. Activate the CYCLE command, drive over the Interrupt Loop, and verify its operation.

## 10. Interrupt Bar

While the gate is opening, push on the Interrupt Bar. The gate should stop or reverse.

## 11. Maglock

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

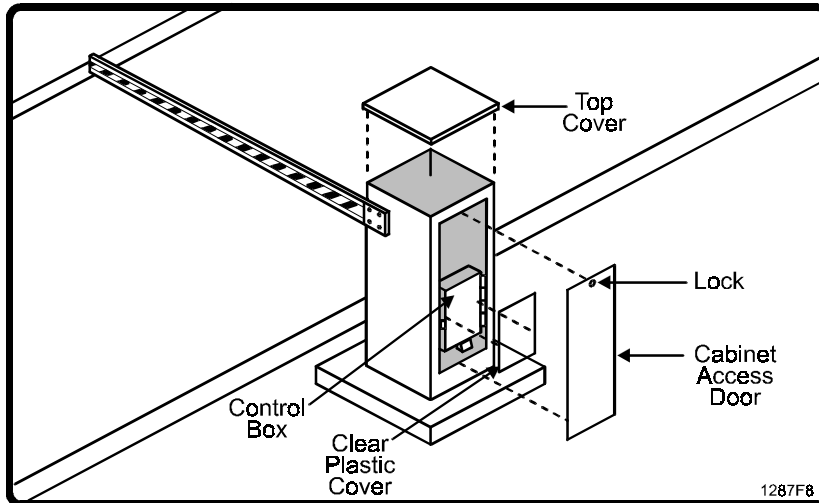
## 12. Automatic Gate Closure

1. To automatically close a fully open gate after power is restored, enable the RECLOSE TIMER.
2. Open the gate fully, then cycle the unit power switch to verify Automatic Gate Closure operation.

## 13. Power Fail Option

1. Verify that switch S2 (Power Fail Open Direction switch) is set to the desired position (Figure 4).

## O. FINAL ASSEMBLY OF GATE OPERATOR



**Figure 14. Gate Operator Final Assembly.**

1. Install gate operator top cover and secure with two wing nuts.
2. Swing hinged control box into cabinet and secure in place with hardware provided.
3. Install clear cover on control box and secure with the four screws provided.
4. **Make sure that gate operator unit power switch is turned on.**
5. Install gate operator cabinet access door and lock.
6. Cycle the gate to ensure it is operating properly.

# PART 3

## MODEL BG 3000-X1 OPTIONS

### A. SENTEX LOOP DETECTOR BOARDS

The model BG 3000-X1 has connectors for four Sentex-supplied loop detector add-on boards. These boards interface with Interrupt and Exit loop sensors, which simply plug into the control board. The add-on boards can be ordered pre-installed, or can be installed in existing model BG 3000-X1 units.

### B. POWER FAIL OPERATION OPTION

The Sentex Power Fail operation Option may be ordered pre-installed on new units, or can be purchased separately for installation in Sentex gate operator systems in the field. The Power Fail kit includes a DC motor, belt, battery, battery support bracket assembly (includes bracket, 3 control relays, rectifier and wire harness) and mounting hardware. Features of the Power Fail Option are as follows:

- The Power Fail Operation system fully opens (Fail Safe) or closes (Fail Secure) the gate (User's choice) one minute after a power outage. The gate will remain open or closed until AC power is restored.
- When AC power is restored, the battery is charged up to its full potential, then continuously trickle charged. Recharging takes from one to five hours, depending on the weight of the gate and how far it moved during the outage. The age of the battery also increases the battery charging time.

**NOTE:** Battery capacity decreases over time, and should be replaced every two to three years.

- The charging section and controls for the Power Fail Operation are located on the control board.
- The motor sensing potentiometers (Right reverse, Left reverse and Inrush) on the Gate Operator board may require readjustment if the Power Fail Operation option is installed in the field.
- Gate speed may be slightly reduced with the Power Fail Operation option installed.

#### IMPORTANT NOTE

During a power outage, all Gate Operator safety features are disabled and only the limit switches stop movement of the gate.

### C. GATE OPERATOR ARM

- The standard arm is 12 feet long and weighs 10 pounds. It is tapered to reduce weight and to prevent warping, and has black and white striping to enhance visibility.
- An optional articulated arm is available for installations with limited overhead space.

# PART 4

## TROUBLESHOOTING AND MAINTENANCE

### A. TROUBLESHOOTING

This section is designed to help you troubleshoot your unit(s) with a minimum of effort. Directly below are some hints to help you test, then a list of problems in order of most severe to least. Next comes a quick-reference list of faults and how to clear them, and then a list of faults and their 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 LEDs are on if the gate is fully closed, and the 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 (black wire) and 3 (red wire) on the Control Board must measure 100VAC to 130 VAC.

