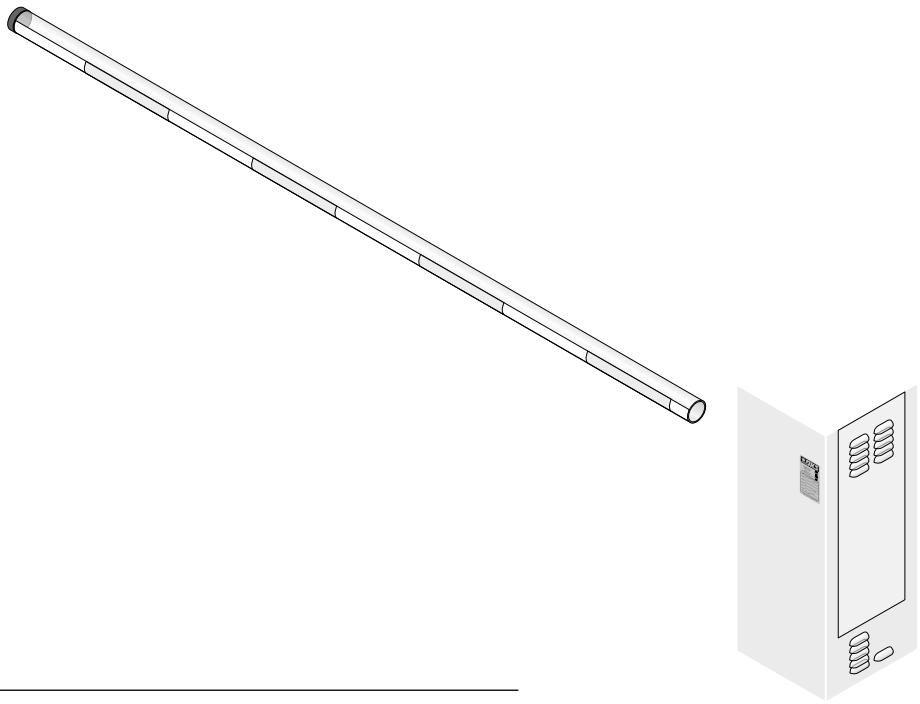
Installation/Owner's Manual

1601 / 1602
Barrier Gate Operator

Use this manual for circuit board 1601-010 Revision V or higher.



Date Installed: _____

Installer/Company Name: _____

_____

Phone Number: _____

Circuit Board
Serial Number
and Revision Letter: _____

Leave Manual with Owner

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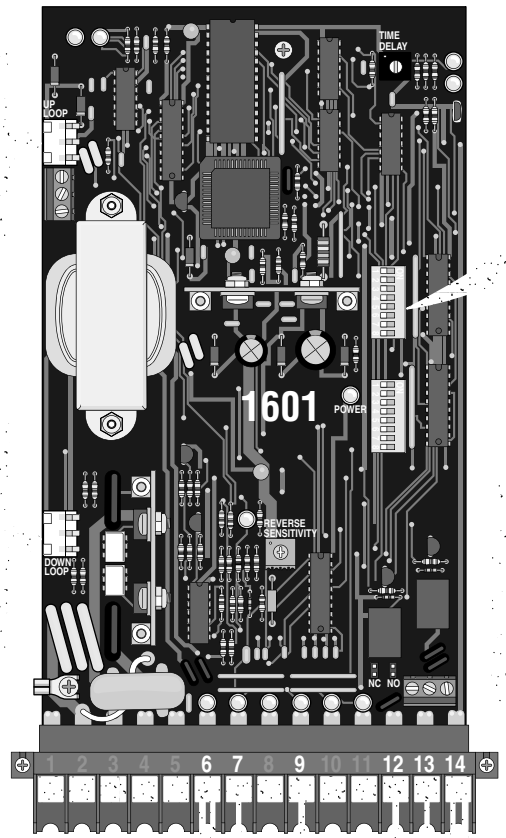
C ETL LISTED US
Intertek

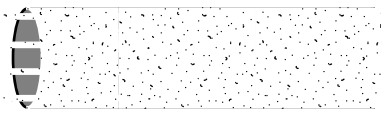
UL 325 Compliant

DOORKING®

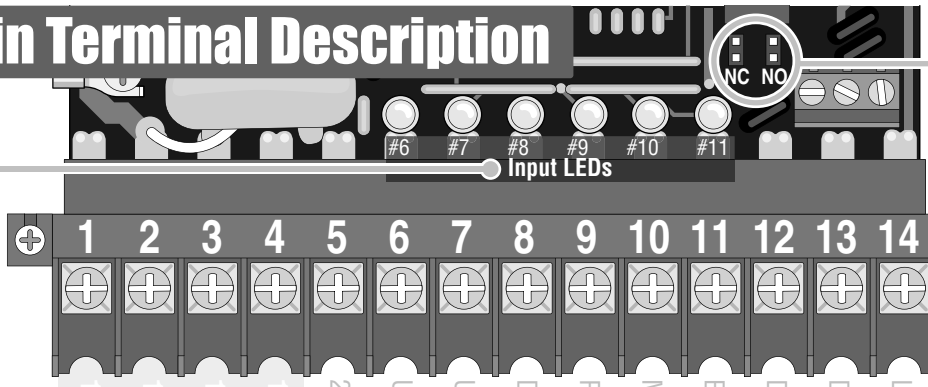
2.3 Dual Gate Operators (Primary/Secondary)

Primary/Secondary Interconnection Basic Details





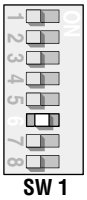
2.4 Main Terminal Description



Input LEDs: The LED that is above the terminal wiring input will light when that terminal input gets activated.

6

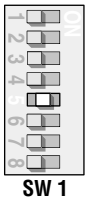
Function is dependent on the setting of programming SW 1, switch 6.
When switch 6 is **OFF**, this input will cause the operator to rotate the arm to the up position. If the arm is in the down cycle, this input will reverse the arm to the up position. If this terminal has a constant input, the arm will remain in the up position regardless of any down input or timer command to rotate down.
When switch 6 is **ON**, this input will cause the operator to rotate the arm to the up position when it is down, and will cause the operator to rotate the arm to the down position when it is up. If the auto timer is turned ON (Not recommended if switch 6 is ON), this input will override the timer and rotate the arm to the down position. If the arm is in the down cycle, this input will reverse the arm to the up position.



SW 1

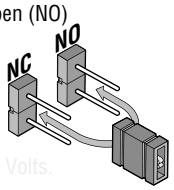
12
13

Function is dependent on the setting of programming SW 1, switch 5.
When switch 5 is **OFF**, activation of the down loop will activate the relay.
When switch 5 is **ON**, activation of the UP loop will activate the relay.



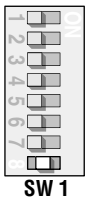
SW 1

Relay contacts can be set for Normally Open (NO) or Normally Closed (NC) operation.
Contact rating is 1 amp maximum at 24 Volts.



7

Function is dependent on the setting of programming SW 1, switch 8.
When switch 8 is **ON**, the function of this input is identical to terminal 6.
When switch 8 is **OFF**, this terminal becomes the logic output of the up loop detector.



SW 1

11

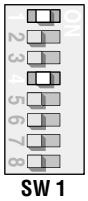
This input is used when sequencing the 1601 with a slide or swing gate operator in **PAMS** applications. This input is only active after a MOMENTARY UP input is received. Activation of this input will rotate the arm to the up position or reverse an arm in the down cycle to the up position.

10

This input is used when sequencing the 1601 with a slide or swing gate operator in **PAMS** applications. Activation of this input will rotate the arm to the up position one time, and activates the enable up input.

8

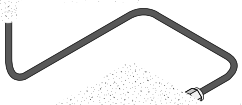
Function is dependent on the setting of programming SW 1, switches 1 and 4.
With switch 1 **OFF** and switch 4 **ON**, activation and then deactivation of this input will rotate the arm to the down position, provided that the deactivation of the input happens while the arm is in the full up position. This input will override the auto timer if it is turned **ON**. If the arm is in the down position, traveling in the down cycle, or traveling in the up cycle, activation and deactivation of this input has no effect on the arm.
With switches 1 and 4 are **ON**, activation and then deactivation of this input will rotate the arm to the down position after it reaches the full up position regardless of when the deactivation of the input occurred.
When switch 4 is **OFF**, this input is identical to the reverse input, terminal 9.



SW 1

9

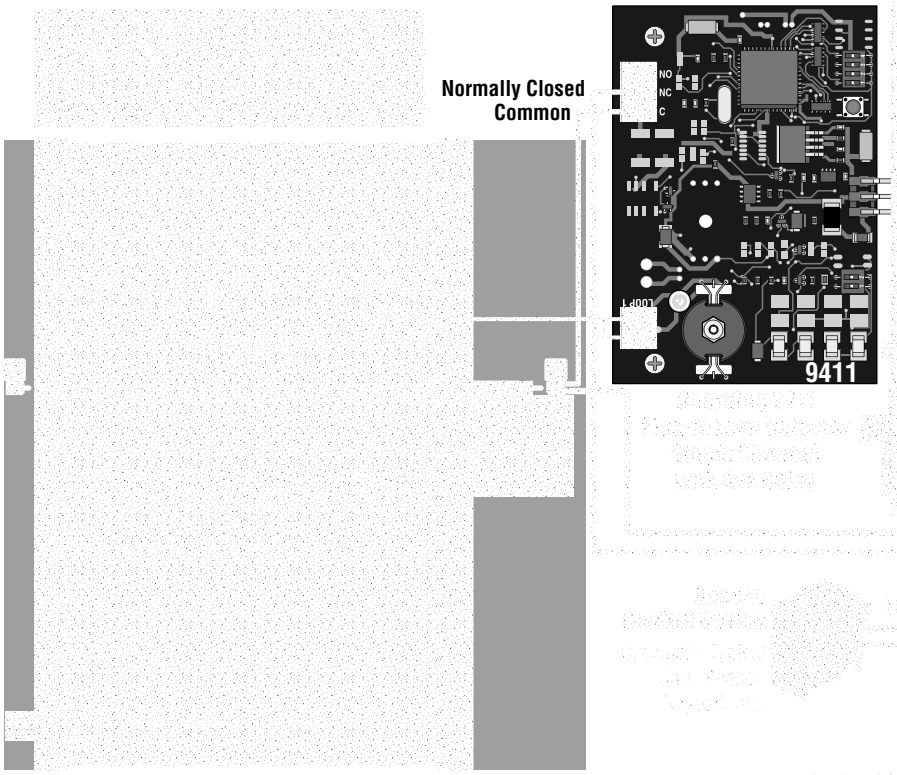
When the arm is in the down position, activation of this input has no effect.
When the arm is in the up position, activation of this input will prevent the arm from rotating to the down position. If the arm is in the down cycle, activation of this input will reverse the arm to the up position.
This input can be controlled to allow the arm to lower for tailgating vehicles but NOT get lowered when a pedestrian is underneath it. The 9411 plug-in loop detector must be installed for this function, see page 10 for more information about controlled non-contact sensors.



3. 24 Volt

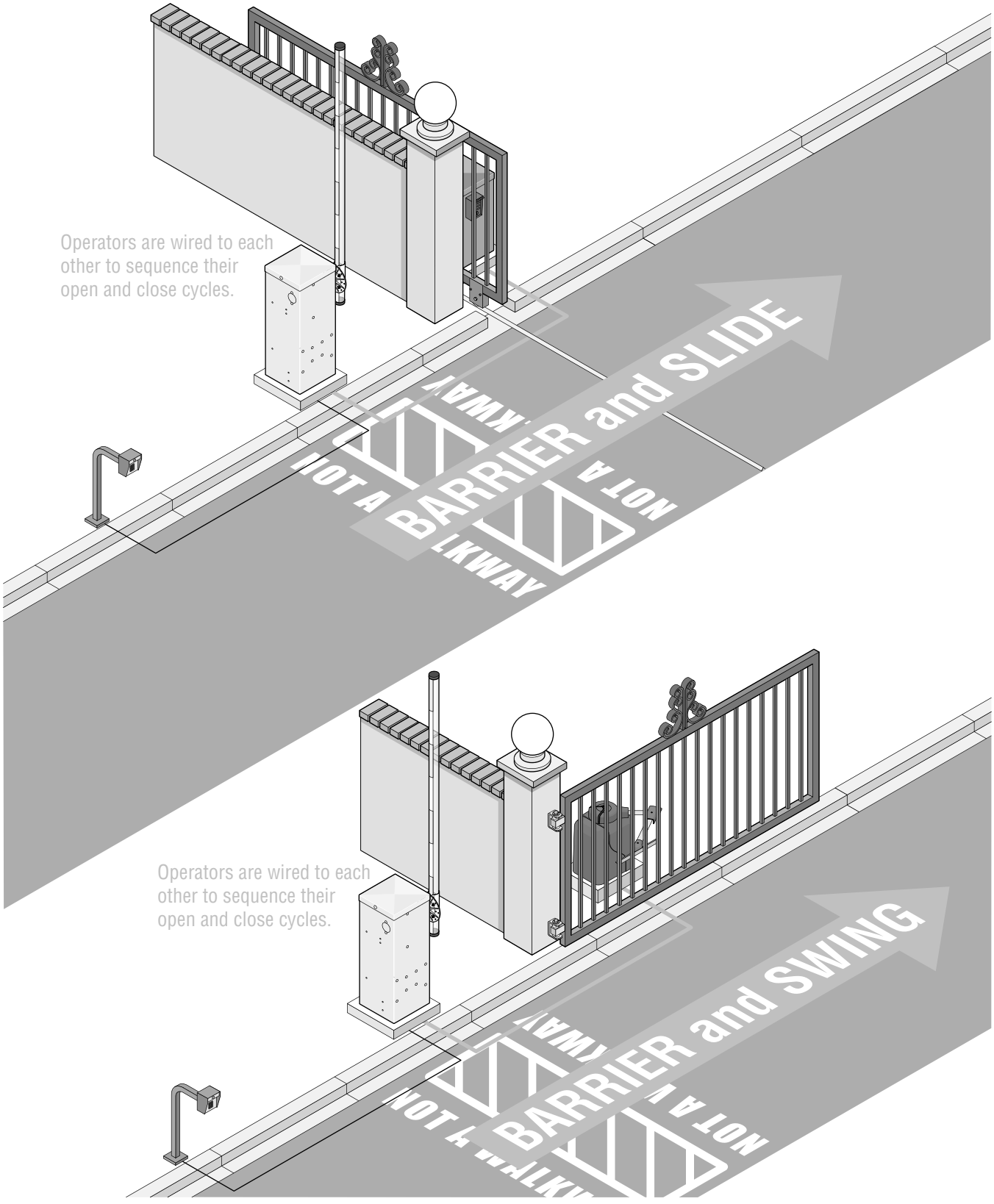
2. Relay

1. Com


Normally Closed
Common
NO
NC
C
LOOP 1
9411
Reverse
Com

2.6 P.A.M.S. Multiple Gate Operator Sequencing

Perimeter **A**ccess **M**anagement **S**olution (PAMS) application allows open and close cycle sequencing of a DoorKing barrier gate operator and a DoorKing slide or swing gate operator. For detailed PAMS wiring information, refer to the PAMS Technical Information and Wiring Manual.

