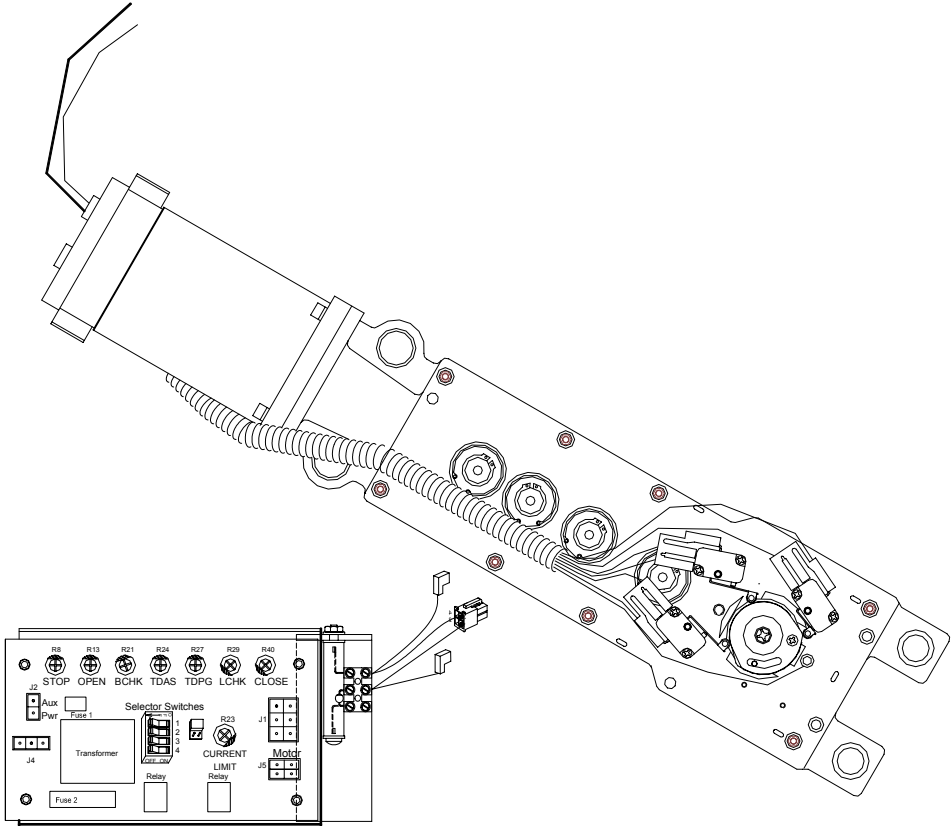




# Automatic Entrance Systems

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# Retrofit Kit Manual Model 300/400/500 Swing Door System With Magnum II Control



**WARNING**

**Do not install, operate or service this product unless you have read and understand the Safety Practices, Warnings, Installation and Operating Instructions contained in this manual. Failure to do so may result in property damage, or bodily injury.**

Part Number 15-10366  
July 27, 2004 Revision

**INSTALLATION MANUAL**

**NABCO**  
ENTRANCES INC

**CAUTION:**

**Read these safety practices before installing, operating or servicing the automatic door. Failure to follow these practices may result in serious consequences.**

**Read, study and understand the operating instructions contained in or referenced in this manual before operating. If you do not understand the instruction, ask the installing qualified technician to teach you how to use the door.**

**This manual and the owners' manual must be given to and retained by the purchasing facility or end user.**

- 1. If the door appears broken or does not seem to work correctly, it should be immediately removed from service and a qualified service technician contacted for corrective action.**
- 2. Disconnect power at the fused disconnect during all electrical or mechanical service. When uncertain whether power supply is disconnected, always verify using a voltmeter.**
- 3. All electrical troubleshooting or service must be performed by qualified electrical technicians and must comply with all applicable governing agency codes.**
- 4. It is the responsibility of the installing door technician to install all warning and instructional labels in accordance with ANSI A156.19.**
- 5. It is the responsibility of the purchasing facility or end user to keep warning and instructional labels and literature legible, intact and with the door.**
- 6. Replacement labels and literature may be obtained from local NABCO Entrances Inc. distributors. If the name of the local distributor is unknown, contact NABCO Entrances Inc. at (877-622-2694) for assistance.**
- 7. Do not place finger or uninsulated tools inside the electrical control box. Touching wires or other parts inside the enclosure may cause electrical shock, serious injury or death.**

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**To The Installer**

The purpose of this manual is to familiarize the purchaser with the proper installation and operation of this system. It is essential that this equipment be properly installed and operational before the door is used by the public. It is the purchaser’s responsibility to inspect the operation of the entrance system to be sure it complies with any applicable standards. In the United States, ANSI Standard 156.19 usually covers this type of door. Other local standards or codes may apply. Use them in addition to the ANSI Standard.

Instruct the building owners/operator on the essentials of the operation of the door and this device. The owner should follow these instructions to determine whether the door is operating properly and should immediately call for service if there is any malfunction.

All installation changes and adjustments must be made by qualified, NABCO trained technicians.

**Overview**

Earlier versions of the NABCO GT300/400/500 Swing Door Operator can be retrofitted with the newer Magnum Control Board (Magnum II). This combination offers several control features that accommodate most installations.

Magnum II Board has a “lockout” feature and two kinds of “Time delay” features in itself. Extra Lockout Module and Time Delay module are not necessary.

This Manual offers step-by-step instructions on how to upgrade an existing GT300/400/500 installation with the Magnum II and related hardware.