**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 sequentially spell out "HELLO".***

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

#### 2. OPERATOR DOES NOT RUN

***When the unit power switch is cycled, the 7-segment display does sequentially spell out "HELLO".***

1. An input is continuously activated (stuck).
2. Both limit switches are stuck closed.
3. Wrong switch S1 setting.
4. Stalled motor.

#### 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.
4. Bad motor.

***Motor is stalled:***

1. Frozen motor or gearbox.
2. V-belt is too tight.
3. Gate is too heavy.

#### 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 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.  
**Power Fail Option was installed recently:**
3. Gate sensitivity adjustments were not reset after installation of the Power Fail Option.
4. A Fault has occurred.

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

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

#### 7. GATE STOPS WHILE OPENING OR REVERSES WHILE CLOSING

A Fault has occurred.

#### 8. OPENING GATE STOPS WHEN A VEHICLE APPROACHES THE GATE

Gate Type is set to Swing, causing the Interrupt loop to stop the gate.

#### 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 Input by mistake.

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

1. Limit cams are out of adjustment.
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 bearings.
3. Slipping Belt.

#### 12. GATE DOESN'T STAY OPEN/CLOSED WITH MANUAL/FIRE INPUTS

Manual inputs or Fire were 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 by mistake.
3. An input is continuously activated (stuck).

### 14. OPERATOR DOESN'T RESPOND TO COMMANDS FOR A MINUTE

A Fault has occurred and Max Retry Count is set to 0.

### 15. ALTERNATE ACTION DOES NOT WORK

1. ATG or Reclose Timer is enabled.
2. Entry system is connected to the Manual Input by mistake.

### 16. GATE DOES NOT OPEN TO THE CORRECT DIRECTION

1. The power was not cycled after changing the setting of switch S1.
2. Limit switches are miswired.

### 17. AN OPEN GATE DOES NOT CLOSE AT POWER UP

1. An input is continuously activated (stuck).
2. The gate was not on the open limit switch when the power went out.
3. Reclose Timer is disabled.

### 18. GATE DOES NOT MOVE AFTER POWER OUTAGE

1. Bad Power Fail Option battery.
2. Miswired DC motor inputs.
3. Bad connection between the Power Fail Option harness connector and the Control Board.
4. Power Fail Option Open direction (switch S2) is not set to the correct position.
5. Battery is connected backwards, causing resettable fuse on the control board to open.

### 19. POWER FAIL OPTION WORKS, BUT GATE DOESN'T STOP AT LIMIT

1. Miswired DC motor inputs.
2. Bad Power Fail Option harness.

### 20. BATTERY DOESN'T RECHARGE WITHIN 4 TO 5 HOURS AFTER USE

1. Old or bad battery.
2. Bad harness
3. Bad Control board.

### 21. POWER FAIL OPTION MOVES THE GATE TOO SLOWLY

1. Old or not fully charged battery.
2. Frozen gearbox.
3. Slipping belt.
4. Belt is too tight.

## 22. THERE IS SLACK OR PLAY IN THE GATE ARM

1. The hardware interconnecting the arm to the gate operator is not tight.
2. Bad gear box.

## 23. ATG (ANTI-TAILGATE) DOES NOT WORK

1. ATG is disabled.
2. Entry system is connected to Manual Open by mistake.
3. Interrupt loop or loop detector is not working properly.

## 24. INTERRUPT LOOP DOES NOT ACT PROPERLY

1. Improper Gate Type and ATG settings.
2. Bad loop sensor or loop detector.
3. Bad connection between the loop sensor, loop detector and the Control Board.

## 25. 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.

## 26. MASTER SLAVE SYSTEM

### ***Units are not synchronized:***

1. Improper Operator Pair setting.

### ***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 in the BG 3000-X1 gate operator system.

1. **Interrupt Bar activation.**
2. **Average motor overcurrent** (overload) caused by an excessive motor current.
3. **Instantaneous motor overcurrent** (left/right reverse sense) due to an impact on the gate.
4. **Maximum motor run time** exceeding 75 seconds.
5. **Inoperative motor** caused by an open motor winding, broken or unconnected input motor wire, or thermal overload.
6. **Limit switch staying closed when gate is supposed to move**, caused by a broken V-belt, defective limit switch, or defective cams.