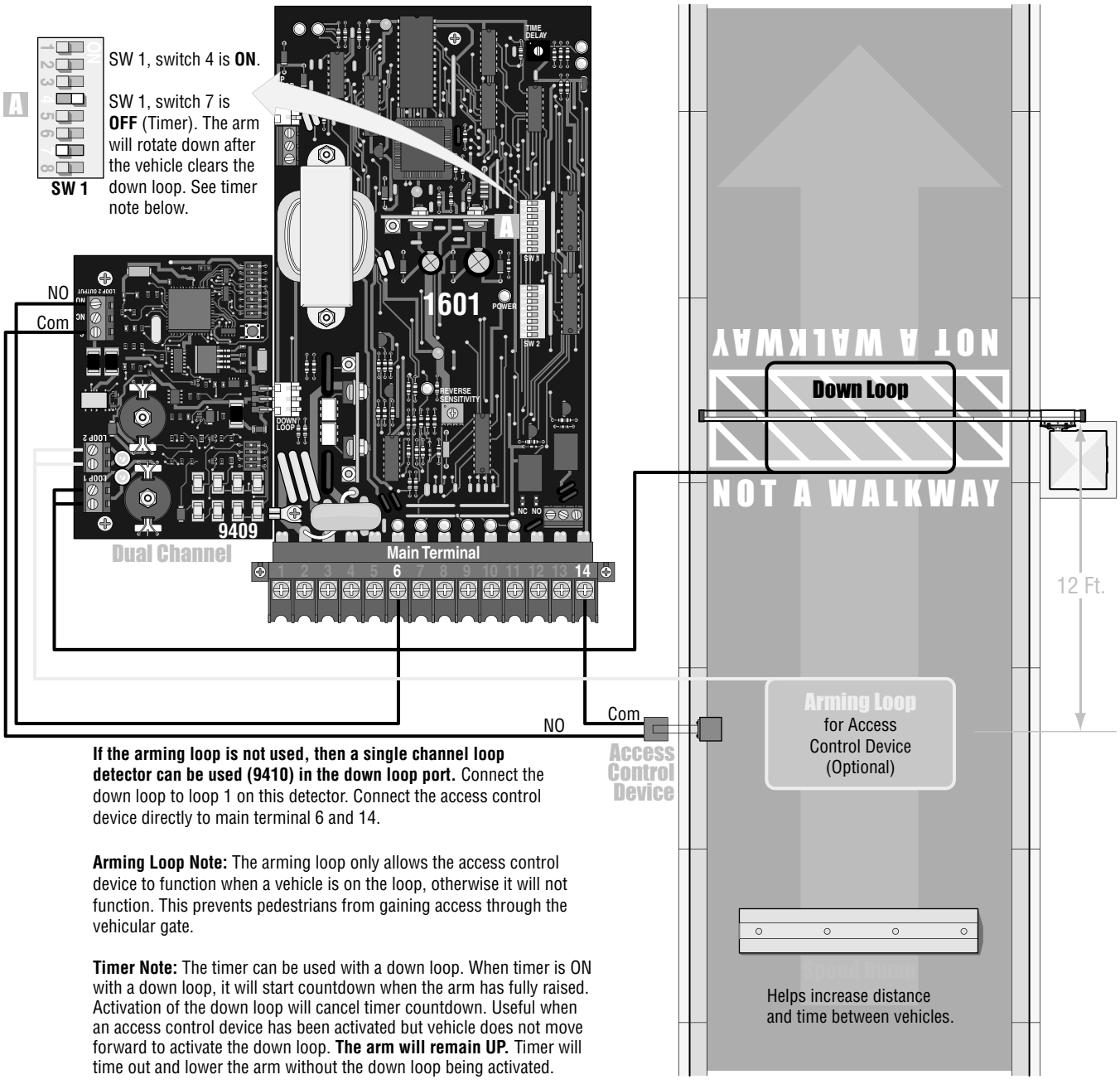


SECTION 3 - LOOP DETECTOR LANE SETUPS

Before attempting to connect any wiring to the operator, be sure that the circuit breaker in the electrical panel is in the OFF position. Permanent wiring must be installed to the operator as required by local electrical codes. It is recommended that a licensed electrical contractor perform this work.

Loop detector wiring shown is for DoorKing model 9409 Dual Channel and 9410 Single Channel plug-In loop detectors only. If using other loop detectors refer to the separate Loop Information Manual for installation instructions, loops/preformed loops and wiring diagrams. All inputs to the main terminal are NORMALLY OPEN.

3.1 Entry Lane Only

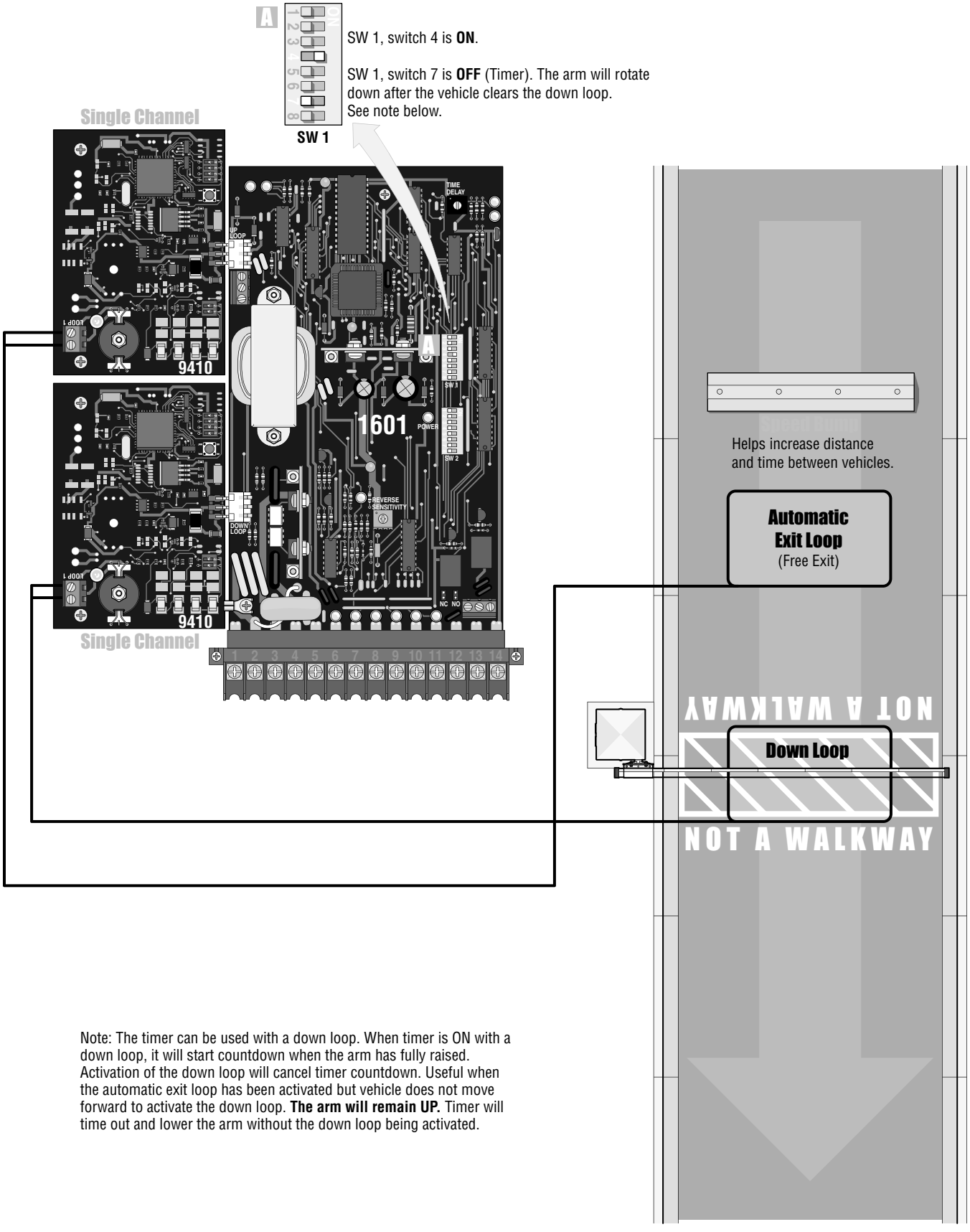


If the arming loop is not used, then a single channel loop detector can be used (9410) in the down loop port. Connect the down loop to loop 1 on this detector. Connect the access control device directly to main terminal 6 and 14.

Arming Loop Note: The arming loop only allows the access control device to function when a vehicle is on the loop, otherwise it will not function. This prevents pedestrians from gaining access through the vehicular gate.

Timer Note: The timer can be used with a down loop. When timer is ON with a down loop, it will start countdown when the arm has fully raised. Activation of the down loop will cancel timer countdown. Useful when an access control device has been activated but vehicle does not move forward to activate the down loop. **The arm will remain UP.** Timer will time out and lower the arm without the down loop being activated.

3.2 Exit Lane Only

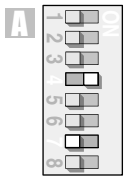


Note: The timer can be used with a down loop. When timer is ON with a down loop, it will start countdown when the arm has fully raised. Activation of the down loop will cancel timer countdown. Useful when the automatic exit loop has been activated but vehicle does not move forward to activate the down loop. **The arm will remain UP.** Timer will time out and lower the arm without the down loop being activated.

3.3 Two-Way Traffic Lane

When a vehicle enters, the down loop will be overridden by the automatic exit loop which will continue to hold the arm up. When the interior down loop has been cleared by the vehicle, the arm will lower.

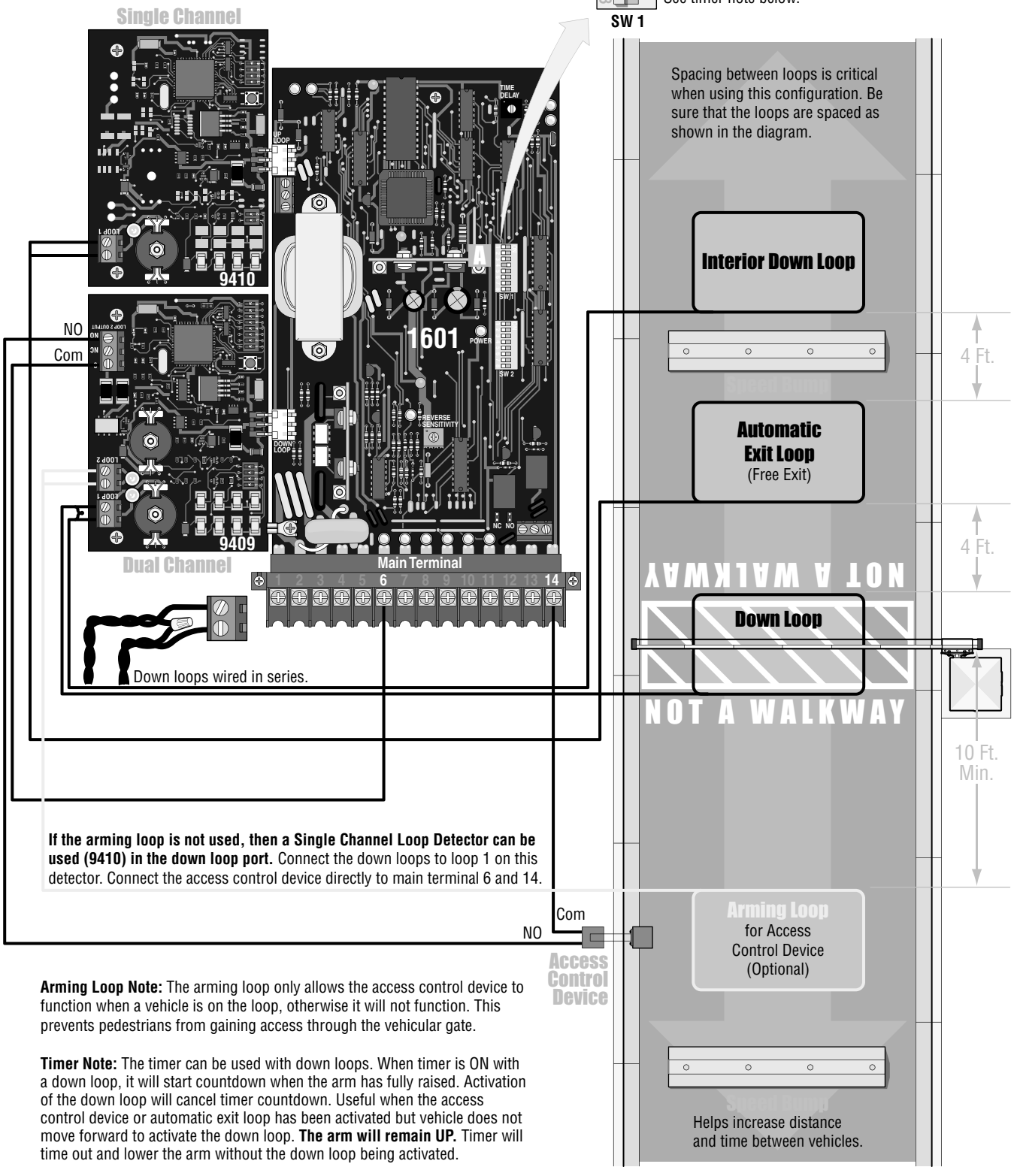
When a vehicle exits, the automatic exit loop will raise arm and when the down loop is cleared, the arm will lower. The interior down loop is inoperative for exiting vehicles.



SW 1, switch 4 is **ON**.

SW 1, switch 7 is **OFF** (Timer). The arm will rotate down after the vehicle clears the down loops. See timer note below.

SW 1

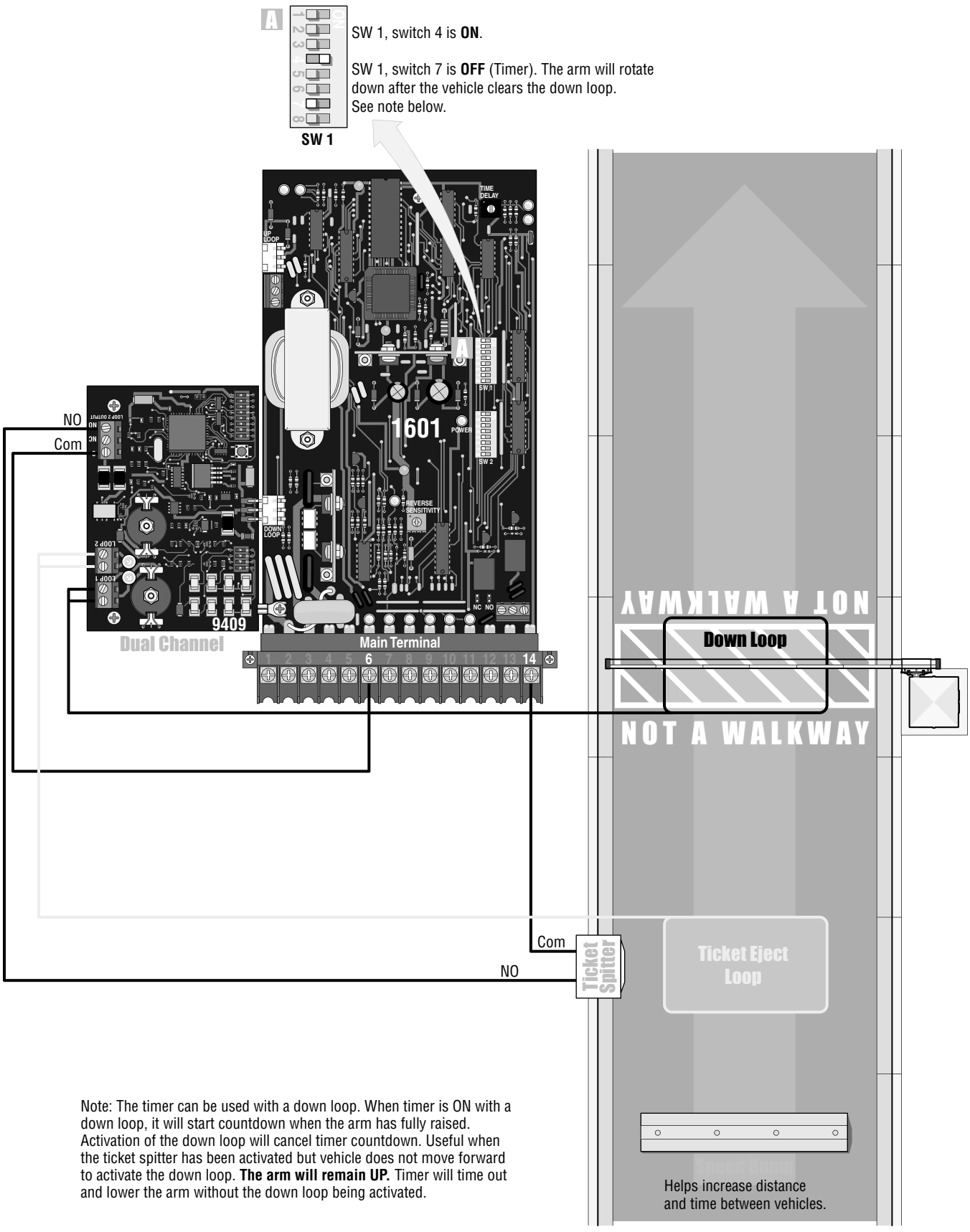


If the arming loop is not used, then a Single Channel Loop Detector can be used (9410) in the down loop port. Connect the down loops to loop 1 on this detector. Connect the access control device directly to main terminal 6 and 14.

Arming Loop Note: The arming loop only allows the access control device to function when a vehicle is on the loop, otherwise it will not function. This prevents pedestrians from gaining access through the vehicular gate.

