VERTICAL EXPRESS

LD-16 Door Operator

For New Installation

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

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

General Safety

CAUTION **Before applying power to the controller, check that all manufacturing 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 *Employee Safety and Accident Prevention Program Manual* and 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 the correct type fuse, 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.

Electrical Safety
(continued)

Mainline Disconnect

Unless otherwise directed, always Turn OFF, Lockout, and Tagout 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 *Employees' Safety and Accident Prevention Program Manual* for the required procedure.

When Power Is On

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

Test Equipment Safety

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

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 1 M Ohm/Volt. A digital voltmeter is recommended.

Mechanical Safety

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

Arrival of Equipment

Receiving

Upon arrival of the equipment, inspect it for damage. Promptly report all visible damage to the carrier. All shipping damage claims must be filed with the carrier.

Storing

During storage in a warehouse or on the job site, precautions should be taken to protect the equipment from dust, dirt, moisture, and temperature extremes.

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Static Protection Guidelines

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

Elevator systems use electronic circuit boards to control various functions of the elevator. These boards have components that are extremely sensitive to electrostatic voltage, which can cause board damage or failure.

Proper handling and shipping of boards is important to ensure their reliability and long-term operation. For this reason, manufacturing bases warranty decisions on the guidelines below.

Handling

- Store all boards in separate, sealed, anti-static bags until time for installation.
- When handling boards, wear an anti-static wrist strap with ground wire. Acceptable straps are available through local electronics parts suppliers. Typical anti-static wrist straps are intended for applications below 240 VAC.
- Do not place boards on any surface without adequate static protection.
- Handle boards only by their edges using proper anti-static techniques. Avoid touching components, traces, and connectors.
- Take extra care when handling individual components, such as integrated chips, metal oxide semiconductors, and field-effect transistors. These components can be destroyed with as little as 30 volts of electrostatic discharge.

Shipping

- Complete the included board discrepancy sheet.
- Any board returned to manufacturing must be packaged in a closed, sealed anti-static bag designed for the board, and packaged in a sturdy protective shipping carton.
- Clear bubble wrap and Styrofoam are unacceptable packing materials.

NOTE Refer to the *Replacement Parts Catalog* to order extra static bags and shipping cartons for each board.

Failure to adhere to the above guidelines will void the card warranty.

Revision Change Bars

Each revised page included in this manual will have a vertical line (change bar) to the left of the text that has been added or changed. The example at the left of this paragraph shows the size and position of the revision change bar.

Access and Egress Procedures

The access and egress procedures that are used entering the hoistway determine whether or not power is needed to perform the required task(s). If not, Turn OFF, Lockout, and Tagout the mainline disconnect.

Car Top Safety

WARNING **DO NOT stand on the car top emergency access cover.**

Safety Precautions When Accessing/Egressing Car Tops

- Before opening the hoistway door, ensure that the correct hoistway has been selected and that the car is at the proper floor (to avoid a fall hazard).
- Access car tops from the top terminal landing whenever possible.
- Never access a hoistway, unless a reliable method of controlling the car has been determined.
- Locate the emergency stop switch.
- Before accessing the car top, place the stop switch in the STOP position, and confirm the proper operation.
- Locate a safe refuge area.
- Always maintain control of the hoistways doors during access/egress.
- Use fall protection when a fall hazard exists. The only exception to this is when routine maintenance is being performed on top of complete, operational elevator cars. Do not use fall protection where there is a greater risk of entanglement.
- When opening hoistway doors from the car top, do so slowly, so that no one steps in from the landing thinking a car has arrived.
- Observe overhead clearances.
- Use extra care when working on car tops that are curved, domed, or located in unenclosed hoistways.

WARNING **DO NOT turn the following switches to Automatic Operation until the hoistway door interlock is open–and remains open–and the hoistway is empty.**

- When egressing the hoistway/car top, ensure that the stop switch is in the STOP position, and that the inspection switch is on Inspection Operation.

Safety Precautions When Working on Car Tops

CAUTION **DO NOT attach electrical cords on the car or counterweight ropes.**

- Before beginning work, check car top for oil or grease, and clean as required.
- Locate the position and counterweights of the car being accessed as well as any other cars/counterweights in the vicinity. Take appropriate measures to avoid hazards.
- Verify proper operation of the top-of-car inspection operating buttons. Where outlets are provided, use a grounded, portable light with a suitable, non-conductive; or use a grounded lamp guard and reflector.

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Access and Egress Procedures
(continued)

Pit Safety

Before entering a pit, ensure that every employee is aware of the hazards. Some common hazards are:

- Recognized refuge space
- Inadequate lighting
- Improper access
- Tripping hazards
- Improper use of pit ladders
- Moisture/water/fluid
- Moving equipment

Safety Precautions Before Entering a Pit

Take appropriate steps to minimize the following hazards and any others that are identified, such as:

- Locate the position of the car being accessed, as well as any other cars in the vicinity.
- Before accessing the pit, the car MUST be located high enough to allow the placement of the pit prop pipe stands to be inserted into the buffers.
- Once the pit is initially accessed, the pit props must be installed and the oil line shutoff valve closed to prevent car movement.
- Obtain control of the car.
- Identify a refuge space.
- If movement of the elevator is not needed to complete the work being performed, Turn OFF, Lockout, and Tagout procedures are required.
- If notified by the building owner or representative that the pit and/or hoistway has been classified as a Permit Required Confined Space (this notification could be verbal or the pit/hoistway may be labeled), contact the appropriate person for authorization. In either case, do not enter the pit/hoistway until authorization is received.

Safety Precautions When Working In Pits

- Before entering a pit, test and verify the door lock circuit and stop switch circuit.
- Ensure that all portable lights and tools are connected through a ground fault (GFCI).
- Take care to protect all lighting from damage.
- DO NOT work in a pit with standing water.
- Before climbing, always examine shoes for fluid/grease.
- Use both hands when working with ladders and also when accessing and egressing a pit.
- Be aware of moving equipment (e.g., pump, motors, belts, and sheaves), and ensure that clothing and hands cannot get caught in them.
- Avoid smoking or the use of open flames in the pit.

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Overview

Features

- Car Door Interlock (CDI)
- Fascia Reduction (Local AHJ)
- Positive Close Clutch
- 3 phase PM induction motor
- 2 motors, 2 Boards
- 2 power supply options: 110VAC, 230VAC
- Communications: CAN, 485, Discrete
- Diagnostic tool: UIT
- Driven from the hanger rather than the door panels.
- Leading edges of car and hatch doors must now align at closed position.
- Simple learn process requires minimal adjustment with given profile options.

Side-Opening Single-Speed Assembly (3002BG)

Side-Opening Two-Speed Assembly (3002BH)

Center-Opening Single-Speed Assembly (3002BF)

Center-Opening Two-Speed Assembly (3002BJ)

Performance Specifications

	MIDI+	SUPRA
Motor Characteristics	Three-phase Permanent Magnet Synchronous Motor	
Drive	V3F-Converter (vector control)	
Average power consumption	92W	170W
Maximum momentary power consumption	475W	900W
Power supply	Universal 115-230V+20% 50/60Hz	
Protection class	IP20	
Storage temperature	–45° to 70° C	
Operating ambient temperature	–20° to 50° C	
Humidity range	98% maximum 40°C	
Regulations and codes	ASME A17.1/CSA B44, EN81	
Electromagnetic compatibility	Immunity and emission protection EN12015/16	
Maximum movable masses	600 lbs. (270 kg)	1322 lbs. (600 kg)
Estimated lifetime	More than 3 million cycles	More than 5 million cycles
Safety device for cab egress	Car door interlock	
Door operator noise level* *sound levels in a stopped car	Average 55 dBA Maximum 60 dBA	Average 50 dBA Maximum 55 dBA
Maximum door speed capability* *actual top door speed for a specific installation may be different depending on door mass or door travel.	2.16 ft/sec	2.96 ft/sec
Reopening device* *on modernization installations: door reversal could be greater if the door edge bypasses the door control board and is connected to the elevator controller.	Safety light edge with door reversal capability less than $2^{1}/_{2}$"	

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Motor Specifications

	Unit of Measure	MIDI PMSM	SUPRA PMSM
Motor Type	—	57BL74	M763
Operation Mode	—	S1	S1
Insulation Class	—	B	B
Protection Degree	—	IP40	IP40 (IP54 opt.)
Storage Temperature	°C	-45 to +70	-45 to +70
Operating Temperature	°C	-20 to +65	-25 to +55
Humidity	%RH	93% @ 40° C	98% @ 40° C
Noise Level	dBA	50 avg./55 max.	45 avg./50 max.
Door Cycles, Lifetime	—	7,000,000	10,000,000
Hours, Lifetime	Hours	12,000	20,000
NR Pole	—	4	4
Rated Voltage	V	36	42
Rated Speed	rpm	4000	3300
Rated Torque	Nm	0.22	0.41
Nominal Current	A	3.45	4
Rated Output Power	W	92	142
Efficiency	%	—	84.5
Overload (Imax/Irated)	—	5	7
DC-Link Voltage	V	18 to 42	18 to 75
Rotor Inertia	gcm^2	119	760
Max. Cogging Force	Ncm	< 85, 9	< 85, 9
Cogging Torque (Motor Only)	Ncm	< 4, 5	< 4, 5
Gear Rate	—	8.2	6.43
Tooth Belt Diameter	mm	38.2	38.2
Tooth Belt Tension	N	800	1,100
Duty	Starts/Hour	250	250
Top Speed	ft/sec	1.96	2.96

Required Tools and Materials

- Ratchet wrenches: 13 mm, 17 mm, $^{1}/_{16}$", $^{3}/_{4}$"
- $^{3}/_{8}$" ratchet & extension
- Sockets: 13 mm, 14 mm, 15 mm,$^{1}/_{64}$", $^{3}/_{4}$"
- T-handle (Allen keys): 4 mm, 5 mm, 6 mm, $^{3}/_{16}$"
- $^{3}/_{8}$" socketed-head Allen key
- Flat & Phillips screwdrivers
- Torpedo or tool box level
- Tape measure or folding ruler
- Door pressure gauge
- $^{1}/_{4}$" cordless impact with 12" extension
- Sawsall with metal cutting blades (MOD applications)
- Pallet jack
- Hand trucks
- Tin snips
- Pry bar
- Claw hammer
- Tri square
- Small plumb bob
- Large channel locks
- $^{5}/_{16}$" nut driver for impact
- $^{3}/_{8}$" impact gun adapter
- Wire strippers
- Scribe
- Electrical tape
- Small straight slot screwdriver (plug wiring)
- Runbug
- Grinder
- Hack saw

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Installation

Install Car Header

1. Turn OFF, Lock, and Tag out the mainline disconnect.
2. Before installing the header, remove all cover plates and end caps. See Figure 1.
3. Route the door operator harness and wiring for the light and outlet in the header to the Car Operating Panel (COP).

- Do not connect any plugs at this time.
- The door operator harness plugs for the CWI Board will be installed later.

a. Remove the rubber grommet on the header panel, and insert the wireway assembly in the provided holes next to the Door Operator Control Board. See Figure 2 on page 14.

b. Install the wire harness and the wireway cover.

4. Install the Car Top Station (CTS).
5. Use $^{1}/_{4}$" hardware to attach the car header to the cab.
6. Verify that the header is level and plumb.
7. Attach the fasteners to the header and leave a $^{3}/_{8}$" gap between the bracket and the fastener. See Figure 3 on page 15.

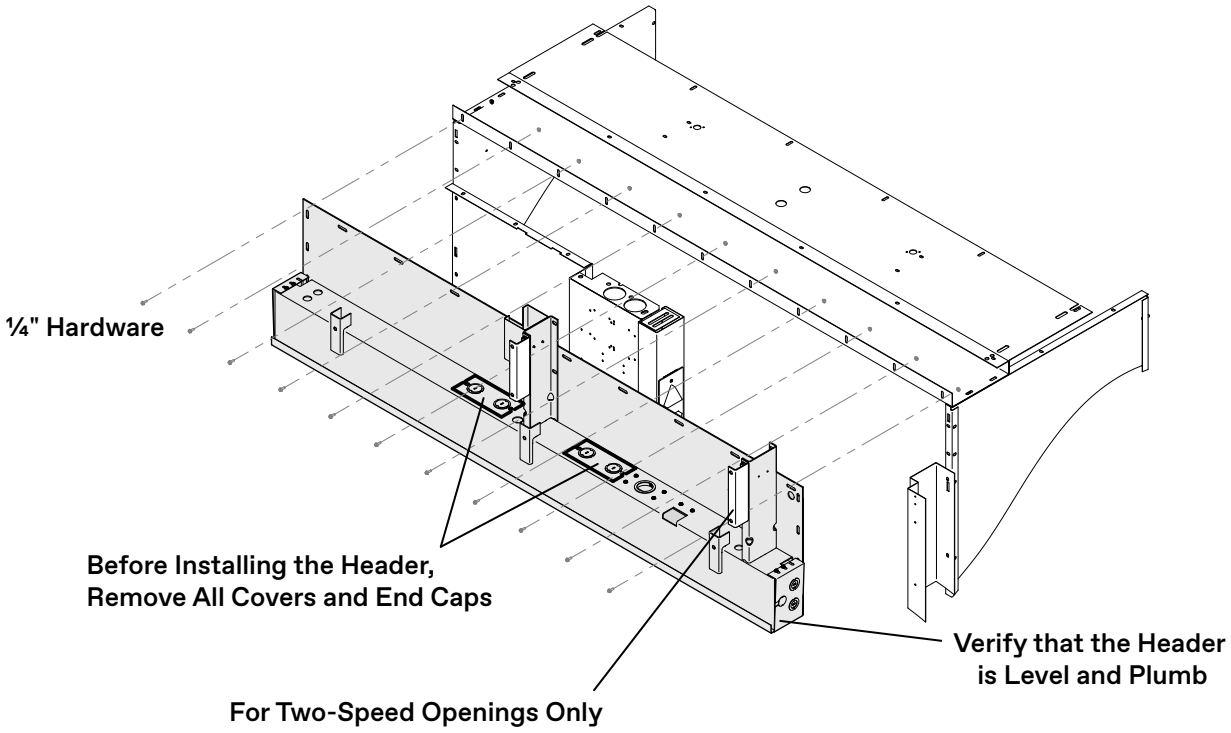

Figure 1 - Attach the Header

Installation
(continued)

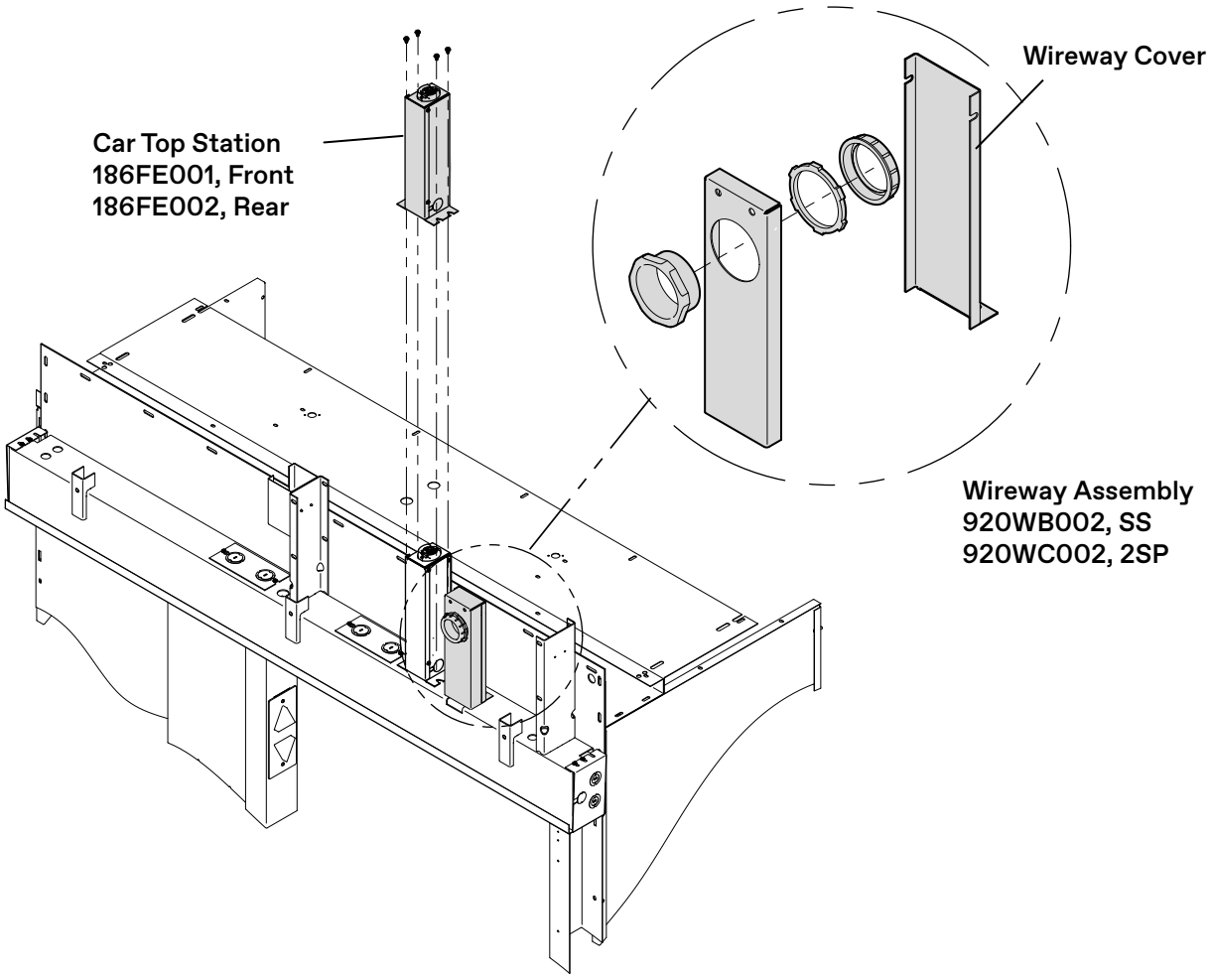

Figure 2- Attach the Wireway Assembly

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Installation
(continued)

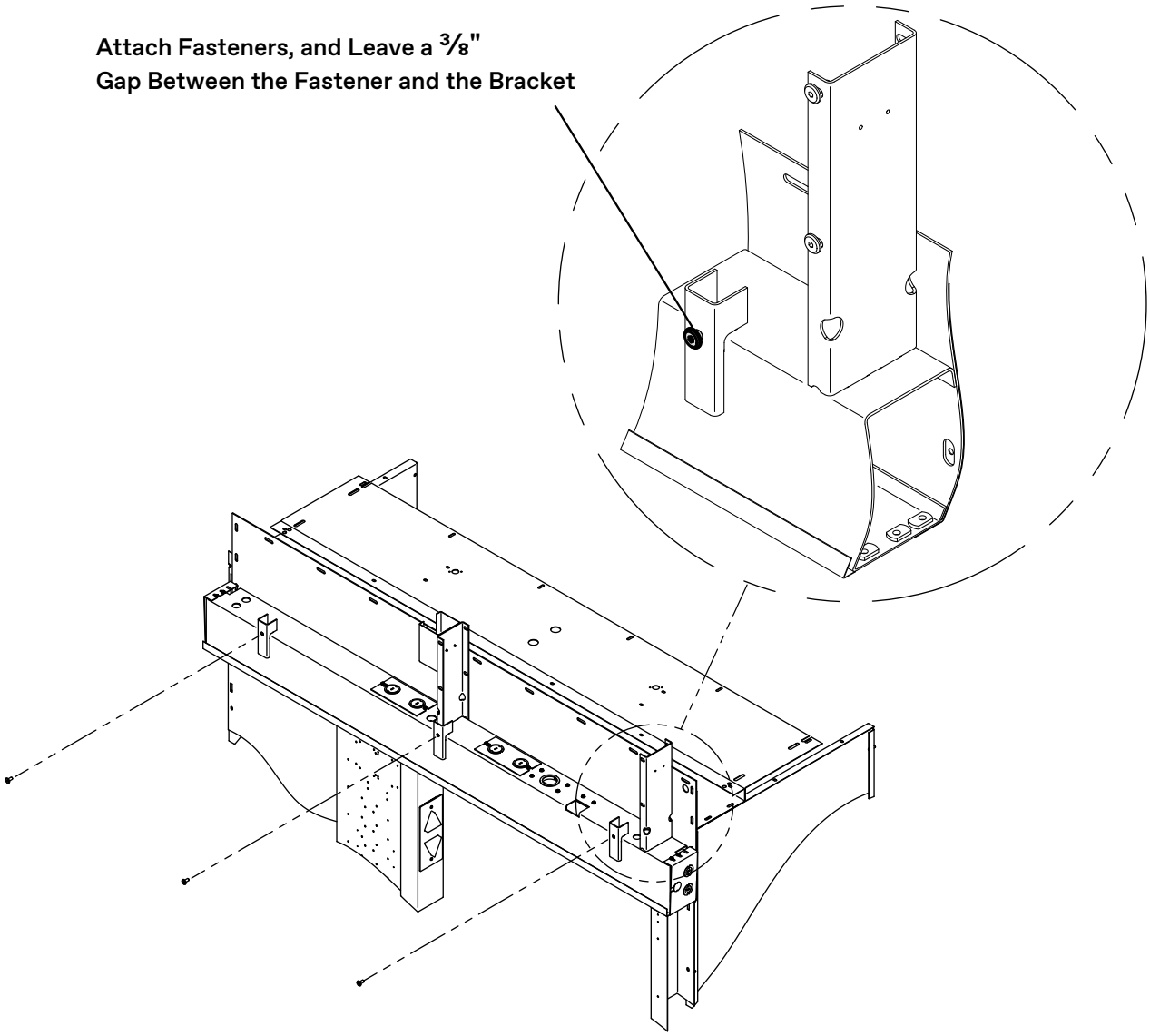

Figure 3 - Attach Fasteners and Remove the Cover Plate

Installation
(continued)

8. Align the keyslots of the door operator door track with the bolts on the header. See Figure 4.

9. After the door operator is set on the 3 bolts at the door track, use 4 nuts and bolts to attach the header at the channels, and tighten the fasteners.

