VERTICAL EXPRESS

HD-03 and HD-04 Door Operators with IMS

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Safety Precautions

IMPORTANT! **Read this page before any work is performed on elevator equipment. The procedures contained in this manual are intended for the use of qualified elevator personnel. In the interest of your personal safety and the safety of others, do not attempt any procedure that you are not qualified to perform.**

All procedures must be accomplished in accordance with the applicable rules in the latest edition of the National Electrical Code, the latest edition of ASME A17.1, and any governing local codes.

Terms in This Manual

CAUTION statements identify conditions that may result in damage to the equipment or other property if improper procedures are followed.

WARNING statements identify conditions that may result in personal injury if improper procedures are followed.

General Safety

Before applying power to the controller, check that all factory wire connections are tight on relays, contactors, fuse blocks, resistors, and terminals on cards and DIN rail terminals. Connections loosened during shipment may cause damage or intermittent operation.

Other specific warnings and cautions are found where applicable and do not appear in this summary. See the *Elevator Industry Field Employees' Safety Handbook* for electrical equipment safety information on installation and service.

Electrical Safety

All wiring must be in accordance with the National Electrical Code and be consistent with all state and local codes.

Use the Proper Fuse

To avoid fire hazards, use only a fuse of the correct type, voltage, and current rating. See the job specific drawings sheet (Power Supplies) for fusing information.

Electric shocks can cause personal injury or loss of life. Circuit breakers, switches, and fuses may not disconnect all power to the equipment. Always refer to the wiring diagrams. Whether the AC supply is grounded or not, high voltage will be present at many points.

Printed Circuit Cards

Printed circuit boards may be damaged if removed or installed in the circuit while applying power. Before installation and/or removing printed circuit boards, secure all power.

Always store and ship printed circuit cards in separate static bags.

Electrical Safety
(continued)

Mainline Disconnect

Unless otherwise directed, always Turn OFF, Lock, and Tag out the mainline disconnect to remove power from elevator equipment. Before proceeding, confirm that the equipment is de-energized with a volt meter. Refer to the *Elevator Industry Field Employees' Safety and Accident Prevention Program Manual* for the required procedure.

Test Equipment Safety

Always refer to manufacturers' instruction book for proper test equipment operation and adjustments.

Megger or buzzer-type continuity testers can damage electronic components. Connection of devices such as voltmeters on certain low level analog circuits may degrade electronic system performance. Always use a voltmeter with a minimum impedance of 1M Ohm/Volt. A digital voltmeter is recommended.

When Power Is On

To avoid personal injury, do not touch exposed electrical connections or components while power is ON.

Mechanical Safety

See the *Elevator Industry Field Employees' Safety Handbook* for mechanical equipment safety information on installation and service.

Static Protection Guidelines

IMPORTANT! **Read this page before working with electronic circuit boards.**

Elevator control systems use a number of electronic cards to control various functions of the elevator. These cards have components that are extremely sensitive to static electricity and are susceptible to damage by static discharge.

Immediate and long-term operation of an electronic-based system depends upon the proper handling and shipping of its cards. For this reason, the factory bases warranty decisions on the guidelines below.

Handling

- Cards shipped from the factory in separate static bags must remain in the bags until time for installation.
- Anti-static protection devices, such as wrist straps with ground wire, are required when handling circuit boards.
- Cards must not be placed on any surface without adequate static protection.
- Only handle circuit cards by their edges, and only after discharging personal static electricity to a grounding source. DO NOT touch the components or traces on the circuit card.
- Extra care must be taken when handling individual, discrete components such as EPROMS (which do not have circuit card traces and components for suppression).

Shipping

- Complete the included board discrepancy sheet.
- Any card returned to the factory must be packaged in a static bag designed for the card.
- Any card returned to the factory must be packaged in a shipping carton designed for the card.
- “Peanuts” and styrofoam are unacceptable packing materials.

Note: Refer to the *Vertical Express Replacement Parts Catalog* to order extra static bags and shipping cartons for each card.

Failure to adhere to the above guidelines will VOID the card warranty!

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Specifications

- Maximum Door Opening Speed: 2 ft/s
- Maximum Combined Door Weight: 1500 lbs (weight is combined car and hoistway door assemblies and components)
- Motor Horsepower: 1/6 and 1/2 hp
- Motor Voltage:1/6 hp - 150 VDC, 1/2 hp - 115 VAC
- Encoder: 500 pulses per revolution (attached to back of motor)
- Drive Belts: Wedge V-Belt
- Door Card: Universal Door Controller (UDC), closed-loop motion control (Position, Speed, and Current)
- Input Voltage:24 VDC and 115 VAC Communication: RS485, CAN
- Diagnostic Tool: Windows PC and Palm PDA based user interfaces. Provides advanced diagnostics for tuning and adjustment
- Two Independent Door Profiles. The second profile is activated when HDI (Heavy Door Input) becomes active
- Aluminum Drive and Intermediate Wheels to minimize rotational inertia and to provide good corrosion protection
- No weight on the drive wheel to prevent the car doors from drifting close when stopped n the open position
- Meets opening and closing specifications while maintaining ANSI Code compliance
- Provides maximum jerk rates to minimize door vibration
- Automatically adapts and compensates for belt slip
- Provides direct door control in response to door protective devices, e.g., safety edge
- Protects against lost encoder and overspeed conditions
- Over-current protection of power IGBTs

Overview

The following is a list of the major components of a door operator including a description of their functions, an overview of some of the critical adjustments, and maintenance information. See Figure 1 on page 8.

- Adjustable Arm - The arm mounted to the drive wheel is used to change the amount of linear door movement or stroke.
- Connecting Arm - Connects the drive arm to the door panel.
- Door Operator Support - A metal plate welded to the header. The door operator is mounted to the door operator support with four bolts through the four mounting slots of the door operator.
- Drive Arm - The linkage connected between the drive arm support and the connecting arm.
- Drive Arm Support - The bracket containing two holes is located on top of the door operator. The drive arm should be connected to the right-hand hole, looking from the hatch, at the front of the door operator.
- Drive Wheel - A metal sheave containing a slotted cam surface. The adjustable arm mounts to the drive wheel and is adjusted in the slotted cam surface. The drive wheel is driven by the jack shaft sheave using 3 V belts.

Overview
(continued)

To change the door travel or stroke, move the adjustable arm:

- Closer to the center of the drive wheel = less door travel for the same amount of wheel rotation.
- Further from the center of the drive wheel = more door travel for the same amount of wheel rotation.

- Idler Arm - An adjustable arm mounted to the front of the door operator which controls the tension of the 3 V belts between the jack shaft sheave and the drive wheel.
- Intermediate Arm - Adjustable linkage connected between the drive wheel adjustable arm and the pivot arm. The connection at the pivot arm is adjustable to control the length of the intermediate arm.
- Mechanical Stops - Metal L brackets mounted to the front of the door operator. The stops have slots to adjust the amount of drive wheel rotation and, once positioned, they limit the physical rotation of the drive wheel.
- Motor - 115V or 230V DC Motor
- Pivot Arm - Connects the drive arm to the intermediate arm and provides an adjustment for the length of the intermediate arm.
- Sheave, Jack Shaft - A spoked sheave driven by the door operator motor with a single V belt. The motor sheave drives the jack shaft sheave which drives the drive wheel.
- Sheave, Motor - A sheave attached directly to the door operator motor shaft.
- Support Strut - Unistrut legs on the rear of the door operator which are used to secure the rear of the operator to the car top, and also to plumb the face of the drive wheel.

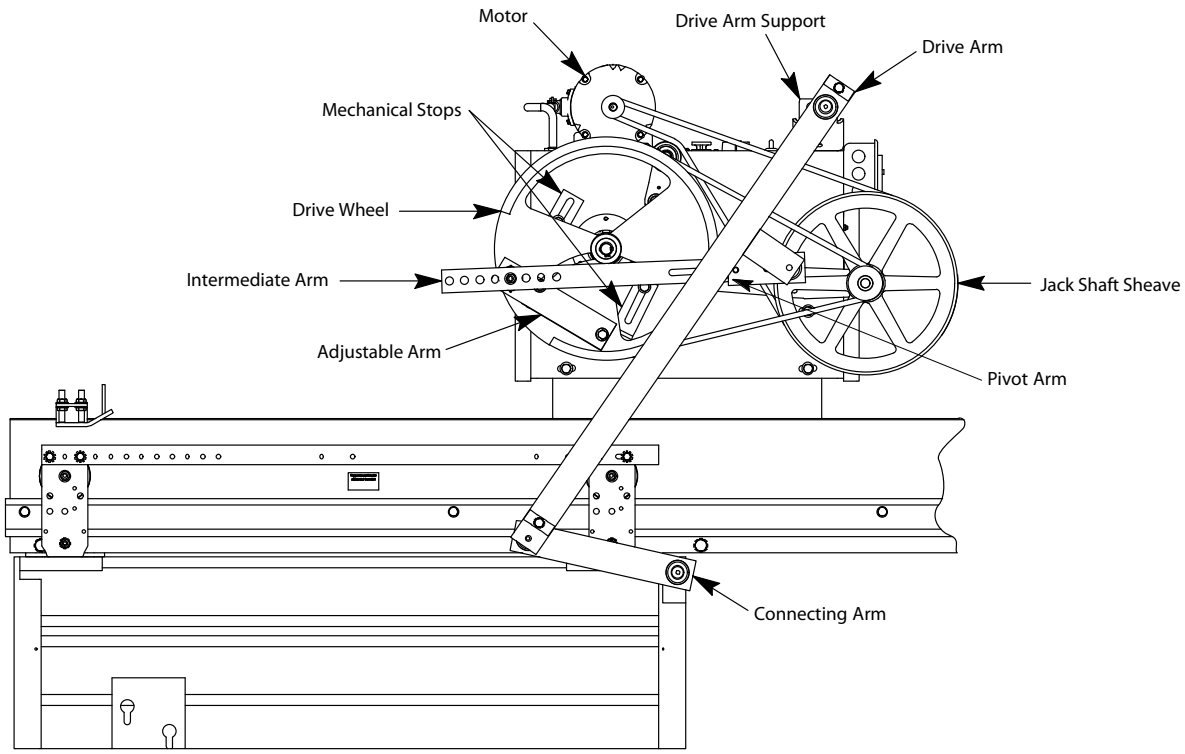


Figure 1 - Door Operator

Mechanical Installation and Adjustment

Single and Two-Speed Door Operation

Prepare the Door Operator

Note: Installation and adjustment of the door operator is best accomplished from an upper landing. Place the car top at a comfortable working height, and use the landing as a working platform.

1. Turn OFF, Lock, and Tag out the mainline disconnect.
2. Remove the door operator from the shipping carton and crate. Locate and store the bag of parts.
3. Remove the cover from the rear of the operator by loosening the two top screws and the two lower rear screws.
4. Inspect the wiring. Make sure all connections are secure.
5. Loosen the bolts holding the mechanical stops.
6. While observing the shaft containing the cams (inside the operator), rotate the drive wheel.
7. Check and adjust, as necessary, the tension of the 3 V belts between the drive wheel and the jack shaft sheave. See Figure 2.
   a. Loosen the two bolts on the idler arm, and turn the locknut on the adjustment screw (located at the end of the idler arm).
   b. Securely tighten the idler arm bolts and the locknut.

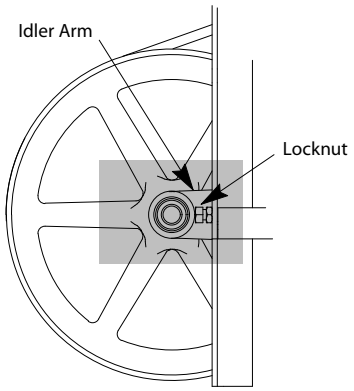


Figure 2 - Locknut Adjustment Screw

8. Check and adjust as necessary the tension on the single V belt between the motor sheave and jack shaft sheave:
   a. Loosen the four motor mounting bolts and position the motor.
   b. Securely tighten the motor mounting bolts.

Single and Two-Speed Door Operation
(continued)

Mounting the Door Operator

1. Lift the door operator to the car top. Center the operator in the slots of the door operator support. Install the four bolts and tighten. See Figure 3, Detail A.

Note: The operator may require repositioning within the slots to achieve the correct drive arm-to-connecting arm relationship with the doors fully open. The hole in the drive arm support bracket may also be used to achieve this relationship. For more details, see Figure 5 on page 13.

2. Attach the drive arm to the right hand hole in the drive arm support, looking at the front of the operator, in the drive arm support. See Figure 3, Detail B.
3. Attach the connecting arm to the door panel. See Figure 3, Detail C.
4. Install the rear support. See Figure 3, Detail D.
   a. Attach the rear foot mount to the car top. Use the support clips to attach the strut to the mount.
   b. With a level, plumb the face of the drive wheel. Loosen the cap screws inside the door operator frame and adjust the strut nuts up or down in the support struts (as needed).
   c. Tighten all bolts securely.
5. With a level, check the drive arm for plumb. If necessary, space the drive arm from the door with no more than 3/8" (10mm) flat washers.

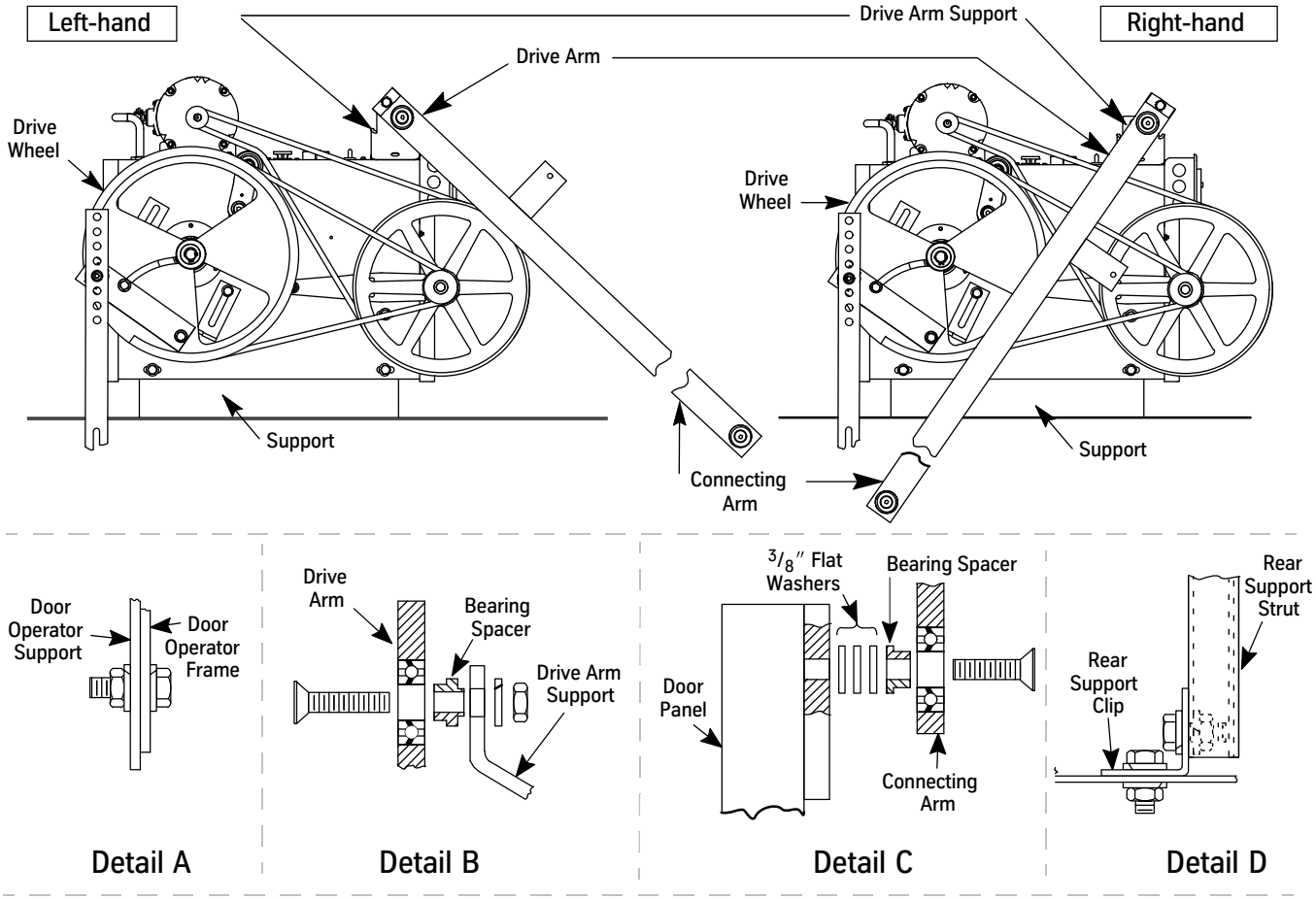


Figure 3 - Mounting the Door Operator

Single and Two-Speed Door Operation
(continued)

Setting the Stroke

Notes:

- The two cap screws securing the intermediate arm to the pivot arm should be loose when setting the stroke.
- Fully Open Position - The point where the doors are flush with or slightly recessed behind the open door jamb.
- Fully Closed Position - The point where the leading edge of the door contacts the door jamb, or in the case of center opening doors, the point where the two leading edges of the doors contact.

1. Place the doors in the Fully Open Position.
2. Measure the distance from **B** to **C** and record this measurement as Door Open (DO). See Figure 4.
3. Place the doors in the Fully Closed Position.
4. Measure the distance from **B** to **C** and record this measurement as Door Closed (DC). See Figure 4.
5. Calculate the stroke using the following formula:

$$\text{STROKE} = \frac{\text{DO - DC}}{2} + 1/8"$$

6. Loosen the two cap screws in the adjustable arm.
7. Move the adjustable arm in the circular slot of the drive wheel so that the distance from **A** to **B** is equal to the calculated stroke length. See Figure 4.
8. Tighten the two cap screws in the adjustable arm.

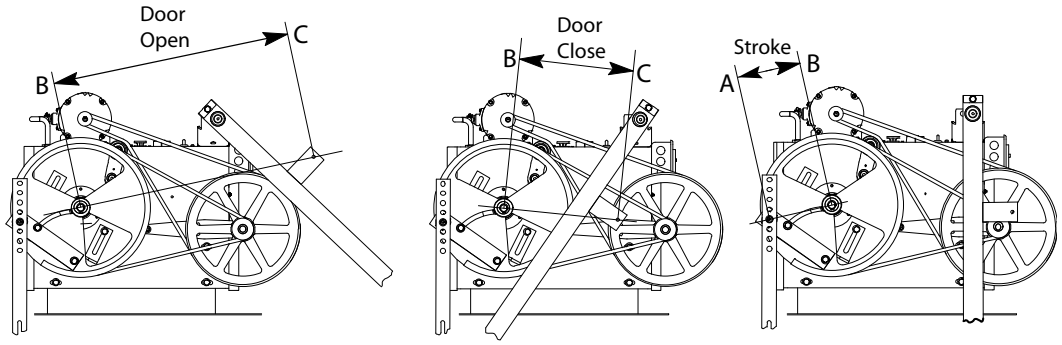


Figure 4 - Door Operator Stroke

Single and Two-Speed Door Operation

(continued)

Adjusting the Drive Arms - See Figure 5 on page 13 for all steps in this procedure.

1. Place the doors in the Fully Open Position.

2. Slide the pivot arm to the end of the slot in the intermediate arm so that the hole in the bearing is exposed.

3. Attach the pivot arm to the intermediate arm through the bearing with a 3/8" (10mm) flathead socket cap screw.

Note: Ensure that the spacer plate is between the two arms, the bearing spacer is installed, and that the doors are still in the Fully Open Position.