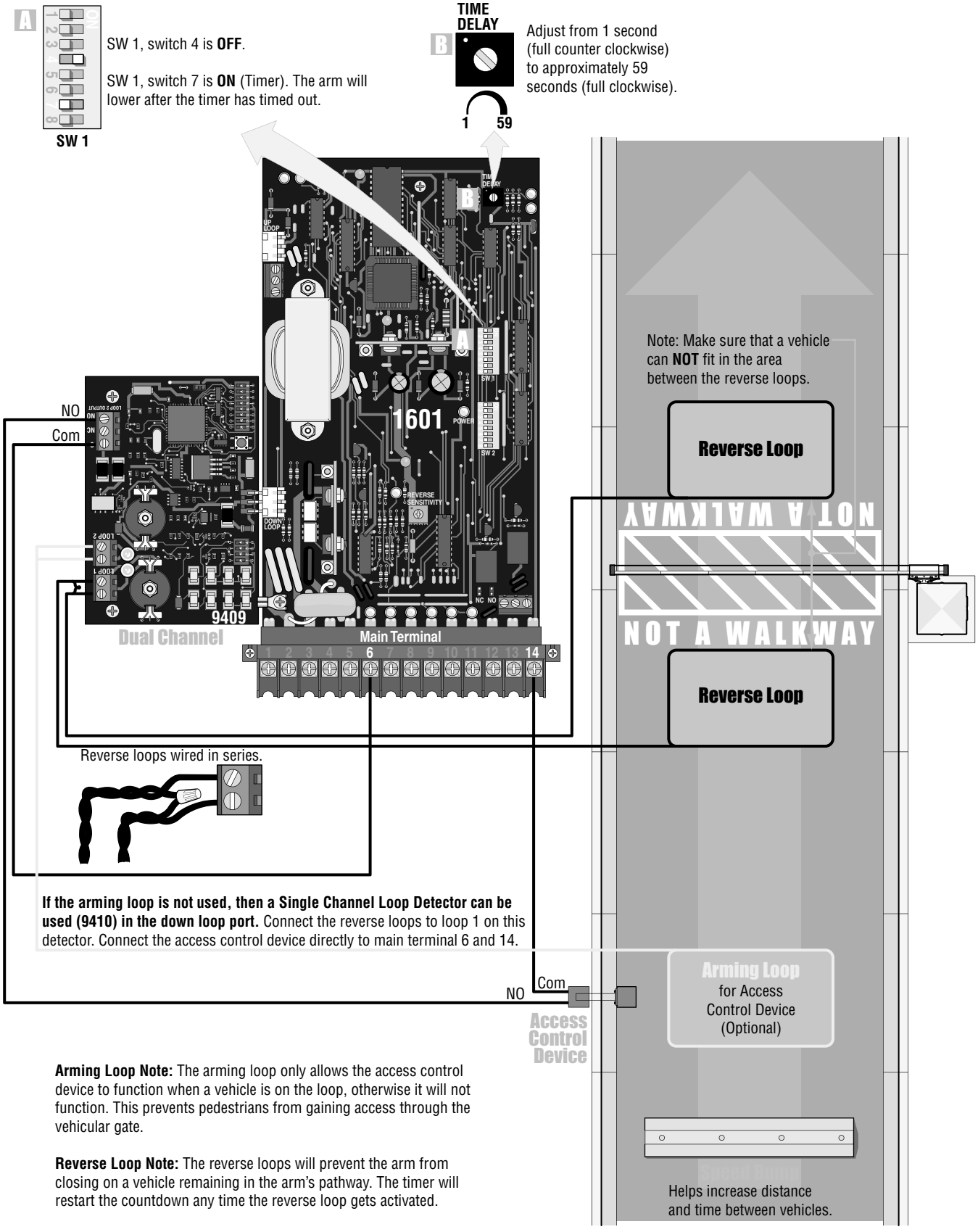
Timer Note: The timer can be used with down loops. When timer is ON with a down loop, it will start countdown when the arm has fully raised. Activation of the down loop will cancel timer countdown. Useful when the access control device or automatic exit loop has been activated but vehicle does not move forward to activate the down loop. **The arm will remain UP.** Timer will time out and lower the arm without the down loop being activated.

3.4 Ticket Spitter Entry Lane



Note: The timer can be used with a down loop. When timer is ON with a down loop, it will start countdown when the arm has fully raised. Activation of the down loop will cancel timer countdown. Useful when the ticket spitter has been activated but vehicle does not move forward to activate the down loop. **The arm will remain UP.** Timer will time out and lower the arm without the down loop being activated.

3.5 Operator Timer ON Entry Lane (No Down Loop)



Arming Loop Note: The arming loop only allows the access control device to function when a vehicle is on the loop, otherwise it will not function. This prevents pedestrians from gaining access through the vehicular gate.

Reverse Loop Note: The reverse loops will prevent the arm from closing on a vehicle remaining in the arm's pathway. The timer will restart the countdown any time the reverse loop gets activated.

SECTION 4 - ARM INSTALLATION

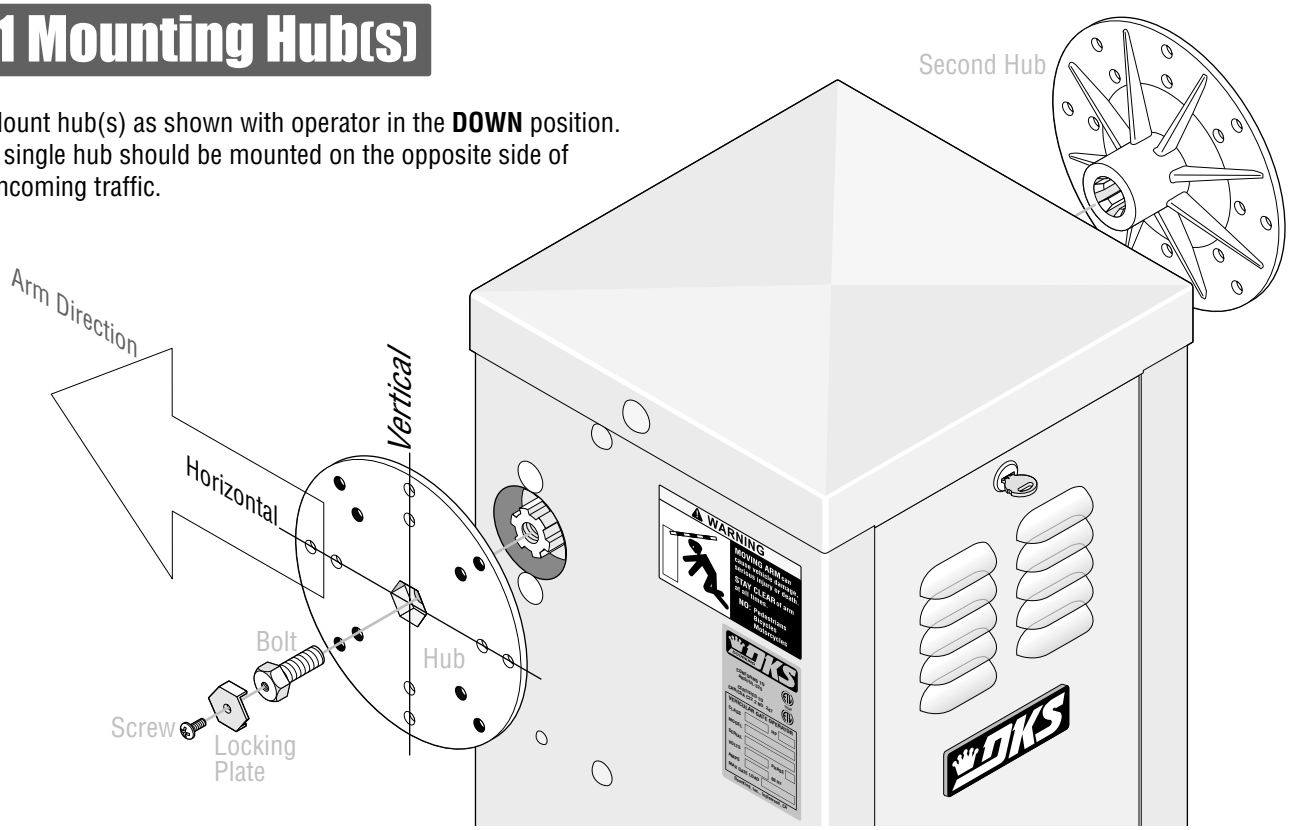
Arm installation varies depending on the operator model and individual installation requirements. All operators are equipped with 2 hub connections on opposite sides of the operator.

The 1601 operates with a single 14 ft. arm (either straight or folding arm). The 1601 **can not** operate with the 20 ft. to 27 ft. 3-piece arm assemblies.

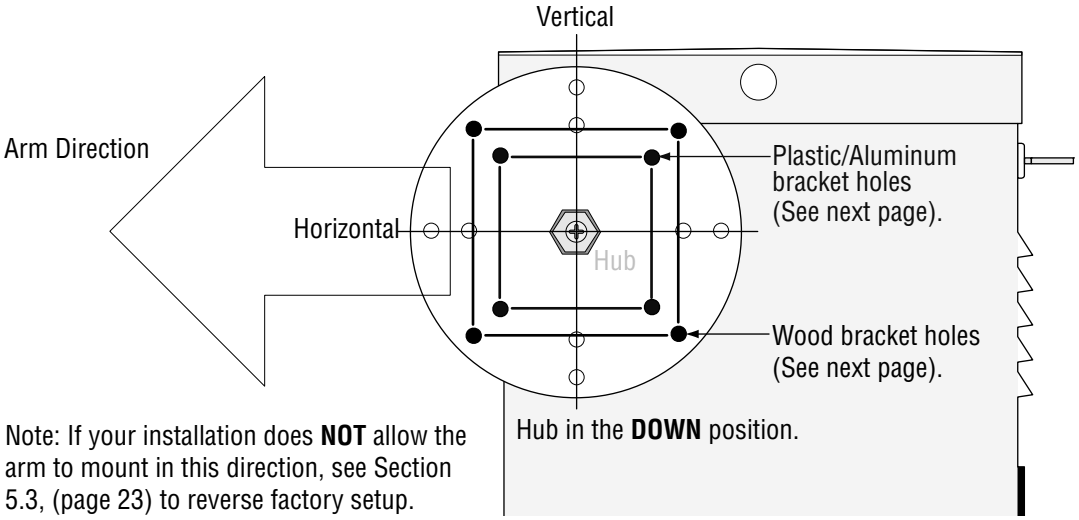
The 1602 operator is designed for the 3-piece 20 ft. to 27 ft. arm assemblies only.

4.1 Mounting Hub(s)

Mount hub(s) as shown with operator in the **DOWN** position. A single hub should be mounted on the opposite side of oncoming traffic.



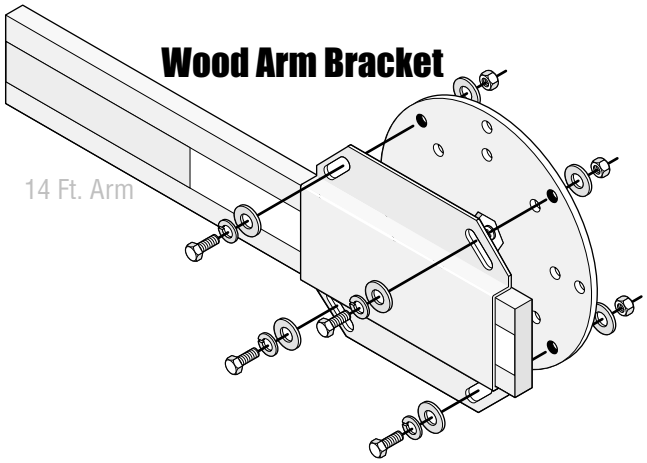
Arm Direction and Bracket Hole Positions



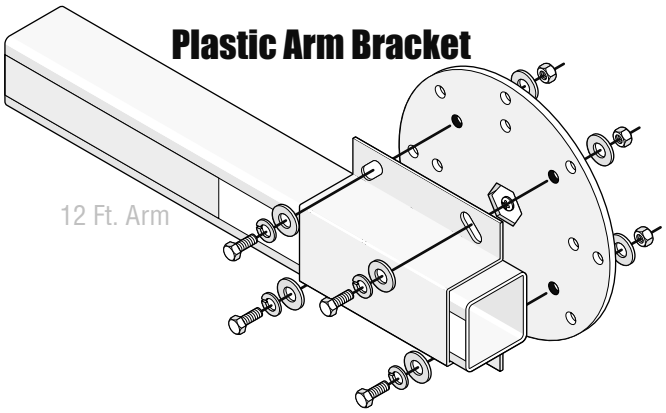
Note: If your installation does **NOT** allow the arm to mount in this direction, see Section 5.3, (page 23) to reverse factory setup.

4.2 Mounting Arm(s)

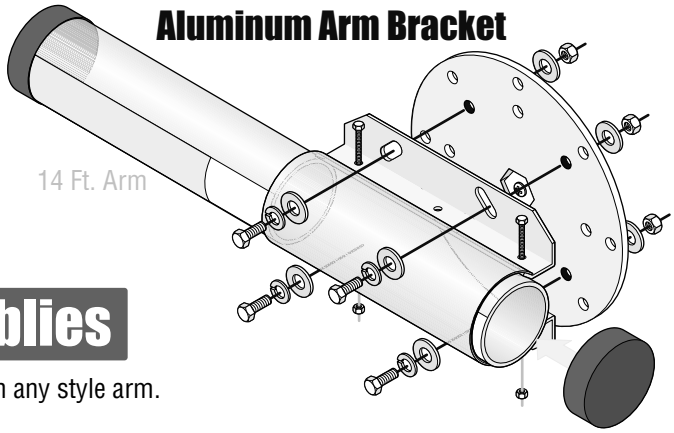
Wood Arm Bracket



Plastic Arm Bracket



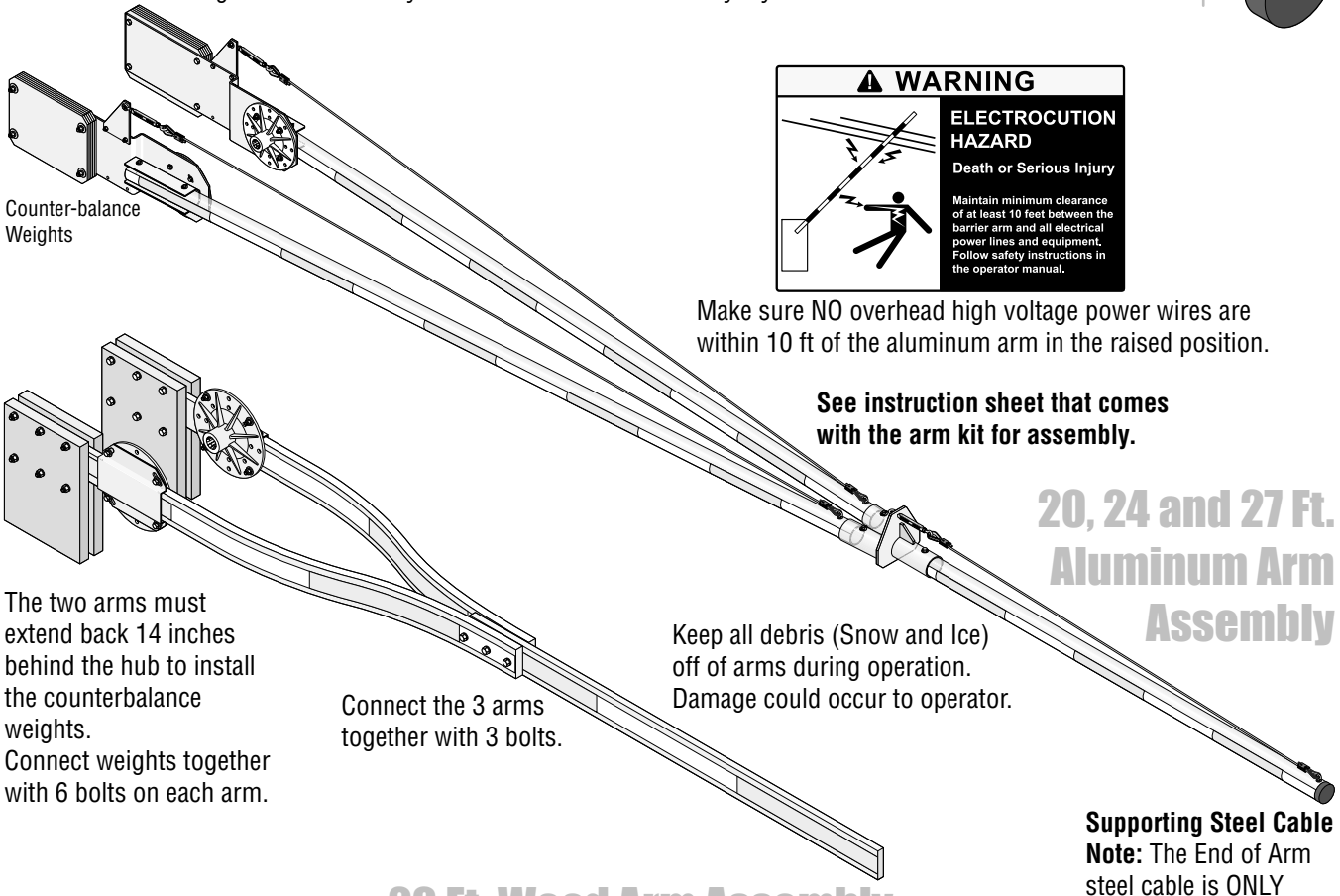
Aluminum Arm Bracket



Test hub **UP** and **DOWN** position before installing arm(s).