10. Check the plumb of the door operator; if necessary, use shims to correct the plumb.

11. Install the car top light. See Figure 5 on page 17.

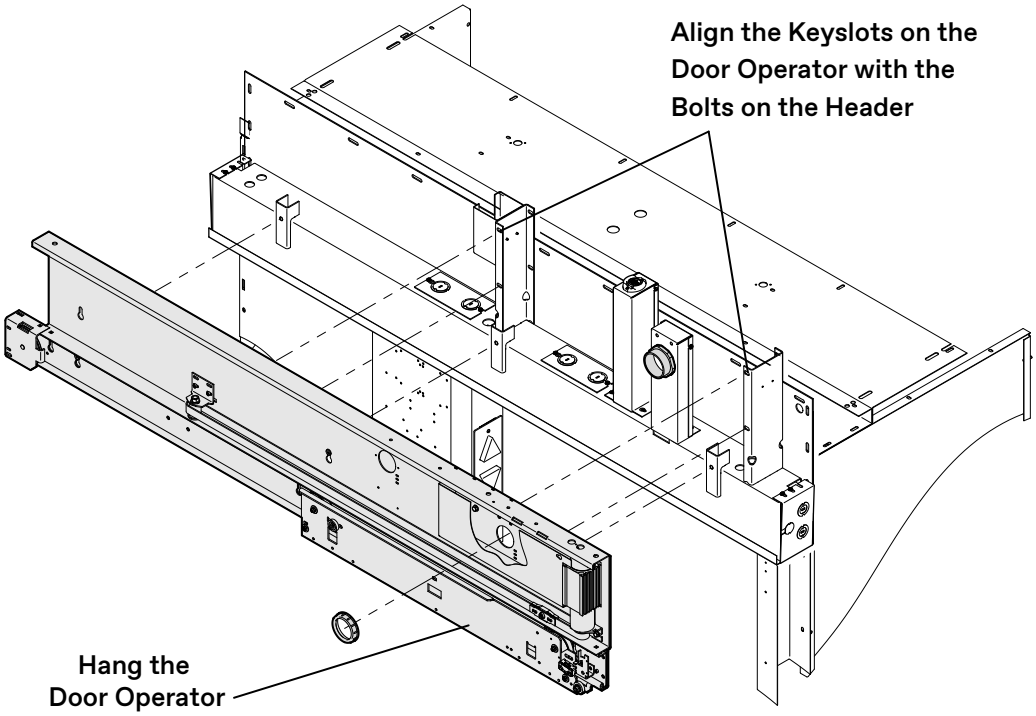

Figure 4 - Attach and Install the Door Operator

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Installation
(continued)

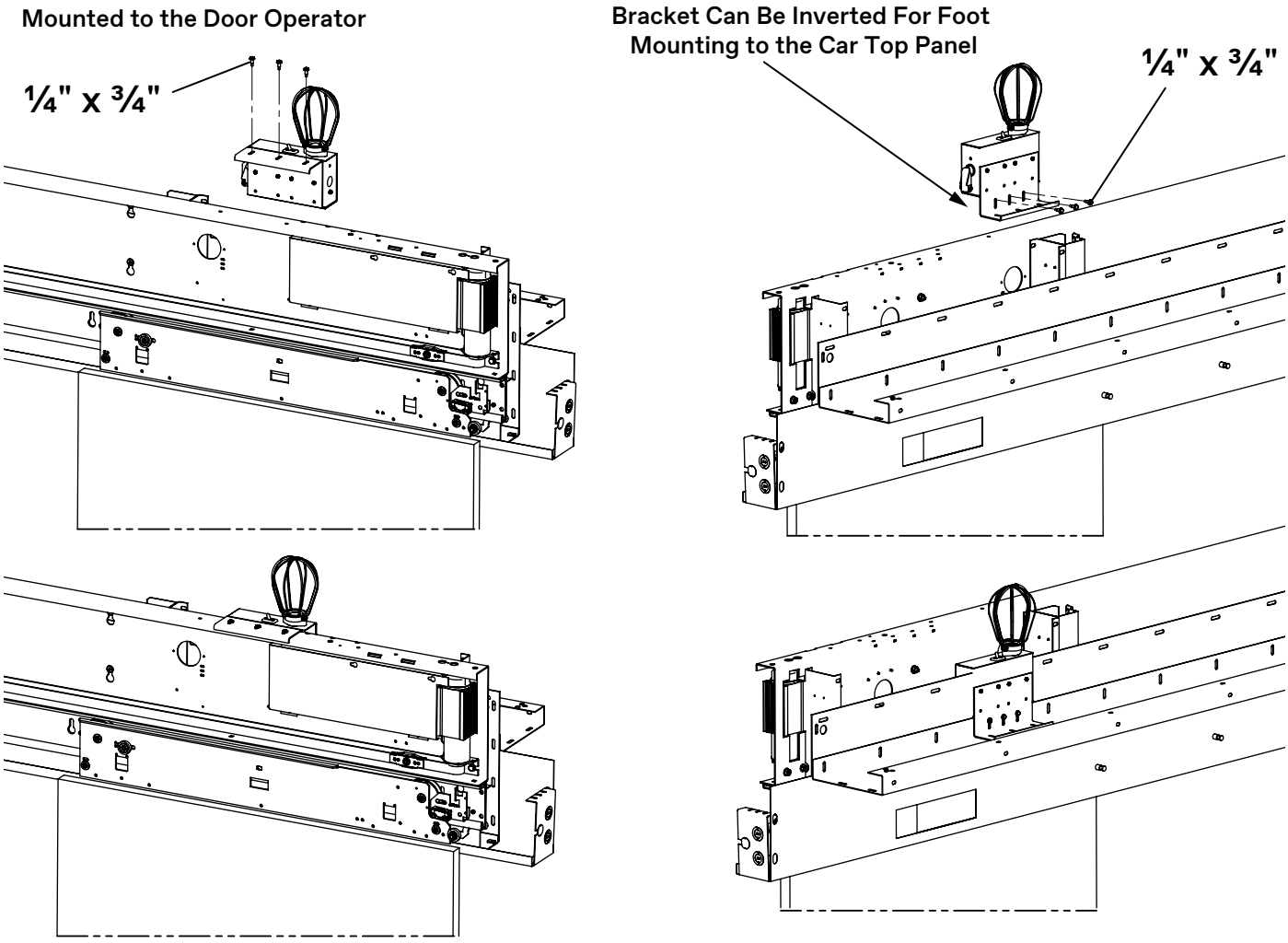


Figure 5 - Install the Car Top Light

Install Car Doors

1. Place a $^{1}/_{4}$" spacer on the car sill.
2. Install the car door on the two eccentrics, and align the adapter slots with the holes in the hanger. See Figure 6 on page 18.

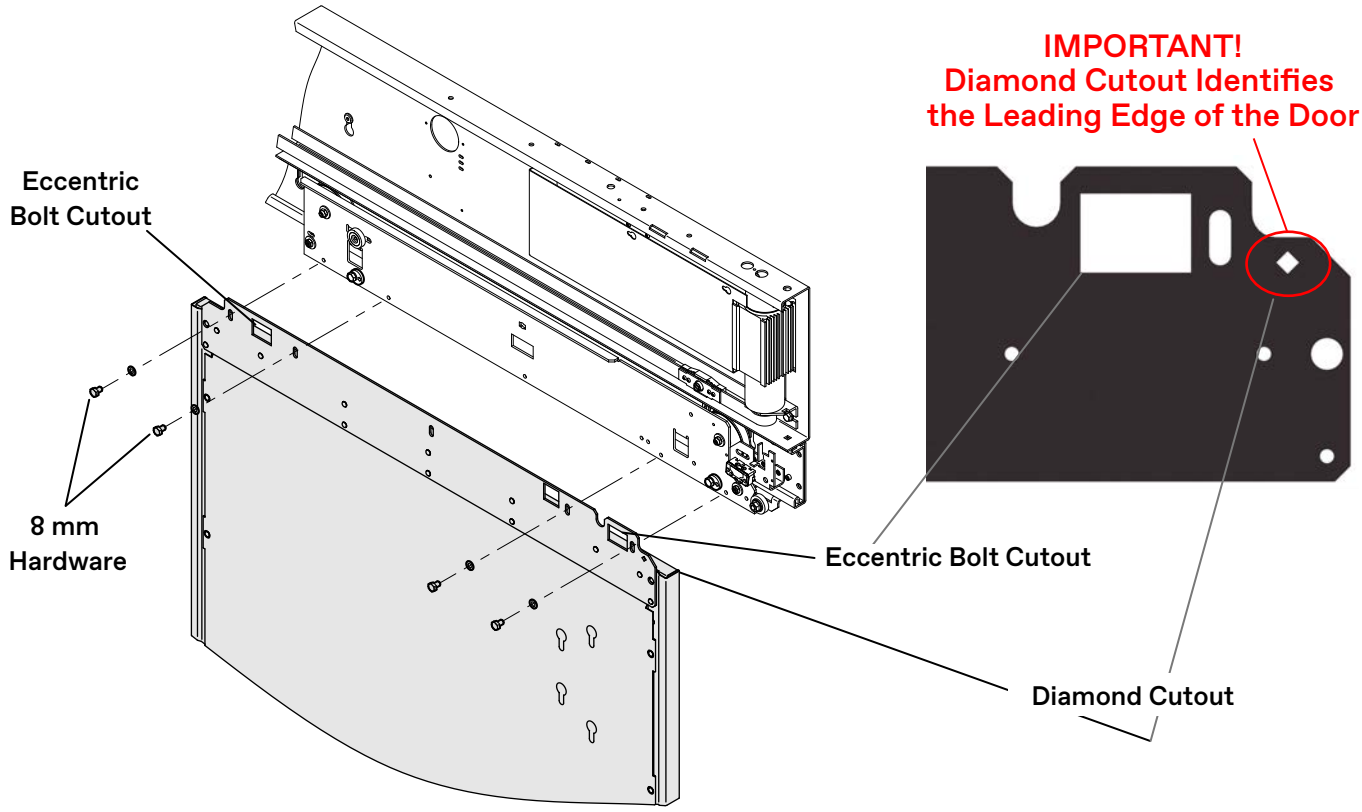
IMPORTANT!

Door Identification

- Two-Speed Door
  - — Fast Door: Taller hanger adapter
  - — Slow Door: Shorter straight adapter
- Other Doors: The diamond cutoff identifies the leading edge of the door

3. Install the 8 mm bolts, and hand-tighten.
4. Use a 6 mm Allen wrench on the door level eccentrics to align the door(s), and set the door clearance $^{1}/_{4}$" from the sill. See Figure 6 on page 18.

Installation
(continued)



DOOR LEVEL ECCENTRIC ADJUSTMENT

Makes door "square" with the entrance.

Two levels per door.

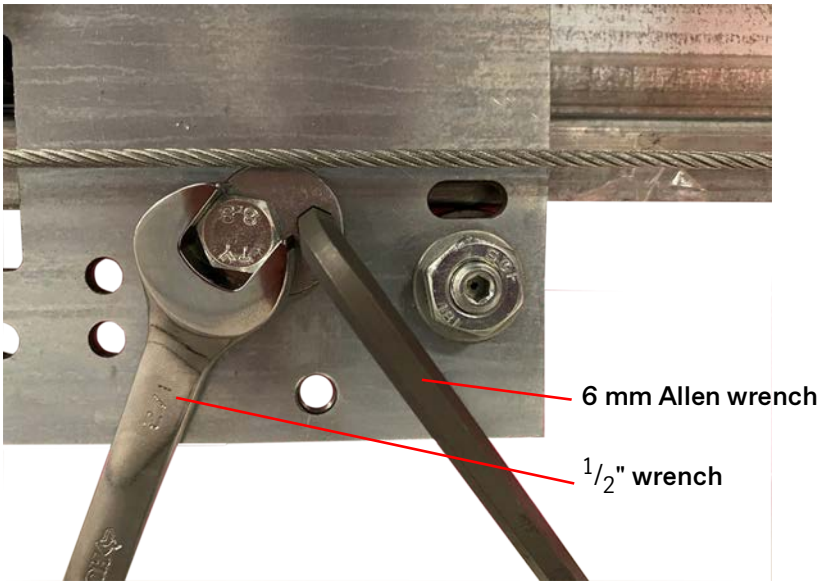


Figure 6 - Car Door Installation

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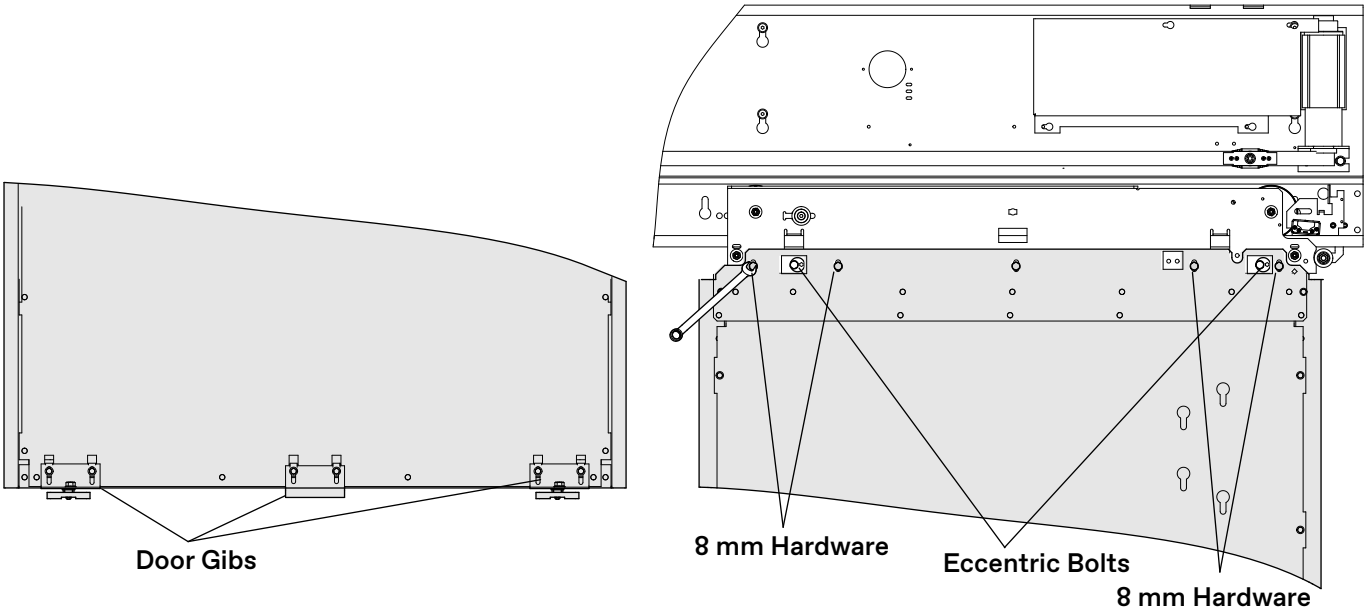
Installation
(continued)

5. Once the eccentrics are adjusted and tight, use a 13 mm wrench to tighten the 8 mm mounting bolts. See Figure 7.
6. Install the door gibs.
7. Check the upthrust roller adjustment, and correct as required.



UP THRUST ECCENTRIC ROLLER ADJUSTMENT

This adjustment will keep the door from coming off the track.

- **Too tight and roller will pinch the track too tight.**
- **Too loose and door can be knocked off the track.**
- **Two rollers per door.**

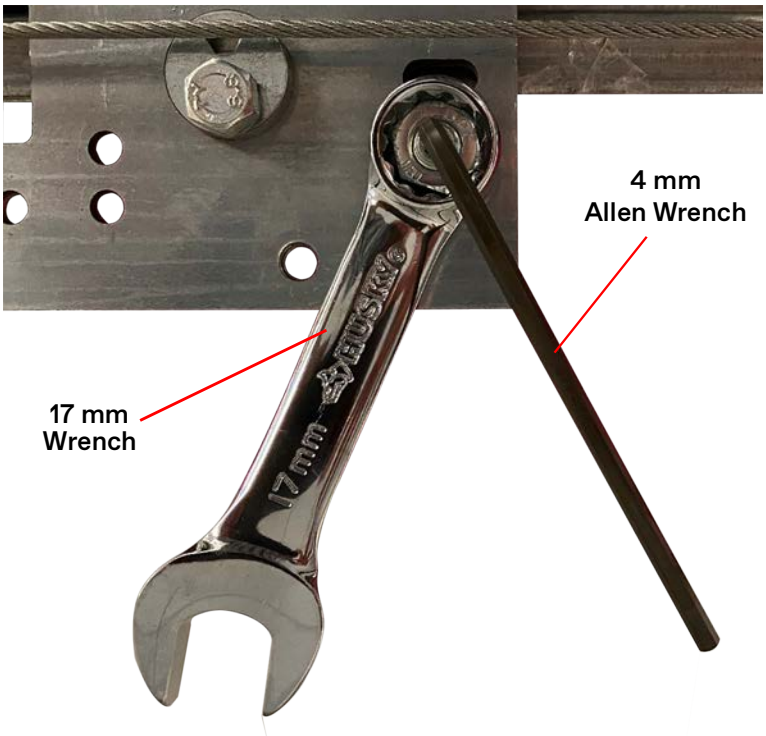


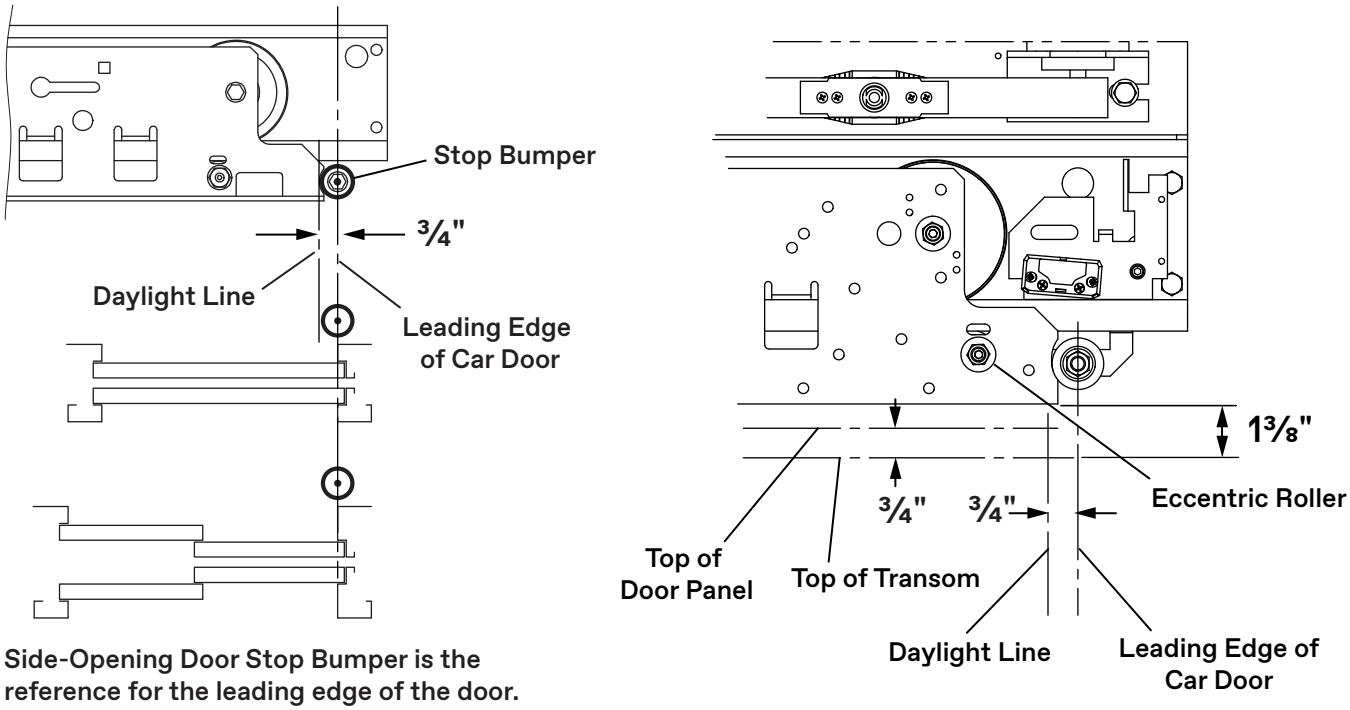
Figure 7 - Tighten the Mounting Bolts

Installation
(continued)

8. Verify that the gap between the up thrust eccentric roller and the rail is $^{1}/_{64}$". If the eccentric roller needs adjustment, loosen the nut and use the Allen wrench to turn the roller shaft. See UP THRUST ECCENTRIC ROLLER ADJUSTMENT on page 19, Figure 8 below, and Figure 9 on page 21.

9. From inside the car, verify that the gap between the door panels and the cab is between $^{1}/_{4}$" to a maximum of $^{3}/_{8}$".

Side-Opening



Note: All Car and Landing Door Stop Bumpers are reference for horizontal position of all car and landing doors.

Figure 8 - Side-Opening Eccentric Roller Adjustment

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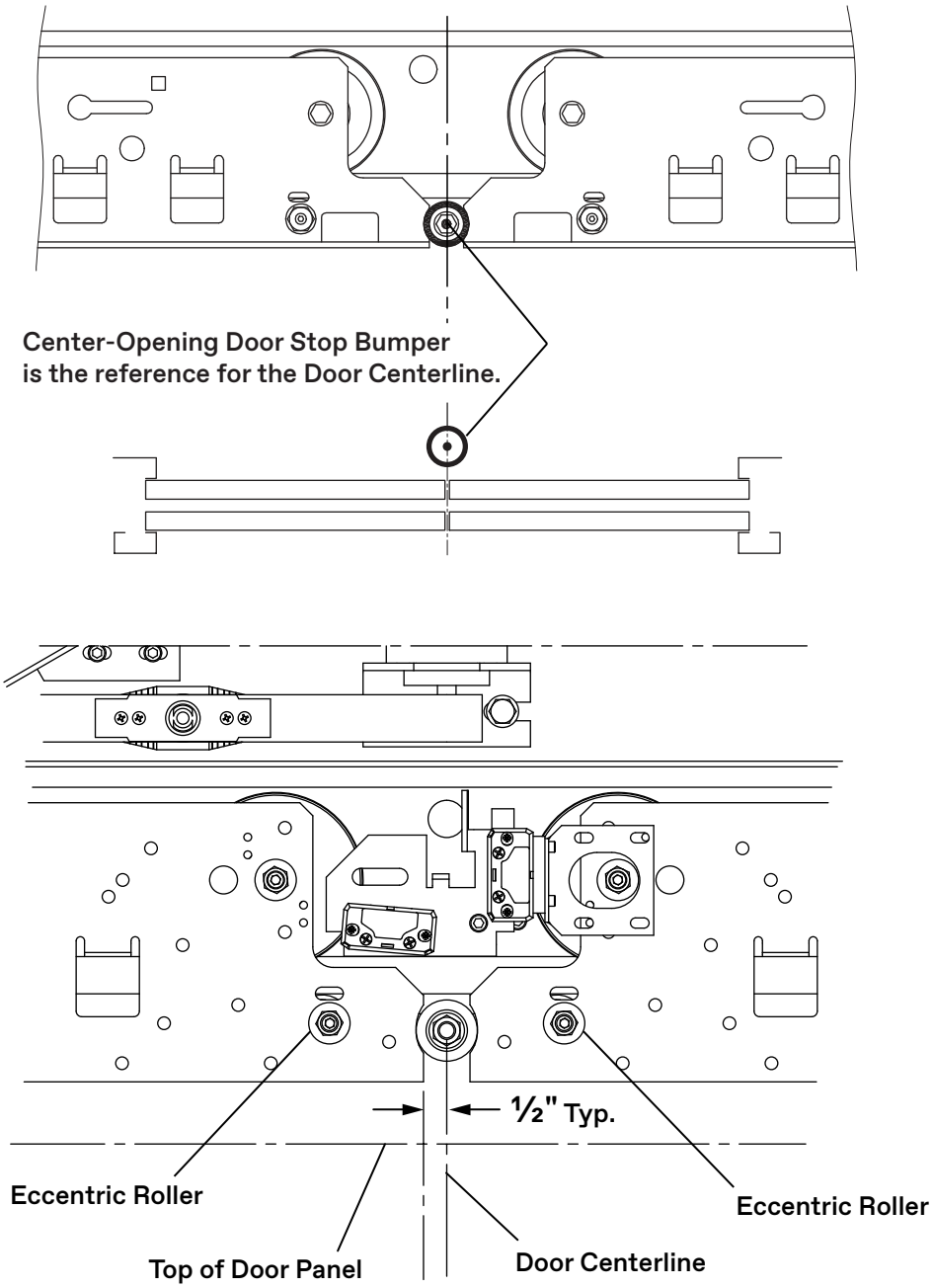
Installation
(continued)

Center-Opening



Note: All Car and Landing Door Stop Bumpers are reference for horizontal position of all car and landing doors.

Figure 9 - Center-Opening Eccentric Roller Adjustment

Installation
(continued)

Adjust the Car Door Panels

1. Move the door hanger(s) to the fully closed position against the bumper.
2. Secure the door hanger(s) with a cable tie.
3. Adjust the doors until the upper and lower leading edge of the door panel makes contact with the strike jamb, or the opposite door panel on center-opening doors.
4. Verify that the door gib running clearance is $^{1}/_{8}$".

Relating the Car Doors

Center-Opening Doors

1. Open the car doors.
2. Loosen the relating cable set screw until it is flush with the leading edge of the car doors to the returns. See Figure 10.
3. Tighten the set screw.

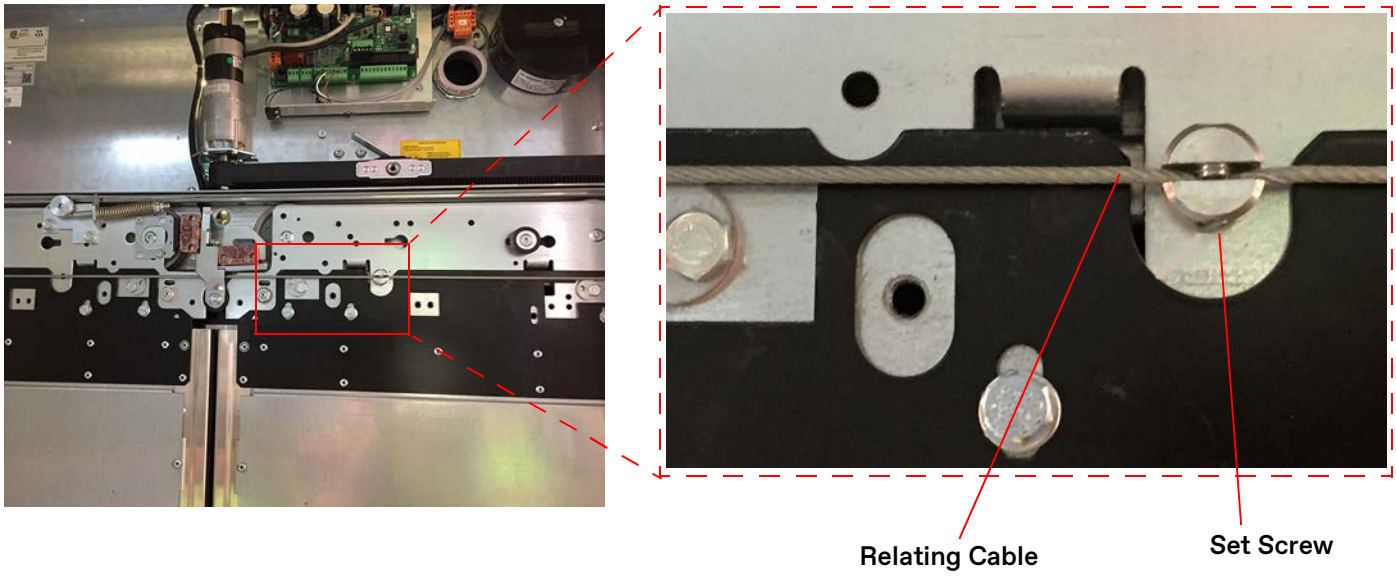


Figure 10 - Center-Opening Relating Cable for Car Doors

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Relating the Car Doors
(continued)

Two-Speed Doors

1. Open the slow door until it is flush with the return.
2. Loosen the door relation set screw. See Figure 11.
3. Ensure that the fast door, the slow door, and the return are flush.
4. Tighten the set screw.