Faults 1, 2 and 3 may be cleared at any time by the follow, *if Max Retry Count is set to 1 or 2*:

- All open commands (Cycle, Radio, Exit, Fire)
- Manual commands (Open, Close, Stop)
- Inside Interrupt Loop (ATG is enabled)

Faults 1, 2 and 3 may be cleared at any time by the following, *if Max Retry Count is set to 0*:

- Fire command
- Manual commands (Open, Close, Stop)
- All other commands must wait 60 seconds to clear these faults.

Faults 4, 5 and 6 may be cleared at any time by the following:

- All open commands (Cycle, Radio, Exit, Fire)
- Manual commands (Open, Close, Stop)
- Inside Interrupt Loop (ATG is enabled)

## C. FAULTS AND THEIR CAUSES

### 1. IF FAULT AND OVERLOAD LEDS ARE TURNED ON

1. Bad Control board.
2. Bad motor.

### 2. IF FAULT AND REVERSE LEDS ARE TURNED ON

1. REVERSE or INRUSH adjustment is set too low.
2. The gate is blocked by an object.
3. Frozen motor or gearbox.
4. The Maglock does not disengage from the gate at the start of gate opening.
5. Power Fail option was installed without readjusting the gate sensitivity adjustments.
6. A sudden increase in input power while the gate is in motion.
7. Bad Control board.
8. Belt is too tight.

### 3. IF MAX RUN TIME LED IS TURNED ON ONLY

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

#### 4. IF OPEN MTR LED IS TURNED ON ONLY

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

#### 5. IF FAULT LED IS TURNED ON ONLY

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

### D. MAINTENANCE

#### WARNING

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

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

- If the gate is installed in a private residence or small apartment house where usage is not rigorous, 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:** must swing freely without any impediment. Tighten set screws if loose ❶. Check hub, grease if necessary.
2. **Limit switches:** contacts must bounce back rapidly when they are pressed and released.
3. **Belt:** Check for wear and tension (23 to 25 lbs.). Adjust the AC motor left or right to set the proper tension.
4. **Pulleys:** must all line up and be firmly secured to their shafts. Tighten set screws if loose ❶.
5. **Gear Box:** Check for no oil leakage around the bushings. Do not oil gearbox.
6. **Control Board:** Check for water damage or burned spots. All connectors secured to the board.
7. **Wiring:** Check all wiring for any insulation damage. Check for loose wire connections.
8. **No Rust:** Check for rust throughout the unit. Check corners for water entrapment.
9. **Fire Open:** Activate Fire department switch to verify emergency gate opening.
10. **Gate Sense:** Check for the gate sensitivity (refer to Part 2, System Installation, paragraph J, Gate Sensitivity Adjustments)
11. **Power Fail Option:** Check for proper operation (refer to Part 2, System Installation, paragraph K, Power Fail Option Connection, item b, Power Fail Option Operation Test).

**NOTE:** ❶: To prevent loosening, LOCTITE threadlocker 242 is applied.

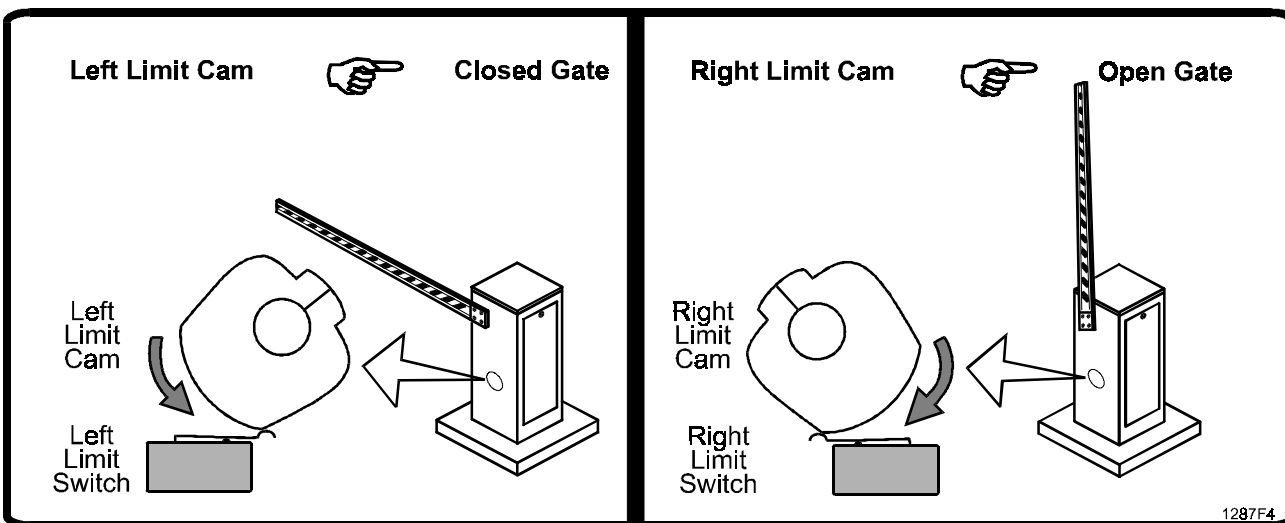


## E. LIMIT CAMS

Gate operator limit cams are factory adjusted for 90° arm swing, and never need to be adjust in the field. However, if long-term use requires replacing the limit cams, use the following procedure to install and adjust the replacement limit cams

