RAM CRYSTAL ELEVATORS & LIFTS
Commercial & Residential Elevators

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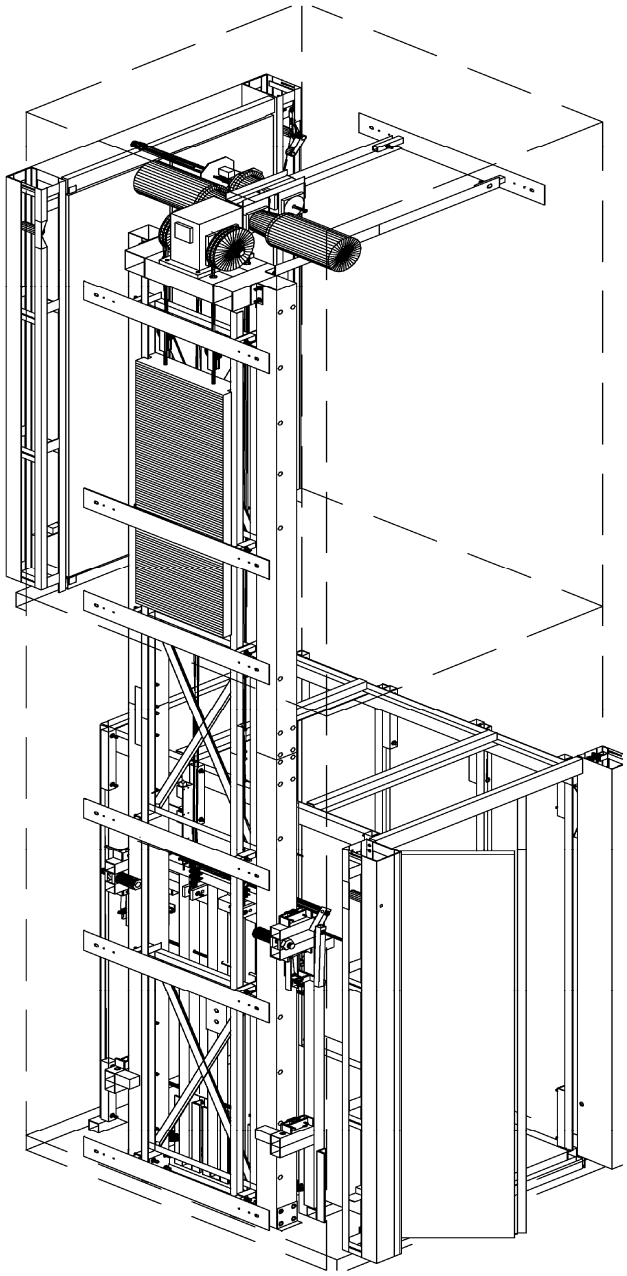
RAM CRYSTAL ELEVATOR INSTALLATION MANUAL

Revision B – June 2013



UNI-VERS ELEVATOR INSTALL MANUAL - TABLE OF CONTENTS

SECTION 1 - SITE PREPARATION AND SET UP.

1.1

a. Make sure the area where you are working is clean. Sweep out the pit if necessary, and clean the area where your parts are going to be placed.

b. Check installation drawing for shaft dimensions and guide rail locations.

c. Measure the shaftway along its full length at 24” intervals making sure that all four walls are parallel, square and plumb, and that the dimensions match the installation drawings.

d. Measure the distance to each landing from the bottom of the pit to the top of the finished floor, the distance from the pit floor to the finished top floor is the most critical.

e. Measure clearance from the finished top floor to the shaft ceiling, a minimum of 96” is required. If the shaft ceiling is less than 97” you will have to modify the motor position to the lowest position on the gear reducer if it is not already done.

f. Ensure that you have 83" (for standard Bi-fold door only) door height clearance from the top of the FINISHED floor to the door header. If floors are not finished, determine thickness of finished flooring and add to required door height clearance.

g. Ensure that the 2” x 3” slots are cut out at the base of each door opening for the Bi-fold door tracks.

h. Make sure that the floors at each landing are level, especially where the guide rails are going to be assembled. Guide rails may have to be shimmed with steel shims if floor is not level.

SECTION 2 - GUIDE RAILS AND CROSS BRACES.

2.1
Determine which wall will support the guide rails and locate the center of the wall. Place a mark on the floor at 14 ¾" on either side if the centerline. This will be the position that you start setting up your guide rails.

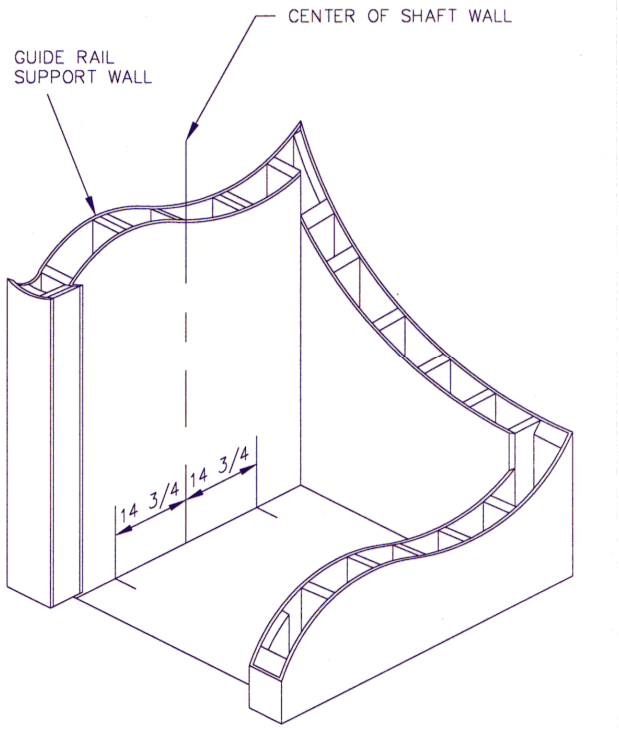


Figure 1. Marking the guiderail location.

MATERIAL LIST PART #

NOTE:

SECTION 2 - GUIDE RAILS AND CROSS BRACES.

2.2
Assemble lower guide rails, guide rail base frame, lower cross brace, lower counter weight guides, and 2 wall mounting brackets (FIG. 2). Leave all bolts loose.
NOTE: Do not use washers for the bolt heads on the outside of the guide rails.

MATERIAL LIST	PART #
1. Lower guide rails	*NOTE
2. Crossbrace support (4 hole)	FFBUG003
3. Wall mounting bracket	FFBUG008
4. Lower guide rail base frame	FFBUG001
5. 7/16 N.C. x 5 bolt	PGAGF014
6. 7/16 N.C. x 1 3/4 bolt	PGAGF042
7. 7/16 N.C. nylon lock nut	PGAGF030
8. Lower counter weight guides	*NOTE

NOTE:
Refer to the shop drawings for each job for details on these items.

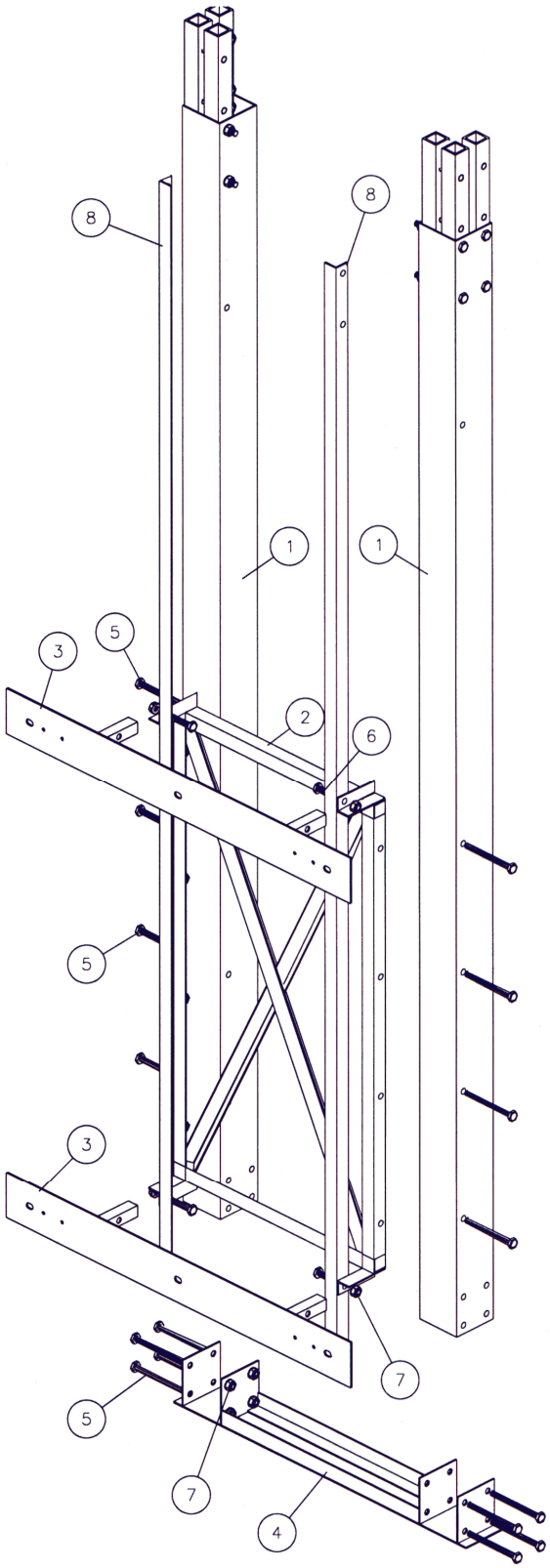


Figure 2. Lower guide rail assembly, looking from behind the guide rails.

SECTION 2 - GUIDE RAILS AND CROSS BRACES.

2.3
Stand lower guide rail assembly against supporting wall. Measure from each guide rail to the nearest wall, the distance should be equal. If you are unable to keep the guide rails an equal distance from both walls for the entire travel distance then pick a wall (the one with the doors) and make sure the guide rails run parallel to that wall for the entire travel distance. Install ONE lag bolt into the top wall mounting bracket to stabilize the assembly (FIG. 3), leave all of the other bolts loose.

MATERIAL LIST	PART #
1. Lag bolt 1/4 x 3 long (wood wall), or concrete block lag bolt 1/4 X 2 1/4 (concrete block wall).	PGAGF082 or PGAGF083
2. Guide rail connector section (double) **Change required Conn. Section with welded lock nuts**	FFBUG013
3. Guide rail connector section (single)	FFGUG015

NOTE:

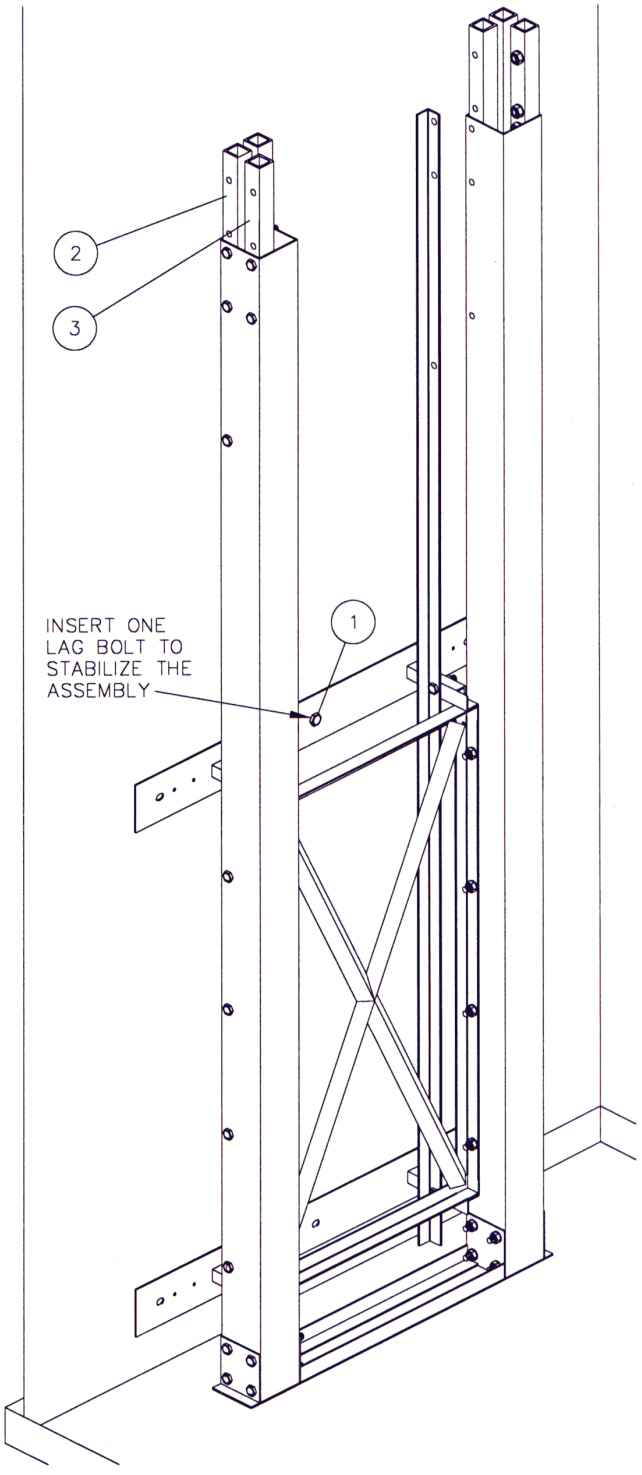


Figure 3. Lower guide rail installation, looking from in front of the guide rails.

SECTION 2 - GUIDE RAILS AND CROSS BRACES.

2.4

a.) Slide the next (upper or mid) guide rail sections in place. Insert all of the outside bolts. Remove the uppermost inner guide rail bolt (do not remove all the inner guide rail bolts or the connector tube will fall inside the guide rail).

b.) Put the 6 hole cross brace in place at an angle (Fig. 4) and insert one bolt on each side as shown. Remove the lower inside bolt, swing the cross brace into position and install the remaining bolts. Leave all bolts loose.

NOTE: Do not use washers for the bolt heads on the outside of the guide rails.

MATERIAL LIST	PART #
1. 7/16 x 2 bolt	
2. 7/16 x 2 ¼ bolt	
3. 7/16 Flat washer	
4. 6 hole crossbrace	FFBUG006

NOTE:

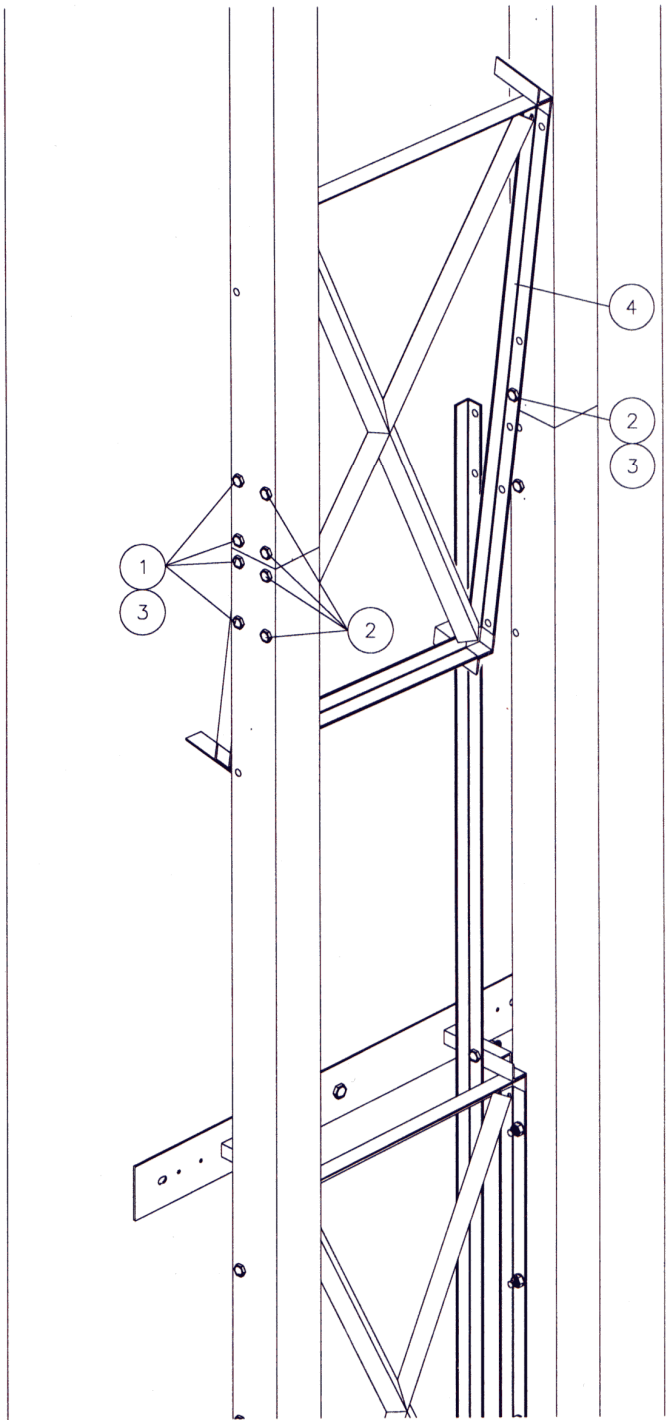


Figure 4. Installing the middle cross brace, looking from in front of the guide rails.

SECTION 2 - GUIDE RAILS AND CROSS BRACES.

2.5
Install the remaining guide rails, cross brace, upper counter weight guides, and wall mounting brackets (FIG. 5). Leave all bolts loose.

NOTE: Do not use washers for the bolt heads on the outside of the guide rails.

MATERIAL LIST	PART #
1. Upper guide rails	FFBUG011
2. Crossbrace support (4 hole)	FFBUG003
3. Wall mounting bracket	FFBUG008
4. 7/16 N.C. x 5 bolt	PGAGF014
5. 7/16 N.C. x 2 1/4	PGAGF020
6. Upper counter weight guides	FFBUG012

NOTE:

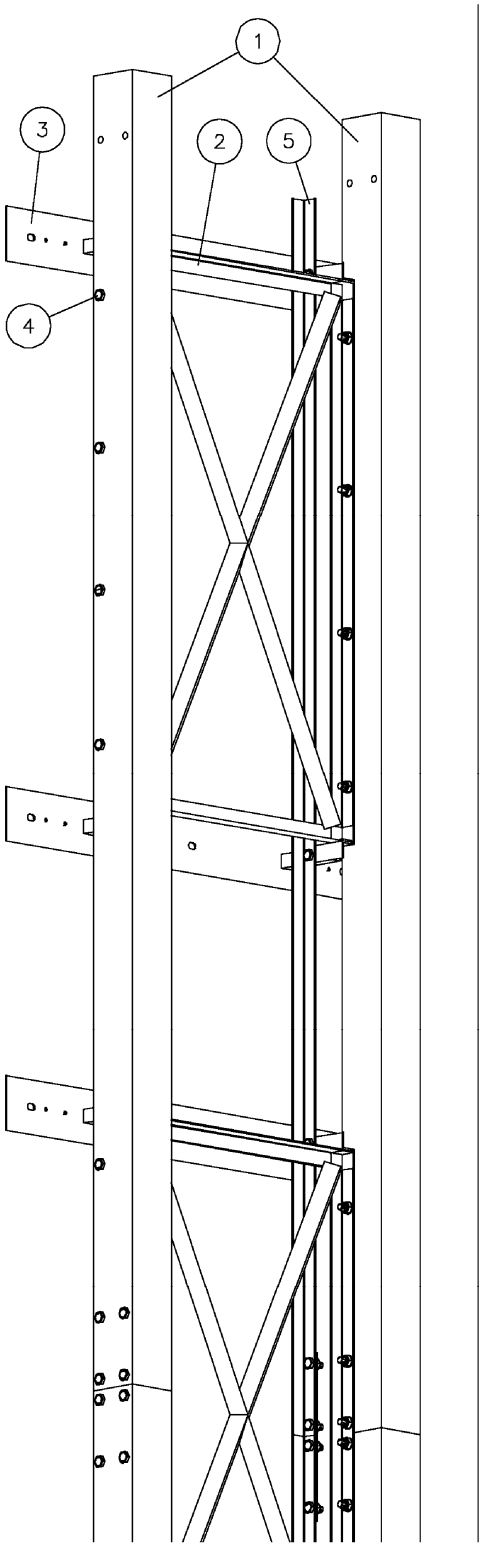


Figure 5. Installation of the upper guide rails, cross brace, upper counter weight guides, and wall mounting brackets. Looking from in front of the guide rails.