4. Align the drive arm and connecting arm in a straight line. Vice grips may be used to hold these two arms in alignment.

5. Maintain the doors in Fully Open Position, and rotate the drive wheel until all three points A, B, and C are in a straight line.

6. Tighten the two cap screws attaching the pivot arm to the intermediate arm.

7. Use a pencil to trace a line along both sides of the adjustable arm on the drive wheel.

Note: This will be the reference mark in the event that the stroke requires further adjustment.

8. Remove the vice grips and move the doors to the Fully Closed Position.

Note: If the doors will not fully close: loosen the two cap screws in the adjustable arm, and reposition the arm toward the outside of the drive wheel in small increments of 1/8" (3mm).

9. Measure the distance from the top of the intermediate arm to the center of the drive wheel. The correct distance for this measurement is 1/2" (13mm) to 1 1/2" (38mm). Ensure that the doors can be opened from the inside per local code. The smaller this diameter, the more difficult it will be to pull the car doors open manually.

   If the measurement is correct - Securely tighten the cap screws in the adjustable arm and the cap screws connecting the intermediate arm to the pivot arm. Proceed to “Setting the Mechanical Stops” on page 14.

   If the measurement is less than 1/2" (13mm) - Loosen the two cap screws in the adjustable arm. Reposition the arm toward the outside of the drive wheel and tighten the two cap screws.

   If the measurement is more than 1 1/2" (38mm) - Loosen the two cap screws in the adjustable arm. Reposition toward the center of the drive wheel and tighten the two cap screws.

   a. Move the doors to the Fully Open Position, and check the alignment of the connecting arm and the three points A, B, and C.

   b. Move the doors to the Fully Closed Position, and measure the distance from the top of the intermediate arm to the center of the drive wheel.

   c. If these measurements are not correct, repeat the adjustment of the arm until the correct operation and measurement is obtained.

Note: Once the stroke has been properly adjusted, check to ensure that the two cap screws in the adjustable arm and the two cap screws holding the pivot arm to the intermediate arm are securely tightened.

Adjusting the Drive Arms
(continued)

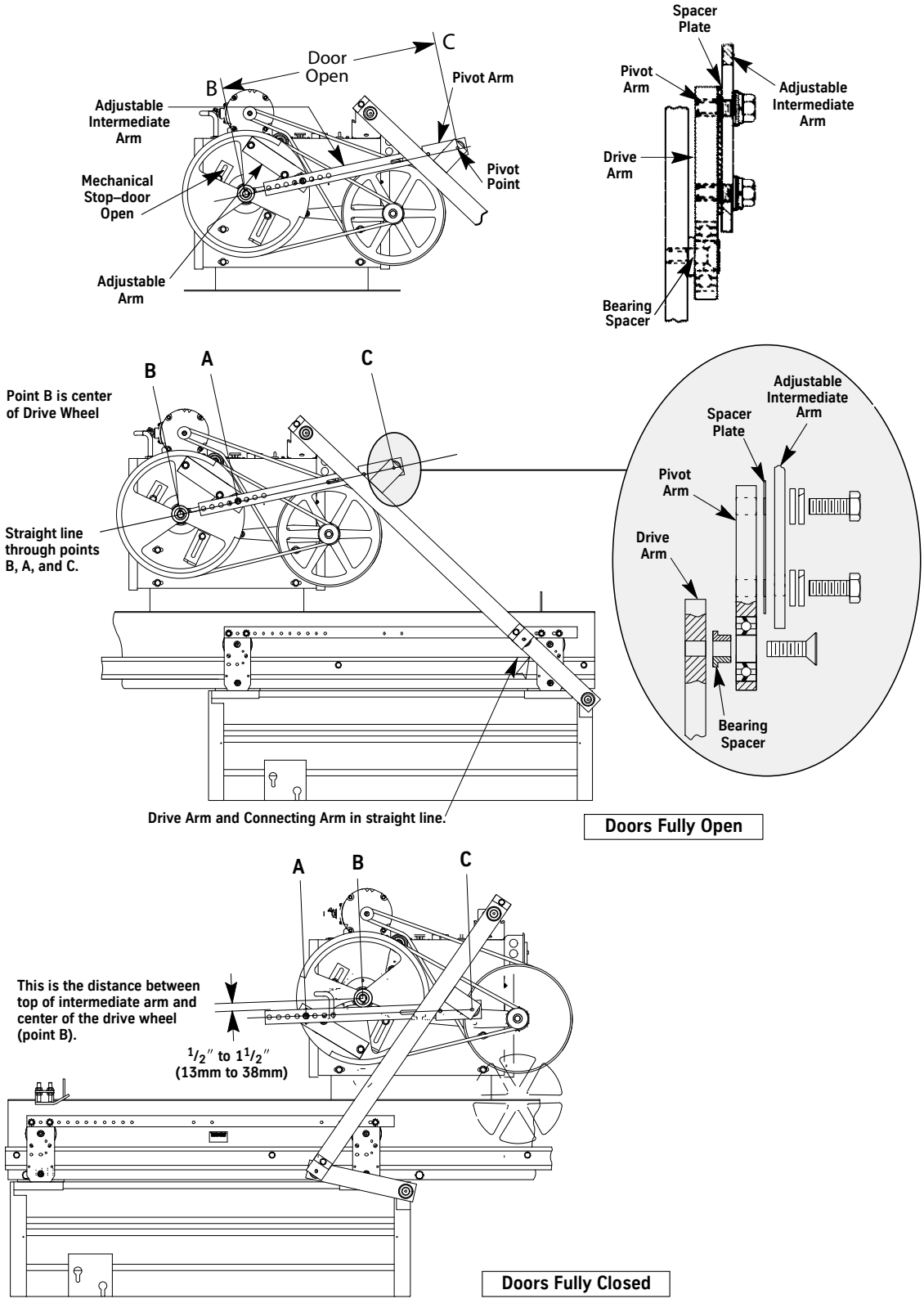


Figure 5 - Adjusting the Drive Arms

Single and Two-Speed Door Operation
(continued)

Setting the Mechanical Stops

1. Move the doors to the Fully Open Position.
2. Position the open mechanical stop 1/8" (3mm) from the inside surface of the drive wheel, and tighten the bolt securely.
3. Move the doors to the Fully Closed Position.
4. Position the closed mechanical stop 1/8" (3mm) from the inside surface of the drive wheel, and tighten the bolt securely.

Center Opening Door Operation (Dual Drive Arm)

Prepare the Door Operator

Note: Installation and adjustment of the door operator is best accomplished from an upper landing. Place the car top at a comfortable working height, and use the landing as a working platform.

1. Turn OFF, Lock, and Tag out the mainline disconnect.
2. Remove the door operator from the shipping carton and crate. Locate and store the bag of parts.
3. Remove the cover from the rear of the operator by loosening the two top screws and the two lower rear screws.
4. Inspect the wiring. Make sure all connections are secure.
5. Loosen the bolts holding the mechanical stops.
6. While observing the shaft containing the cams (inside the operator), rotate the drive wheel.
7. Check and adjust, as necessary, the tension of the 3 V belts between the drive wheel and the jack shaft sheave. See Figure 6.
   a. Loosen the two bolts on the idler arm, and turn the locknut on the adjustment screw (located at the end of the idler arm).
   b. Securely tighten the idler arm bolts and the locknut.

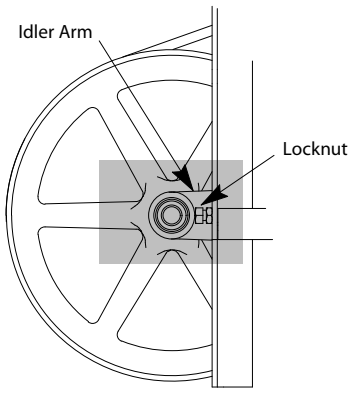


Figure 6 - Locknut Adjustment Screw

Center Opening Door Operation (Dual Drive Arm)

(continued)

8. Check and adjust as necessary the tension on the single V belt between the motor sheave and jack shaft sheave:
   a. Loosen the four motor mounting bolts, and position the motor.
   b. Securely tighten the motor mounting bolts.

Mounting The Door Operator

1. Lift the door operator to the car top.
2. Remove the mounting hardware from the base of the door operator, and set aside.
3. Center the front slots of the mounting base with the slots in the middle of the car header. Install two sets of mounting hardware, and loosely tighten. See Figure 7 on page 16.
4. Use a level to plumb the face of the drive wheel.
5. Match the vertical center line of the drive shaft with the center line of the door opening by adjusting the door operator sideways. Tighten the front mounting hardware. See Figure 7 on page 16 and Figure 9 on page 18.
6. Place the doors in the Fully Closed Position.
7. Check all dimensions shown in Figure 9. Adjust dimensions M, N, and P as necessary.
8. Attach the drive arm assembly to the pivot bearing (located on the car header). See Figure 8 on page 17.
9. Position the connecting arm to point away from the door operator, and attach the door tap plate to the door panel. See Figure 8 and Figure 9.
10. Attach the adjustable arm to the drive wheel bar. See Figure 8.
11. Connect the adjustable arm to the drive arm. See Figure 8.
12. With a level, check the drive arm for plumb. If necessary, space the drive arm from the car header with 5/8" (10mm) flat washers. See Figure 8.
13. Repeat Step 8 through Step 12 on the other arm.
14. Match drill 9/16 holes in the car top with the slots in the door operator mounting base. See Figure 7.
15. Install two other sets of mounting hardware and tighten.

Setting the Mechanical Stop

1. Move the doors to the Fully Open Position.
2. Position the open mechanical stop 1/8" from the inside surface of the drive wheel, and securely tighten the bolt.

Center Opening Door Operation (Dual Drive Arm)

(continued)

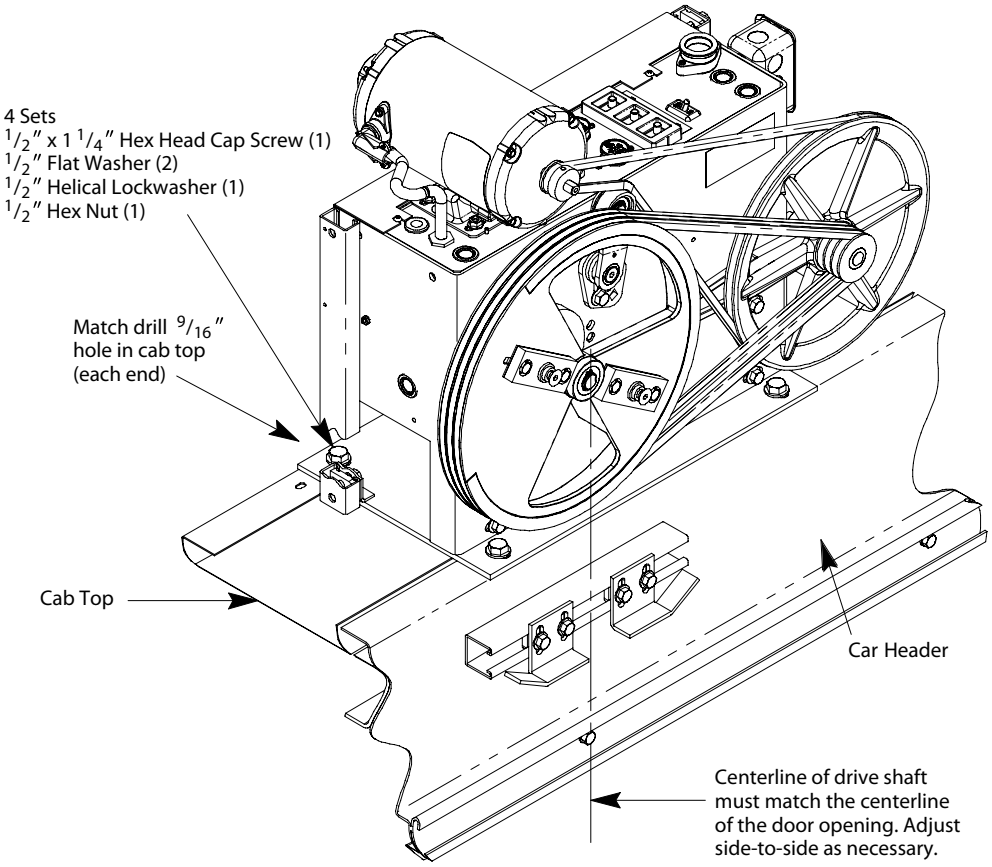


Figure 7 - Mounting the Door Operator (1 of 3)

Center Opening Door Operation (Dual Drive Arm)

(continued)

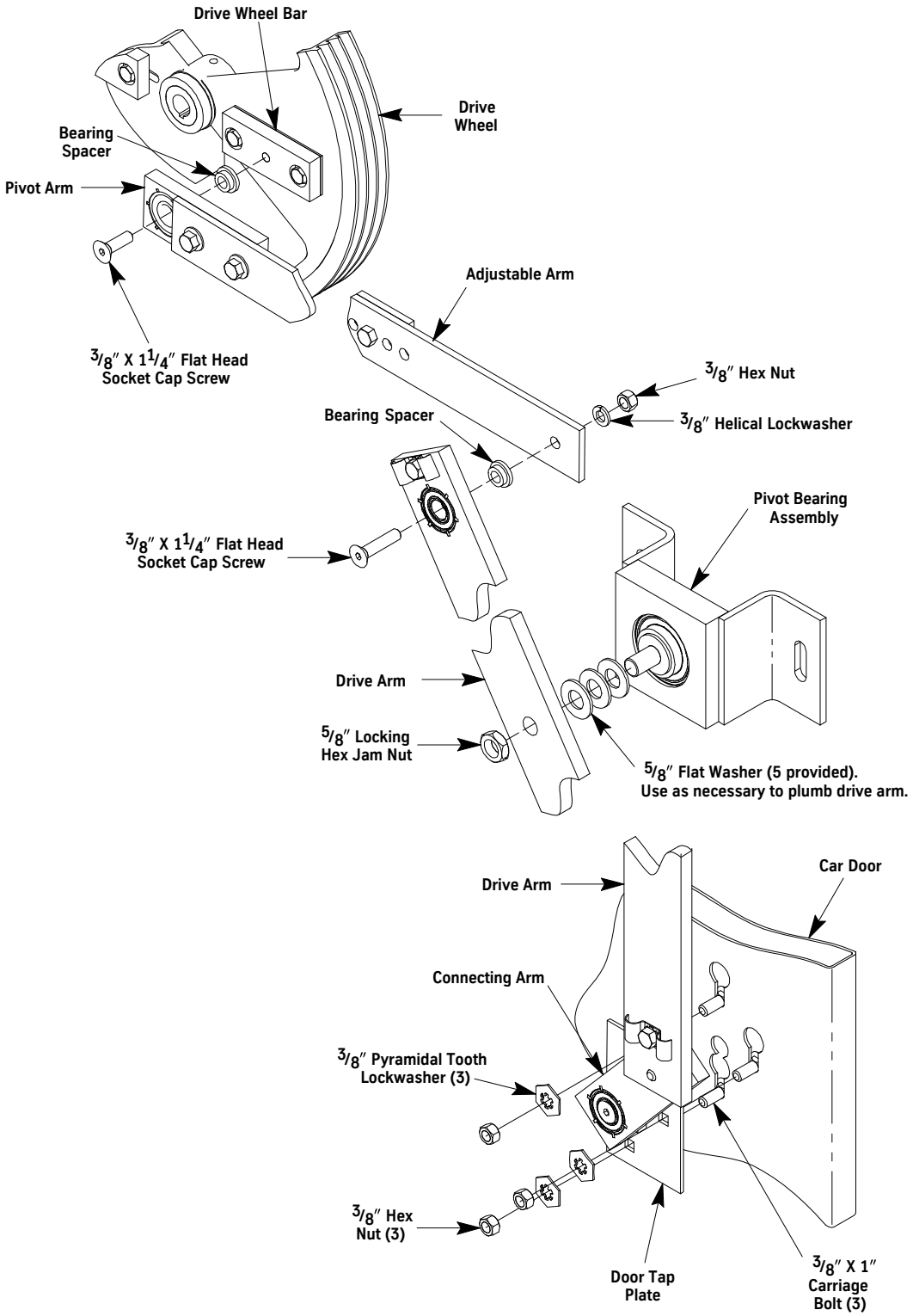
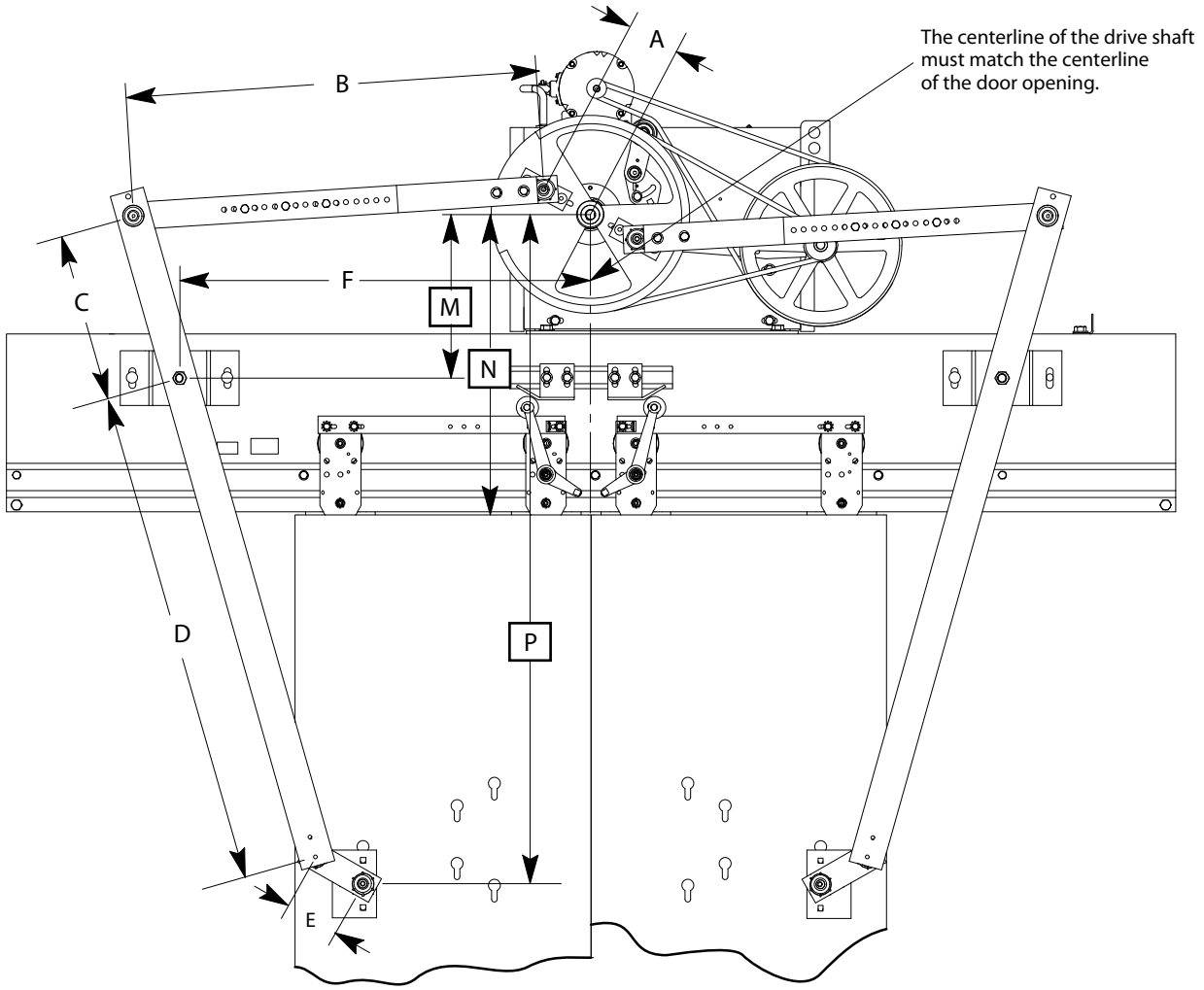


Figure 8 - Mounting the Door Operator (2 of 3)

Center Opening Door Operation (Dual Drive Arm)

(continued)



Note: Corresponding dimensions on each side are equal.