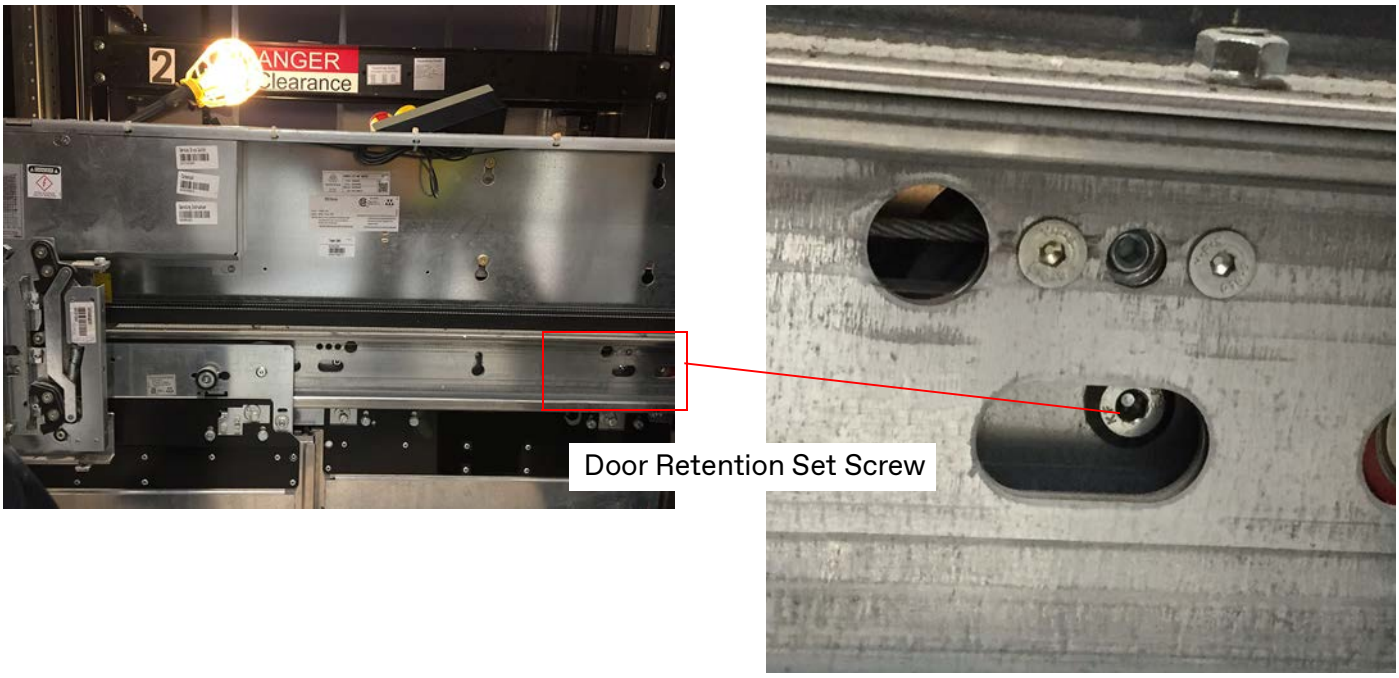

Figure 11 - Relating Car Doors (Two-speed shown)

Door Open Stop Adjustment

With the doors open and flush with the return, move the door stop bumper until it contacts the door stop bracket.

Door Hanger Mounted Clutch

Installation and Adjustment

1. Verify that the doors have been related (if CO).
2. Open the clutch, and move the screw from the Parking Position to the Fixed, Open Position. See Figure 12.

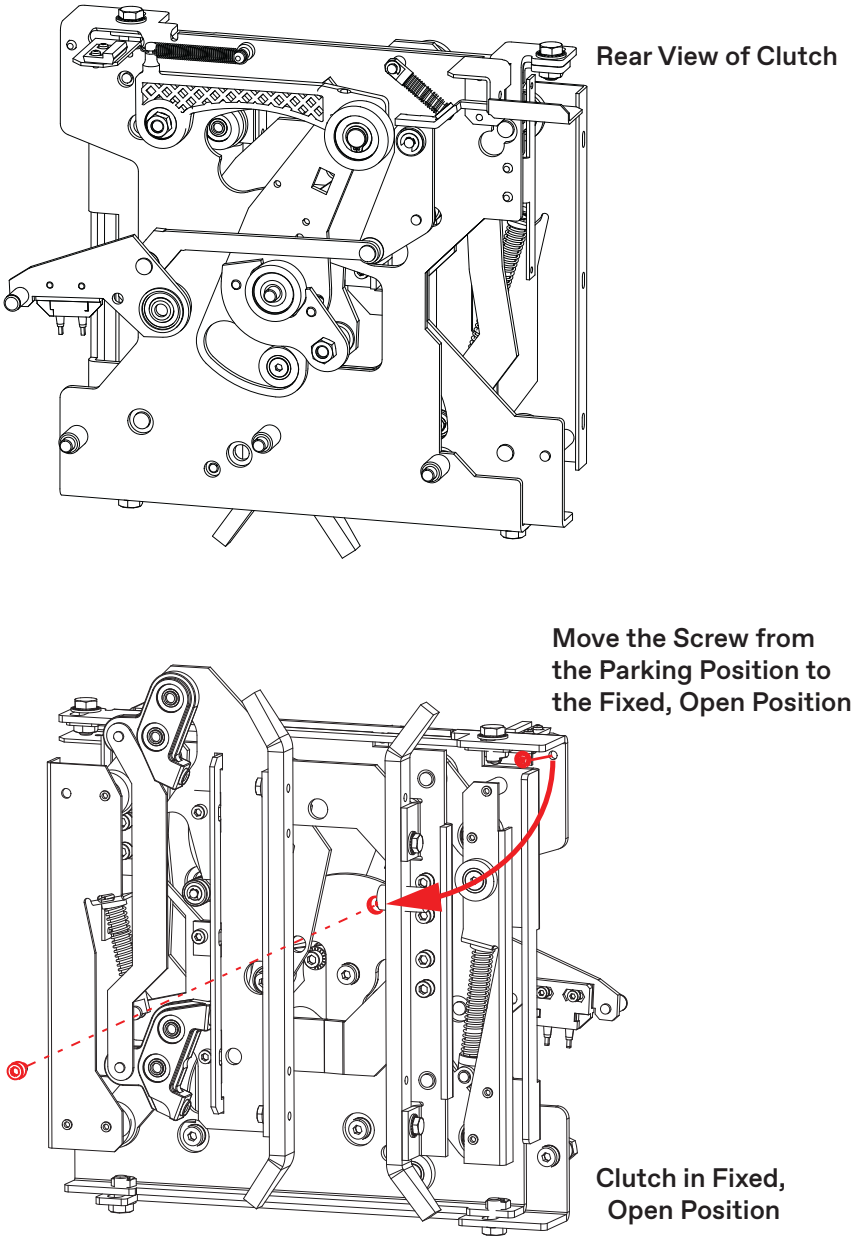

Figure 12 - Change Clutch to Fixed, Open Position

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Door Hanger Mounted Clutch Installation and Adjustment
(continued)

3. Remove the four shipping nuts from the rear of the clutch. See Figure 13.

4. Use the four screws to mount the clutch on the car door hanger. See Figure 14.

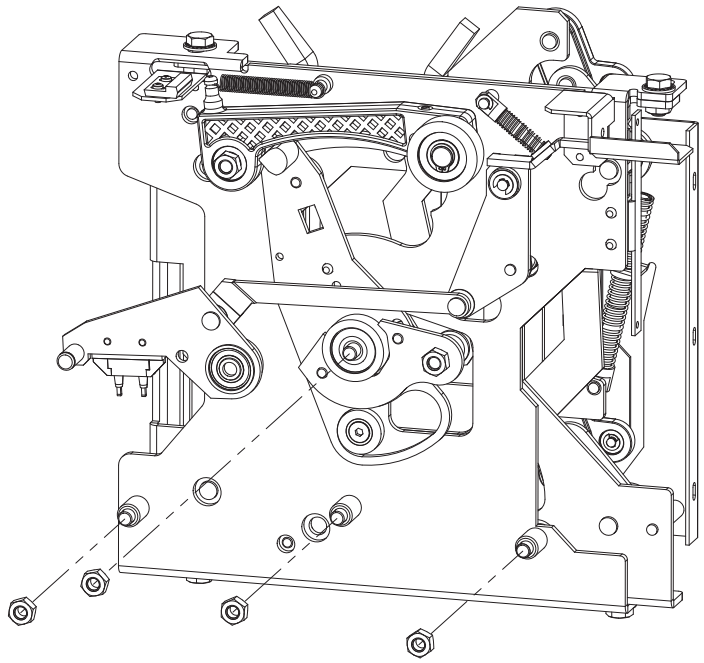

Figure 13 - Remove Shipping Nuts from Rear of Clutch

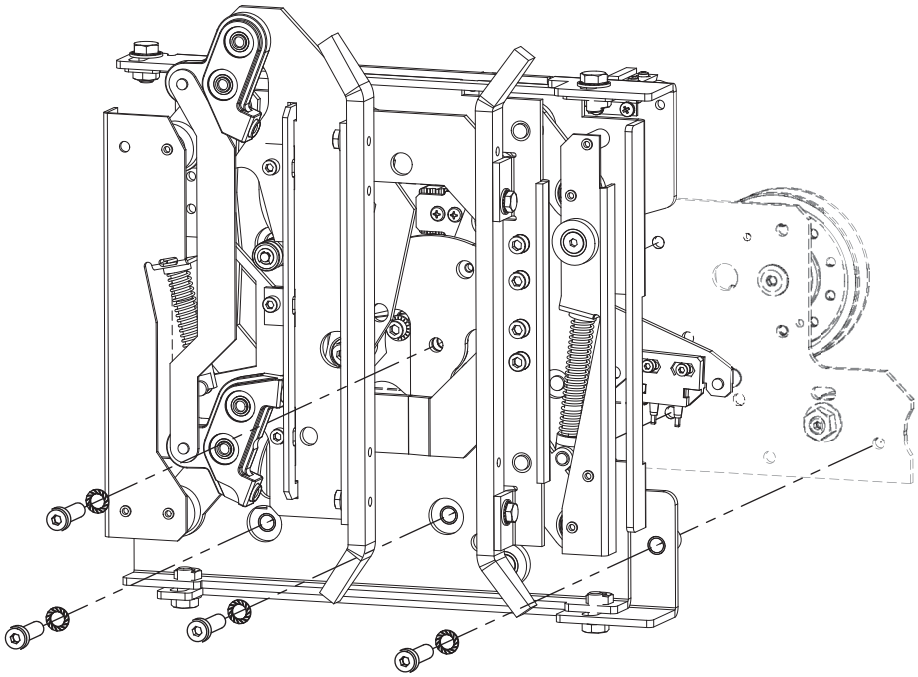

Figure 14 - Attach Clutch to Door Hanger

Door Hanger Mounted Clutch Installation & Adjustment
(continued)

5. Insert a fixing screw into the belt clamp to connect the clutch and the belt clamp. See Figure 15.

6. Pull on the belt to remove the screw from the parking position and unlock the clutch. Return the screw back to the parking position hole. See Figure 16.

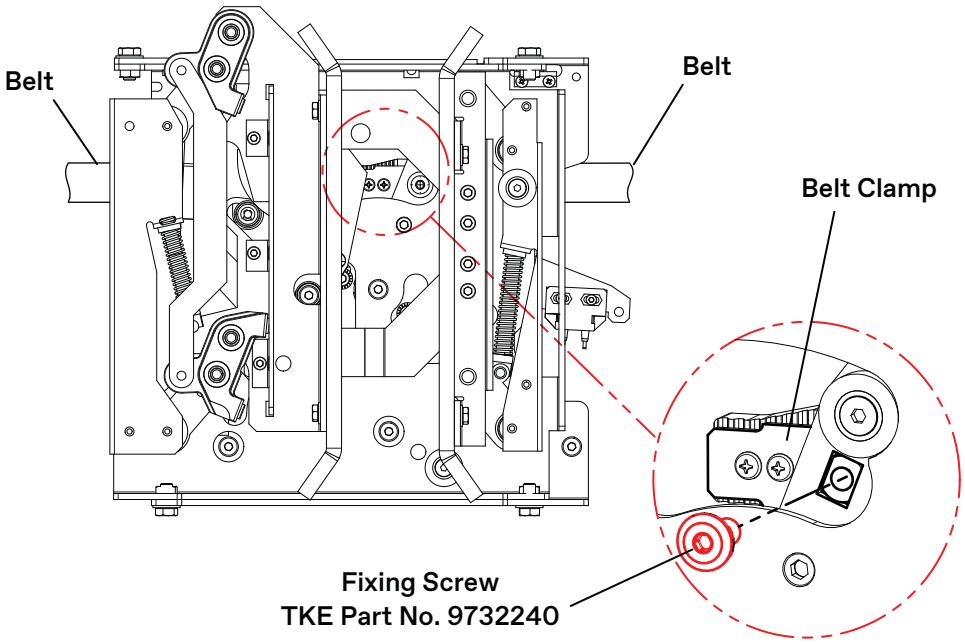

Figure 15 - Attach Clutch to the Belt

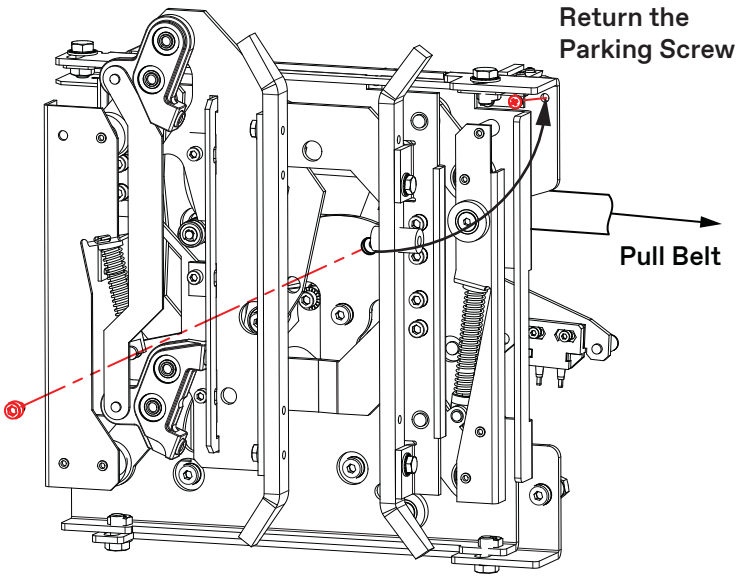

Figure 16 - Unlock the Clutch

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Adjust Door Contacts and Door Lock Contact (Relating Cable Adjustment)

Center-Opening Doors

1. Verify the distance from the bumpers to the pendants is equal for both pendants.

   If the distance is not equal:

   a. Loosen the set screw on the rope guide (relating cable rope guide).

   b. Move the car door hanger until the distance is equal for both pendants.

   c. Tighten the set screws on the rope guide.

All Other Doors

2. When the door lock pins are just touching the door contacts, verify that the measurement between the door hanger and the bumper is $^{1}/_{8}$". See Figure 17.

   If the measurement is not $^{1}/_{8}$":

   a. Loosen the screws.

   b. Move the bracket(s).

   c. Verify that the measurement is $^{1}/_{8}$".

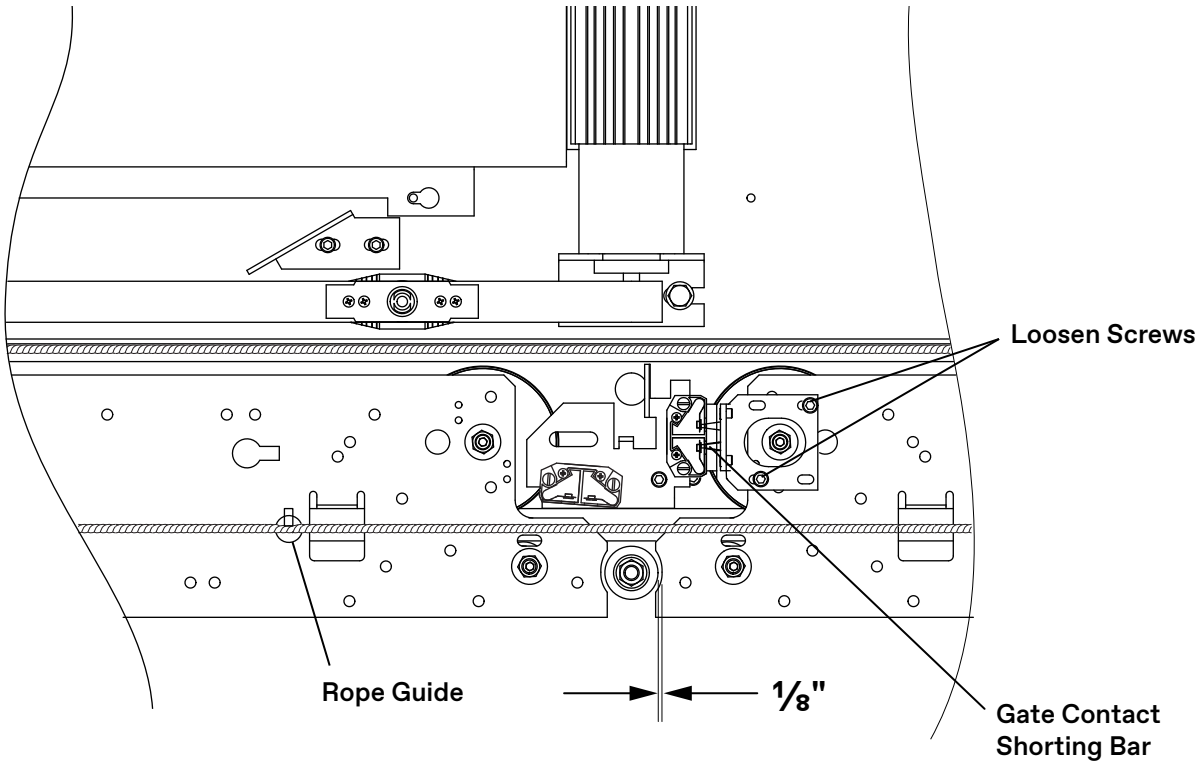

Figure 17 - Adjust Door Contacts/Door Lock Contact (Center-Opening Shown)

Adjust Car Door Interlock/Restrictor

The horizontal location of the car door interlock/restrictor ramp determines when the restrictor latch starts to open as the car door reaches a fully closed position. See Figure 18.

Troubleshooting

Problem	Reason	Solution
Car door interlock/ restrictor does not open.	Hoistway door is already closed.	Move car door interlock/restrictor ramp in the Door Open direction.
Hoistway door is not locked and car door is closed.	Hoistway door latch does not lock because of closing force, wind, or dirt in the sill.	Move car door interlock/restrictor ramp in the Door Close direction.

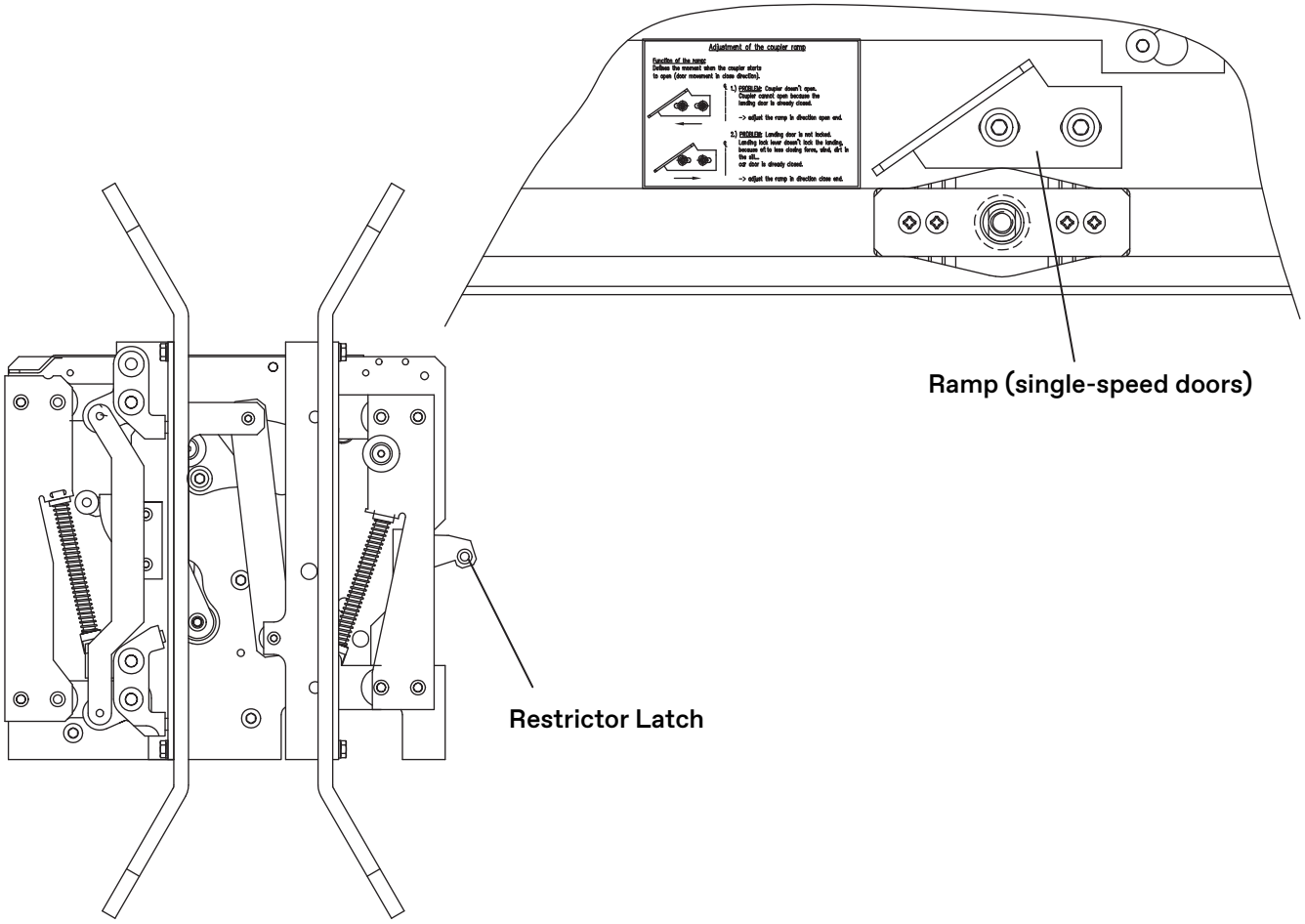

Figure 18 - Adjust Car Door Interlock/Restrictor

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Verify Running Clearances

IMPORTANT!

- To move the doors open under power when not floor level, manually open the clutch to operate the restrictor. See “Block LD-16 Clutch Open” (next section).
- To retract the clutch with the doors all the way closed, move the screw towards the Door Close direction.

Verify that there is a $^{3}/_{8}$" running clearance for the following areas. See Figure 19.

1. Clutch to sill - use the four bolts (see below) for adjustment.

2. Stationary pickup roller to rear clutch cam - after one pickup roller is adjusted, transfer the roller position to the top of the LD-16 header and use this position to set the pickup rollers at all other entrances.

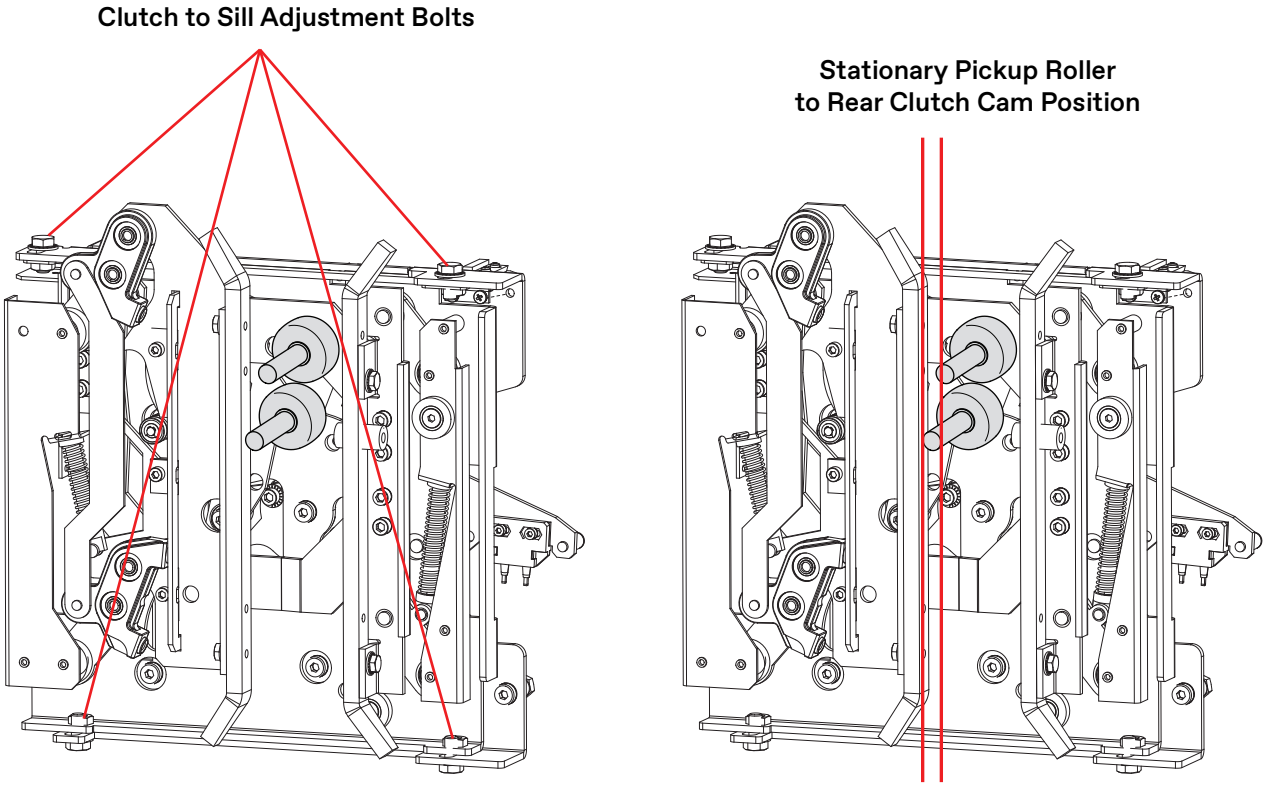

Figure 19 - Verify Running Clearances

Block LD-16 Clutch Open

If it is necessary to move the car with no power to the door operator, block the LD-16 clutch open.

