

UT-ID 22.14-3

Otis QL, Black-Belt, and i-MOTION Door Operator
Conversion to Discrete UNITEC AT400 Door Operator

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Comments or questions about the information contained in this publication should be directed to:

UNITEC
212 West Newberry Road
Bloomfield, CT 06002
(800) 328-7840 Phone
(860) 286-1625 Fax

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QL to AT400 Door Operator Upgrades



Figure 1: Old Aluminum Base Plate Version QL Operator

Steps Prior to Removing the Old Operator and Installing the New

1. Review the original copy of the controller wiring diagram for your job. If you do not have the diagram, order one from UNITEC. When ordering, provide the sales number and the data tag information from the controller.
2. Review the last page of UT-ID 22.16-1, Appendix B (22.16-500).
3. Set aside the dwg. AAA24430V. Do not use the drawing at this time for installing the QL, Black Belt, or i-MOTION 1 upgrades, **unless** you mount the operator using the unistrut from the cab top.

NOTE: The pictorial installation guide in this document assumes track-back mounting, which covers 95% of the installations you will encounter (see Figure 12).

4. Read this entire manual before starting the installation.

NOTE: For QL operator upgrades, expect to mount two new small relays (supplied by UNITEC) on a DIN rail in the existing controller in the machine room.

There may be some case where mounting relays in a top-of-car mounted junction box may be the most practical approach.
Example box identity: AAA25580AM1 (not included)

Job Site Planning

1. First, study UT-ID 22.14-2 for equipment confirmation and applicability of AT400 to your car door system.
2. Follow this document and UT-ID 22.16-1 to understand the final operator mounting and wiring requirements.
3. You will need document UT-ID 22.16-1 for finer gate switch adjustments and Learn Run instructions.
4. Appendix A depicts a very typical QL, Black Belt, or i-MOTION I car door system. If your elevator does not have this kind of system or you are not sure, review UT-ID 22.14-2 and contact UNITEC if you have any questions.

Job Site Evaluation

- Review this document and UT-ID 22.14-2 prior to doing any work.
- Start with the end in mind (see Figure 53).
- Confirm that the Otis QL operator to be replaced is Otis New Equipment version—that is, the QL that is in place now was **not** installed as a retrofit for some other pre-1983 operator. If unsure, send a photo of the car front, track, header, and hanger to UNITEC.
- For track-back mounting, clear space of about 3/8 in. behind the car header track is required to permit slipping in the AAA316GPM5 or AAA316GPM6 heavy “L” shape support angles.

NOTE: If this 3/8 in. space is available, the installation will go smoother. If using track back, set aside the separate reference installation dwg. AAA24430V shipped with the operator; instead, follow the instructions and illustrations in this document only.

- If the space behind the car header is **not** sufficient, use the cab-top mounting approach. Having access to some lengths of unistrut would be helpful only if cab-top mounting is necessary. For cab-top mounting, refer to dwg. AAA24430V sheets 6 and 10–13. This drawing comes in the documents kit p/n AAA24430V435 with your operator upgrade order.

Pre-Installation Steps

- Use this document for standard track-back installations.

- Set aside and do not use the extra hitch parts included in the base operator kit ACA24350BW_ (see Appendix B): these parts are p/n AAA392DS1, p/n AAA392DF1, p/n AAA392DF2, p/n AAA392CJ1, p/n AAA283ATJ2, and p/n AAA141AV1.
- Keep the AAA392DS-UNITEC belt hitch handy (see Figure 2). It will be used for track back operator mounting.



Figure 2: Belt Hitch (note horizontal mounting slots, 8-1/8 in. tall)

- Set aside two of the four heavy support angle brackets AAA316GPM5 or AAA316GPM6 (referred in this document as the GPM angles).



Figure 3: GPM Angles (note the difference in short leg length)

- Use the longer reach p/n AAA316GPM5 (see Figure 3) for 2-speed door applications.
- Use the shorter reach AAA316GPM6 (see Figure 3) for the single-slide or center-opening applications.

Track Back Mounting Installation

Removal of Old Operator (QL example)



Figure 4: Typical Old Otis QL Operator with Aluminum Base Plate Structure



Figure 5: Linkage Removal

1. Isolate and label the necessary existing wires to be reused.

NOTE: QL operators utilized dry contacts in the CAMPACK to indicate DOL and DCL for control system.

2. Re-use the existing gate switch wires inside the new AT400 assembly (see UT-ID 22.16-1, p. 23 for reference to gate switch wires).
3. If required, order a car-top junction box AAA25580AM1 from UNITEC separately.
4. Remove the old QL operator and all linkages except the car door vane. Consult UNITEC for what to do with type 6970F movable car door vane (see UT-ID 22.14-2).



Figure 6: Solid Car Vane Remains



Figure 7: Aluminum Drive Arm Removed



Figure 8: Remove QL Operator Base Plate



Figure 9: Remove QL Support Brackets

5. Remove the upper two-piece transmission arm, the aluminum drive arm, the lower pivot link, and the top-of-cab stands formerly used for QL operator blocking.
6. Remove the old gate switch roller arm. Set it aside in case it is needed for AT400 gate switch. Temporarily remove any c/o aircord at this time for drilling clearance.



Figure 10: Remove Gate Roller Arm (do not discard)

Installation



Figure 11: Single-Slide and Center-Opening GPM Angle at Left, and 2-Speed at Right



Figure 12: Check for Clear Space (no drilling)

1. Choose a proper 'L' support angle (see Figure 12) based on operator reaching to the outermost car door panel. If single-slide or center-opening, use the short reach GPM angle. If 2-speed, use the longer reach angle.
2. After confirming the acceptable space behind the car door header track, slip type AAA316GPM angles behind the car header track to ensure they fit and can be slid easily in a horizontal path by several inches each way allowing for operator positioning.

CAUTION: Do not drill yet! You will be moving or removing those angles again for drilling clearances and safety.

NOTE: The AT400 operator is "dumb" to the opening width, height, hand, etc. until the Learn Run is accomplished.

3. When selecting a reasonable horizontal operator position, choose one to:
 - A. Avoid interference with other existing equipment that must remain—such as, wiring boxes, Greenfield, trough, etc.
 - B. Allow for easy future maintenance of the operator.

4. Do not worry about positioning the door operator to any specific horizontal dimension with respect to the opening line. You can slide the operator horizontally wherever it fits best. Keep the final belt hitch position clear of striking the belt pulleys in the full open position. Retain enough belt throw in choosing the operator position.
Example: For 42 in. center-opening, driven door travel is about 21 in. Your theoretical hitch location on the belt must be able to move ~22 in.



Figure 13: Temporary Mount

5. Mount **one** of the GPM support angles to the single protruding stud from the underside of the operator. Fasten the angle to the operator. Slip the other loose angle behind the car header at appropriate temporary location, spaced a reasonable distance from the first angle position for roughly symmetric support.
Option for Safety: You may choose to mount both GPM angles to the underside of the operator before you lift the operator up into place and slide the angles behind the header track. If needed, shift the one angle into different slots (Figure 15) in the operator base for the most convenient angle bracket location, operator position, and eventual drilling ease.
6. Slip the operator and double angle setup behind the car header. There are multiple slots in the base of the operator to which the second angle must align for temporary fastening.
NOTE: Two mechanics should be performing this job.



Figure 14: Wood Block Establishes Operator Height



Figure 15: Note Multiple Slots in Operator Base

NOTE: The wood block (supplied with kit) shown in Figure 14 is positioned on top of the car header track and beneath the operator channel and **not under the support angles**.

7. Stabilize and lift the operator to allow for insertion of two wood blocks (2 x 3 x ~ 4-1/4 in.) under the operator channel and on top of the car header track flange (Figure 14). This blocking provides for a **very near final vertical position** of the AT400 operator. Do not shim this wood blocking. Temporarily insert a second fastener set (nut and bolt) into the second support angle through one of the slots in the operator base (Figure 15), so the operator does not fall off the angles. Do not bolt the operator in place yet, nor drill any holes. The operator position should be **roughed in only**, but secured safe at the same time.

NOTE: Two workers should be performing this job.

8. Depending on the amount of space available behind the car header, temporarily shim behind the angles with wood or stiff cardboard to prevent the angles and the operator from flopping over. Use 'C' clamps if convenient (no drilling yet).

Establishing the Final Horizontal Position for the Operator

1. Slide the operator and the GPM angles horizontally as necessary. Adjust the second AAA316GPM support angle position for convenient operator location. Establish clear space for the under operator mounted integral gate switch. For now, keep the operator on the wood blocks.
2. Choose the gate switch orientation and estimate roller arm fastening location (no final drilling to be done at this stage). Gate Switch must be above a clear spot on the door hanger for the undriven door.



Figure 16: Flip Gate Switch if Necessary

3. For some center-opening applications, you may need to flip the gate switch orientation in the operator channel 180 degrees using four bolts (Figure 16). For center-opening, use the door hanger on the panel **opposite** the driven panel which has the (door unlocking vane) to secure the gate switch roller on it. The gate switch must be oriented so that when that panel closes, that direction will allow the roller arm to engage the gate switch in the proper direction.
NOTE: The gate switch moves from left to right in the closing direction in this (Figure 17) orientation.



Figure 17: Theoretical Roller Mount on Undriven Door Panel

4. Once the operator is in a reasonable horizontal position (specifically, there is no cab front or cab top equipment interference, operator is still resting on the wood blocks without shim, and there is clear space to reasonably apply the gate switch roller arm to the undriven door hanger), temporarily **size up** the position for the offset belt-to-door hanger hitch AAA392DS-UNITEC (Figure 2) on the door hanger.
5. Temporarily position and mount the belt hitch to the door hanger (one or two screws) behind any aircraft cable. Do not secure to the belt yet. Just align over the top of the lower belt (Figures 19 and 20).