2.6
Install counter weight guide connecting angle (FIG. 6). Leave all bolts loose.

2.7
Install battery base frame (FIG. 7).

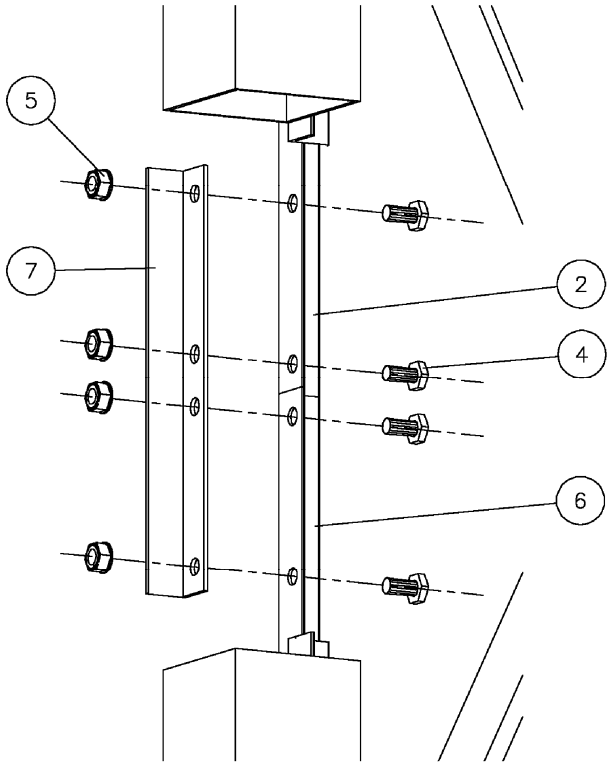


Figure 6. Installation detail of the counter weight guide connecting angle. Looking from in front of the guide rails, with part of the guide rail and cross brace cut away for clarity.

MATERIAL LIST	PART #
1 Gear Drive base frame	FFCUG017
2. Upper counter weight guides	FFBUG012
3. Wall mounting bracket	FFBUG008
4. 7/16 N.C. x 1 bolt	PGAGF006
5. 7/16 nylon lock nut	PGAGF030
6. Lower counter weight guide	*NOTE
7. Counter weight guide connecting angle	FFBUG016

NOTE:
Refer to shop drawings for each job for details of this item.

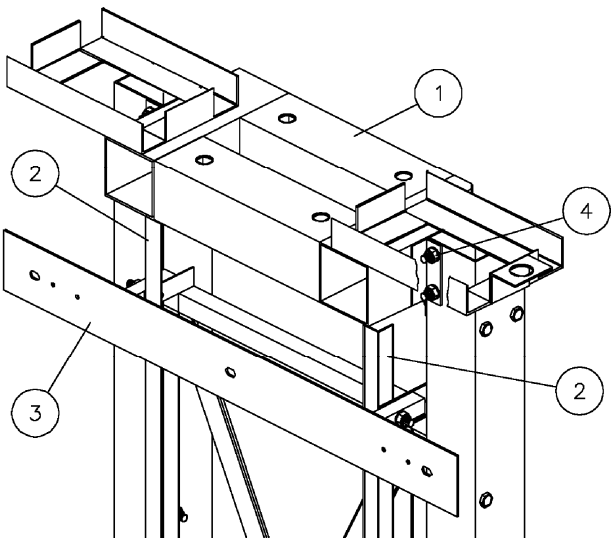


Figure 7. Gear Drive base frame and counter weight guides installation, looking from behind the guide rails.

2.8
Tighten all bolts on the guide rails, cross braces, and counter weight guide angles starting from the bottom to top in the following sequence:

a) Tighten the base frame first followed by the lower cross brace (FIG. 8) Ensure cross brace is flush with back of rail. (do not tighten the wall mounting brackets or the counter weight guides at this time).

b) Tighten the guide rail connector sections and mid-cross brace ensuring that the rails make a straight line where they connect. Tighten to about 80 ft-lbs, do NOT over tighten. **IMPORTANT**: Using a 4' level or a set square ensure that the guide rails are in line and square in all directions (FIG. 9) (do not tighten the wall mounting brackets or the counter weight guides at this time).

c) Tighten the bolts on the upper cross brace and motor base frame.

d) Tighten the counterweight guide connecting angles (Figure 6) Ensure counterweight guide angles edges are lined up and are tight together. Grind connection smooth if necessary.

e) Move guide frame assembly back to supporting wall and anchor the wall mounting brackets to the supporting wall. Center guide rails in shaft by measuring from 4" x 4" rail to shaft walls adjacent to the support wall.

f) Tighten all of the counter weight guide angle bolts except for the ones on the lower cross brace (FIG. 8).

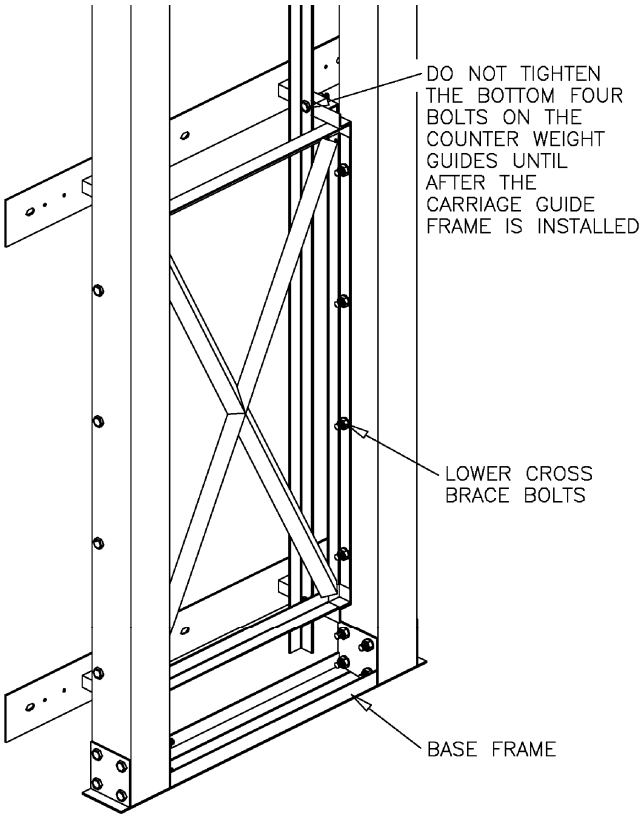


Figure 8. Tightening the base frame and lower cross brace, looking from in front of the guide rails.

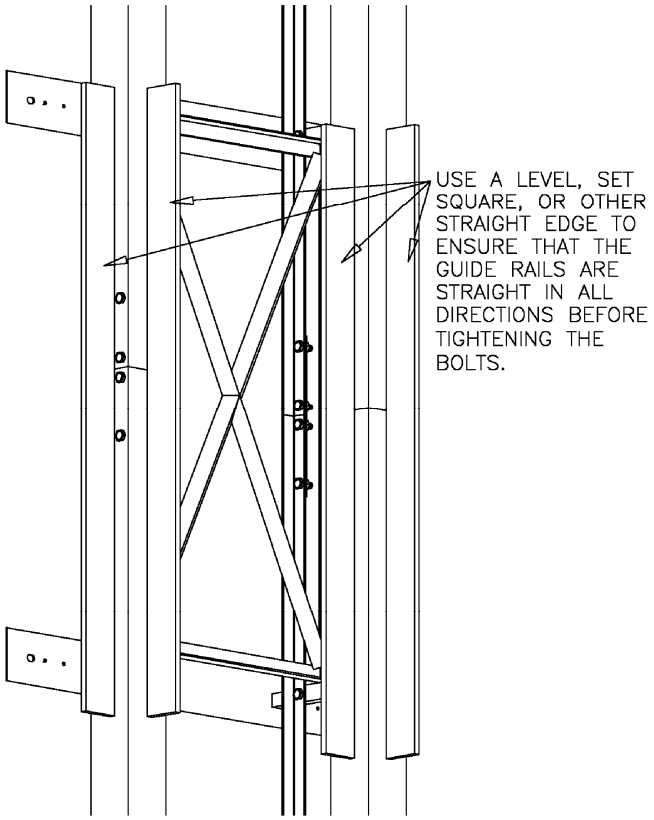


Figure 9. checking that the guide rails are straight and square, looking from in front of the guide rails.

2.9
Install and tighten the upper horizontal supports and wall mounting bracket (FIG. 10).

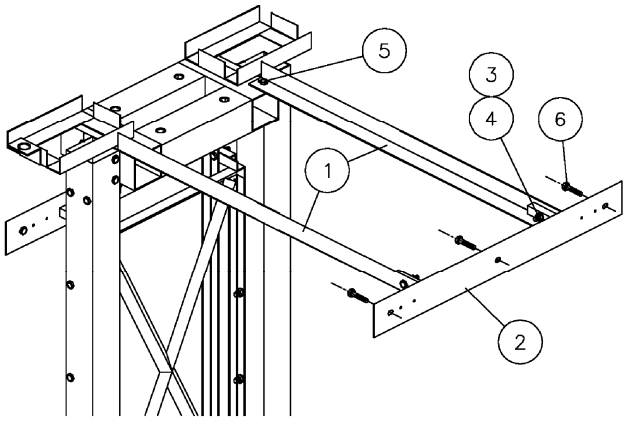


Figure 10. Installing the upper horizontal supports looking from in front of the guide rails.

MATERIAL LIST	PART #
1. Upper horizontal supports	*NOTE
2. Wall mounting bracket	FFBUG008
3. 7/16 N.C. x 1 3/4 bolt	PGAGF042
4. 7/16 N.C. nylon lock nut	PGAGF030
5. 7/16 N.C. x 1 bolt	PGAGF006
6. Lag bolt 1/4 x 2 1/2 long (wood wall), or concrete block lag bolt 1/4 x 2 1/2 (concrete block wall).	PGAGF082 or PGAGF083

NOTE:
Refer to shop drawings for each job for details of this item.

SECTION 3 - MOTORS AND RUNNING GEAR

3.1
Hang the working platform on the bottom of the upper cross brace (FIG. 1) to install the gear reducers and motor(s).

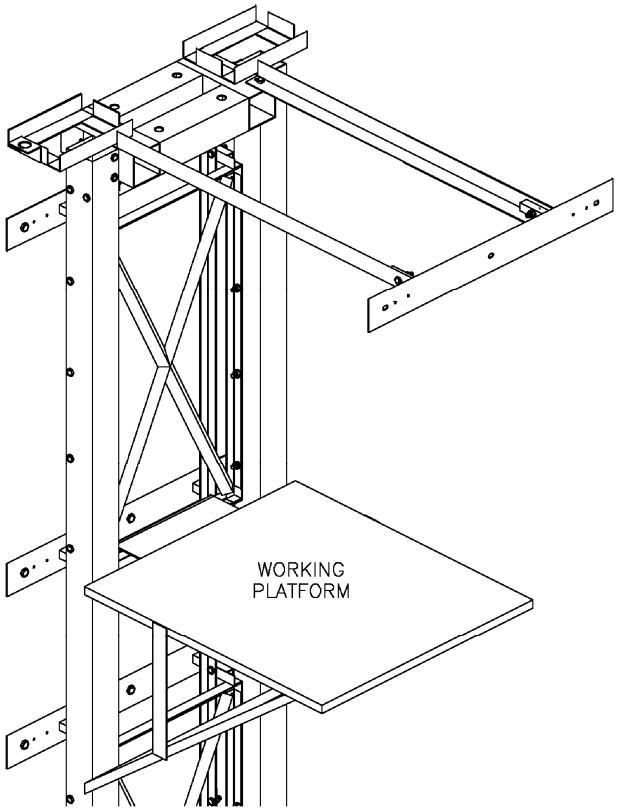


Figure 1. Hanging the working platform on the upper cross brace.

MATERIAL LIST PART #

NOTE:

3.2
Mount the gear reducer on to the mounting base at the top of the guide rail assembly (FIG. 2). The sheaves should have been installed at the shop, and should be secured with a roll pin through the boss.

3.3
Ensure that the sheaves are 9 1/2" centre to centre (FIG. 3).

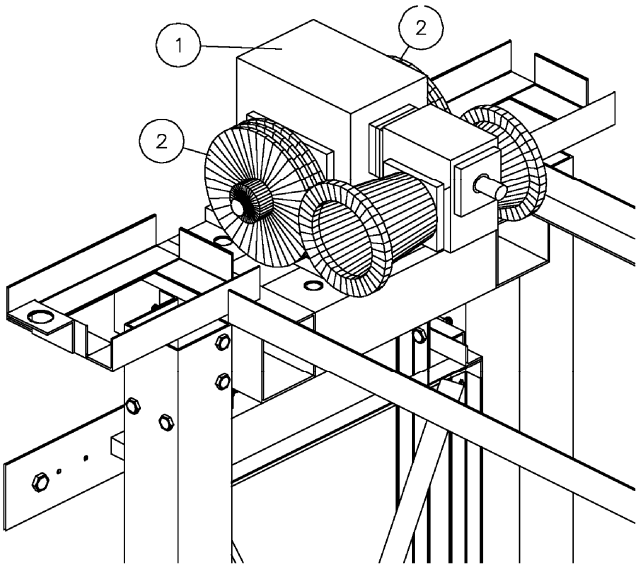


Figure 2. Installation of gear reducer assembly. Looking from in front of the guide rails.

MATERIAL LIST	PART #
1. Gear reducer assembly	
2. Traction sheave	MMBUG080
3. 7/16 N.C. x 5 1/2 bolt	PGAGF015

NOTE:

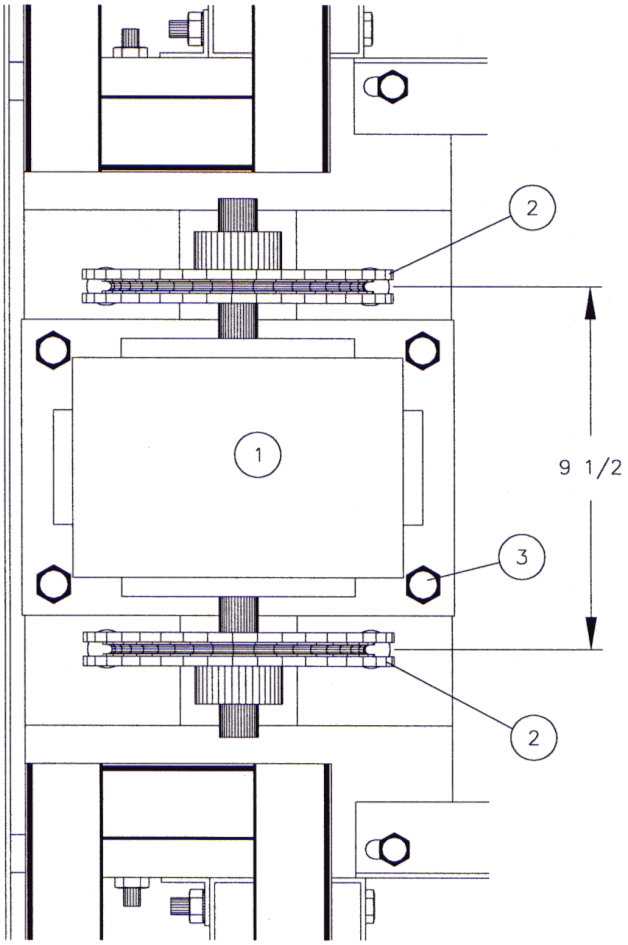


Figure 3. Sheave spacing.

3.4
Install motor. (FIG. 4).

3.5
Move the working platform to the top of the second cross brace to begin installation of the counter weights.

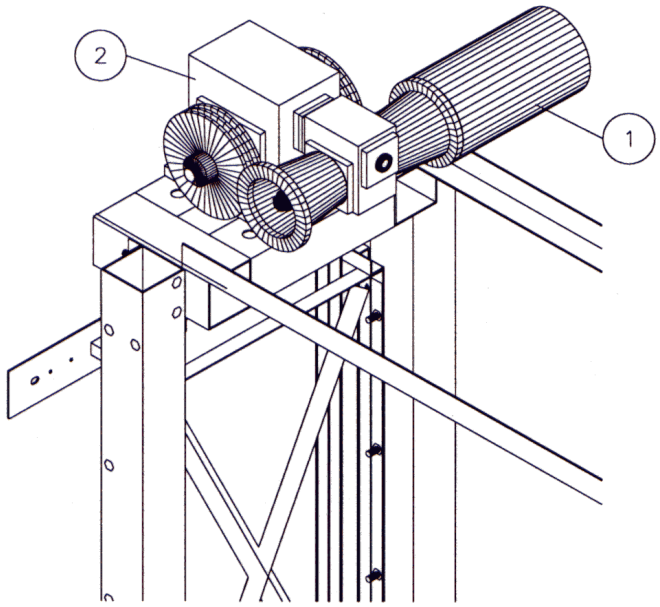


Figure 4. Motor installation. Looking from in front of the guide rails.

MATERIAL LIST PART #
1. AC motor
2. Gearbox

3.6
Hang the temporary counter weight hangers on the top of the second cross brace (FIG. 5).

Refer to counterweight assembly drawing UG135 in appendix B for all counterweight assembly images.

3.7
Assemble the counterweight side channels (UG136)to the upper and lower cross plates (UG140 & UG141) as per DWG UG135 in Appendix B using the 5/16 x 1 Hex bolts. Finger tight only at this stage

3.8
Install the specified number of counterweight plates (UG142) onto the lower cross plate ensuring that the weight stack is tight to the back of the side channel.

3.9
Install the lower & upper keeper plates using the low profile 10-32 Pan Head screws.

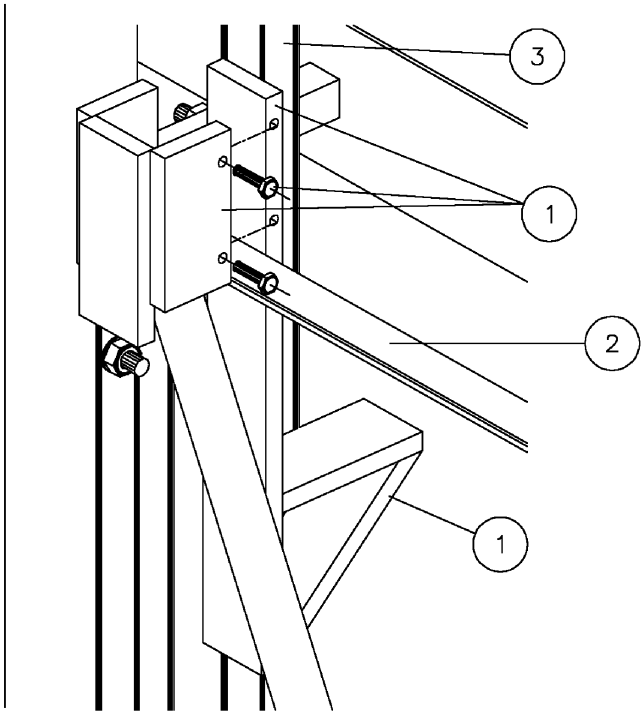


Figure 5. Installation of the counter weight hangers, looking from the front of the guide rails.

MATERIAL LIST	PART #
1. Counter weight hanger	AMBUG023
2. Crossbrace support (6 hole)	FFBUG006
3. Counterweight Assembly	UG135

NOTE: The counterweight sling will be shipped assembled-it must be disassembled prior to being installed on the counterweight hangars.

SECTION 4 - CARRIAGE

4.1
Remove the four bolts that connect the lower two wall mounting brackets to the counter weight guides (FIG. 1).

4.2
Place carriage floor inside shaftway on 4 x 4 temporary support tubes (2-2x4 studs on edge screwed together will also work) (FIG. 2). Centre the carriage floor with the guide rails.

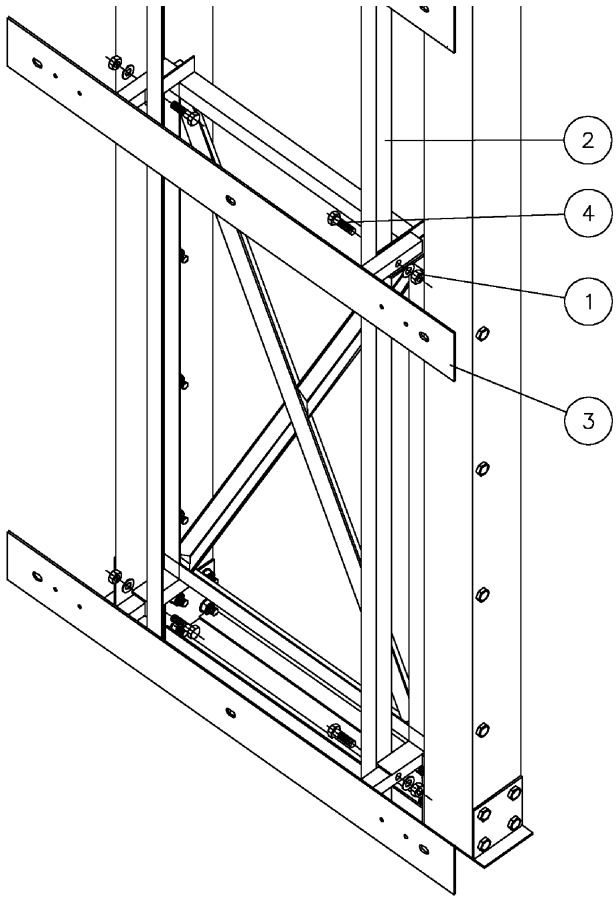


Figure 1. Removing the lower counter weight guide bolts. Looking from behind the guide rails.