4.3 1602 3-Piece Arm Assemblies

Counter-balance weights are mandatory and **MUST** be installed on any style arm.



Make sure NO overhead high voltage power wires are within 10 ft of the aluminum arm in the raised position.

See instruction sheet that comes with the arm kit for assembly.

20, 24 and 27 Ft. Aluminum Arm Assembly

The two arms must extend back 14 inches behind the hub to install the counterbalance weights.
Connect weights together with 6 bolts on each arm.

Connect the 3 arms together with 3 bolts.

Keep all debris (Snow and Ice) off of arms during operation. Damage could occur to operator.

Supporting Steel Cable Note: The End of Arm steel cable is ONLY used on the 27 ft arm.

20 Ft. Wood Arm Assembly

SECTION 5 - ADJUSTMENTS

The switch settings and adjustments in this chapter should be made after your installation and wiring to the operator is complete. **Whenever any of the programming switches on the circuit board are changed, power must be shut-off, and then turned back on for the new setting to take effect.**

5.1 1601 Circuit Board Description and Adjustments

Gate Tracker Activity LED

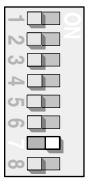
An automatic sensor system that senses entrapment of a solid object and is incorporated as a permanent and integral part of the operator.

Gate Operator Data Terminal

Operator status reporting; cycle count, shorted inputs, loop detector problems, power interruptions, etc. See page 9.

Auto Close Timer

Auto close timer (when turned on) SW 1, switch 7.



SW 1

Adjust from 1 second (full counter clockwise) to approximately 59 seconds (full clockwise).

1 59

How LEDs Function

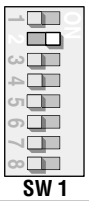
Illuminated **LEDs** Indicates that low voltage power is being applied to the circuit board.

Input LEDs should be OFF and will only illuminate when the input is activated.

Limit LEDs will only illuminate when the respective limit sensor has been activated.

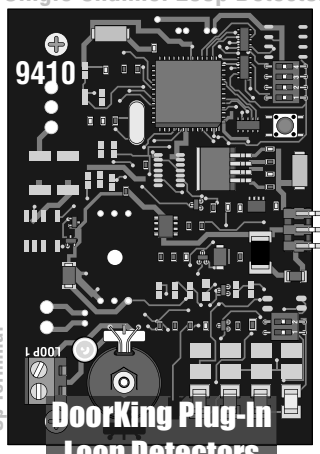
Self Test

Self test (when turned on) SW 1, switch 2.



SW 1

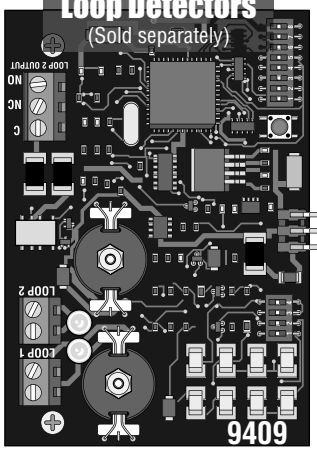
Single Channel Loop Detector



Up Terminal

Up Loop Port

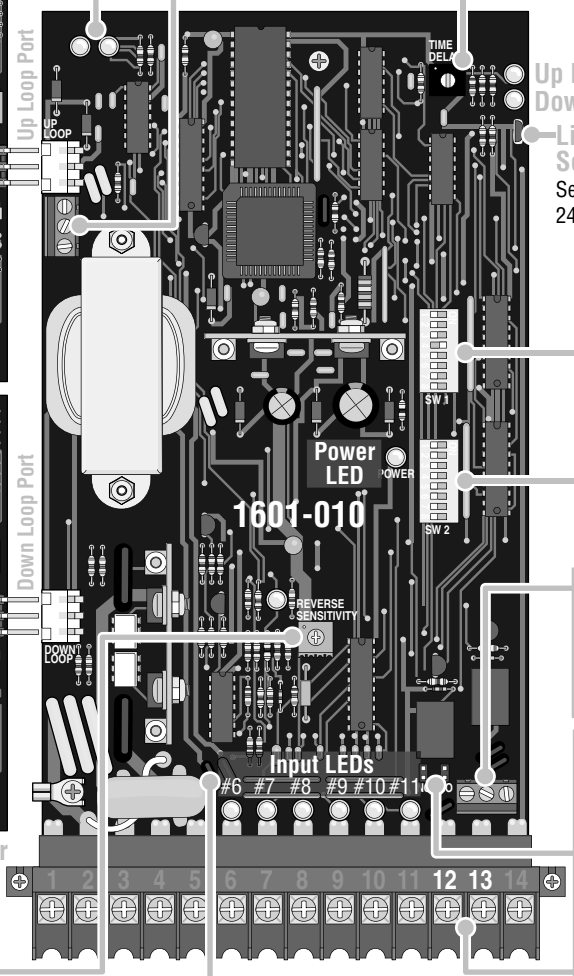
DoorKing Plug-In Loop Detectors
(Sold separately)



Down Terminals

Down Loop Port

Dual Channel Loop Detector

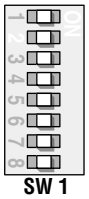


Up Limit LED
Down Limit LED

Limit Sensor
See page 24.

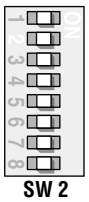
DIP-Switches

Set the DIP-switches on the circuit board to the desired setting. See switch settings information on the next 3 pages.



SW 1

Note: SW 2, switch 1 **MUST** be set for the correct model operator that has been installed.

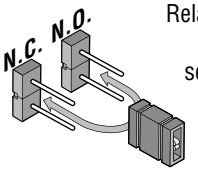


SW 2

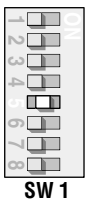
Arm Relay Contacts

(C – NC – NO) This relay can be used for a variety of purposes and is typically used to signal when the arm is up or down.

Dry Relay Contact



Relay activation is dependant on setting of SW 1, switch 5.

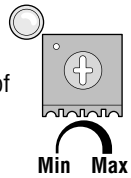


SW 1

Dry relay contacts (terminals 12-13) can be set for Normally Open (NO) or Normally Closed (NC) operation by placing the relay shorting bar on the N.O. or N.C. pins respectively. See page 8 and next page.

Reverse Sensor

Adjust reversing sensitivity for the DOWN direction of arm.
See page 24.



Min Max

Input LEDs Note: The LED that is above the terminal wiring input will light when that terminal input gets activated.

5.2 DIP-Switch SW 1 and SW 2 Settings

The two DIP-switches located on the circuit board are used to program the operator to operate in various modes and to turn on or off various operating features. Whenever a switch setting is changed, power to the operator must be turned OFF and then turned back on for the new setting to take affect. Check and review ALL switch settings prior to applying power to the operator.

SW 1 (Top 8 Switches)

Switch	Function	Setting	Description
1	Down Active when arm is full up.	OFF	Activation and then deactivation of the down loop or down / reverse input will cause the arm to rotate down ONLY if the deactivation occurred after the arm reached the FULL UP position.
	Down Active when arm is moving up or is up.	ON	Activation and then deactivation of the down loop or down / reverse input will cause the arm to rotate down AFTER reaching the FULL UP position regardless of when the deactivation occurred.
2	Self-Test	**OFF**	**Normal setting.** Self-test is turned off.
		ON	Run self-test.
3	Gear Box Travel	**OFF**	**Normal setting.** Operator uses 360° of gearbox. Extends wear life of gearbox.
		ON	Operator uses 180° of gearbox. See page 24.
4	Down / Reverse Loop and Input	OFF	Down / Reverse loop and input will function as a REVERSE loop and REVERSE input.
		ON	**Normal setting.** Down / Reverse loop and input will function as a down input and cause the arm to rotate down upon deactivation of the input. See SW 1, switch 1 for additional information.
5	Relay 1 Activation	**OFF**	**Normal setting.** Relay activates when the DOWN loop detector (DoorKing plug-in detector only) senses a vehicle presence.
		ON	Relay activates when the UP loop detector (DoorKing plug-in detector only) senses a vehicle presence.
6	Up Input Function	OFF	Up Input will raise arm and/or reset the down timer. Input will not lower the arm.
		ON	Up Input will raise arm if it is down, or will lower arm if it is up.
7	Timer	OFF	Timer to lower arm is OFF.
		ON	Timer to lower arm is ON. Set from 1 to 59 seconds for close time delay. Timer can be used as a **secondary** closing command for a down loop. Timer countdown starts when arm has fully raised. Down loop activation will cancel timer and lower arm **OR** arm will lower when timer has timed out.
8	Up Loop Port Input	OFF	Output of the loop detector plugged into the UP loop port is switched to terminal 7 for connection to other input terminals.
		ON	**Normal setting.** Output of the loop detector plugged into the UP loop port will raise arm when activated.

SW 2 (Bottom 8 Switches)

Switch	Function	Setting	Description
1	Model 1601	OFF	Switch **must** be **OFF** for model 1601 barrier gate operator.
	Model 1602	ON	Switch **must** be **ON** for model 1602 barrier gate operator.
2	Multiple Input Memory ON/OFF Switch	**OFF**	**Normal setting.** Operator will respond to a single UP command, then require a DOWN command. **Operator will not accept multiple Up commands.** Operator will not accept the next UP command until the previous DOWN command is in progress.
		ON	Turns ON the multiple input memory option 1 or 2 (See switch 3). SW 1, switch 4 must also be on.
3	Multiple Input Memory Options (SW2, Switch 2 must be ON) (SW1, Switch 4 must be ON)	Option 1 (OFF Position)	Override a DOWN command – When the arm is in the up position for a vehicle passing through and the next vehicle's UP command is received, the operator will hold the arm up and wait for the next vehicle to clear the down loop before lowering the arm. The operator **will not count** multiple UP commands. Distance between access control device and barrier operator is a factor when using this option. Remote transmitters recommended for this option. See next page for more information.
		Option 2 (ON Position)	Override Mulitlpe DOWN commands – The operator **will count** multiple UP commands received **during** an UP command and require a matching number of DOWN commands before lowering the arm. Distance between access control device and barrier operator is a factor when using this option. Remote transmitters **NOT** recommended for this option. See page 22 for more information.
4	Stop Arm Function	**OFF**	**Normal setting.** Arm **will NOT stop** DURING the down cycle.
		ON	Stop Arm Function – Arm **will stop** DURING the down cycle if a vehicle activates the down loop. An UP command will raise the arm, or the arm will continue down AFTER the down loop is cleared.
5	Reverse Delay	OFF	Arm reversal is delayed approximately .5 seconds when a reverse input from terminal 9 is received during the down cycle. (eg. non-contact sensor beam is blocked). Limited application use.
		ON	**Normal setting.** Instant Reverse – Arm reversal is delayed approximately .1 second when a reverse input from terminal 9 is received during the down cycle. (eg. non-contact sensor beam is blocked)
6	Arm Rotation Direction	**OFF**	**Normal setting.** Leave in OFF position.
7	Spare	**OFF**	**Normal setting.** Leave in OFF position.
8	Spare	**OFF**	**Normal setting.** Leave in OFF position.

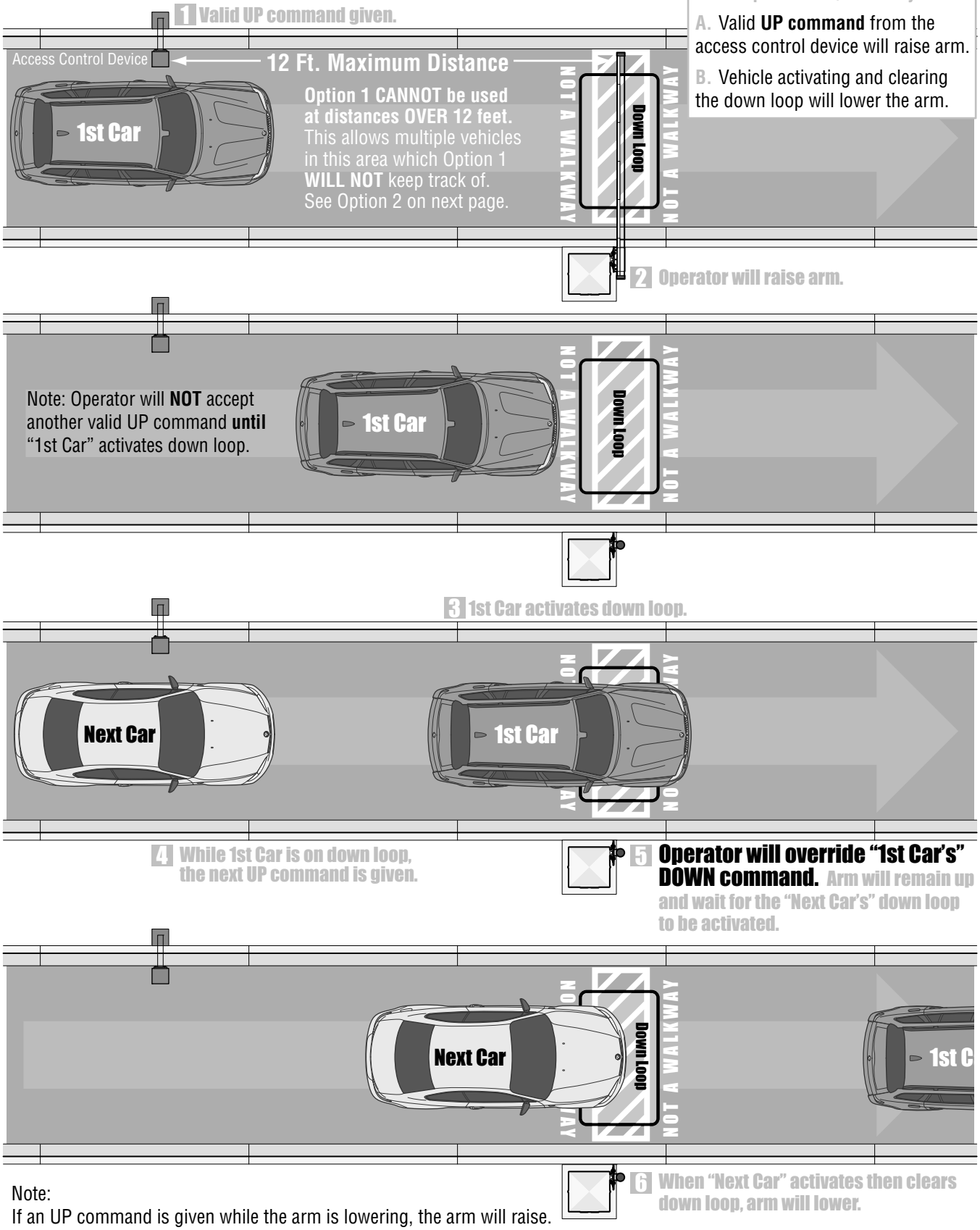
Option 1 - Override a DOWN Command SW2, Switch 3 OFF

Remote transmitters are recommended for this option.

Basic operator UP/DOWN cycle:

A. Valid **UP command** from the access control device will raise arm.

B. Vehicle activating and clearing the down loop will lower the arm.



Note:
If an UP command is given while the arm is lowering, the arm will raise.