Figure 18: Special Slotted Hitch AAA392DS-UNITEC

6. With car doors closed, choose the hanger **that is mounted to the door panel with the door unlocking vane on it**. Orient the belt hitch to align it with the belt centerline as close as possible (see Figures 19 and 20). To establish a good side-to-side and front-to-back operator position, and to determine the shimming needs for the operator, **hold** the offset hitch flush on the upper offset portion of the door hanger (aligning it with the bolt holes already in the hangers).
*Remember that the operator is still resting on wood blocks and secure to GPM angles.
7. Align the holes in the hitch with the most convenient existing holes in the door hanger. There should be no need to drill any new holes. The hole pattern in the hitch matches the hole pattern in either the post-1977 Otis integral car hanger or the 389BA_ applied car hanger.
8. If needed, temporarily hold the hitch in place with a small c-clamp or use a couple of screws. Choose the hole set that:
 - Keeps the belt relatively straight (no deflection up or down)
 - If necessary, deflect the belt up only slightly (which would require operator to be shimmed up)
 - Allows for shim safe blocking under the operator channel and between the two GPM mounting angles.
9. **Side-to-side positioning.** With the doors fully closed, choose a hitch position on the hanger that allows for full travel of the door to the full open position and leaves about 1 in. clear from the edge of the hitch to the operator belt pulley. The hitch location chosen horizontally is very flexible. Remember to mount the hitch on the hanger with the door vane on it.
10. Front-to-back positioning (Figures 19 and 20).



Figure 19: To Calculate Shimming Needs, Shift Operator Back (Shim Behind Header)



Figure 20: (Rarely should happen) Operator Must Be Shifted Out



Figure 21: Perfect Alignment of Belt-to-Hitch (No Pulloff)

11. Examine the centerlines of the belt alignment and the hitch bracket. The goal is to have no or minimal shim between the vertical faces of the GPM angles and the back of the header track to drive the operator backwards enough (towards the car crosshead) to align the hitch with the centerline of the belt. **Do not shim now. Measure and take note of how much shim will be needed and which way to shift the operator to avoid shimming behind the belt hitch. The hitch mounts directly flush to the hanger.** Write down your front-to-back and up/down shimming dimensions. Plan to shim between the back of the header and the AAA316GPM mounting angle **by that amount** (Figure 22) when the time comes after drilling. Avoid shimming if possible at the door hanger, because you may introduce running or aircord clearance problems.

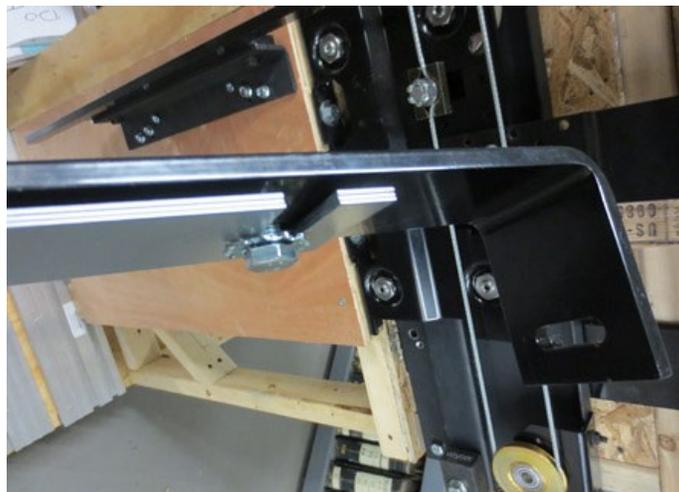


Figure 22: Shim Stack to Push Operator Back

12. If the operator has to be **brought out** away from the crosshead of the elevator, use the longer reach angles or drill a couple new holes in the GPM mounting angles in place now. Be aware of infringing on running clearance.

13. Do not situate the belt hitch either outside of the aircord drive cable or with any contact to any aircraft cable.

Establishing Final Position of Operator Mounting Angles GPM

1. Use the drill template tool and mark four holes in the face of the car header track for drilling. Be sure the operator has been properly positioned and that location of the GPM mounting brackets allows for easy drilling and hardware application.

NOTE: Temporarily disengage any present aircord drive to allow for drilling and mounting clearance. Protect the aircord!

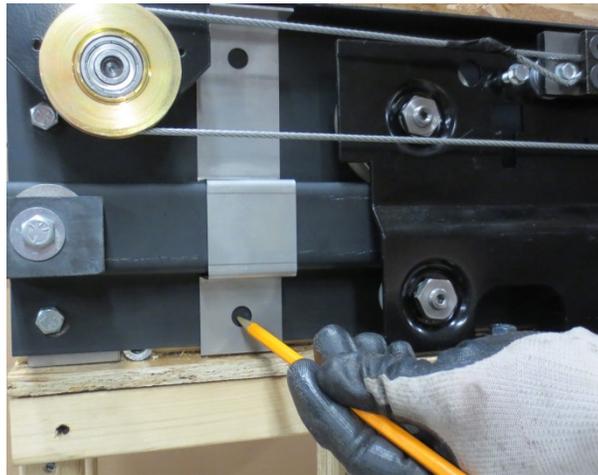


Figure 23: Align the Position of the Drill Template Exactly Centered on Both Positions of Each of the Two Mounting Angles AAA316GPM

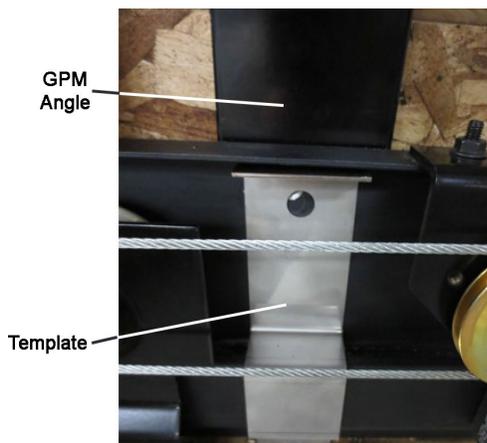


Figure 24: Template Centered on GPM Angle



Figure 25: Mark and Center Punch



Figure 26: Remove or Slide

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2. Either slide the operator out of the way horizontally by several inches of the break through area of the drill bits or remove the operator and angles completely so damage to threads on the GPM angles is avoided.
3. Drill all holes (Figures 27 and 28) and insert and re-mount operator along with aircord (Figures 29 and 30).

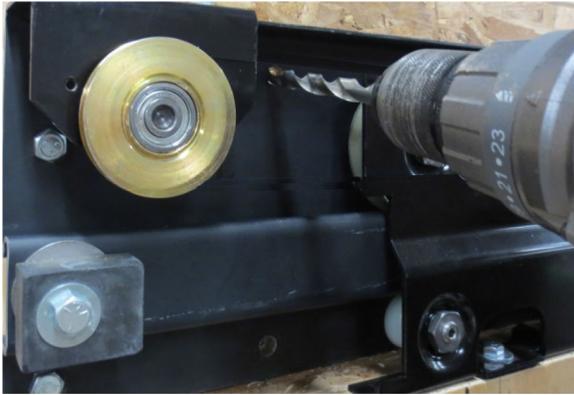


Figure 27: Drill Clear of Aircord



Figure 28: Protect Cab Front from Break-Through



Figure 29: Re-Mount GPM Angles



Figure 30: Re-Mount Operator

4. Use wood blocking again to assist in vertical alignment. With wood blocking in place and GPM angles put back in the original positions, secure the bolts in the TOPS of the GPM angles first (Figures 31 and 32).



Figure 31: Door Block to Establish Height



Figure 32: Secure Nut to Contact Only

5. Apply all the hardware and secure the operator to the tops of the angles with any necessary shim you measured and wrote down previously. Snug bolts only.

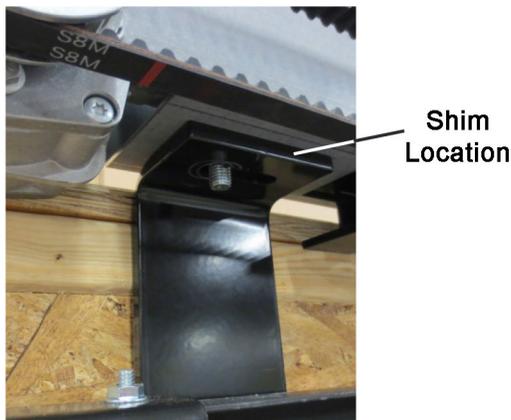


Figure 33: Shim at Top of Angle Only if Previously Found Necessary



Figure 34: Shim at Track Back Only if Necessary (Shim 255ES8)



Figure 35: Snug Operator Channel Bolts



Figure 36: Snug Channel Bolts

6. The holes drilled through the car header track should align well with the tapped holes in the GPM angles.

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7. Apply four (shallow head clearance) hex bolts and lock washers to secure the GPM angles to the back of the header track. These are shallow height hex bolts to allow for clearance to the hanger and the upthrust rollers. If necessary, eliminate lockwashers and use Loctite thread locker for added clearance.



Figure 37: Shallow Protrusion Bolts



Figure 38: Snug 4 Bolts, then Remove Wood Blocks

8. Once the four bolts are in place, remove the wood blocking.



Figure 39: Belt is Perfectly Straight

9. Now loosen the belt tensioning device (Figure 40).



Figure 40: Belt Tension Adjuster

10. Remove any previously mounted factory hitch on the belt out of the box (see Appendix B). Apply the proper offset AAA392DS-UNITEC special belt hitch.