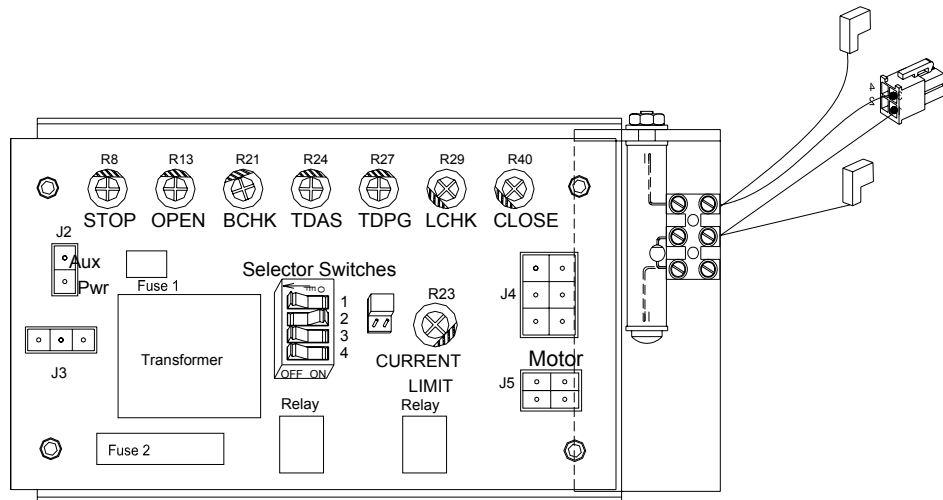


Figure 1 – Overview of Magnum II & Chassis Assembly

Table 1 – Comparison of Magnum II to the GT710 Controller

Magnum II Board	Analog Controller
Adjustable opening speed.	Limited adjustment on opening speed.
Adjustable closing speed.	Adjustment by changing resistors
Adjustable Back-check speed.	Limited adjustment on Back-check speed.
Adjustable Latch-check speed.	No adjustment.
Adjustable current limit/door block trip.	No adjustment.
Adjustable activation timer (0 to 60 seconds)	Requires separate time delay module
Adjustable separate push-n-go timer (0 to 60 seconds)	No adjustment.
Adjustable door action when detection (continuous safety) occurs – allow door to stop, creep open or creep closed.	No adjustment.
Automatic shut-off of motor if door dies not open within 30 seconds.	N/A
Connection provided for swing side mats and swing side presence detector (Continuous safety and safety with lockout).	N/A
Enable/disable sequential operation via dip switch.	N/A
Enable/disable push-n-go via dip switch.	Requires separate module

**Specifications**

Power Input	120 (±10%) AC 50-60 Hz, 5 Amps
Available current for Accessories	0.5 Amps 24 Volts AC
Available Wire Size for Incoming Power	14 AWG
Minimum Frame Face for Mounting	1 3/4" (44 mm)
Minimum Clearance from Top of Door to Ceiling	7" (178 mm)
Door Hinge Requirements	3/4" Butt, Offset Pivot, or Center Pivot
Door Thickness	1 3/4" (44 mm) Minimum
Door Width	Specify When Ordering

**Tools required**

Phillips Screwdriver, #0 (for potentiometers), #2 Slotted Screwdrivers, Small and Medium

**Handing Requirements**

The type of door will determine whether a left-hand or a right-hand operator is required. **Figure 2** can be used to determine which unit is required.

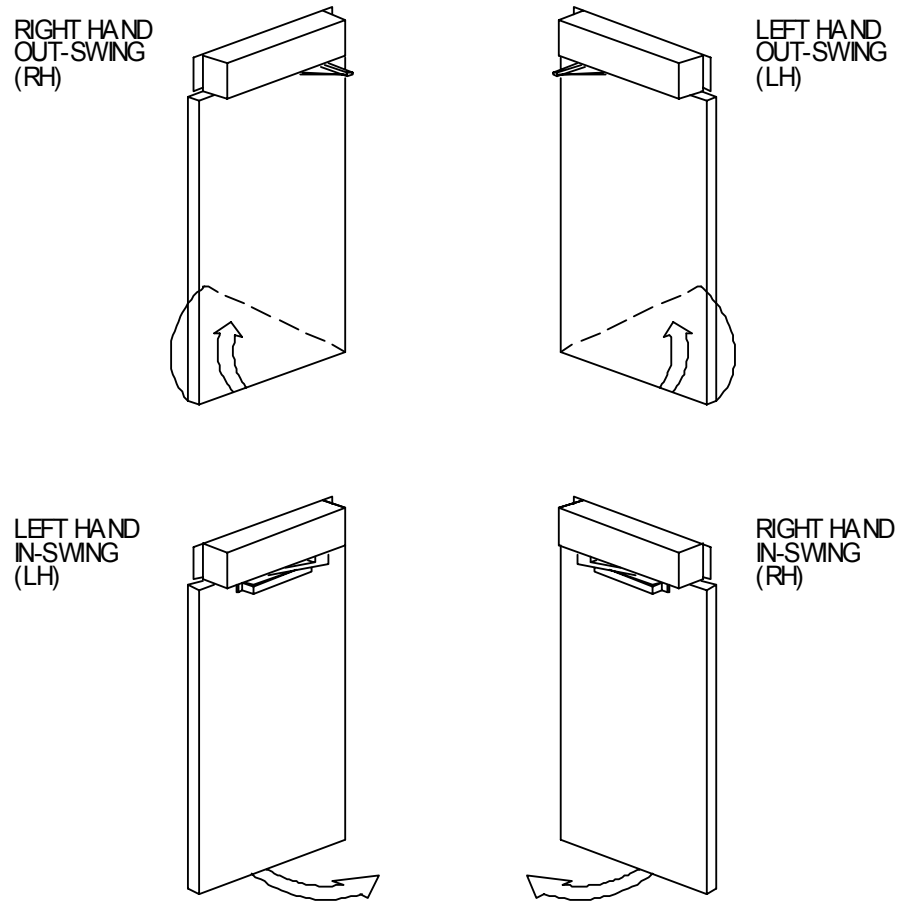


Figure 2 – Determine the Swing (Hand) of the Door.

**Note:** The hand of the unit and the hand of the door must be the same. The hand of the unit is not reversible and cannot be converted in the field.

**Hard Ware Kit List**

This kit has been shipped with the following installation hardware.

- 01 11-10293-01 Magnum Board Retrofit Kit for Single Swinger
- 02 11-10293-02 Magnum Board Retrofit Kit for Simultaneous Pair Swinger

	Part #	Part Description	Qty		Notes
			-01 Single	-02 Sim- Pair	
1	12-10292	Magnum II Board & Chassis Assembly	1	2	With Braking Module
2	22-10065	Main Harness - Single	1	---	With Terminal Block
3	22-10270	Main Harness – Simultaneous Pair	---	1	With Terminal Block
4	21-9934	300/400/500 Harness, Magnum Board	1	2	
5	21-9933	Power Harness - Single	1	---	
6	14-5883	Power Harness – Simultaneous Pair	---	1	
7	14-3867	Micro switch – Short Arm	1	2	
8	15-10366	Magnum Board II Retrofit Manual For Swing Operator	1	1	