MATERIAL LIST	PART #
1. 7/16 nylon lock nut	PGAGF030
2. Lower counter weight guides	*NOTE
3. Wall mounting bracket	FFBUG008
4. 7/16 x 1 3/4 bolt	PGAGF042
5. Carriage floor	*NOTE
6. Temporary 4 x 4 support tubes	

NOTE:
Refer to job specific shop drawings for details of these items.

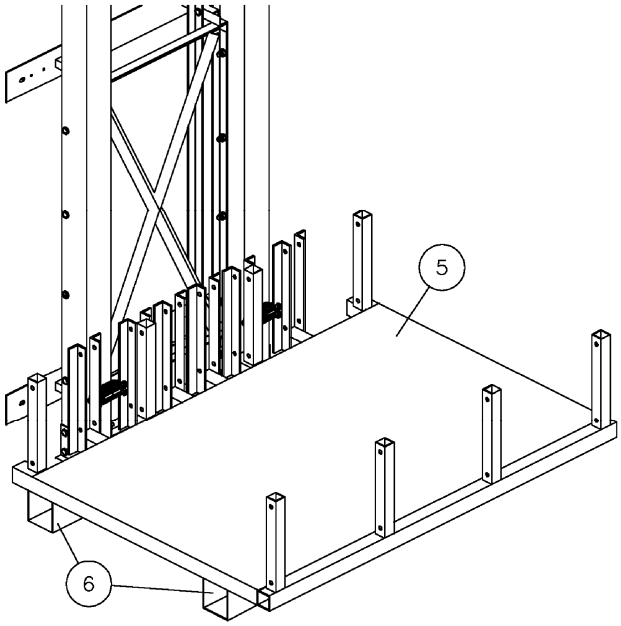


Figure 2. Placing the carriage floor inside the shaftway.

4.3
Remove the lower side guide roller bracket assemblies and the upper rollers from the guide frame. Slide the guide frame into place and insert the lower nuts & bolts. Insert the tilt plate bolts through the back of the guide frame tilt plate and the carriage floor vertical angles. Tighten the tilt plate bolts until they just make contact but can still turn freely.

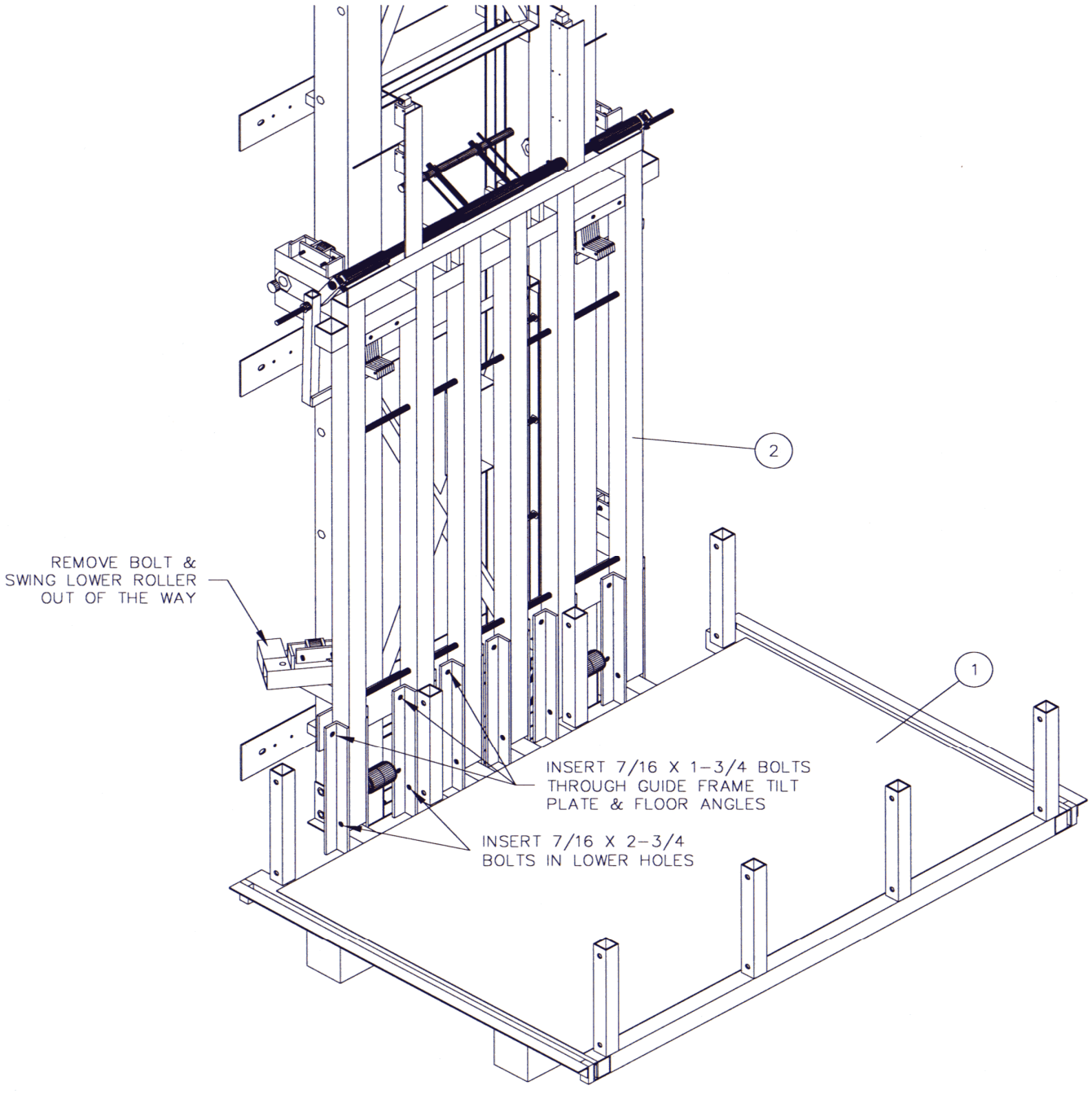


Figure 3. Setting the guide frame in place.

MATERIAL LIST	PART #
1. Carriage floor	AFBUC050
2. Carriage guide frame	AFCUC001

4.4

Install the upper rollers as shown in (FIG. 4). Note the 1"NC jamb nut is placed in between the two ½" thick steel plates of the guide frame. Thread the jamb nut onto the 1"x7" bolt until it has reached the end of the threads. Thread the 1"NC lock nut onto the bolt and tighten so that the jamb nut and lock nut are tight and rigid against the outside ½" steel guide frame plate. Note the upper roller should have approximately 1/4" movement along the bolt shaft when tight.

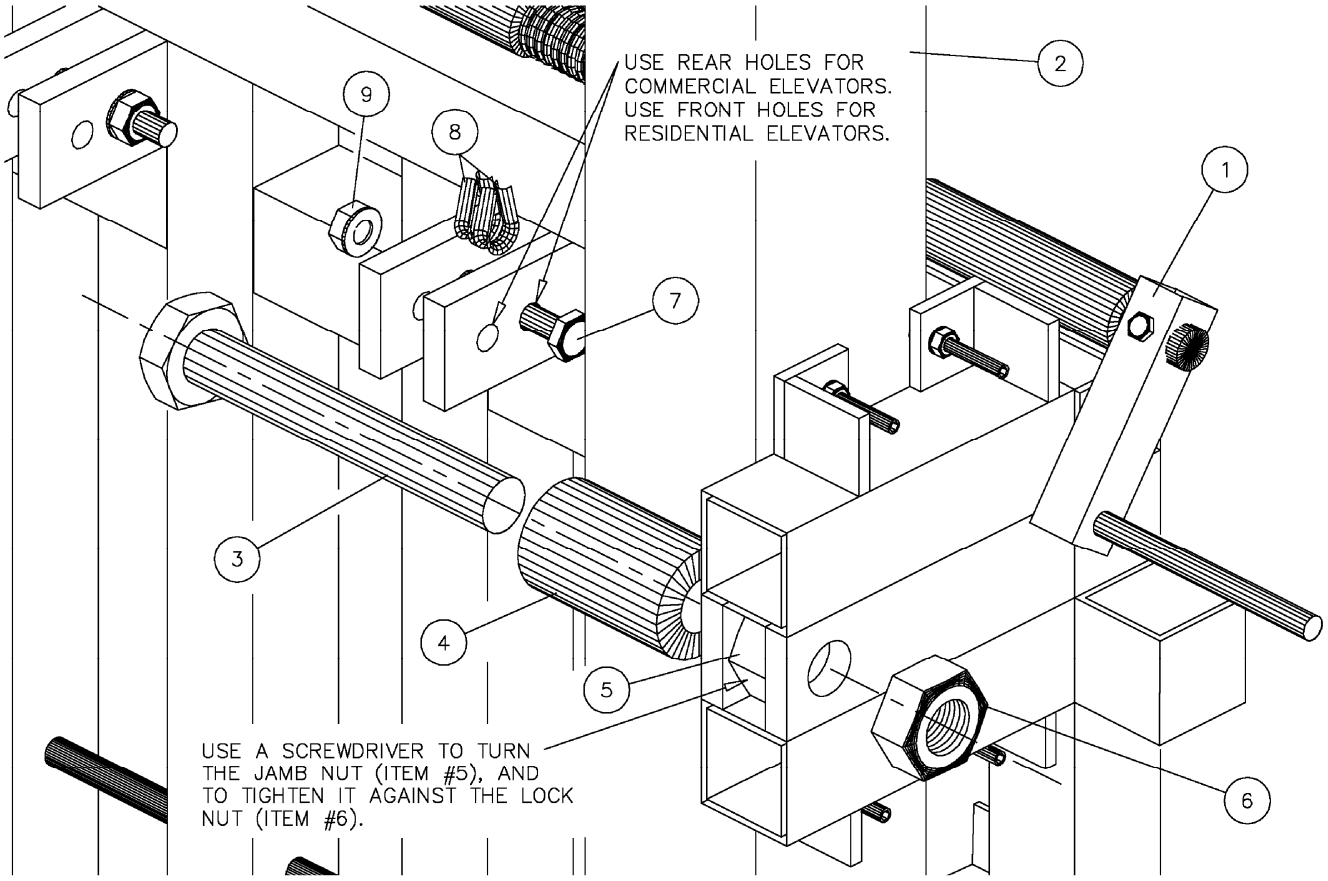


Figure 4. Installing the carriage guide frame on to the guide rails. Looking from behind the guide rails.

MATERIAL LIST	PART #
1. Carriage guide frame	AFCUC001
2. Lower guide rails	*NOTE
3. 1 N.C. x 7 bolt	PGAGF019
4. Upper roller	MMBUC040
5. 1 N.C. jamb nut	PGAGF026
6. 1 N.C. lock nut	PGAGF033
7. 5/8 N.C. x 3 bolt	PGAGF017
8. Cable thimble	
9. 5/8 N.C. nylon lock nut	PGAGF032

NOTE:
Refer to shop drawings for each job for details of this item. Parts are not exactly as shown.

4.5
Install the bottom side rollers on the carriage guide frame (FIG. 5) (not exactly as illustrated).

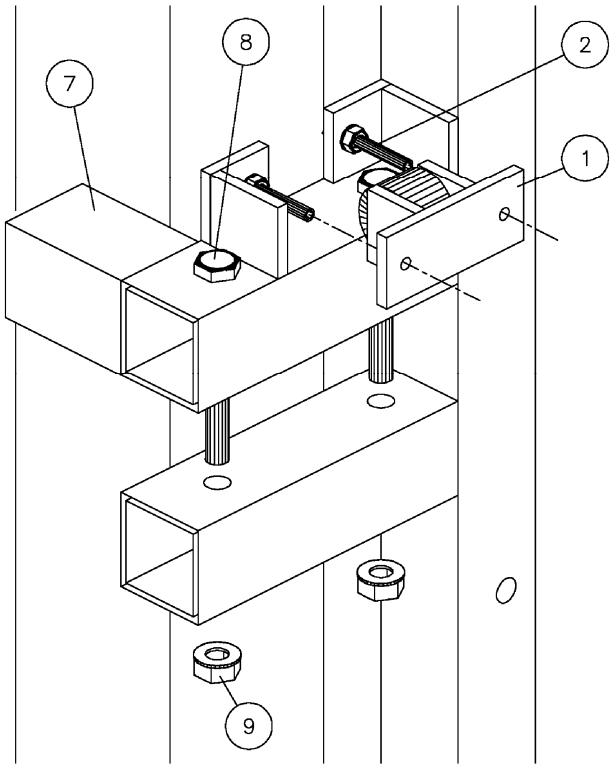


Figure 5. Installation of the bottom side rollers. Looking from behind the guide rails.

MATERIAL LIST	PART #
1. Side roller and bracket – No longer required	FMBUC014
2. 1/4 N.C. x 2 Allen head bolt	PGAGF002
3. 1 N.C. lock nut	PGAGF033
4. 1 N.C. jamb nut	PGAGF026
5. 1 N.C. x 7 bolt	PGAGF019
6. Upper roller	MMBUC040
7. Lower side roller frame bracket	FFBUC018
8. 7/16 N.C. x 5 bolt	PGAGF014
9. 7/16 N.C. nylon lock nut	PGAGF030

NOTE:
Parts may not be exactly as shown

4.6
Install the lifting cables. Note the attachment to the carriage is assembled in the factory-inspect to ensure cable attachment bolts are fully threaded onto the locknuts.(Figure 6.)

Refer to counterweight assembly drawing UG135 in appendix B for all counterweight assembly images.

4.7
Thread the counterweight end of the lifting cable through the gear drive base frame and over each traction sheave ensuring that each cable is set into the sheave groove. Note: you will need to loosen the cable keeper angle bolts to get the cables into the sheave groove. Tighten bolts once cables are in-place.

4.8
Connect the rope wedge socket to the counterweight as shown in drawing UG135. Adjust the thread length after the bottom nut so that it is even on both sides and remove as much slack from the cable as possible. Jamb the nuts to secure the wedge socket in place as per UG135 and install the cotter pin in the hole below the bottom nut.

Figure 6. Carriage Lifting Cable Attachment.

NOTE:
Slack cable operated safeties shown.

4.9
Remove the temporary 4x4 support tubes underneath the carriage by lifting the carriage floor from the pit using a plank lever and blocks. The carriage should now be suspended by the lifting cables.

DO NOT REMOVE COUNTERWEIGHT HANGARS UNTIL CARRIAGE IS FULLY ASSEMBLED

4.10
The right side rollers will have been set in the factory to achieve clearance of approximately 3/4" (FIG 7&8) spacing between the carriage guide frame and the outside of the guide rails. The left side rollers are spring loaded and you must back off the 5/16 square headed bolt to allow the spring to apply roller pressure on the guide rail.
(not exactly as illustrated).

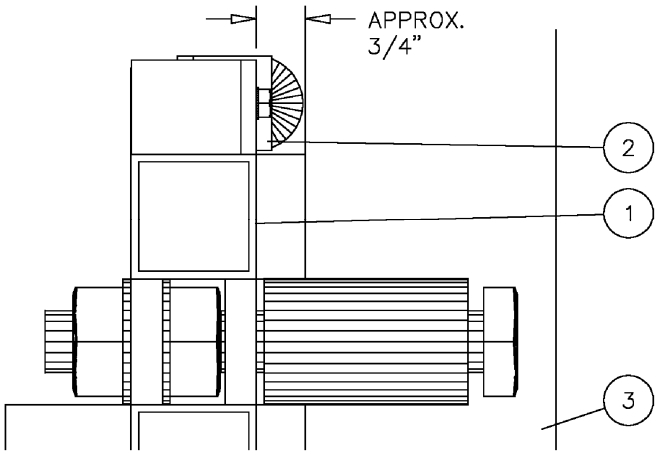


Figure 7. Upper side roller spacing. Looking from behind the guide rails.

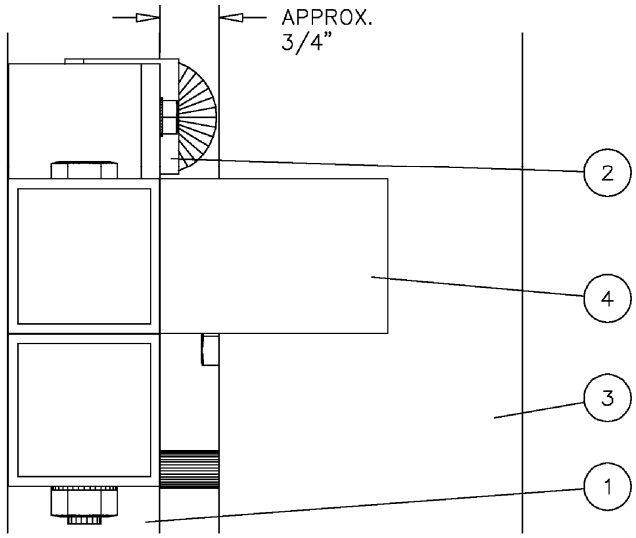


Figure 8. Lower side roller spacing. Looking from behind the guide rails

MATERIAL LIST	PART #
1. Carriage guide frame	AFCUC001
2. Side roller and bracket	FMBUC014
3. Lower guide rails	*NOTE
4. Lower side roller frame bracket	FFBUC018
5. 1/4 N.C. x 2 Allen head bolt	PGAGF002

4.11
Install the carriage walls and ceiling, leave the bolts loose.

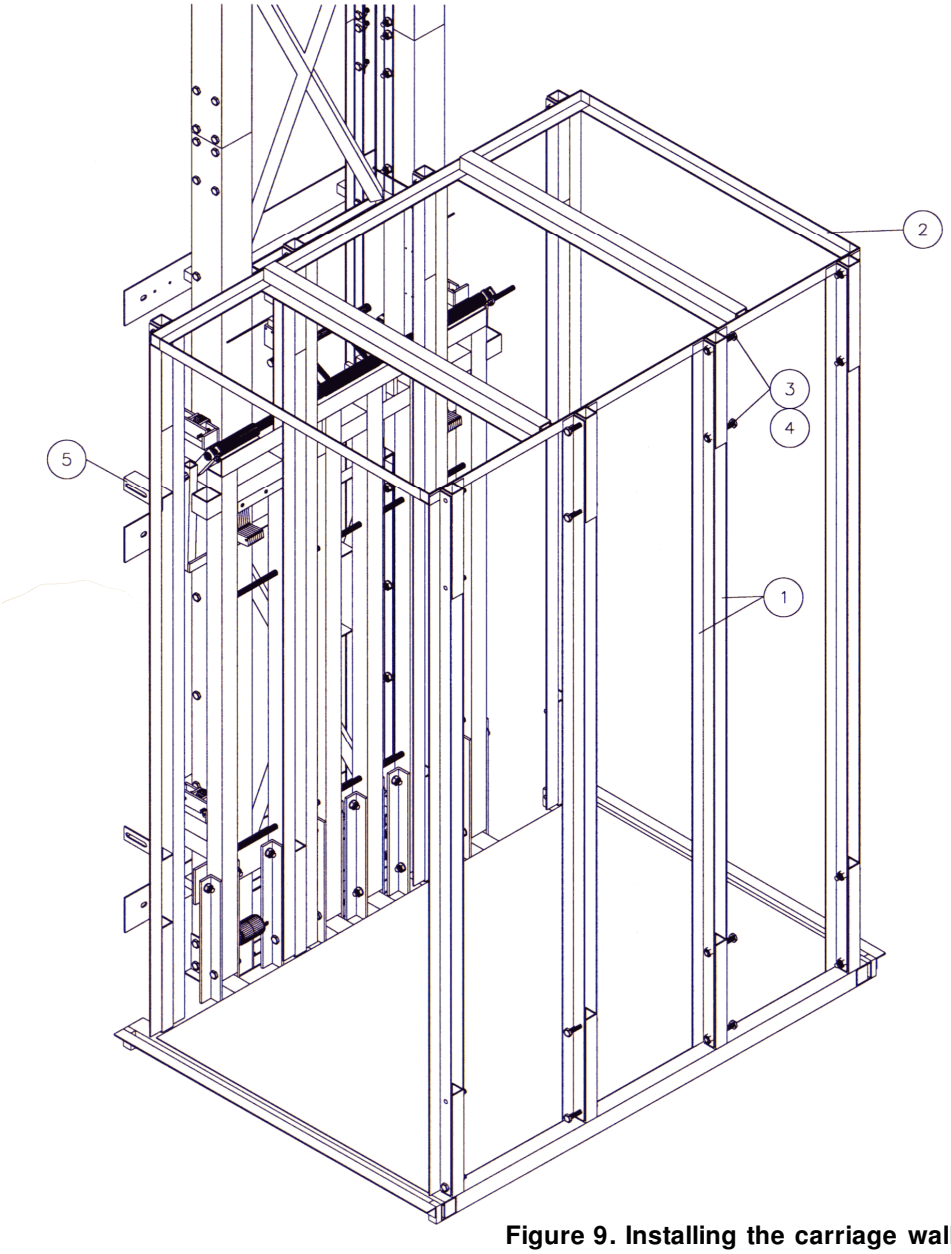


Figure 9. Installing the carriage walls and ceiling.