- Remove old limit cams by loosening the locking screws and removing cams from the shaft.
- When installing replacement limit cams, ensure that the limit cams are centered over their corresponding limit switches.
- Small adjustments are magnified by the length of the gate.
- To avoid damage to the gate and gate operator due to the gate overrunning its limits, perform the following steps carefully:

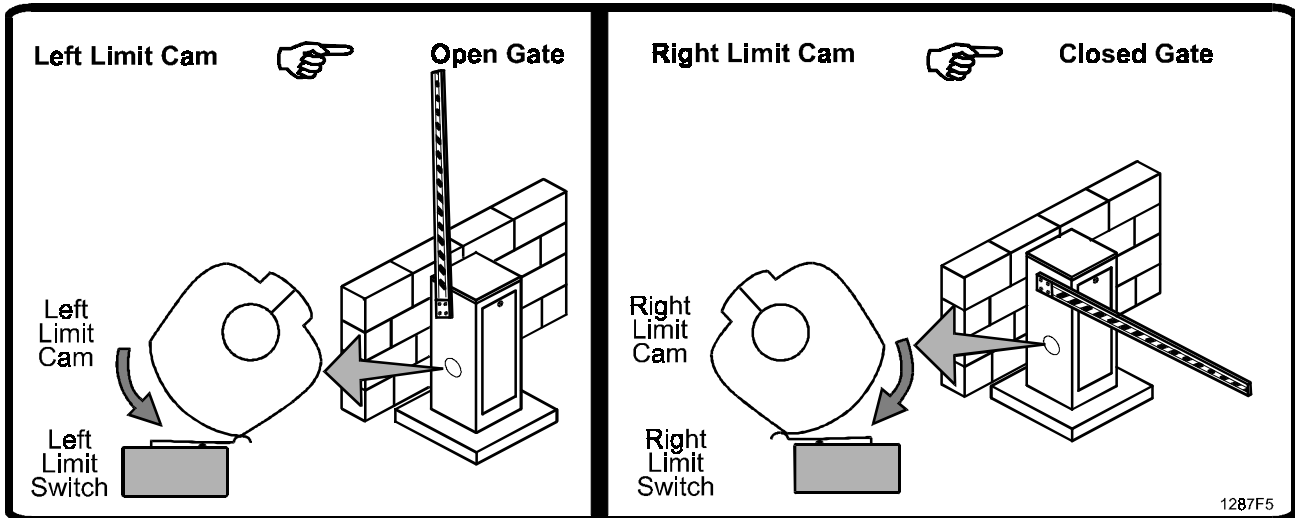
### 1. REPLACING AND ADJUSTING LIMIT CAMS IN A TYPICAL INSTALLATION



**Figure 10. Setting Limit Cams for a Typical Installation.**

1. Make sure that switch S1 is set to the “Left” position.
2. Turn on gate operator power switch.
3. Using manual CLOSE and STOP, move the gate to its proper closed limit position.
4. If not already loose, loosen the locking screw on the left limit cam and turn the cam counter-clockwise until it just barely closes the limit switch.
5. Tighten the left limit cam locking screw.
6. Using manual OPEN and STOP, move the gate to its proper opened limit position.
7. If not already loose, loosen the locking screw on the right limit cam and turn the cam clockwise until it just barely close the limit switch.
8. Tighten the right limit cam locking screw.
9. Open and close the gate to check the limit cam settings. If required, readjust the limit cams until they are set properly.