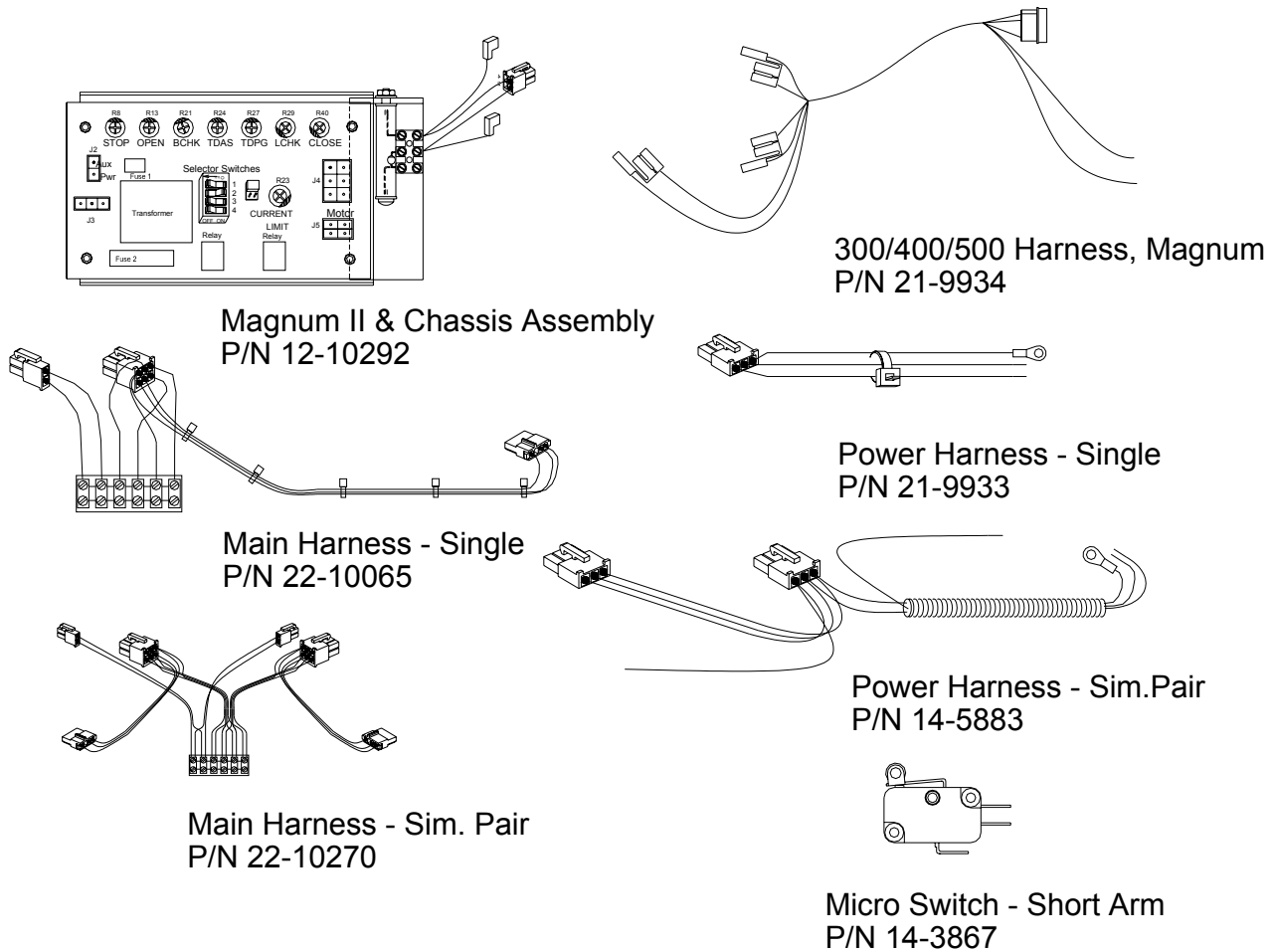


Figure 3 – Hardware Kit

**Conversion of a GT300/400/500 to a Magnum II**

1. Shut off power to the header.
2. Uninstall the swing operator from the header.
3. Remove all wires and the switch harness from the operator.
4. Remove the control board and the appropriate wiring from the header.  
Mounting Clip would be used for Magnum II Assembly.
5. Connect the "Magnum Board 300/400/500 harness," (See Figure 3) to the micro switches on the operator as shown in Figure 4

If the door is an inswing with a breakout feature, a breakout microswitch must be used as shown in Figure 4 below.

6. Install the Magnum II board next to the operator using the Mounting Clip from the Analog Control Box.
7. Plug the power harness into the Magnum II board.

When the operator has a breakout feature, the Panic Latch must be reversed.  
(See page 19)

8. Connect the green wire (ground) to the header chassis, black 120 VAC wire to black through thermal protector, and white wire to white wire as shown in Figures 9 ~ 10.
9. Connect the four-pin plug from the limit switches to the plug at the end of the main harness.(Figure 9~10)
10. Connect the Rocker Switch to the terminal block of the main harness. (Figure 9~10)
11. Connect the motor harness from J5 (marked MOTOR) on the Magnum II board to the associated red and black terminals on the motor. (Figure 9~10)
12. Connect the six-pin connector from the main harness to J1 on the Magnum II board.
13. Connect the two-pin connector from the main harness to J2 (marked AUX PWR) on the Magnum II board.
14. Connect the activation/detection devices to the terminal block of the main harness. (Figure 9~10).
15. Cap off all unused wires.



**Wiring Limit Switches**

After removing the existing Switch harness, install the GT 300/400/500 Magnum Harness, to the Back-check, Latch-check and Break-out micro switches on the operator as shown in Figure 4