CAUTION

Failure to provide proper clutch-roller clearance will cause roller or clutch damage. Failure to block the clutch open when running the car with the LD-16 powered OFF will cause roller or clutch damage.

1. Remove the screw from the parking position on the clutch. See Figure 20.
2. Open the clutch vanes, and install the screw in the lock position hole.
3. Run the car on Inspection Operation, and check the running clearance between the clutch and the hatch door rollers at each floor. Adjust the hatch door rollers (or clutch) to measure $^{3}/_{8}$" from the back vane of the clutch to the stationary rollers.
4. After checking the running clearance, remove the screw from the lock position hole and reinstall it in the parking position hole.

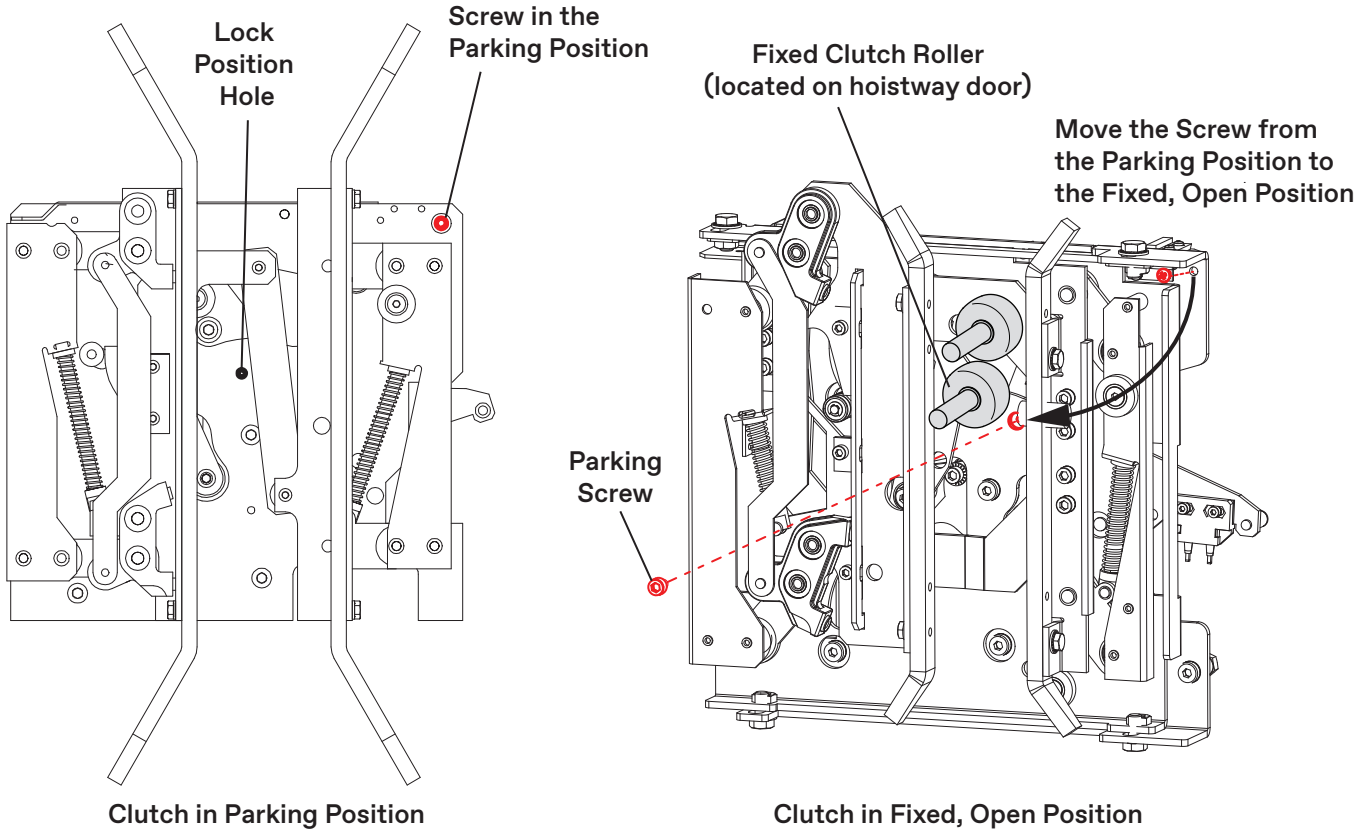

Figure 20 - Block LD-16 Clutch Open

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Door Panel Mounted Clutch

Installation and Adjustment

1. Verify that the clutch with spacer configuration matches the hoistway equipment.
2. Remove and discard 4 shipping nuts from the clutch actuator/restrictor assembly. See Figure 21.
3. Use included hardware to mount the clutch actuator assembly to the hanger plate.
4. Check all clutch bolts and fasteners for tightness (may be loose from shipping).
5. Use 2 Allen screws to connect the clutch assembly to the drive belt.

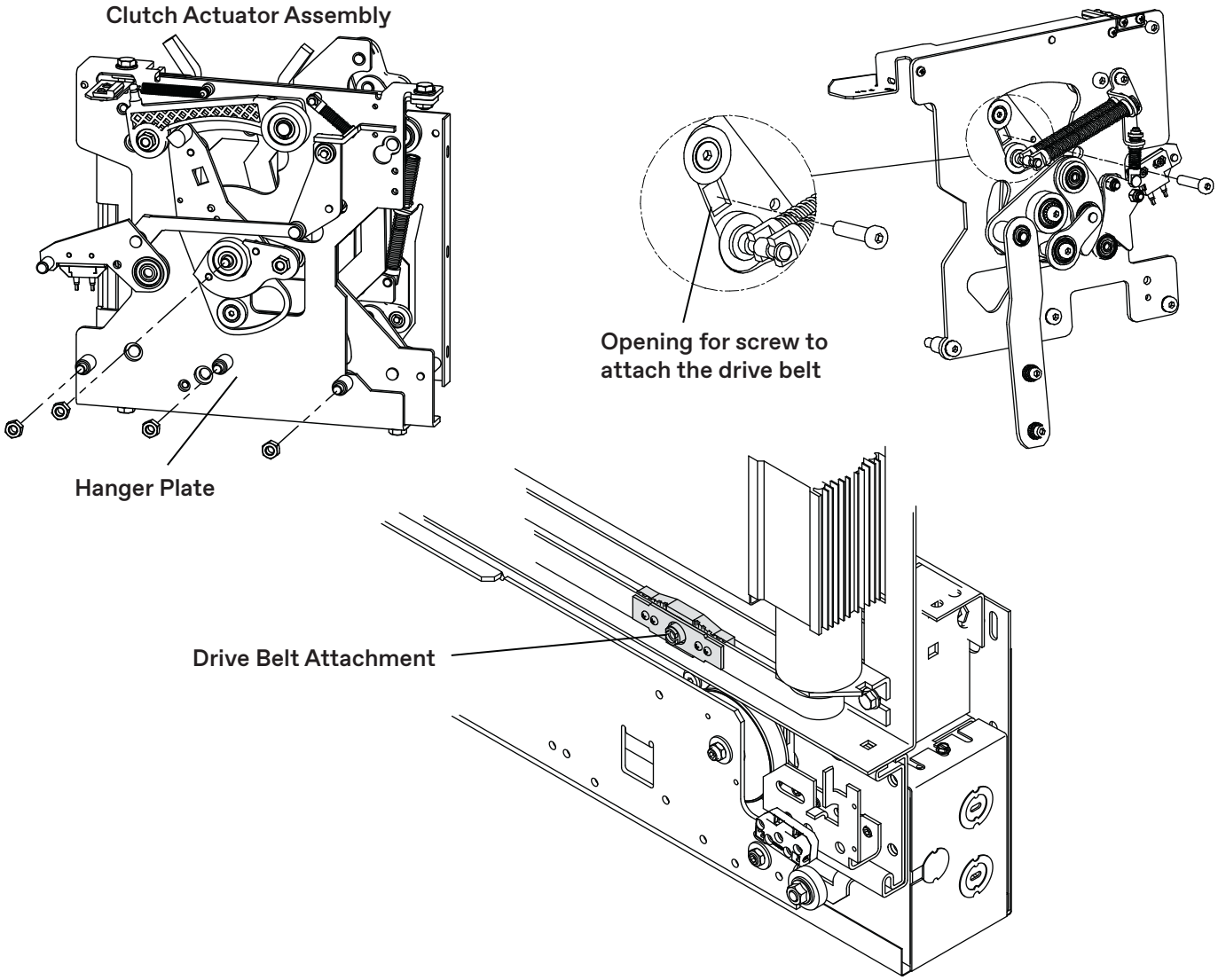

Figure 21 - Clutch Actuator Assembly Installation

Door Panel Mounted Clutch Installation & Adjustment
(continued)

6. Move the car to the tightest hatch pickup roller to car sill clearance location.
7. Mark the level edge of closed door stationary pickup roller location onto the car sill.
8. Close car door and transfer the roller location mark from the car sill to the car door.
9. Install cage nuts in the car door keyslots. If existing keyslots do not exist, scribe the elevation of rollers above the sill; use the clutch baseplate as a drilling template.
10. Use the supplied metric bolts to attach the clutch assembly. See Figure 22.

NOTE Clutch location = the hatch door rollers are centered vertically in the clutch with the car at floor level.

11. Verify that the running clearance is between $^{1}/_{4}$" and $^{5}/_{16}$" with the hatch sill at the tightest landing in the hoistway and adjust as required.
12. Check the alignment and adjust as required.

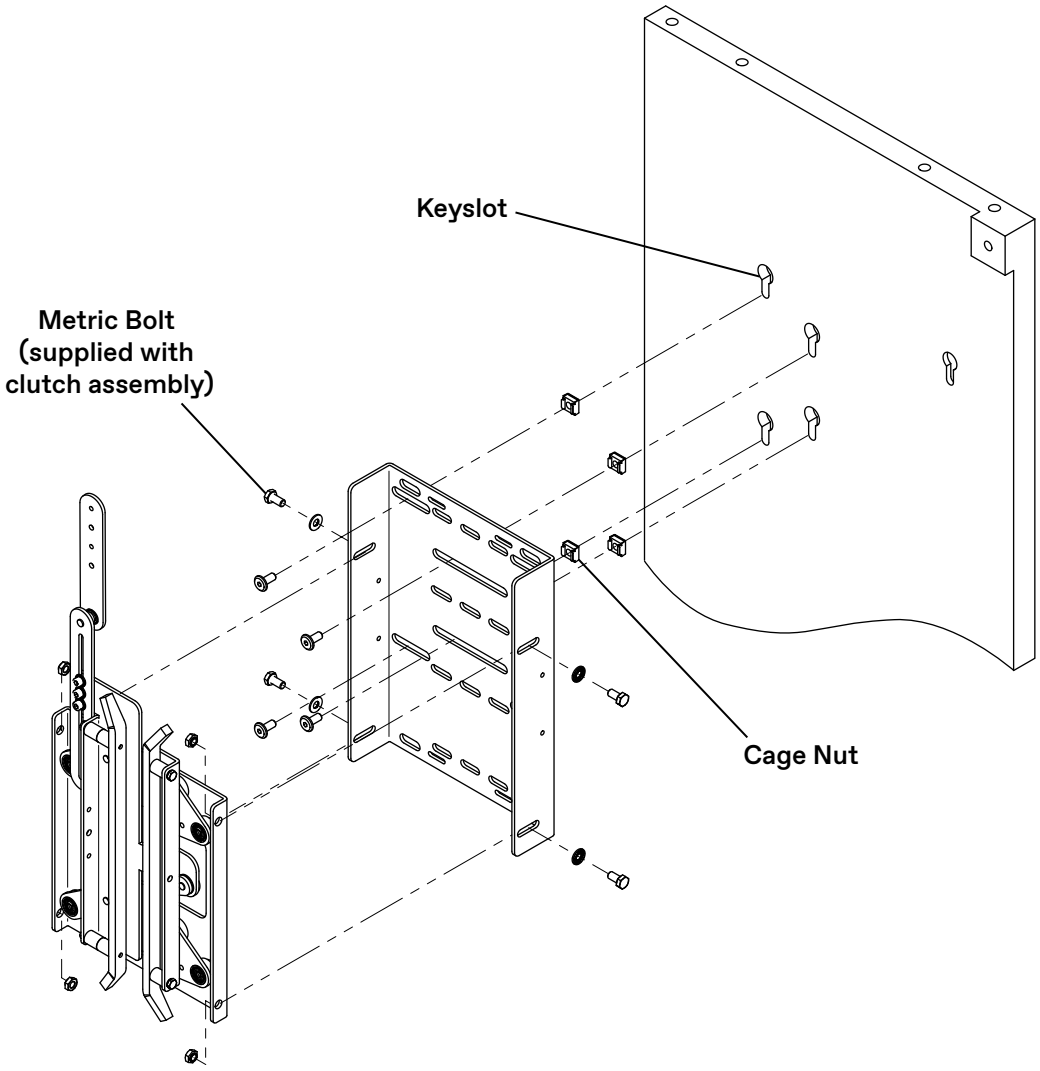

Figure 22 - Clutch Installation

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Door Panel Mounted Clutch Installation & Adjustment
(continued)

13. Use the enclosed hardware screws to connect the door linkages.

14. Adjust clutch and clutch actuator linkage. See Figure 23 below and Figure 24 on page 34.

    a. Place a spacer between the vanes. Use one of the following methods to determine the spacer width:
    - Distance of the squeezed pickup rollers
    - Actual rollers
    - TKE interlock rollers width = $1^{5}/_{8}$"

    b. Use a 5 mm hex key to adjust the linkage length until the lock hook is in the fully lifted position, and tighten the linkage screws. To extend the lengths of the push rod (if needed) use the linkage extensions.

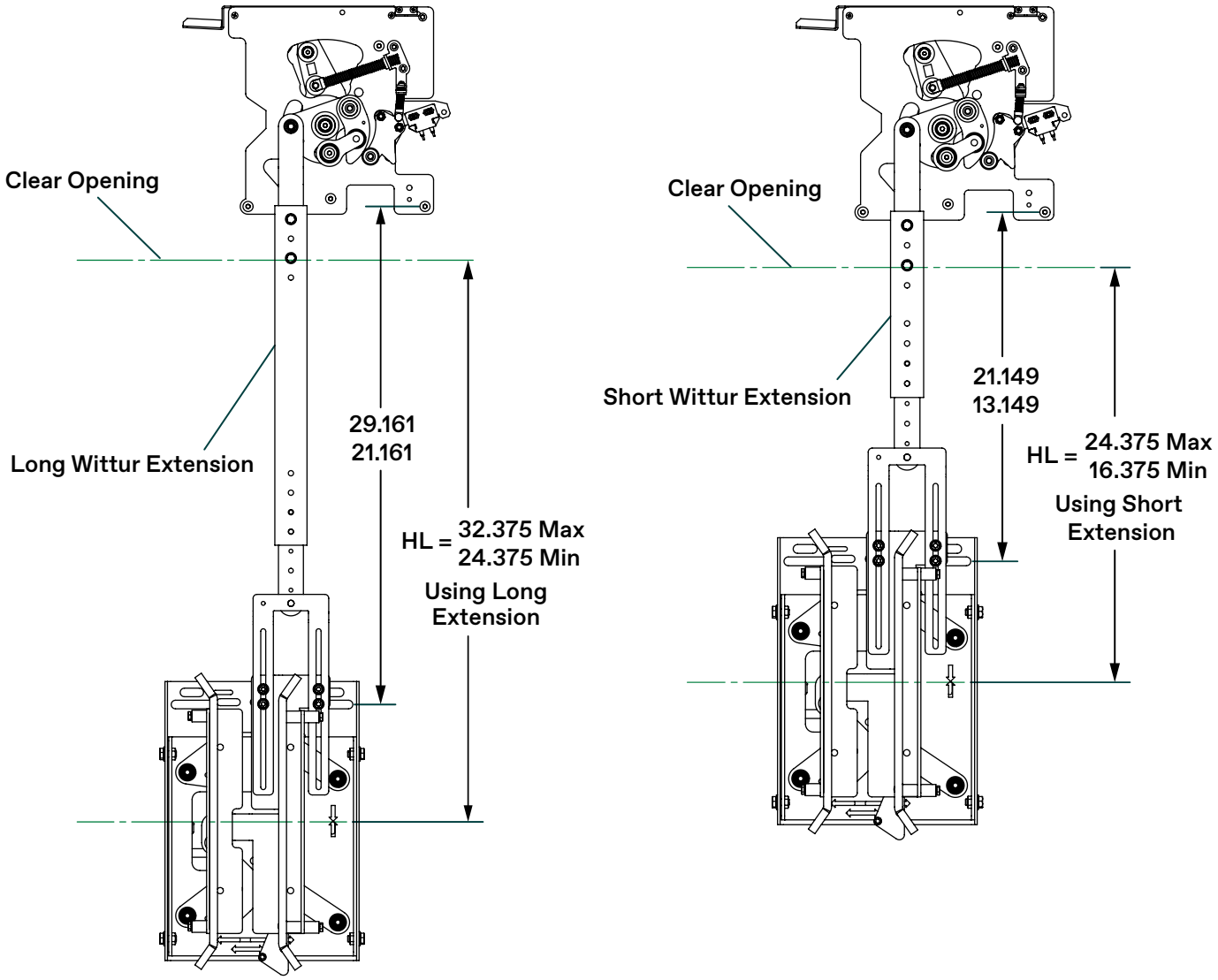

Figure 23 - Adjust Clutch and Linkage - Short and Long Wittur Extensions

Door Panel Mounted Clutch Installation & Adjustment
(continued)

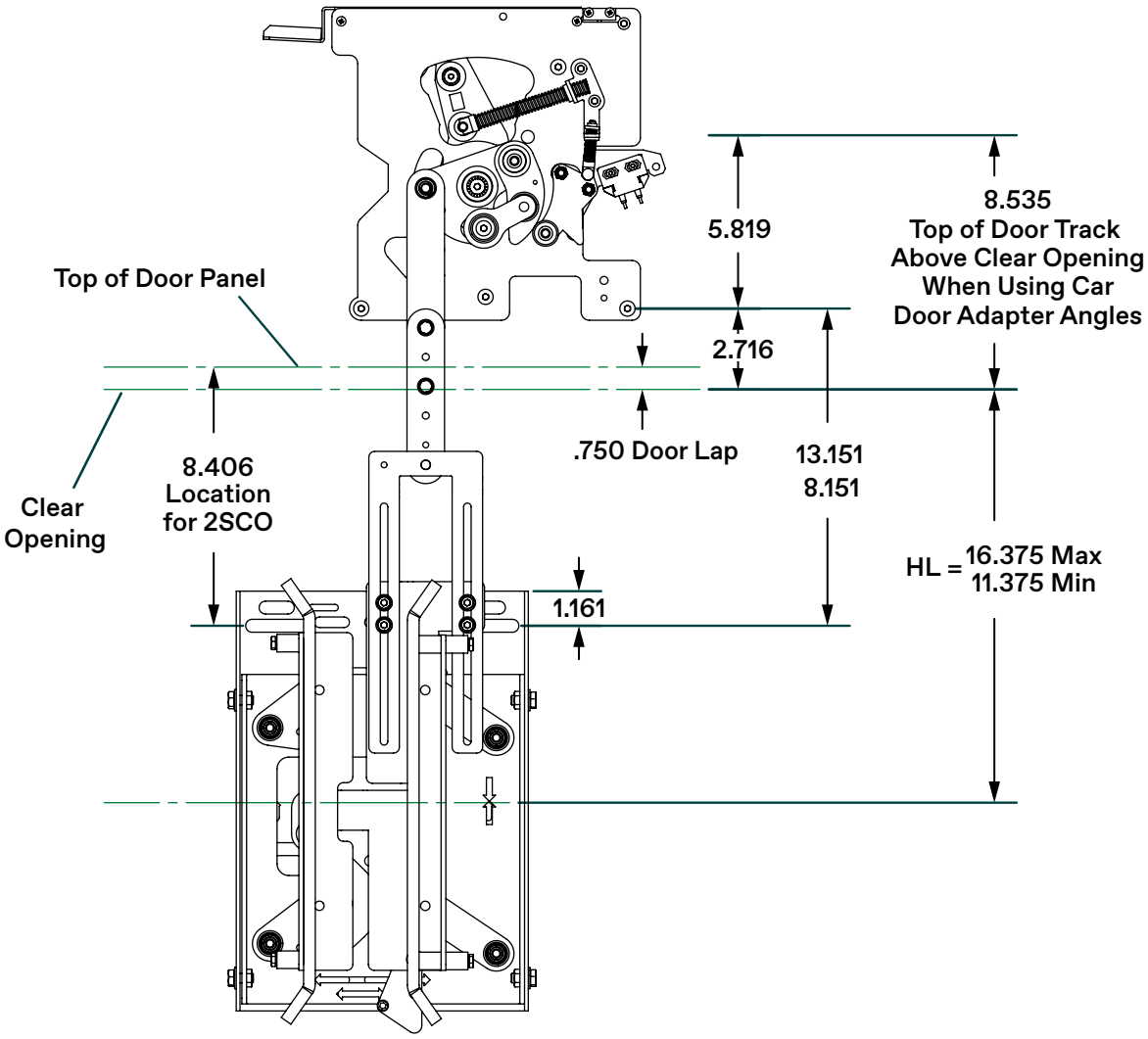

Figure 24 - Adjust Clutch and Linkage

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Install Electronic Edge

1. Install the electronic edge per the included instructions. See also: *Door Protection Installation Manual*.
2. Route cables—avoid tight bends and sharp edges—from the light curtain to the ends of the door track, and secure with cable ties. See Figure 25.
3. Use clips to secure the electronic edge cables to the doors.
4. Route the electronic edge cables up to the top of the door operator C-channel, and secure with cable ties.
5. Route the electronic edge cables to the Door Operator Control Board located behind the cover.
6. Plug in the cable from the receiver to X15 on the Door Operator Control Board.
7. Plug in the cable from the transmitter to X16 on the Door Operator Control Board.