Figure 41: Hitch Behind Aircord (No Shim)



Figure 42: AAA392DS-UNITEC

11. Position (first just checking for alignment) the belt hitch in the previously established location. If you chose and positioned the shim for mounting angles correctly (vertically and horizontally), there should be **zero** pull off of the belt to the hitch at this stage (Figure 39 and 40).

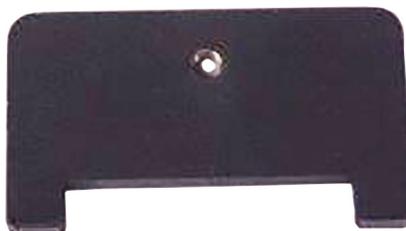


Figure 43: p/n AAA386LQC2 Belt Clamp Plate



Figure 44: Secure Belt Hitch



Figure 45: Snug Hitch to Hanger

12. With the belt tension loosened and the factory hitch removed, join the loose ends of the belt together with the new AAA392DS and hitch clamp plate and secure with screws (Figure 44).
13. Be sure to align the cogs in the belt ends with the cog slots in the hitch top flange.
Re-tension the belt per UT-ID 22.16-1.
14. Make minor leveling and height adjustments once the belt hitch is engaged with the cogs of the belt, and the clamp plate is secured in place. Level, adjust shim as needed to reflect excellent professional practice. Do not pin or torque down the hitch in place yet.

NOTE: If you had planned to change door hanger rollers or check door bottom clearance to sill, do this now.
15. Close the doors completely. Double check for no belt deflection or pull off. Secure the hitch in a slot and at least one round hole with two bolts. Force the operator to the full open position to ensure minimum 1 in. clearance of hitch to operator pulley. If not clear, shift the operator on the GPM angles or slide belt hitch horizontally, whichever is most convenient.
16. Apply two more screws in the other hitch holes on the door hanger. Do not pin the hitch in place until the job is completely done. You should apply two more pinning screws at that time. Six total screws on hitch when complete, especially if two of the screws were applied in the slots.



Figure 46: Typical Full Open/Close – Reasonable Hitch-to-Pulley Clearance

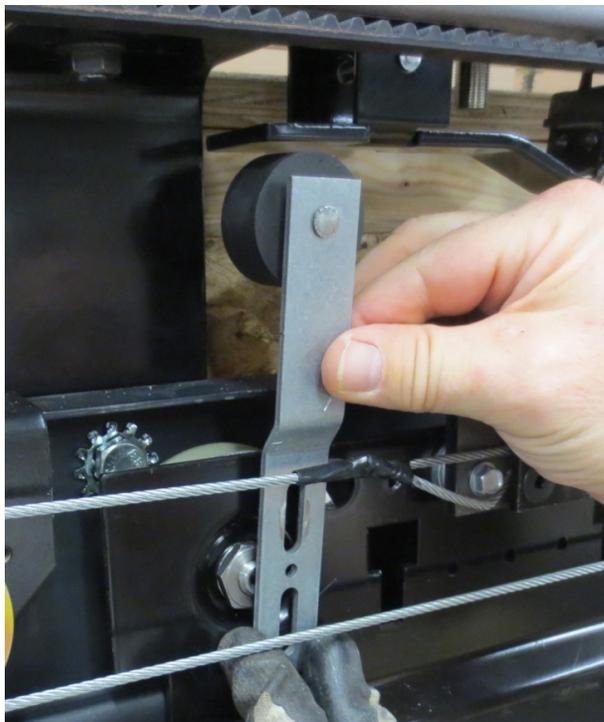


Figure 47: Gate Switch Roller on Undriven Door Hanger



Figure 48: Find Open Space on Hanger to Secure

Gate Switch Roller Arm Installation

1. Consult UT-ID 22.16-1 gate switch and backup DCP inductor adjustment section for proper roller-to-gate switch clearances. Apply gate switch arm in a location where through bolts will not interfere or contact other equipment, rollers, etc. Angling the gate switch roller arm is perfectly acceptable. If the proper, as documented, clearance and dimensions are not followed carefully, learn run operation will be compromised. Take the time now.



Figure 49: Note Vertical Clearance to Arm



Figure 50: Use Slots Initially

2. With doors fully closed, secure the arm initially using the slots to allow for height adjustment. Pin the roller arm in place only when the **final** position is established.



Figure 51: Fully Closed Position

3. You must achieve proper compression, but do not “bury” the gate switch. “Play” must be present in the gate switch lever upon full door closed position. See UT-ID 22.16-1.



Figure 52: Adjust Horizontally if Needed

4. Due to limited places to position the roller arm, you may need more adjustment. If needed, loosen the gate switch mounting bolts in four places in the operator base channel to achieve proper contact wipe and gate switch arm deflection. Do this with the doors fully closed and with the gate switch roller arm at the proper vertical clearance to the horizontal/flat portion of the arm.

Installation Completion

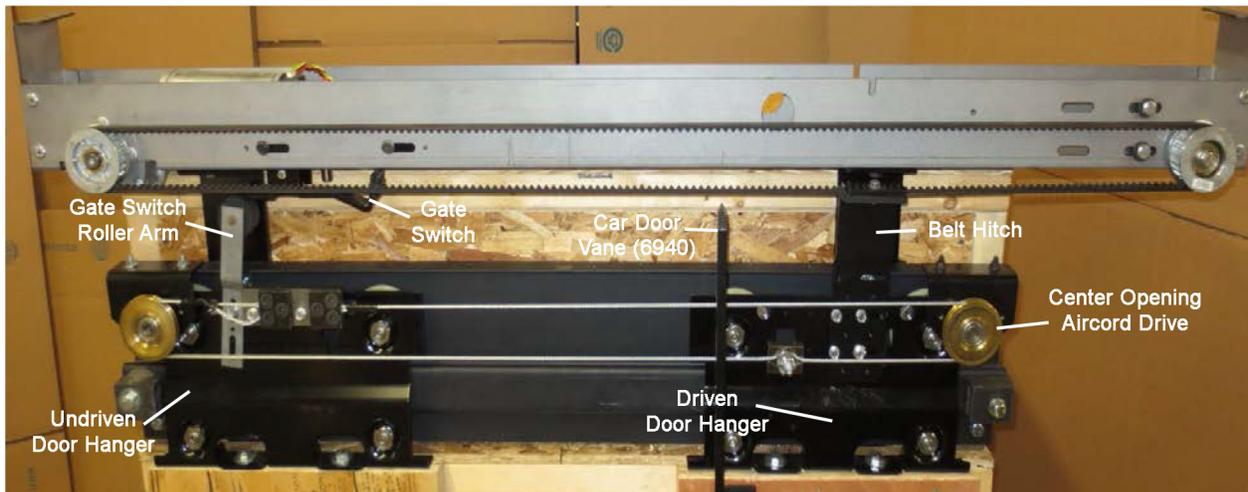
High quality AT400 installation (mechanical) should result in:

- A level operator
- No belt deflection: up or down, in or out. A properly tensioned belt.
- No rubbing of aircord on any operator, hanger, bolt heads, or hitch equipment
- No striking of upthrusts or rollers to GPM angle hex bolts
- Full open position of doors exhibiting the following:
 - A hard stop for the driven car door (the one with the unlocking vane on it) add a rubber stop if not present.



Figure 53: Door Rubber Hanger Stop

- Travel clearance of the belt hitch to the operator pulleys by at least 1 in. in fully open position (Figure 46).
- Aircord (aircraft relating cable) properly tensioned and, if worn, replaced with new.
- If no aircord drive is present, consult the dwg. AAA24430V for the dual belt hitch driving method (this should never be the case for black belt, QL operators).
- 99% of QL, black belt, and i-MOTION I operators will have aircord relating pulleys and hitches for their center-opening doors. Expect 2-speed doors to have the angle type dual pulley aircord drive device Type 6178CG_ in place.

Completed AT400 Operator (Top Cover Removed)**Figure 54: Left-Hand C/O Door Operator (shown)****NOTES:**

- Hand is established standing inside the car looking out. The door having the unlocking vane on it establishes the center-opening hand. The direction of open travel establishes the hand for single-speed and 2-speed.
- Most typical center-opening Otis installations are right hand center-opening, but some left hand may be present.
- Door unlocking vane on the left hand panel (in this example).
- Belt hitch on the left hand door hanger of the driven door.
- Gate switch roller arm on the un-driven right hand panel. Allows for protection of aircord breakage and car not running with one panel open.



Figure 55: Belt Tension Device

- Do not forget to re-tension the belt with the belt tension device shown at the upper right.
- See slotted holes/hex bolts and spring-loaded device inside channel. Refer to the UT-ID 22.16-1 for belt tensioning procedure.

Final Steps

Go over every single mounting bolt and nut to ensure all of them are tight. Pin in place:

- Car door unlocking vane (should be done already)
- Gate switch roller arm
- Belt hitch fastened to door hanger
- Movable (monkey motion) vane, if applicable.

Double check that applied type door hangers are not cracked in any way and that the mounting bolts to door top are tight. Check the condition of:

- Hanger rollers
- Upthrust rollers (clearance too)
- Door bottom guides (wear?)
- Aircord pulleys (dry bearings).

Ensure the car doors have proper ~1/4 in. clearance to the threshold surface side and top jambs.