Door Opening	Cab Height	Set at Factory						Field Adjusted		
		A	B	C	D	E	F	M	N	P
7′ 0″ x 42″	8′ 0″	3.875	30.250	12.375	41.250	4.0	30.250	12.0	23.0	52.750
7′ 6″ x 42″	8′ 6″	3.875	30.250	12.375	41.250	4.0	30.250	12.0	23.0	52.750
8′ 0″ x 42″	10′ 6″	3.875	30.250	15.0	50.0	4.0	30.250	14.625	35.0	64.750
8′ 0″ x 42″	10′ 8″	3.875	30.250	16.875	56.250	4.0	30.250	16.625	43.0	72.750
8′ 0″ x 48″	9′ 6″	4.250	31.750	13.875	46.250	4.0	31.750	13.375	29.0	58.750
8′ 0″ x 48″	9′ 8″	4.250	31.750	14.250	47.50	4.0	31.750	13.750	31.0	60.750
9′ 0″ x 48″	10′ 0″	4.250	31.750	12.750	42.50	4.0	31.750	12.250	23.0	53.750
9′ 0″ x 48″	10′ 2″	4.250	31.750	13.50	45.0	4.0	31.750	13.0	25.0	56.750
NOTE: For combinations of door sizes and cab heights not shown, please see job specific drilling templates.										

Figure 9 - Mounting the Door Operator (3 of 3)

Electronic Setup and Adjustment

IMS 2.2 or greater is required for these adjustments. See “Use of the Door Smart FAST” on page 27 for the following procedures.

CAUTION The configuration done by the factory uses adjustment and parameter values that are different from the default values shown in the *Diagnostics* section.

Preparation

1. Turn OFF, Lock, and Tag out the mainline disconnect.
2. Route the door operator harness to the swing return, and connect the harness connectors to the appropriate connectors on the car wiring interface card.
3. If required, connect the safety edge cables to the safety edge box.

Note: On jobs with both front and rear doors, adjust front and rear door operators separately.

4. Unplug the door motor connector (CON10) from the door card.
5. Turn ON the mainline disconnect.
6. Place the car on Inspection Operation.
7. Verify that the VBUS and WD LEDs on the door card are ON.

Note: If LEDs are not ON, refer to the *Troubleshooting* section.

8. In the Door Smart FAST, check that the value of DCM = 0 for a 1/2 HP AC motor.

Note: If the DCM value is not correct, STOP and obtain a disk with the proper door operator profile. See “Upload the Door Operator Profile” on page 39.

Limit Setting

1. Turn OFF, Lock, and Tag out the mainline disconnect.
2. Reconnect CON10.
3. Manually move the door to the Fully Closed Position, noting which direction the cam shaft rotates. See Figure 10.
4. Loosen DCL and DOL Cams, and rotate them until their magnets face the door card.
5. Loosen the door card mounting bracket screws.
6. Slide the door card and bracket toward or away from the DCL and DOL Cams until there is 1/8" between the card and the cams. The card MUST be square with the DCL and DOL Cams.

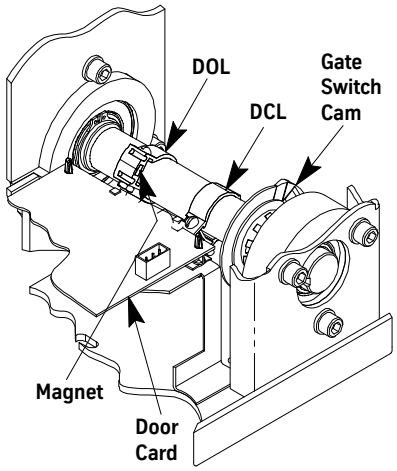


Figure 10 - Door Operator Cams

Limit Setting
(continued)

7. Tighten the door card mounting bracket screws.

8. Slide the DCL and DOL Cams to align the center of their magnets with the center of their respective magnetic sensors at the edge of the door card.

9. Ensure that the door configuration jumpers on the door card are installed per Table 1. See Figure 11 on page 21 for locations.

10. Turn ON the mainline disconnect.

WARNING **To prevent automatic movement of the door while adjusting limit switches, place the elevator on Inspection Operation.**

11. Rotate the DCL Cam in the same direction that the cam shaft rotated in Step 3 until the DCL LED just turns ON. Tighten the set screw.

12. Move the door to the Fully Open Position, noting which direction the cam shaft rotates.

13. Rotate the DOL Cam in the same direction the cam shaft rotated in the previous step until the DOL LED just turns ON. Tighten the set screw.

Jumper	Jumper Setting/Position	Description
JP1	Jumper on 1 and 2 (default)	Selects the DSP to run as a microcontroller. Factory Use Only.
	Jumper on 2 and 3	Selects the DSP to run as a microprocessor. Factory Use Only.
JP2	Jumper on 1 and 2	Provides +5 VDC programming voltage for the DSP core FLASH. Factory Use Only.
	Jumper on 2 and 3	Removes +5 VDC programming voltage to the DSP core FLASH. Factory Use Only.
JP3*	On	Selects Zmodem Mode for uploading new s/w. Field Selectable.
	Off	Selects Normal Mode for running. Field Selectable.
JP4*	On (default)	Selects Rear Door Mode for receiving rear door commands. Field Selectable.
	Off	Selects Front Door Mode for receiving front door commands. Field Selectable.
JP5*	On	Selects RS485 Communication Link Mode. (Door Parameters D12 and D13=8) Field Selectable.
	Off	Selects CAN Communication Link Mode. (Door Parameters D12 and D13=7 or 9) Field Selectable.
JP6*	On	Selects 100K baud for CAN communication link. (JP6 ON for ISIS 1) (Door Parameters D12 and D13=9) Field Selectable.
	Off (default)	Selects 50K baud for CAN communication link. (JP6 OFF for TAC 50/03 and TAC 50/04) (Door Parameters D12 and D13=7) Field Selectable.
* Must push reset to take affect.		

Table 1 - 6300PA4 Door Operator Card Configuration Jumpers

Limit Setting
(continued)

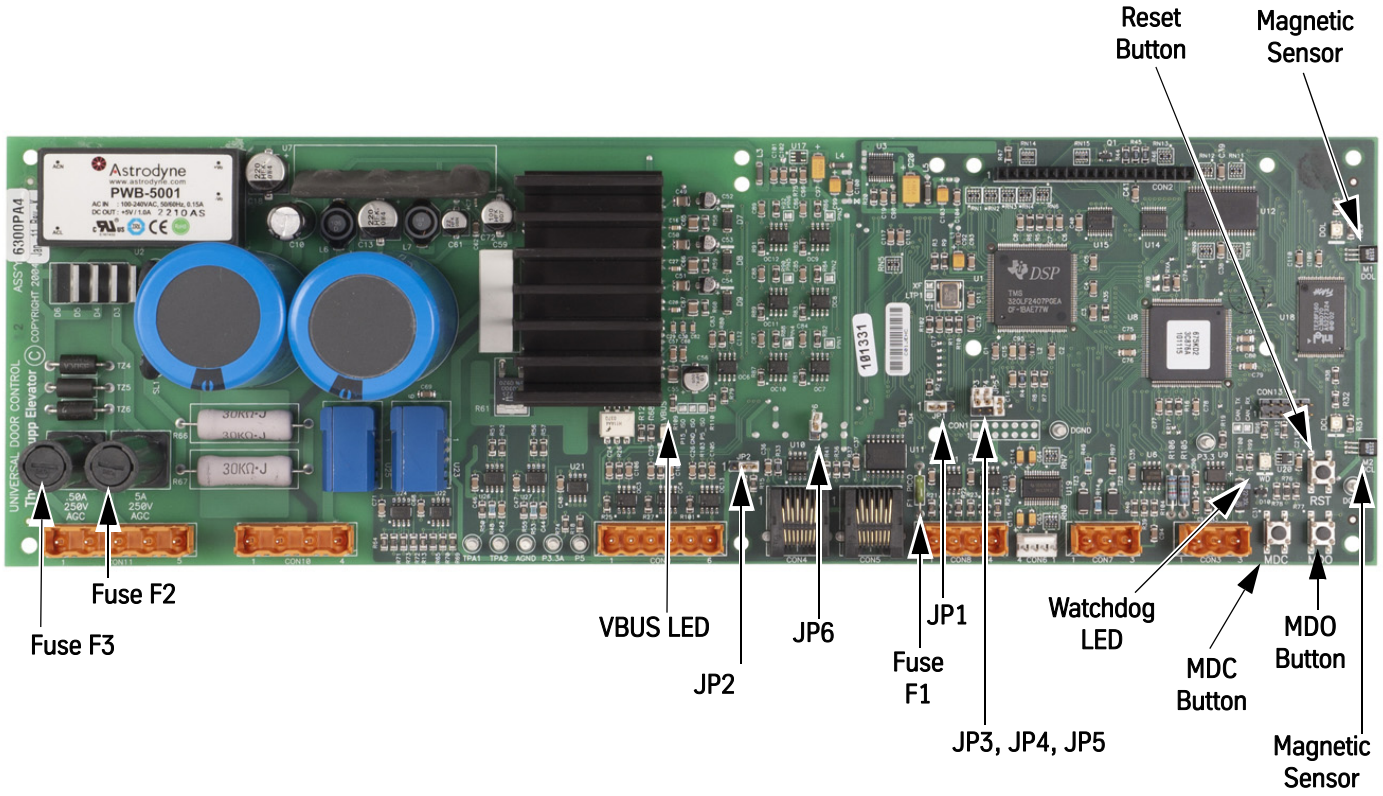


Figure 11 - 6300PA4 Door Operator Card

Direction Check

WARNING **To prevent automatic movement of the door while adjusting limit switches, place elevator on Inspection Operation.**

1. Check DOL and DCL limits:
   a. Press and hold MDO on the door card to open the doors. Verify that the doors open fully and the DOL LED turns ON.
      - If the doors move in the open direction, continue with Step 1b.
      - If doors do not move in the open direction, change the value of LHO, save the value, and press Reset on the door card. Repeat Step 1a.

CAUTION **Do not change motor leads or encoder wires.**

   b. Press and hold MDC on the door card to close the doors. Verify that the doors close fully and the DCL LED turns ON.

Auto Null

1. With the car on Inspection Operation, bring the doors to rest. Position is not important.
2. In the Door Smart FAST, view and record the values of the ADC0 and ADC1 parameters.
3. In the Door Smart FAST, select the ANL (Autonull) Command from the Command pull-down menu.

Note: The Autonull operation takes 1 to 2 seconds, but there will be no confirmation message. View the ADC parameter values to determine whether they have been changed.

4. Save the autonull parameters to FLASH by selecting Save.

Door Scan

1. With the car on Inspection Operation, make sure the doors are Fully Closed or Fully Open.
2. In the Door Smart FAST, select the LTR (Learn Travel) Command from the Command pull-down menu.
3. Press and hold MDO OR MDC until the doors travel the full width of the opening and the DOL or DCL LED turns ON.
4. Save Door Scan to Flash by selecting Save.

Profile Adjustments

Doors should perform well with default settings. However, if changes to the performance are required, see the *Diagnostics* section for more information on the adjustments.

1. Make sure the car is on Inspection Operation.
2. In the Door Smart FAST, select the Cycle Mode Command from the Command pull-down menu.
3. Adjust the delay time at each limit by changing the value of CDT (Door Control Adjustment). Some delay at the door close limit is necessary to allow other adjustments to be changed.

Note: Some adjustments cannot be changed with the doors in motion. If not using the cycle mode with a delay, make adjustment changes only when the doors are at rest.

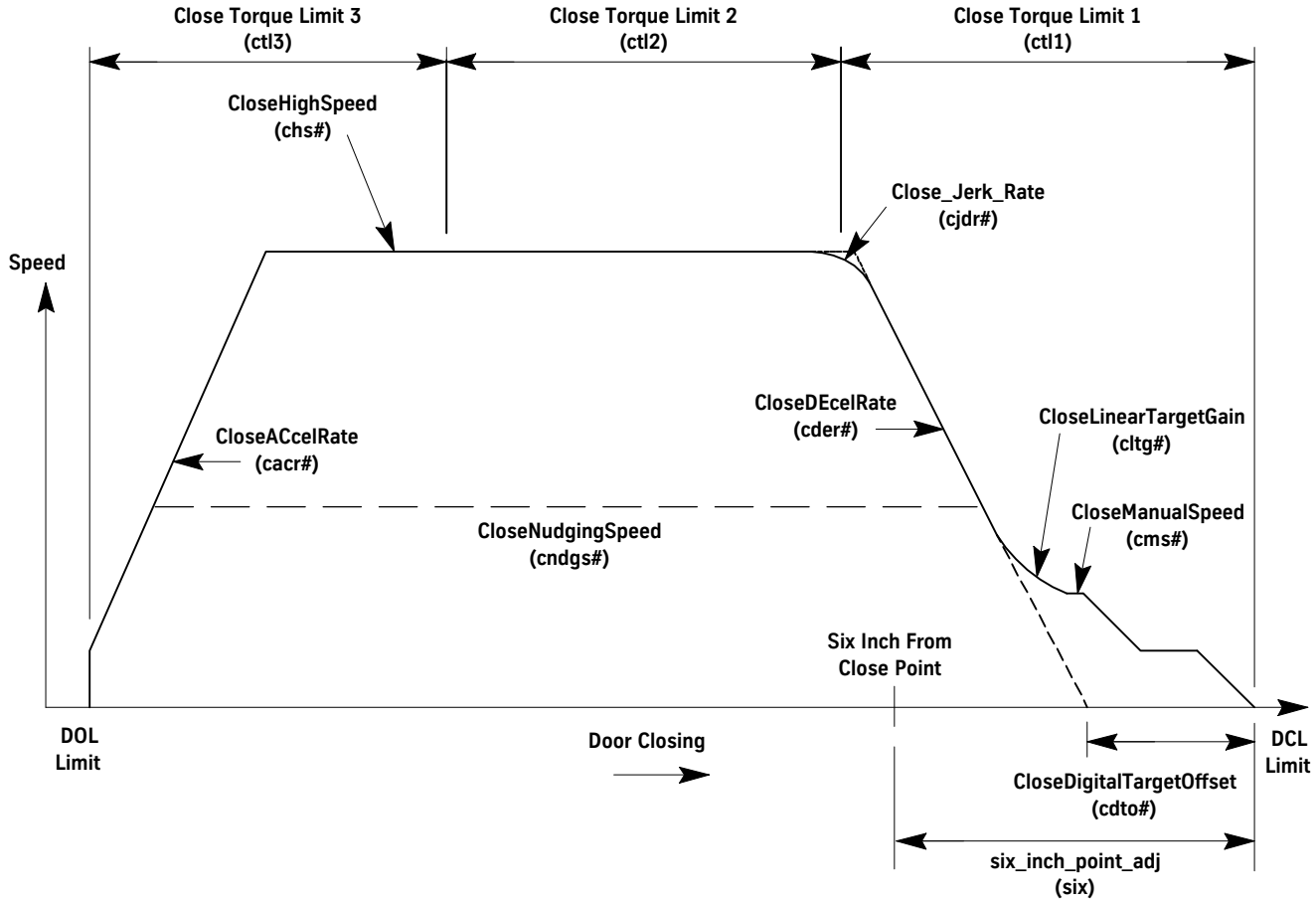
4. Place the car at the appropriate landing that will use the profile to be adjusted.

CAUTION

To avoid mechanical damage to the doors when increasing Open and Close High Speed, do NOT make drastic changes.

5. Right-click anywhere in the Door Smart FAST grid, and select the appropriate profile from the pop-up menu. The adjustment values for the selected profile are displayed.
6. Make the necessary adjustments. After each adjustment change, press Enter. See Figure 12 on page 23 and Figure 13 on page 24 for Door Open and Door Close Profiles.
7. Save any adjustment changes to Flash by selecting Save.

Profile Adjustments
(continued)



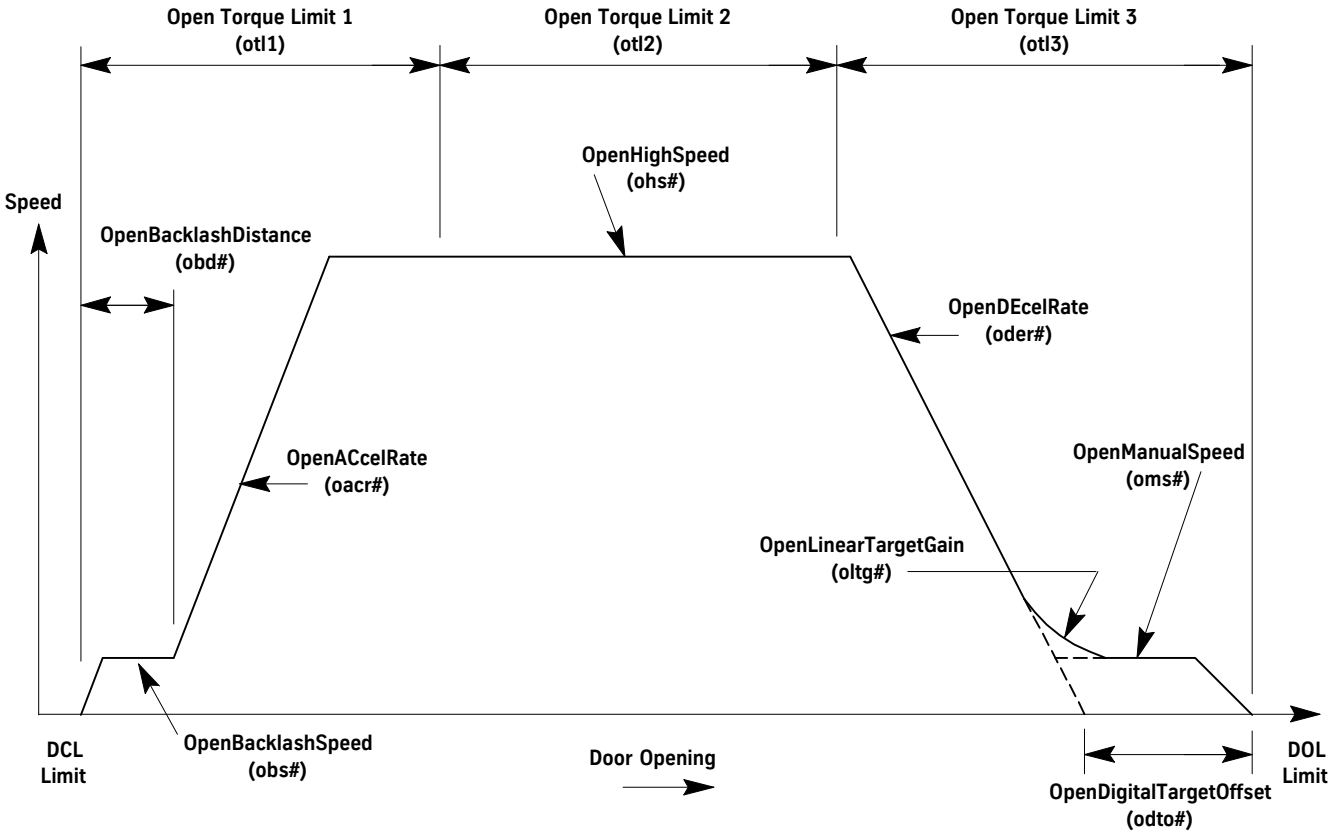
Profile#	Adjustment
cacr#	CloseACcelRate
cbs#	CloseBacklashSpeed
cbt#	CloseBacklashTime
chs#	CloseHighSpeed
cder#	CloseDEcelRate
cms#	CloseManualSpeed
cltg#	CloseLinearTargetGain
cdto#	CloseDigitalTargetOffset
cndgs#	CloseNudgingSpeed

Note: # = Profile Number

Door Adjustment	
ctl1	Close Torque Limit 1
ctl2	Close Torque Limit 2
ctl3	Close Torque Limit 3

Figure 12 - Door Closing Profile

Profile Adjustments
(continued)



Profile#	Adjustment
oacr#	OpenACcelRate
obs#	OpenBacklashSpeed
obd#	OpenBacklashDistance
ohs#	OpenHighSpeed
oder#	OpenDEcelRate
oms#	OpenManualSpeed
oltg#	OpenLinearTargetGain
odto#	OpenDigitalTargetOffset

Note: # = Profile Number

Door Adjustment	
otl1	Open Torque Limit 1
otl2	Open Torque Limit 2
otl3	Open Torque Limit 3

Figure 13 - Door Opening Profile

Closing Force

1. In the Door Smart FAST, note the value of the door adjustment STALL so that it can be set back later.
2. Set the value of STALL to 0.
3. Measure the closing force with a force gauge. The closing force should be less than 30 lbf in the middle one-third of travel. See Figure 14.