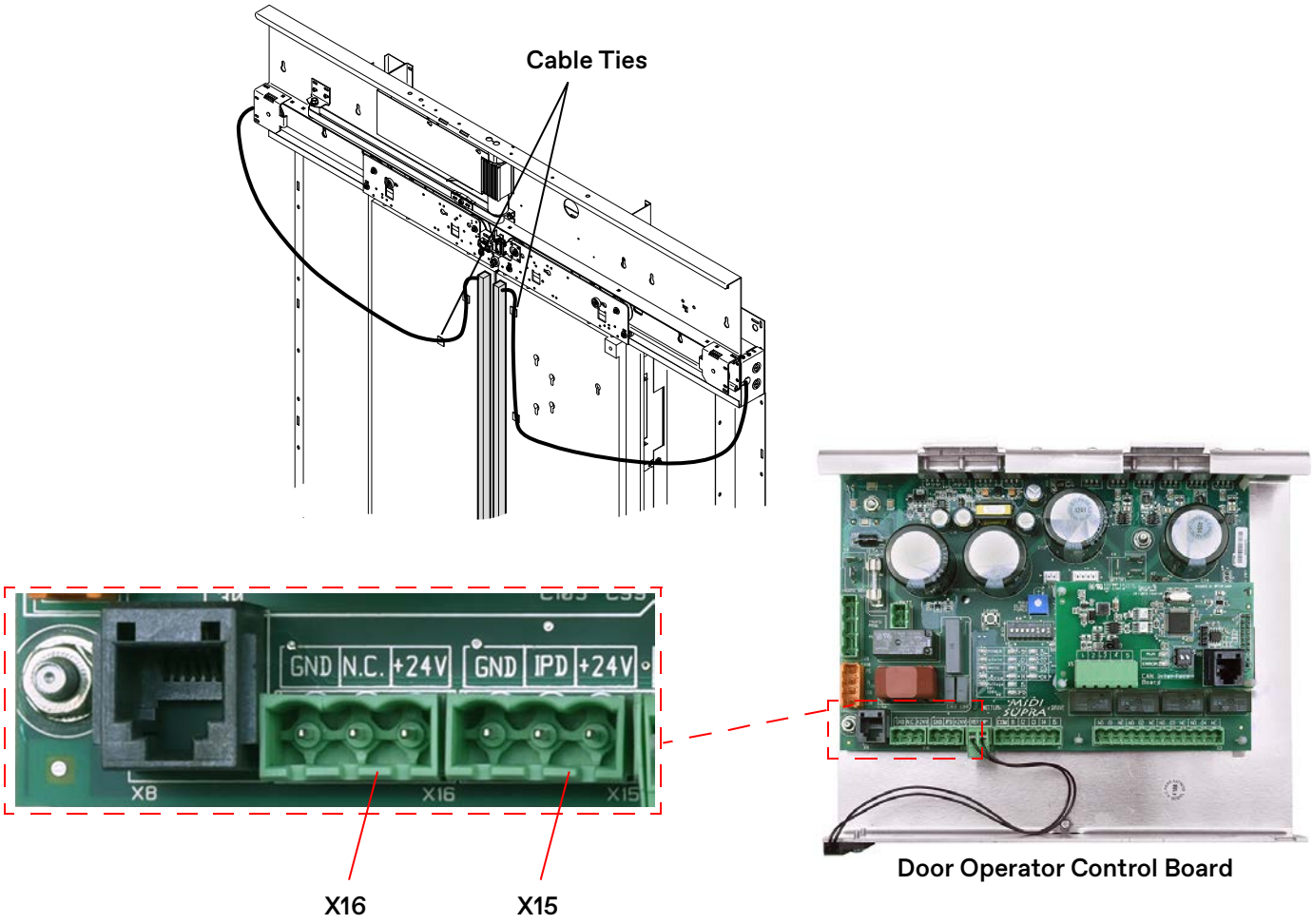

Figure 25 - Install Electronic Edge

Electronic Setup/Adjustment

Wiring

See also: Generic Wiring Diagrams starting on page 65.

1. Verify that the doors are mechanically adjusted for smooth movement with no binding or interference.

2. Remove the cover from the Door Operator Control Board. See Figure 26.
   a. If required, move the car doors partially open.
   b. Loosen 4 screws, slide the cover over and off of the screws, and set the cover aside.

NOTE The Door Operator Control Board should not have power at this point.

3. Attach the previously installed door operator harness and the plugs in the COP to the Door Operator Control Board. See Figure 27 on page 37.

4. Attach the following wires to the ground screws.
   a. Ring lug ground wire from X19.
   b. Ring lug ground wire in the harness from the COP.

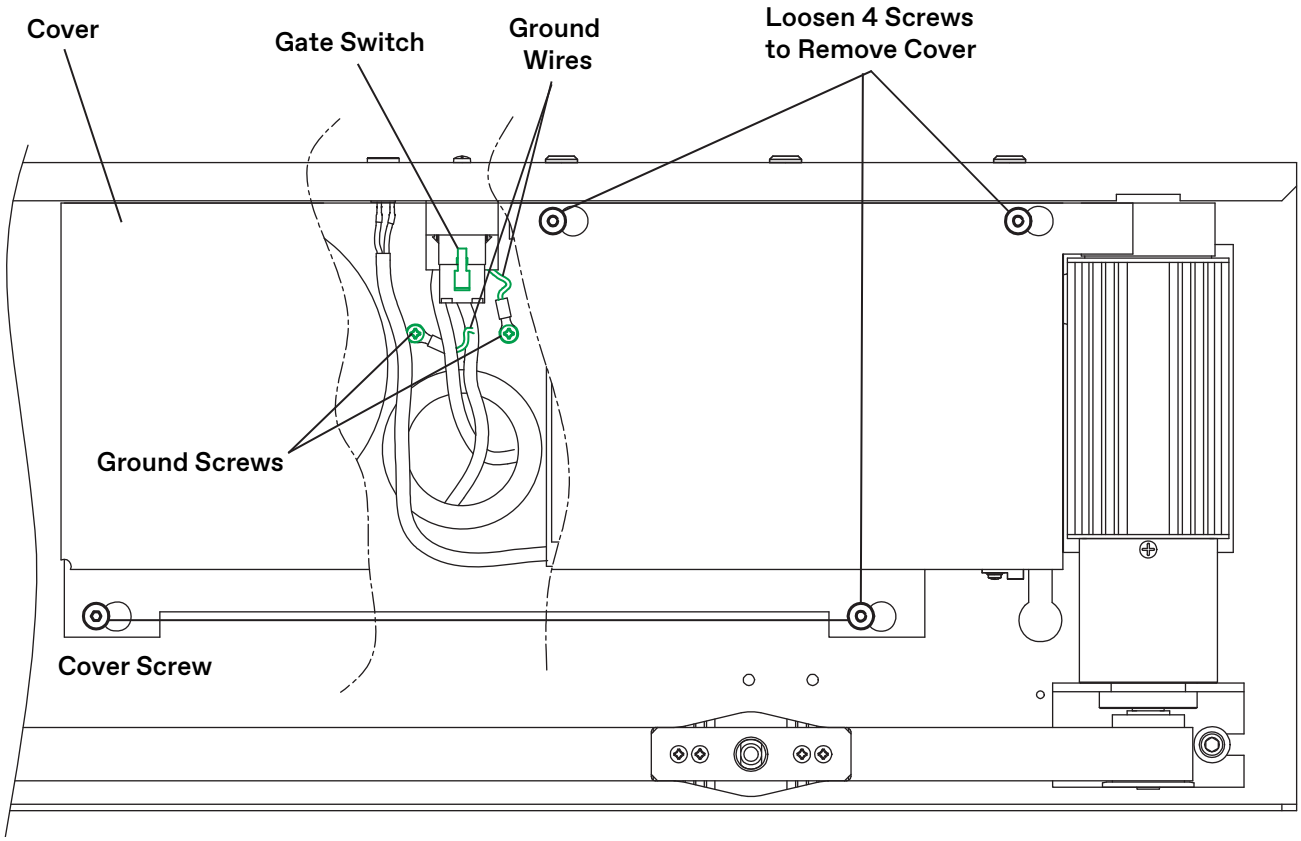

Figure 26 - Remove Cover and Attach Ground Wires

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Wiring
(continued)

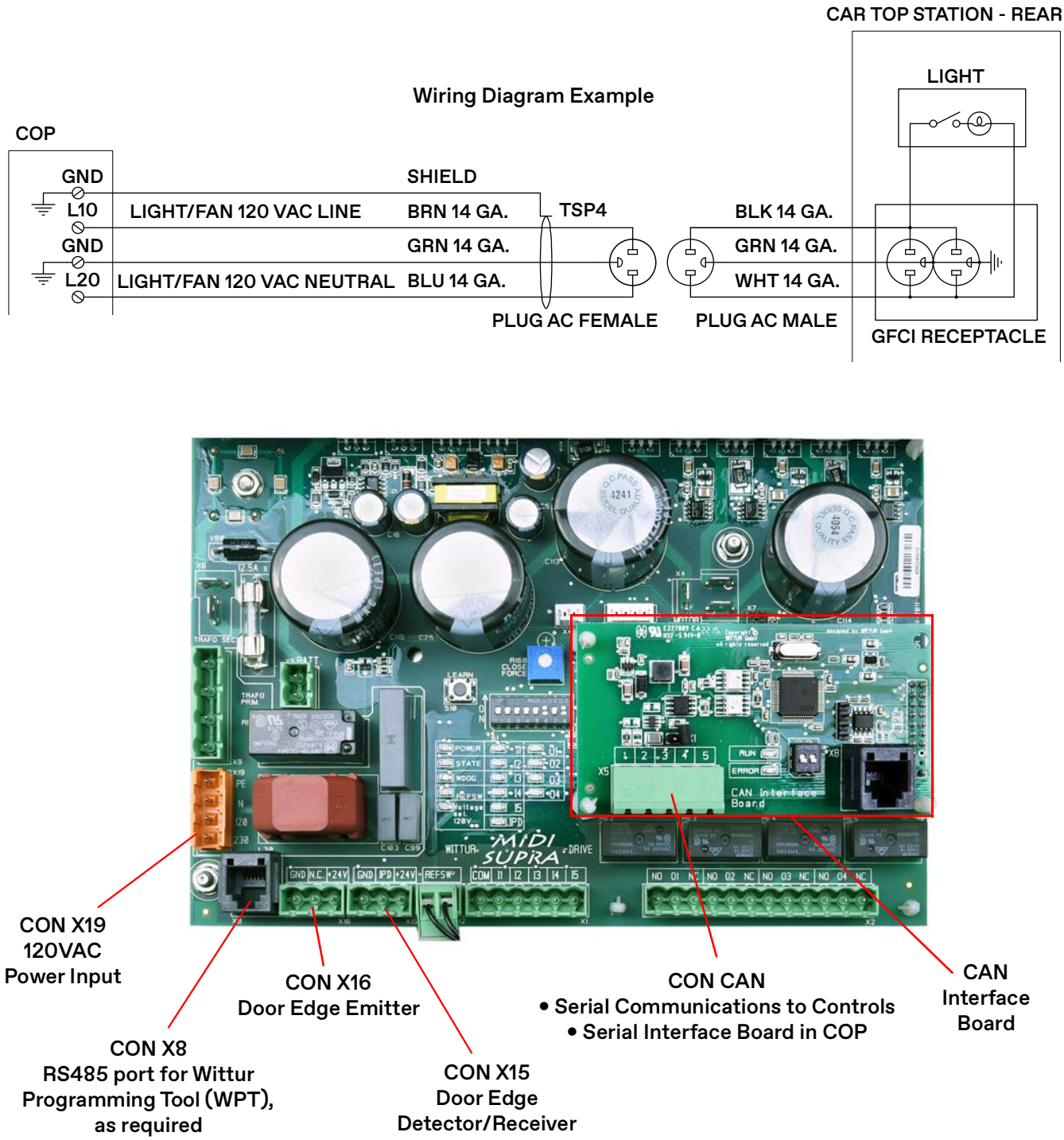
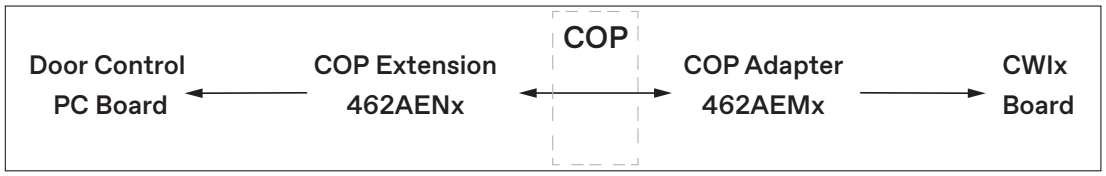


Figure 27 - Wiring Diagram Example and Harness Connections

Harness Assemblies

Harness Assemblies Installation Overview



The 120VAC female plug receptacle powers the GFCI receptacle in the CTS

Car Operating Panel (COP) Adapter, 462AEM_;
diagrams start on page 61.

Print No	Type	Location	Use
462AEM008	Operator	Front	ICON
462AEM009	Operator	Rear	ICON
462AEM011	Inspection	Front	TAC22, ICON
462AEM013	485, Alarm	Front	ICON
462AEM014	485	Rear	ICON

Car Operating Panel (COP) Extension, 462AEN_;
diagrams start on page 63.

Print No	Type	Location	Length (ft.)
462AEN001	With Inspection	Front	12
462AEN002	Without Inspection	Rear	32
462AEN004	Without Inspection	Front	6
462AEN005	Add On	Front	12
462AEN006	Add On	Rear	32

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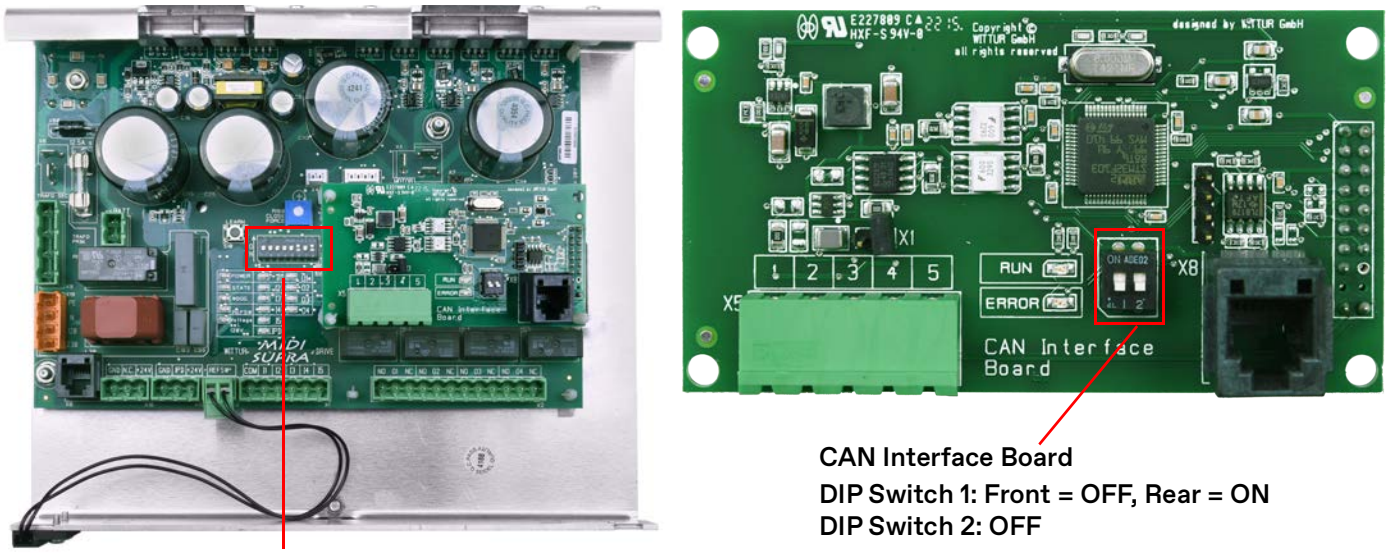
DIP Switch Settings

CAUTION **Disconnect power from door operator when changing DIP Switch settings.**

Verify DIP Switch settings. See Figure 28 and Table 1 below, and Table 2 on page 40.



Door Operator Control Board
DIP Switch 2 & 8 = ON
All Others = OFF

CAN Interface Board
DIP Switch 1: Front = OFF, Rear = ON
DIP Switch 2: OFF

Figure 28 - DIP Switch Default Settings

Switch No.	ON	OFF
1/1*	Test Drive Button Operation (Buttons active) Performs same function as TEST/RUN.	Normal Operation (Command Inputs Active)
1/2	Automatic Reopen on Obstruction or IPD (Reopen O3 is switched as long as Reopen is in progress)	No Automatic Reopen (Only Reopen O3 is switched)
1/3	Electric Shoe Operation, Command Input Always I1 (Swing Door Mode) (*)	Normal Operation (Command Inputs Active)
1/4	Reduced Motor Torque Used	Maximal Possible Motor Torque Used
1/5 1/6	Speed Adjustment, Binary Coded (Only used on discrete interfaces)	
1/7	Open Force Limitation Active	No Open Force Limitation
1/8	Automatic End-Keeping	Hold Open/Closed Only on Active Open/Close Command

Table 1 - DIP Switch Definitions of the Door Operator Control Board

DIP Switch Settings
(continued)

LED	Application	Description - When Illuminated
I1	Discrete Input Status	Discrete input I1 is active - Open command (connected to COM)
I2		Discrete input I2 is active - Close command (connected to COM)
I3		Discrete input I3 is active - Nudging command (connected to COM)
I4		Discrete input I4 is active - Inspection command (connected to COM)
I5		Discrete input I5 is active - Alt speed profile command (connected to COM)
IPD	Input - Passenger Detection	Light curtain signal is active - Doors are obstructed
O1	Discrete Output Status	Discrete output O1 is active - Door Open Limit - relay is ON and serial bit sent
O2		Discrete output O2 is active - Door Close Limit- relay is ON and serial bit sent
O3		Discrete output O3 is active - Reopening - relay is ON
O4		Discrete output O4 is active - SIX Inch Limit- relay is ON and serial bit sent
POWER	Board Power Supply	Board power supply is ON
WDOG	Microprocessor Function	Board microprocessor is not executing software - locked up
REFSW	Closed Limit Area	Car door is in the REFSW area - closed limit area, REFSW is active
Voltage Sel 120VAC	120VAC Supply Selected	120VAC power input is selected and active
STATE	—	OFF = Normal Operation
	—	Constant ON = Learn Mode and Start Up
	Error/Status See Troubleshooting Guide on page 47	Flashing: 1X = Motor or encoder fault 3X = Internal board fault 4X = Abnormal operation 5X = Learn error

Table 2 - Door Operator Control Board LEDs

Learn Door Travel

CAUTION **Before performing a Learn Door Travel Procedure, install a tie wrap to keep the CDI picked and eliminate the risk of getting fingers pinched.**

1. Place the elevator on Inspection Operation, and manually close the doors.
2. Power up door operator, and verify the following LEDs. See Figure 29 on page 41.
   a. POWER, VOLTAGE SEL 120VAC, and REFSW are illuminated.
   b. WDOG is not illuminated.
3. Press **LEARN**, and then release it. The **STATE** LED should flash 2 or 3 times and then remain illuminated; If it remains in the flashing mode, there is an error and setup cannot proceed. The first LEARN cycle will operate at a reduced speed.
   a. Press and hold **DOOR CLOSE** until **02** and **REFSW** LEDs illuminate—the door will jerk and then start powered motion to learn the direction and the closed limit. If the doors move open, continue to press **DOOR CLOSE** until the doors move in the correct direction and **02** illuminates.
   b. Pick the Car Door Interlock (CDI).

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Learn Door Travel
(continued)

c. Press and hold **DOOR OPEN** until the door is fully open on its door stop bumper and the **01** LED illuminates.

d. Press **DOOR CLOSE** until the 02 LED light illuminates.

e. Press **DOOR OPEN** until the 02 LED illuminates again. When the **STATE** LED is not illuminated, a LEARN Run Scan has been completed.

f. Repeat Step a and Step c until **STATE** LED is not illuminated.

- The doors have learned the hardware parameters. Door direction, opening width, and clutch width are retained until manually reset or re-learned.
- A soft learn (used for fine-tuning the belt position) must happen after every power cycle. In this case, the door will not move itself to LEARN, but will LEARN while moving.

4. Rotate the TEST/RUN switch to the RUN position. The door system is now capable of Automatic Operation, and learned parameters are automatically saved.

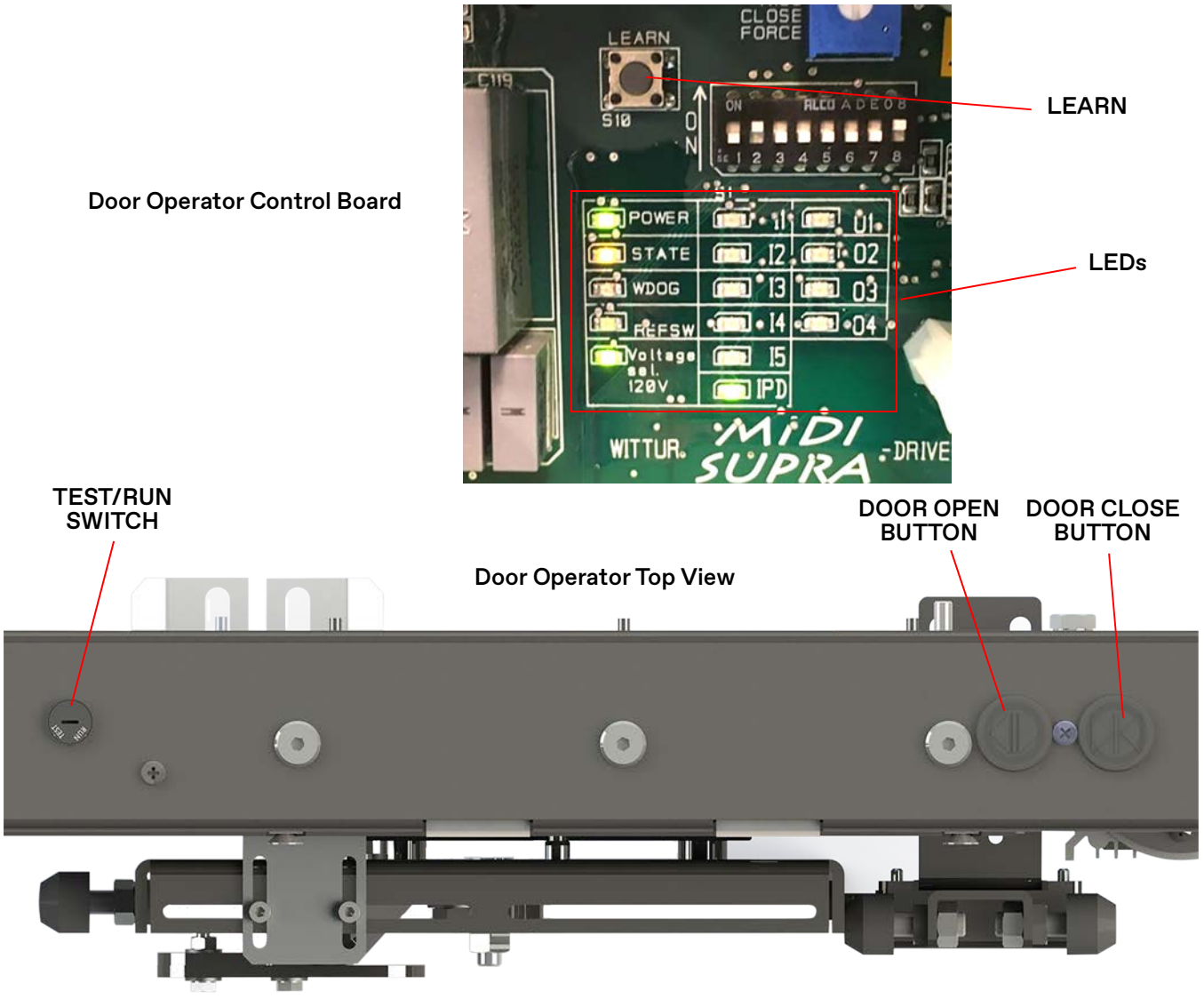

Figure 29 - LEDs and Test Buttons for Learn Door Travel

Speed Pattern Adjustment with the Wittur Programming Tool (WPT)

The LD-16 Door Operator is shipped with standard speed pattern default settings for the open and close movement profiles (doors come pre-adjusted, but nudging and closing force must always be adjusted per car). However, these default speed pattern settings may not provide the operation desired. Operate the elevator on Automatic Operation to observe the default door operation and, if modifications are desired, perform the Speed Pattern Adjustment process.

Use with: *Programming Tool WPT* manual (located in the WPT Kit, see page 60).

The port for the WPT on door card is only active when the CAN interface card communications are removed (uncoupling door operator from the ICON32 control system). When this link is removed, automatic cycling of doors from the ICON32 control system is not possible.

Use the following procedure for the Wittur door system on an ICON32 control system.

Automatic Door Cycling During Adjustment Procedure

See Figure 30 on page 43 for all steps in this procedure.

1. Place the car on Inspection Operation, then power down and remove the X5 plug from the CAN Interface card (located on top of the door card). Power back up, and the Wittur tool communications and the X1 discrete door movement inputs are now enabled.

2. Construct a reusable harness long enough to use the WPT and also reach the door operator so that when the car is placed below floor level, or if working from the car top, the use of the X1 wires can initiate door movement.

3. Use plug 292PG6 as the male portion of X1 and install wires in the plug to correspond with the inputs in Figure 30.

4. To activate the input, connect the COM wire to any one of the other five wires.
   - inputs are active low = goes to ground to activate.
   - When the X1 inputs are used and the input is activated, the corresponding card LED will light up. See Table 3 on page 44.