Replacement of Common Existing Otis Car Door Components

Part Number	Description
456EW1	Hanger Roller, QL (if metric, contact UNITEC)
456CP1	Upthrust Roller
456EK1	Upthrust Roller, 2 Speed (shallow)
174AS995	Aircraft Cable by the Foot
B316CCB2	C/O Aircord Pulley and Angle Bracket
AAA24479C400	Door Bottom Guide
6178CG_	2-Speed Aircord Drive Device

Wiring Cut-In Work

NOTES:

- Be certain to have the complete original wiring diagram. You will need it to perform the wiring adjustments on some of the provided upgrade/service replacement equipment.
- If the unit and controller are made by Otis and you need the original wiring diagram, contact UNITEC 800-328-7840 with the sales/machine number, along with any wire diagram number reference you may have.
- Read the following documents: UT-ID 22.16-1 and UT-ID 22.16-500.

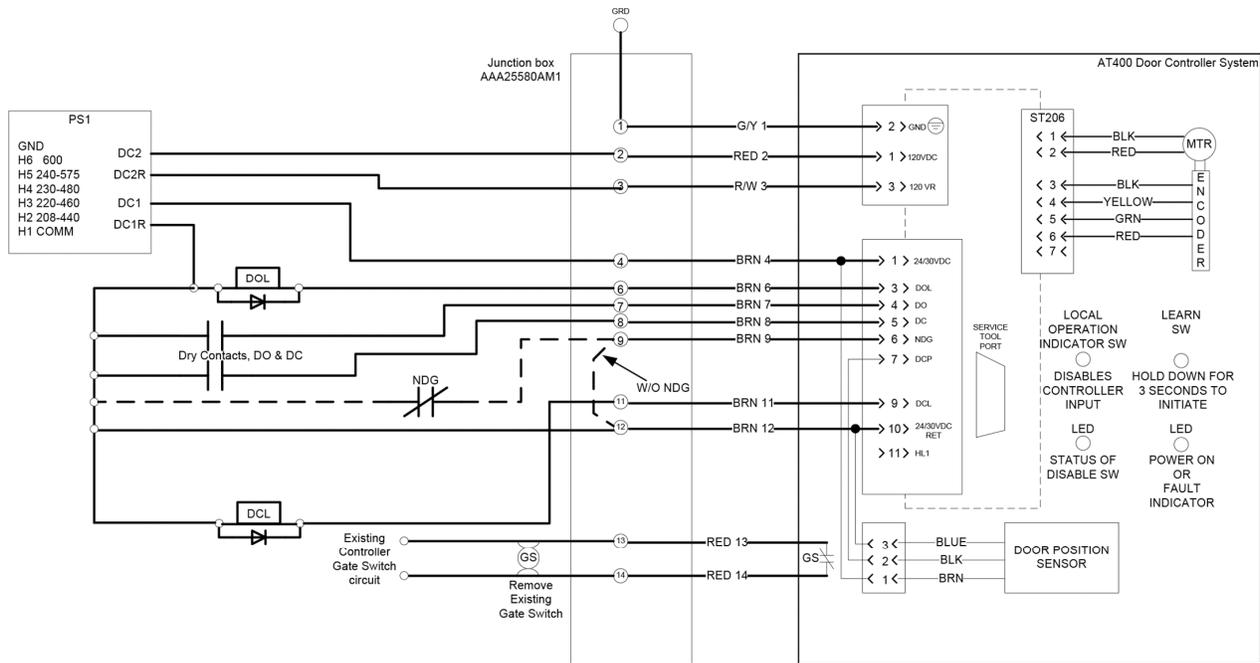
If your installation does not have one of the diagrams (listed below) governing the main controller on your particular installation, contact UNITEC with your specific existing wiring diagram and your Otis sales number before ordering parts or beginning the installation.

System / Model	Wiring Diagram or Document Number
211 / LVM1	A*A21241L
211 / LVM2	A*A21241V
LRV	SPL 10-2S7900AR
LRS-3	10-1S7900AS
SPEC 60(MRQ)	2-2S7417A
E311	AAA21380A
GEM	A*A21290T (WHERE * could be letters: A through M)
E411MHS	AAA21255A

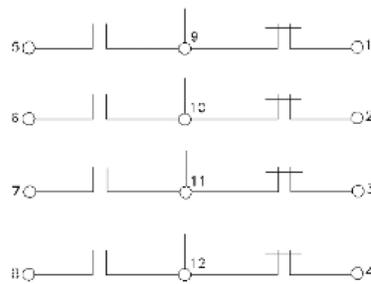
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General Overview of AT400 Wiring

WARNING: High voltage! Lock out, tag out, and test and verify the main line disconnect before making any connections to the controller or the main line. See Figure 56 for the basic electrical requirements for the AT400.



Available DCL Contacts
 (use as required in existing
 controller circuits)



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 (use as required in existing
 controller circuits)

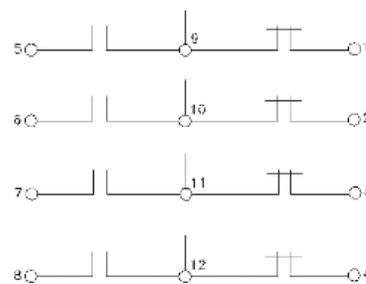


Figure 56: AT400 Basic Requirements
 (this information can be found in UT-ID 22.16-1)

The installation requires two major pieces of work: mechanical and electrical. The QL door operator wiring plus connections depend on the existing controller type. See Table 1 for several typical connections. Figures 57–58 are typical wiring diagrams for QL door operators. Figure 57 uses the door interface sub-system (DISS) board, which should be used to control the AT400.

Table 1: Typical Connections per Elevator Type

AT400 Required Signals		Elevator Controller Types & Terminals									
Inputs/Outputs		2111LVM1	2111LVM2	2111LVM2	2111LVM2	LRV	LRS-3	SPEC 60 (MRQ)	E311	E411	
Input	120VDC	C-6	KJ8-143	KJ8-143	KJ8-143	B17	B17	7, F2			
Input	120VRET	C-5	KJ8-142	KJ8-142	KJ8-142	B19	B19	8, F1			
Input	24VDC	K30DC2	K-355	K-132	K-132	B16	B16	4, OHS			
Input	24VDC RET	C-24	K-133	K-133	K-133	B20	B20	6, NR			
Input	DO	C-127	IO-354	IO-354	IO-354	B9	B9	3, A1			
Input	DC	C-128	IO-353	IO-353	IO-353	B10	B10	5, A2			
Input	NDG	C-129	IO-352	IO-352	IO-352	B18	B18	1, CHS			
Output	DOL	C-32	IO-350	IO-350	IO-350	Add Relay B13	Add Relay B13	Add Relay DOL, 2K12	Add Relay		
Output	DCL	C-33	IO-349	IO-349	IO-349	Add Relay B14	Add Relay B14	Add Relay DCL, 15	Add Relay		
Output	GND										
Wire Diagrams		A*A21241L	AAA21241V	AFA21241V	10-2S7900AR	10-1S7900AS	2-2S7417A	AAA21380A	AAA21255AG		

DISC BOARD SEE WIRE DIAGRAM, FIGURE 2

DISC BOARD controls AC contactors for DO, DC & NR, use dry contacts from these relays, adding 30VDCR to each contact, see AT400 requirements.

Caution: Contract specific wire diagrams may not match the above connections, review all inputs/outputs before removing any wires or making any connections to the AT400, it is highly recommended you have a wire diagram.

NOTE: From the late 1980s into the 1990s, some QL operators were installed as Mod service replacement operators on numerous older relay logic controllers having previously incorporated older door operator types, such as: 7300, 7660, 7777A, 7770R, AB, and O. Table 1 does not cover these types of installations or wiring schematics. Contact UNITEC if you are addressing some of these older retrofit installations.