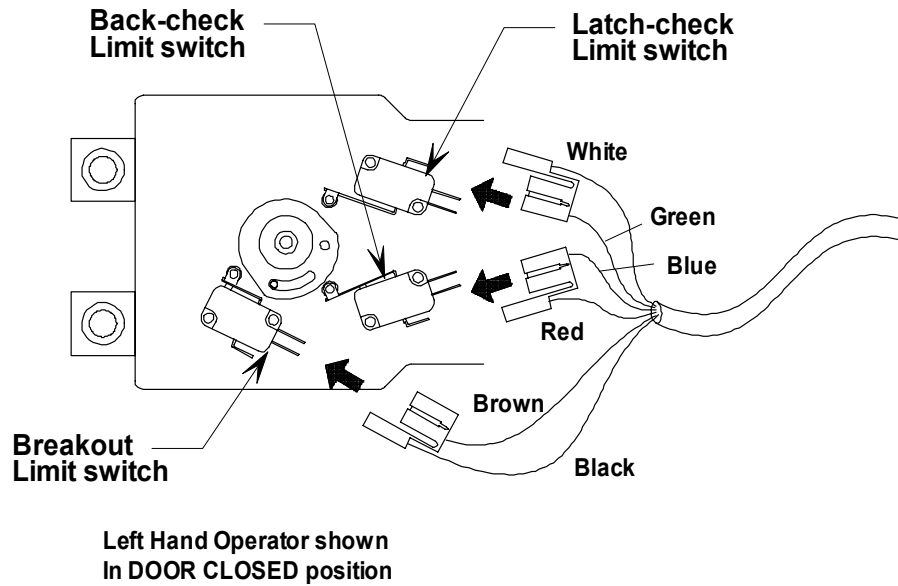
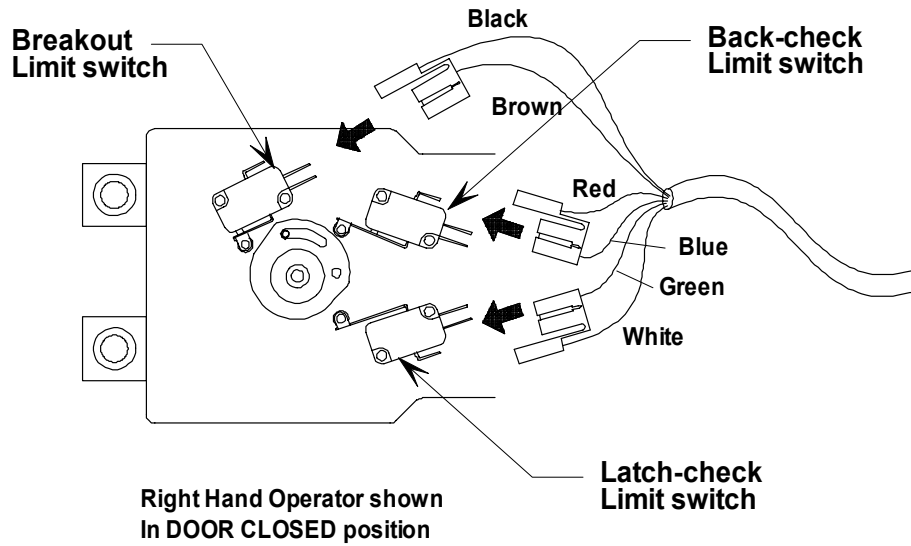


Figure 4 – Wiring limit switches

## Wiring Connectors

There are four connectors located on the control board labeled J2, J3, J4, and J5 (Figure 5). There is a re-settable fuse 1 (F1) and a replaceable fuse 2 (F2). A wiring diagram is provided at the end of this section.

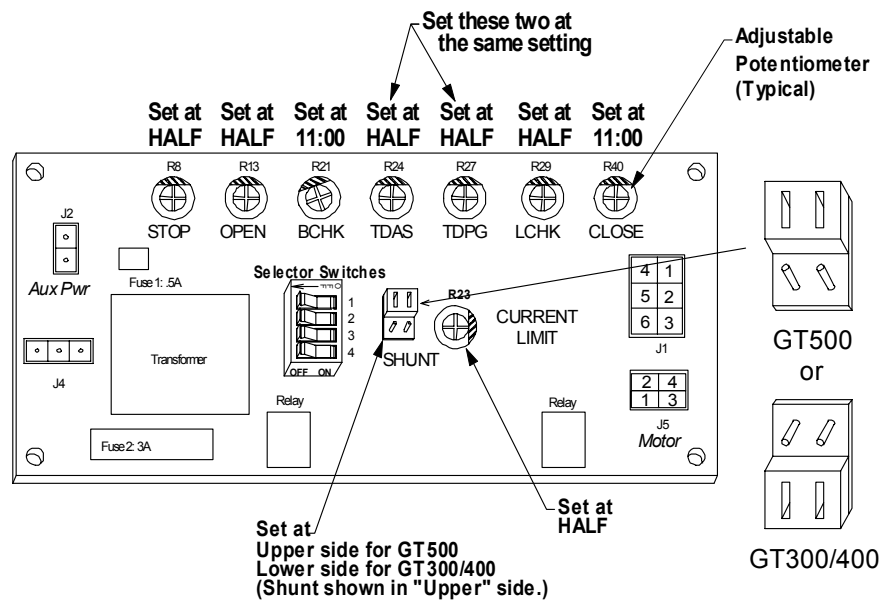


Figure 5 – Magnum Control

**J2** is the 24 VAC output to the actuating device. It is a two-pin connector.

1. Do not exceed 0.500-amp current draw.
2. This circuitry was designed to work with any sensor that operates on 24 VAC. This circuitry is limited to 0.500-amp current draw and must not be exceeded. If a sensor requires a different operating voltage, a separate voltage module must be used to supply power to the sensor.

**J1** is the signal input. It is a six-pin connector with a mating connector installed.

1. Pin 1 has a lock out circuit so that the signal only works when the door is in the closed or fully open position. The logic is turned off and on through back check and door closed switches. Completing the circuit from the common (pin 6) will prevent the door from opening or closing from a fully closed or fully open position. It is generally used for swing side presence detectors where the detector needs to be deactivated as

the door sweeps across the detection zone. The wire to this pin is white.

2. Pin 2 should be connected to the door closed switch to determine when the door is closed and out of the detection area of the presence sensor. The wire to this pin is orange.
3. Pin 3 should be connected to the back check switch. The wire to this pin is blue.
4. Pin 4 receives the activate signal from the actuating device when someone approaches. The wire to this pin is black.
5. Pin 5 is used with the ACUGARD 2 System, swing side floor mats, or other safety systems. Completing the circuit from the common (pin 6) will stop the door during opening or closing as well as prevent it from moving if it is fully open or closed. This safety circuit is always active unlike the safety circuit described for pin 1. The wire to this pin is purple.
6. Pin 6 is common, so connecting this red wire to any of the other five will cause that feature to be activated. For example, connecting the red and blue will result in back check.

**J5** is the motor feed. It is a four-pin connector that connects to the motor braking circuit mounted at the end of the Magnum control board. This circuit uses a resistor & diode to slow the door down if J5 is accidentally unplugged while the door is in the open position.

1. Pin 1 is motor negative. The wire to this pin is red.
2. Pin 2 is motor positive. The wire to this pin is black.
3. Matching the color wires into the motor makes the unit work for right-hand doors. Mismatching the wires makes the unit work for left-hand doors.
4. There are no wires to the Pin 3 and 4.

**NOTE:** If the operator is the wrong hand, it **CANNOT** be corrected by reversing the wiring leads into the motor.

**Fuse 1 (F1)** is a 0.5 amp, fuse that protects auxiliary equipment that may be connected to J2. It also protects the auxiliary power circuit of the magnum board.

**Fuse2 (F2)** is a 3 amp, 250 volt fuse that protects the circuit board from voltage spikes and incorrect voltage being applied to the board.