5. Once all door adjustments have been performed and saved, **power down** and remove the reusable harness.

6. Reinstall the X5 plug onto the CAN Interface card (located on top of the door card).

7. Power up, test, and verify door operation.

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Automatic Door Cycling During Adjustment Procedure
(continued)

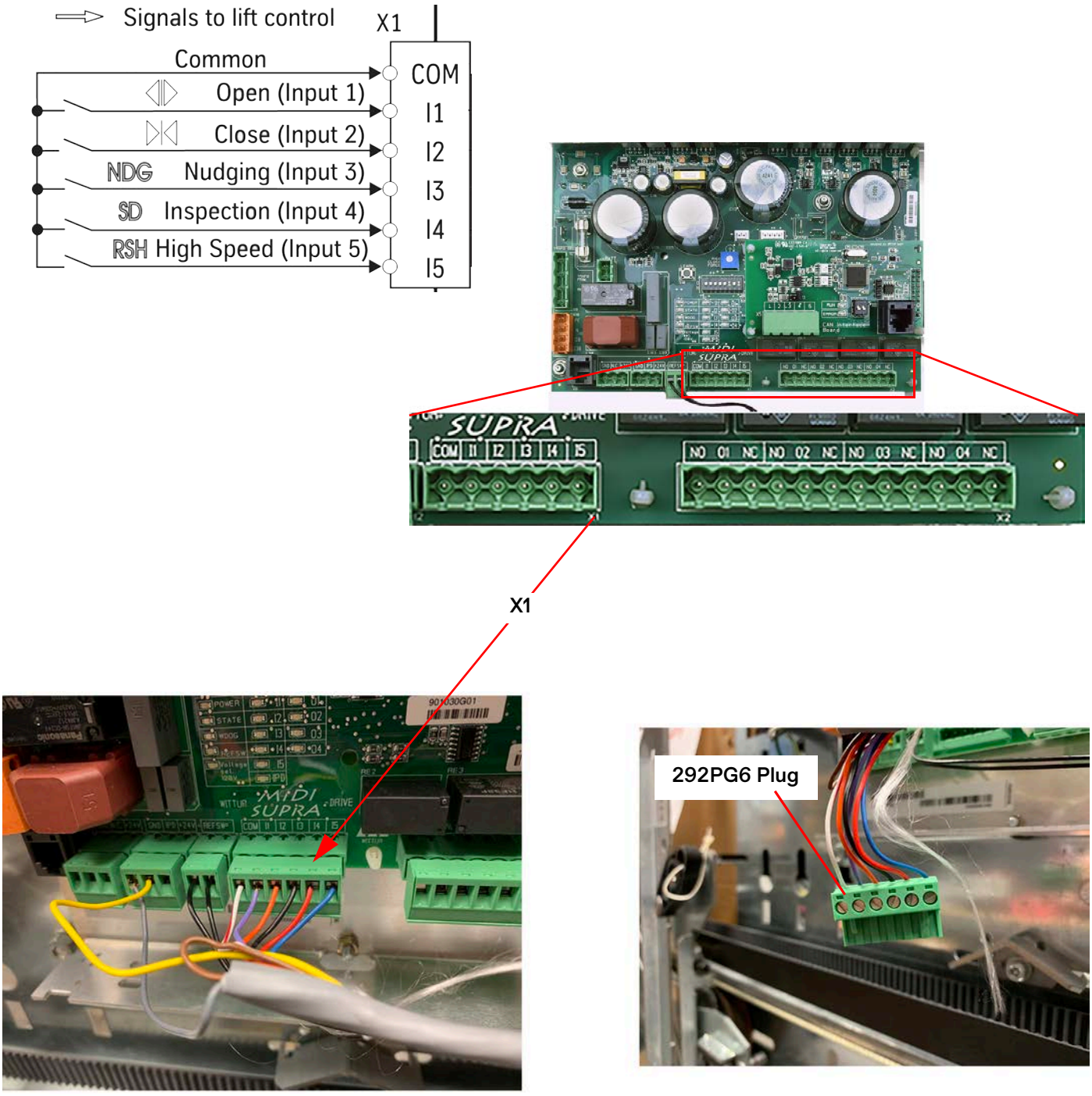

Figure 30 - X1 Inputs on Door Board

Automatic Door Cycling During Adjustment Procedure
(continued)

LED	Name	Definition
I1	OPEN Command	Drives the door in the open direction until the open position is reached. Input must be maintained all the way to the mechanical open stop. Automatic End-Keeping - DIP Switch 8 = ON; the door card and motor torque keeps doors open with this commend being active. Use If the control system does not maintain the Open Command input when DOL is reached.
I2	CLOSE Command	Drives the door in the closed direction until the closed position is reached. Input must be maintained all the way to the mechanical close stop. Automatic End-Keeping - DIP Switch 8 = ON; the door card and motor torque keeps doors closed with this commend being active. Use If the control system does not maintain the Close Command input when DOL is reached.
I3	NUDGING Command	Activates the nudging door slow speed for the Close cycle. Input must be maintained all the way to the mechanical close stop. Smoke-sensitive devices (photo cell/light curtain--IPD input) & closing force reopen ignored.
I4	INSPECTION Command	Deactivates all inputs at the X1 plug and activates the door operator test drive buttons (same function as DIP Switch 1). The X2 outputs still functional when input is active.
I5	ALT SPEED Command	Selects a higher Open or Close speed profile when active and used with an Open or Close Command input (same function as DIP Switch 6). DIP Switches 5 & 6 = OFF, speed pattern 1 in effect input selects pattern 3. DIP Switches 5 = ON & 6 = OFF, speed pattern 2 in effect input selects pattern 4. DIP Switch 6 = ON, no change.

Table 3 - Wittur Door Card X1 Discrete Input Command Descriptions and LEDs

Table 3 Notes:

- The movement input wires must be maintained so that the input is active all the way to the door limit or the doors will stop mid-travel.
- For normal speed pattern adjustment, the open and close commands can be used to cycle the doors to see the door operation results after adjustment changes.
- Use the nudging input to set the Nudging duty/speed.
- Use the Inspection input to enable the slow speed buttons on the operator frame and inhibit the other X1 inputs (same function as DIP Switch #1).

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Closing Force Adjustment - 30 lbs. Maximum

1. Place the car at floor level on Inspection Operation.
2. Rotate the TEST/RUN switch to the TEST position.
3. Use the kinetic force gauge (part no. 9869657) to measure the closing force, and press DOOR CLOSE to close the doors. Do not apply closing force for more than 10 seconds at a time. See Figure 31.

- If required, reduce the closing force by turning the Close Force Potentiometer counterclockwise; remeasure and repeat until closing force is within limits.
- To control kinetic energy, reduce door closing top speed within code requirements.

4. Rotate the TEST/RUN switch to the RUN position.

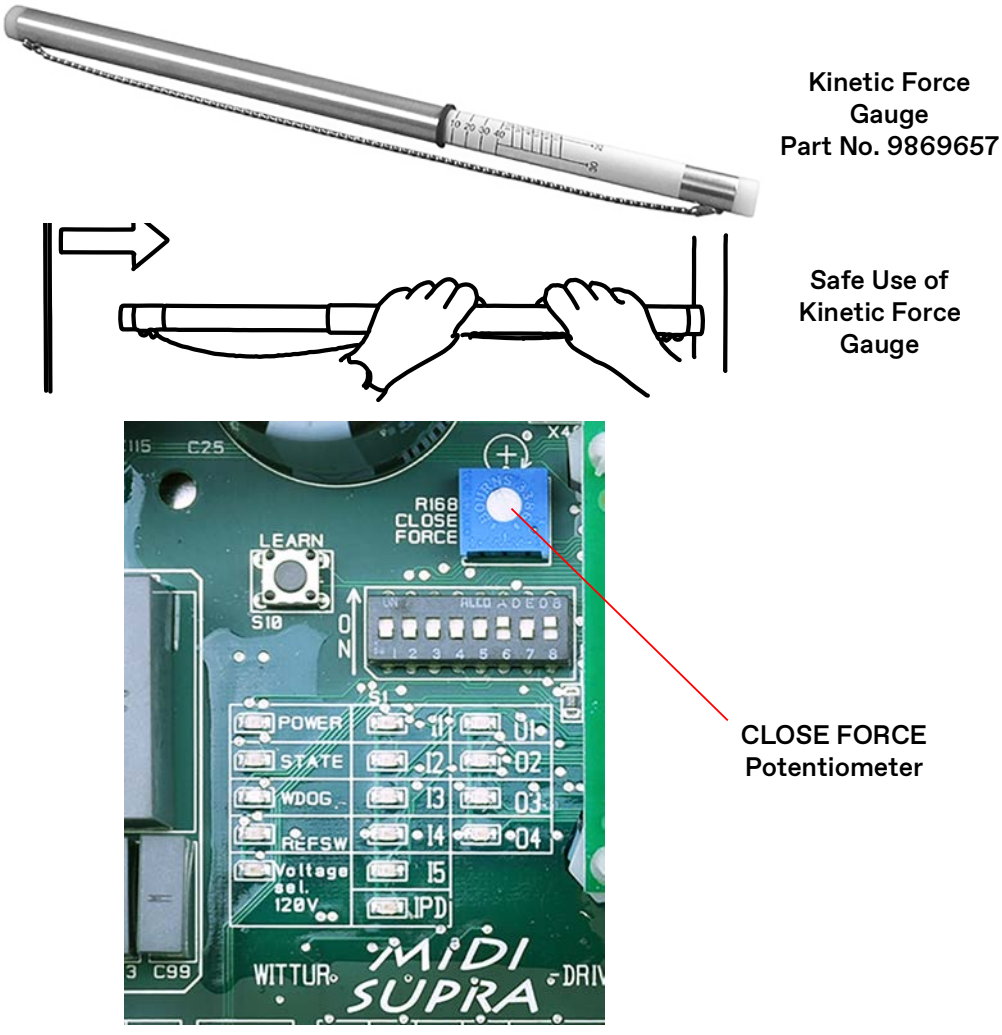

Figure 31 - Closing Force Gauge

Diagnostics

Fault Codes

WPT Tool Mnemonic	Description
PS	Parameter set error
EE	EEPROM writing or reading fault
OC	Overcurrent
RS	Faulty reference switch
IE	Internal software fault
AP	Fault by position counter, door width > 3.5m
TS	Faulty temperature sensor
NE	Encoder not connected
CF	Closing force potentiometer defect
ME	Fault by motor or encoder
SS	Standstill fault, door is blocked
TH	Temperature of the electronic or motor too high
FE	Set during manual change of coupler movement parameter
ES	Fault by encoder, signals out of limits
PI	Position input (ABSPOS) Invalid
BE	Electrical error during rotor angle detection, no current is flowing (motor not connected)
BM	Mechanical error during rotor angle detection; door stalled wrong rotation direction; press LEARN.

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Troubleshooting Guide

Problem	Possible Causes or Solutions
The Door Does Not Move At All	Blinking STATE LED = Fault; the fault codes can be read by WPT. STATE LED (# blinks) Fault Type (1) Motor or Encoder Fault (3) Internal Board Fault (4) Abnormal Operation (5) Learn Error 1. Check that the power is ON. The POWER LED must illuminate if X19 is connected and the circuit breaker in the elevator control panel is ON. 2. Check WD LED. If continuous light/blink, switch OFF/ON or replace electronic unit. 3. Verify that the motor and encoder wires (plug X4 and X10) are correctly connected and that the motor is not overheated. 4. Verify that the control panel is sending an Open or Close Command. • Discrete interface system: I1-I2/X1, LED I1, I2 • Serial system: see Serial Communications on page 48. 5. Verify that the friction is not too high when the door is manually moved. If the STATE LED flashes, use WPT to read the faults; switch OFF/ON. 6. Verify the DIP Switch settings.
The Door Does Not Reopen	1. When Automatic Reopen is selected (DIP switch S1/2 is ON), an Automatic Reopen process is executed by the IPD input (safety edge input) or by the Close Force Limiter. 2. Check the following reopen devices: • Curtain of Light: not defected or dirty. • Close Force Limiter: friction is not too high.
Faults Cause Reset or Switch Off	Blinking STATE LED = Fault; the fault codes can be read by WPT. STATE LED (# blinks) Fault Type (1) Motor or encoder short circuit - open wires and/or missing signals. (3) Overcurrent, e.g., power stage or motor short circuit. (3) Internal electronic fault. (4) Door mechanically blocked. (5) Mechanical end not found (>=3.5m). OFF - Undervoltage; supply voltage is measured and if too low, power stage switches OFF.
Faults Decrease Door Performance	Blinking STATE LED = Fault; the fault codes can be read by WPT. STATE LED (# blinks) Fault Type (4) Motor and/or power stage temperature too high, and the software reduces the motor power. If the temperature exceeds a higher limit, the power stage is shut down for cooling. (5) Faulty reference switch. OFF - Low voltage supply, low line voltage.

Serial Communications

- The outputs exit the Door Operator Control Board at plug X2 and are dry contacts of the four relays on the board. See Figure 32.
- The relay output contacts are rated at 5A, 30VDC or 5A, 250VAC.
- The X2 plug provides normally open and normally closed contacts for each output signal with a separate common for each to facilitate different logic states.
- The output relays activate, and their contacts change state when the respective door position or function has been reached, and are maintained as long as equivalent serial signal is sent as well.
- On serial systems, if required, the output relay contacts at the X2 plug may be used for a Field-added function outside of door control.
- The 01-04 Door Operator Control Board LEDs may be used to monitor output states.

LED	LED illuminates when:	
01	DOL is sent serially (doors on the open limit)	
02	DCL is sent serially (doors on the closed limit)	
03	Doors are reopening due to safety edge or closing force limiter (not sent serially).	
04	SIX is sent serially (doors are in the as-adjusted 6" from closed limit position window)	
Term.	**Output Name**	**Output Description**
01	Door Open Limit	Activates when car doors reach fully open position; active until car doors move off this position.
02	Door Closed Limit	Activates when car doors reach fully closed position; active until car doors move off this position.
03	Reopening	Activates when reopen request comes into door board from the light curtain or closing force limiter, or whenever an Automatic Reopen is performed. Typically, the light curtain is connected to the door board's X15/X16 plugs and DIP switch 2 is ON.
04	SIX	Activates when car doors reach a preset position (6 inch from closed point) in travel. Output is active if doors are between closed limit and preset position. To adjust this preset position, use the WPT Position Out Adjustment.

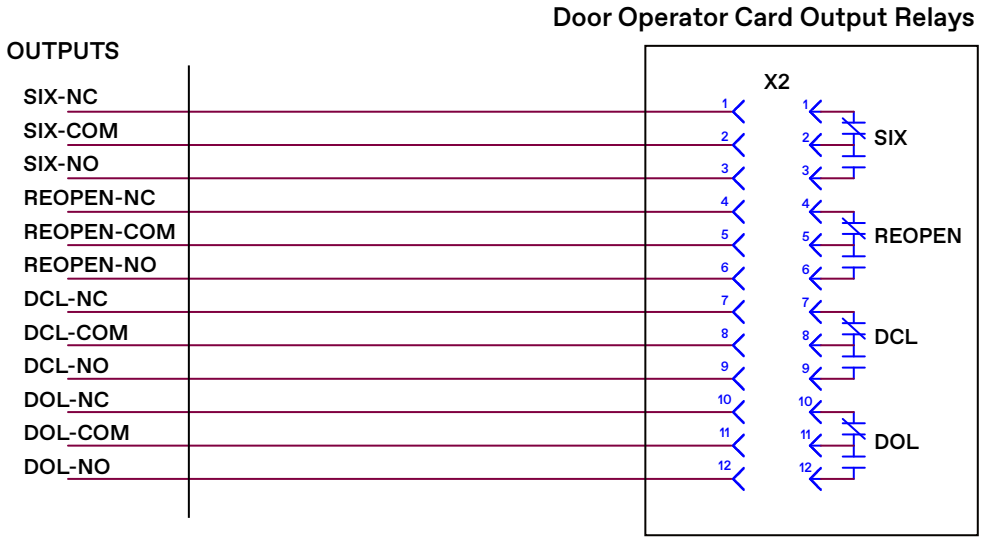

Figure 32 - Door Operator Control Board Output LEDs and Output Relays

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Serial Interface Board Overview

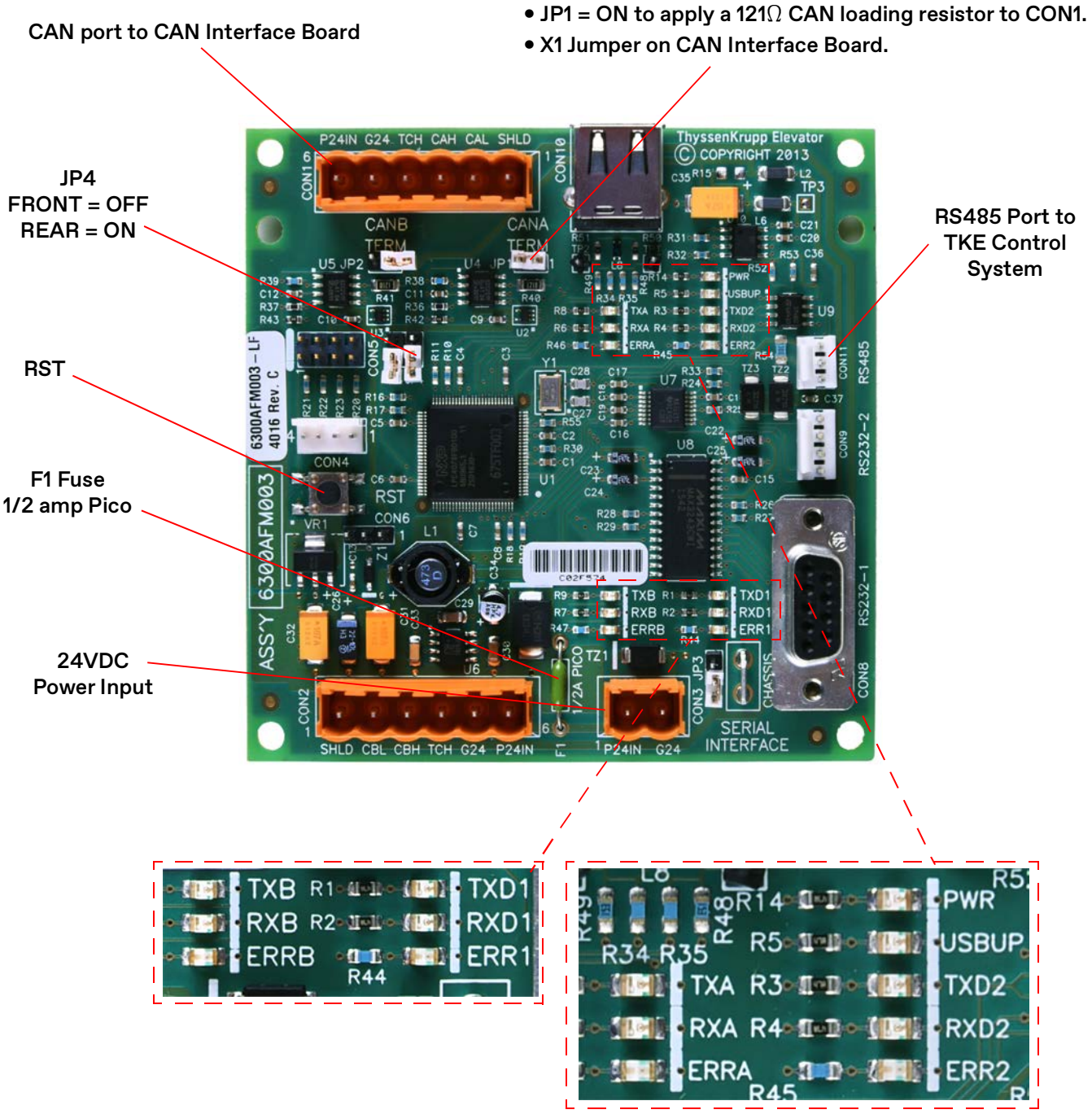

Figure 33 - Serial Interface Board (6300AFM)

Serial Interface Board LED Definitions

LED	Color	Use	Status	Definition
PWR	Green	24VDC Power Input	ON	• +24VDC correct at CON3. • F1 fuse is functional. • All low voltage power supplies are functional.
TXA	Green	CAN Packet Transmit	Blinking	CAN comm. transmitted from CON1 to CAN Interface Board.
RXA	Green	CAN Packet Receipt	Blinking	CAN comm. received at CON1 from the CAN Interface Board.
ERRA	Red	CAN Packet Errors	Blinking or ON	Serial Interface Board detecting CAN packet errors.
TXD2	Green	RS485 Packet Transmit	Blinking	RS485 comm. transmit from CON11 to TKE control CPU.
RXD2	Green	RS485 Packet Receipt	Blinking	RS485 comm. rec'd at CON11 from TKE control system CPU.
ERR2	Red	RS485 Packet Errors	Blinking or ON	Serial Interface Board detecting RS485 packet errors.

Serial Interface Board Troubleshooting Guide

Problem	Possible Causes or Solutions
RX_ or TX_ LEDs are not blinking.	Press RST on Serial Interface Board, and all LEDs illuminate for one second - LEDs good and microprocessor board functional. If not, verify the following: a. +24VDC power input problems. b. F1 Fuse (1/2 amp Pico). c. Board replacement. The RX_LEDs will not blink if communication is not established, or if the wiring is not correct. The TX_LEDs may blink at first, even with faulty wiring, as the board attempts to establish communication.
Serial Interface Board stops trying to communicate on one of the channels (CAN or RS485) because the other channel cannot be established.	•If the CAN bus to the door operator does not function for 10 seconds or longer, the board will stop trying to communicate to the TKE CPU on the RS485 channel to signal to the TKE CPU that door communications are offline, and the TXD2 LED will stop blinking. •If the RS485 bus to the TKE CPU does not function for 10 seconds or longer, the board will stop trying to communicate to the LD-16 door board on the CAN channel to signal to the LD-16 door board that door communication to the controller CPU is offline, and the TXA LED will stop blinking. Verify the following: a. LEDs per Serial Interface Board - LED Definitions (see above). b. Both TX_LEDs are blinking. c. No ERR_LEDs are blinking or ON.

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Serial Communications Troubleshooting Guide

Door Communications Faults in the Host CPU/CPUa, or Door Serial Communications Not Working Correctly	
Verify the following applicable items.	
CAN Systems	Jumper X1 on the CAN Interface Board is not installed. (inserts a termination resistor – not used in this mode).
	Door Adjustments D12 and D13 = 7.
	462AEN/462AEM harness connections between the CWIx (in the COP) and the CAN Interface Board are correct.
	Wires are properly inserted in OPERF plug and OPERR plug.
TAC32 CAN Systems	Car CAN channel is fully functional; the DCN Command shows the CWIx node online.
RS485 Systems	462AEM harness connections between the CWIx (in the COP) and the Serial Interface Board are correct.
	462AEN harness connections between the CAN Interface Board and the Serial Interface Board are correct.
	Wires are properly inserted in the OPERF plug and the OPERR plug.
RS485 Systems with Serial Interface Board in the COP	Door Adjustments D12 and D13 = 8.
	Jumper X1 on the CAN Interface Board = ON. JP1 on the Serial Interface Board (in the COP) = ON.
	Door communication travel cable wires are not damaged and correctly connected at both ends.
CAN Interface Board	DIP Switch S1-2 = OFF (for 50K baud).
Door Operator Control Board	RS485 Systems JP4 on Serial Interface Board. Front = OFF Rear = ON
	CAN Interface Board DIP Switch S1-1. Front = OFF Rear = ON

Calculate Minimum Door Closing Times

Based on Kinetic Energy

1. Use the Car or Hoistway Door Weight Tables on page 53 through page 54 to determine the weight of the car doors and the weight of the hoistway doors.

2. Add the weight of the car doors and the weight of the hoistway doors, and enter this number as the typical door weight on the Total Door System Weight label (580AWP001). See Figure 34.
   a. If hoistway doors are heavier at one or more floors, determine weight of doors.
   b. Add weight of the car doors to weight of the heavier hoistway doors, and enter the heavy door weight on the Total Door System Weight label (580AWP001).

3. Install the Total Door System Weight label (580AWP001) per Figure 34.

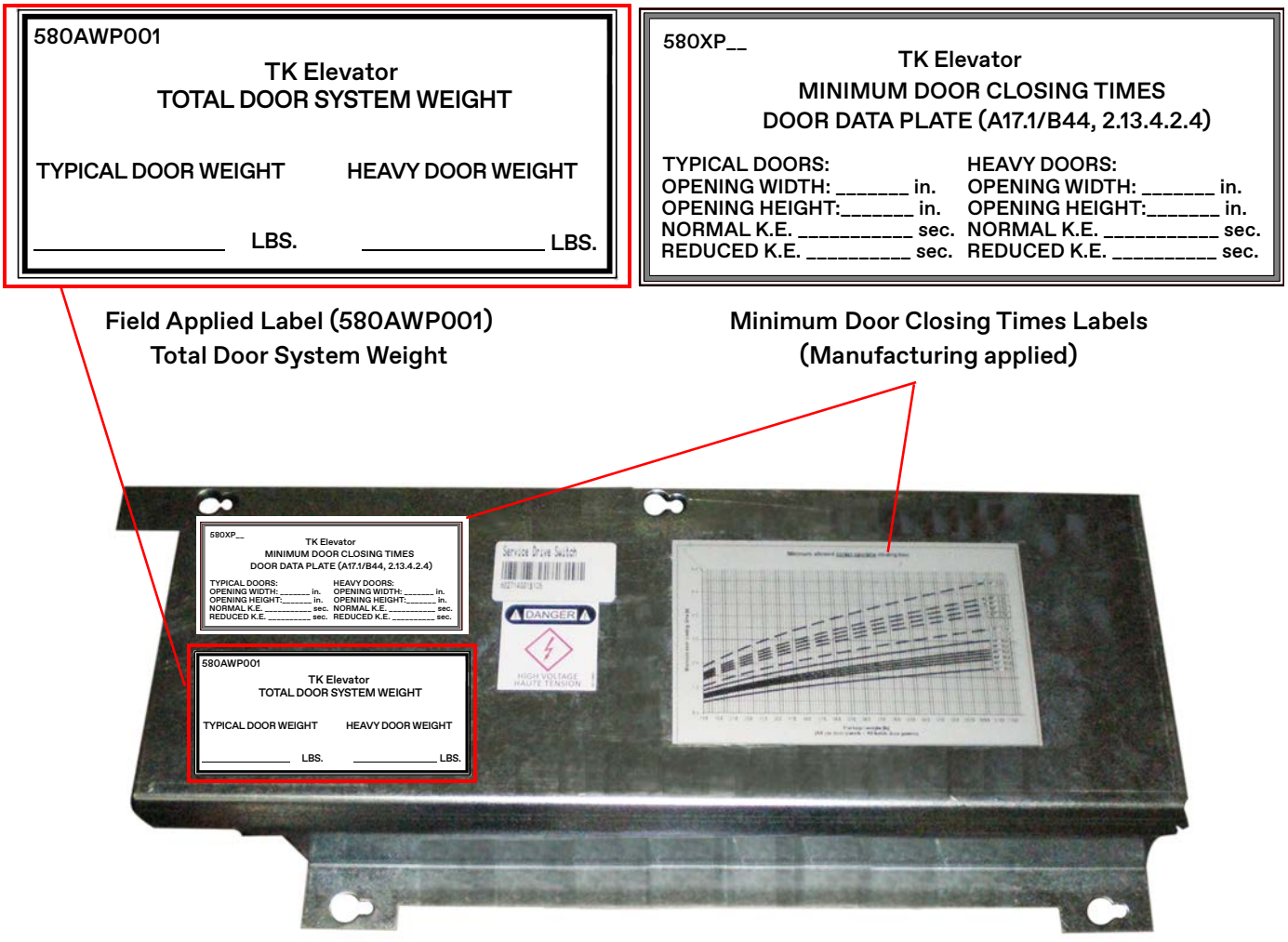

Figure 34 - Door Labels

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Car or Hoistway Door Weight

SINGLE SPEED SIDE OPENING

Weight Density = 7.600

Door weights include allowance for door hangers, clutch, crank, etc.
The IMS Monitor variable, MASS, can be used to determine total door weight for label.