## 2. REPLACING AND ADJUST LIMIT CAMS IN A RESTRICTED INSTALLATION



**Figure 11. Setting Limit Cams for a Restricted Installation.**

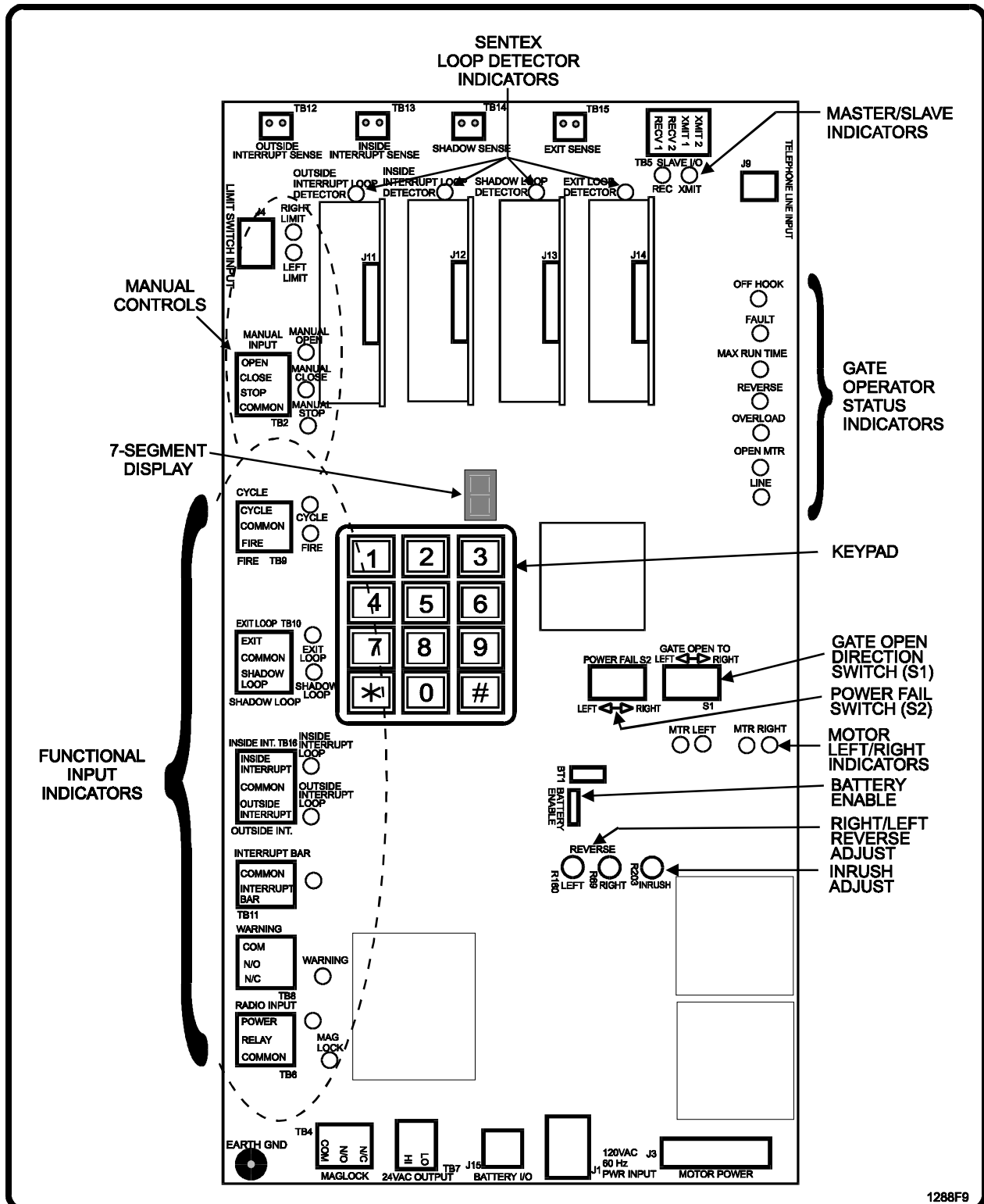
1. Make sure that switch S1 is set to the "Right" position.
2. Turn on gate operator power switch.
3. Using manual OPEN and STOP, move the gate to its proper open limit position.
4. If not already loose, loosen the locking screw on the left limit cam and turn the cam counter-clockwise until it just barely closes the limit switch.
5. Tighten the left limit cam locking screw.
6. Using manual CLOSE and STOP, move the gate to its proper closed limit position.
7. If not already loose, loosen the locking screw on the right limit cam and turn the cam clockwise until it just barely closes the limit switch.
8. Tighten the right limit cam locking screw.
9. Open and close the gate to check the limit cam settings. If required, readjust the limit cams until they are set properly.

# APPENDIX A

## SYSTEM OPERATION REFERENCE

### CONTROLS, INDICATORS, INPUTS AND ADJUSTMENTS

For control and indicator locations, refer to the figure below. For detailed explanations of the Gate Operator's various controls, indicators, inputs and adjustments, refer to the pages that follow.



1288F9

## CONTROLS

**KEYPAD** The 12-key keypad is used for local operation, programming and service.

### SWITCH S1

**GATE OPEN TO LEFT/RIGHT** Selects the direction the gate will open for typical installation (left) and restricted installation (Right).