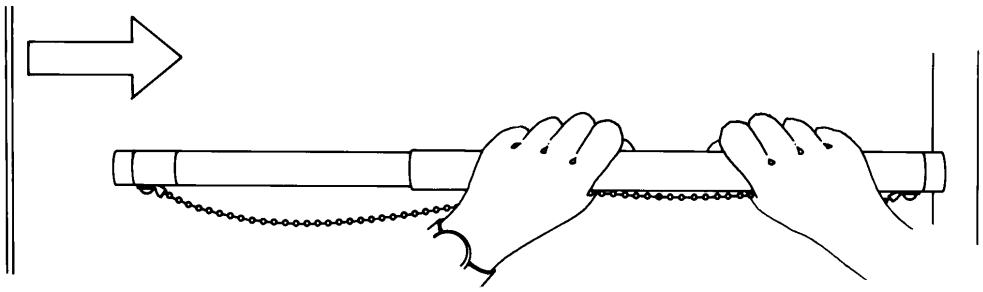


Figure 14 - Safe Use of the Door Gauge

4. If the closing force is too high, reduce the value of Door Adjustment CTL2 and re-measure.
5. Repeat Steps 3 and 4 until the closing force is within limits.
6. Set the value of STALL back to its original value.
7. Save the values to Flash by selecting Save.

Closing Kinetic Energy

1. Place the car at the landing where the test will be performed.
2. Place the car on Inspection Operation.
3. From the Monitor pull-down menu, select the DOOR_trav (Door Travel) parameter and record the value.
4. Use MDC or MDO to move the doors to one of the following positions:

   Center Opening Doors – 1" from Fully Open

   Single Speed Doors – 2" from Fully Open
5. From the monitor pull-down menu, select the POS (Door Position) parameter and record the value.
6. Subtract the POS value (Step 5) from the DOOR_trav value recorded in Step 3.
7. On the Door Adjustment Screen, enter the value from Step 6 into SWM1.
8. Use MDC or MDO to move the doors to one of the following positions:

   Centering Opening Doors – 2" from Fully Closed

   Single Speed Doors – 2" from the face of the strike column

Closing Kinetic Energy
(continued)

9. From the monitor pull-down menu, select the POS (Door Position) parameter and record the value.
10. On the Door Adjustment Screen, enter the value from Step 9 into SWM2.
11. Determine the Minimum Allowable Closing Time from the Door Operator nameplate.
12. Place the car on Automatic Operation.
13. In the Door Smart FAST, select the Stopwatch Closing Time Command from the Command pull-down menu.
14. Press Door Open.
15. If the closing time is less than the minimum allowable closing time specified, reduce the value of Profile# Adjustment CHS# (Close High Speed).
16. Repeat the previous two steps until the closing time is greater than or equal to the minimum.
17. Save any adjustments to Flash by selecting Save.

Setting the Gate Switch

1. Position the doors 1 1/2" from Fully Closed.
2. Rotate the disk in the CLOSE direction until the shorting bar just touches the two leaf contacts. See Figure 15.
3. Locate a tab on the locking ring that lines up with a notch in the contact disk.
4. Rotate the drive wheel until the doors are Fully Closed and ensure that the shorting bar has NOT run past the leaf contacts.
5. Open and close the doors to verify that the gate switch shorting bar enters the leaf contacts at 1 1/2" (38mm) from Fully Closed.

Note: Verify that the shorting bar remains between the leaf contacts in the Fully Closed Position. Be sure that the gate switch leaf contacts do not rub on the thin portion of the plastic disk during normal operation.

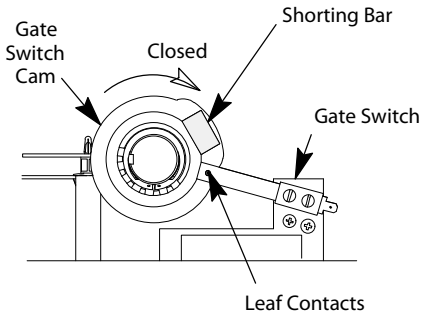


Figure 15 - Gate Switch

Final Security

Recheck all bolts, cap screws, cam hex screws, and belt tensions for proper tightness.

Diagnostics

The Door Smart Fast

Overview of Adjustments, Parameters, and Commands

- All adjustments must be made when the doors are idle.
- Before the card is reset or powered down, save any adjustment changes to FLASH.
- When the adjustment is a speed value:

  Increase the value = The door runs at a faster speed.
  Decrease the value = The door runs at a slower speed.
- When the adjustment is an acceleration or deceleration rate value:

  Increase the value = The door accelerates or decelerates faster.
  Decrease the value = The door accelerates or decelerates slower.
- When the adjustment is a distance or point value:

  Increase the value = The distance or point is further from either the door open limit (DOL) or door close limit (DCL), depending on whether the door is opening or closing.

  Decrease the value = The distance or point is closer to either the door open limit (DOL) or door close limit (DCL), depending on whether the door is opening or closing.
- The door position is stored at 0 on DCL and at Travel (TRV) on DOL.
- Speeds are (+) in the opening direction, and (–) in the closing direction.

IMS Help Files

The most recent information for diagnostics is located in the IMS Help Files on TEnet @:TEnet->Technical Information->Technical Publications->IMS Help Files.

Quick Reference Table

Commands	Parameters					Adjustments				
	Door	Control	Diagnostics	System	CAN	Profile#	Control	Diagnostics	Door	System
ANL	ADC	MCS	TPL1	VER	CEC	OHS#	*IBMO	TPA1	OTL1	LHO
CER	ADC	*PIN0	TPL2		ESR	OMS#	*DBMO	TPA2	OTL2	DCM
CLF	CSC	*PIN1	TPO1		GSR	OACR#	*IBM1	TPM1	OTL3	DCI
CYC	DTG	*PIN4	TPO2		MD	ODER#	*DBM1	TPD1	CTL1	DOI
IEF	DTG	*PIN5	TPS1		RCR	ODTO#	*IBM4	TPM2	CTL2	ELI
LTR	DPI	*POUT	TPS2		TCR	OBS#	*DBM4	TPD2	CTL3	MAL
RST	OSC	*POUT				OBD	*IBM5	*DMO	CLT	LDO
SHD	POS	*POUT				OLTG#	*DBM5	*DZ0	SIX	*FSP
SWC	TRV	*POUT				CHS#	*IIM	*DM1	DIREV	*UPM
SWF	UCV					CMS#	*OIM	*DZ1	STALL	*DRM
SWO	UPE					CACR#	*CDT	*TPL1	ADP	
	UMV					CDER#		*TPL2	*PPR	
	UTQ					CDTO#		*HEX	*IFB	
	UVE					CJDR#			*RPM	
						CLTG#			*LPTC	
						CNDGS#			*ADZ1	
						KPCMD#			*MDC	
						KICMD#			*MNC	
						KDCMD#			*IKP	
						KPFB#			*IKI	
						KDFB#			*IVL	
						‡LAG			*SWM1	
						‡RSC			*SWM2	

= profile number
* = available only when system adjustment MAL = 1
‡ = available only in Profile 1.

Monitor Menu

Command	Name	Definition
Analog to Digital Converter 0	ADC0	Displays the value of analog to digital converter number 0.
Analog to Digital Converter 1	ADC1	Displays the value of analog to digital converter number 1.
CAN Control Error Register	CEC	Displays the value of the control error register.
Close Slip Compensation*	CSC	This value automatically set. Shows amount of belt slip during close door cycle.
Door Profile ID	DPID	Displays the current door profile.
Distance To Go Close	DTGC	Calculated value based on travel and close slip compensation.
Distance To Go Open	DTGO	Calculated value based on travel and open slip compensation.
CAN Error Status Register	ESR	Displays the value of the error status register.
CAN General Status Register	GSR	Displays the value of the general status register.
CAN Mailbox Direction/	MDER	Displays the value of the mailbox direction/enable register.
Open Slip Compensation*	OSC	This value automatically set. Shows amount of belt slip during open door cycle.
Input Parameter 0	PIN0	Use to view the status of the parameters shown in the table.
Input Parameter 1	PIN1	
Input Parameter 4	PIN4	
Input Parameter 5	PIN5	
Output Parameter 0	POUT0	
Output Parameter 1	POUT1	
Output Parameter 4	POUT4	
Output Parameter 5	POUT5	
Door Position	POS	Displays door position in motor revolutions from the door close limit (DCL).
CAN Receive Register	RCR	Displays the value of the receive register.
CAN Transmit Register	TCR	Displays the value of the transmit register.
Door Travel	TRV	Travel value learned when a door scan is performed.
UPID Command Velocity	UCV	Displays the dictated or commanded velocity.
UPID Motor Velocity	UMV	Displays the dictated or commanded motor velocity.
UPID Position Error	UPE	Displays the difference between calculated position and actual position.
UPID Torque	UTQ	Displays the dictated or commanded torque.
UPID Velocity Error	UVE	Displays difference between dictated/commanded velocity and actual velocity.
Software Version/Revision	VER	Displays the version/revision of door operator software.

Command	Name	Definition
Motion Control State Number	MCS	Indicates the current motion control state shown below.
4		Direction Reversal
8		Stop Door
9		Hold Closed
10		Nudge Close
11		Manual Open
12		Manual Close
13		Open Door
14		Close Door
Test Point 1 Long In	TPL1	Displays Long Test Point 1 input variable.
Test Point 2 Long In	TPL2	Displays Long Test Point 2 input variable.
Test Point 1 Out	TPO1	Displays Test Point 1 Voltage Out (above and below 1.5V nominal).
Test Point 2 Out	TPO2	Displays Test Point 2 Voltage Out (above and below 1.5V nominal).
Test Point 1 Short In	TPS1	Displays Short Test Point 1 input variable.
Test Point 2 Short In	TPS2	Displays Short Test Point 2 input variable.
*Do not change this value.		

Command Menu

Note: The most recent information for diagnostics is located in the IMS Help Files on TEnet @:TEnet->Technical Information->Technical Publications->IMS Help Files.

Definition	Name	Command
Instructs the UDC to null the ADCs and DACs.	ANL	Auto Null
Clears any CAN errors.	CER	CAN Error Reset
Clears all of the faults that are no longer active.	CLF	Clear Faults
Will cause the UDC to go into a continuous cycle mode. The delay at each limit	CYC	Cycle Mode
Resets the power module.	IEF	IGBT Error Reset
Places the door operator card in the learn door travel mode.	LTR	Learn Travel
Resets the UDC Card.	RST	Reset
Shuts down the power module.	SHD	IGBT Shutdown
When activated, measures and displays the door closing time between Stopwatch Mark 1 (SWM1) and Stopwatch Mark 2 (SWM2).	SWC	Stopwatch Closing
When activated, measures and displays the elevator flight time between SWM1 and SWM2.	SWF	Stopwatch Flight
When activated, measures and displays the door opening time between SWM1 and SWM2.	SWO	Stopwatch Opening

Profile Adjustments

Notes:

- The most recent information for diagnostics is located in the IMS Help Files on TEnet @:TEnet->Technical Information->Technical Publications->IMS Help Files.
- # = Profile Number
- Several different door operation profiles are available.
- Each profile has adjustments for both Open and Close; The profile adjustments have the same minimum, default, and maximum values.
- Each value may be adjusted for a different purpose.
- Adjustment values can relate to one another only within the same door operation profile.

Definition	Name	Minimum	Maximum	Default
Close Acceleration Rate (RPM/sec)	CACR#	0	3600	1575
Close Deceleration Rate (RPM/sec)	CDER#	0	3600	1575
Close Digital Target Offset (Rev)	CDTO#	-2000	2000	700
Close High Speed (RPM)	CHS#	CMS x adj.	RPM adj. value	735
Close Jerk Rate (RPM/sec^2)	CJDR#	0	8192	3100
Close Linear Target Gain - 1/min	CLTG#	60	3000	130
Close Manual Speed (RPM)	CMS#	0	CHSx adj. value	42
Nudge Close Speed (RPM)	CNDGS#	0	CHSx adj. value	440
Speed Control Derivative Gain*	KDCMD#	0	327.67	0
Speed Feedback Derivative Gain*	KDFB#	0	327.67	0
Speed Control Integral Gain*	KICMD#	0	3276.7	66.7
Speed Command Proportional	KPCMD#	0	327.67	0
Speed Feedback Proportional	KPFB#	0	327.67	10
Profile Lag Compensation (sec)*	LAG	0	0.250	0.150
Open Acceleration Rate (RPM/sec)	OACR#	0	3600	1200
Open Backlash Distance (Rev)	OBD	0	10	1
Open Backlash Speed (RPM)	OBS#	0	OHSx adj. value	5
Open Deceleration Rate (RPM/sec)	ODER#	0	3839	1050
Open Digital Target Offset (Rev)	ODTO#	-2000	2000	0
Open High Speed (RPM)	OHS#	OMSx adj. value	RPM adj. value	820
Open Linear Target Gain (Rev)	OLTG#	60	3000	145
Open Manual Speed (RPM)	OMS#	0	OHSx adj. value	105
Re-open Slip Compensation*	RSC	0	2000	0
* Do Not Change				

Control Adjustments

Note: The most recent information for the diagnostics is located in the IMS Help Files on TEnet @:TEnet->Technical Information->Technical Publications->IMS Help Files.

Definition	Name	Minimum	Maximum	Default
Cycle Delay Time	CDT	0	20	5
De-Bounce Bit Mask 0	DBM0	0	500	100
De-Bounce Bit Mask 1	DBM1	0	255	255
De-Bounce Bit Mask 4	DBM4	0	255	255
De-Bounce Bit Mask 5	DBM5	0	255	255
Invert Bit Mask 0	IBM0	0	255	32
Invert Bit Mask 1	IBM1	0	255	192
Invert Bit Mask 4	IBM4	0	255	0
Invert Bit Mask 5	IBM5	0	255	35
Input Invert Mask	IIM	0	127	127
Output Invert Mask	OIM	0	15	0

Diagnostic Adjustments

Notes:

- These values are for diagnostic purposes and cannot be changed via the UIT.
- The test points have a range of 0V minimum to +3V maximum.
- The test point outputs are based on Equation 1 and Equation 2.
  Equation 1= TP1out = ((TP1in * TPM1) / TPD1) * 0.73mV + 1.5V
  Equation 2 = TP2out = ((TP2in * TPM2) / TPD2) * 0.73mV + 1.5V

Definition	Name	Minimum	Maximum	Default
DAC 0 Multiplier	DM0	0	4095	2048
DAC 1 Multiplier	DM1	0	4095	2048
DAC 0 Offset	DZ0	-1228	1228	0
DAC 1 Offset	DZ1	-1228	1228	0
Values in Hexadecimal	HEX	0	1	0
Test Point 1 Address	TPA1	0	32767	2048
Test Point 2 Address	TPA2	0	32767	2048
Test Point 1 Divider	TPD1	0	32767	0
Test Point 2 Divider	TPD2	0	32767	0
Test Point 1 Length	TPL1	0	1	0
Test Point 2 Length	TPL2	0	1	0
Test Point 1 Multiplier	TPM1	1	32767	1
Test Point 2 Multiplier	TPM2	1	32767	1

Door Adjustments

Note: The most recent information for the diagnostics is located in the IMS Help Files on TEnet @:TEnet->Technical Information->Technical Publications->IMS Help Files.

Definition	Name	Minimum	Maximum	Default
Active Door Profile	ADP*	1	DPL adj. value	1
A/D Digital Zero0	ADZ0*	-8192	8192	0
A/D Digital Zero1	ADZ1*	-8192	8192	0
Closing Torque (%)	CLT	0	25	10
Close Torque Limit 1 (%)	CTL1	0	100 (AC)	20
Close Torque Limit 2 (%)	CTL2	0	100 (AC)	20
Close Torque Limit 3 (%)	CTL3	0	100 (AC)	60
Smooth Turnaround (rpm)	DIREV*	0	500	100
Invert Feedback	IFB*	0	1	0
Current Loop Integral Gain	IKI*	0	6400	375
Current Loop Proportional Gain	IKP*	0	8.0	0.5
Current Loop Voltage Limit	IVL*	10	100	71
Low Pass Time Constant	LPTC*	0	.050	.005
Maximum Drive Current	MDC*	MNC adj. value	6.80	6.79
Motor Field Current	MFC*	0	MNC adj. value	2.50
Motor Nameplate Current	MNC*	MFC adj. value	MDC adj. value	4.4
Motor Poles	MTP*	2	8	6
Open Torque Limit 1 (%)	OTL1	0	100 (AC)	60
Open Torque Limit 2 (%)	OTL2	0	100 (AC)	50
Open Torque Limit 3 (%)	OTL3	0	100 (AC)	25
Encoder Resolution	PPR*	64	2048	500
Motor RPM	RPM*	50	3600	1050
Rated Slip Frequency	RSF*	100	5000	3100
Six Inch Point	SIX	0	15.9	1.0
Stall Velocity	STALL	0	300	50
Stop Watch Mark 1	SWM1*	0	32.767	0
Stop Watch Mark 2	SWM2*	0	32.767	0
*Available only if system adjustment MAL=1.				

System Adjustments

These adjustments will not take effect until the new value is saved to FLASH and the door operator card is reset.

Note: The most recent information for diagnostics is located in the IMS Help Files on TEnet @:TEnet->Technical Information->Technical Publications->IMS Help Files.

Definition	Name	Minimum	Maximum	Default
Discrete Controller Interface	DCI	–	–	0
DC Motor Control Selection	DCM	–	–	1
Discrete Operator Interface	DOI	–	–	0
Door Profile Limit	DPL	1	5	5
Multiple for Slow Clock*	DRM	1	50	4
Electronic Limit Interface	ELI	–	–	0
Sample Frequency*	FSP	250	2500	1000
Linear Door Operator	LDO	–	–	0
Left Hand Operation	LHO	–	–	1
Menu Access Level	MAL	–	–	0
Multiple for Medium Clock*	UPM	1	50	2
*Do not change these values.				