DOOR OPENING HEIGHT									
120	208	221	234	247	260	273	285	298	311
118	205	218	230	243	255	268	281	293	306
116	202	214	226	239	251	264	276	288	301
114	198	210	222	235	247	259	271	283	296
112	195	207	219	231	243	255	267	279	291
110	191	203	215	227	238	250	262	274	285
108	188	199	211	222	234	246	257	269	280
106	184	196	207	218	230	241	252	264	275
104	181	192	203	214	226	237	248	259	270
102	178	188	199	210	221	232	243	254	265
100	174	185	196	206	217	228	238	249	260
98	171	181	192	202	213	223	234	244	255
96	167	178	188	198	208	219	229	239	250
94	164	174	184	194	204	214	224	234	244
92	160	170	180	190	200	210	220	229	239
90	157	167	176	186	196	205	215	225	234
88	154	163	172	182	191	201	210	220	229
86	150	159	169	178	187	196	206	215	224
84	147	156	165	174	183	192	201	210	219
82	143	152	161	170	178	187	196	205	214
80	140	148	157	166	174	183	191	200	209
	32	34	36	38	40	42	44	46	48

DOOR OPENING WIDTH

CENTER OPENING

Weight Density = 8.500

Door weights include allowance for door hangers, clutch, crank, etc.
The IMS Monitor variable, MASS, can be used to determine the total door weight for the label.

DOOR OPENING HEIGHT	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60
120	233	247	262	276	290	305	319	333	348	362	377	391	405	420	434
118	229	243	257	272	286	300	314	328	342	356	370	384	399	413	427
116	225	239	253	267	281	295	309	323	336	350	364	378	392	406	420
114	222	235	249	262	276	290	303	317	331	344	358	372	385	399	412
112	218	231	245	258	271	285	298	312	325	338	352	365	379	392	405
110	214	227	240	253	267	280	293	306	319	332	346	359	372	385	398
108	210	223	236	249	262	275	288	301	313	326	339	352	365	378	391
106	206	219	232	244	257	270	282	295	308	320	333	346	359	371	384
104	202	215	227	240	252	265	277	290	302	314	327	339	352	364	377
102	199	211	223	235	247	260	272	284	296	309	321	333	345	357	370
100	195	207	219	231	243	255	267	279	291	303	315	327	339	350	362
98	191	203	214	226	238	250	261	273	285	297	308	320	332	344	355
96	187	199	210	222	233	245	256	268	279	291	302	314	325	337	348
94	183	194	206	217	228	240	251	262	273	285	296	307	318	330	341
92	179	190	201	212	224	235	246	257	268	279	290	301	312	323	334
90	176	186	197	208	219	230	240	251	262	273	284	294	305	316	327
88	172	182	193	203	214	225	235	246	256	267	277	288	298	309	320
86	168	178	189	199	209	220	230	240	250	261	271	281	292	302	312
84	164	174	184	194	204	214	225	235	245	255	265	275	285	295	305
82	160	170	180	190	200	209	219	229	239	249	259	269	278	288	298
80	156	166	176	185	195	204	214	224	233	243	253	262	272	281	291

DOOR OPENING WIDTH

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TWO SPEED SIDE OPENING

Weight Density = 7.900

Door weights include allowance for door hangers, clutch, crank, etc.
The IMS Monitor variable, MASS, can be used to determine the total door weight for the label.

DOOR OPENING HEIGHT	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72
120	243	257	270	283	297	310	323	337	350	363	377	390	403	417	430	443	457	470	483
118	239	252	266	279	292	305	318	331	344	357	370	384	397	410	423	436	449	462	475
116	235	248	261	274	287	300	313	326	338	351	364	377	390	403	416	429	442	454	467
114	231	244	257	269	282	295	307	320	333	345	358	371	383	396	409	421	434	447	459
112	227	240	252	265	277	290	302	314	327	339	352	364	377	389	402	414	427	439	451
110	223	236	248	260	272	284	297	309	321	333	346	358	370	382	395	407	419	431	443
108	219	231	243	255	267	279	291	303	315	327	339	351	363	375	387	399	411	424	436
106	215	227	239	251	262	274	286	298	310	321	333	345	357	369	380	392	404	416	428
104	211	223	234	246	258	269	281	292	304	315	327	339	350	362	373	385	396	408	420
102	207	219	230	241	253	264	275	287	298	309	321	332	344	355	366	378	389	400	412
100	203	214	226	237	248	259	270	281	292	303	315	326	337	348	359	370	381	393	404
98	199	210	221	232	243	254	265	276	287	297	308	319	330	341	352	363	374	385	396
96	195	206	217	227	238	249	259	270	281	292	302	313	324	334	345	356	366	377	388
94	191	202	212	223	233	244	254	265	275	286	296	306	317	327	338	348	359	369	380
92	187	197	208	218	228	239	249	259	269	280	290	300	310	321	331	341	351	362	372
90	183	193	203	213	223	233	243	253	264	274	284	294	304	314	324	334	344	354	364
88	179	189	199	209	218	228	238	248	258	268	277	287	297	307	317	327	336	346	356
86	175	185	194	204	214	223	233	242	252	262	271	281	290	300	310	319	329	338	348
84	171	181	190	199	209	218	227	237	246	256	265	274	284	293	303	312	321	331	340
82	167	176	186	195	204	213	222	231	240	250	259	268	277	286	295	305	314	323	332
80	163	172	181	190	199	208	217	226	235	244	253	262	271	279	288	297	306	315	324

DOOR OPENING WIDTH

TWO SPEED CENTER OPENING

Weight Density = 7.900

Door weights include allowance for door hangers, clutch, crank, etc.
The IMS Monitor variable, MASS, can be used to determine the total door weight for the label.

DOOR OPENING HEIGHT	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96
120	403	417	430	443	457	470	483	497	510	523	537	550	563	577	590	603	617	630	643
118	397	410	423	436	449	462	475	488	502	515	528	541	554	567	580	593	606	620	633
116	390	403	416	429	442	454	467	480	493	506	519	532	545	558	570	583	596	609	622
114	383	396	409	421	434	447	459	472	485	497	510	523	535	548	561	573	586	599	611
112	377	389	402	414	427	439	451	464	476	489	501	514	526	539	551	564	576	588	601
110	370	382	395	407	419	431	443	456	468	480	492	505	517	529	541	554	566	578	590
108	363	375	387	399	411	424	436	448	460	472	484	496	508	520	532	544	556	568	580
106	357	369	380	392	404	416	428	439	451	463	475	487	498	510	522	534	546	557	569
104	350	362	373	385	396	408	420	431	443	454	466	477	489	501	512	524	535	547	559
102	344	355	366	378	389	400	412	423	434	446	457	468	480	491	503	514	525	537	548
100	337	348	359	370	381	393	404	415	426	437	448	459	471	482	493	504	515	526	537
98	330	341	352	363	374	385	396	407	418	429	439	450	461	472	483	494	505	516	527
96	324	334	345	356	366	377	388	398	409	420	431	441	452	463	473	484	495	505	516
94	317	327	338	348	359	369	380	390	401	411	422	432	443	453	464	474	485	495	506
92	310	321	331	341	351	362	372	382	392	403	413	423	433	444	454	464	474	485	495
90	304	314	324	334	344	354	364	374	384	394	404	414	424	434	444	454	464	474	484
88	297	307	317	327	336	346	356	366	376	385	395	405	415	425	435	444	454	464	474
86	290	300	310	319	329	338	348	358	367	377	386	396	406	415	425	434	444	454	463
84	284	293	303	312	321	331	340	349	359	368	378	387	396	406	415	425	434	443	453
82	277	286	295	305	314	323	332	341	350	360	369	378	387	396	405	415	424	433	442
80	271	279	288	297	306	315	324	333	342	351	360	369	378	387	396	405	414	423	431

DOOR OPENING WIDTH

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Maintenance

Replace the Door Operator Control Board

Replacement Door Operator Control Boards are mounted in an aluminum box; reference sensor included.

1. Remove the car from service, and then remove the door operator power.
2. Remove all door board plugs.
3. Remove 3 Allen bolts from the top of the door board box, and then slide the aluminum box down and out of the door operator.
4. Set the new door board DIP switches and jumpers to match the replaced unit.
5. Attach the new door board box onto the door operator hanger, and then install the 3 Allen bolts at the top to attach the unit to the door operator—do not omit any spacers that may be present.
6. Verify that the REFRSW (reference switch) LED activates approximately $^{1}/_{2}$" before the door is closed. See Figure 35.

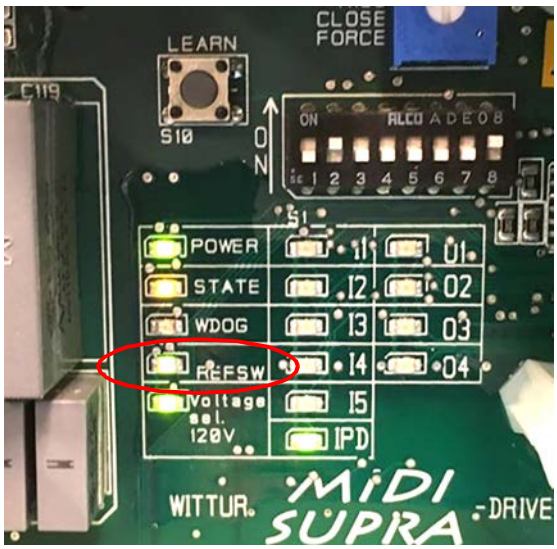

Figure 35 - Activated REFRSW (reference switch) LED

7. Verify the following:
   a. The doors are fully closed on their rubber buffer stop.
   b. The control system is on Inspection Service.
8. Power up the door board, and verify POWER, WDOG, and REPSW LEDs illuminate.
9. Perform a new door scan. See Learn Door Travel on page 40.

Replace the Door Operator Control Board
(continued)

10. Verify door speeds and door operation.
    a. Operate the doors either on Automatic Operation, or use the test buttons located on top of the door operator.
    b. Adjust the speed or operation (as needed). See Speed Pattern Adjustment with the Wittur Programming Tool (WPT) on page 42.
11. Adjust the kinetic and closing force of the new door board. See Closing Force Adjustment - 30 lbs. Maximum on page 45.
12. Return the car to service.

Replace the Drive Belt

1. Remove the drive belt screws. See Figure 36.
2. Release the old belt from the bracket.
3. Shorten the new belt to match the length of the old belt.
4. Install the new belt. Loosen the screws of the diverting pulley, and use a screwdriver to tighten the belt.

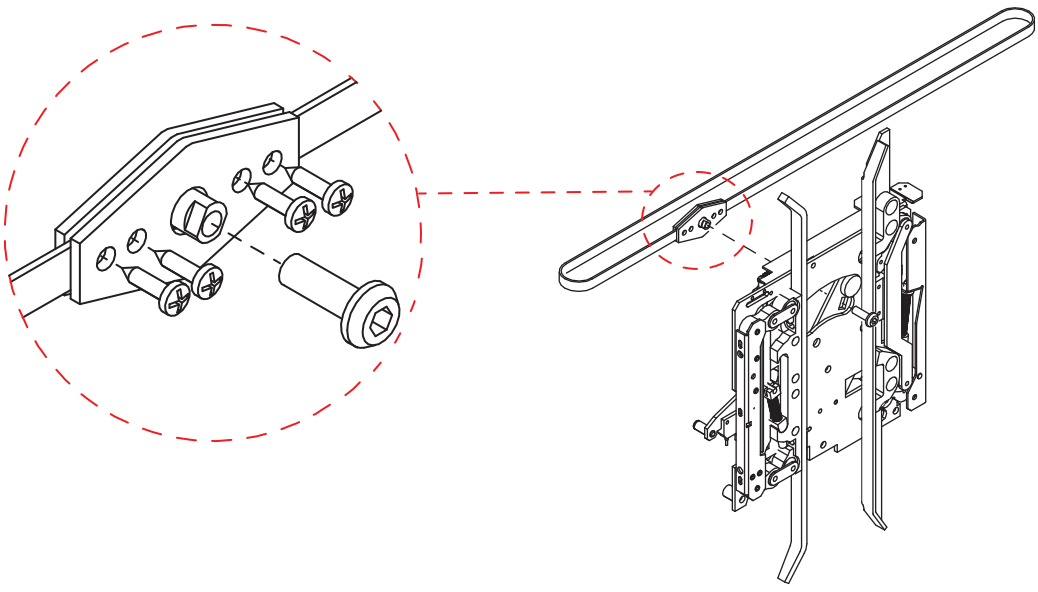

Figure 36 - Replace the Drive Belt

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Replacement Parts

ITEM	PART NO.	DESCRIPTION
1	9732100	Hanger Roller, D94 x 19 mm with Bushing
2	9732202	Counter Roller, D30 x 9 mm with Shaft
3	9732305	Buffer Cup
4	9731714	Buffer
5	9731313	Door Contact
6	9731416	Door Contact Bridge
7	9731910	Synchronization Rope, L= 5010
8	9732019	Synchronization Rope, L=1750 mm
9	9732317	Coupler Contact Bridge
10	9732718	Rope Diverting Pulley, Left
11	9733012	Rope Diverting Pulley, Right
12	9747977	Rubber Puffer
13	9732240	Fixing Screw (for clutch), M8 x 20 mm
14	9733310	Belt, L=3000 mm, SS <=42"; SS-C/O,<=48"
15	9731325	Belt, L=3900 mm, All Others >46"
16	9731428	Belt Diverting Pulley
17	9731726	Belt Diverting Pulley, Left
18	9731829	Door Drive Control Box - Standard
19	9731921	Door Drive Control Box with CAN Interface
20	9732123	Motor Unit Midi, C/O, LH
21	9732226	Motor Unit Midi, C/O, RH
22	9732329	Motor Unit Supra, C/O, LH
23	9733127	Motor Unit Supra, C/O, RH
24	9733220	Motor Unit, Double Coupler Main, LH
25	9731349	Transformer (Universal Trafo)
26	9731337	Magnet Switch, L=220 mm
27	9731430	Magnet
28	9731933	Belt Fixing Clamp
29	9732238	Belt Fixing Clamp, Main Belt
30	9732330	Belt Fixing Clamp, Second Belt
31	9733139	Service Switch, Electrical Box
33	9731829	Wittur Door Drive Control Box Kit, Discrete
34	9371921	Wittur Door Drive Control Box with Can Interface Kit, Serial
32	9736918	Wittur Programming Tool (WPT), see next page.

Replacement Parts
(continued)

Wittur Programming Tool (WPT)
Part No. 9736918

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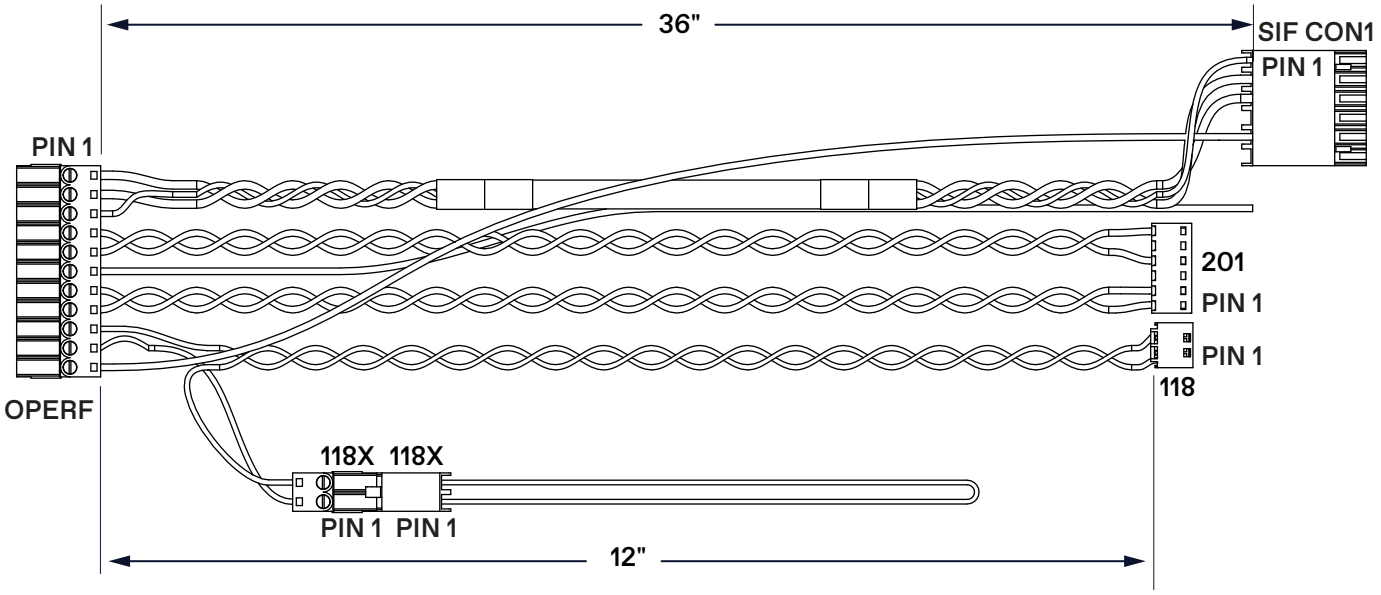
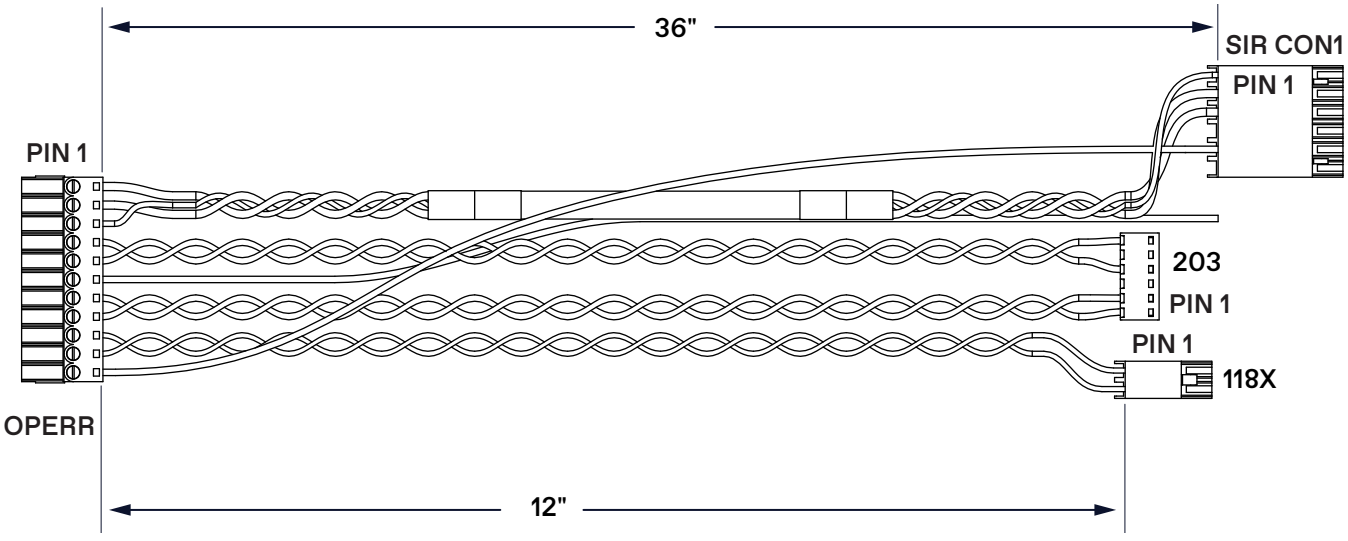
Harness Assembly Diagrams

COP Adapter, 462AEM_

Type: Door Operator
Use: TAC22, ICON
Front: 462AEM008

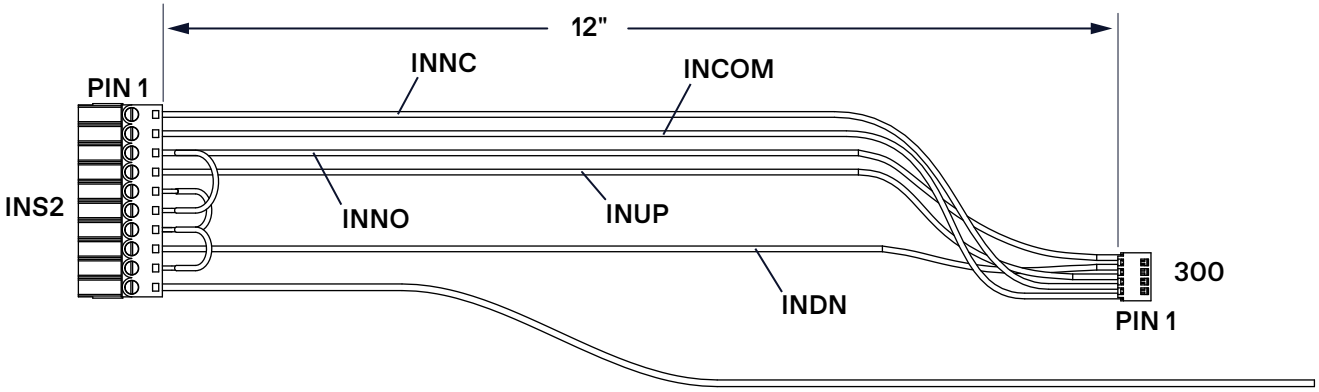


Type: Door Operator
Use: TAC22, ICON
Rear: 462AEM009

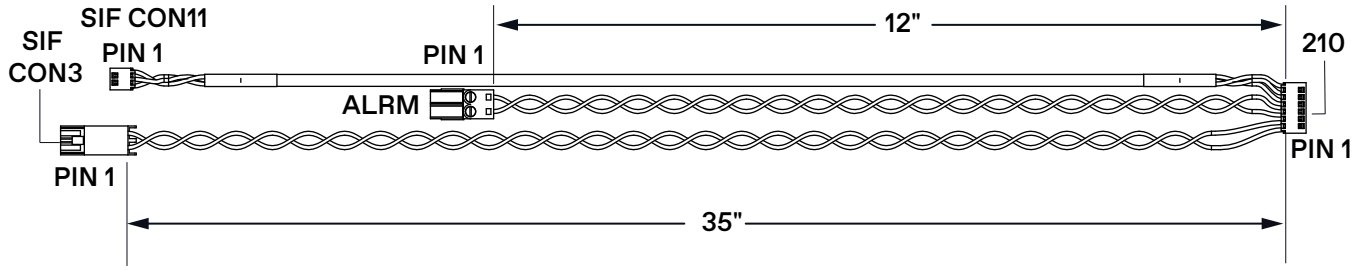


Harness Assembly Diagrams - COP Adapter, 462AEM_
(continued)