Option 2 - Override Multiple DOWN Commands SW2, Switch 3 ON

Basic operator UP/DOWN cycle:

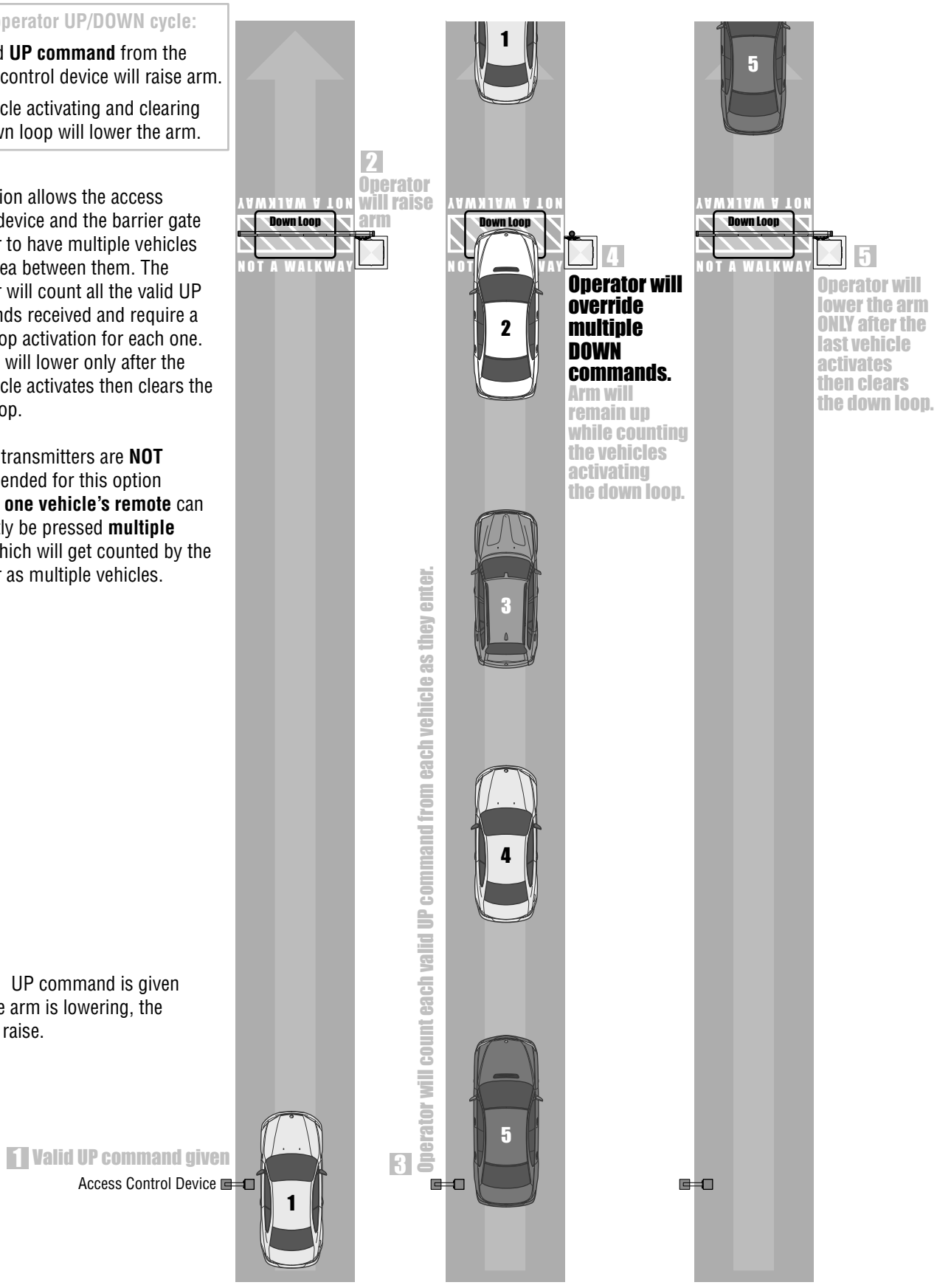
A. Valid **UP command** from the access control device will raise arm.

B. Vehicle activating and clearing the down loop will lower the arm.

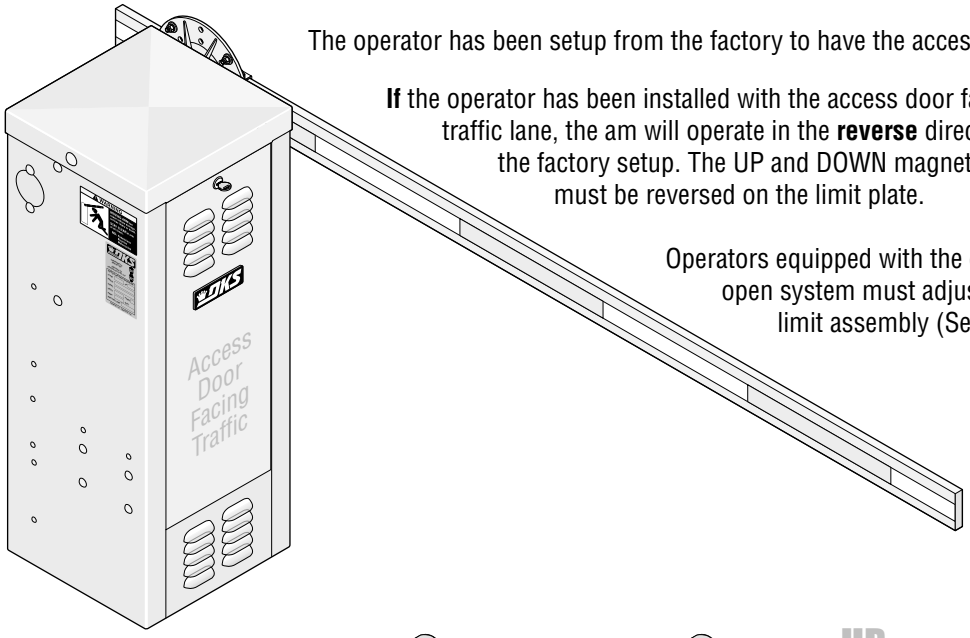
This option allows the access control device and the barrier gate operator to have multiple vehicles in the area between them. The operator will count all the valid UP commands received and require a down loop activation for each one. The arm will lower only after the last vehicle activates then clears the down loop.

Remote transmitters are **NOT** recommended for this option because **one vehicle's remote** can accidently be pressed **multiple times** which will get counted by the operator as multiple vehicles.

Note:
If a valid UP command is given while the arm is lowering, the arm will raise.



5.3 Reverse Arm UP and DOWN Positions

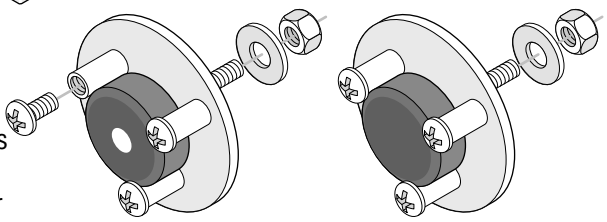


The operator has been setup from the factory to have the access door opposite the traffic lane.

If the operator has been installed with the access door facing the traffic lane, the am will operate in the **reverse** direction from the factory setup. The UP and DOWN magnet positions must be reversed on the limit plate.

Operators equipped with the convenience open system must adjust the DC limit assembly (See below).

Note: Magnets can be removed from assemblies with 3 screws and flipped over to show or hide the white dot.



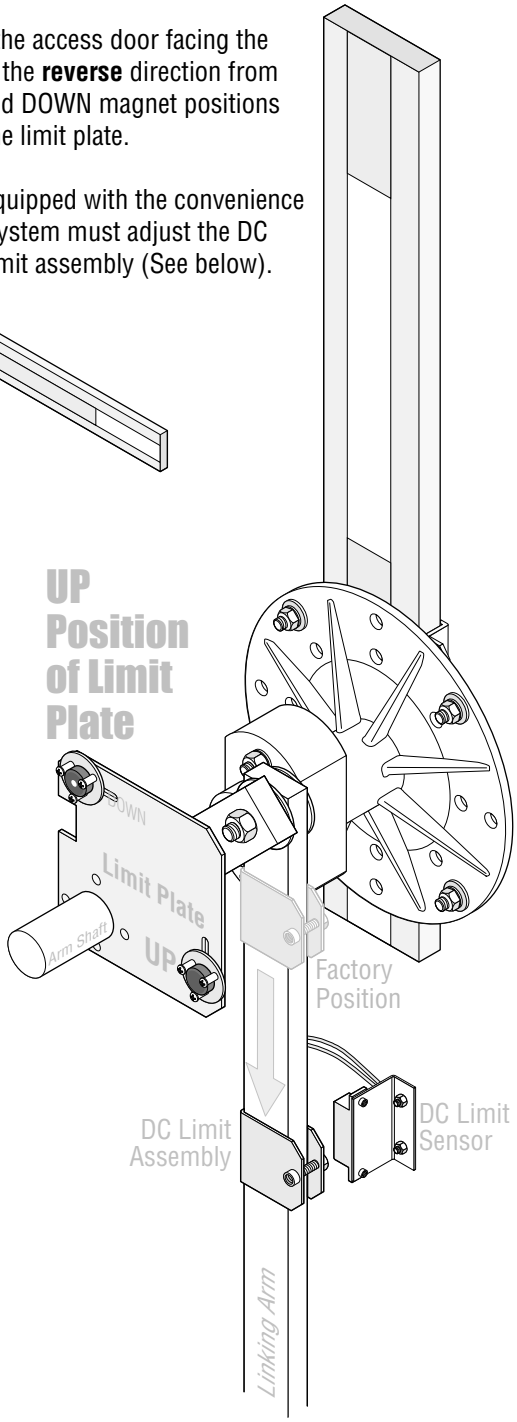
DOWN Assembly **UP Assembly**

Magnetic Limit Assemblies

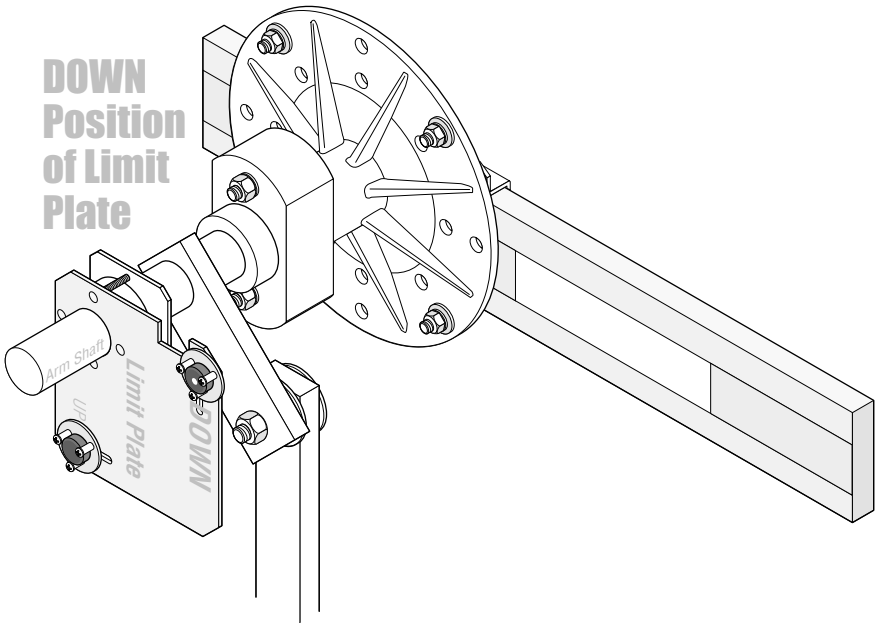
Reverse the positions of the magnets on the limit plate.
The white dot will be visible on the DOWN assembly magnet ONLY.

Be careful when reversing assemblies not to damage circuit board.

UP Position of Limit Plate



DOWN Position of Limit Plate



Convenience Open System

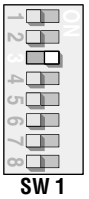
Slide the DC limit assembly down the linking arm to align with the DC limit sensor when the arm is in the **UP** position.
Note: DC limit sensor is used to hold the arm in the UP position during an AC power failure.

5.4 Magnetic Limit Adjustments

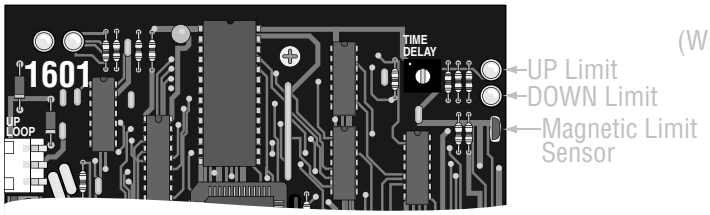
The operator has been preset at the factory to rotate 90°. **No adjustments are necessary when used in a normal 90° setup.**

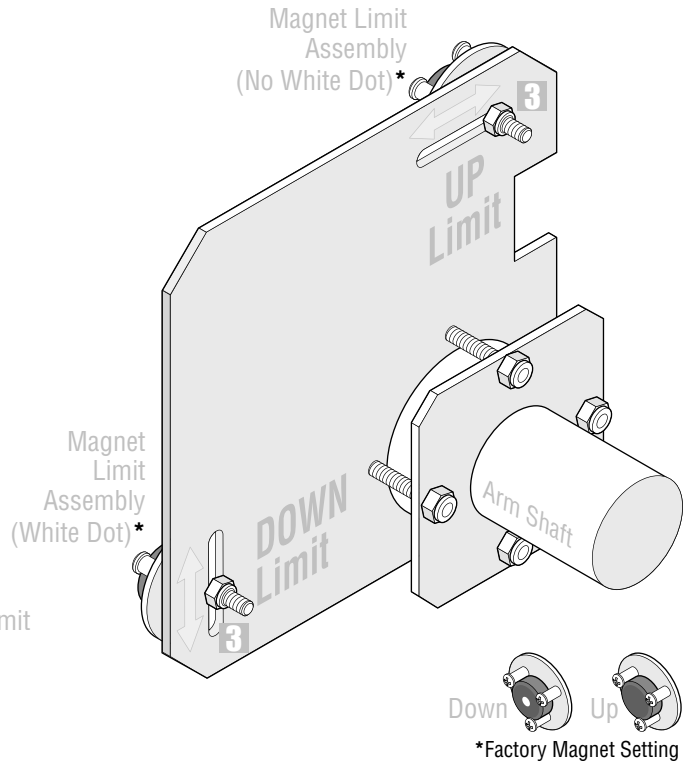
If the arm needs to rotate less than 90°:

1. Turn operator power **OFF**.
2. Set the DIP-switch SW 1, switch 3 to **ON**. This changes the rotation of the gearbox from 360° to 180° allowing the gearbox to rotate the arm less than 90°.
   Note: The arm will **always** cycle to 90° open with the 360° gearbox setting.



3. Loosen magnet limit assembly nuts and slide the assemblies to the desired **UP** and **DOWN** positions. Tighten nuts when desired positions are achieved.





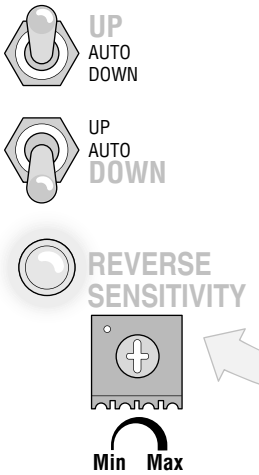
*Factory Magnet Setting

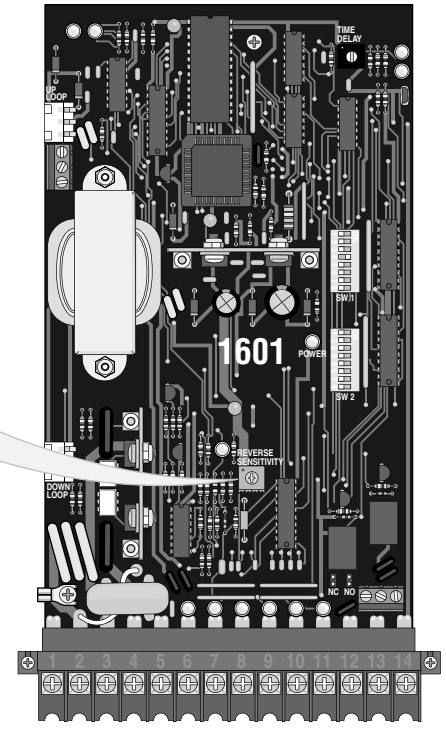
5.5 Reverse Sensor

Reverse sensitivity adjustment will cause the barrier arm to reverse direction of travel should an object be encountered during the down cycle. The amount of force required for the arm to reverse direction depends on the reverse sensitivity potentiometer.
CAUTION: Keep pedestrians and vehicles clear of the arm zone while adjusting sensor!

While operator has AC power:

1. Turn control switch to **UP**. Arm will rotate UP.
2. Turn control switch to **DOWN**. While arm is traveling down, rotate reverse sensor clockwise until the reverse LED lights up and the arm reverses direction. Rotate reverse sensor back counterclockwise approximately 1/8 turn.
3. Repeat the adjustment as needed to find a satisfactory setting.