Fault Codes

Access the Door Diagnostics I/O and Fault Window

1. Select the appropriate car from the Control Panel window. See Figure 16.
2. Select Door Diagnostics from the Service menu.
3. Select Front/Rear: I/O and Faults from the Door Diagnostics menu.

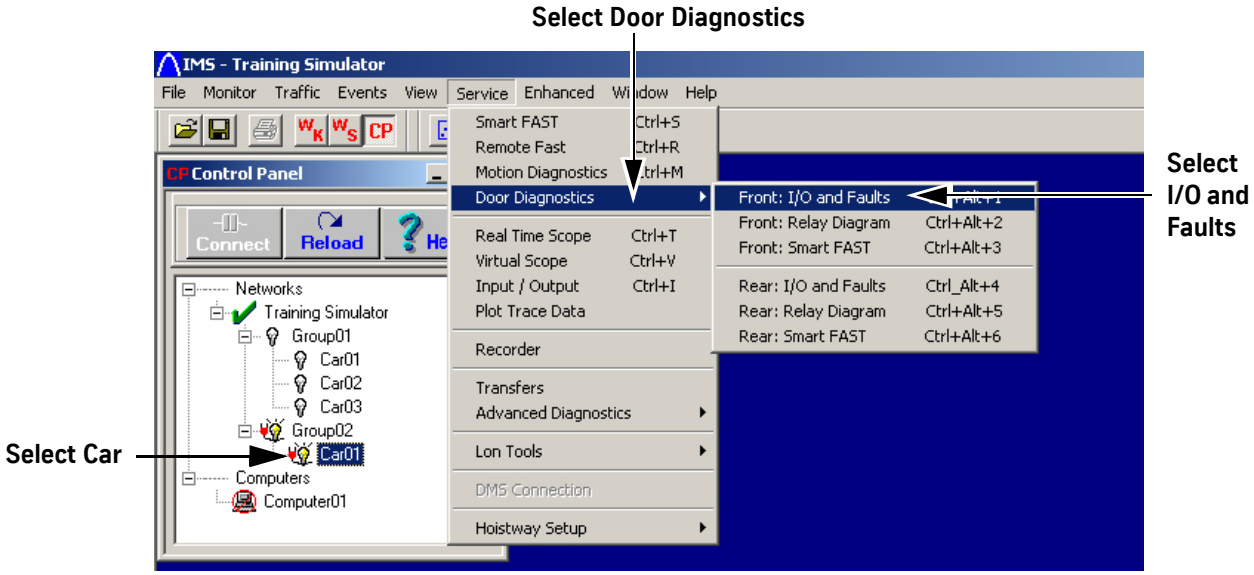
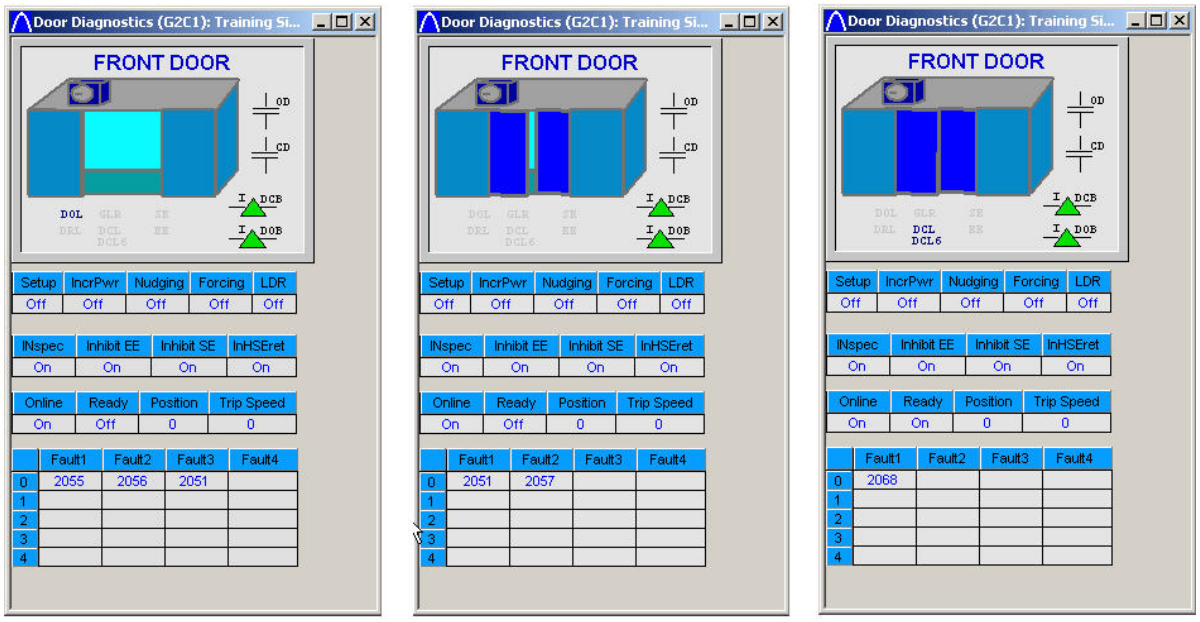


Figure 16 - Access the Door Diagnostics I/O and Fault Window



Fault Codes

Notes:

- The most recent information for diagnostics is located in the IMS Help Files on TEnet @:TEnet->Technical Information->Technical Publications->IMS Help Files.
- IMS 2.2 or greater is required to adjust the door operator or upload door profiles.
- 2000 Series Fault Code = Front Door Operator
  3000 Series Fault Code = Rear Door Operator

Fault Code	Name	Description
2036 / 3036	IGBT FAULT	A defective IGBT.
2050 / 3050	ENCODERFAULT	An invalid encoder count.
2051 / 3051	XS BELT SLIP FLT	Excessive Belt Slip.
2053 / 3053	MOTOR WIRE WRONG	Door timed out, more than 14 seconds, while powering off a limit during a scan.
2054 / 3054	REV ENCODER FLT	—
2055 / 3055	TRAVEL FAULT	An invalid door travel value.
2056 / 3056	OPEN OS FAULT	Door overspeed in open direction with Open Command.
2057 / 3057	CLOSE OS FAULT	Door overspeed in close direction with Close Command.
2058 / 3058	CL RUNAWAY FAULT	Door overspeed in close direction with no Close Command.
2059 / 3059	BUS POWER FAULT	Loss of BUS supply.
2060 / 3060	OP RUNAWAY FAULT	Doors overspeed in open direction with no Open Command.
2061 / 3061	OP OV DRIVE FAULT	Doors overdriven in open direction with Open Command.
2062 / 3062	CL OV DRIVE FAULT	Doors overdriven in close direction with Close Command.
2063 / 3063	IFBK FAULT	Failure to regulate the DC current (only) on DCL.
2064 / 3064	I SERIAL COM FAULT	Failure to receive data from the controller within 5 seconds.
2065 / 3065	I SCALE FAULT	Current adjustments are out of range.
2066 / 3066	DOL DCL FAULT	Both DOL and DCL are on at the same time.
2067 / 3067	DOL FAILURE	The Door Open Limit (DOL) sensor failed to operate after 60 seconds.
2068 / 3068	DCL FAILURE	The Door Close Limit (DCL) sensor failed to operate after 60 seconds.
2069 / 3069	MAX TORQUE FAULT	One or more torque limit adjustments are greater than maximum allowed torque.

Service Information

Record Flight Time

This procedure requires two people - one in the car, and one on top of the car.

1. Place the car at the landing where the test will be performed.
2. Place car on Inspection Operation.
3. Change the value of Door Adjustment SWM1 to 0 (zero).
4. Record the value of Door Parameter TRV.
5. Use MDC or MDO to move the doors to three-quarters Fully Open Position.
6. Record the value of Door Parameter POS.
7. Subtract the POS value from the TRV value, and enter this value in Door Adjustment SWM2.
8. Place the car on Automatic Operation. The doors will close.
9. Select the Stopwatch Flight (SWF) Command from the Command pull-down menu.
10. Press and hold Door Open (located in the car) to open the doors.
11. Enter a car call for the next landing - Up or Down.
12. Release Door Open. The doors will close, and the car will run to the selected car call. When the car makes its run and the doors open, the flight time is displayed.

Note: SWM1 and SWM2 values are retained, without saving, until the Door Operator Power is cycled or the Door Card is reset.

Jumper Settings

If the card is not communicating with IMS, verify that the jumpers are set as shown in Table 2. If not, power down the card, set the jumper(s) to the proper setting, and power up the card.

Jumper	Jumper Setting/Position	Description
JP1	Jumper on 1 and 2 (default)	Selects the DSP to run as a microcontroller. Factory Use Only.
	Jumper on 2 and 3	Selects the DSP to run as a microprocessor. Factory Use Only.
JP2	Jumper on 1 and 2	Provides +5 VDC programming voltage for the DSP core FLASH. Factory Use Only.
	Jumper on 2 and 3 (default)	Removes +5 VDC programming voltage to the DSP core FLASH. Factory Use Only.
JP3	On	*Selects Zmodem Mode for uploading new software. Field Selectable.
	Off (default)	*Selects Normal Mode for running. Field Selectable.
JP4	On	*Selects Rear Door Mode for receiving rear door commands. Field Selectable.
	Off (default)	*Selects Front door mode for receiving front door commands. Field Selectable.
JP5	On (default)	*Selects RS485 communication link mode. Field Selectable. (Door Parameters D12 and D13=8).
	Off	*Selects CAN communication link mode. Field Selectable. (Door Parameters D12 and D13=7 or 9).
JP6	On	*Selects 100K baud for CAN communication link. (JP6 ON for ISIS 1) Field Selectable. (Door Parameters D12 and D13 = 9).
	Off (default)	*Selects 50K baud for CAN communication link. (JP6 OFF for TAC 50-03 and TAC 50-04) Field Selectable. (Door Parameters D12 and D13=7).
*Reset must be pressed for changes to take effect.		

Table 2 - Jumper Settings

Upload Door Operator Software

Upload Generic Software

If the "CHECKSUM FAILURE" Fault has been displayed, the generic software has been corrupted and must be reloaded. In addition, the door operator profile must be reloaded.

1. Upload the latest generic software. Contact Field Engineering to obtain the latest software.

Note: If the door card has been replaced, the latest generic software is already uploaded.

2. Upload the appropriate door operator profile (available in IMS).
3. Turn OFF, Lock, and Tag out the mainline disconnect.
4. Remove CON10 from the UDC card (this action will disconnect the door motor leads).
5. Use a serial cable with a 4-pin connector adapter to connect a laptop with HyperTerminal software to the UDC Card at CON6.
6. Click Start.
7. Select Programs -> Accessories -> HyperTerminal. The Connection Description window opens.
8. Type in a name, such as "FLASH COMM", select an icon, and then click OK. The Connect To window opens.
9. Select the arrow beside Connect Using:, then select COM1 (or the port that will be used) from the list and click OK. The COM1 Properties window opens.
10. Type in the following properties:
    - Bits per second: 38400
    - Data bits: 8
    - Parity: None
    - Stop bits: 1
    - Flow Control: Hardware
11. Click OK. This session will be activated.
12. Select File -> Save.
13. Select File -> Properties. The Properties dialog box opens.
14. Select Settings. Verify the following:
    - The function, arrow, and ctrl keys act as terminal keys
    - The backspace key sends: Ctrl+H
    - Emulation: Auto detect
    - Telnet terminal ID: ANSI
    - Back scroll buffer lines: 500

Upload Generic Software
(continued)

15. Click ASCII Setup, and verify the following:
    - Line delay: 0 milliseconds
    - Character delay: 0 milliseconds
    - The only item checked is “Wrap lines that exceed terminal width”
16. Click OK on both dialog boxes.
17. Select the Transfer pull-down menu, then select Send File.
18. Use the Browse Command to find the correct file, click the filename, and then click Open.
19. Install jumper JP3.
20. Turn ON the mainline disconnect.

Notes:

- HyperTerminal displays the status message "ZMODEM READY." If this message is not shown, replace the door card.
- If more than one minute goes by after turning ON the mainline disconnect and before the transfer starts, the door card will time out and HyperTerminal will display: “ZMODEM FAILED NO FILES REVD.” If this occurs, press Reset (located on the door card). HyperTerminal displays "ZMODEM READY". If not, replace the door card if it has not already been replaced.

21. To start the software upload, click Send in the HyperTerminal screen.
22. When the upload is complete, HyperTerminal displays "ZMODEM READY."

CAUTION **Power to the door card is still ON.**

21. Remove jumper JP3, and press Reset.
22. Turn OFF, Lock, and Tag out the mainline disconnect.
23. Remove the cable from CON6.
24. Reconnect CON10.

Upload the Door Operator Profile

IMS Version 2.2.0.1 (and later) contains the door operator profile information for the different door operator types. To download the correct door operator profile from IMS:

1. Turn OFF, Lock, and Tag out the mainline disconnect.
2. Remove CON10 from the door card to disconnect door motor leads.

CAUTION **The motor leads must be disconnected. If an incorrect door operator profile is loaded with the motor connected, damage to the card or motor may result.**

3. Turn ON the mainline disconnect, and start IMS 2.2.0.1 (and later).
4. Click on the UDC Icon, or from the IMS Menu Bar click Service->Door Diagnostics->Front (or Rear) Door Smart FAST as appropriate. See Figure 17 on page 40.

Upload the Door Operator Profile
(continued)

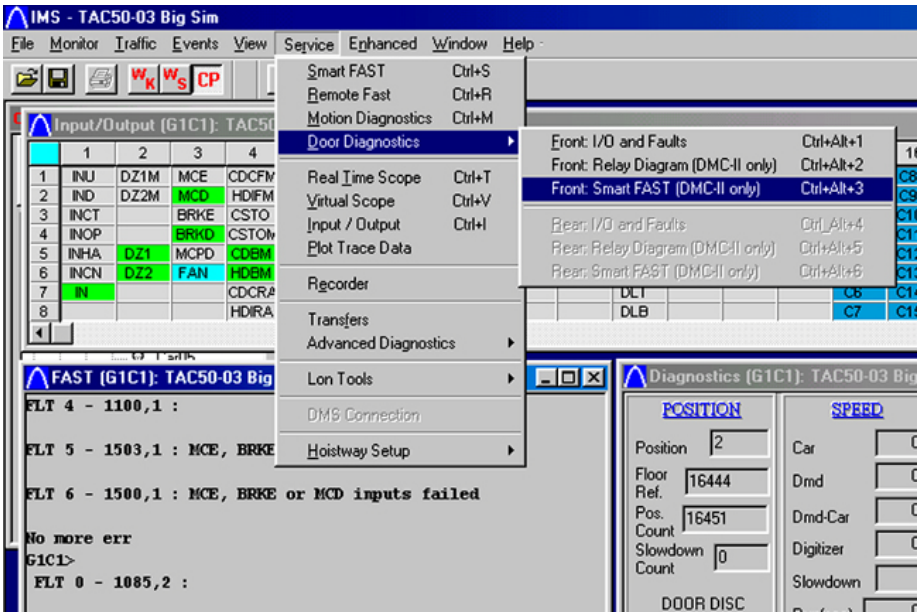


Figure 17 - IMS Window, Service Tab

5. In the Transfer window, click on the chip in the graphic, or select Upload to cause the arrows to point from the computer to the chip. See Figure 18.

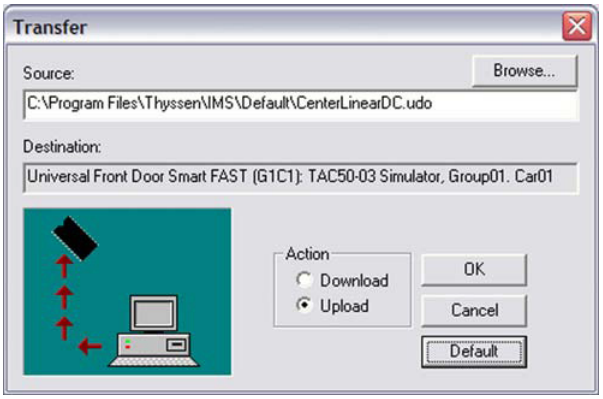


Figure 18 - Transfer Window

6. Click Default. The Open window displays. See Figure 21.

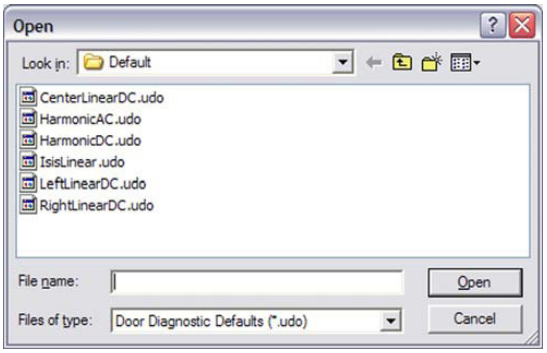


Figure 19 - Open Window

Upload the Door Operator Profile
(continued)

7. Highlight the file that matches the job.
8. Click Open, and the Door Profile Value Screen displays. The values will begin to fill in as they are being loaded (this may take several seconds). See Figure 20.

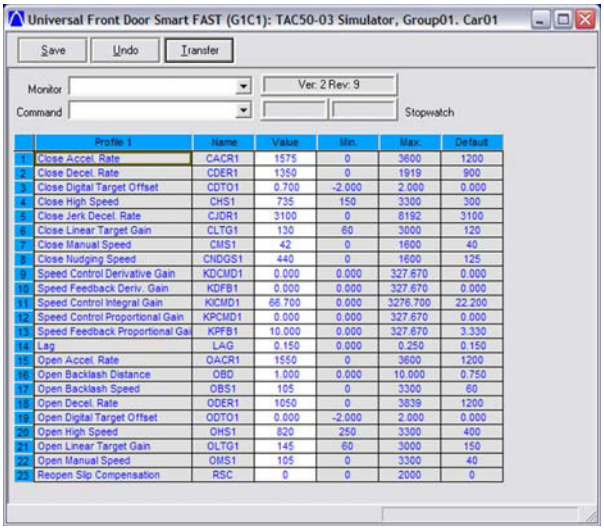


Figure 20 - Door Profile Value Screen

9. Click OK. When all values are filled in, the door operator profile has been successfully loaded.
10. Click Save.

CAUTION

An improper DCM setting could cause damage to the door operator card and/or motor.

11. Verify that DCM is set to 0 (zero) for 1/2 hp AC motor.
12. Turn OFF, Lock, and Tag out the mainline disconnect.
13. Reconnect CON10.
14. Turn ON the mainline disconnect.
15. Verify proper door operation.

Cycle Mode

To help with the adjustment procedure, the Cycle Command is available. This command, when activated, will cause the doors to continuously cycle. The Cycle Delay Time (CDT) adjustment can be used to control the delay time at each limit. Some delay at the door close limit will be necessary to allow other adjustments to be changed.

- To activate the Cycle Command, select CYC from the Command pull-down menu
- To deactivate the Cycle Command, select CYC again.

Restart the IGBT Power Module

The power module can be reset if an over-current circuit condition has caused the power module to send a shutdown signal to the DSP. The power module can only be reset after the fault condition has been cleared. Press Reset on the door card, or select IEF from the Command pull-down menu.

Shut Down the IGBT Power Module

The power module can be shut down by selecting SHD from the Command pull-down menu. This command prevents any motor operation including the manual MDO and MDC functions.

Card Replacement

1. Use IMS to save the door operator profile to a computer file.
   a. In the Front Door Smart Fast window, click the Transfer tab.
   b. Click Download.
   c. Browse to a location for the file and give it a name in the File Name field. See Figure 21.
   d. Click Open.
   e. In the Transfer window, click OK.