MATERIAL LIST	PART #
1. Carriage wall studs	FFBUC060
2. Carriage ceiling	
3. 7/16 N.C. x 2 1/4 bolt	PGAGF008
4. 7/16 Nylon lock nut	PGAGF030
5. Carriage Corner Cam Stud	FFBUC100

NOTE:
Refer to shop drawings for each job for details of these items.

4.11
To level the carriage, adjust each tilt plate bolt in sequence until the deck is level or tilted slightly up(approx. ¼") on the side opposite the guide frame and all of the bolts have the same amount of tension. Do not adjust the bolts more than a ½ turn at a time.

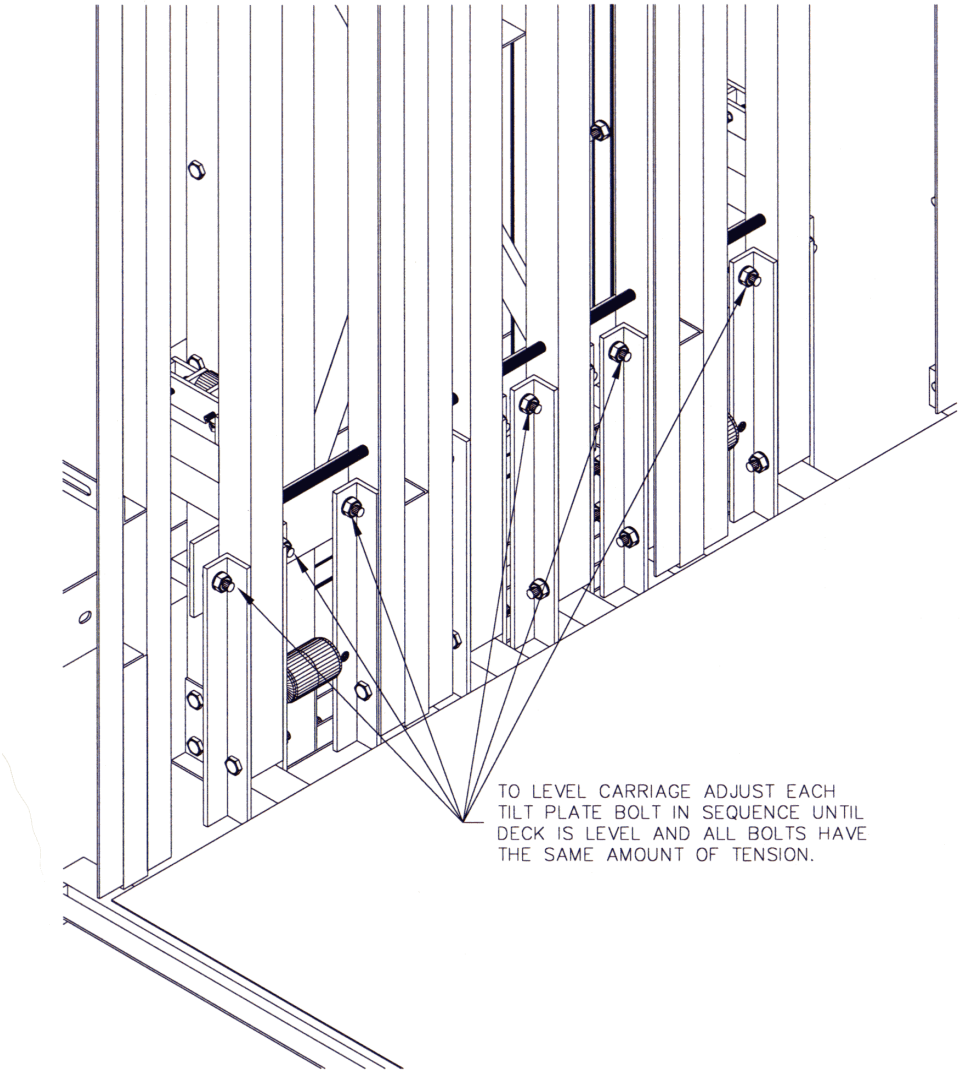


Figure 10. Tightening the carriage bolts.

4.12
Once the carriage floor is level proceed to tightening all of the carriage studs making sure that the factory set markings line up on each stud as this will make installing the trim panels easier.

4.13
Once the carriage studs are tight proceed to installing the carriage trim pieces using the 1/8 pop rivets provided.

4.14
Turn gear reducer manually to raise the counter weight from the hangers (FIG. 11), make sure that the counter weight is not resting on the hangers before continuing with the next step.

NOTE:
Parts may not be exactly as shown

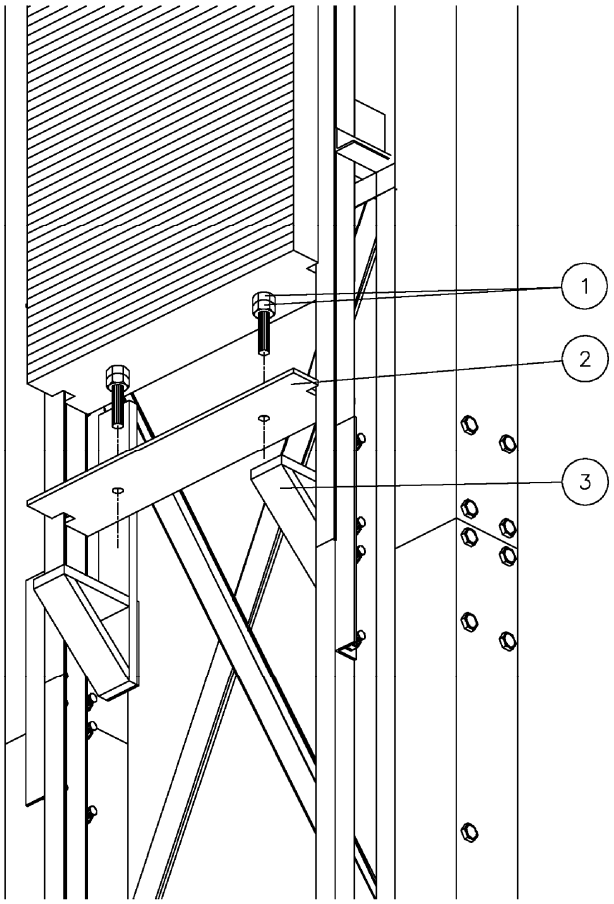


Figure 11. Removing the counter weight hangers and bottom counter weight plate, and installation of a lock nut on the threaded shaft. Looking from behind the guide rails.

4.15
Remove the counter weight hangers and bottom counter weight plate. (FIG. 12).

Figure 12. Removing the counterweight hangars.

NOTE:
Parts may not be exactly as shown.

4.16
Install the four bolts that connect the lower two wall mounting brackets to the counter weight guides (FIG. 1). These bolts were removed in step 4.1.

4.17
Tighten the 5/16 x 1 Hex bolts on the counterweight side channels and the counterweight lower & upper keeper plates (see section 3.7 and 3.9) by manually cranking the weights to a position where the bolts and screws can be accessed.

SECTION 5 - SAFETIES

5.1
The Wedge type safeties require onsite adjustment.
Adjust the brake adjustment bolts (see figure two) so that the brakes move 1-1/4" off the lifting bar when manually lifted and jammed between the roller and guide rail. Ensure that each brake set are tight across the face of the brake. This may need to be repeated a few times to get both brakes set equally.

Next block the counterweights and jack up the carriage 12" to cause the cables to go slack. Without moving the brake shoes make a final adjustment to ensure that both sets of brakes are engaged equally.

Release the jack quickly, both brake sets should engage equally. Repeat drop test with 125% of the rated carriage load.

Note: The above procedure is for slack cable activated safeties. When using an overspeed governor, activate the safeties by moving the linkage up by hand when moving in the down direction at contract speed with 125% of the rated load instead of jacking up the carriage to slacken the cables.

Figure 2. Location of brake adjustment bolts.

5.2
Figure 3 shows the location of the slack cable brake safety circuit switch. Adjust this switch by rotating the spline switch head and/or bending the copper tube so that the switch activates when the safeties are engaged and so the switch disengages just prior to coming to rest in the normal position when the brake linkage is fully disengaged.

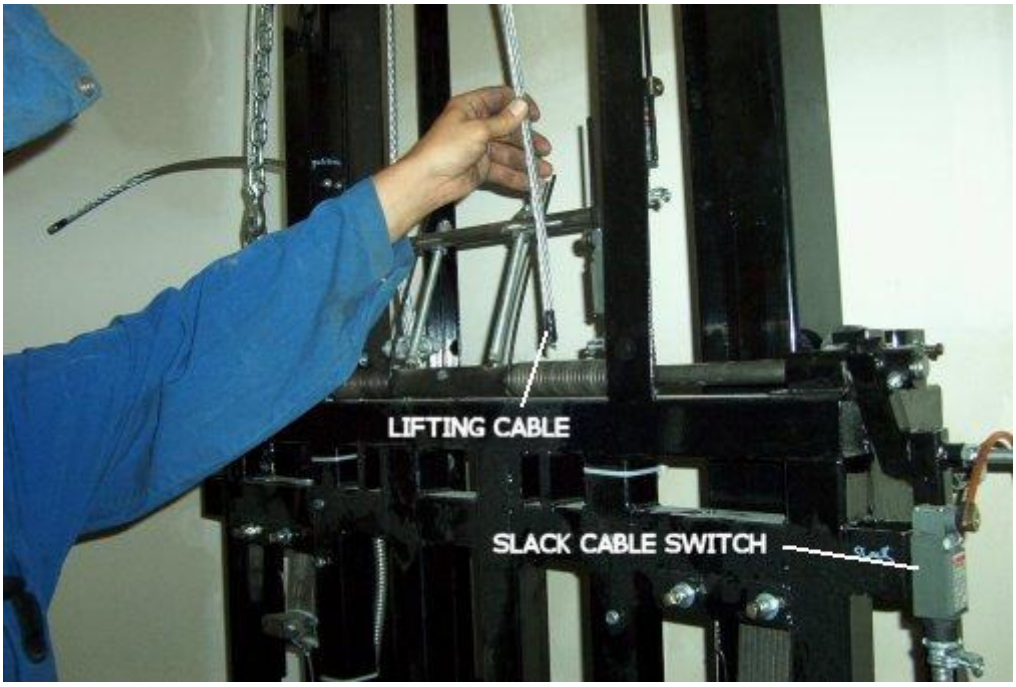


Figure 3. Location of the slack cable brake safety circuit switch.

NOTE:
Parts may not be exactly as shown

SECTION 6 - DOORS

Bi-fold Doors

6.1
Install the doors and jambs so that they are flush with the inside of the shaftway. The carriage corner studs should clear the inside of the shaft by 1 1/2 inches at the end of the carriage, the side of the carriage should clear the inside of the shaft by 3 inches (FIG. 1). See Appendix A for more door details.

6.2
Install the carriage door trim as shown (FIG. 1).

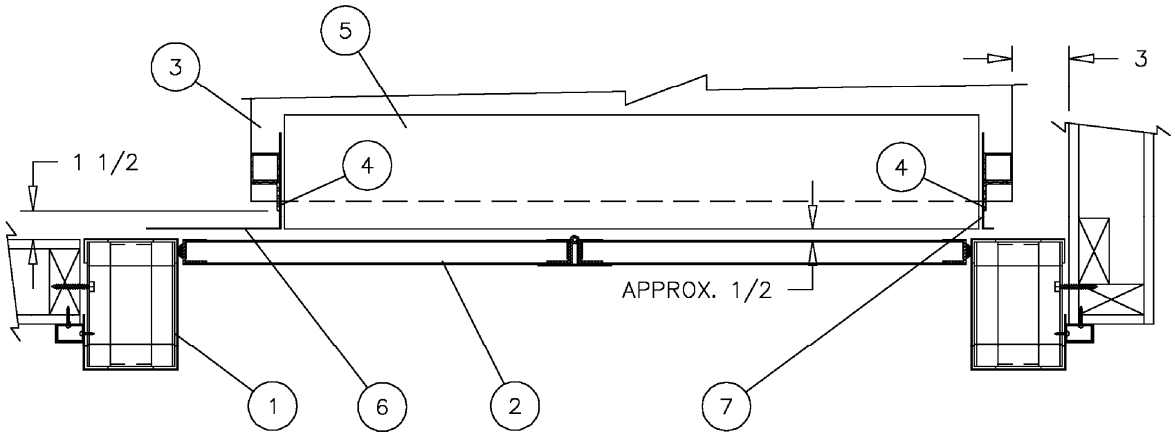


Figure 1. Installing the door, jamb, and carriage door trim.

MATERIAL LIST	PART #
1. Complete door frame assembly	AFCUD101
2. Bi-fold door	AFBUD001
3. Carriage floor	*NOTE
4. Carriage corner stud (L section)	FFBUC060
5. Floor finishing plate	*NOTE
6. Entrance trim - guide rail side	FEBUC071
7. Entrance trim - opp. guide rail side	FEBUC072

NOTE:
See shop drawings for details of these items.

SECTION 7 – DOOR LOCK OPERATOR CAMS

Bi-fold Doors

7.1
Figures 1 to 3 show the cam configurations for various shaft widths when the cam is on the guide rail side.

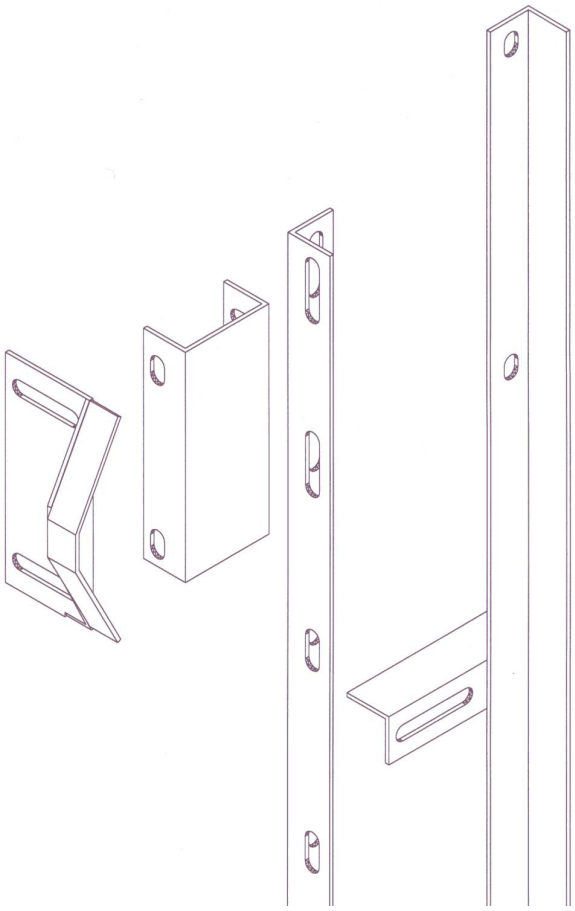


Figure 1. Narrow Shaft (54” to 57”)

Figure 2. Standard Shaft (58” to 65”)

SECTION 7 – DOOR LOCK OPERATOR CAMS

Bi-fold Doors

7.1 Continued

7.2
Figure 4 shows the cam configurations for an adjacent access Bi-fold door.

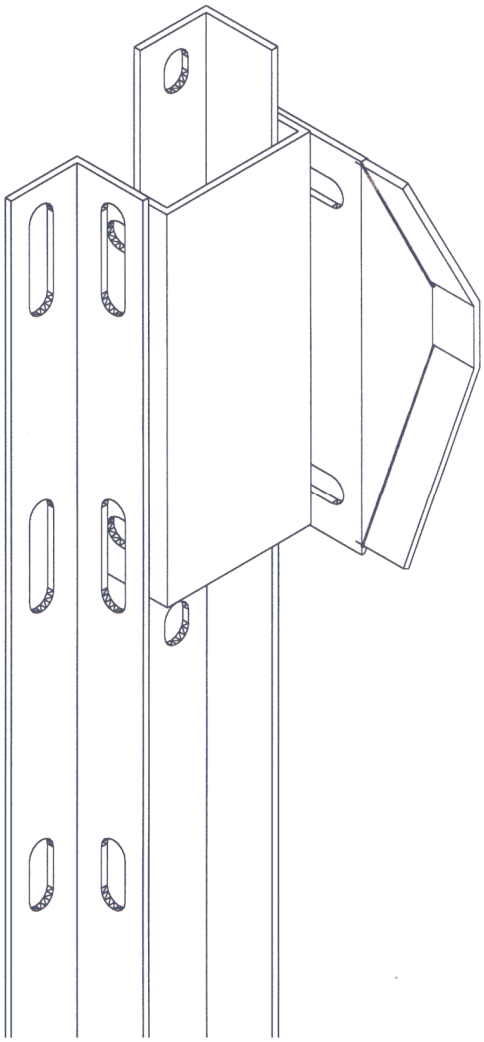


Figure 3. Wide Shaft (66” to 67”)

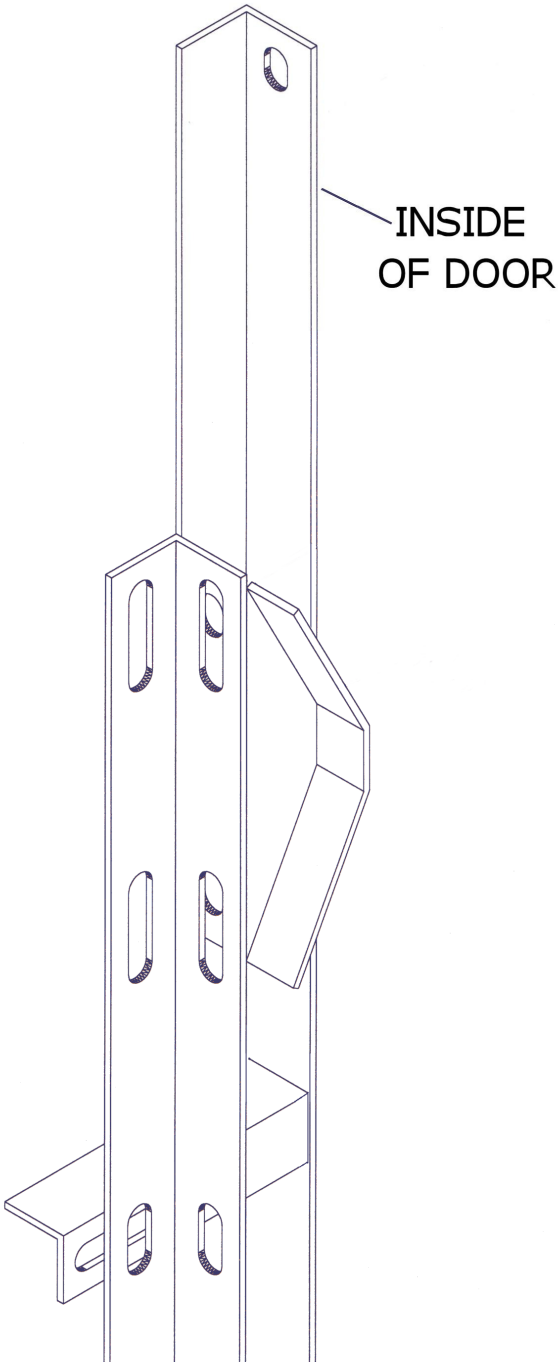


Figure 4. Adjacent Access Carriage.

SECTION 7 – DOOR LOCK OPERATOR CAMS

GAL Interlocks (Swing Doors)

7.3
Figure 5 shows a typical GAL cam configuration for a shaft up to 59” wide. The extension bracket may or may not be required.

7.4
Figure 6 shows a typical GAL cam configuration for shaft 60” wide or larger.

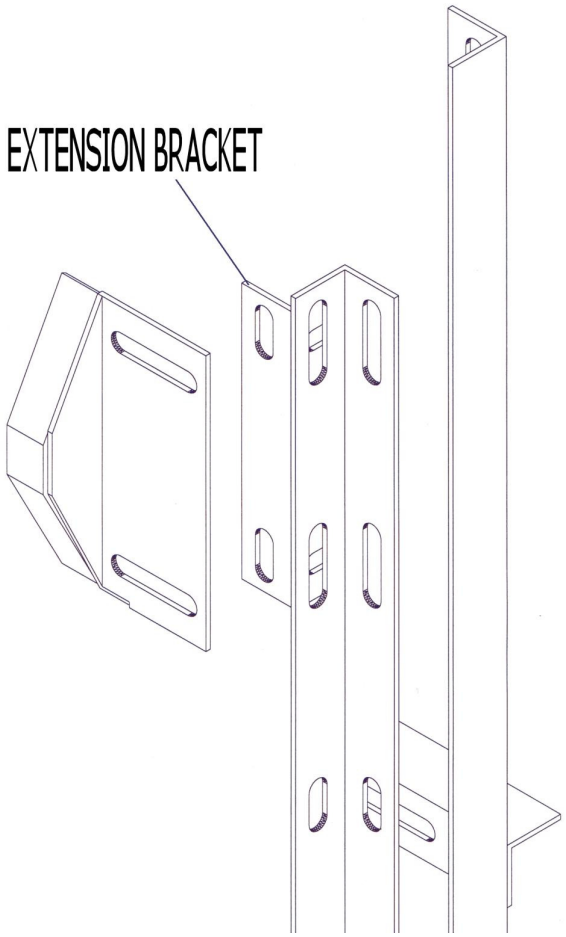


Figure 5. GAL cam configuration (carriage up to 59” wide).