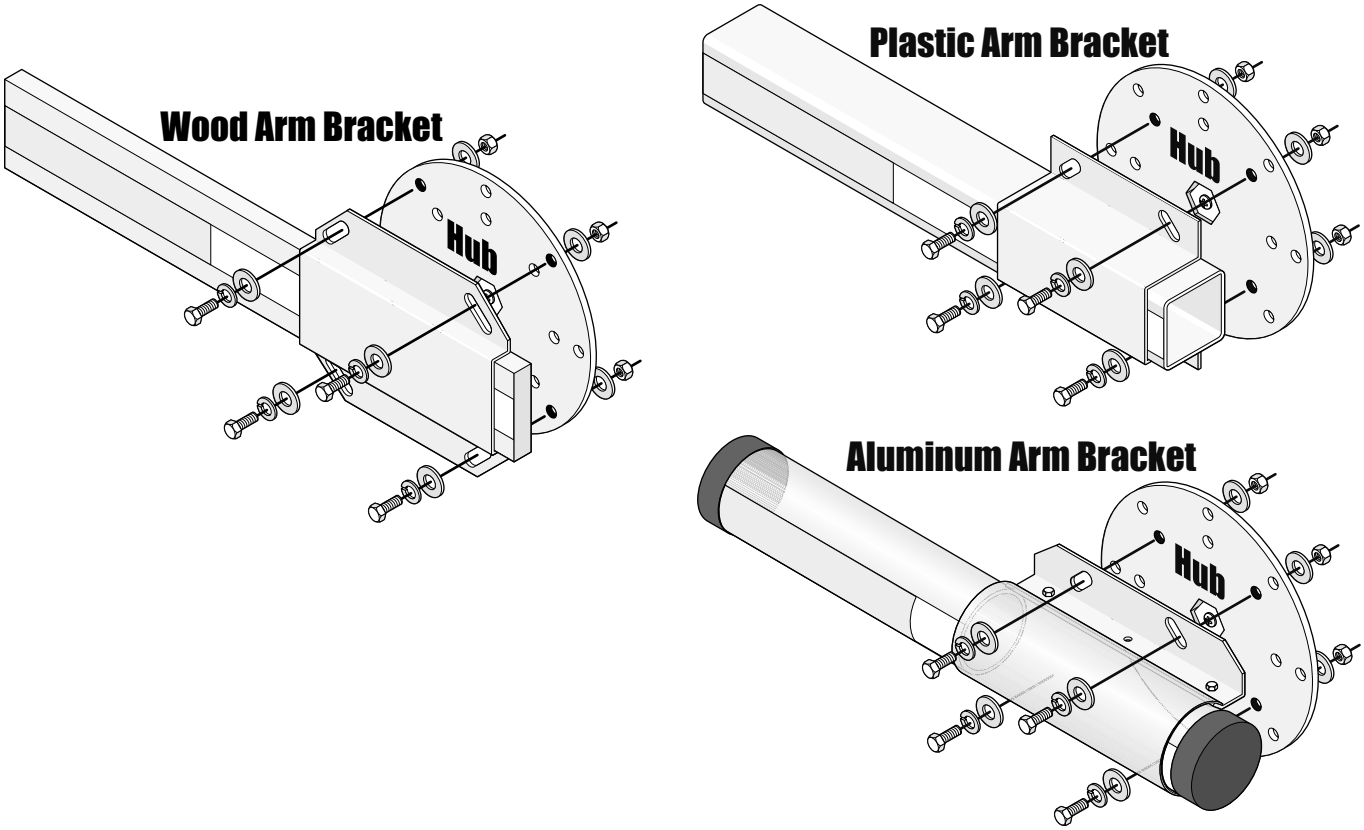




5.6 Manual Operation of the Arm

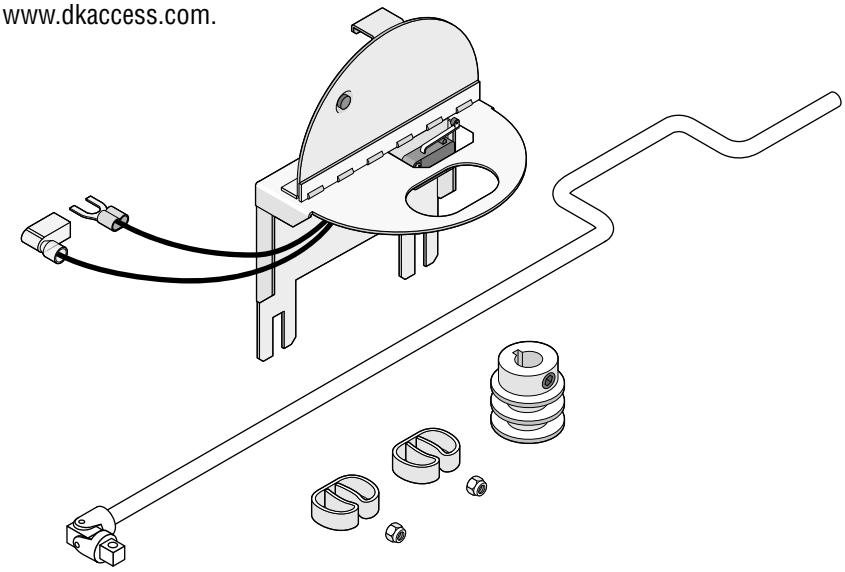
When a power failure occurs in an operator **WITHOUT** the convenience open feature with the arm (3-piece arm for the 1602) in the down position and the pathway needs to be open, **the arm MUST be unbolted from the hub with 4 bolts and removed to clear the pathway**. A manual release kit is offered from DoorKing to physically crank the arm up if desired (See below).

Operators **WITH** the convenience open feature can be set to automatically open the arm(s) during a power failure.



"Optional" Manual Release Kit

DoorKing offers a kit designed to be installed on the 1601 or 1602 barrier gate operators **WITHOUT the convenience open** feature. It provides a crank tool to manually move the arm up or down. **DO NOT install on convenience open models.** For further information about this kit, refer to the instruction sheet provided with the kit (P/N 1601-270) or go to DoorKing's technical web site at: www.dkaccess.com.



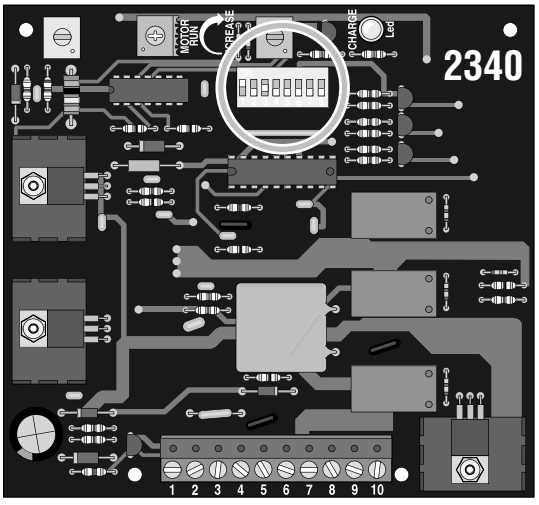
SECTION 6 - OPTIONAL CONVENIENCE OPEN SYSTEM

The optional convenience open system installed in your vehicular gate operator is designed as a convenience enhancement only. It is not designed or intended to provide continuous gate operation during a power outage. Its sole purpose is to provide a method to open the vehicular gate to allow unimpeded traffic flow when the gate and access control system is without power. If your access control system requires 100% power backup and continuous operation when primary (AC) power has failed, a power inverter / backup system, such as DoorKing's Models 1000 or 2000, is required.

- The convenience open system cannot provide continuous gate operation during a power outage.
- **This system cycles the arm to the open position one time only after AC power failure.**
- The convenience open system requires testing on a monthly basis to insure the batteries are fully charged and that the system is operational.
- The convenience open system uses two 12-volt, 3.0 amp-hour gel-cell batteries. These batteries should be replaced every two years on average, or sooner if required.
- Batteries are affected by temperature. Cold temperatures will reduce the effectiveness of the batteries. High temperatures will result in a shortened battery life.
- Batteries are not covered under warranty.

6.1 Operating Mode

This convenience open system consist of a control board (2340-010), motor and power supply (batteries) providing a completely redundant drive system to open the barrier arm should a power outage occur. This system is not designed to maintain continuous barrier operation; rather it provides a convenient method to open the arm **once** during adverse conditions. **If continuous barrier and access control system operation is required, refer to the DoorKing Models 1000 or 2000 Inverter / Backup Power System.**



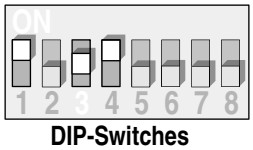
Automatic Open after loss of AC Power

Turn switch 1 **ON** and the system will automatically open the arm approximately 3 seconds after loss of AC power. Automatic mode is **always** used for barrier arms in general access applications such as gated communities, apartment complexes, etc. Switch 1 **OFF** is not used.

DIP-Switches

Restart Options once AC Power is restored

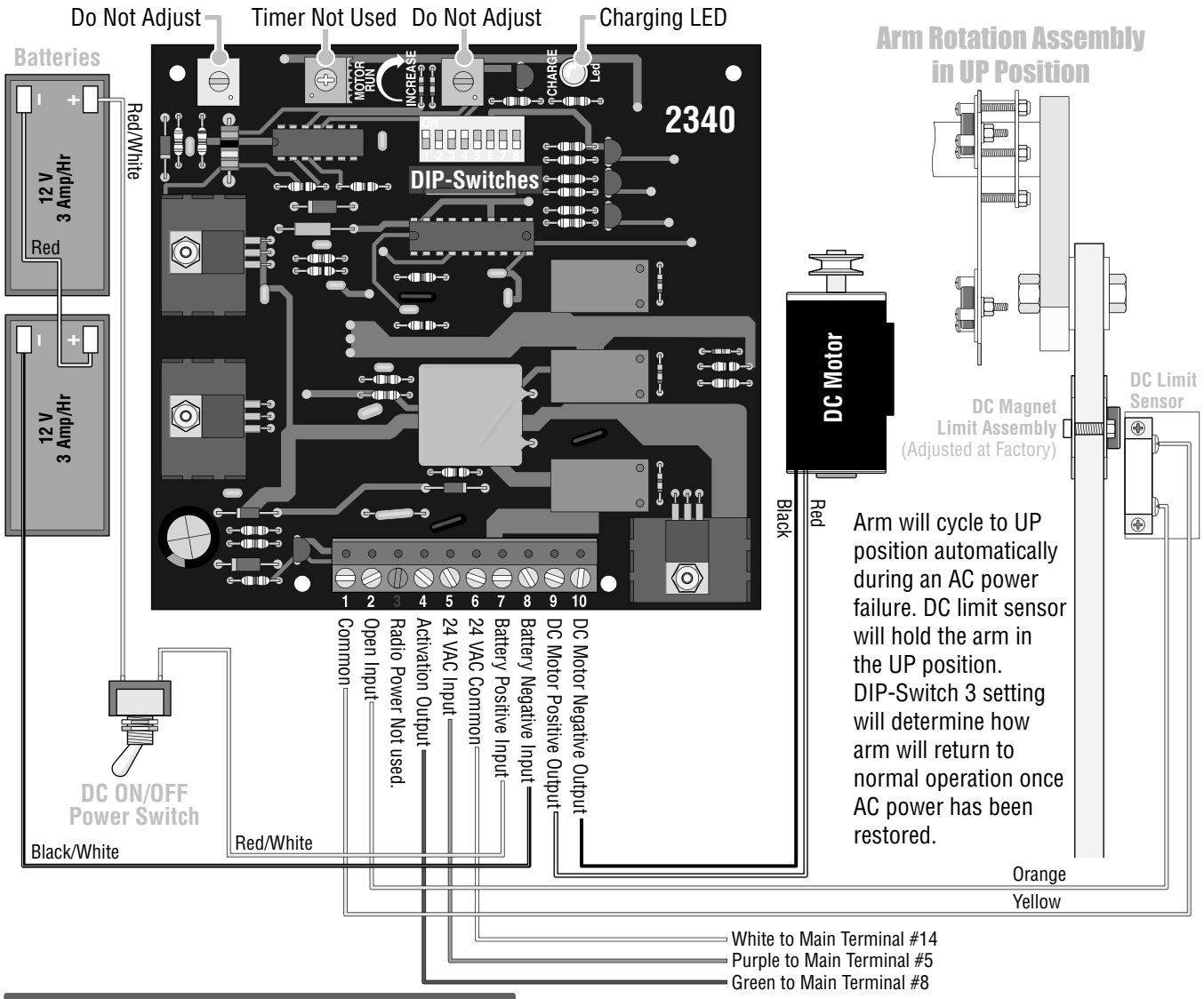
Once AC power is restored, the system's control board can be set to "**automatically re-key**" the operator (switch 3 **ON**) to establish normal operation, or can be set to require a "**manual input**" (switch 3 **OFF**) before the operator resumes normal operation.



DIP-Switches

Initial Power Up Convenience Open Note: The DC power is not present on the main circuit board until the first initial cycle.

6.2 DC System Description



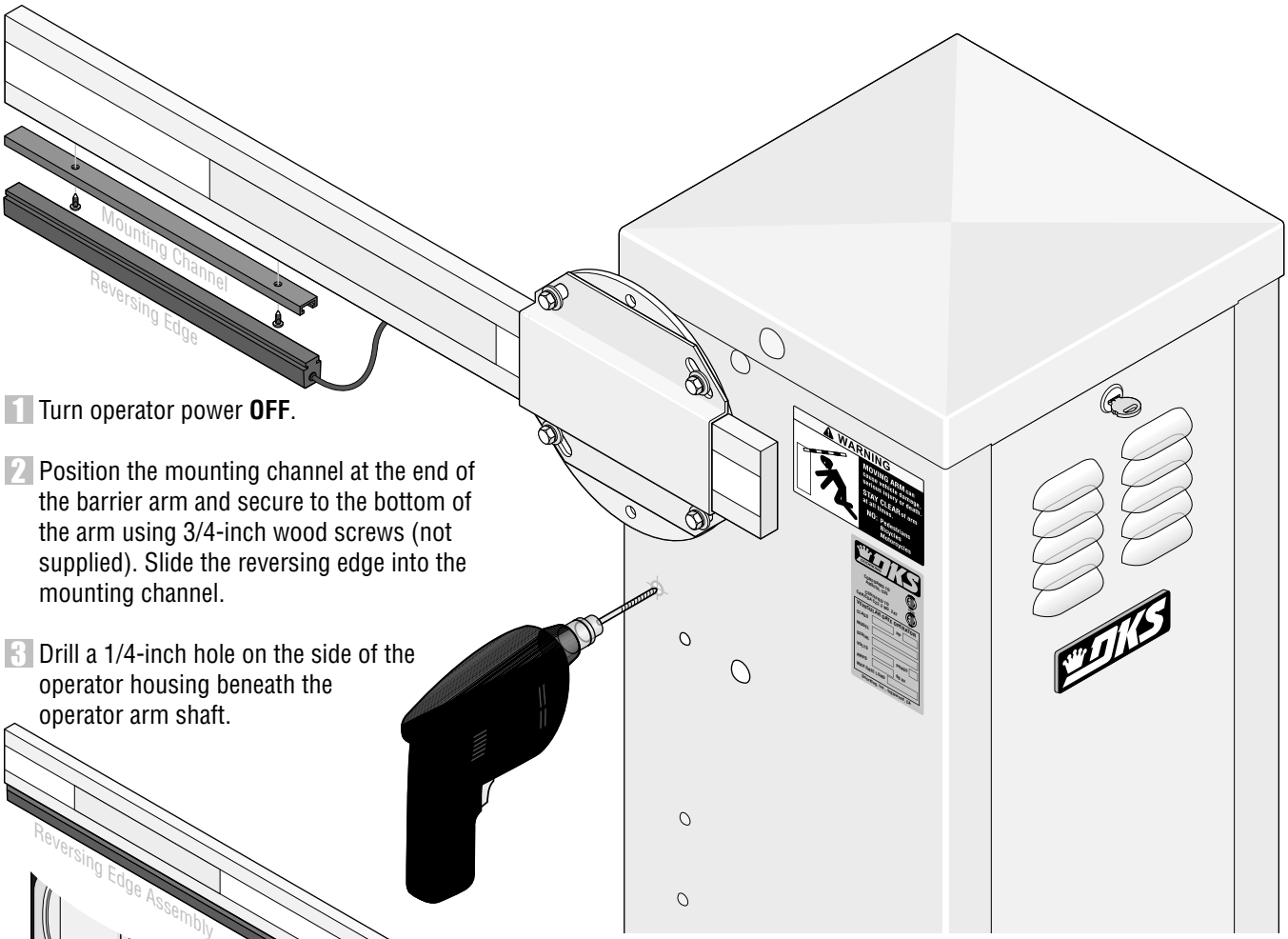
6.3 DIP-Switch Settings

Switch	Function	Setting	Description
1	Operation	OFF	Not Used
		ON	Arm will automatically open when a power outage occurs.
2	Changes Open Direction	**OFF**	Set so that the arm runs to the open (up) direction upon loss of AC power.
3	Automatic Power-up Activation	OFF	When AC power is restored, an input (push button, loop, radio receiver, etc.) is required to return the arm to normal operation.
		ON	When AC power is restored, a 1-second pulse is sent to the gate operator input to automatically restore normal operation.
4	Operator Type	**ON**	Must be in the **ON** position.
5	Not Used	**OFF**	
6	Not Used	**OFF**	
7	Not Used	**OFF**	
8	Not Used	**OFF**	