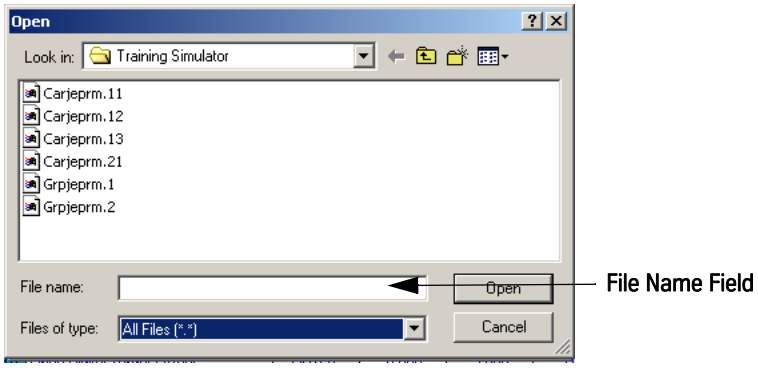


Figure 21 - Transfer Door Profile to Computer File

2. Turn OFF, Lock, and Tag out the mainline disconnect.
3. Unplug all door card connectors.
4. Remove the old door card.
5. Ensure that the door configuration jumpers on the door card are installed correctly. SeeFigure 22 for jumper settings and locations.

Jumper	Jumper Setting/Position
JP1	Jumper on 1 and 2 (default)
	Jumper on 2 and 3
JP2	Jumper on 1 and 2
	Jumper on 2 and 3 (default)
JP3	On
	Off (default)
JP4	On
	Off (default)
JP5	On (default)
	Off
JP6	On
	Off (default)

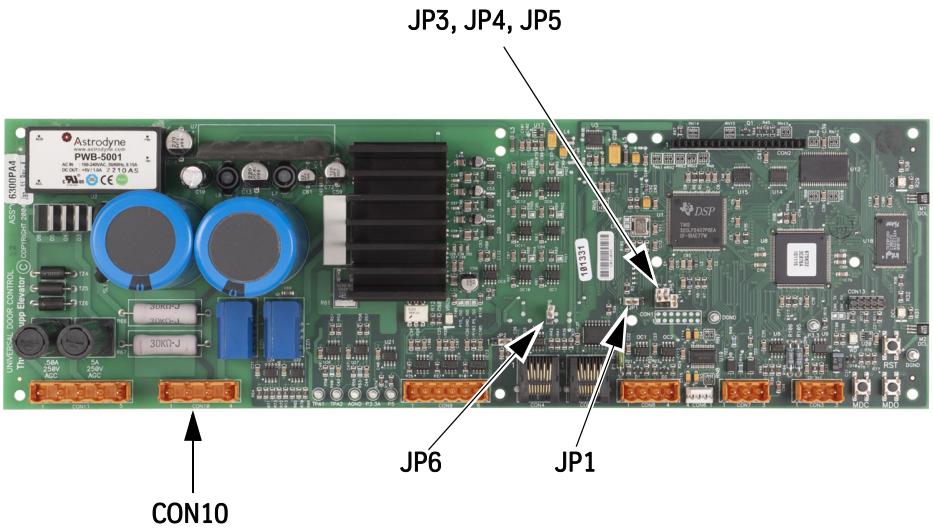


Figure 22 - Door Card Jumpers

Card Replacement
(continued)

6. Install the new door card.
7. Reconnect all connectors except CON10.
8. Turn ON the mainline disconnect.
9. Verify that the VBUS and WD LEDs are ON. If LEDs are not ON, see the *Troubleshooting* Section to correct the problem.
10. Upload the file (saved in Step 1), or upload the correct default Door Operator Profile.
11. Turn OFF, Lock and Tag out the mainline disconnect.
12. Reconnect CON10.
13. Turn ON the mainline disconnect.

Auto Null

1. With the car on Inspection Operation, bring the doors to rest. Position is not important.
2. In the Door Smart FAST, view and record the values of the ADC0 and ADC1 parameters.
3. In the Door Smart FAST, select the ANL (Autonull) Command from the Command pull-down menu.

Note: The Autonull operation takes 1 to 2 seconds, but there will be no confirmation message. View the ADC parameter values to determine whether they have been changed.

4. Save the autonull parameters to FLASH by selecting Save.

Direction Check

WARNING **To prevent automatic movement of the door while adjusting limit switches, place elevator on Inspection Operation.**

1. Check DOL and DCL limits:
   a. Press and hold MDO on the door card to open the doors. Verify that the doors open fully and the DOL LED turns ON.
      - If the doors move in the open direction, continue with Step 1b.
      - If doors do NOT move in the open direction, change the value of LHO, save the value, and press Reset on the door card. Repeat Step 1a.

CAUTION **Do not change motor leads or encoder wires.**

   b. Press and hold MDC on the door card to close the doors. Verify that the doors close fully and the DCL LED turns ON.

Card Replacement
(continued)

Limit Setting

1. Turn OFF, Lock, and Tag out the mainline disconnect.
2. Reconnect CON10.
3. Manually move the door to the Fully Closed Position, noting which direction the cam shaft rotates. See Figure 23.
4. Loosen DCL and DOL Cams, and rotate them until their magnets face the door card.
5. Loosen the door card mounting bracket screws.
6. Slide the door card and bracket toward or away from the DCL and DOL Cams until there is 1/8" between the card and the cams. The card MUST be square with the DCL and DOL Cams.

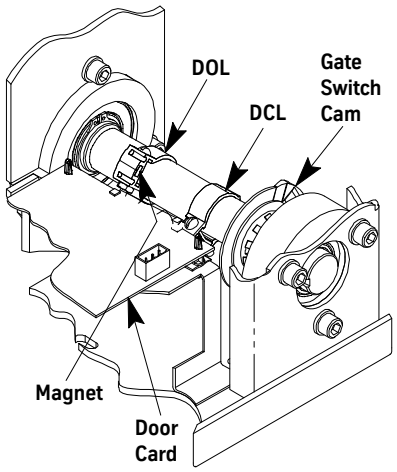


Figure 23 - Door Operator Cams

7. Tighten the door card mounting bracket screws.
8. Slide the DCL and DOL Cams to align the center of their magnets with the center of their respective magnetic sensors at the edge of the door card.
9. Ensure that the door configuration jumpers on the door card are installed correctly.
10. Turn ON the mainline disconnect.

WARNING **To prevent automatic movement of the door while adjusting limit switches, place the elevator on Inspection Operation.**

11. Rotate the DCL Cam in the same direction that the cam shaft rotated in Step 3 until the DCL LED just turns ON. Tighten the set screw.
12. Move the door to the Fully Open Position, noting which direction the cam shaft rotates.
13. Rotate the DOL Cam in the same direction the cam shaft rotated in the previous step until the DOL LED just turns ON. Tighten the set screw.

Card Replacement
(continued)

Door Scan

1. With the car on Inspection Operation, make sure the doors are Fully Closed or Fully Open.
2. In the Door Smart FAST, select the LTR (Learn Travel) Command from the Command pull-down menu.
3. Press and hold MDO OR MDC until the doors travel the full width of the opening and the DOL or DCL LED turns ON.
4. Save Door Scan to Flash by selecting Save.

Note: If a default door operator profile was uploaded, the profile adjustments must be reset. See “Profile Adjustments” on page 22.

Troubleshooting

Power Up Verification

1. Turn OFF, Lock, and Tag out the mainline disconnect.
2. Unplug the connectors from the door card.
3. Turn ON the mainline disconnect.
4. Measure AC voltage on the door operator terminal strip across AC1S and AC2. The voltages should match the voltages in Table 3. If the voltage measured is zero (0), verify the following:
   - The power switch in the door control box is ON.
   - The AC1S switch is ON in the swing return.
   - The connections in the swing return are good.
   - The power is ON at the elevator controller.
   - The fuses in the elevator controller are good.
   - The connections in elevator controller are good.
5. Measure the AC voltage across AC1S and ACG.
   a. If the voltage is in range of 0 and 80 VAC, measure AC2 to ACG.
   b. If AC2 to ACG is in range of 103 and 126 VAC, AC1S and AC2 have been reversed; Reverse AC1S and AC2.
6. With the system still powered Up, measure the DC voltages on the door operator terminal strip across P24 and G24. The voltages should match the voltages in Table 3. If the voltage measured is zero (0), verify the following:
   - The P24 switch in the swing return is ON.
   - The connections in the swing return are good.
   - The power is ON at the elevator controller.
   - The fuses in the elevator controller are good.
   - The connections in the elevator controller are good.

Voltage	Meter Setting	Positive Meter Probe	Negative Meter Probe	Voltage Measured
AC1S	Volts AC	AC1S terminal 6	AC2 terminal 4	103 - 126 VAC
AC1S	Volts AC	AC1S terminal 6	ACG terminal 2	103 - 126 VAC
AC2	Volts AC	AC2 terminal 4	ACG terminal 2	0 - 80 VAC
P24	Volts DC	P24 terminal 17	G24 terminal 20	22 - 26 VDC

Table 3 - Voltage Settings

LED Verification

Note: See Figure 24 on page 48 for all steps in the next two procedures.

1. Turn OFF, Lock, and Tag out the mainline disconnect. Reconnect the connectors on the door card (located inside the door operator).
2. Make sure the doors are in the Fully Closed position.
3. Turn ON the mainline disconnect.
4. Verify that the VBUS and WD LEDs are ON.
   - If the VBUS LED does not come ON, see "Troubleshooting Guide" on page 53.
   - If the WD LED does NOT come ON, see "Troubleshooting Guide" on page 53.
5. Verify that the door is still in the Fully Closed position, and that the DCL LED is ON. If the LED does not come ON, see "Troubleshooting Guide" on page 53.
6. Turn OFF the toggle switch (located in the door operator).
7. Manually move the doors to the Fully Open Position.
8. Turn ON the toggle switch.
9. With the door in the Fully Open Position, verify that the DOL LED is ON. If the LED does NOT come ON, see "Troubleshooting Guide" on page 53.

Power Supplies Check

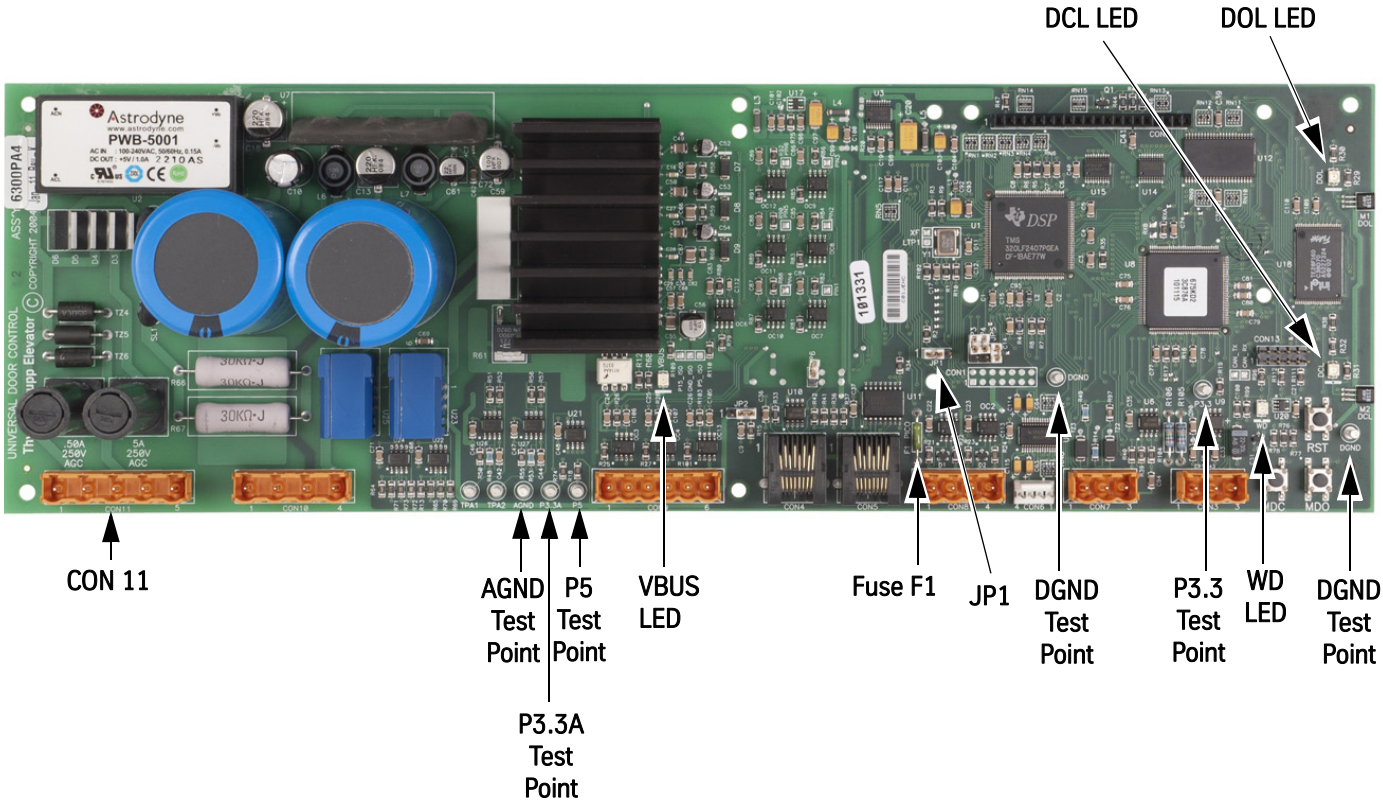
1. Turn the door card ON and measure the voltages at the specified points on the door card. The voltage for each measurement should be in the range noted.

When checking door card power supplies, take great care to avoid electrical shock and/or damage to the door card.

The power supply for the door motor is named V-Buss. The voltage for this power rail is generated from the incoming 115 VAC, and the 115 VAC is rectified and filtered to produce the DC power supply. A VBUS indicator LED is provided on the card.

2. The VBUS LED will indicate whether this power supply is good.
   - If the VBUS LED is not ON, see the "Troubleshooting Guide" on page 53.
   - If 115 VAC is available at CON11, pins 1 and 2, and the VBUS LED is not ON, replace the door operator card.

LED Verification and Power Supplies Check
(continued)



Power Supply	Measurement Locations	Acceptable Voltage Range (VDC)
P5	P5 Test Point to DGND Test Point	4.875 to 5.125
P3.3	P3.3 Test Point to DGND Test Point	3.2 to 3.37
P3.3A	P3.3A Test Point to AGND Test Point	3.2 to 3.4
V-Buss	—	140 to 170

Figure 24 - Door Card Power Supply Check

Checking the Encoder

Perform this check to ensure that the encoder signals are working properly.

1. Before conducting this test, verify that fuse F1 on the door card is good.
2. Use a digital multimeter, and measure the voltage across fuse F1.
   - If the voltage reads higher than 1.5 volts, replace the fuse.
   - If the voltage reads below 1.5 volts, the fuse is good.

The best way to check the encoder signals is with an oscilloscope. If an oscilloscope is not available, use the digital multimeter method.

Oscilloscope Method

Required tool: An oscilloscope with two working channels.

1. Set the vertical channel to 5V/div.
2. Set the horizontal channel to 1uS/div.
3. Connect the ground leads for both channels to the GND test point.
4. Connect the channel A probe to CON8-2 (PHA).
5. Connect the channel B probe to CON8-3 (PHB).
6. Slowly rotate, by hand, the door motor.

Note: PHA and PHB should be 90 degrees out-of-phase, and toggle between 0 to 1 and 4.5 to 5 volts.

If both signals, PHA and PHB, toggle as they should then the encoder is working. The door card may need replacing.

Digital Multimeter Method

Required tool: A digital multimeter set to measure DC volts.

1. Connect the negative lead to the GND test point, and the positive lead to CON8-2 (PHA).
2. Slowly rotate, by hand, the door motor.

Note: The digital multimeter display should toggle between less than 1 volt and greater than 4 volts.

3. Connect the negative lead to the GND test point, and the positive lead to CON8-3 (PHB).
4. Slowly rotate, by hand, the door motor.

Note: The digital multimeter display should toggle between less than 1 volt and greater than 4 volts.

If both signals, PHA and PHB, toggle as they should then the encoder is working. The door card may need replacing.