UNITEC QL, BLACK-BELT AND I-MOTION

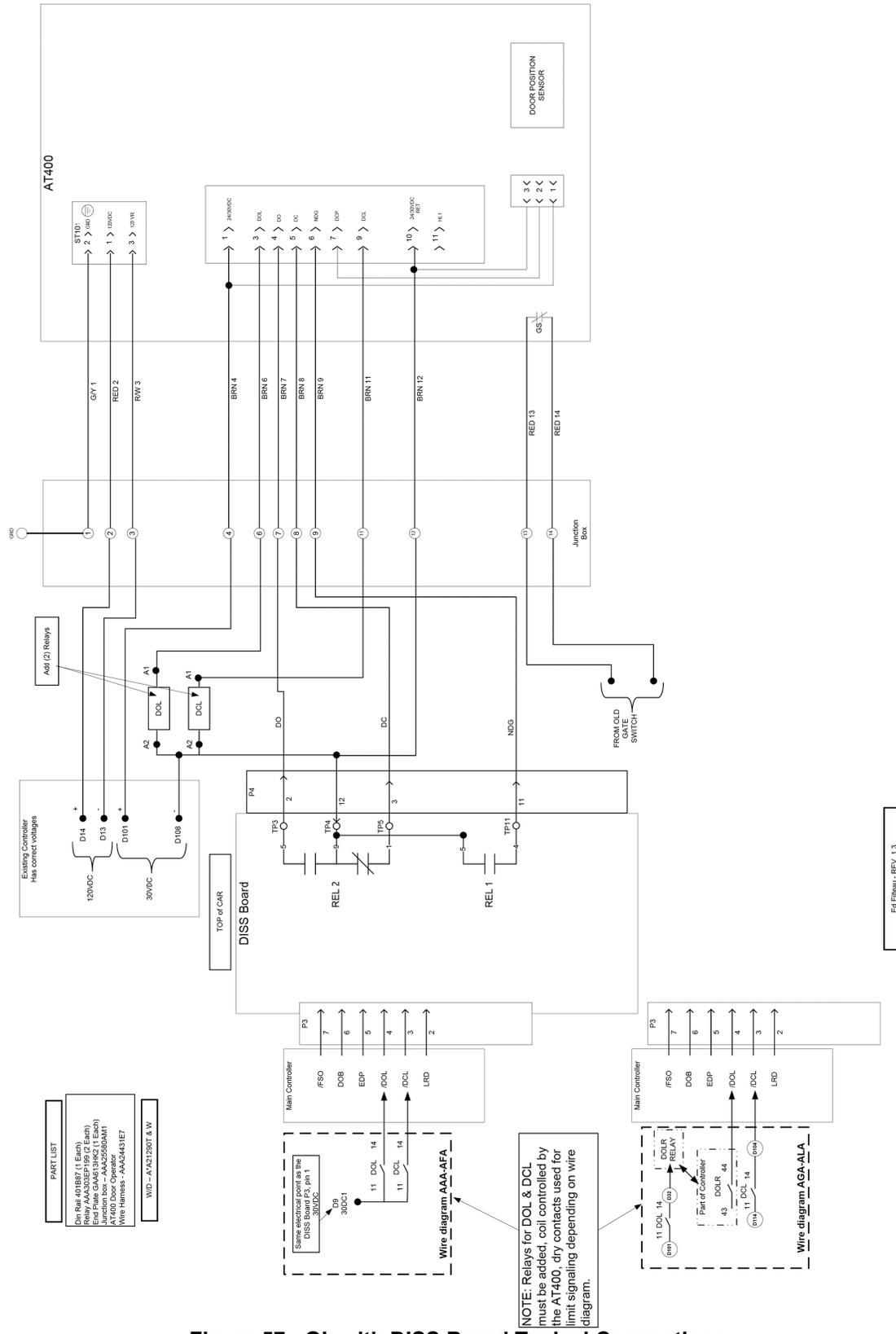


Figure 57: QL with DISS Board Typical Connections

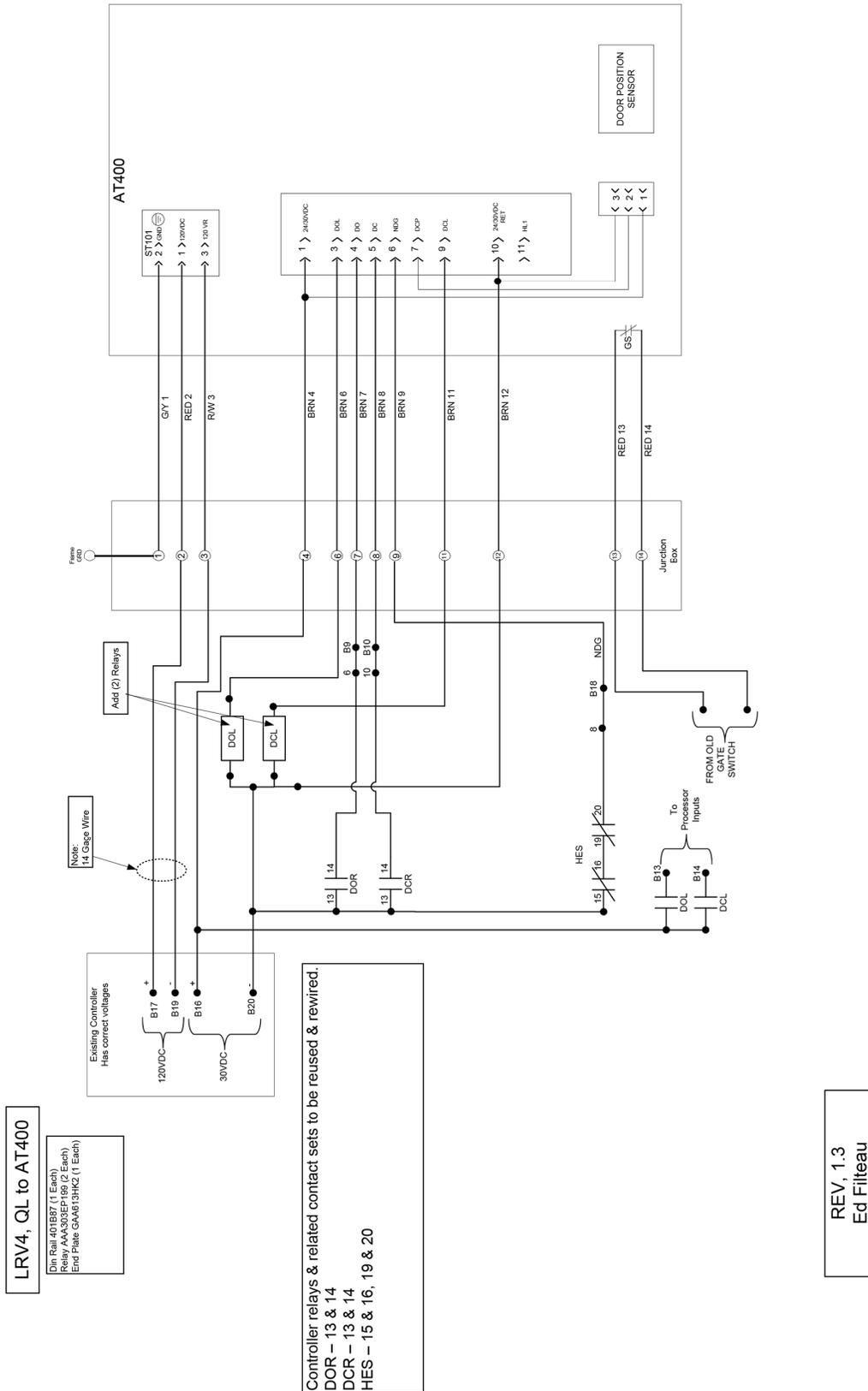


Figure 58: Typical Connections for LRV and LRS

Note: This is a General Guide for removing and isolation former contacts and circuits from an ORIGINAL Otis QL operator (not one installed as a retrofit for an earlier Otis operator). Your circuits may vary slightly, so use as a general guide, being sure to label and mark all wires as you remove them.

DO NOT attempt to perform this retrofit without first having your original Wiring Diagram FOR THAT INSTALLATION."