### SWITCH S2

**POWER FAIL (LEFT/RIGHT)** Selects the direction the Power Fail Operation option will move the gate (Left/Right) if AC power fails.

## 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 that the gate is moving counterclockwise.
MTR RIGHT	Indicates that the gate is moving clockwise.
XMIT	Indicates data is being sent to the other unit in a Master/Slave system.
RECV	Indicates data is being received from the other unit in a Master/Slave system.
LINE	Indicates the ring detect for an incoming telephone call and if the phone line is available when the gate operator wants to initiate a call.
OFF HOOK	Indicates the gate operator is off hook and using the phone line.
FAULT	Indicates a fault in the system. See Fault List in Part 5, Troubleshooting and Maintenance.
MAX RUN TIME	Indicates the motor ran for more than 75 seconds without reaching a limit switch, and was stopped. Usually requires mechanical service. See Fault List in Part 5, Troubleshooting and Maintenance.
REVERSE	Indicates the peak motor current threshold was reached. See Fault List in Part 5, Troubleshooting and Maintenance.
OVERLOAD	Indicates that the average motor current threshold was reached. See Fault List in Part 5, Troubleshooting and Maintenance.
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 in Part 5, Troubleshooting and Maintenance.

## FUNCTIONAL INPUTS

- NOTES:**
- ① The term “activation” means closing an input circuit (via a relay or switch), and may be momentary or continuous. Momentary activations are superseded by any command. Continuous activations are superseded only by an overriding command.
  - ② Activating any command when gate is at the open limit stops the Reclose Timer. When any command (except Manual Close and Stop) clears, the Reclose Timer is reset.

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

**MAN OPEN** Activation fully opens the gate. **Continuous activation holds gate open.** Man Open overrides Anti-Tailgate (ATG, Reclose Timer, and all controls but Man Stop).

- MAN CLOSE      Activation fully closes the gate. **Continuous activation holds gate closed.**  
 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. **If Man Stop is  
 disconnected from its COMMON, no commands affect the gate.**

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

CYCLE      Reclose Timer Disabled:

Activation opens the gate, **which remains open until another command is received.** A Cycle command when the gate is fully open closes the gate. This Alternate action allows a single command to both open and close 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 Inside Interrupt Loop clears.

Reclose Timer Enabled:

Activation opens the gate, **then the Reclose Timer closes the gate.** 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 Inside Interrupt Loop clears.

FIRE      Activation opens the gate. **Continuous activation holds the gate open.** If Reclose Timer is disabled, when Fire is deactivated, gate closes immediately. 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 (swing gate only).

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

INSIDE

INTERRUPT LOOP      with Gate Type = Swing and ATG enabled

**Gate fully open or closed:** activation prevents the gate from moving. When the Interrupt loop clears, the gate begins closing.

**Gate opening or closing:** activation halts the gate. When the Interrupt Loop clears, an opening gate closes and a closing gate resumes its course.

INSIDE

INTERRUPT LOOP      with Gate Type = Swing and ATG disabled

**Gate fully open or closed:** activation prevents the gate from moving.

**Gate opening or closing:** activation halts the gate. When the Interrupt Loop clears, the gate resumes its course.

INSIDE

INTERRUPT LOOP      with Gate Type = Slide or Barrier and ATG enabled

**Gate fully open or closed:** activation prevents the gate from closing. When the Interrupt Loop clears, the gate begins closing.

**Gate opening or closing:** activation halts a closing gate. When the Interrupt Loop clears, an opening gate closes and a closing gate resumes its course.

## INSIDE

INTERRUPT LOOP with Gate Type = Slide or Barrier and ATG disabled

**Gate fully open or closed:** activation prevents the gate from closing only.

**Gate opening or closing:** activation fully opens a closing gate and starts the Reclose Timer if timer is enabled.

## OUTSIDE

INTERRUPT LOOP with ATG disabled

**Gate fully open or closed:** activation prevents the gate from closing only.

**Gate opening or closing:** activation fully opens the closing gate and starts the Reclose Timer if timer is enabled.

## OUTSIDE

INTERRUPT LOOP with ATG enabled

**Gate fully open or closed:** activation prevents the gate from closing only.

**Gate opening or closing:** activation prevents the gate from closing. When the interrupt loop clears, the gate begins closing.

## NOTES

- ◆ If Gate Type = Slide, gate brakes whenever it stops.
- ◆ If Gate Type = Swing, gate brakes only at open or close limit.
- ◆ If Gate Type = Barrier, gate never brakes.

## INTERRUPT BAR INPUTS (TB11)

INTERRUPT BAR Activation causes the gate to reverse for a programmable distance and stop. If Max Retry Count is enable, gate waits a programmable pause time, then tries to resume. The gate will retry up to twice before faulting out.