Wiring Diagrams

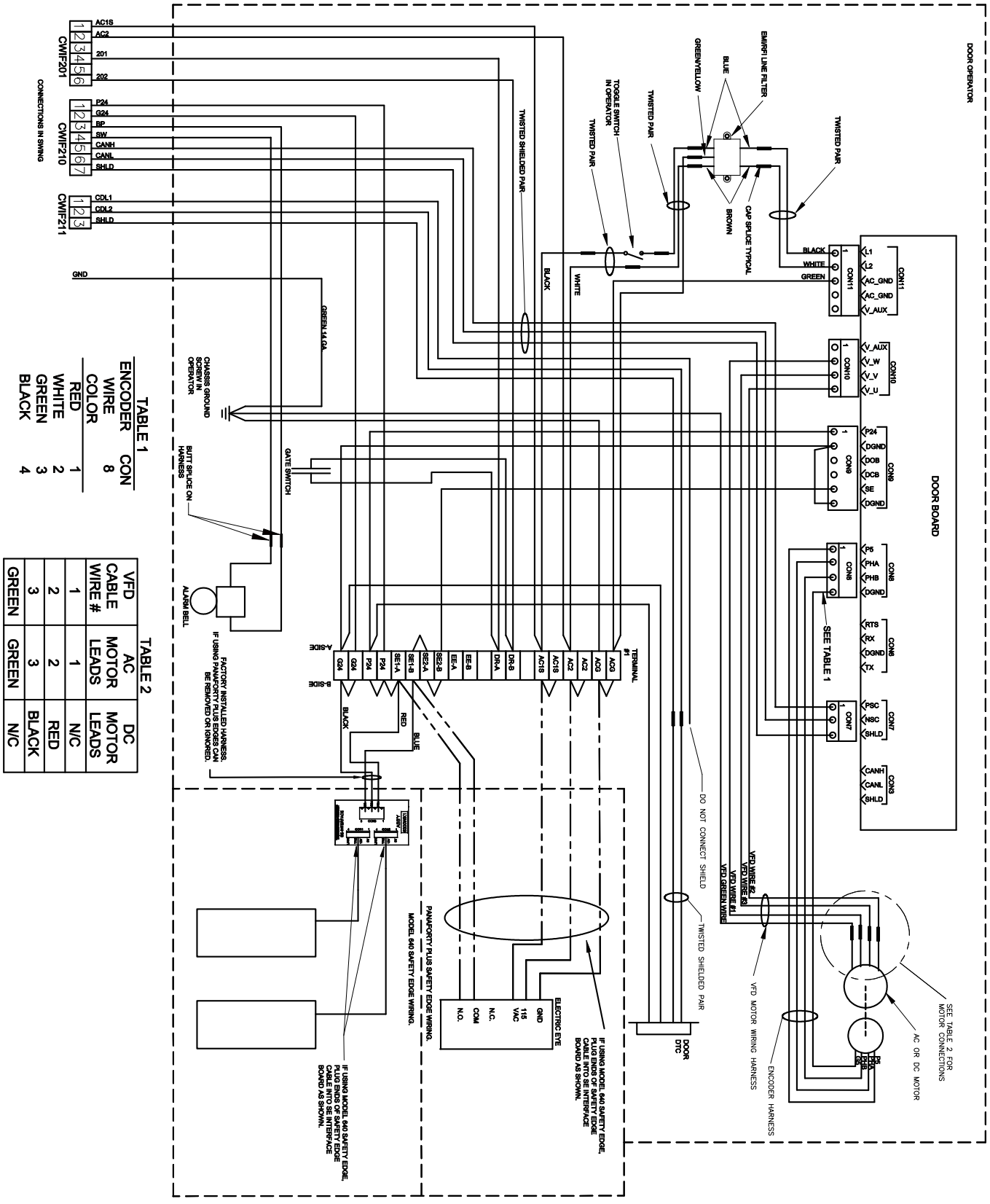


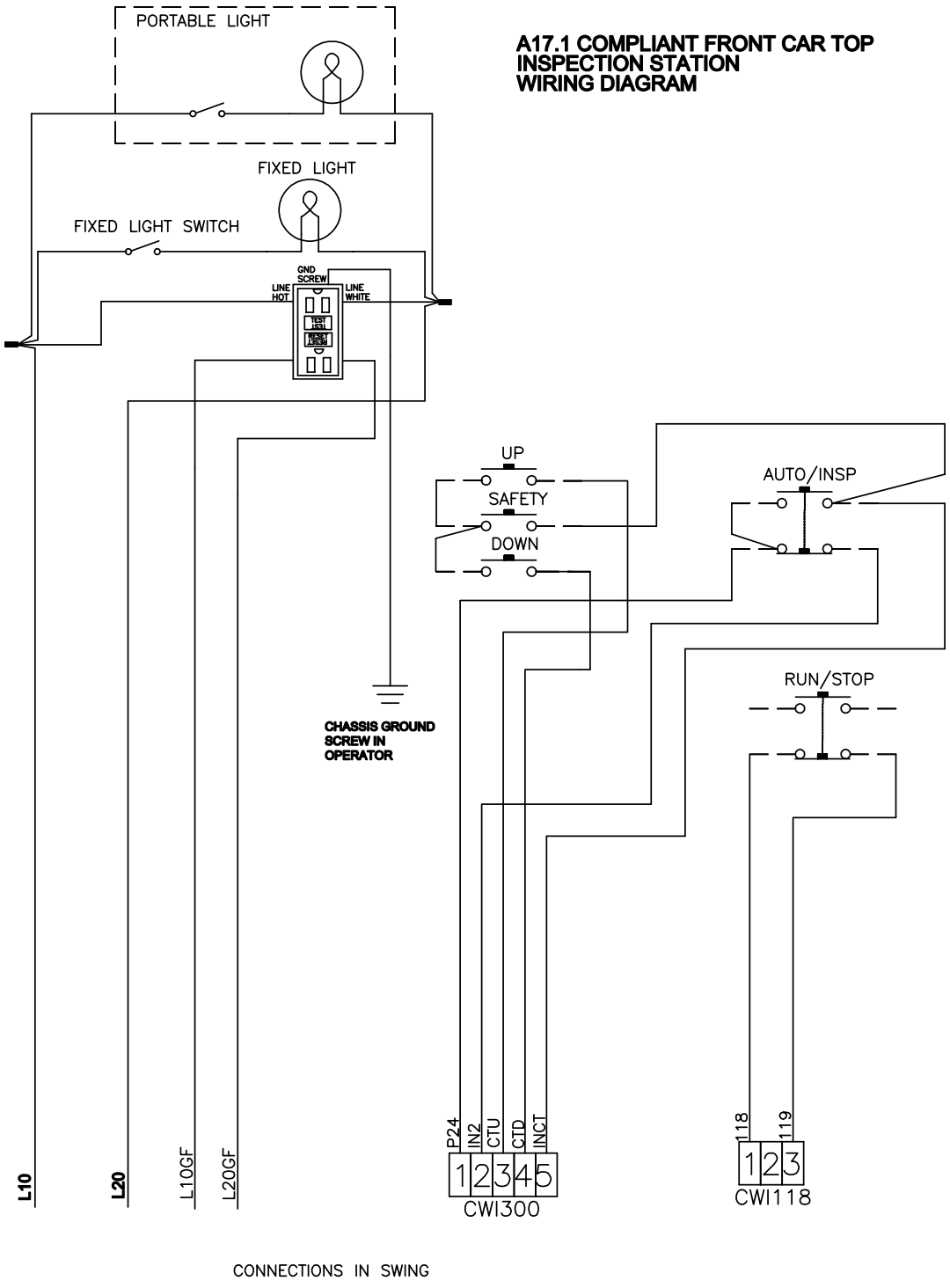
TABLE 1

ENCODER WIRE COLOR	CON 8
RED	1
WHITE	2
GREEN	3
BLACK	4

TABLE 2

VFD CABLE WIRE #	AC MOTOR LEADS	DC MOTOR LEADS
1	1	N/C
2	2	RED
3	3	BLACK
GREEN	GREEN	N/C

Wiring Diagrams
(continued)



Wiring Diagrams
(continued)

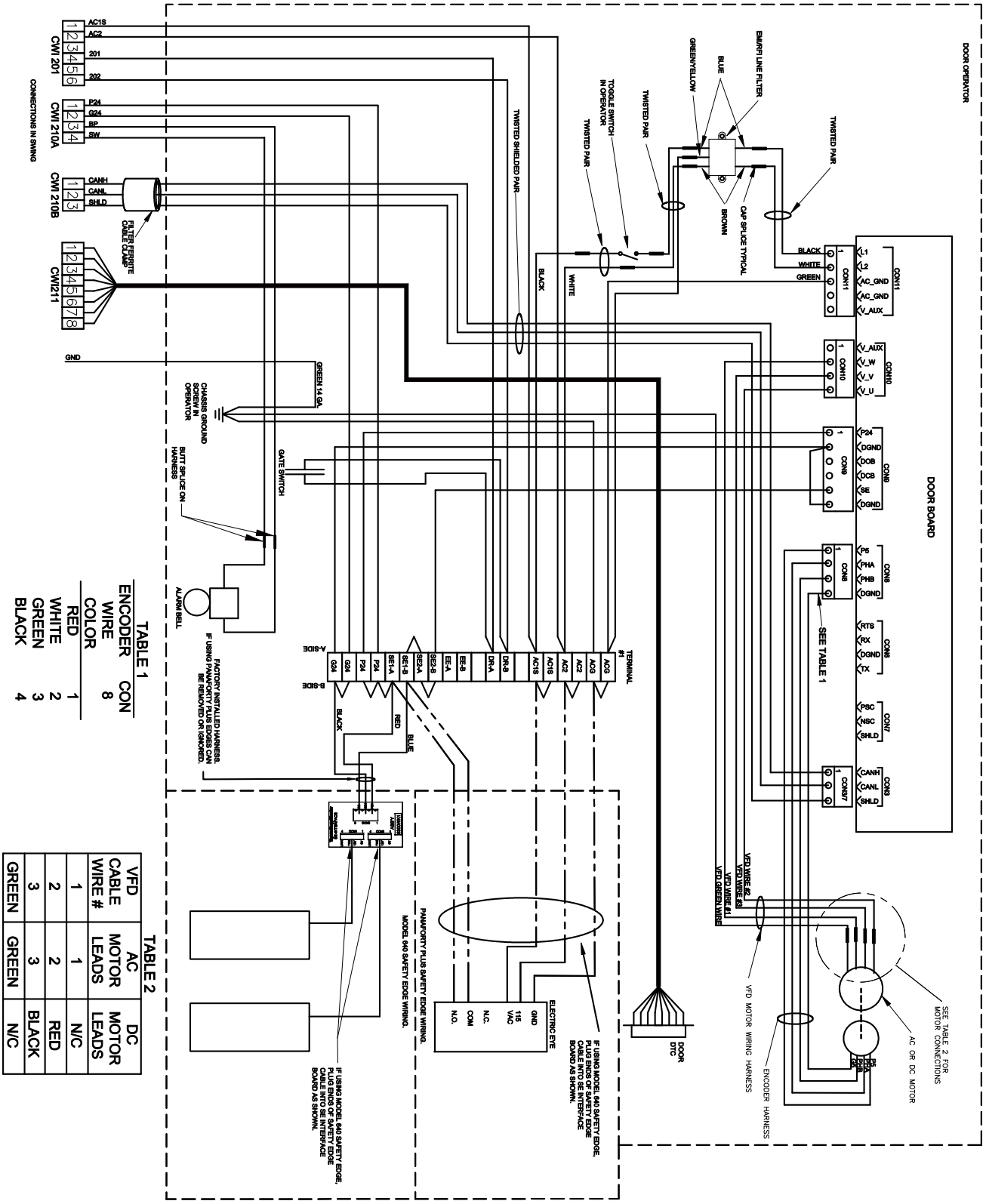


TABLE 1

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2	2	RED
3	3	BLACK
GREEN	GREEN	N/C

Troubleshooting Guide

For assistance, please call 1-866-HELP-TKE.

<table>
<tr><th>Problem</th><th>Possible Causes or Solutions</th></tr>
<tr><td>Doors Run the Opposite Direction When First Powered Up</td><td>1. Change the hand of the operator by changing the LHO adjustment.
2. To verify that the change corrected the problem, press MDO to verify that the doors move in the open direction.
3. Press MDC to verify that the doors move in the close direction.
4. Save this adjustment change to FLASH.</td></tr>
<tr><td>Door Motor Vibrates When Trying to Move the Door</td><td>1. Verify that the proper motor type is selected in the DCM adjustment.
2. Verify that the motor leads are connected per the Motor Connections Chart below.
Note: The motor and encoder connections must match what is shown in the charts below. If any of these connections are not correct, unstable operation will result.
CAUTION
Do not change motor or encoder connections to change door direction. To change door direction, use the LHO Adjustment.
3. Verify that the encoder is connected per the Encoder Connections Chart below.
4. Verify 5 VDC to encoder connector.
• Use a digital multimeter to measure the voltage from CON8-1 to CON8-4. Place the red probe on CON8-1 and the black probe on CON8-4.
• If the voltage reads less than 4.5 volts, check the fuse.
• If the voltage reads above 4.5 volts, check the encoder signals.
5. Verify that the encoder power fuse F1 on the door card is good.
6. Verify that the encoder works.

Motor Connections
<table><tr><th>Connector-Pin</th><th>VFD Cable Wire No.</th><th>AC Motor Leads</th><th>DC Motor Leads</th></tr><tr><td>CON10-2</td><td>1</td><td>1</td><td>no connect</td></tr><tr><td>CON10-4</td><td>2</td><td>2</td><td>Red</td></tr><tr><td>CON10-3</td><td>3</td><td>3</td><td>Black</td></tr><tr><td>GND Screw</td><td>Green</td><td>Green</td><td>no connect</td></tr></table>
Encoder Connections
<table><tr><th>Connector-Pin</th><th>Wire Color</th><th>Signal</th></tr><tr><td>CON8-1</td><td>Red</td><td>P5</td></tr><tr><td>CON8-2</td><td>White</td><td>PHA</td></tr><tr><td>CON8-3</td><td>Green</td><td>PHB</td></tr><tr><td>CON8-4</td><td>Black</td><td>GND</td></tr></table></td></tr>
</table>

Problem (Continued)	Possible Causes or Solutions
Doors Will Not Open to Fully Open Position	1. Verify that the DOL limit is adjusted properly, and that the DOL LED comes ON when the magnet is aligned with the hall-effect sensor. 2. Verify that the mechanical stop is set properly and is not interfering with the open cycle. 3. Verify that the drive arms are setup and aligned properly.
Doors Will Not Close to Fully Closed Position	1. Verify that the DCL limit is adjusted properly, and that the DCL LED comes ON when the magnet is aligned with the hall-effect sensor. 2. Verify that the mechanical stop is set properly and is not interfering with the close cycle. 3. Verify that the drive arms are setup and aligned properly.
VBUS LED Will Not Light	1. Verify that the power switch in the operator is in the ON position. 2. Check for 115VAC across pins 1 and 2 of CON11. 3. Check fuse F2 on the door card; Replace if necessary. 4. Verify that the wires for power (those going to CON11) are securely fastened and in the correct place.
WD LED Will Not Light	1. Verify that power switch in operator that is located on the PC card shelf is in the ON position. 2. Check fuse F3 on the door card; Replace if necessary. 3. Verify that the wires for power (those going to CON11) are securely fastened and in the correct place.
DCL or DOL LED Will Not Light	Note: The DCL or DOL LEDs will not light unless the magnet cam is aligned with the hall-effect sensor on the end of the card. 1. Verify proper alignment of the magnetic limit cam with the hall-effect sensor. If not aligned properly, adjust the magnetic limit cam on the door operator cam shaft. 2. Verify that the DCI, ELI, and LDO adjustments are all set to 0 (zero). 3. Verify that the power switch in the operator is in the ON position. 4. Check fuse F3 on the door card; Replace if necessary. 5. Verify that the wires for power (those going to CON11) are securely fastened and in the correct place.
Doors Will Not Reverse on Safety Edge Activation	1. Verify that the wires for safety edge signal are securely fastened and in the correct connector. The safety edge signal wire goes to CON9-5 on the UDC. 2. Verify that the SE signal return wire (G24) is connected to CON9-6. 3. Verify that the signal is getting to the UDC card. a. Use a digital multimeter to place the black probe on CON9-6 and the red probe on CON9-5. b. Activate the safety edge, and verify that the digital multimeter reads less than 2 volts. The safety edge input is active low. • If the voltage at CON9 is greater than 2 volts, then the wiring in the safety edge enclosure will have to be changed so that the signal goes low when an obstruction is in the doorway. • Setting IBM4 to 0 will invert the active state for the SE Input.
MDO Starts to Open Doors, But Doors Reclose	Verify that the car is on Inspection Operation. The MDO is overridden by a close door command from the elevator controller.
MDC Starts to Close Doors, But Doors Reopen	Verify that the car is on Inspection Operation. The MDC is overridden by a open door command from the elevator controller, or by an active SE signal.

Problem (Continued)	Possible Causes or Solutions
Doors Will Not Set Up	1. Verify that the motor moves the door in the correct direction when MDC or MDO are pushed. 2. Verify that the encoder is connected properly. 3. Verify 5 VDC to the encoder connector. 4. Use a digital multimeter to measure the voltage from CON8-1 to CON8-4. Place the red probe on CON8-1, and the black probe on CON8-4. • If the voltage reads less than 4.5 volts, check the fuse. • If the voltage reads above 4.5 volts, check the encoder signals. 5. Verify that the encoder power fuse F1 on the door card is good. 6. Verify that the encoder works.
Doors Will Not Close After Opening, or Doors Open Without Command and Will Not Close	1. Verify that the SE signal is not active; The SE signal is active low. 2. Use a digital multimeter to place the black probe on CON9-6 and the red probe on CON9-5. 3. Activate the safety edge, and verify that the digital multimeter reads less than 2 volts. **Note**: If the voltage at the CON9 is greater than 2 volts then the wiring in the safety edge enclosure will have to be changed so that the signal goes low when an obstruction is in the door way.
Doors Will Not Move When MDO or MDC Is Pushed	1. Verify that there are no mechanical restrictions or binds. 2. Verify that the IGBT has not been shut down due to a fault. Check faults and follow the instructions for the particular faults that are listed. If the fault listed is the IGBT_FAULT, reset the IGBT power module. 3. If MDO does not work: a. Verify that the car is on Inspection Operation. The MDO is overridden by a close door command from the elevator controller. b. Verify that the DOL limit is not active. If it is active, the doors will not open. If on the DOL limit, move the doors off of the open limit and verify that MDO does cause the doors to open. 4. Verify that the car is on Inspection Operation. The MDC is overridden by an open door command from the elevator controller, or by an active SE signal. 5. If MDC does not work: a. Verify that the DCL limit is not active. If it is active, the doors will not close. If on the DCL limit, move the doors off of the close limit and verify that MDC does cause the doors to open. 6. Verify that VBUS LED is ON. 7. Verify that WD LED is ON. 8. Power down the card, remove the connector to the motor, and power up the card. 9. Connect a voltmeter to the motor output pins; be very careful not to short the pins together. 10. Press MDO or MDC, and verify that there is voltage on the motor output pins. a. If voltage is present, check the motor wiring. If wiring is good, the motor may be bad. b. If no voltage is present, verify that the correct door operator profile is loaded for the type of door and motor being used. If the correct door operator profile is loaded and the IGBT is not faulted out, the card may be damaged.

Maintenance

1. Check that the motor mounting bolts are tight.
2. Remove the brush covers (where applicable), blow out the brush holders, check the brushes for wear, and reinstall the covers.
3. Inspect the operator belts for the following:
   a. Cracks or glazing
   b. Even wear on both sides of the belt
   c. The belts are not bottomed out in the grooves
   d. Proper tension (belt slippage).

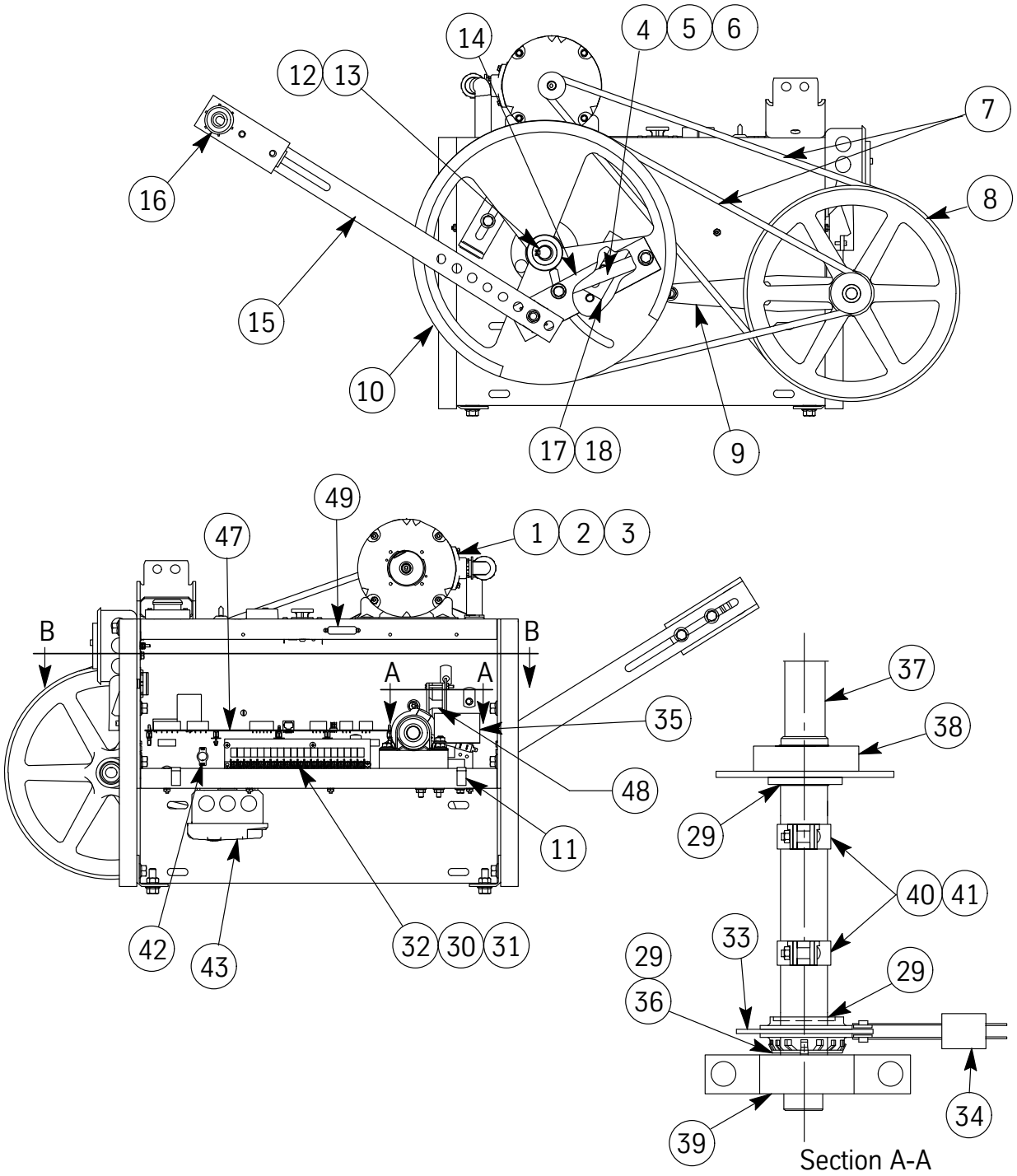
The following guidelines apply when testing, adjusting, or replacing belts:

- Ideal tension is the lowest tension at which the belt will not slip at peak load.
- All belts in the set should be tested for equal tension by pushing each belt down at the midpoint between the pulleys. (Typical deflection is 3/8" with 10 lbf applied).
- If belts require tensioning, check the sheave alignment with a straight edge.
- If belts are replaced on multi-groove sheaves, change the belts as a matched set.