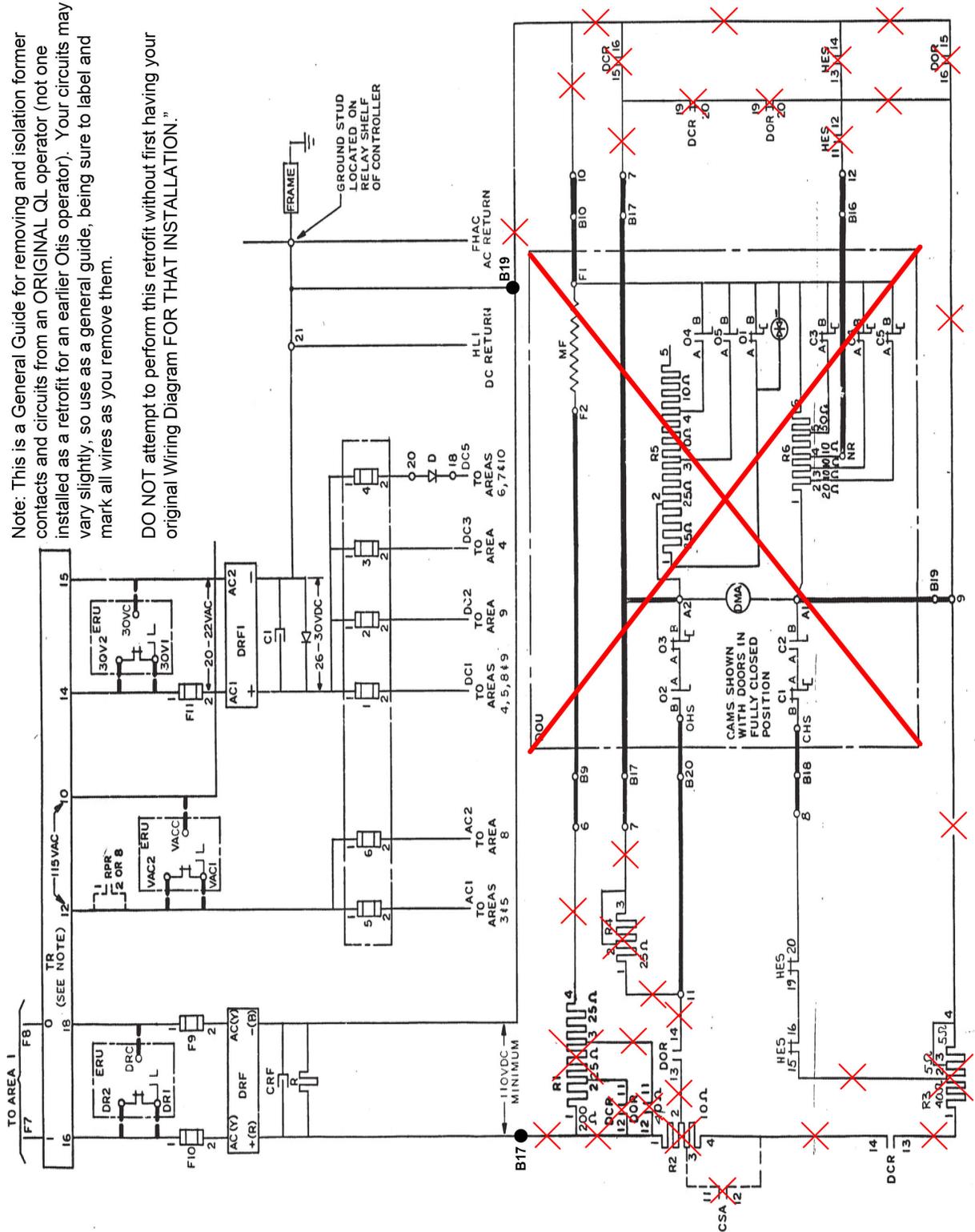


Figure 58a: Components/Wires to Remove

UNITEC QL, BLACK-BELT AND I-MOTION

CABLE NO. 1					
VARIABLE CONDITION	WIRE LABEL	SIGNAL NAME	AWG	VOLTAGE HIGH/LOW	DIAGRAM AREA (S)
CONSTANT	1	CLS1X	14	Hi	23
CONSTANT	2	CLS2	14	Hi	23
CONSTANT	3	PE-GND	14	Hi	23
CONSTANT	4	CLS1	14	Hi	23
CONSTANT	5	DMA-A1	14	Hi	7
CONSTANT	6	DMA-A2	14	Hi	7
DRO	7	RDMA-A1	14	Hi	8
DRO	8	RDMA-A2	14	Hi	8
*	9	*	14	Hi	
CONSTANT	10	CLS-FNS	14	Hi	23
CONSTANT	11	SOS	18	Hi	4
CONSTANT	12	CIO	18	Hi	3
CONSTANT	13	GS	18	Hi	3
DRO	14	RGS	18	Hi	3
CONSTANT	15	ES	18	Hi	3
CONSTANT	16	DMF-F2	18	Hi	7
CONSTANT	17	DOCB-OHS	18	Hi	7
CONSTANT	18	DOCB-CHS	18	Hi	7
CONSTANT	19	DOCB-NR	18	Hi	7
DRO	20	RDMF-F2	18	Hi	8
DRO	21	RDOCB-OHS	18	Hi	8
DRO	22	RDOCB-CHS	18	Hi	8
DRO	23	RDOCB-NR	18	Hi	8
CONSTANT	24	30VR2	18	Hi	7
CONSTANT	25	30DCRTN	18	Lo	13&20
CONSTANT	26	30DC2	18	Lo	5&6
CONSTANT	27	30DC3	18	Lo	13&20
CONSTANT	28	30V-REM	18	Lo	17
CONSTANT	29	REM-LAMB	18	Lo	17
CONSTANT	30	30VR3	18	Lo	10
CONSTANT	31	EDP	18	Lo	6
CONSTANT	32	DOL	18	Lo	6
CONSTANT	33	DCL	18	Lo	6

UNITEC QL, BLACK-BELT AND I-MOTION

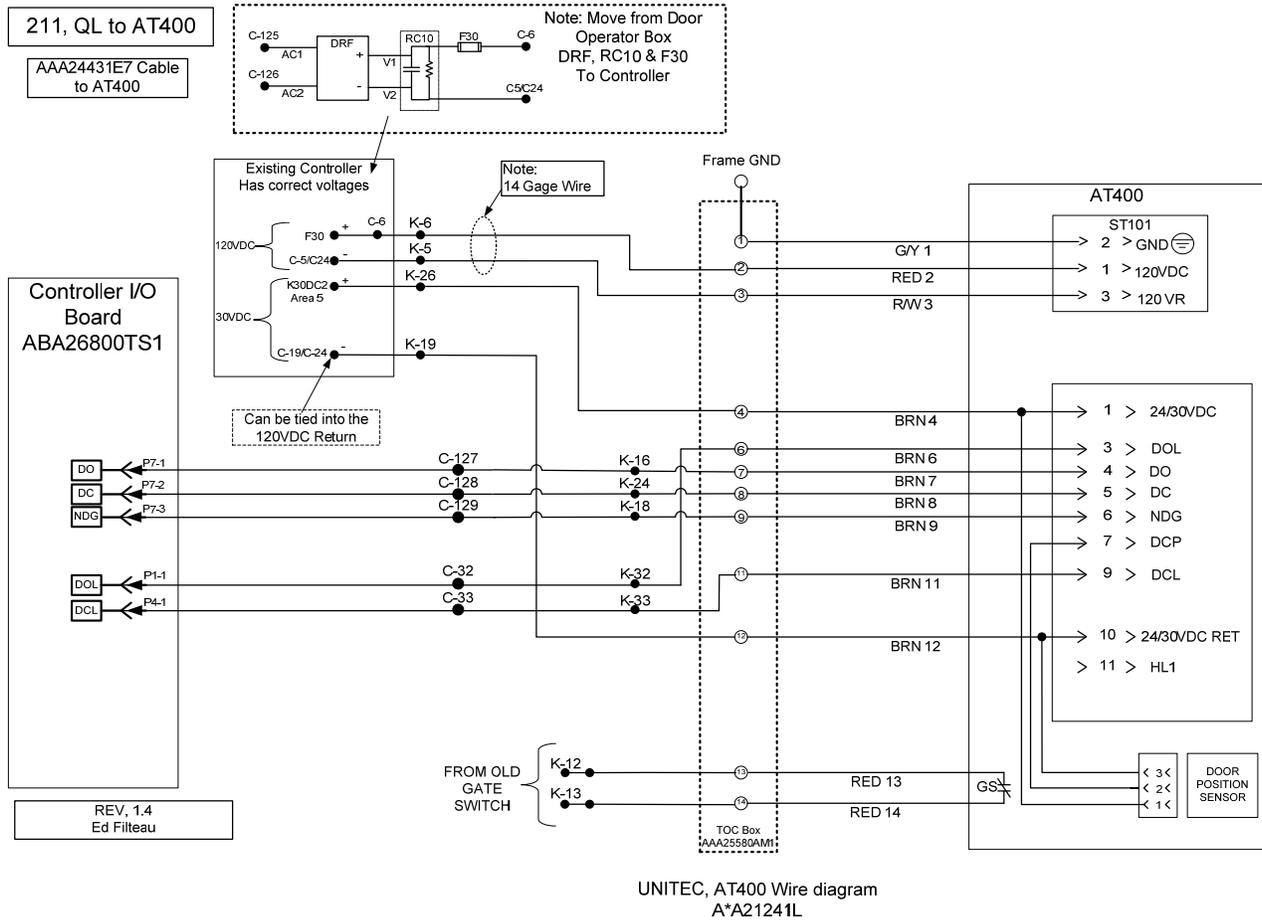


Figure 59: Typical Connections for 211 with Wiring Diagram AEA21241L

UNITEC QL, BLACK-BELT AND I-MOTION

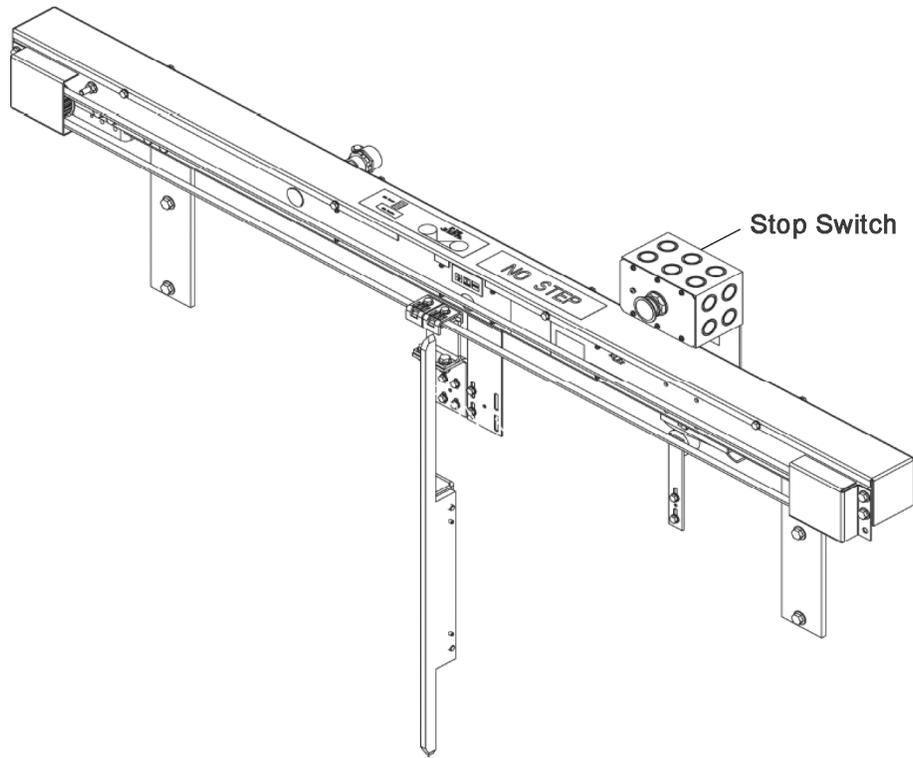


Figure 60: Black-Belt Door Operator with Stop-Switch

Wiring, Logic, and Connections for the Black-Belt Door operator to AT400

- Table 2 lists the connections made to the Black Belt door operator along with the wire diagram (AFA21241V) area location.