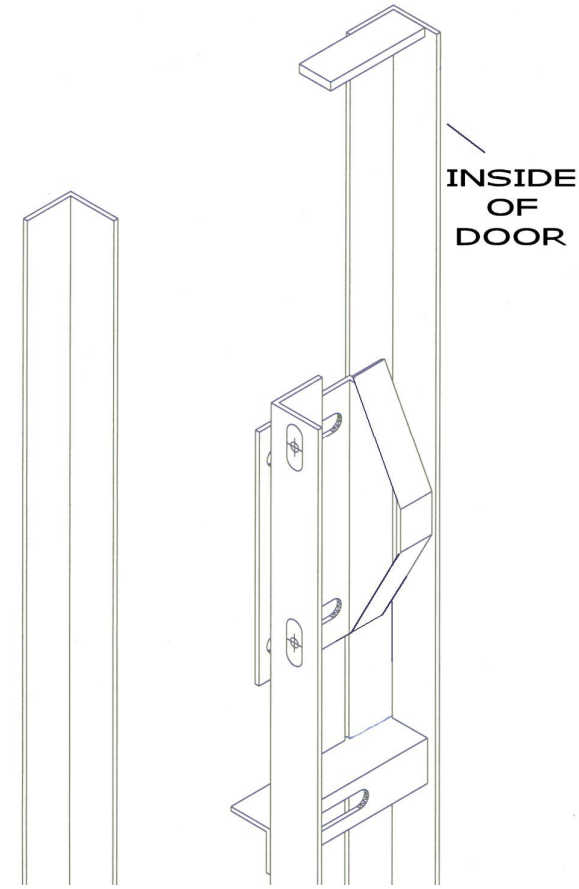


Figure 6. GAL cam configuration (carriage 60” or wider).

GAL Interlocks (Swing Doors)

7.5
Figure 7 shows a typical GAL cam configuration for an adjacent shaft.

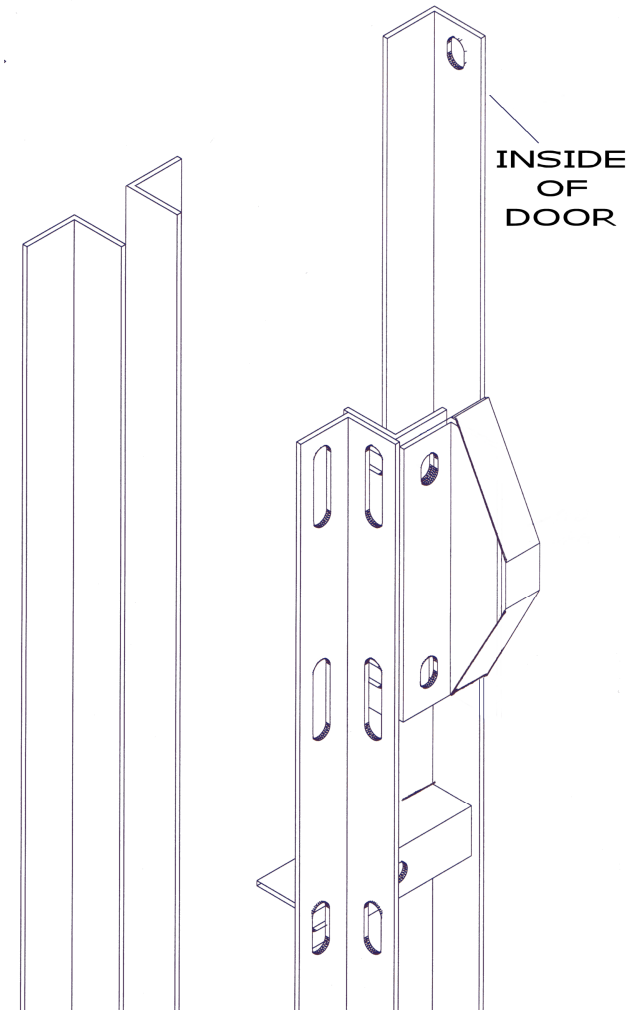
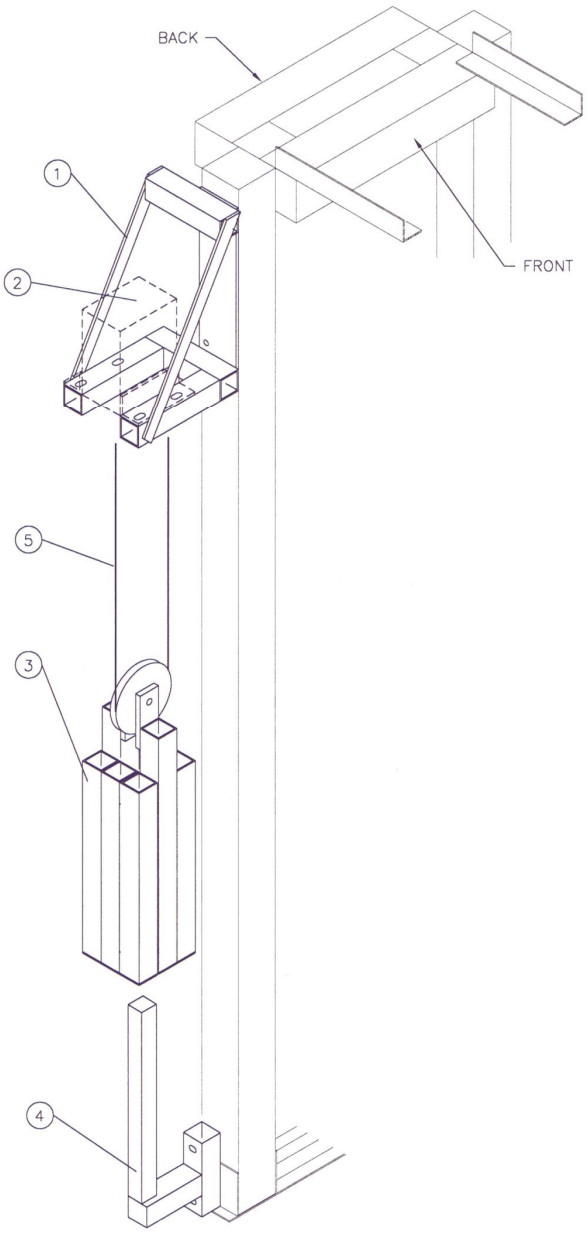


Figure 7. GAL cam configuration (adjacent carriage).

SECTION 8 – OVER SPEED GOVERNOR

8.1
Figure 1 shows the basic configuration of the over speed governor. The over speed governor is always on the left side of the guide rails.



MATERIAL LIST	PART #
1. Over speed governor bracket	FMBUG050
2. Over speed governor	
3. OSG counter weight assembly	AMBUG057
4. OSG counter weight guide	FMBUG055
5. ¼" dia. OSG pulley cable	

Figure 1. Typical over speed governor configuration

NOTE:
Not all installations require an over speed governor.

SECTION 8 – OVER SPEED GOVERNOR

8.2
Figure 2 shows how to connect the over speed governor cable to the brake system.

8.3
Figure 3 shows the location of the over speed governor safety circuit switch.

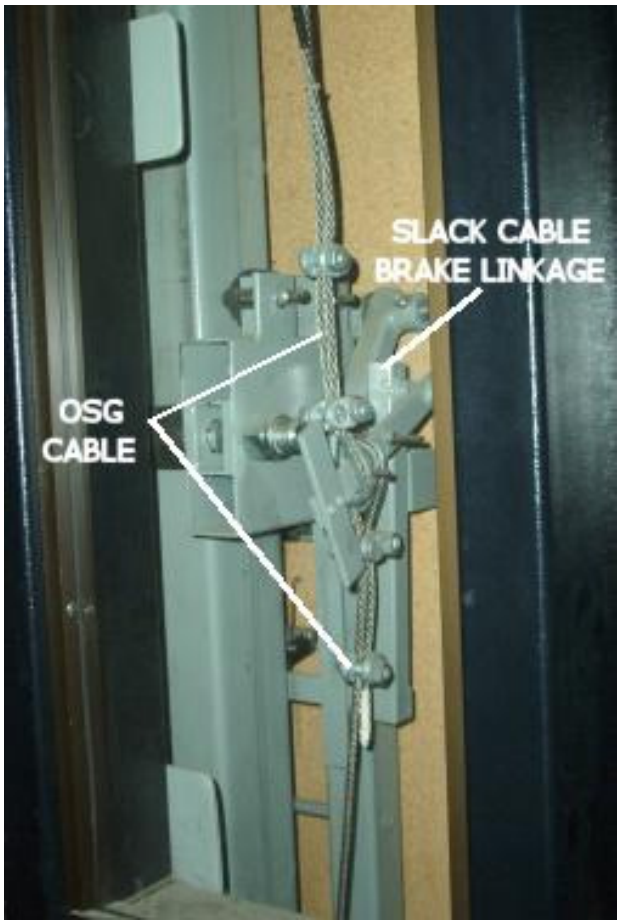


Figure 2. Connecting the over speed governor cables to the slack cable brake linkage.

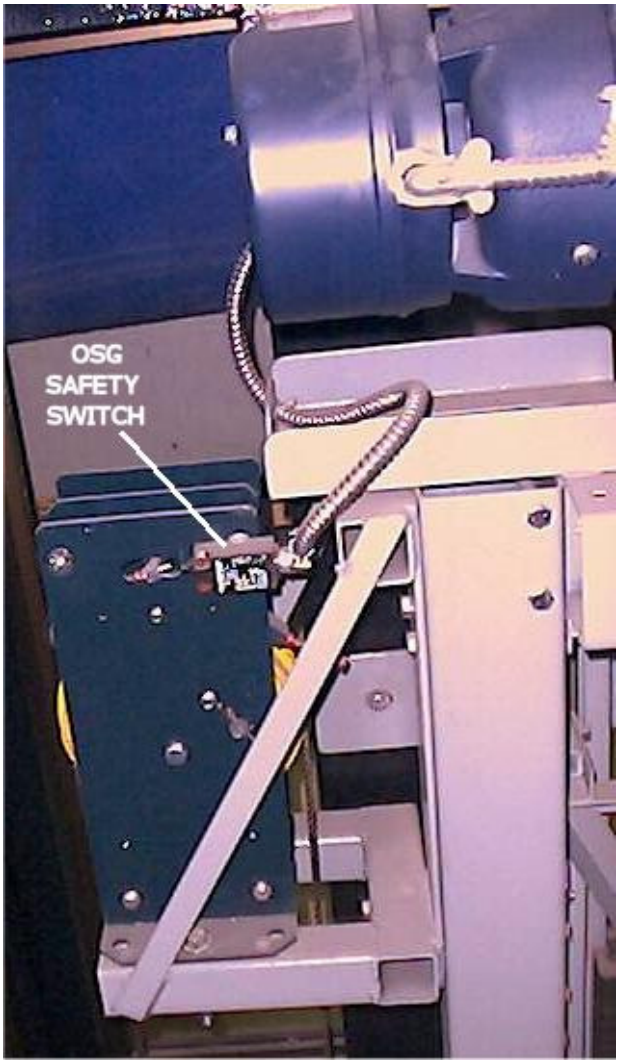
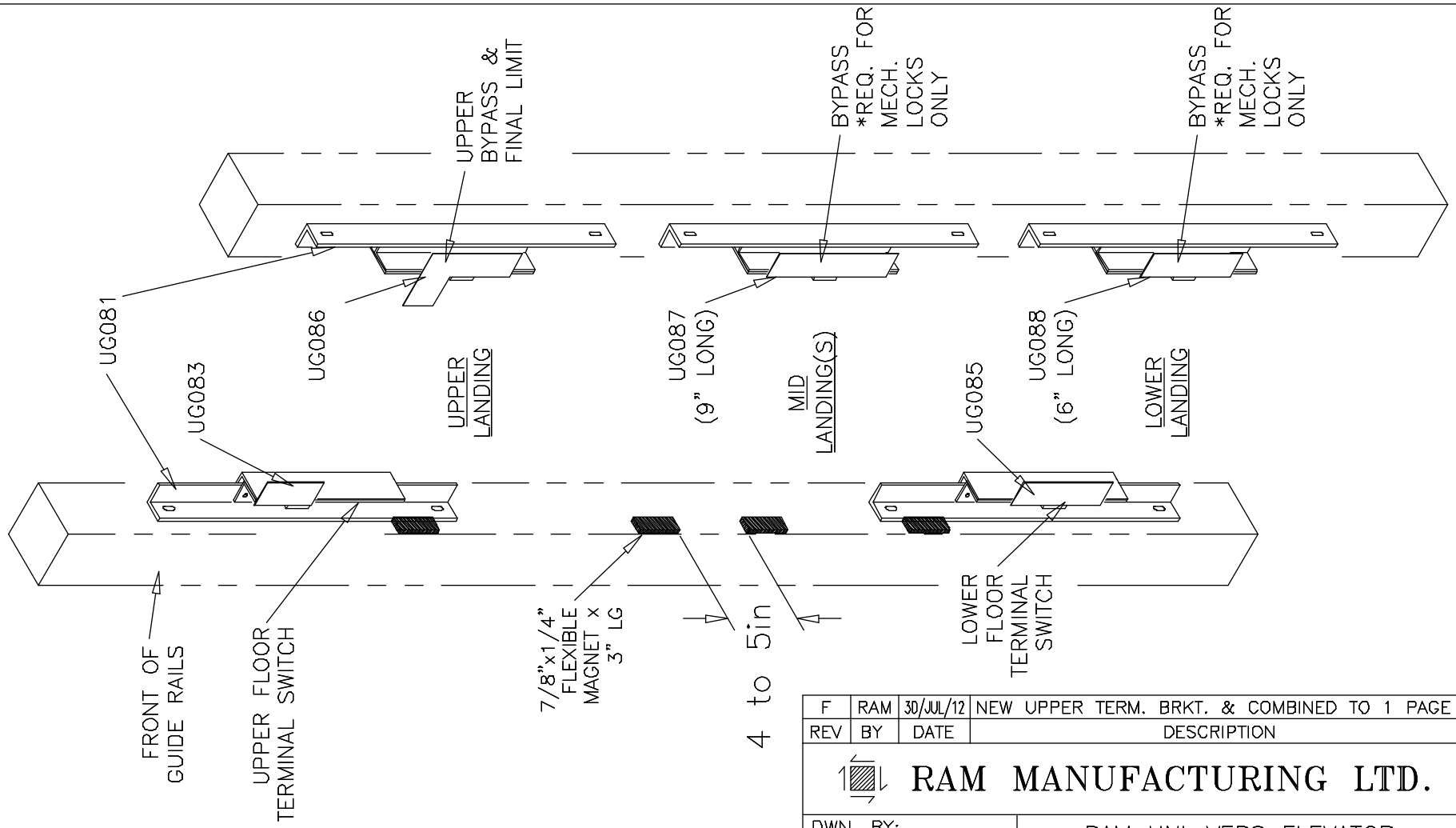


Figure 3. Location of the over speed governor safety circuit switch.

APPENDIX A – INSTRUCTIONAL DRAWINGS

- **APPENDIX A – INSTRUCTIONAL DRAWINGS**
    - **UG089 – LIMIT SWITCH OPERATOR BRACKET LOCATIONS**
    - **LimSwLocation – LIMIT SWITCH LOCATION**
    - **CONTROLLAYOUT (1-5) – ON-BOARD CONTROLLER LOCATION AND LAYOUT**
    - **CLEARANCES – CARRIAGE AND MOTOR CLEARANCES**

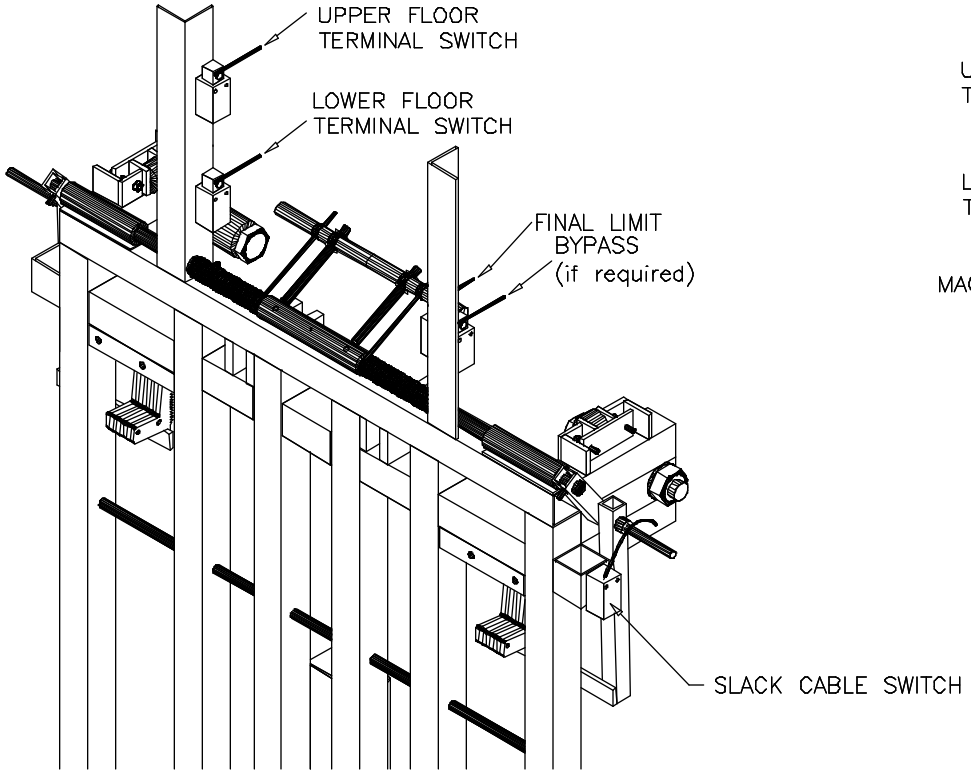


**NOTE–MAGNETS NEAR UPPER & LOWER TERMINAL SWITCHES MUST BE POSITIONED SUCH THAT THE SWITCH RELEASES BEFORE THE SENSOR SEES THE MAGNET WHEN LEAVING THE FLOOR

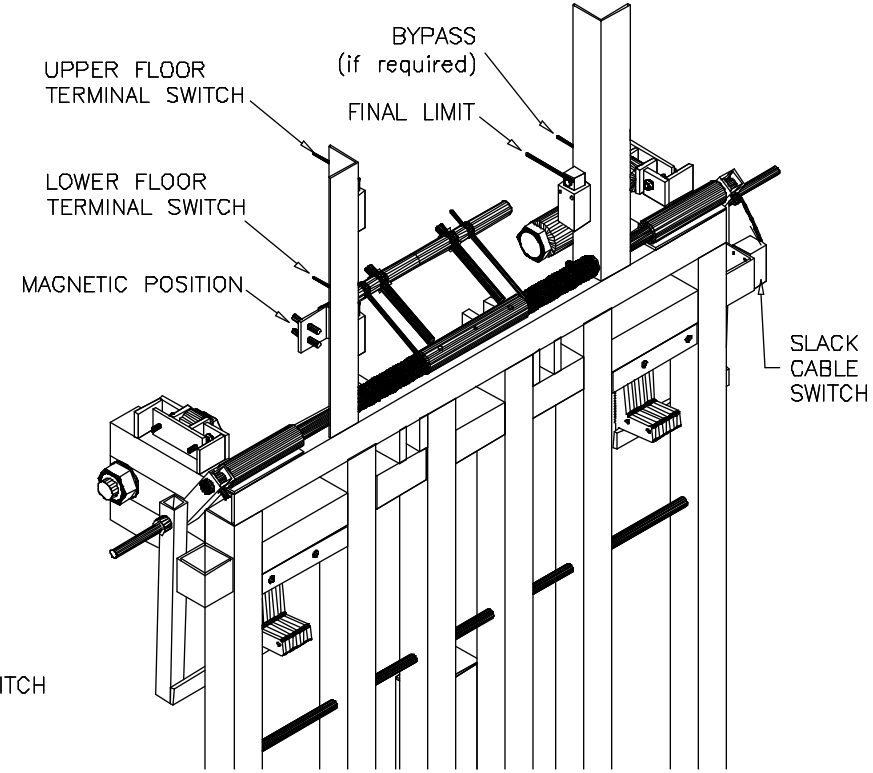
REV	BY	DATE	DESCRIPTION
F	RAM	30/JUL/12	NEW UPPER TERM. BRKT. & COMBINED TO 1 PAGE

RAM MANUFACTURING LTD.