## WARNING (TB8)

WARNING OUT Relay contacts close depending on the programmed setting of the warning.

## PHONE LINE (J9)

PHONE LINE Terminals connect the telephone line to the gate operator.

## 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 Sentex 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 Sentex 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 Sentex loop detector add-on board. Operation is the same as Shadow Loop input, above.

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

## RADIO INPUT (TB6)

RADIO RECV Convenience terminals provide power (24VAC, 200mA) and signal connection for a radio receiver. Activation is the same as Cycle.

## MAGLOCK INPUT (TB4)

MAGLOCK **NO** and **COM** inputs can close a circuit (i.e., Maglock) when the Close Limit switch is activated (the gate is fully closed).

**NC** and **COM** inputs close a circuit (security camera, camcorder, light, etc.) when the Close Limit switch is deactivated (when gate is not fully closed).

## SLAVE I/O INPUT (TB5)

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

## ADJUSTMENTS

REVERSE RIGHT (R61) Adjustable pot controls gate sensitivity to blockages by the instantaneous rise in motor current. When the limit is exceeded, the gate reverses a programmed distance and stops. If Max Retry Count is enabled, the gate waits a programmed pause time, then tries to resume. The gate will retry twice before faulting out.

REVERSE LEFT (R160) Adjustable pot controls gate sensitivity to blockages by the instantaneous rise in motor current. When the limit is exceeded, the gate reverses a programmed distance and stops. If Max Retry Count is enabled, the gate waits a programmed pause time, then tries to resume. The gate will retry twice before faulting out.

**NOTE:** Sentex gate operators have two reverse 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 a Reverse Sense input. This delay in sensitivity prevents the initial motor inrush current from causing a fault condition. The weight of the gate determines this setting.

## CONNECTORS

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

BATTERY I/O (J15) Connector for use by the Power Fail Operation unit.

PWR INPUT (J1) Connector for AC input power.

MOTOR POWER (J3) Connector for the motor cable.

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

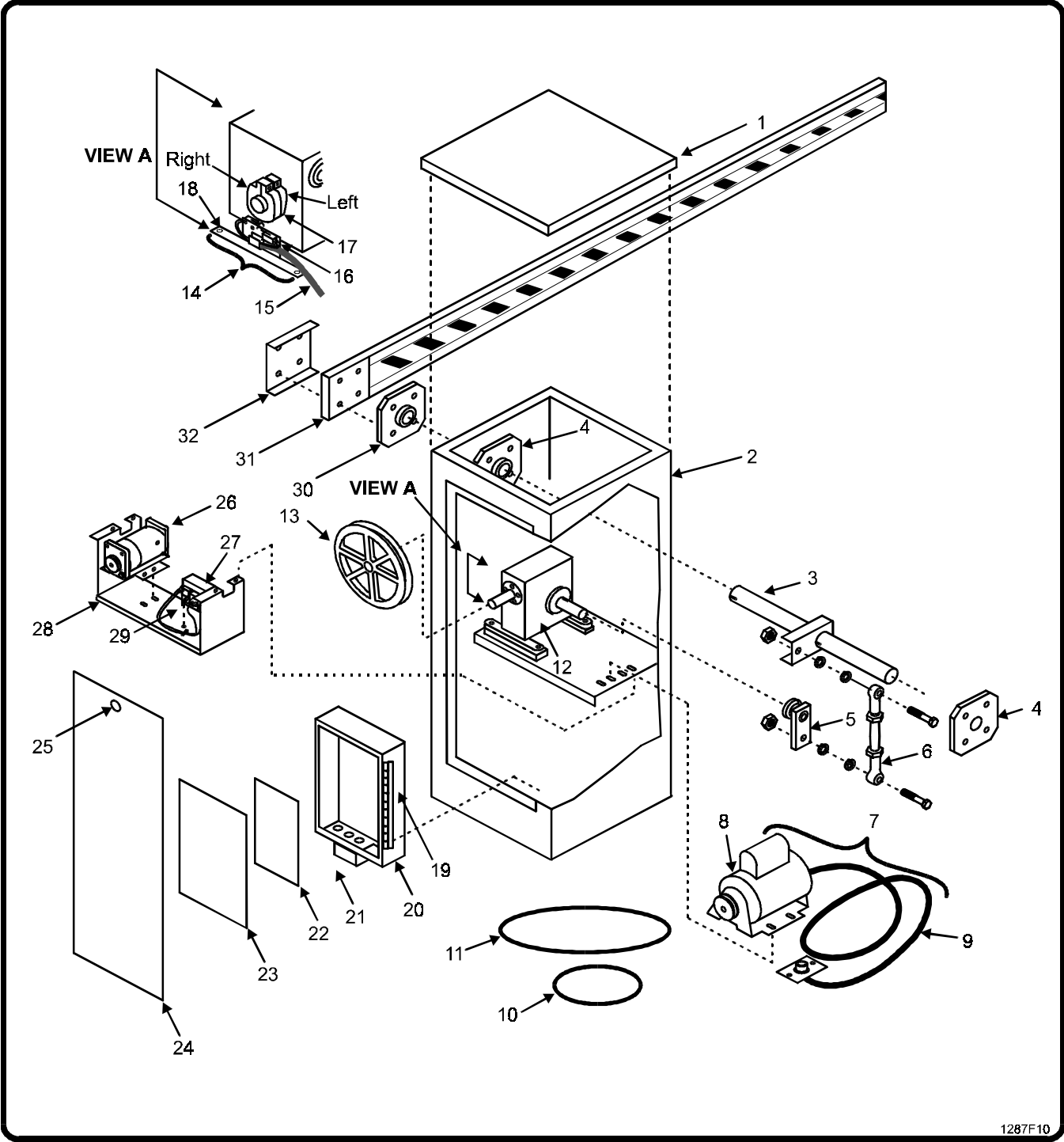
LOOP DETECTOR (J13) Connector for the optional Sentex Inside Interrupt Loop detector add-on board.