SECTION 7 - OPTIONAL ACCESSORIES INSTALLATION

7.1 Contact Sensor (Reversing Edge)

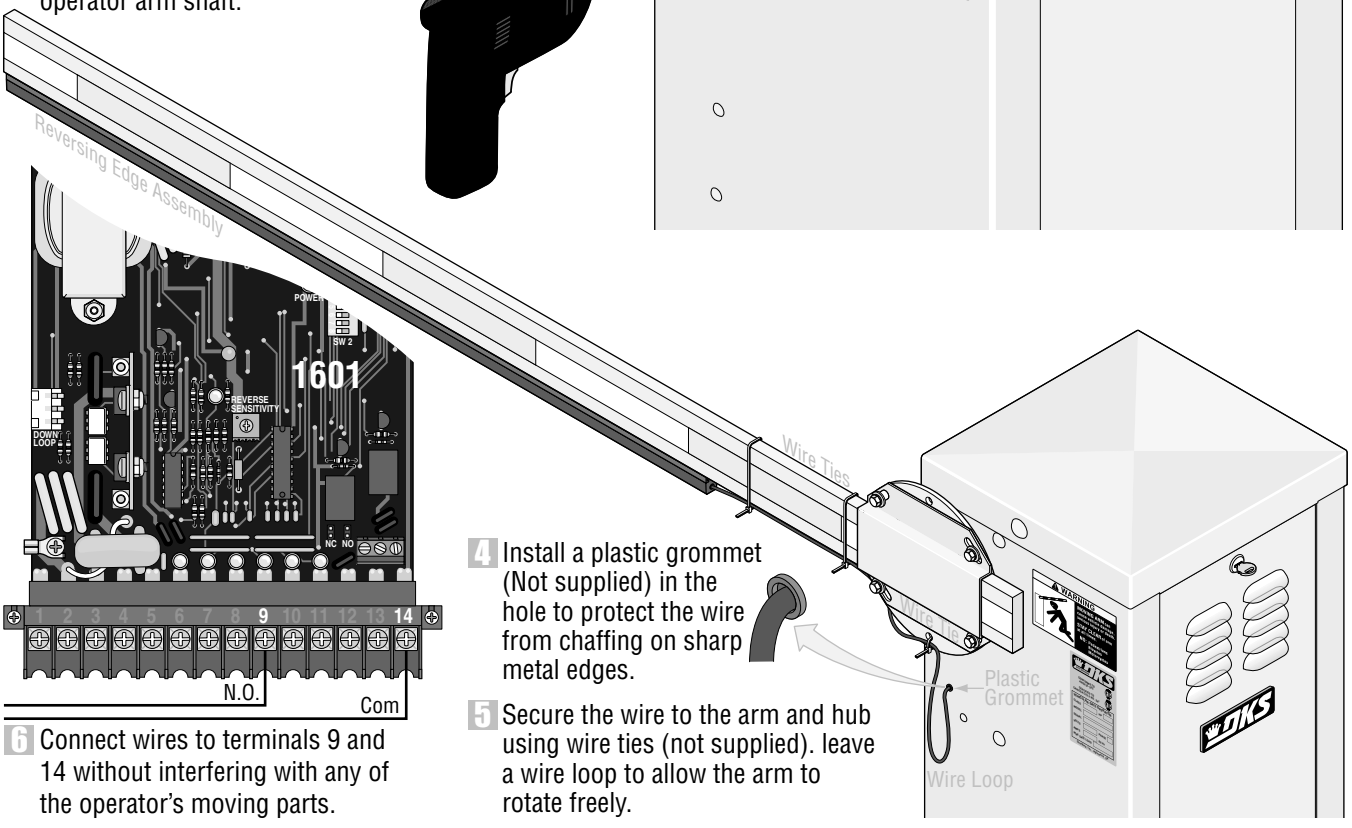
In addition to the electronic reversing device (ERD) an optional electric reversing edge may be installed offering additional protection to the arm, operator and obstruction. Available from DoorKing to fit all arm lengths.



1 Turn operator power **OFF**.

2 Position the mounting channel at the end of the barrier arm and secure to the bottom of the arm using 3/4-inch wood screws (not supplied). Slide the reversing edge into the mounting channel.

3 Drill a 1/4-inch hole on the side of the operator housing beneath the operator arm shaft.



4 Install a plastic grommet (Not supplied) in the hole to protect the wire from chaffing on sharp metal edges.

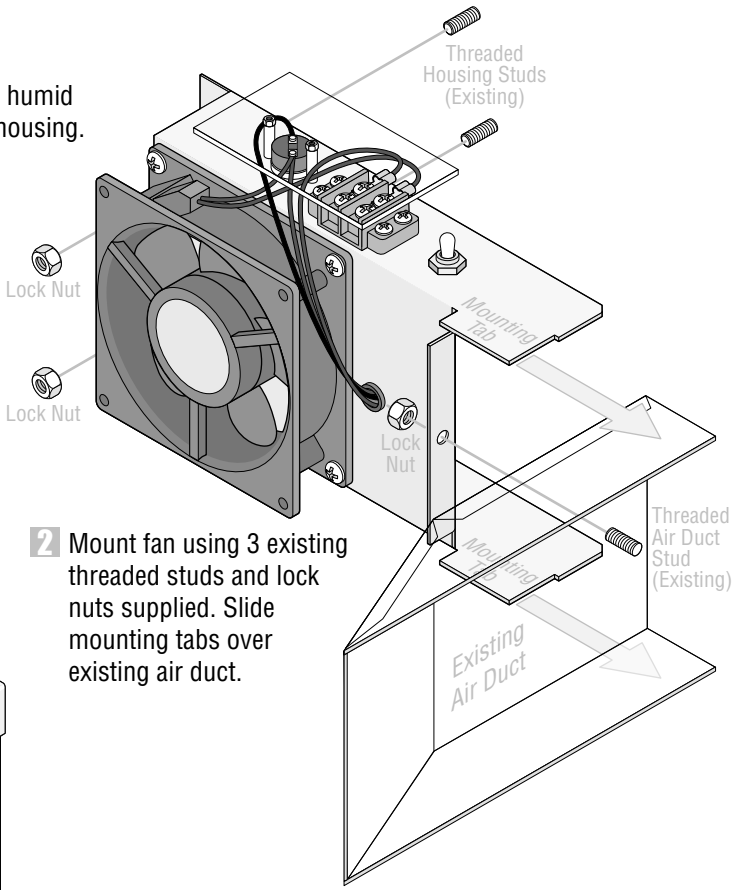
5 Secure the wire to the arm and hub using wire ties (not supplied). leave a wire loop to allow the arm to rotate freely.

6 Connect wires to terminals 9 and 14 without interfering with any of the operator's moving parts.

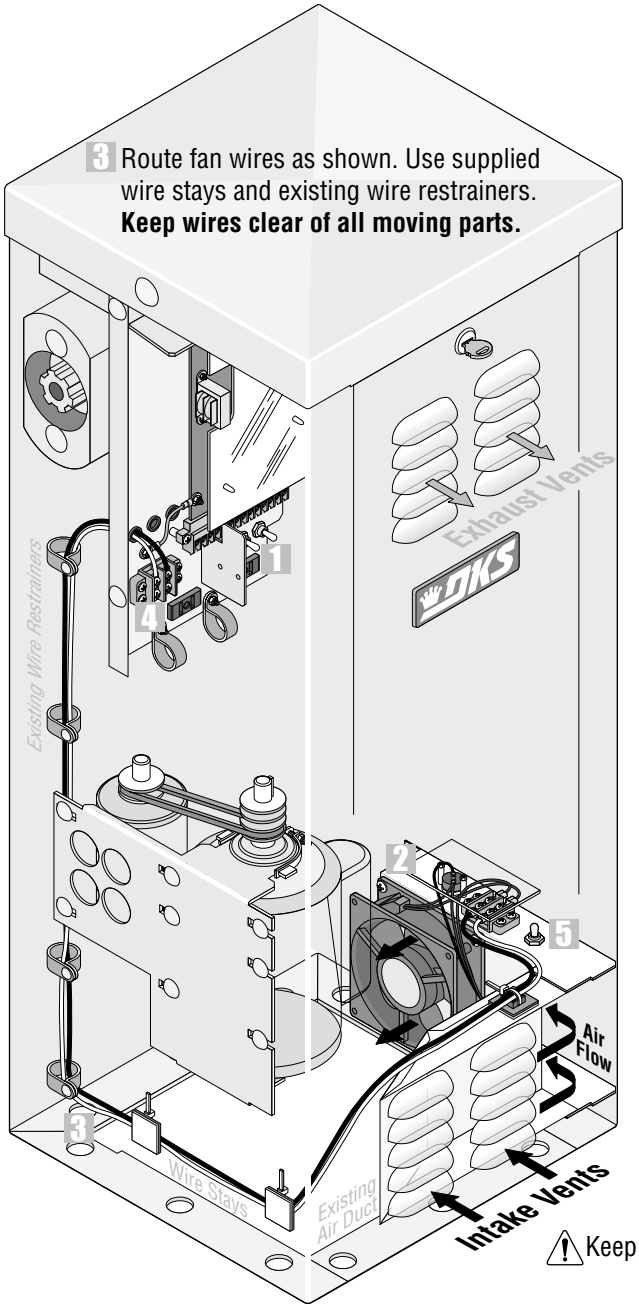
7.2 Fan Kit

An optional fan kit (P/N 1601-093) is recommended in hot humid climates to prevent heat and moisture build-up inside the housing.

1 Shut off AC power to operator.
Turn off DC power switch on certain models.

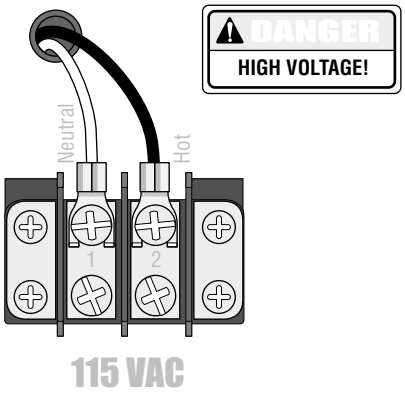


2 Mount fan using 3 existing threaded studs and lock nuts supplied. Slide mounting tabs over existing air duct.



3 Route fan wires as shown. Use supplied wire stays and existing wire restrainers. **Keep wires clear of all moving parts.**

4 Connect the fan power wires.



5 Fan switch settings.

OFF - Turns the fan off.

ON - Turns the fan on continuously.

AUTO - **Normal setting.** Automatically turns the fan **ON** when the temperature rises above 90°F inside the housing, and turns the fan **OFF** when the temperature drops below 90°F.

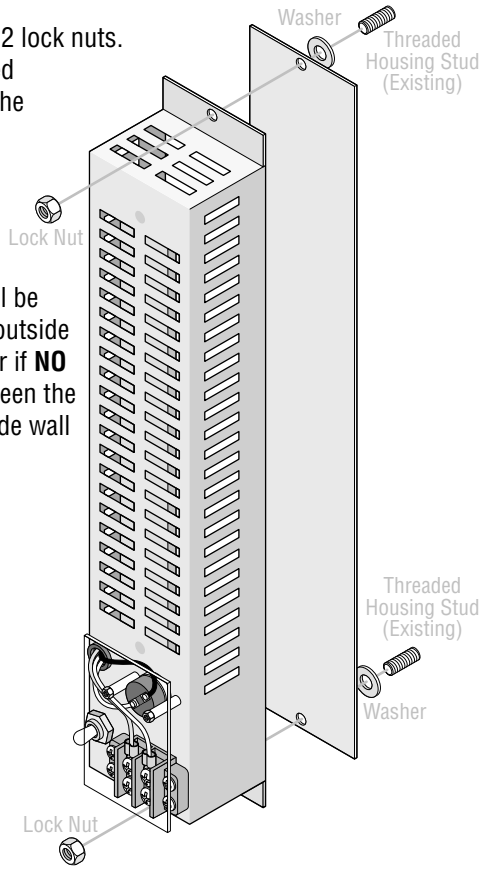
⚠ Keep intake vents clear of debris.

7.3 Heater Kit

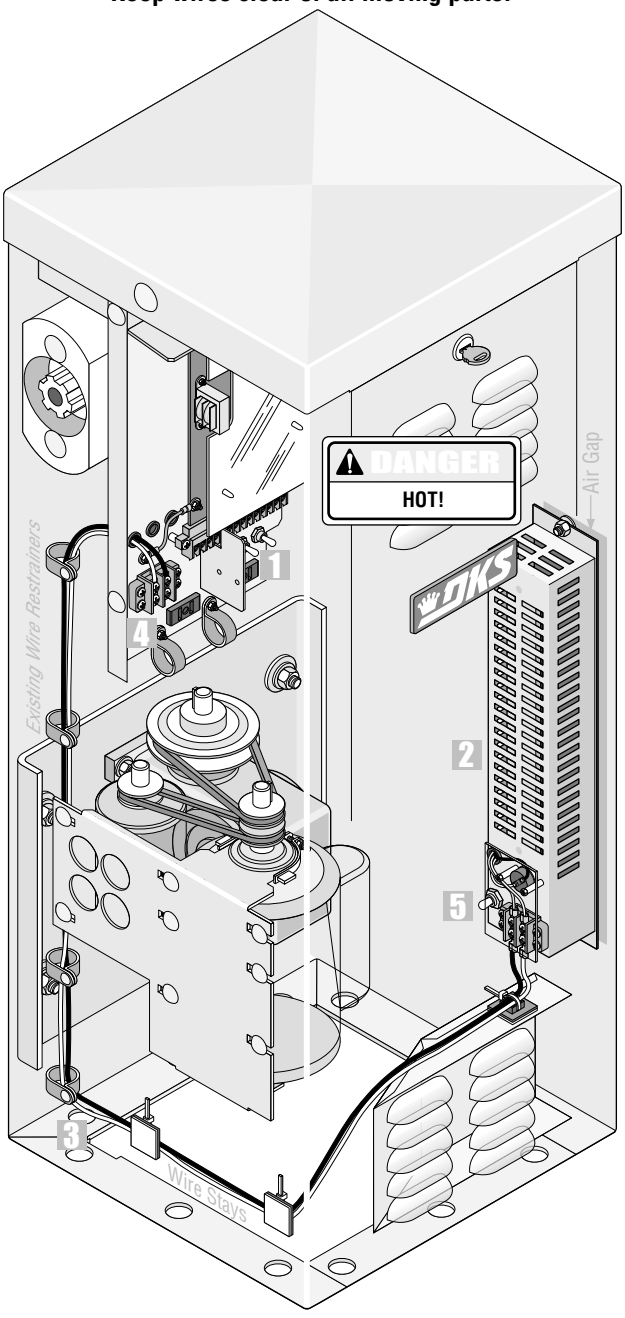
To avoid the gearbox oil from freezing an optional heater kit (115 VAC - P/N 1601-092) is recommended in areas where temperatures routinely drop below 40°F (4°C).

1 Shut off AC power to operator. Turn off DC power switch on certain models.

2 Mount heater with 2 lock nuts. Place the 2 supplied washers between the operator wall and the heater to create an air gap.

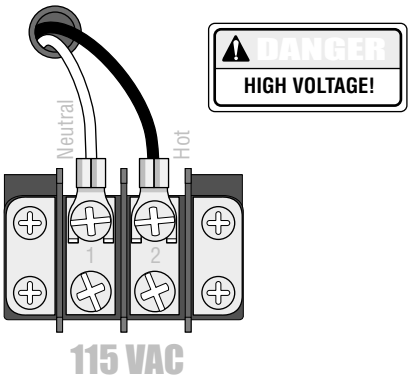


3 Route heater wires as shown. Use supplied wire stays and existing wire restrainers. **Keep wires clear of all moving parts.**



⚠ **CAUTION:** Heat will be transferred to the outside wall of the operator if **NO** air gap exists between the heater and the inside wall of the operator.

4 Connect the heater wires.



5 Heater switch settings.

AUTO - **Normal setting.** Automatically turns the heater **ON** when the temperature drops below 40°F inside the housing, and turns the heater **OFF** when the temperature rises above 40°F inside the housing.

OFF - Turns the heater off.

ON - Turns the heater on continuously. The heater will become **VERY HOT** when running continuously.

SECTION 8 - MAINTENANCE AND TROUBLESHOOTING

Inspection and service of this gate operator by a qualified technician should be performed anytime a malfunction is observed or suspected. High cycle usage may require more frequent service checks.

8.1 Maintenance

When servicing the gate operator, always check any secondary (external) reversing devices (loops, photo eyes, etc.) for proper operation. If external reversing devices cannot be made operable, do not place this operator in service until the malfunction can be identified and corrected.

Always check the inherent reversing system when performing any maintenance. If the inherent reversing system cannot be made operable, remove this operator from service until the cause of the malfunction is identified and corrected. Keeping this operator in service when the inherent reversing system is malfunctioning creates a hazard for persons which can result in serious injury or death should they become entrapped.

When servicing this gate operator, always turn power **OFF!!** If equipped with batteries, make sure battery power switch is **OFF**.

If gearbox requires oil, use only Mobil SHC-629 Synthetic Gear Oil. Do not completely fill gearbox with oil. Gearbox is full when oil completely covers inspection window.