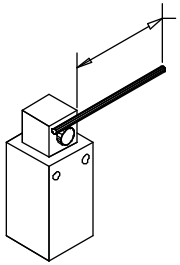
DWN. BY: B. HANNAH	RAM UNI–VERS ELEVATOR LIMIT SW. OPERATOR BRACKET LOCATIONS		
CHECKED BY:			
SCALE: NTS	DATE: 14/12 /05	DRAWING No. UG089	REV H



LOOKING FROM RIGHT SIDE



LOOKING FROM LEFT SIDE

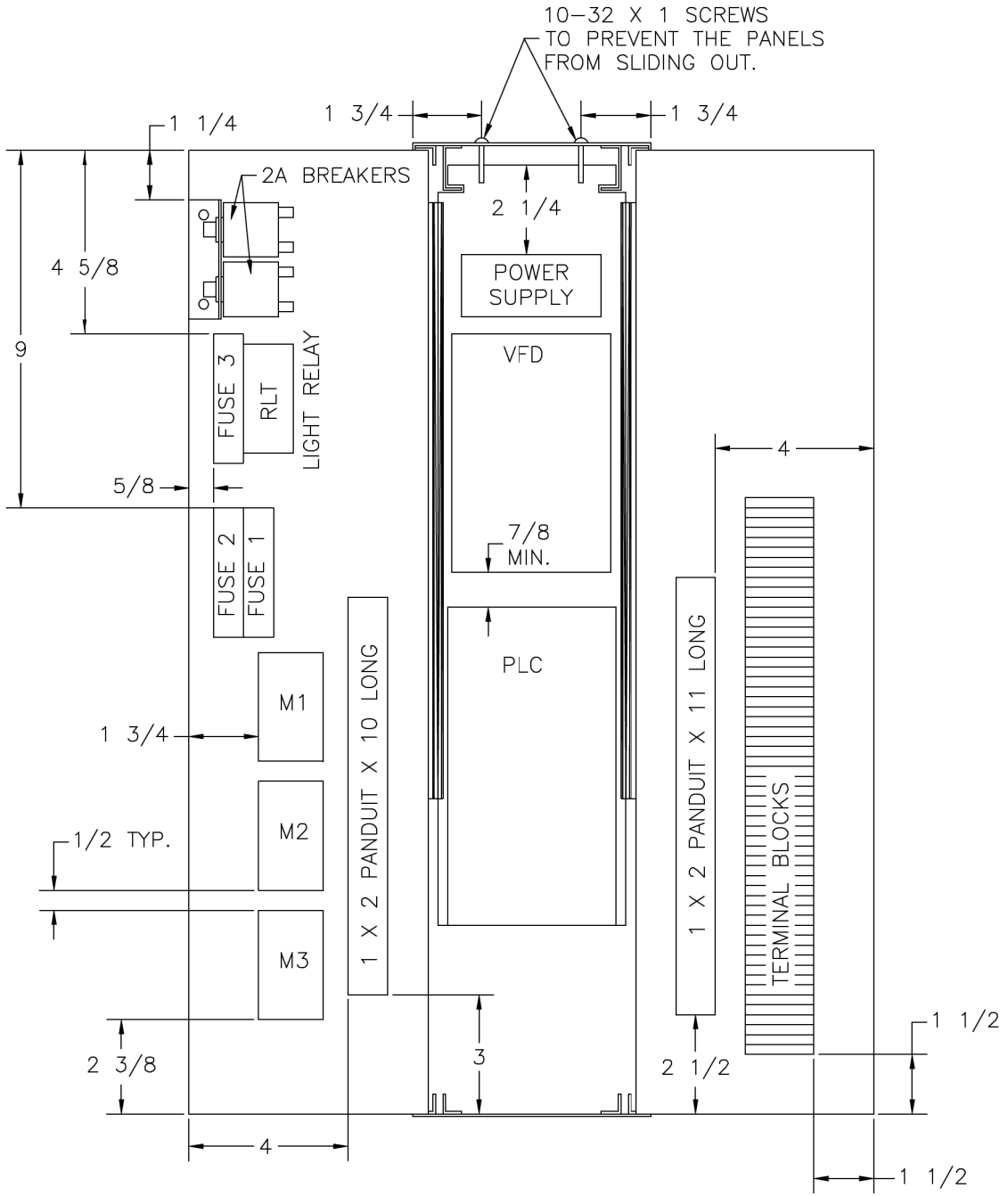


LIMIT SWITCH
OPERATOR ROD
TYPICAL FOR 4
SWITCHES

REV	BY	DATE	DESCRIPTION
C	RAM	19/03/12	NEW MAGNETIC POS SW CONGFIG

RAM MANUFACTURING LTD.

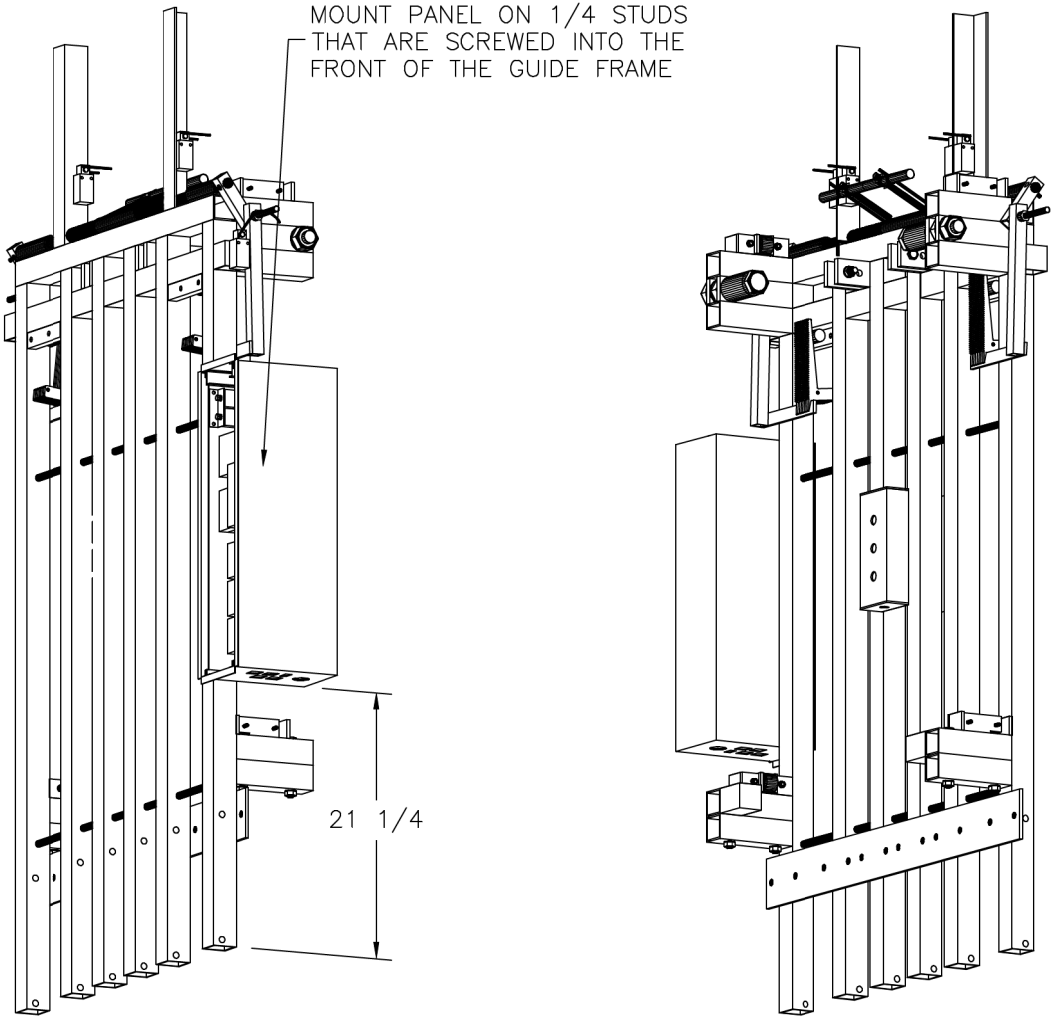
DWN. BY: B. HANNAH	RAM UNI-VERS ELEVATOR LIMIT SWITCH LOCATIONS		
CHECKED BY:			
SCALE: NTS	DATE: 02/JAN/06	DRAWING No. LIMSWLOCATION	REV C



REV	BY	DATE	DESCRIPTION
F	BH	12/2/07	NEW POWER SUPPLY & LOCATION
E	BH	15/6/06	CHANGE BREAKER LOCATION
D	BH	31/5/06	ADD BKR OPTIONS, CHANGE BKR MTG STRAP
C	BH	8/5/06	REPLACE LIGHT RELAY (RLT) WITH OMRON
B	BH	9/2/06	REVISE TO AS–BUILT

RAM MANUFACTURING LTD.

DWN. BY: BH	RAM CRYSTAL ELEVATOR ON BOARD CONTROLLER EQUIPMENT LAYOUT		
CHECKED BY:			
SCALE: 1/2 SIZE	DATE: 30/11 /05	DRAWING No. CONTROLLAYOUT 1/5	REV F



FRONT VIEW

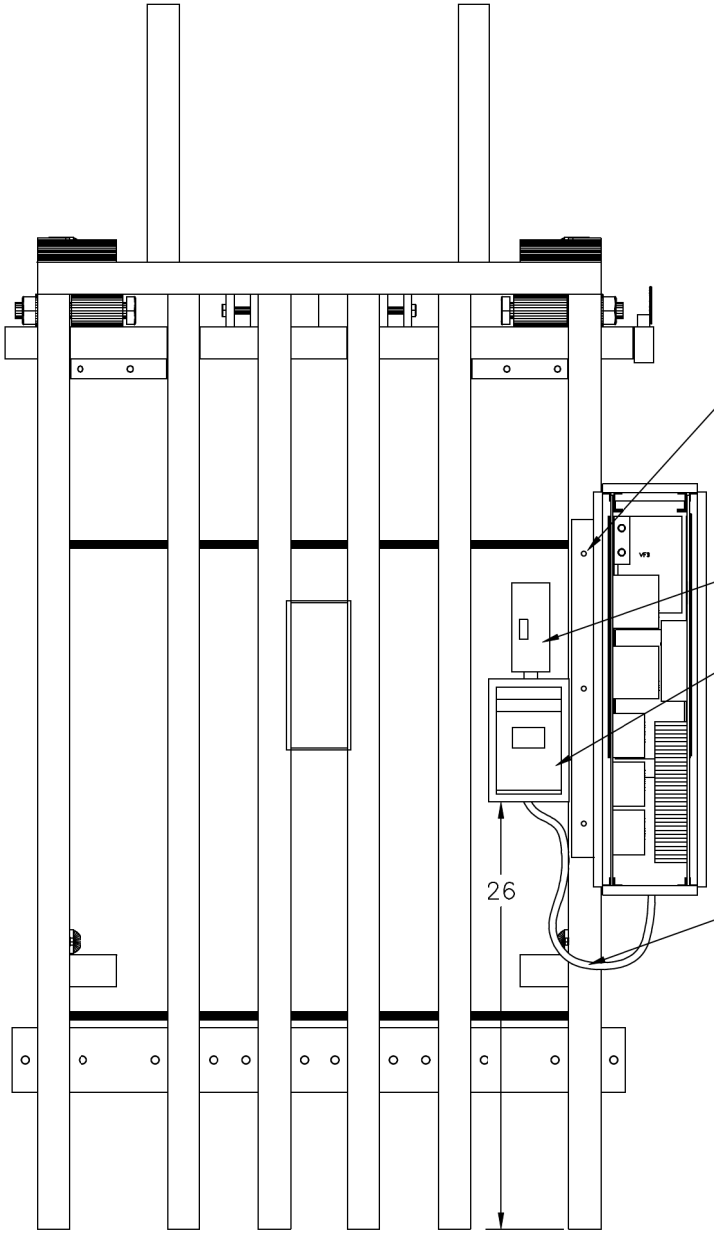
REAR VIEW

INSTALLING MAIN CONTROL BOX

REV	BY	DATE	DESCRIPTION
E	BH	15/6/06	CHANGE BREAKER LOCATION
D	BH	31/5/06	ADD BKR OPTIONS, CHANGE BKR MTG STRAP

RAM MANUFACTURING LTD.

DWN. BY: BH	RAM CRYSTAL ELEVATOR ON BOARD CONTROLLER EQUIPMENT LAYOUT		
CHECKED BY:			
SCALE: 1/2 SIZE	DATE: 11/May/06	DRAWING No. CONTROLLAYOUT 2/5	REV E

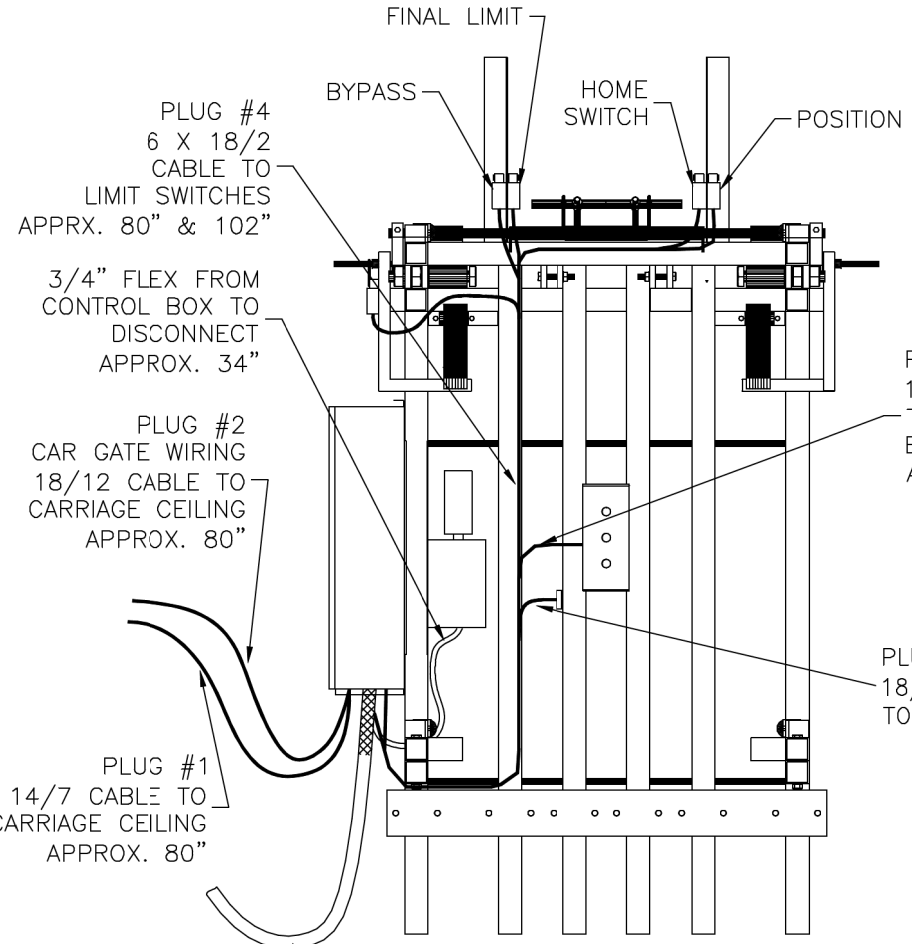


FRONT VIEW OF GUIDE FRAME

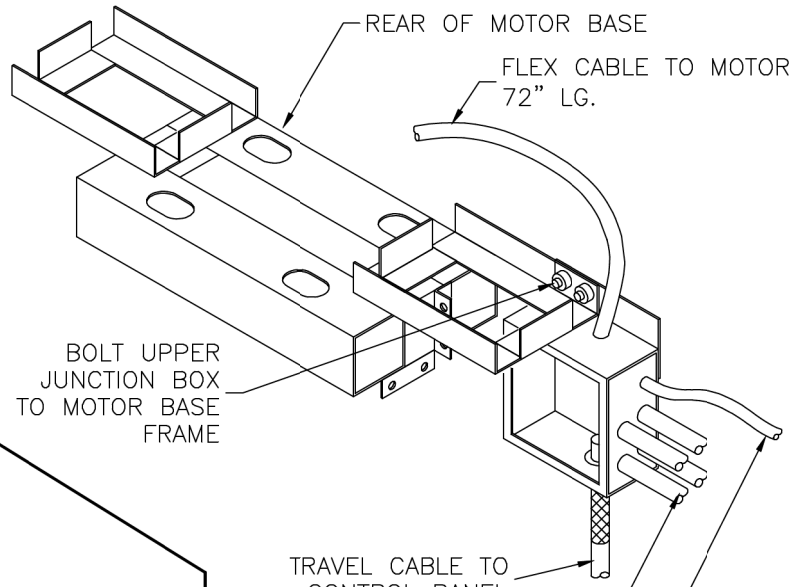
REV	BY	DATE	DESCRIPTION
E	BH	15/6/06	CHANGE BREAKER LOCATION
D	BH	31/5/06	ADD BKR OPTIONS, CHANGE BKR MTG STRAP

RAM MANUFACTURING LTD.

DWN. BY: BH	RAM CRYSTAL ELEVATOR ON BOARD CONTROLLER BREAKER LAYOUT OPTIONS		
CHECKED BY:			
SCALE: 1/2 SIZE	DATE: 11/May/06	DRAWING No. CONTROLLAYOUT 3/5	REV E



REAR VIEW
OF GUIDE FRAME



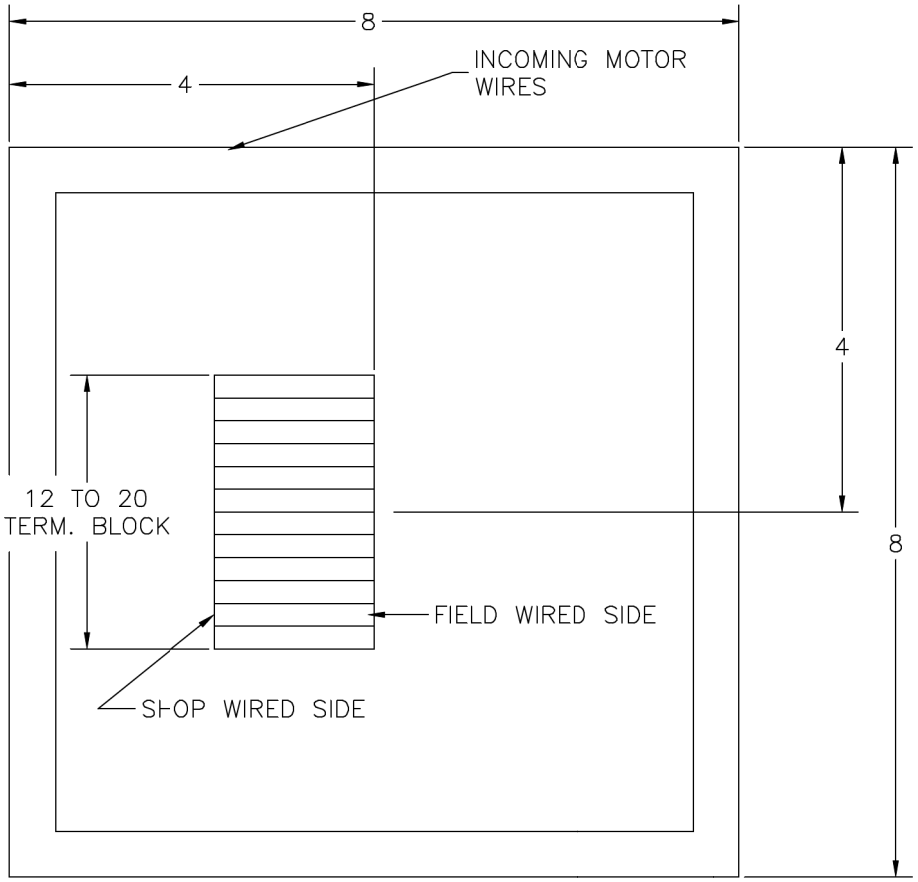
UPPER JUNCTION BOX

NOTE:
1. FLEX CABLE FROM MOTOR J.B. TO MANUAL CRANK = 60" LG.
2. FLEX CABLE FROM MOTOR J.B. TO OVERSPEED GOV. = 108" LG.