Table 2: Typical Connections on the Black-Belt Operator

Pin	Signal Name	LVM Wiring Diagram Area
P1-1	Drain wire from motor	12r, 13r
P1-2	Black wire from motor	12r, 13r
P1-3	White wire from motor	12r, 13r
P2-1	30VDC return	11r
P2-2	+30VDC	11r
P2-3	/DO input	11r
P2-4	/DC input	11r
P2-5	/NDG input	11r
P2-6	/DHC input (B44 use only)	11r
P3-1	Brown wire from DCL sensor	12r, 13r
P3-2	Black wire from DCL sensor	12r, 13r
P3-3	Blue wire from DCL sensor	12r, 13r
P4	Manufacturing use only	N/A
P5-1	Red wire from encoder	12r, 13r
P5-2	Green wire from encoder	12r, 13r
P5-3	Yellow wire from encoder	12r, 13r
P5-4	Black wire from encoder	12r, 13r
P7-1	DOL output	11r
P7-2	Not used	
P7-3	DCL output	11r
P7-4	Not used	
P8-1	+120VDC	12r, 13r
P8-2	120VDC return	12r, 13r
P11-1	Stop switch contact (input)	11r
P11-2	Stop switch contact (30VDC feed)	11r
P13	4-wire cable for three-button interface	

- Connections for the **Black-Belt door operator** are made to KJ8 interconnecting terminals (see Figures 61 and 62).

UNITEC QL, BLACK-BELT AND I-MOTION

Black Belt / i-MOTION I: UNITEC Must Verify Applicability of Discreet AT400 Operator to i-MOTION I

The electrical connections for the AT400 are similar to the black belt door operator and the i-MOTION I discrete operators with the exception of the stop switch circuit. For both the black belt and i-MOTION I operators, the stop switch must be wired in series with the 30VDC input to the AT400 (see Figures 63a, 63b and 63c).

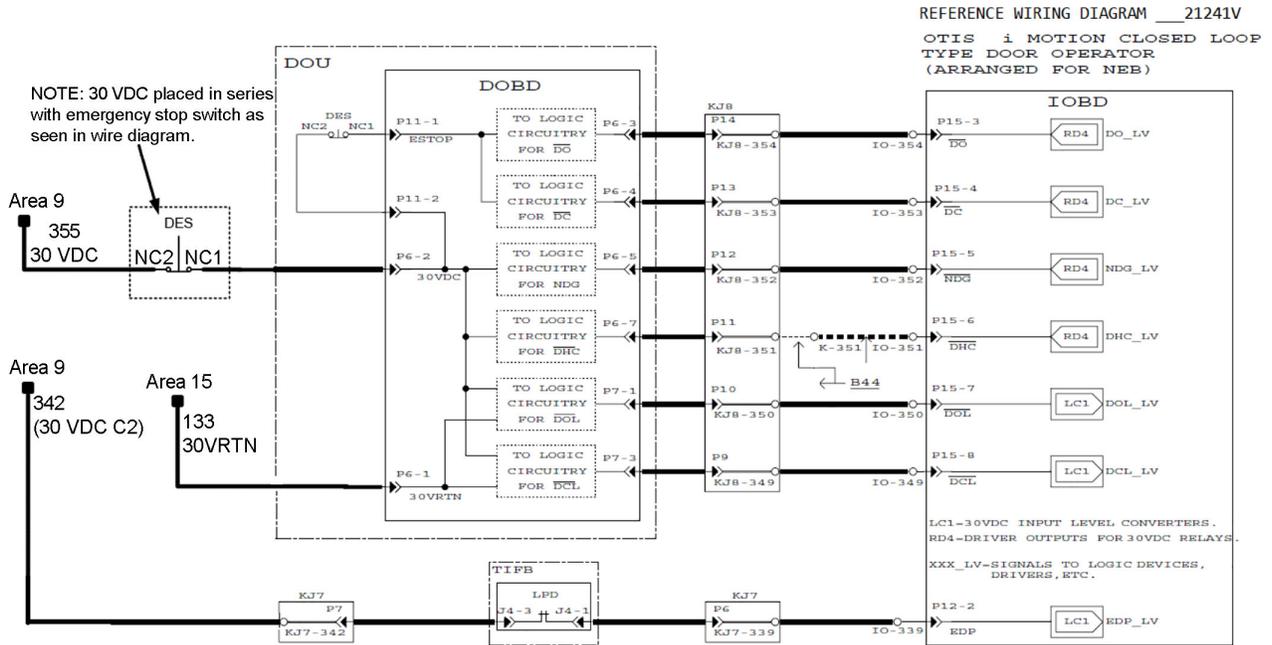


Figure 63a: AT400 Low Voltage Connections Adding the Emergency Stop Switch (i-MOTION I Operators)

UNITEC QL, BLACK-BELT AND I-MOTION

REFERENCE WIRING DIAGRAM AFA21241V & AGA21241V

OTIS BLACK BELT CLOSED LOOP TYPE DOOR OPERATOR (ARRANGED FOR NEB)

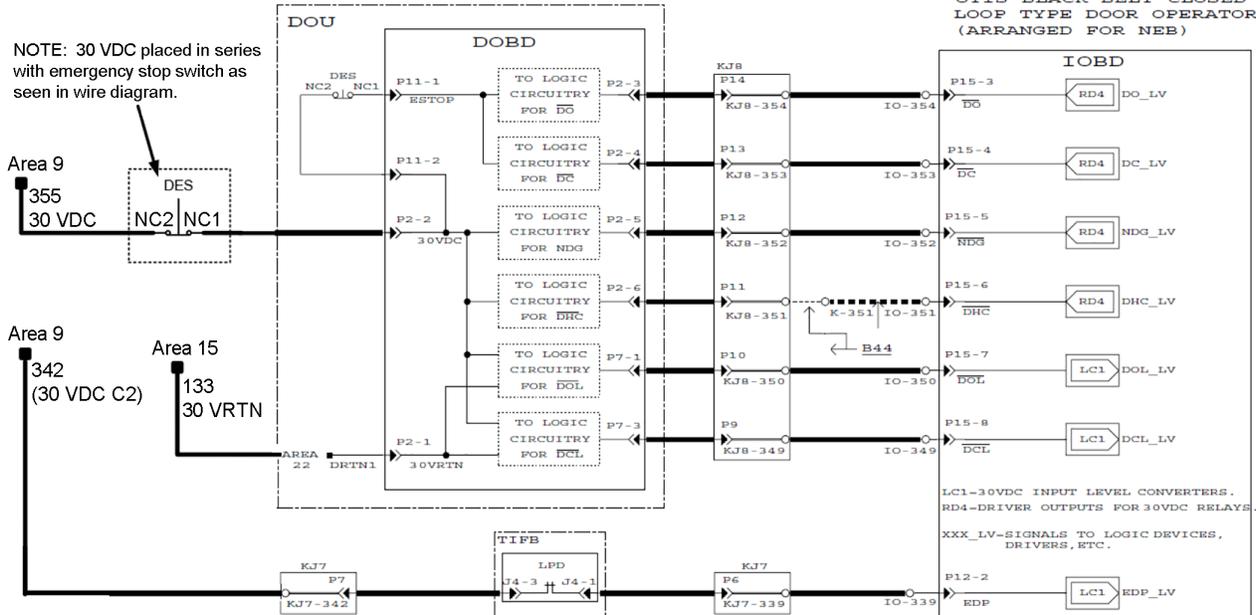


Figure 63b: AT400 Low Voltage Connections Adding the Emergency Stop Switch (Black belt Operators)

DOOR MOTOR - MOD & MODEL & AT4XX

AT-400 CLOSED LOOP TYPE DOOR OPERATOR

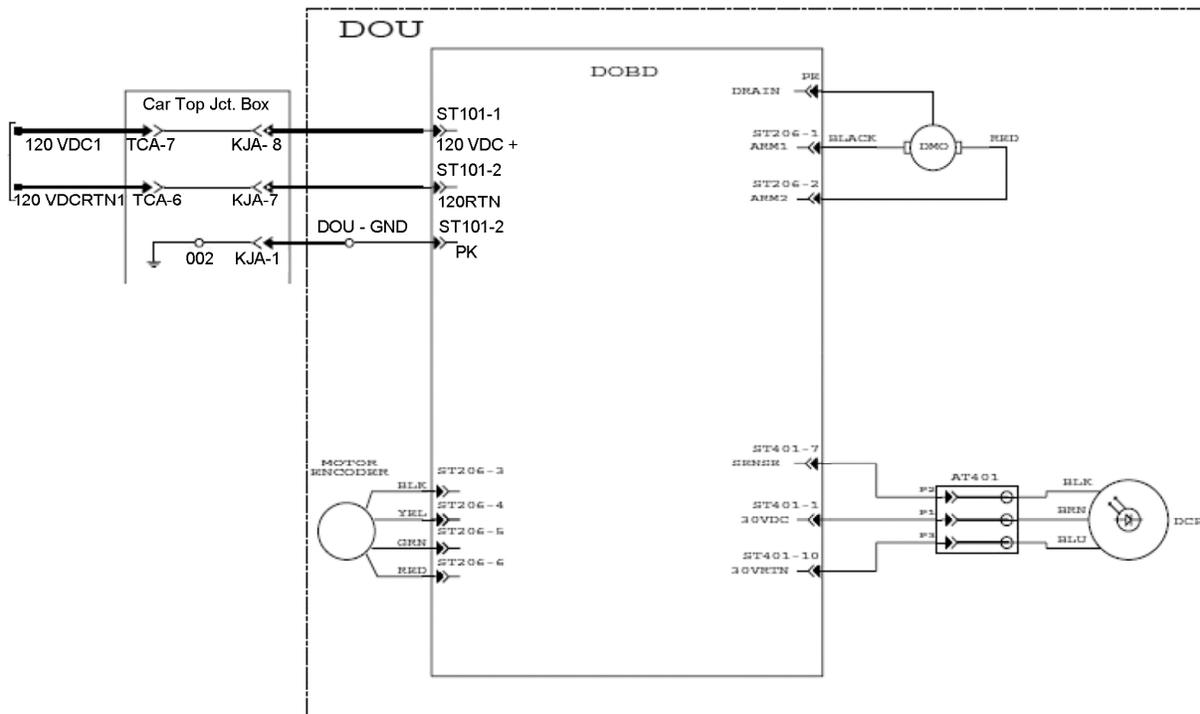


Figure 63c: AT400 High Voltage Connections Adding the Emergency Stop Switch (Black Belt and i-MOTION I Operators)