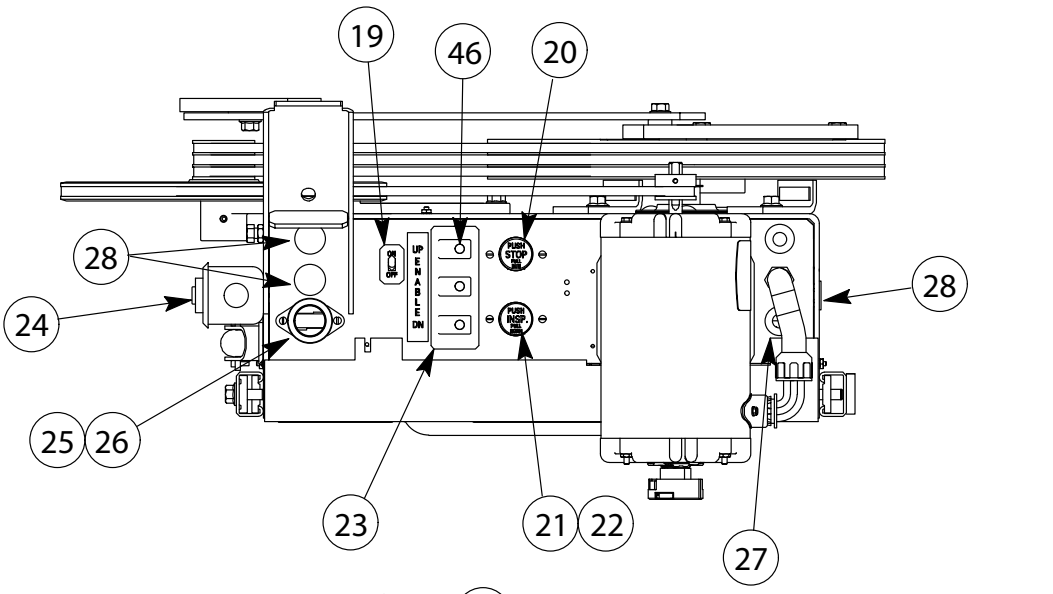
4. Check that all of the linkage bolts are tight.
5. Remove the door operator cover, rotate the door operator by hand, and check the operation of the DOL and DCL sensors.
6. Check the operation of the gate switch, and make sure that it is adjusted per code.
7. Use a burnishing tool or clean rough paper, and clean the gate switch contacts (if necessary).
8. Replace the door operator cover.
9. Check for excessive bearing wear.

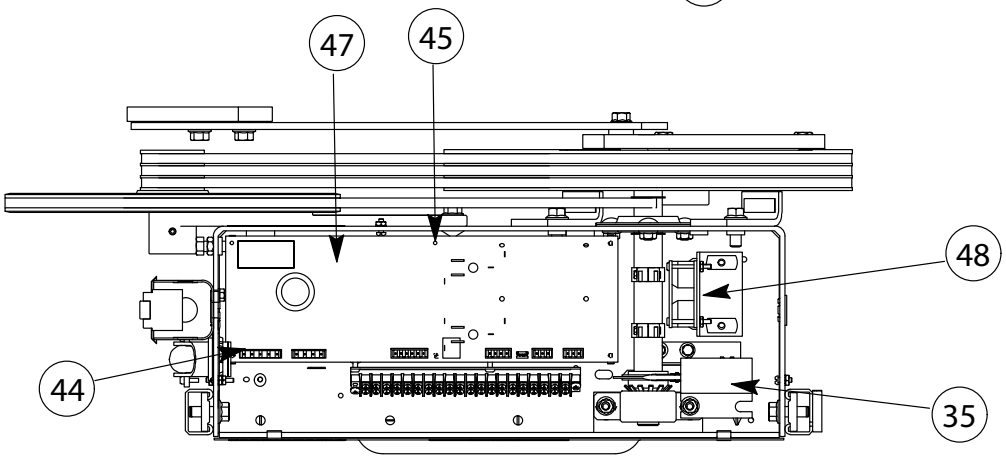
Replacement Parts

3001AH_ HD-03 Door Operator
3001AN_HD-04 Door Operator

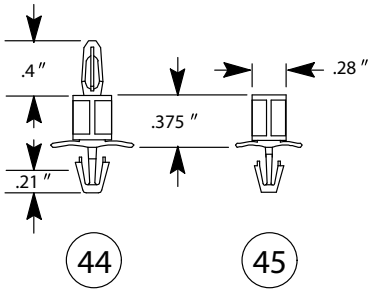


3001AH_ HD-03 Door Operator
3001AN_HD-04 Door Operator
(continued)





Section B-B



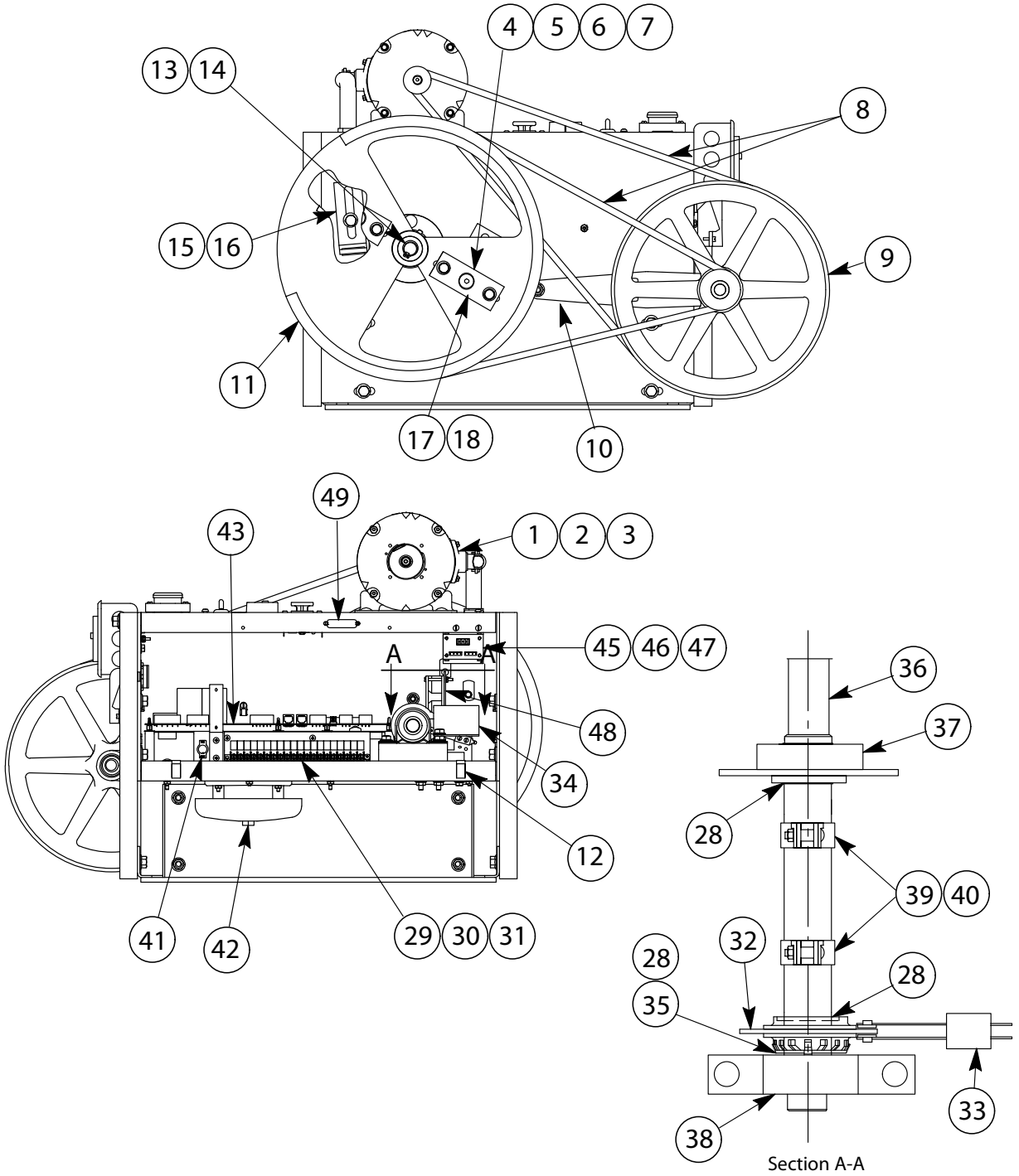
3001AH_ HD-03 Door Operator
3001AN_HD-04 Door Operator
(continued)

ITEM	PART NO.	PRINT NO.	DESCRIPTION
1	9739593	591BJ1	Motor Assembly, 115 VAC, 1/2 HP w/Encoder
	9779504	591BF1	Motor Assembly, 115 VAC, 1/6 HP w/Encoder
2	9825431	373BA1	Encoder, Closed Loop Door Operator
3	9820966	750DB1	Sheave, Motor
4		124050	Tap Bar, Arm
5		123988	Shim, Door Operator
6	9801170	40117	Spacer, Roller
7	9749470	77920	Belts, Drive
8	9876686	67668	Sheave Assembly, Jack Shaft
9	9838820	63882	Arm, Adjustable Idler
10	9842214	750CV1	Drive Wheel
11		277BY1	Clip, S
12		717CV1	Ring, Retaining, Bowed, .750" Dia.
13		44312	Key, .188" x 1.375"
14	9723997	123992	Arm, Adjustable Assembly
15		103268	Arm, Adjustable Assembly (Intermediate)
16	9723985	123990	Arm, Pivot Assembly
17	9814656	114653	Stop, Mechanical
18		40148	Bumper
19	9743637	76703	Switch, Light
20	9810857	108150	Switch, (Run Stop)
21	9810985	109888	Switch, (Inspection)
22		320JX1	Dust Cover, Inspection Button (Not Shown)
23		127196	Switch, Push Button
24		687BR1	Receptacle (GFCI)
25	9781821	78182	Socket, Lamp
26		109789	Guard, Lamp (Not Shown)
27		127960	Grommet, Rubber (ATLI2761)
28		700201	Snap-In, .500, Blank
29		700626	Snap Ring
30		320AF1	Cover, Kit, Terminal Strip (Not Shown)
31		141675	Jumper Strip, 2-Position
32		834AJ6	Block, Terminal
33	9850909	45090	Disk, Contact, Gate Switch
34		171BJ1	Switch, Leaf, Gate
35		320DF1	Cover, Gate Switch
36	9726834	700420	Lockwasher, Shaft to Switch Disc
37		744FE1	Shaft, Cam
38		101171	Bearing, Main
39		101172	Bearing, Rear

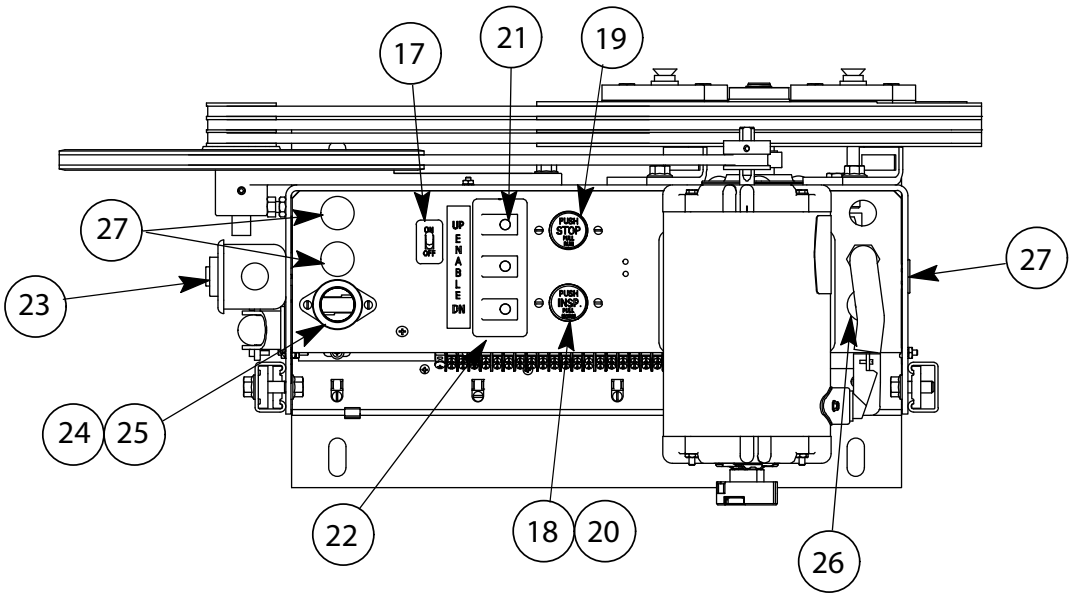
3001AH_ HD-03 Door Operator
3001AN_HD-04 Door Operator
(continued)

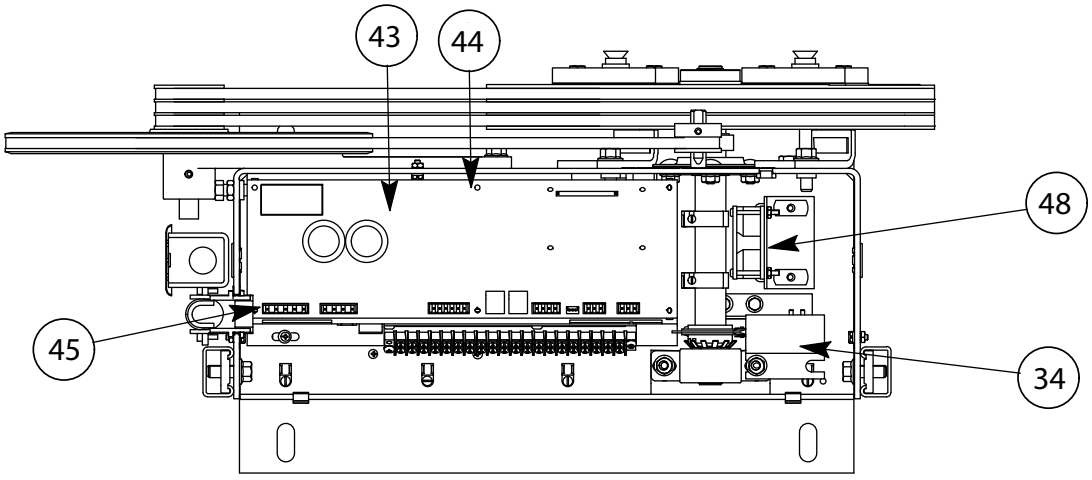
40	9741227	141222	Holder, Magnet
41	9741252	141251	Magnet, Cam
42		171CM1	Switch, Toggle, SPST, 250V, 3A
43	9782527	108252	Bell, Emergency Alarm
44		141787	Stand-off, Card, Locking
45		786AJ1	Spacer, Card
46		127195	Guard, Button
47	9803889	6300PA4	Card, Electronic, Door Operator
	9803877	6300PA3	Card, Electronic, Door Operator
48		378AW1	Fan Assembly, Door Operator
49		462KT2	Harness, Diagnostic Tool, Door
50	9850922		Cable, Door Diagnostic, Orange (not shown)
51	9765841	6300WK1	Card, SE Interface (not shown)
52		196APE1	Bracket, Safety Edge Interface (not shown)
53		296AH37	NM Connector, Zinc Die Cast, .500 (not shown)
54	9875412	850RW1	Magnetic-Based Trouble Light (not shown)
55		451LF	Guard, Belt (not shown)

3001AT_HD-03 Center Opening Dual Arm Door Operator
3001AW_HD-04 Center Opening Dual Arm Door Operator



3001AT_HD-03 Center Opening Dual Arm Door Operator
3001AW_HD-04 Center Opening Dual Arm Door Operator
(continued)





3001AT_HD-03 Center Opening Dual Arm Door Operator
3001AW_HD-04 Center Opening Dual Arm Door Operator
(continued)

ITEM	PART NO.	PRINT NO.	DESCRIPTION
1		591BJ1	Motor Assembly, 115 VAC, 1/2 HP w/Encoder
2		373BA1	Encoder, Closed Loop Door Operator
3	9820966	750DB1	Sheave, Motor
4		40121	Spacer, Roller
5		112HC1	Bar, Drive Wheel
6		112HE1	Bar, Tap, Drive Wheel
7		760BM1	Shim, Drive Wheel
8	9749470	77920	Belts, Drive
9	9876686	67668	Sheave Assembly, Jack Shaft
10	9838820	63882	Arm, Adjustable Idler
11		894AM1	Wheel, Drive
12		277BY1	Clip, S
13		717CV1	Ring, Retaining, Bowed, .750" Dia.
14		44312	Key, .188" x 1.375"
15	9814656	114653	Stop, Mechanical
16		40148	Bumper
17	9743637	76703	Switch, Light
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21		127196	Switch, Push Button
22		127195	Guard, Button
23		687BR1	Receptacle (GFCI)
24	9781821	78182	Socket, Lamp
25	9850909	109789	Guard, Lamp (Not Shown)
26		127960	Grommet, Rubber (ATLI2761)
27		700201	Snap-In, .500, Blank
28		700626	Snap Ring
29		834AJ6	Block, Terminal
30		141675	Jumper Strip, 2-Position
31		320AF1	Cover, Kit, Terminal Strip (Not Shown)
32	9850909	45090	Disk, Contact, Gate Switch
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34		320HJ2	Cover, Gate Switch
35	9726834	700420	Lockwasher, Shaft to Switch Disc
36		744FE1	Shaft, Cam
37	9711715	101171	Bearing, Main
38	9911739	101172	Bearing, Rear
39	9741227	141222	Holder, Magnet

3001AT_HD-03 Center Opening Dual Arm Door Operator
3001AW_HD-04 Center Opening Dual Arm Door Operator
(continued)

40	9741252	141251	Magnet, Cam
41		171CM1	Switch, Toggle
42	9782527	108252	Bell, Emergency Alarm
		177AM1	Alarm, Audible Signal, 12V
43	9803889	6300PA4	Card, Electronic, Door Operator
	9803877	6300PA3	Card, Electronic, Door Operator
44		786AJ1	Spacer, Card
45	9763754	141787	Stand-off, Card, Locking
46		6300WK1	Card, Interface, Safety Edge
47		462PE1	Harness, Interface, Safety Edge
48		378AW1	Fan Assembly, Door Operator
49		462KT2	Harness, Diagnostic Tool, Door
50	9850922		Cable, Door Diagnostic, Orange (Not Shown)
51		381AM1	Filter, EMI/RFI, Door Operator, UDC (Not Shown)
52		296AH37	NM Connector, Zinc Die Cast, .500 (not shown)
53	9875412	850RW1	Magnetic-Based Trouble Light (not shown)
54		451LF	Guard, Belt (not shown)

Vertical Express

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