Operator Component	Maintenance	Monthly Interval		
		3	6	12
Arm(s)	Check for alignment, tightness and wear.		✓	✓
Drive Belt(s)	Check for alignment, tightness and wear.		✓	✓
ERD Reversing System	Check that the arm reverses on contact with an object in closing cycle. Adjust the reversing sensor if necessary.	✓		✓
Batteries (On select models)	If operator is equipped with optional convenience open system, check the batteries for any leakage or loose connections. Batteries should be replaced every two years.	✓		
Convenience Open System (Not on all models)	If operator is equipped with optional DC open system, check to be sure the system opens the arm upon loss of AC power. Operator should resume normal operation when AC power has been restored.	✓	✓	✓
Fire Dept.	Check emergency vehicle access device for proper operation.	✓		✓
Gearbox	Check oil level and fill if necessary. Do not overfill.			✓
Linkages	Check internal linkages for wear. Inspect bushing for wear.		✓	✓
Loop(s)	Check all external ground loops for proper operation.	✓		✓
Pulleys	Check set screw for tightness.		✓	✓
Secondary Reverse Device(s)	Check electric reversing edges and photo-cells for proper operation.	✓		✓
Complete System	Perform a complete system check. Include all reversing devices, loops, access system devices, Fire Dept. access devices, etc.			✓

8.2 Diagnostics Check

Have the following diagnostic tools available: VOM meter with minimum voltage memory or min-max range to check voltage and continuity. Meg-ohm meter capable of checking up to 500 megohms of resistance to properly check ground loop integrity.

A malfunction can be isolated to one of the following:

- Gate Operator
- Loop System
- Keying Devices

Disconnect all external inputs to the circuit board terminal.

1. Use caution when checking high voltage areas: terminals 1 through 6, the motor capacitor and the motor.

2. Check the input indicator LED's. They should only come ON when a keying device (card reader, push button, etc.) is activated. If any of the input LED's are ON continuously, this will cause the gate operator to hold the arm up. Disconnect the keying devices one at a time until the LED goes OFF (see troubleshooting guide).

3. If the operator stops or holds open, check external entrapment protection devices for any shorts or malfunction.

4. A malfunction in a loop or loop detector can cause the gate operator to hold the arm up, or not detect a vehicle when it is present over the loop. Pull the loop detector circuit boards from the loop ports on the operator circuit board. If the malfunction persists, the problem is not with the loop system. For more information refer to the loop detector instruction sheet and the DoorKing Loop and Loop Detector Information Manual.

5. Check that there are no shorted or open control wires from the keying devices to the gate operator. If a keying device fails to open the arm, momentarily jumper across terminals 6 and 14 on the control board terminal. If the gate operator starts, this indicates that a problem exist with the keying device and not with the gate operator.

6. Check the supply voltage and batteries. A voltage drop on the supply line (usually caused by using wires that are too small) will cause the operator to malfunction. Batteries should be fully charged for proper operation, replace batteries every two years on average.

8.3 Troubleshooting

Symptom	Possible Solution(s)
Operator will not run. Power LED is OFF.	Check that power to the operator is turned ON. Check for 117 VAC with a voltmeter at control board terminals 1 and 2. If voltage measures 0, check power supply to operator or check terminal strip. If voltage measures OK, replace control board.

8.3 Troubleshooting Continued

Symptom	Possible Solution(s)
Operator will not run. Power LED is ON.	Momentarily jumper terminal 6 to terminal 14. If input LED does not come ON, check terminal strip or replace control board. If LED does come on, go to the next step. Momentarily jumper terminal 2 to terminal 3 (Caution – High Voltage). The motor should run. Momentarily jumper terminal 2 to terminal 4 (Caution – High Voltage). The motor should run in opposite direction of above. If motor does not run in either or both steps above, bad motor, motor capacitor or wiring to motor.
Arm rotates up, but will not rotate down.	• Check LEDs on terminals 6, 7 and 9. Any of these ON will hold the arm in the UP position. This indicates a shorted input. • Check the LEDs on the loop detectors. Any ON will hold the arm in the UP position. Possible loop or loop detector problem. • If auto timer is not used (SW 1, switch 7 off), check to be sure SW 1, switch 6 is in the ON position. This will cause terminal 6 to rotate the arm down when it is activated. • Check to be sure SW 1, switch 4 is ON. This will cause terminal 8 activation, then deactivation to rotate arm down.
Down input / down loop will not rotate arm to down position.	Check to be sure, switch 4 is in the ON position. Down input must be activated, and then deactivated to cause arm to rotate down.
Loop detector LED is on continuously.	• Activate the reset switch on the loop detector. • Decrease loop detector sensitivity. • Check loop wire for resistance to ground with meg-ohm meter. Should be 100 meg-ohms or higher. If less than 50 meg-ohms, replace loop wire. • Be sure loop lead-in wire is twisted at least 6 turns per foot. • Be sure all loop connections are soldered. • Replace loop detector.
Loop detector LED never activates.	Increase loop detector sensitivity. Check continuity of loop wire. Should be 0 ohms. If continuity check indicates anything other than 0 ohms, check all connections. Replace loop wire. Move loop detector board to the other loop detector port on the control board, and then check loop operation. If loop detector still fails, replace loop board. If loop detector operates OK in the other loop port, replace control board.
Battery back-up system will not raise arm upon power outage.	• Check that the back-up system toggle switch is in the ON position. • Check to be sure that the 2340-010 battery back-up control board switch settings are set as described in SECTION 6. • Check the batteries for proper voltage, replace if necessary. • Replace the 2340-010 Back-up control board.

8.4 Accessories Parts List

The following accessories are available for 1601 and 1602 barrier gate operators.

Loop Detector - Plug directly into ports on circuit board simplifying wiring.
P/N 9410-010 - Single channel detector.
P/N 9409-010 - Two channel detector.
P/N 9411-010 - Single channel detector with aux relay. Controls arm lowering for vehicles but NOT for pedestrians.

Loop Wire - XLPE insulation is available in 500 and 1000 foot rolls, available in Black, Blue and Red insulation.

Loop Sealant
P/N 2600-771 Asphalt
P/N 2600-772 Concrete

Manual Release Kit for the 1601 or 1602 - Installs on operators **WITHOUT** the convenience open. P/N 1601-270

Meg Ohm Meter - Checks the integrity of ground loops. P/N 9401-045

Interconnection Cable - Interconnection cable contains all the necessary wires to interconnect primary / secondary operators.
Cable length: 30 ft. - P/N 2600-755 40 ft. - P/N 2600-756 50 ft. - P/N 2600-757

High Voltage Kit - Alter the input AC voltage on a 115 VAC 1601/1602 to 208, 230, 460 or 575 VAC. P/N 2600-266

Reverse Edge - Installs on the bottom of the arm. P/N 8080-016 - 6 ft. Available from DoorKing to fit all arm lengths.

Photo Cell - Prevents arm from lowering on vehicles or pedestrians. P/N 8080-018

Manual Gate Control Toggle - Allows user to manually operate gate arm. Fits inside single-gang electrical box. P/N 1200-017

Time Clock - 7 and 365 day clocks, used to automatically open gate at pre-set time, fits inside operator.
P/N 2600-791 7 day clock
P/N 2600-795 365 day clock

Surge Devices - Helps prevent circuit board failure caused by lightning strikes and power surges.
P/N 1879-080 - High Voltage
P/N 1878-010 - Low Voltage

Replacement Battery - Convenience open system. P/N 1801-009 (2 required)

Speed Bump - Prefabricated 6-foot speed bump reduces traffic speed through gate system. P/N 1610-150

Heater Kit - Thermostatically controlled heater for cold weather areas. 115 VAC - P/N 1601-092

Fan Kit - Thermostatically controlled fan for hot humid environments. P/N 1601-093

Gate Tracker™ - Optional control board allows the barrier gate operator to report activity to a companion 1833, 1835, 1837 or 1838 access control system.

Wood Arm Only - 14-foot replacement wood arm. P/N 1601-348
Wood Arm Mounting Kit - Wood arm mounting bracket, hub and mounting hardware. P/N 1601-240

Wood Folding Arm Kit - Low headroom applications (Arm included). P/N 1601-384

Plastic Arm Only - 12-foot replacement plastic arm. P/N 1601-571
Plastic Arm Mounting Kit - Plastic arm mounting bracket, hub and mounting hardware. P/N 1601-241

Plastic Folding Arm Kit - Low headroom applications (Arm included). P/N 1601-383

Aluminum Arm Only - 14-foot replacement aluminum arm. P/N 1601-516
Aluminum Arm Mounting Kit - Aluminum arm mounting bracket, hub and mounting hardware. P/N 1601-242

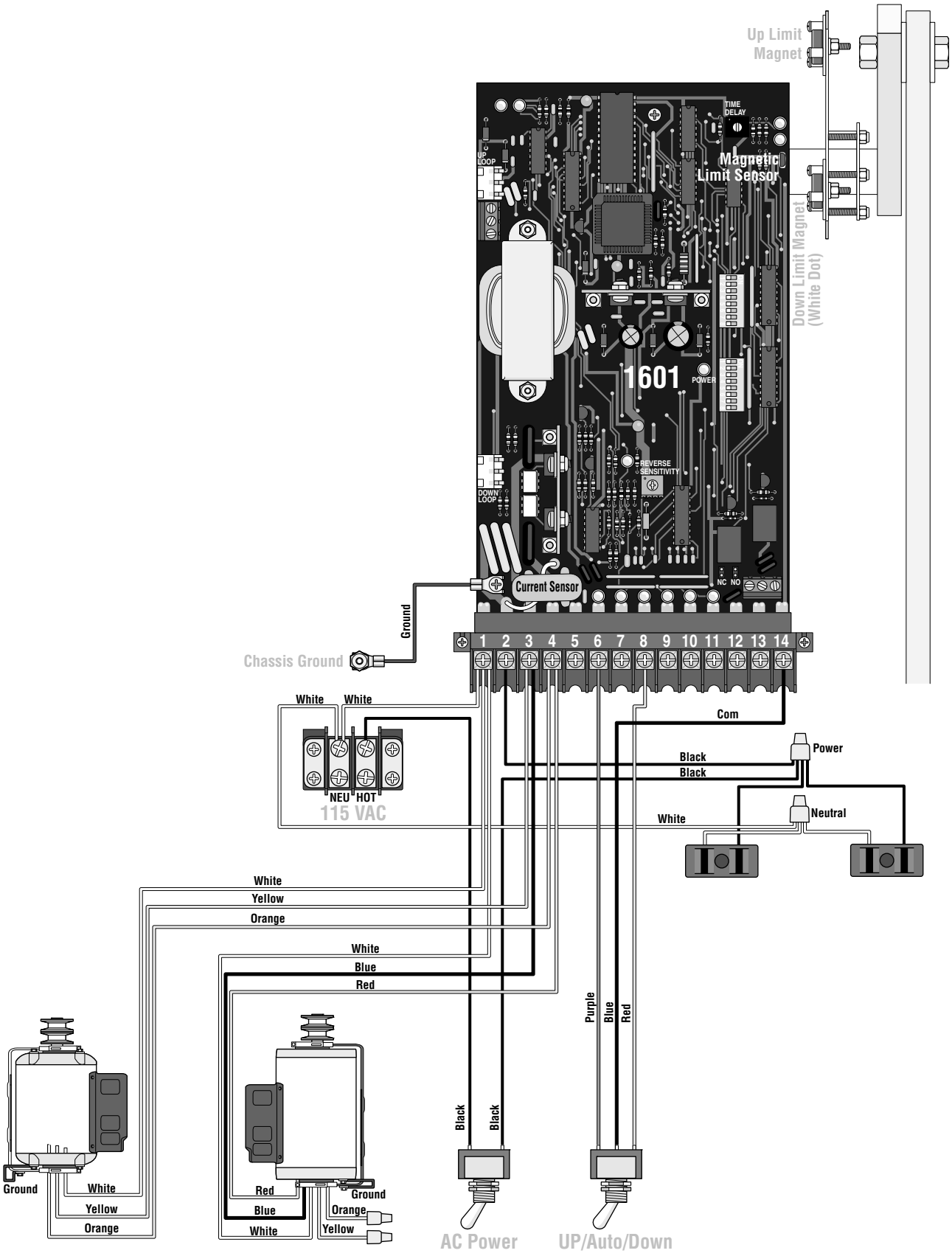
Aluminum Folding Arm Kit - Low headroom applications (Arm included). P/N 1601-610

20 Ft 3-Piece Aluminum Arm Kit - For the 1602 barrier gate operator ONLY. P/N 1602-162
24 Ft 3-Piece Aluminum Arm Kit - For the 1602 barrier gate operator ONLY. P/N 1602-164
27 Ft 3-Piece Aluminum Arm Kit - For the 1602 barrier gate operator ONLY. P/N 1602-166
(Aluminum arm mounting brackets, hubs and mounting hardware included in all 3-piece aluminum arm kits)

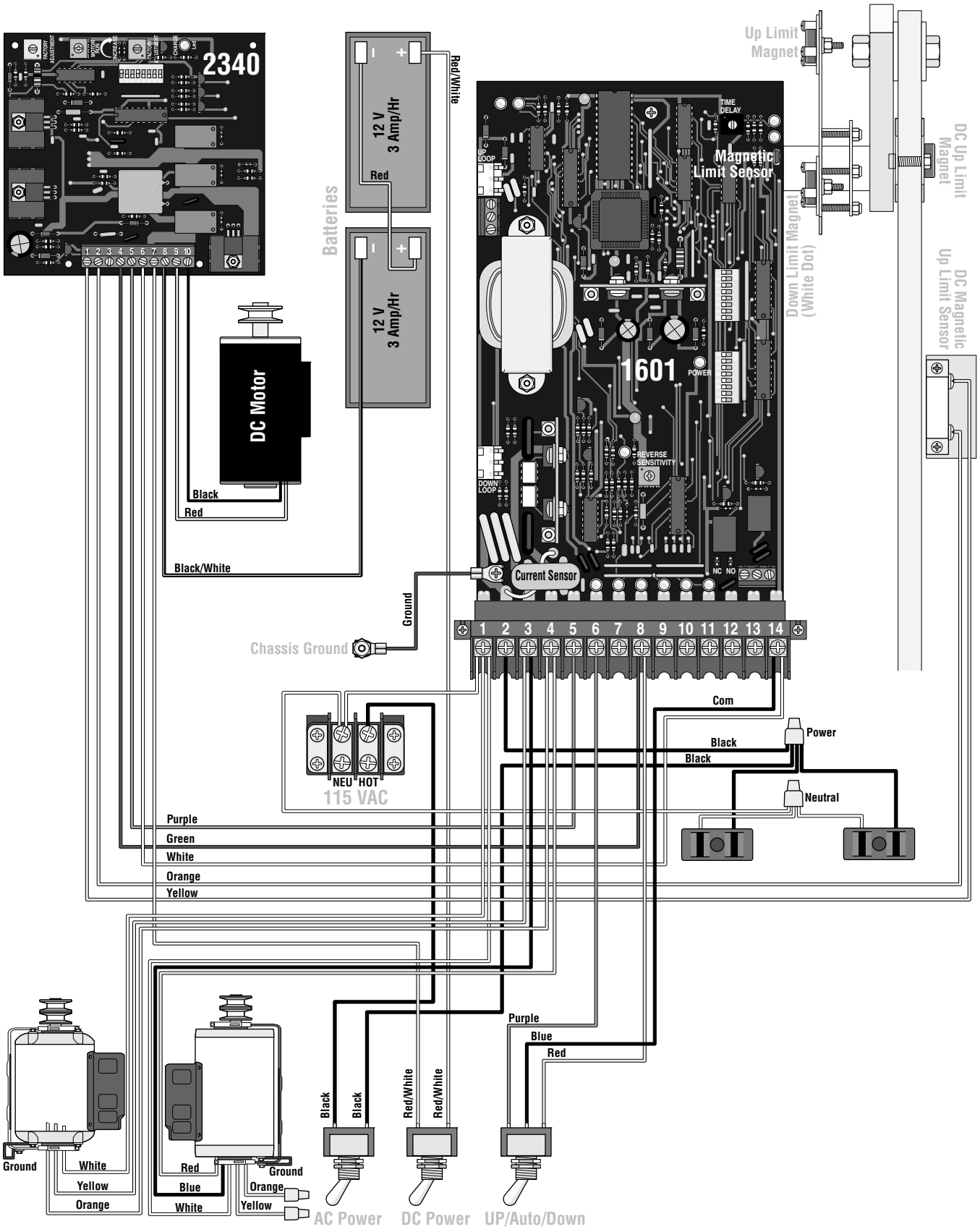
20 Ft 3-Piece Wood Arms Only - For the 1602 barrier gate operator ONLY. P/N 1602-340
20 Ft 3-Piece Wood Arms Mounting Kit - Wood arm mounting brackets, hubs and mounting hardware for 20 ft 3-piece wood arms. P/N 1602-041

Foam Padding for 14 Ft Arm - Foam padding for the aluminum or wood arm. P/N 1601-260

1/2 or 1 HP 115 VAC



1/2 or 1 HP 115 VAC / Convenience Open



Installation/Owner's Manual

1601 / 1602
Barrier Gate Operator

Use this manual for circuit board 1601-010 Revision V or higher.

1601-065-T-12-15

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