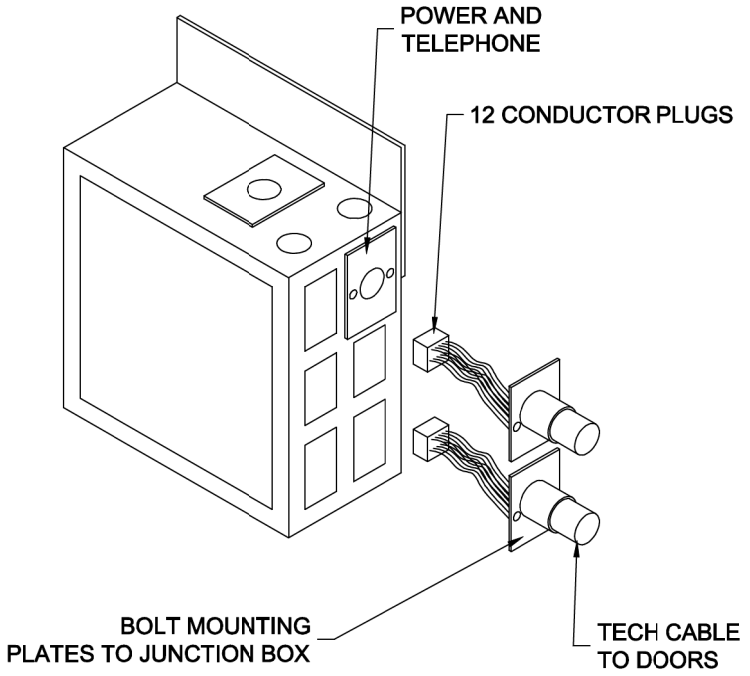
REV	BY	DATE	DESCRIPTION
E	BH	15/6/06	CHANGE BREAKER LOCATION
D	BH	31/5/06	ADD BKR OPTIONS, CHANGE BKR MTG STRAP

RAM MANUFACTURING LTD.

DWN. BY: BH	RAM CRYSTAL ELEVATOR ON BOARD CONTROLLER – GUIDE FRAME & UPPER JUNCTION BOX		
CHECKED BY:			
SCALE: N.T.S.	DATE: 11/May/06	DRAWING No. CONTROLLAYOUT 4/5	REV E



UPPER JUNCTION BOX
TERMINAL BLOCK LAYOUT

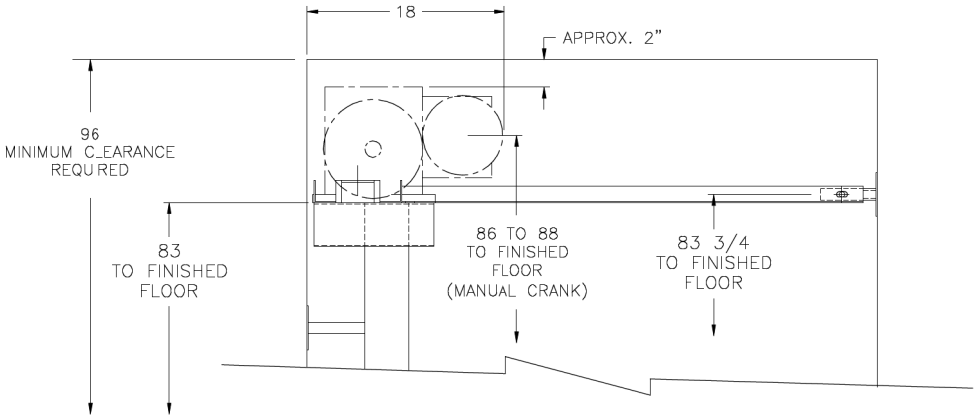


UPPER JUNCTION BOX
INCOMING DOOR CABLES

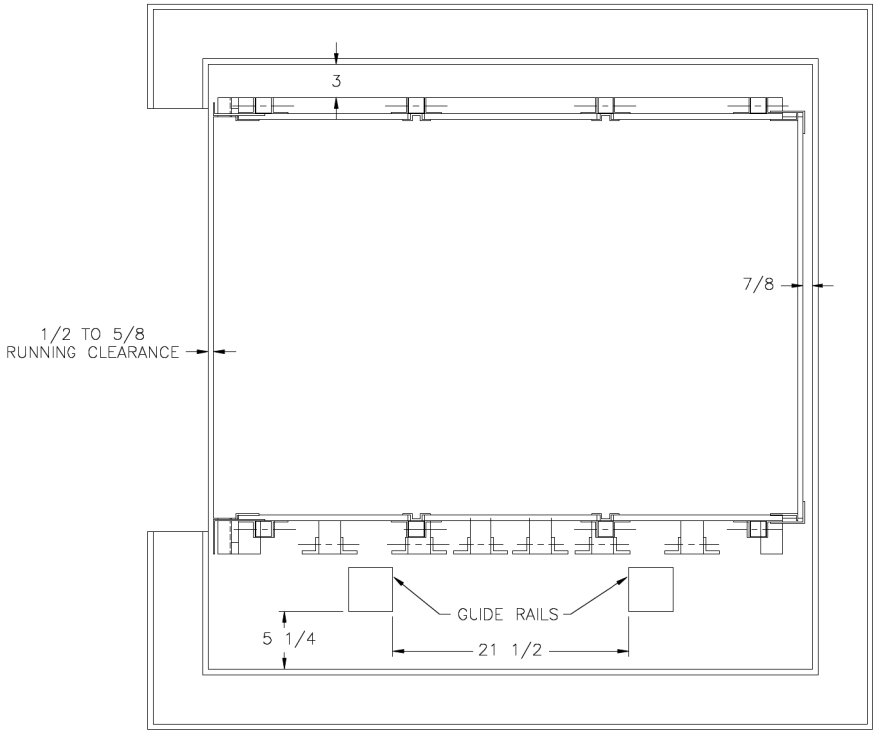
REV	BY	DATE	DESCRIPTION
E	BH	15/6/06	CHANGE BREAKER LOCATION
D	BH	31/5/06	ADD BKR OPTIONS, CHANGE BKR MTG STRAP

RAM MANUFACTURING LTD.

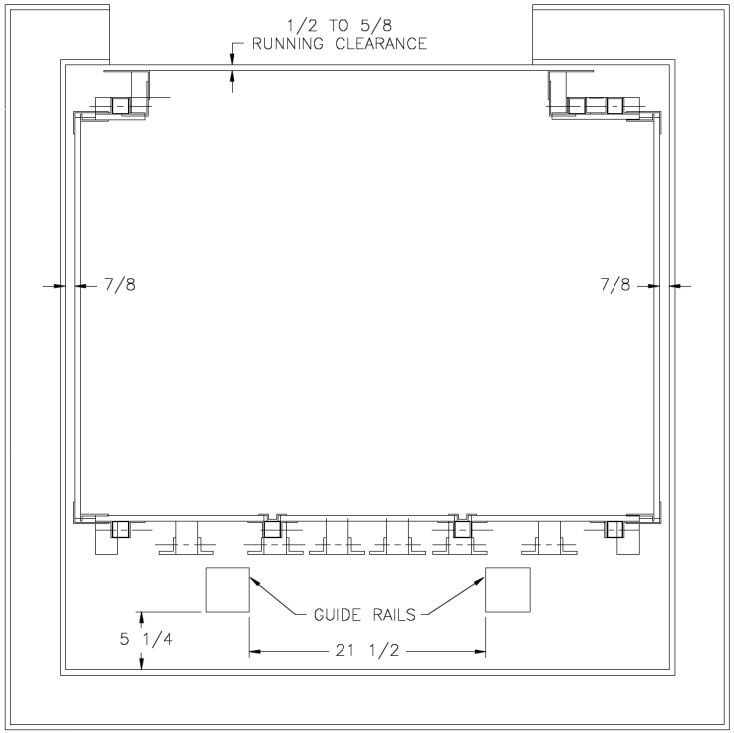
DWN. BY: BH	RAM CRYSTAL ELEVATOR ON BOARD CONTROLLER EQUIPMENT LAYOUT		
CHECKED BY:			
SCALE: 1/2 SIZE	DATE: 30/11/05	DRAWING No. CONTROLLAYOUT 5/5	REV E



OVERHEAD CLEARANCE



CARRIAGE CLEARANCE
STANDARD ACCESS

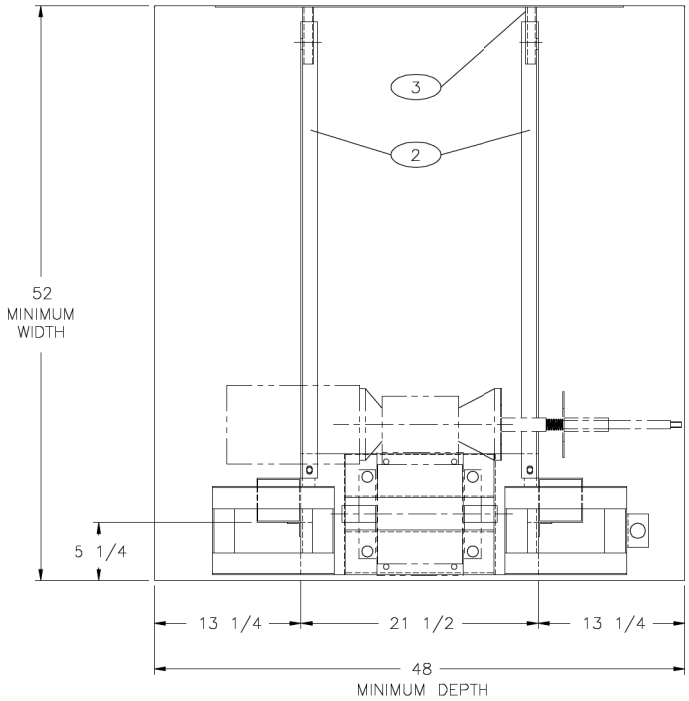


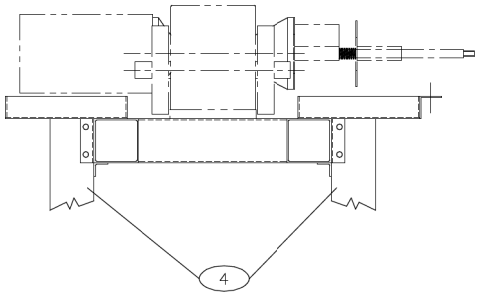
CARRIAGE CLEARANCE
ADJACENT ACCESS

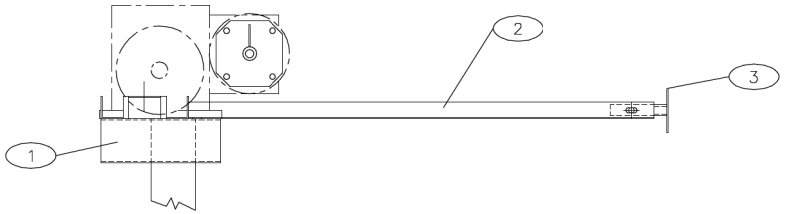
REV	BY	DATE	DESCRIPTION

RAM MANUFACTURING LTD.

DWN. BY: B. HANNAH	RAM CRYSTAL ELEVATOR CLEARANCES		
CHECKED BY:			
SCALE: 1/8 SIZE	DATE: 3 /JUL /03	DRAWING No. CLEARANCES	REV







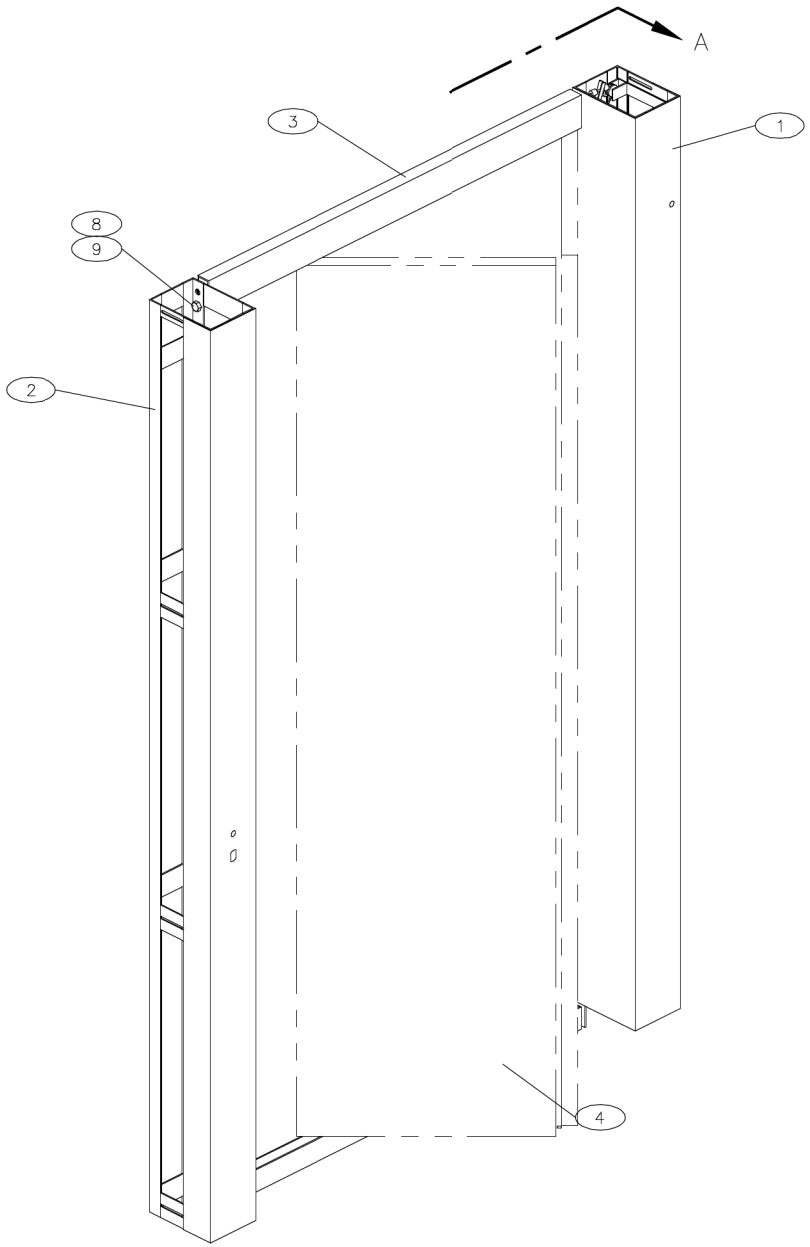
PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	FFCUG017	GEAR–BOX AND MOTOR BASE
3	1	FFBUG008	GUIDE RAIL WALL MOUNTING BRACKET
4	2	FFBUG011	UPPER GUIDE RAILS

*NOTE: ITEM 2 – SEE GUIDE RAIL SHOP DRAWINGS FOR LENGTH OF THE UPPER HORIZONTAL SUPPORTS.

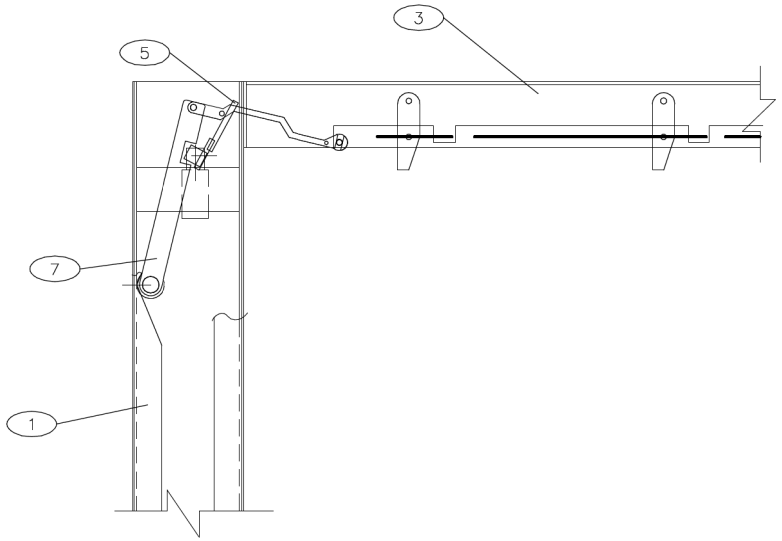
REV	BY	DATE	DESCRIPTION
B	BH	16/04/04	REVISE TO AS–BUILT
A	BH	25/11/95	REPLACES AGFCC164 REV. C

RAM MANUFACTURING LTD.

DWN. BY: B. HANNAH	RAM UNI–VERS ELEVATOR GEAR BOX BASE & UPPER HORIZ. SUPPORT – ASSEMBLY DRAWING		
CHECKED BY:			
SCALE: 1/8 SIZE	DATE: 30/OCT/93	DRAWING No. AFCUG035	REV B



PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	AFCUD102	LATCH/HINGE SIDE DOOR JAMB ASSEMBLY
2	1	AFCUD109	OPPOSITE HINGE SIDE DOOR JAMB ASSY
3	1	AFBUD112	UPPER DOOR TRACK ASSEMBLY
4	1	FFBUD122	LOWER DOOR TRACK ASSEMBLY
5	1	FMAUD108	DOOR LOCK – FORK LEVER ARM
7	1	FMBUD155	DOOR LOCK – CAM ROLLER ARM S.L.
8	4	PGAGF006	7/16 N.C. x 1 LG. BOLT
9	4	PGAGF030	7/16 N.C. NYLON LOCK NUT



VIEW 'A'
SCALE: 1/4 SIZE

NOTE:

1. THE DOOR SHOWN IS A "RIGHT HAND" DOOR, ALL DETAILS IN THE FOLLOWING DRAWINGS ARE FOR A "RIGHT HAND" DOOR. DETAILS FOR A "LEFT HAND" DOOR ARE OPPOSITE OF THAT SHOWN.

REV	BY	DATE	DESCRIPTION
C	BH	4/04.03	ADD KEY & PILOT HOLES, CORRECT DOOR SWING
B	RAM	10/00	ADD NEW SOLID LINK ARM

RAM MANUFACTURING LTD.

DWN. BY: B. HANNAH	(I) RAM UNI-VERSE ELEVATOR BI-FOLD DOOR – COMPLETE DOOR FRAME ASSEMBLY		
CHECKED BY:			
SCALE: 1/8 SIZE EXCEPT AS NOTED	DATE: 27/DEC/95	DRAWING No. AFCUD101	REV C

APPENDIX B – MISCELLANEOUS SHOP DRAWINGS

- **APPENDIX B - MISCELLANEOUS SHOP DRAWINGS**
    - **AMBUG101 – MANUAL CRANK ASSEMBLY**
    - **AMBUG135 - COUNTER WEIGHT ASSEMBLY**
    - **AFCUG035 - GEAR BOX AND UPPER HORIZONTAL SUPPORT**
    - **AFCUD101 - DOOR FRAME ASSEMBLY**

DETERMINING THE LENGTH OF THE OPERATOR SHAFTS (ITEMS 12 & 13)

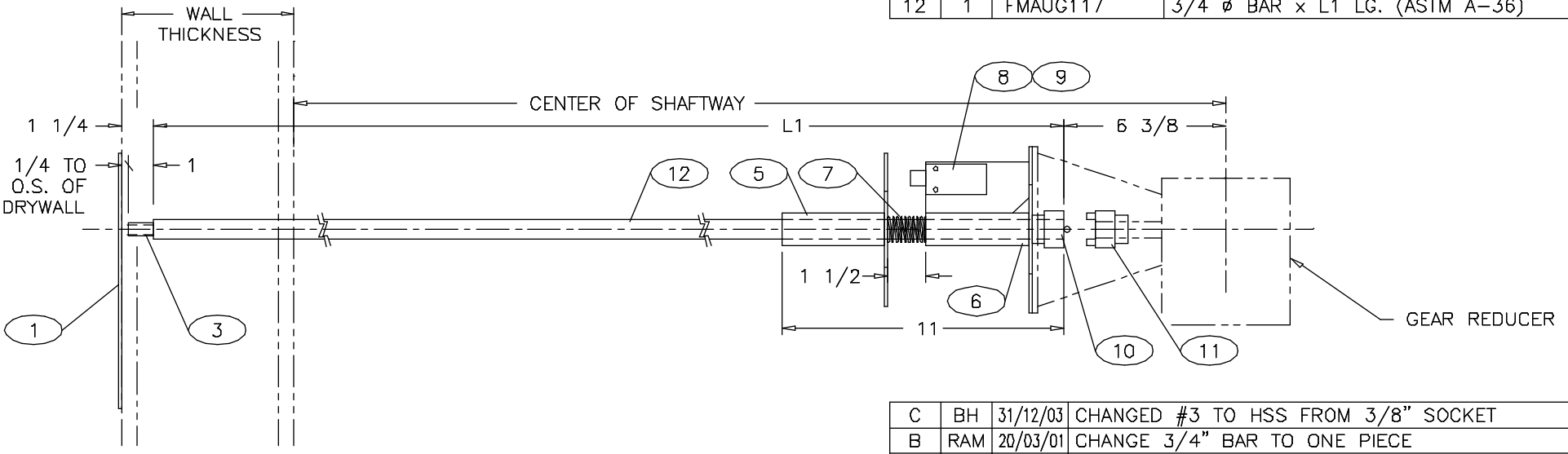
SHAFTWAY DEPTH = SD
WALL THICKNESS = WT
ITEM #12 LENGTH = L1

L1 = SD/2 + WT

EXAMPLE: 60" DEEP SHAFTWAY
2 x 6 WALL C/W 5/8" DRYWALL
SD = 60"
WT = 5 1/2 + 5/8 + 5/8 = 6 3/4"
L1 = 30 +6.75 = 36.75"