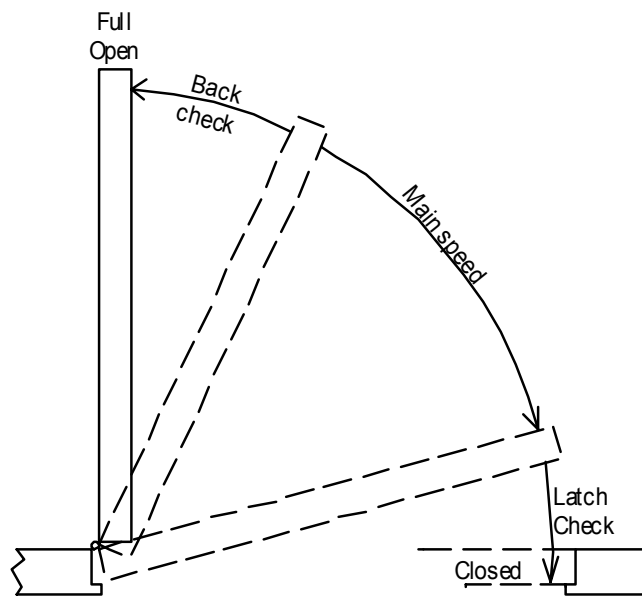


Figure 6 – Stages of Travel.

**Back Check** – This takes place from about the last 10° of sweep to the full open position.

**Closing Speed** – How fast the door moves from fully open to the final 10° before fully closed.

**Current Limit (or Door Block)** – This sensitivity adjustments stops the activation if the door encounters an object in the path of the moving door while opening.

**Latch Check**–This takes place from about the last 10° of sweep to the full closed position.

**Opening Speed** – How fast the door opens from fully closed to approximately 80° open.

**Push-N-Go** – Activation of the GT 300/400 by manually pushing the door. The Magnum Control board senses the power generated by rotation of the motor and energizes the activation circuit.

**Time Delay Activation Signal** – When the door is activated via a push plate, a mat, a sensor, etc., this option determines how long the door will stay open. It is adjustable up to 60 seconds.

**Stop Adjustment** – When an object is detected in the path of a moving door while opening and the door is not in back check, this feature determines whether the door stops, slowly opens, or slowly closes.

## Adjustments

There are three types of adjustments on the Magnum Control Board, shunt, potentiometers and selector (dip) switches. See Figure 1 for the location of these adjustments.

**Shunt** - The 2x2 shunt provides a connection over 4 pins of a 6 pin terminal. The exposed bars in the shunt, that can be seen from the surface must be vertically oriented for the correct pins to be jumped. If the shunt is installed in a horizontal position, the door will not function properly. (See Figure 5)

Upper side is for GT500 (Low Energy Operator).

Lower side is for GT300/400 (Standard Operator).

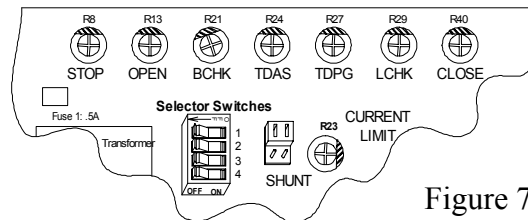


Figure 7 –Shunt

**Potentiometers** – There are eight potentiometers located on the control board. Use a small #0 Cross point or Phillips screw-driver to adjust each potentiometer. Don't touch other parts of the board with the screwdriver. This could damage the electrical circuitry. Adjust potentiometers clockwise to increase the parameters (speeds, stops, delays, etc.), counterclockwise to decrease the parameters. Wait at least 5 seconds before testing the change.

Recommended start settings correspond with positions on a clock with 12 o'clock at the top. The settings are a starting point. They are standard field approximations that might need to be adjusted for a specific situation.

**Selector (Dip) Switches** – There is one bank of four switches located on the control board. The screwdriver can be used to toggle the switches on and off. Do not use a pencil. Note that the edge of the switch bank closest to the transformer is the "Off" position.

## Customized Settings Magnum Board

### Potentiometers

**STOP! Changes should only be made by trained, qualified technicians.**

Each control board has 8 potentiometers:

1. Stop Adjustment (STOPS)
2. Opening Speed Adjustment (OPEN)
3. Back Check Adjustment (BCHK)
4. Time Delay Activating Signal (TDAS)
5. Time Delay Push-N-Go (TDPG)
6. Latch Check Adjustment (LCHK)
7. Closing Speed Adjustment (CLOSE)
8. Current Limit Adjustment (CURRENT LIMIT)

#### **Stop Adjustment (STOP):**

When an object is sensed in the path of a moving door by a swing side safety mat or ACUGARD sensor connected to the control board through J8 and the door is not in back check, this feature determines whether the door stops, slowly opens, or slowly closes. The recommended start setting is 12 o'clock.

Clockwise rotation of the potentiometer increases the stop power. If the stop power is increased and an object is detected in the path of the opening door, the door will continue to open, but at a slower speed. If the stop power is decreased and an object is detected in the path of the opening door, the door will stop, reverse direction, and close slowly. Rotation of the potentiometer towards the midpoint of the setting reduces the speed at which the door moves.

**NOTE:** This adjustment is pertinent to signals from the continuous safety input (Terminal Block #3) and is not related to current limit. Also, heavier doors will require more STOP power.

#### **Opening Speed Adjustment (OPEN):**

This sets the door opening speed. The recommended starting position is 12 o'clock. Clockwise rotation increases opening speed.

GT-300/400 Application : 1.5 ~ 16 sec / 80 deg.

GT-500 Application : 3.0 ~ 16 sec / 80 deg.

### **Back Check Adjustment (BCHK)**

This sets back check speed. Back check takes place from about the last 10° of sweep to the full-open position. The recommended starting position is 11 o'clock. Clockwise rotation increases back check speed. If back check is set too high the door will slam open. The current limit will trip. If back check is set too low the motor will not be able to move the door. The door will slowly close.

GT-300/400 Application : 0.4 ~ 10 sec / 10 deg.

GT-500 Application : 1.8 ~ 25 sec / 10 deg.

### **Time Delay Activating Signal (TDAS):**

When the door is activated, this option determines how long the door will stay open after the activation (or input signal) is released. It is adjustable up to 60 seconds. The recommended starting position is 12 o'clock. Clockwise rotation increases time delay.

GT300/400/500 Application : 1 ~ 60 sec.

### **Time Delay Push-N-Go (TDPG):**

When the push-n-go feature is used, this sets the time delay, which determines how long the door stays open. It is adjustable up to 60 seconds. The recommended starting position is 12 o'clock. Clockwise rotation increases time delay.

GT300/400/500 Application : 1 ~ 60 sec.

**NOTE:** Push-N-Go time delay, when active, should be set for a shorter length of time than the Time Delay Activating Signal.

If TDPG is not used, the time delay adjustment must be set at the same setting as time delay activating signal (TDAS). Do not set TDPG at minimum (full counter clockwise).