i-MOTION I vs. i-MOTION II

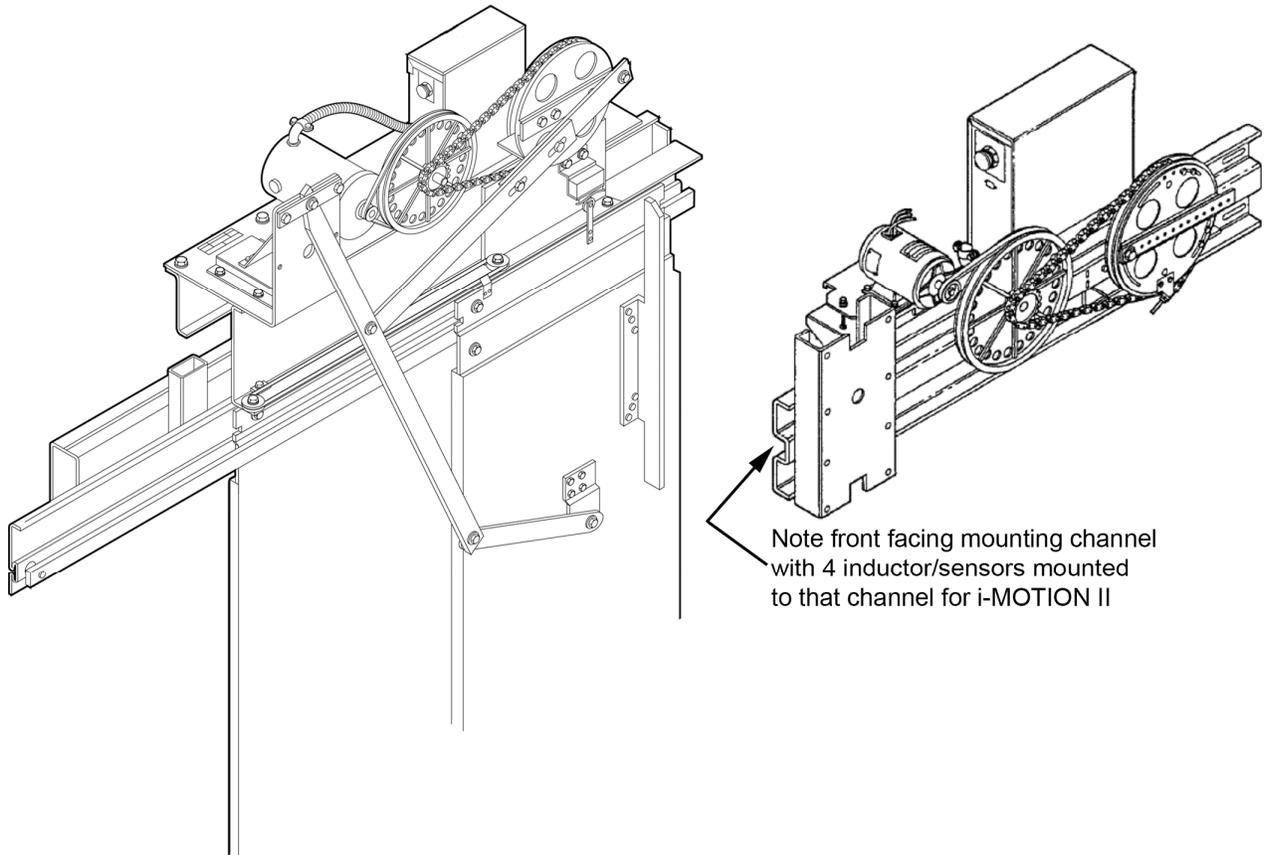


Figure 64: i-MOTION I vs. i-MOTION II

UNITEC QL, BLACK-BELT AND I-MOTION

General Notes on i-MOTION I and i-MOTION II

i-Motion I and i-Motion II are different door operators. There is **no AT400 offering at all for I-Motion II** operators

For i-MOTION 1, fill in A through D.

A. i-Motion I control unit model number: _____.

B. Otis sales number: _____.

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ASSEMBLED IN MEXICO

CSA B44.1/
ASME A17.5
NRTL/C
LR94059

SERIAL NUMBER/ NO. DE SÉRIE/ NO. DE SERIE _____
SALES NUMBER/ NO. DE VENTE/ NO. DE VENTA _____
MODEL NO./ NO. DE MODÈLE/ NO. DE MODELO _____
INPUT VOLTS/ VALEUR NOMINALE/ VOLTAJE ENTRADA _____
OUTPUT VOLTS/ VALEUR SORTANTE/ VOLTAJE SALIDA _____
INPUT AMPS/ AMPÈRES NOMINALE/ AMPERIOS ENTRADA _____
OUTPUT AMPS/ AMPÈRES SORTANTE/ AMPERIOS SALIDA _____
PHASES/ LES PHASES / FASES _____
HERTZ/ HERTZ/ HERTZ _____
H.P. / CHEVAUX/ CABALLO DE FUERZA _____
WIRES/ LES CABLES/ ALAMBRES _____
COMP. VINTAGE NO./ NO. DE TYPE DU COMPOSANT/ NO. DE GENERACION
PASADA DE COMPONENTE _____
COMPONENT CODE/ CODE DU COMPOSANT/ CÓDIGO DE COMPONENTE _____
WIRING DIAGRAM/ SCHEMA DE CÂBLAGE/ DIAGRAMA DE ALAMBRADO _____
DATE/ DATE/ FECHA _____

C. Controller wire diagram number: _____.

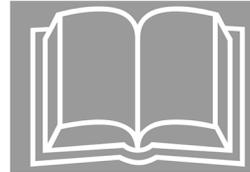
D. Logic board part number: _____.

- Connection to P6 - YES or NO (circle one)
- Connection to P7 - YES or NO (circle one)
- Connection to P2 - YES or NO (circle one)

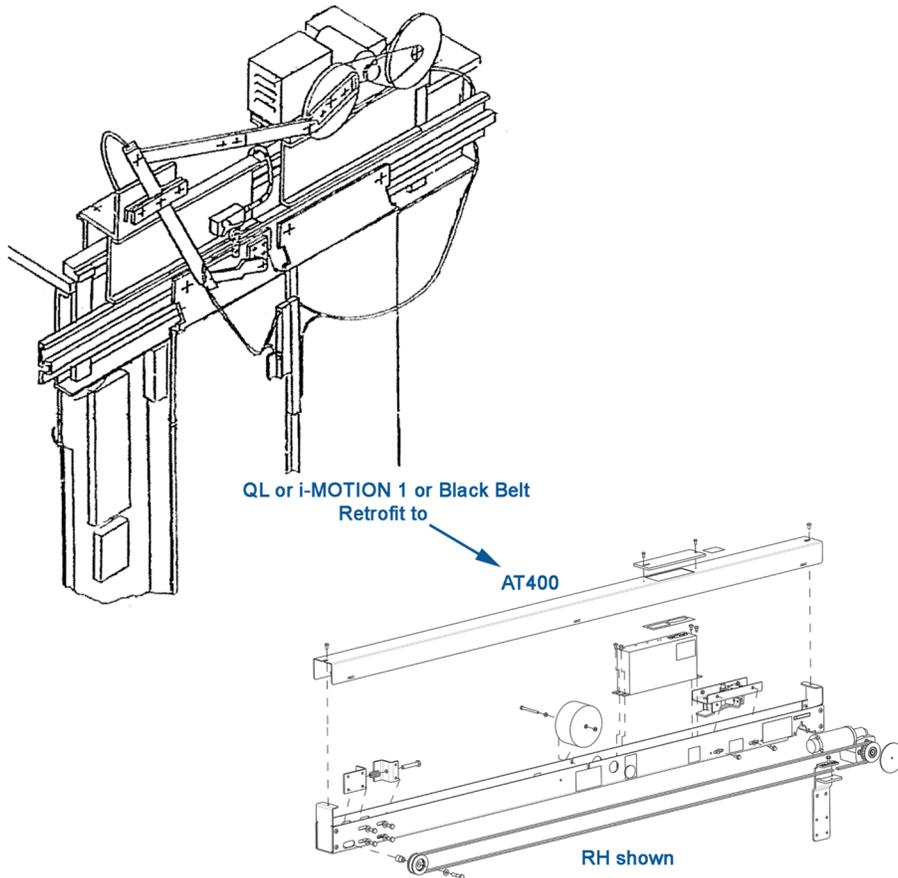
NOTE: E-mail this page to UNITEC.

Appendix A

MARCH 2017



UT-ID 22.14-2



AT400 Confirmation of Equipment

Appendix B

Set aside the extra brackets in the main operator kit. These will likely be un-used for QL, Black Belt, and i-MOTION I installations using the track back method. Save for potential future AT400 installations on other cars with non-Otis or non-QL installations.



**p/n AAA392DS1 9-1/16 in. Long
round holes-no slots (set aside)**



**p/n AAA392DF1
'L' Hitch, 4.25 in. (set aside)**



**p/n AAA392DF2
'L' Hitch, 3.75 in. (set aside)**



**p/n AAA392CJ1
Operator Comes with 'U' Shape Hitch Fastened
to the Belt (remove from the belt and set aside)**



**p/n AAA283ATJ2
Square Holes in Top Flange (set aside)**