LOOP DETECTOR (J14) Connector for optional Sentex Shadow Loop detector add-on board.

LOOP DETECTOR (J15) Connector for optional Sentex Exit Loop detector add-on board.

# APPENDIX B

## SENTEX SMARGATE MODEL BG 3000-X1 PARTS LIST



1287F10

ITEM #	PART NAME	WHAT IT DOES
1	Top Cover	Covers gate operator box
2	Gate Operator Housing	Covers gate operator
3	Shaft	Transmits drive power to gate arm
4	Flange Bearing	Holds shaft in place
5	Lower Crank	Transmits drive power to turnbuckle
6	Turnbuckle	Transmits drive power to shaft
7	AC Motor Assembly	Provides drive power
8	AC Motor	Produces drive power
9	AC Motor Power Cable Assy	Provides power to AC motor
10	V-Belt (no Power Fail Option)	Transmits power from motor to gear reducer
11	V-Belt for Power Fail Option	Transmits power from motors to gear reducer
12	Gear Reducer	Reduces motor speed
13	Reducer Pulley	Reduces Motor speed
14	Limit Switch Bracket Assembly	Controls lever arm limits
15	Limit Switch Cable Assembly	Connects limit switch to control board
16	Limit Switch	Stops motor when gate reaches limit
17	Limit Cam	Activates limit switch
18	Limit Switch Bracket	Holds limit switches
19	Control Box Hinge	Attaches control box; allows control box to be moved for work on other parts of gate operator
20	Control Box	Holds Control Board
21	Control Box Switch	Turns gate operator on or off
22	Control Board	Controls Gate Operator
23	Control Box Clear Cover	Seals Control Box
24	Door	Seals Gate Operator Housing
25	Door Lock	Prevents unauthorized entry
26	DC Motor	Provides drive power in power outage
27	Battery	Provides power to DC motor
28	Tray	Holds power fail option equipment
29	Battery Support Bracket Assy	Supports battery, contains relays, rectifier
30	Gate Arm Hub	Holds gate arm to shaft
31	Gate Arm	Controls traffic
32	Arm Clamp	Holds gate arm to hub

# GLOSSARY

- AC:** Alternating Current. An electric current or voltage that reverses direction at regular intervals
- Alternate Action:** Ability to open and close a fully open gate by using the same open 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 cannot 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 Box:** 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 or Edge:** A switch which is installed at the edge of a gate to protect an object which is situated between the gate and the gate frame.
- LED:** Light Emitting Diode. LEDs are indicators placed on the controller board which light up to indicate an action in the system.
- Limit switch:** The closure of this switch 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:** The excursion of this object 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.
- Power Fail Option:** A battery backup system which opens or closes the gate at power outage.
- Pulley:** A grooved wheel which transfers power via a belt.
- Reclose Timer:** An electronic timer which closes the fully open gate automatically.
- Retry:** A condition at which the stopped gate resumes its course automatically after the occurrence of a Fault.
- RPM:** Rotation Per Minute is a term to indicate the speed of a rotary 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 the causes rotation.
- Torque Limiter:** A clutch-like mechanism used to relieve excessive torque generated by the gate on the gate operator.

## NOTICE 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.

For their own protection, users should ensure that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, is 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.