**Latch Check Adjustment (LCHK):**

This sets latch check speed. Latch check takes place from about the last 10° of sweep to the full-close position. The recommended starting position is 11 o'clock. Clockwise rotation increases latch check speed. If latch check is set too high the door will slam closed.

GT-300/400/500 Application : 1.5 ~ 5.0 sec / 10 deg.

**Closing Speed Adjustment (CLOSE):**

This sets the door closing speed. The recommended starting position is 12 o'clock. Clockwise rotation increases closing speed.

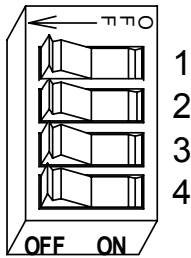
GT-300/400/500 Application : 3.0 ~ 12 sec / 80 deg.

**Current Limit Adjustment (Current Limit):**

This should be set only when the door operation is satisfactory.

In the case of GT-500, to satisfy ANSI Low Energy standard, it will be required to set this pot carefully. Although recommended setting is around 1:00 o'clock, it will be necessary to adjust setting depending upon door weight and speed.

This stops activation and cuts power to the motor if the current exceeds the setting. It is used to set how much force the opening door will push on an encountered object before it recycles. When the recycle is triggered, the door will stop and coast to a close. This adjustment is affected by opening speed. Set opening speed first. The recommended starting position for current limit might not be appropriate in windy conditions. For example, strong wind gusts against an exterior door may inadvertently cause it to recycle. Clockwise rotation makes the door less sensitive to objects in its path.



(Switches shown in "ON" position.)

Figure 8 –Dip Switch

## Dip Switches

**Switch 1 – Not Used.**

**Switch 2 – Not Used.**

**Switch 3**

1. When the switch is ON, push-n-go is not active.
2. When the switch is OFF, push-n-go is activated.

**Switch4**

1. When the switch is ON, the door will open, time out and close.
2. When the switch is OFF, the door is in the sequential mode. One activation opens the door, a second activation is needed for the door to close.

## Signage

After the door has been adjusted properly and tested, decals should be applied to the door such that they are visible from either side of the door. Depending on the type of the door activation, certain decals must be displayed.

**Wiring to Operator** The following harnesses are necessary.

- a. Power Harness, Magnum Board  
Part # 21-9933 (for single door)  
14-5883 (for Simultaneous Pair door)
- b. Main Harness Assy, Magnum Board  
Part # 22-10065 (for single door)  
22-10270 (for Simultaneous Pair door)
- c. 300/400/500 Harness for Magnum Board  
Part # 21-9934

**Wiring for Rocker switch**

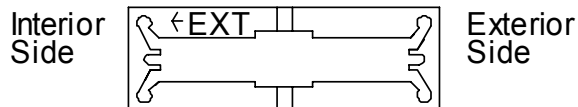
Rocker Switch (part # 11-9935) is available. Connect the black wire to activation input, the red wire to 24VAC common and the green wire to activation signal of sensing device.

**Wiring for Break – out**

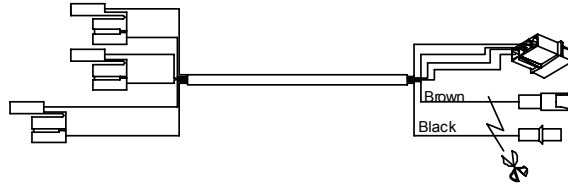
When the unit has a Break-out feature, some modification would be required. Please, refer to the following procedure.

- a. Panic Latch kit:  
Flip the direction of the panic latch so that the “← EXIT” arrow points to Interior side of the building. (This makes the switch close instead of opening when the door is broken out. The contacts of the switch would be changed to Normally Open from Normally Close.)

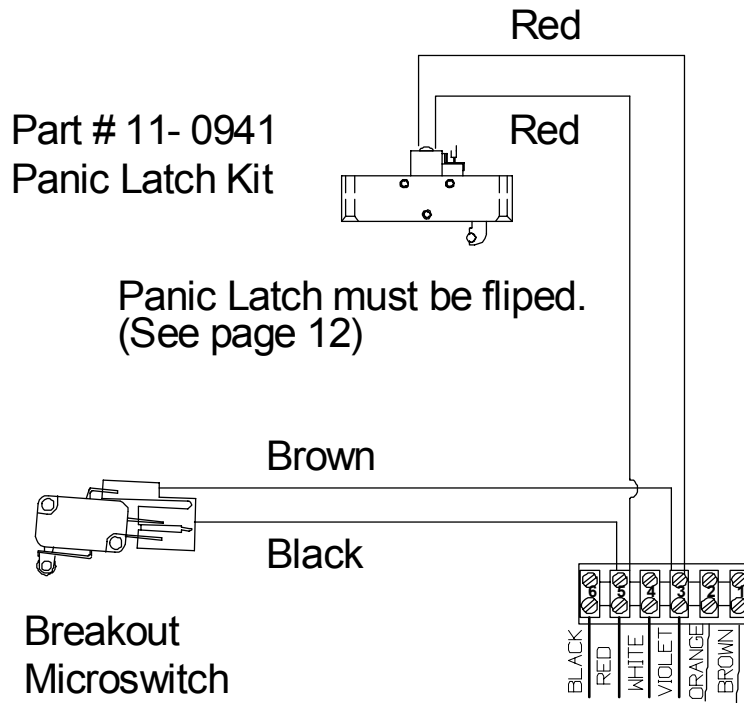
Bottom View of Panic Latch



- b. Cut the connectors to the “Panic Latch” and/or the “300/400/500 harness” as shown below.



- c. Connect these wires to “Continuous Safety” input of Terminal Block.(Between Terminal Block #3 violet and #5 red)



TERMINAL BLOCK		
#1	BROWN	24VAC NEUTRAL
#2	ORANGE	24VAC HOT
#3	VIOLET	CONTINUOUS SAFETY
#4	WHITE	SAFETY WITH LOCKOUT
#5	RED	24VAC COMMON
#6	BLACK	ACTIVATION