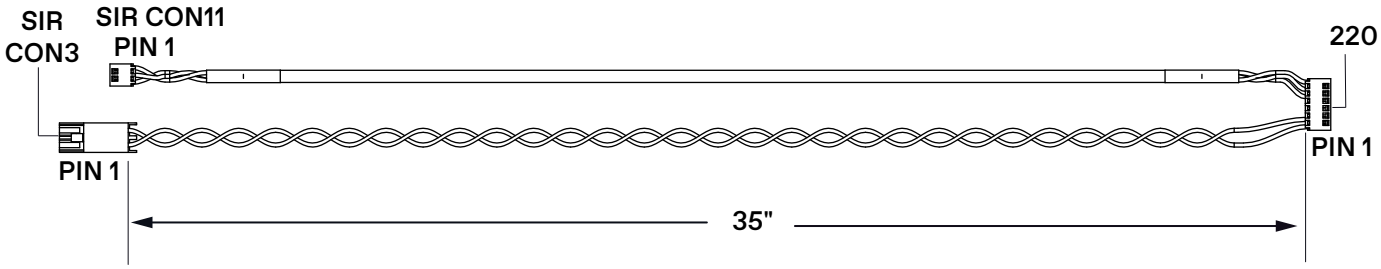
Type: Inspection
Use: TAC22, ICON
Front: 462AEM011



Type: Alarm, 485
Use: TAC22, ICON
Front: 462AEM0013



Type: Alarm, 485
Use: TAC22, ICON
Rear: 462AEM0014



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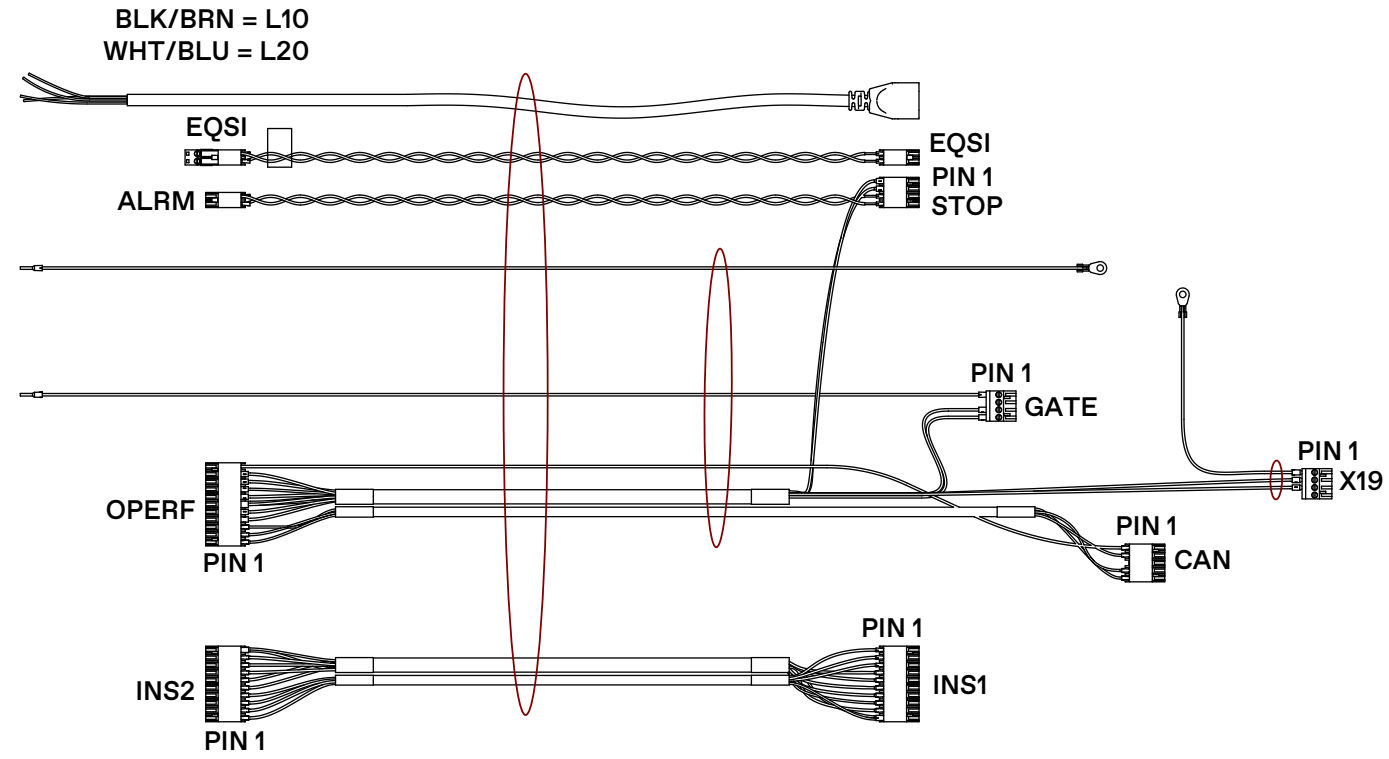
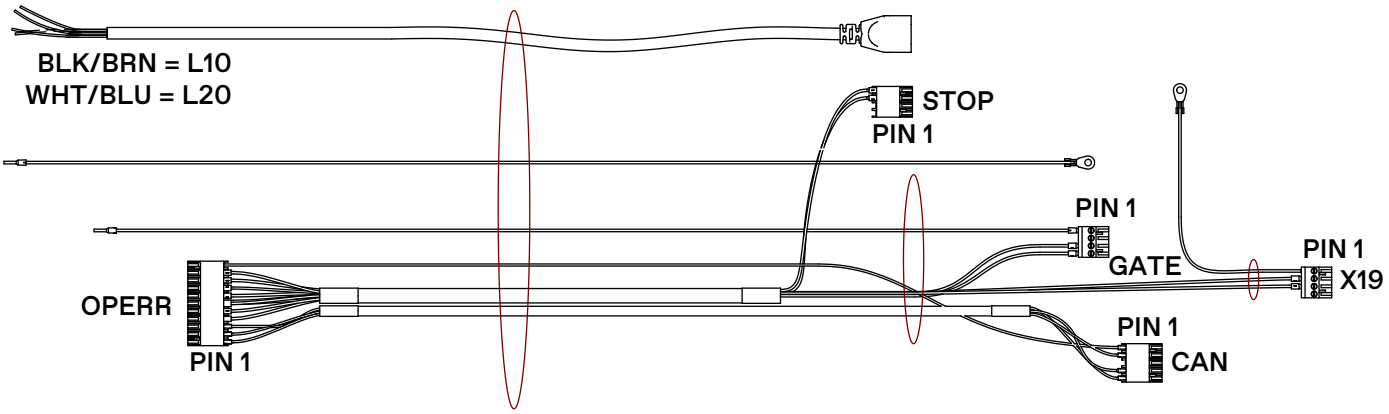
Harness Assembly Diagrams - COP Extension, 462AEN_

Type: COP
Use: Front with Inspection Station
Print No: 462AEN001

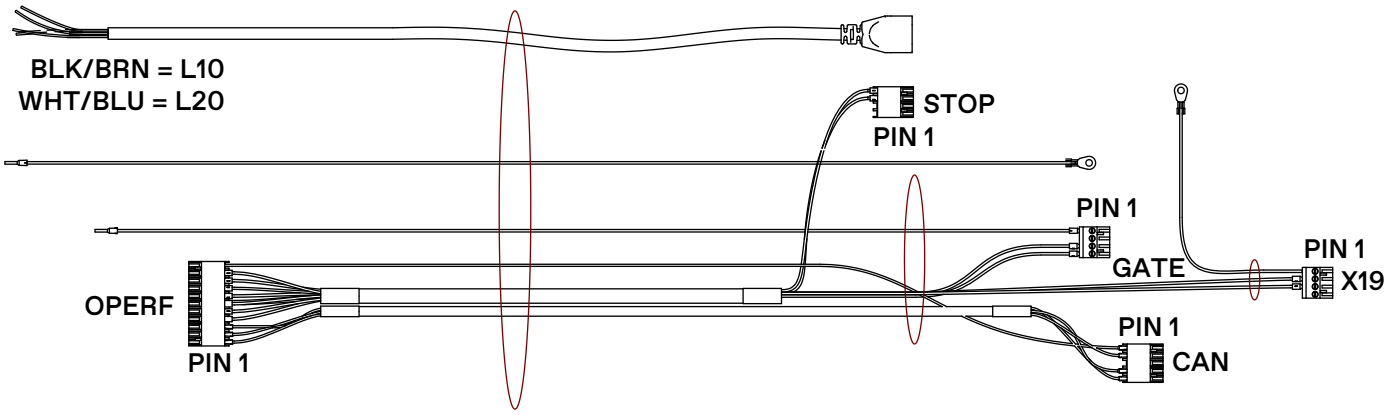


Type: COP/CTB
Use: Rear, No Inspection Station
Print No: 462AEN002

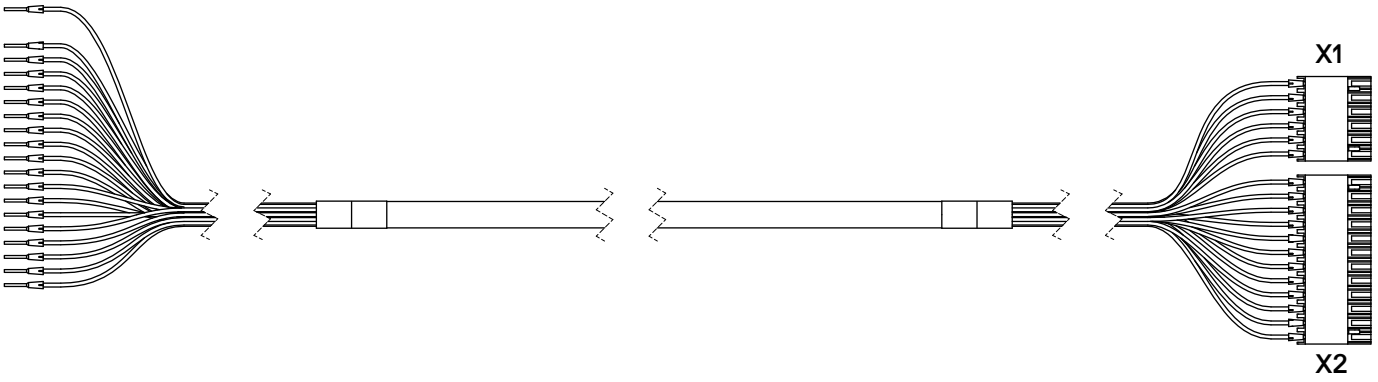


Harness Assembly Diagrams - COP Extension, 462AEN_
(continued)

Type: CTB
Use: Front, No Inspection Station
Print No: 462AEN004



Type: Discrete
Use: Add On
Print No: Front, 462AEN005
Print No: Rear, 462AEN006



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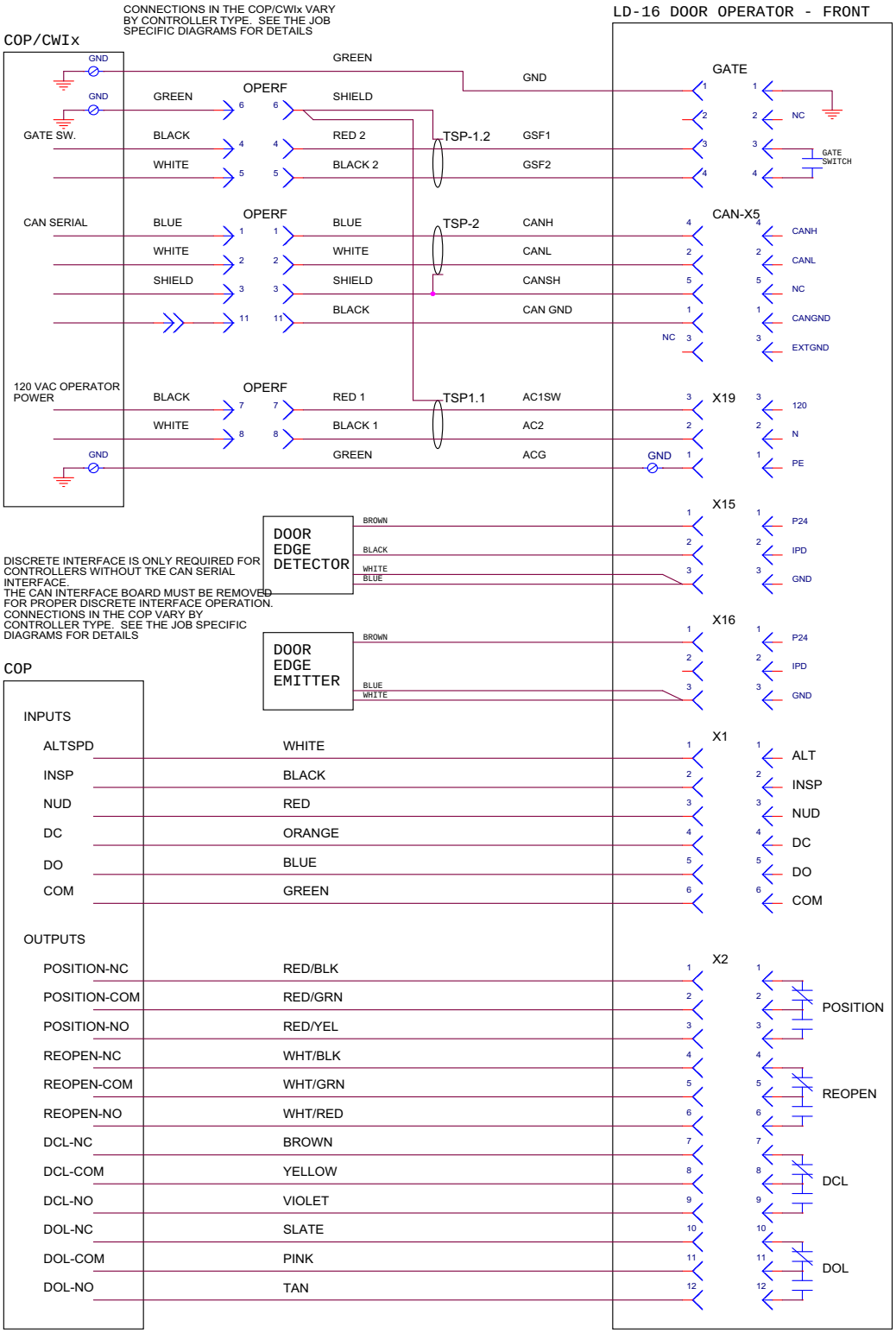
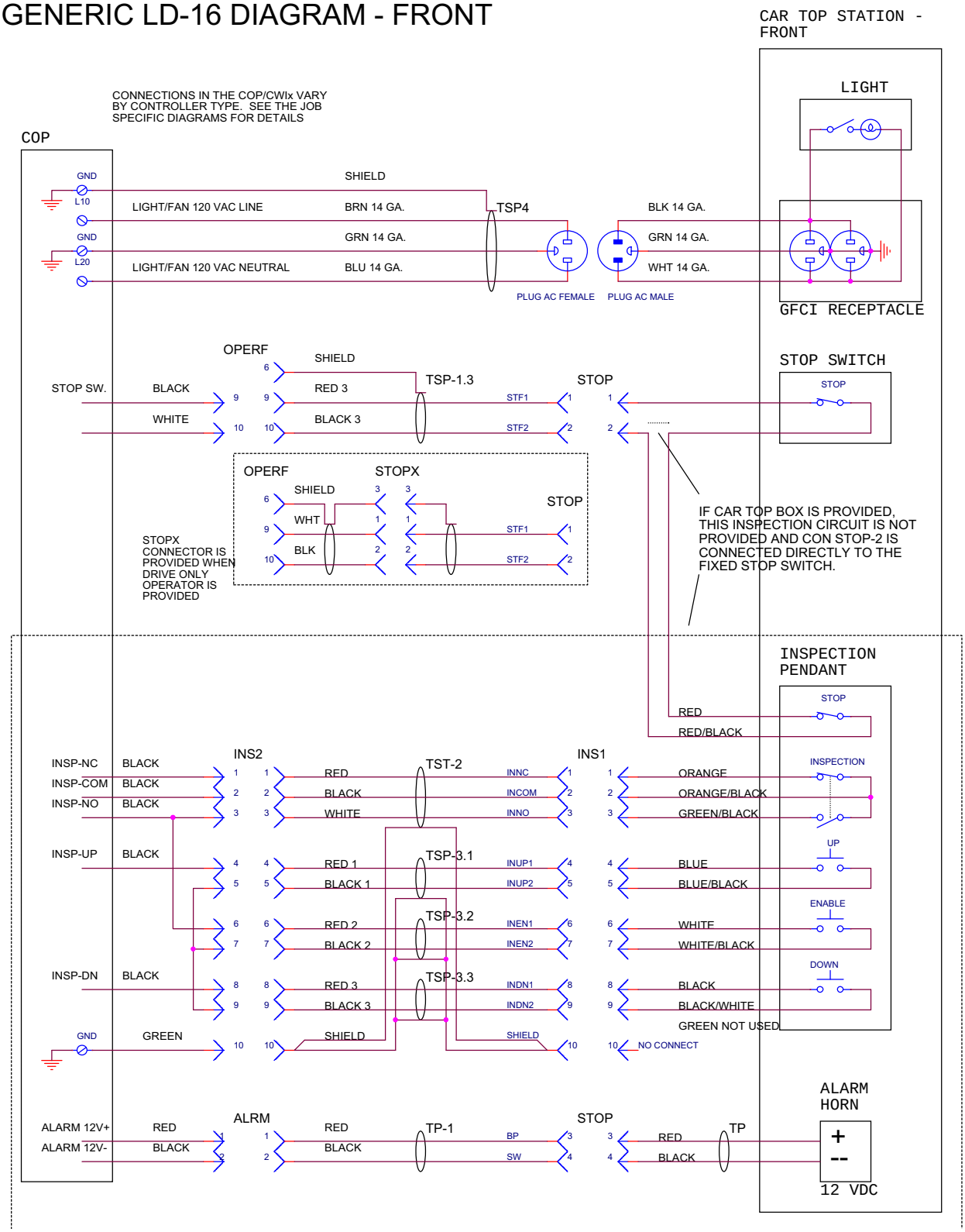
Generic Wiring Diagrams

GENERIC LD-16 DIAGRAM - FRONT



GENERIC LD-16 DIAGRAM - FRONT



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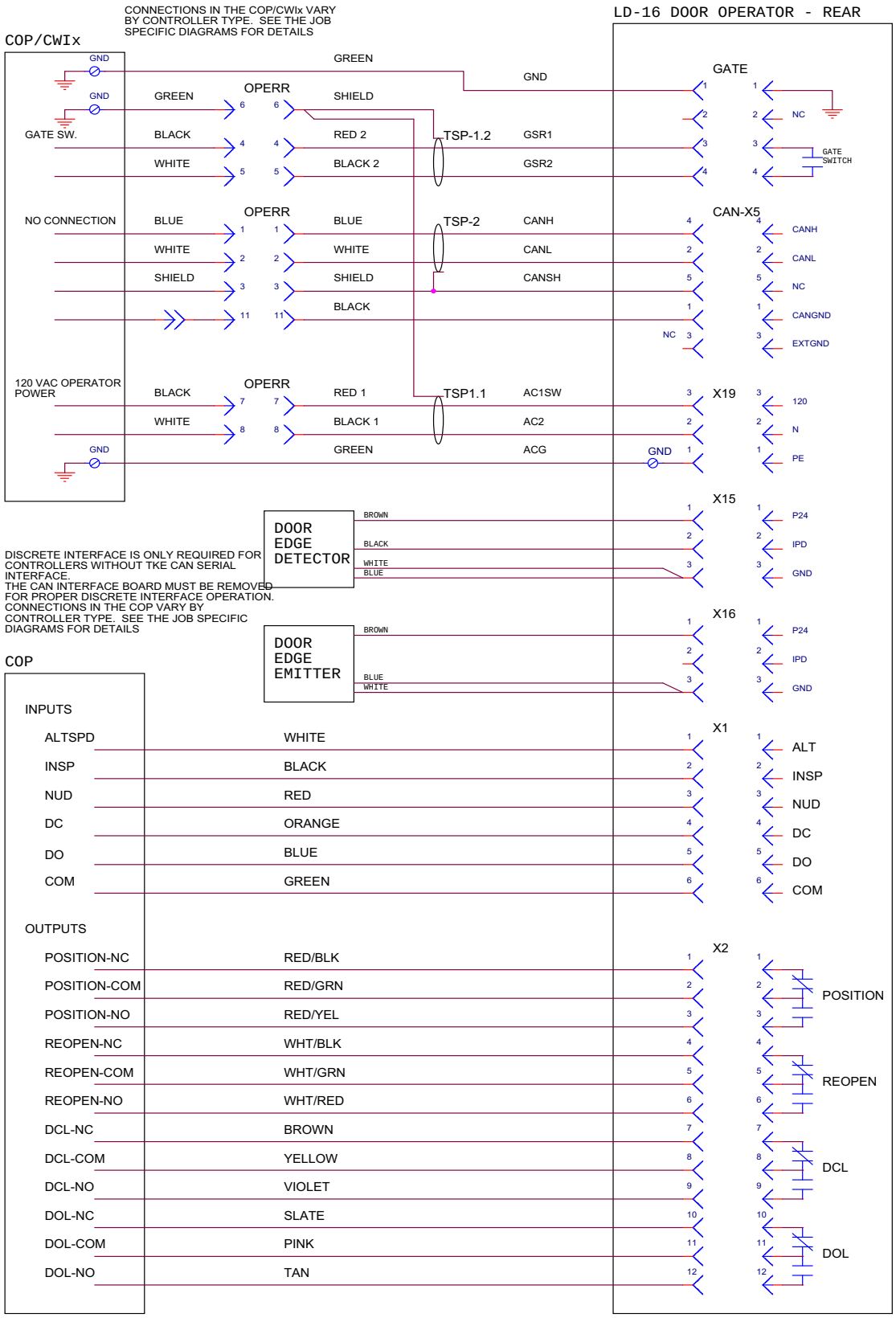
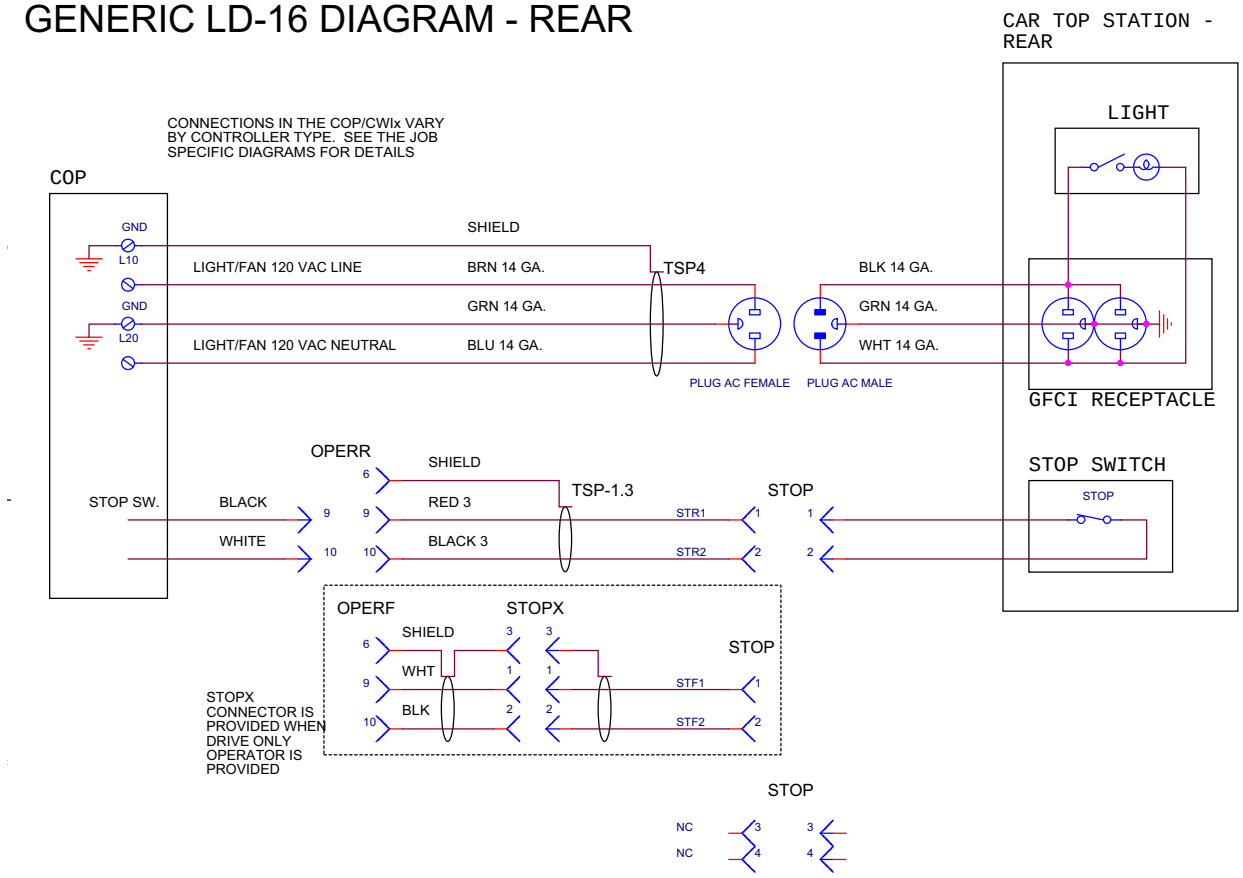
GENERIC LD-16 DIAGRAM - REAR



GENERIC LD-16 DIAGRAM - REAR



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