PARTS LIST

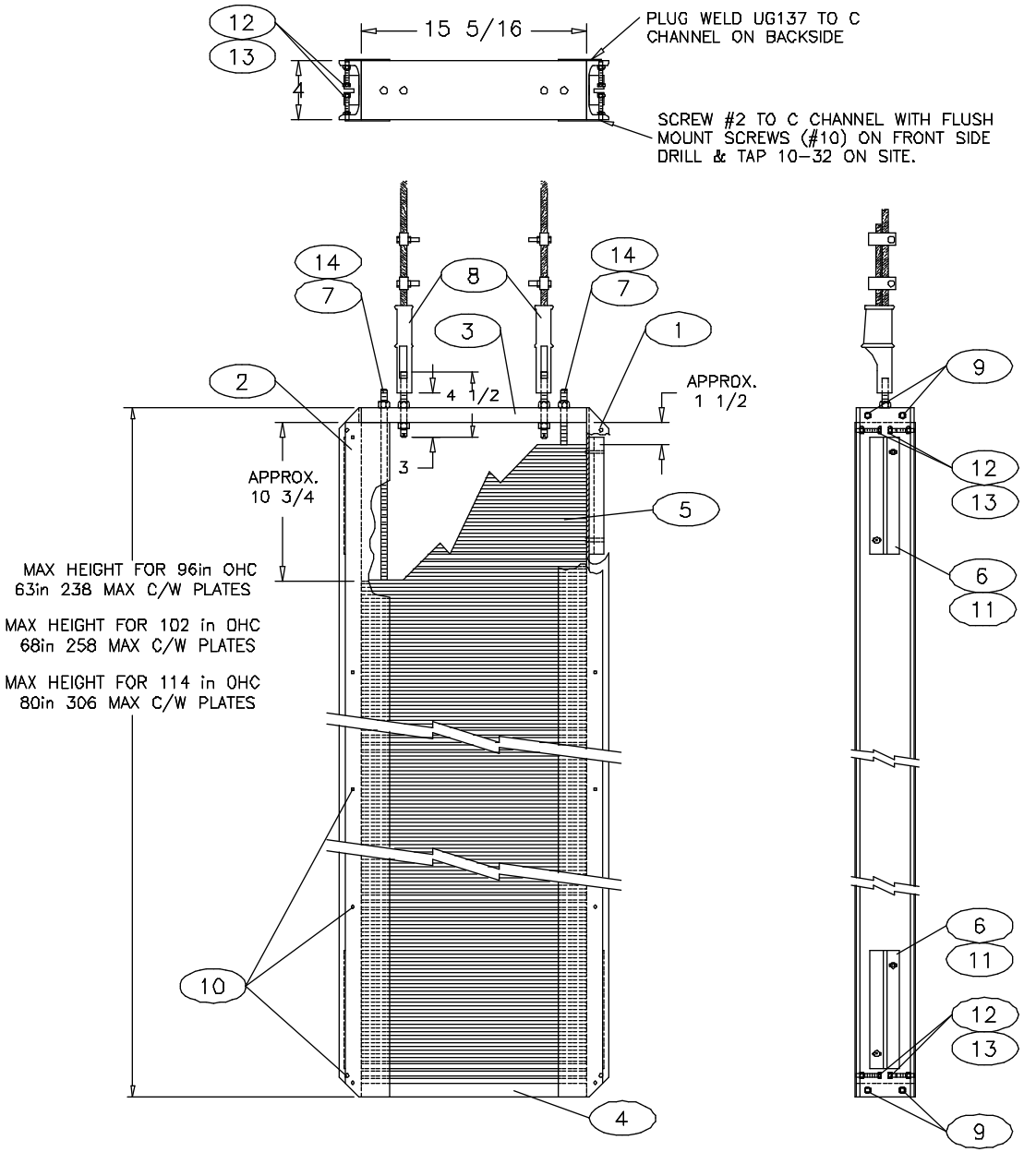
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	FEBUG102	MANUAL CRANK EXTERIOR FINISH PLATE
3	1		0.5 x 0.5 x 0.065 HSS x 1 lg
5	1	FMBUG106	MANUAL CRANK LIMIT SWITCH OPERATOR
6	1	FMBUG109	MANUAL CRANK LIMIT SWITCH BRACKET
7	1	PMAUG112	MANUAL CRANK SPRING
8	1	PMAGE047	LIMIT SW. C-H #E49S71
9	1	PMAGE049	LIMIT SW. OPERATOR #E49DP7
10	1	FMAUG113	MANUAL CR. SHAFT SIDE OPERATOR HUB
11	1	FMAUG115	MANUAL CR. RED. SIDE OPERATOR HUB
12	1	FMAUG117	3/4 ø BAR x L1 LG. (ASTM A-36)



REV	BY	DATE	DESCRIPTION
C	BH	31/12/03	CHANGED #3 TO HSS FROM 3/8" SOCKET
B	RAM	20/03/01	CHANGE 3/4" BAR TO ONE PIECE

RAM MANUFACTURING LTD.

DWN. BY: B. HANNAH	RAM UNI-VERS ELEVATOR MANUAL CRANK ASSEMBLY DRAWING		
CHECKED BY: R.A.M.			
SCALE: 1/4 SIZE	DATE: 15/APR/92	DRAWING No. AMBUG101	REV C



PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
1	2	UG136	SIDE CHANNELS WELDMENT
2	2	UG138	LOWER KEEPER PLATE
2	2	UG139	UPPER KEEPER PLATE
3	1	UG140	UPPER CROSS PLATE
4	1	UG141	LOWER CROSS PLATE
5	**	UG142	COUNTER WEIGHT PLATE
6	4	UG043	GUIDE SHOE
7	2		7/16 NC THRD ROD x 12LG CUT ON SITE
8	2	WS3812	ROPE WEDGE SOCKET
9	4		5/16 NC x 1 HEX HEAD BOLT
10	10		10-32 x 1/2 PAN HD. MACH. SCREW
11	8		10-32 x 1-1/4 RND. HD. MACH. SCREW
12	8		5/16 NC x 1-1/2 HEX HEAD BOLT
13	8		5/16 NC NUT
14	4		7/16 NC NUT

NOTE:
1. C/W PLATE 1/4x4x15 5/16LG FB-4.34 lbs EACH.
2. FOR OVER-SIZE CARRIAGES ADD 20 WEIGHTS (OVER 60X60 SHAFT OR 2400 SQ. IN. CARRIAGE)

NUMBER OF PLATES AND SHAFT LENGTHS.				
MODEL	# OF PLATES "N"	CHANNEL LENGTH "L"	COUNTERWEIGHT LBS	REACT. LOADS H(LBS)/V(LBS)
CR-800	205	63"	982	190/3400
CR-1000	238	63"	1125	210/3750
CR-1250	258	68"	1215	240/4100
CR-1400	302	80"	1420	250/4500

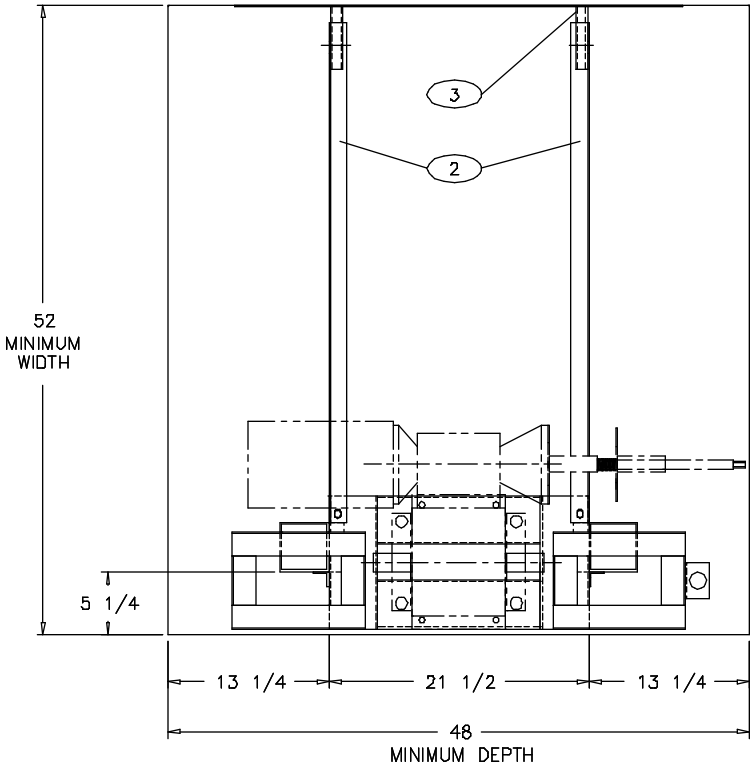
REV	BY	DATE	DESCRIPTION
C	RAM	16/FEB/12	ADD LONGER LENGTH FOR 1400LB ELEVATOR

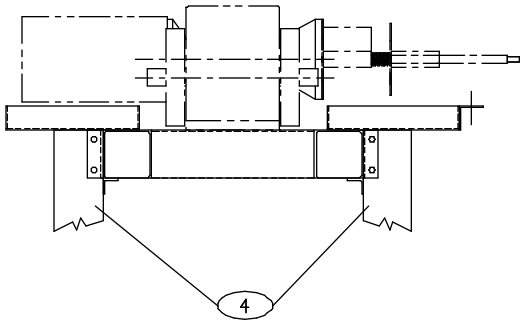
RAM MANUFACTURING LTD.

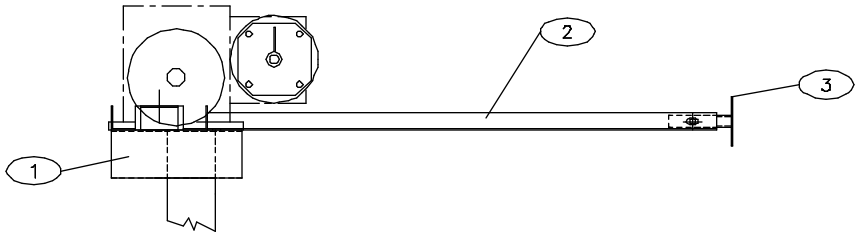
DWN. BY: B. HANNAH	RAM UNI-VERS ELEVATOR COUNTER WEIGHT ASSEMBLY		
CHECKED BY: R.A.M.			
SCALE: 1/8 SIZE	DATE: 17/Nov/11	DRAWING No. UG135	REV C

PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	FFCUG017	GEAR–BOX AND MOTOR BASE
3	1	FFBUG008	GUIDE RAIL WALL MOUNTING BRACKET
4	2	FFBUG011	UPPER GUIDE RAILS

*NOTE: ITEM 2 – SEE GUIDE RAIL SHOP DRAWINGS FOR LENGTH OF THE UPPER HORIZONTAL SUPPORTS.



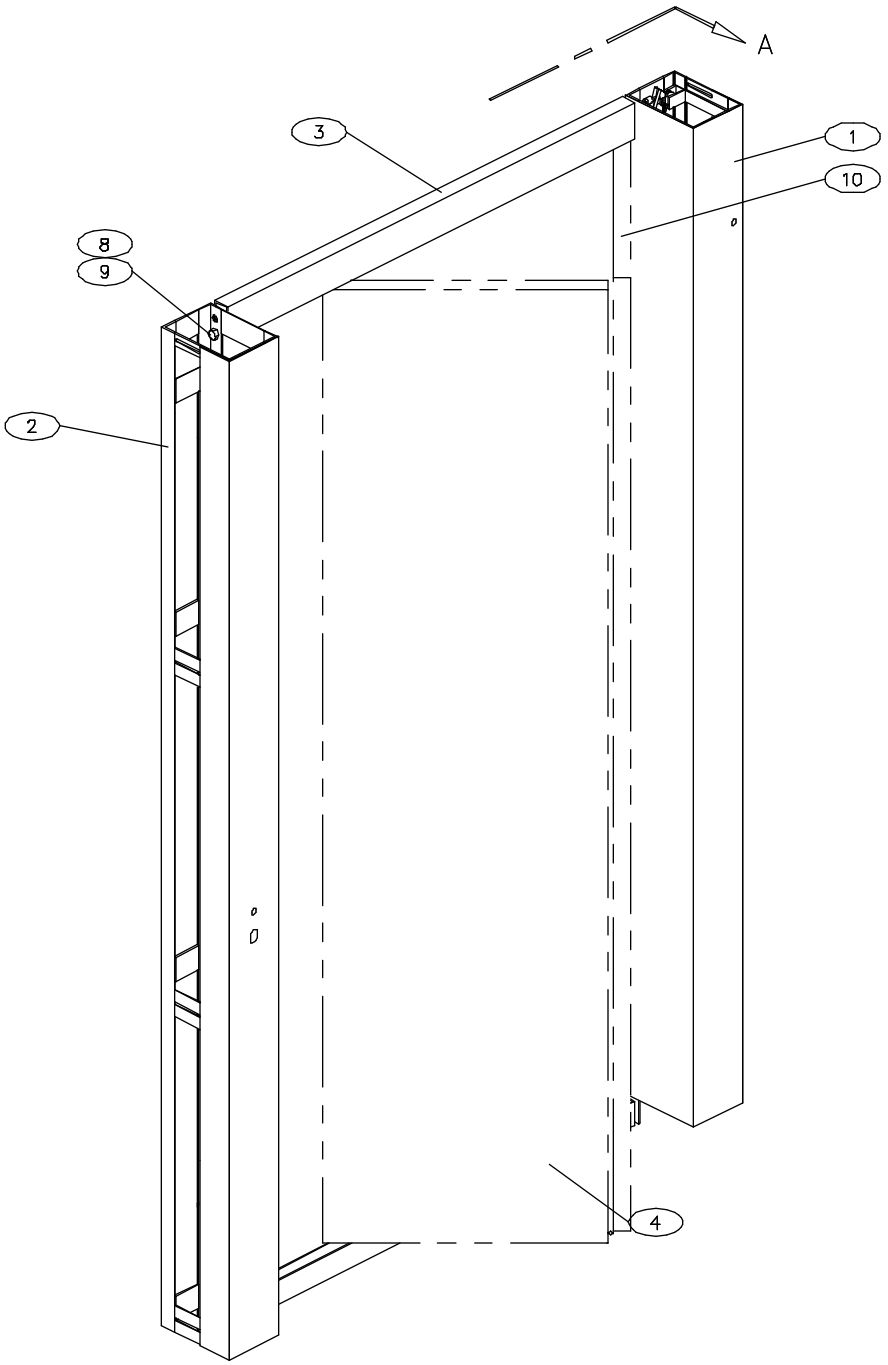




REV	BY	DATE	DESCRIPTION
B	BH	16/04/04	REVISE TO AS–BUILT
A	BH	25/11/95	REPLACES AGFCC164 REV. C

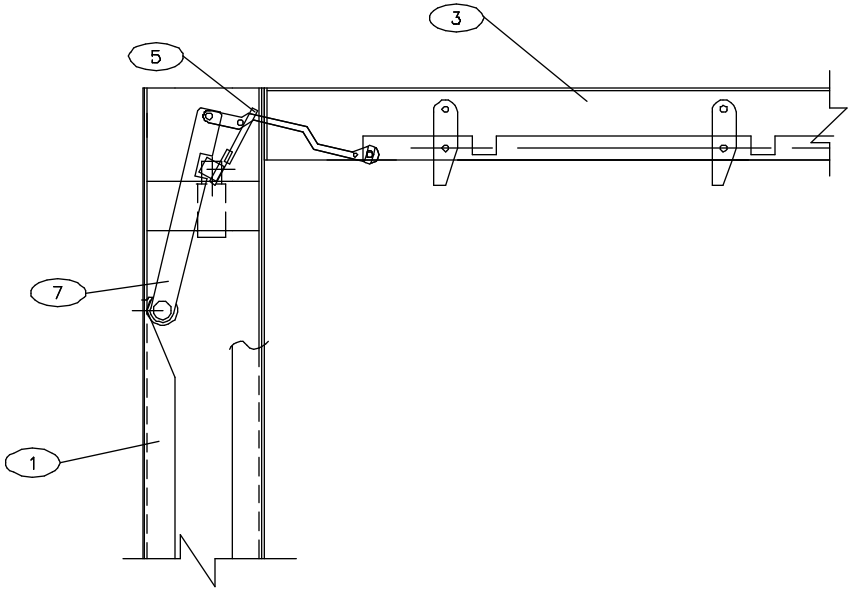
RAM MANUFACTURING LTD.

DWN. BY: B. HANNAH	RAM UNI–VERS ELEVATOR GEAR BOX BASE & UPPER HORIZ. SUPPORT – ASSEMBLY DRAWING		
CHECKED BY:			
SCALE: 1/8 SIZE	DATE: 30/OCT/93	DRAWING No. AFCUG035	REV B



PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	AFCUD102	LATCH/HINGE SIDE DOOR JAMB ASSEMBLY
2	1	AFCUD109	OPPOSITE HINGE SIDE DOOR JAMB ASSY
3	1	AFBUD112	UPPER DOOR TRACK ASSEMBLY
4	1	FFBUD122	LOWER DOOR TRACK ASSEMBLY
5	1	FMAUD108	DOOR LOCK – FORK LEVER ARM
7	1	FMBUD155	DOOR LOCK – CAM ROLLER ARM S.L.
8	4	PGAGF006	7/16 N.C. x 1 LG. BOLT
9	4	PGAGF030	7/16 N.C. NYLON LOCK NUT
10	2	PGAGF040	W21-20 BLACK SMOKE SEAL X 80 LG



VIEW 'A'

SCALE: 1/4 SIZE

NOTE:

1. THE DOOR SHOWN IS A "RIGHT HAND" DOOR, ALL DETAILS IN THE FOLLOWING DRAWINGS ARE FOR A "RIGHT HAND" DOOR. DETAILS FOR A "LEFT HAND" DOOR ARE OPPOSITE OF THAT SHOWN.
2. INSTALL SMOKE SEAL ON JAMB FOR LENGTH OF DOOR EDGE TO REDUCE DOOR TO JAMB GAP TO 1/8" MAX

REV	BY	DATE	DESCRIPTION
C	BH	14/04.03	ADD KEY & PILOT HOLES, CORRECT DOOR SWING
B	RAM	10/00	ADD NEW SOLID LINK ARM

RAM MANUFACTURING LTD.

DWN. BY: B. HANNAH	(1) RAM UNI-VERSE ELEVATOR BI-FOLD DOOR – COMPLETE DOOR FRAME ASSEMBLY		
CHECKED BY:			
SCALE: 1/8 SIZE EXCEPT AS NOTED	DATE: 27/DEC/95	DRAWING No. AFCUD101	REV C

APPENDIX C – TOOLS AND EQUIPMENT

REQUIRED TOOLS FOR INSTALLATION

- ½" Drive Electric Drill
- 1" AUGER Bit LONG 12 – 18"
- 1 1/2" & 1 7/16" Combination Wrench
- 24" Combination Punch-Pry Bar
- Concrete Chisel
- 48" Level
- Broom & Dustpan
- 90 Ft. 12Ga. extension Cord w/tri-plug adapter
- Extension Ladder
- 72" Step Ladder
- Working Platform - shipping with elevator (1st install only)
- 24" Hydraulic Bottle Jack
- Counterweight Hangars - shipping with elevator (1st install only)
- Trouble Light
- Concrete Drill with 3/8 concrete bit

APPENDIX C – TOOLS AND EQUIPMENT

LIST OF STANDARD TOOLS THAT SHOULD BE INCLUDED IN THE INSTALLERS TOOL BOX

- 3/8" Drive Electric Drill
- 4-1/2" Electric Grinder
- 10-12" Hacksaw
- Torpedo Magnetic Level
- Utility Knife
- 25'x1" Measuring Tape
- 12" Combination Square
- Drywall Saw
- Multi-meter
- Pop Rivet Gun
- 16 oz. Ball Peen Hammer
- Tapered Hole Punch
- Center Punch
- Cold Chisel
- 1/2" Wood Chisel
- 10" Vise Grip (x2)
- 7" Quick Clamp
- Round & Flat File
- 1/16"-3/8" Allen Wrenches
- 3/8,7/16,1/2,9/16,5/8,11/16,3/4 Combination Wrenches
- 5/16,3/8,7/16,1/2,9/16,5/8,11/16,3/4&5/8 Deep 3/8" Dr. Sockets
- 3/8" Drive Ratchet w/6" Extension
- 3/8" Drive. Bit Driver
- Combination Screwdriver
- #2 Stubby Robertson Screwdriver
- #2 Stubby Phillips Screwdriver
- Terminal Block Screw Driver (1/8" Tipped Flathead)
- Combination Wire Stripper/Crimper
- 7" Wire Cutters
- 8" Linesman Pliers
- Needle Nose Pliers
- 10" Channel Lock Pliers
- 7/8", 1 1/8", 1 1/16", 1 1/4" Hole Saws w/arbor
- Drill Bits (1/8,5/32,13/64,1/4) X2 & 1/2" w/3/8 shaft
- Taps (10-24 & 1/4-20 NC.) X2
- Large Flat Head Screw Driver
- Needle Nose Vise Grips