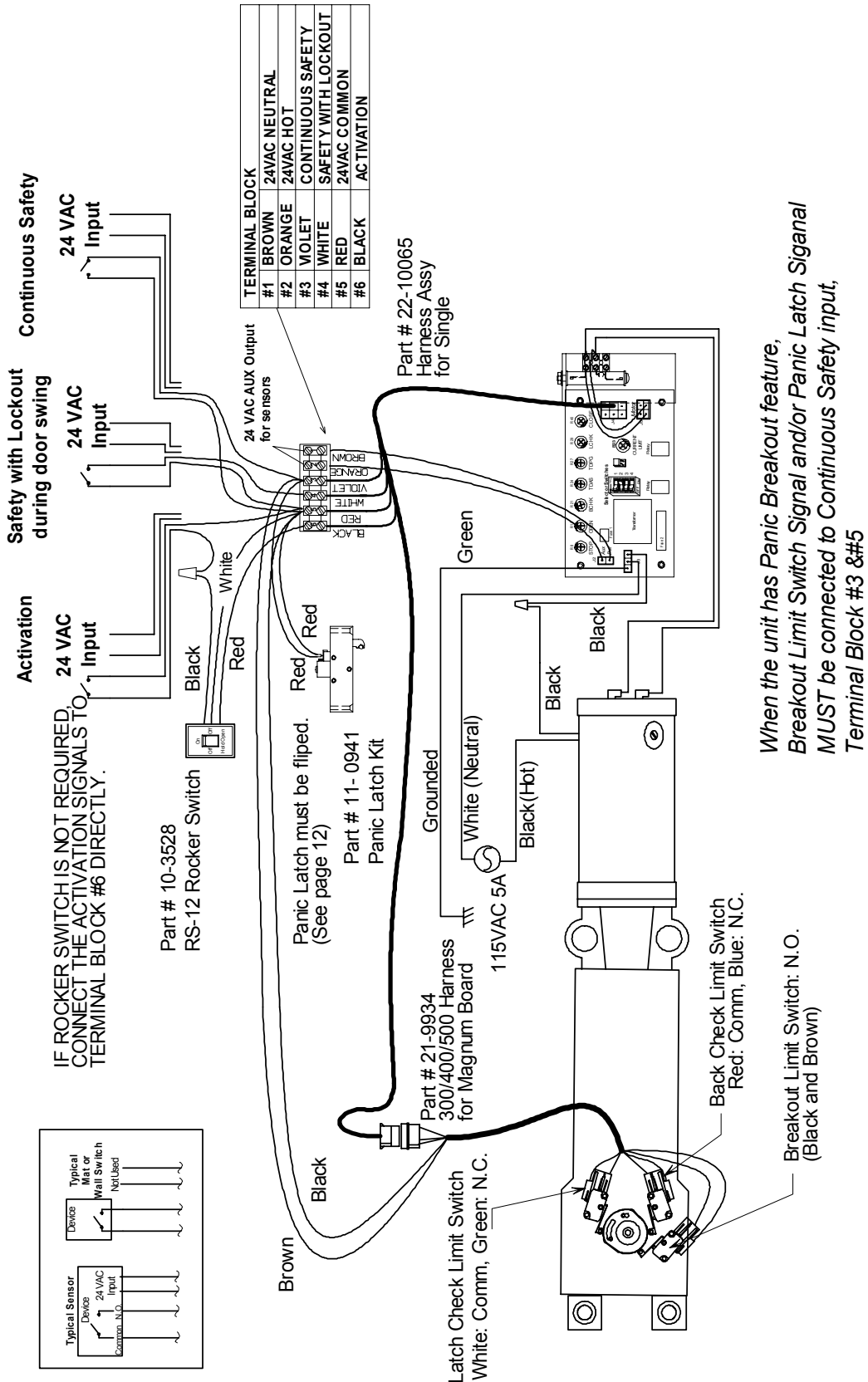


Figure 9

# General Wiring - Single Diagram

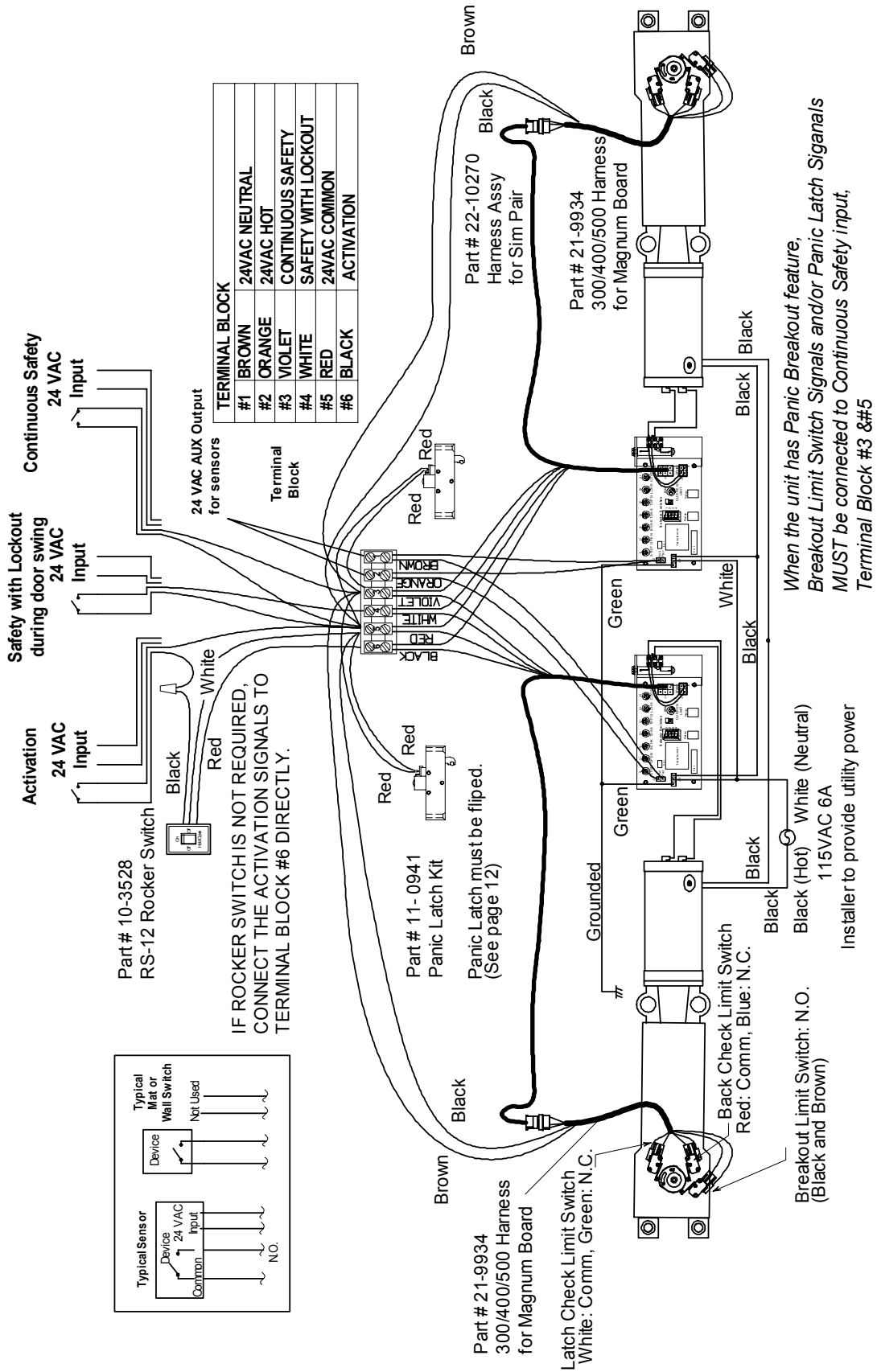


Figure 10

# General Wiring – Simultaneous Pair

## Troubleshooting

Symptom	Action/Cause	Solution
Operator does not function.	<ol style="list-style-type: none"> <li>1. Check Fuse 2 (F2).</li> <li>2. Check for 120 VAC at connector J5.</li> <li>3. Check power to activation device at connector J1.</li> <li>4. Check Fuse 1 (F1).</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace fuse.</li> <li>2. Check incoming power. If power is good, check connection to motor. Replace motor if necessary.</li> <li>3. If power exceeds 0.5 amps at 24 VAC, replace with lower draw sensor.</li> <li>4. If blown, replace fuse. If F1 is OK, check power to activating devices at J2. Voltage is too low, reduce accessory load.</li> </ol>
Adjustment of Hydraulic Closer has no effect.	Check 4 pin motor connector on the board.	Pin #2 and #4 must be jumped by a wire.
Door slams closed.	Main speed on hydraulic closer not adjusted properly.	Turn main speed in direction of turtle.
Door slams open.	Back check speed not adjusted or magnet not in proper location.	Adjust back check potentiometer or relocate magnet.
Fuse 2 (F2) blows when door open is triggered.	Check door activation device power consumption.	If power draw exceeds 0.5 amps at 24 VAC, replace with lower draw sensor.
Motor spins when activated but door does not open	Check polarity of motor input wires at connector on motor.	Reverse motor leads on motor.
Back check adjustment on Magnum board has no effect.	The fully open door position is greater than 90° and the back check adjustment on the hydraulic closer is overriding the controls of the Magnum board.	Adjust the back check screw on the bottom of the header out one turn.
Unit leaks oil.	Adjusting screws on hydraulic closer have been removed.	Replace hydraulic closer.
No back check or motor continues to drive after door is closed.	Magnets on main sprocket not in correct position.	Follow instructions on Page 14 to properly align magnets.
Door does not stay tightly closed.	<ol style="list-style-type: none"> <li>1. Preload on swing arm is not correct.</li> <li>2. Building stack pressure is excessive.</li> </ol>	<ol style="list-style-type: none"> <li>1. Position arm 45° as shown on Figures 11 through 14.</li> <li>2. Upgrade operator unit to GT 500.</li> </ol>
Safety or Presence Sensor does not function.	<ol style="list-style-type: none"> <li>1. No power to sensor or defective sensor.</li> <li>2. Sensor not connected to White wire</li> </ol>	Check harness wiring to wire diagram on Page 21.
Safety or Presence Sensor is activated by closing door.	Connection of sensor to wiring harness was to "Safety" not "Safety w/Lockout".	Rewire Safety Sensor to "Safety w/Lockout" connector.
Swing Side ACUGARD 2, Floor mat, holding beams or other accessories do not function while door is moving.	Connection of accessories was made to "Safety w/Lockout" not "Safety".	Rewire accessory to "Safety" connection (violet wire).
Sensor shows activation signal sent, but door does not open.	Sensor not connected properly to activation connector.	Check harness wiring to wiring diagram on Page 21.
One sensor does not activate both doors on a simultaneous pair.	Sensor is not connected to both control boards.	Install simultaneous pair harness (P/N 229953).

**Appendix A****EXCERPTS FROM ANSI/BHMA A156.19 – 1997**

- 4.0 REQUIREMENTS FOR LOW ENERGY SWINGING POWER OPERATED DOORS OR LOW ENERGY SWINGING POWER OPEN DOORS**
- 4.1 Opening Time
  - 4.1.1 Doors shall be field adjusted so that opening time to back check or 80 degrees, whichever ever occurs first, shall be 3 seconds or longer as required in Table 1. Back check shall not occur before 60 degrees opening.
  - 4.1.2 Total opening time to fully open shall be 4 seconds or longer.
- 4.2 Closing Time
  - 4.2.1 Doors shall be field adjusted to close from 90 degrees to 10 degrees in 3 seconds or longer as required in Table 1.
  - 4.2.2 Doors shall be field adjusted to close from 10 degrees to fully closed in not less than 1.5 seconds.
- 4.3 The door shall be field adjusted to remain fully open for not less than 5 seconds unless a sensing device is used to hold the door open.
- 4.4 The force required to prevent a stopped door from opening or closing shall not exceed a 15 lbf (67 N) applied 1 in (25 mm) from the latch edge of the door at any point in the opening or closing cycle.
- 4.5 The kinetic energy of a door in motion shall not exceed 1.25 lbf-ft (1.69 Nm). Table 1 provides speed settings for various widths and weights of doors for obtaining results complying with this paragraph.
- 4.6 In the event of power failure to the operator, doors shall open with a manual force not to exceed a 15 lbf (67 N) or torque of 40 lbf-in (4.5 Nm) to release a latch, a 30 lbf (133 N) to set the door in motion, and a 15 lbf (67 N) to fully open the door. The forces shall be applied at 1" (25 mm) from the latch edge of the door.



Table 1

**Minimum Opening Time to Back Check or 80 degrees, which ever occurs first, or Minimum Closing time from 90 degrees to Latch Check or 10 degrees. Back check shall not occur before 60 degree opening.**

“D” = Door Leaf Width in Inches (mm)	“W” = Door Weight in Pounds (kg)				
	100 (45.4)	125 (56.7)	150 (68.0)	175 (79.4)	200 (90.7)
30 (762)	3.0*	3.0	3.0	3.0	3.5
36 (914)	3.0	3.5	3.5	4.0	4.0
42 (1067)	3.5	4.0	4.0	4.5	4.5
48 (1219)	4.0	4.5	4.5	5.0	5.5

Matrix values are in seconds.

Doors of weights and widths can be calculated using the formula:

$$T = \frac{D\sqrt{W}}{133\text{ lbf} - \text{ft}} \qquad T = \frac{D\sqrt{W}}{2260\text{ Nm}}$$

WHERE: T = Time, seconds  
D = Door width, inches (mm)  
W = Door weight, lbs (kg)

The values for “T” time have been rounded up to the nearest half second. These values are based on kinetic energy of 1.25 lbf-ft.

The value for the 30 inch wide, 100 pound door actually calculates to 2.5 seconds with rounding. 3.0 seconds was used as a more conservative value.