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MOVFR

DOOR OPERATOR INSTALLATION AND ADJUSTING MANUAL

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COMMENTS

All G.A.L. door operators are factory adjusted and tested for the actual job requirements. When installed correctly, they may require minor adjustments to suit actual job conditions.

IMPORTANT:

All equipment must be installed, adjusted, tested and maintained to comply with all Federal, State, and Local codes.

See section 10, page 22 in this manual for Kinetic Energy and closing force requirements.

Before mounting the operator, check that the car door is plumb, free and moves easily without bind. Check the attached standard measurements sheets. Install the operator according to the measurements supplied.

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FOREWORD

It is the intent of this manual to give the reader certain key points of information critical to the proper installation of the door operator. It is not intended to give comprehensive installation procedures nor does it cover the installation of door headers, tracks, hangers, etc.

It is hoped that the procedures presented in this manual will reduce the installation and adjustment time and result in a smooth, long lasting door operation.

When properly installed, G.A.L. operators will give many years of trouble free service.

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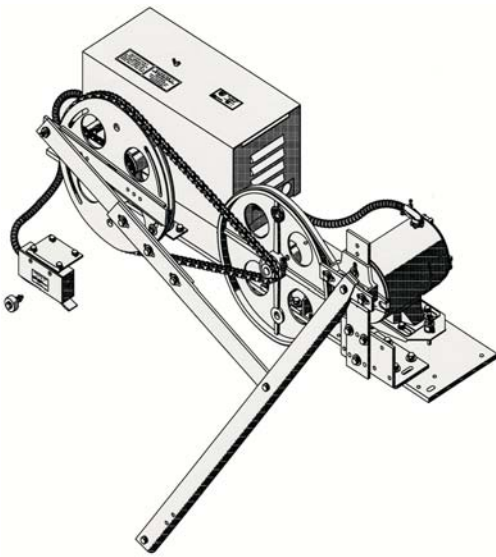
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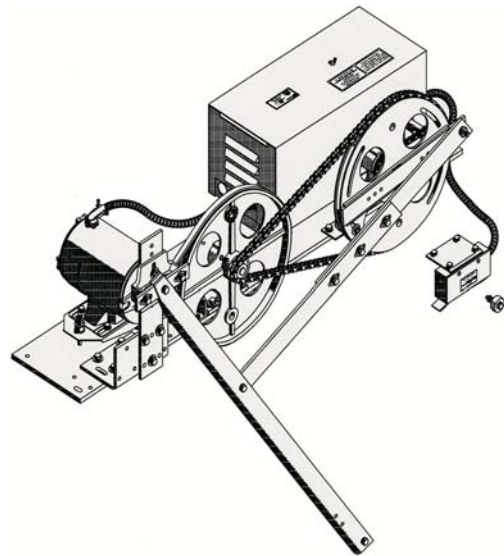
MOVFR OPERATORS

The MOVFR door operator is our newest model. It utilizes a ½ HP AC motor. The controls include the AC motor, a VVVF drive and a PC board.

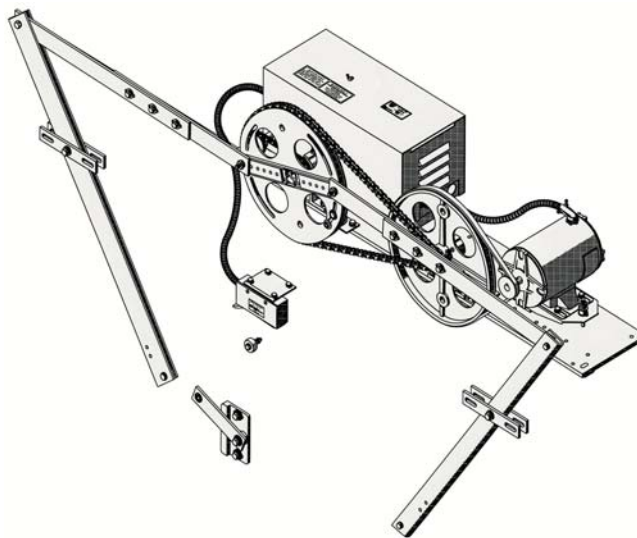
The illustrations on this page show the three different versions available; Left Hand, Right Hand and Center Parting.



LEFT HAND SIDE OPENING



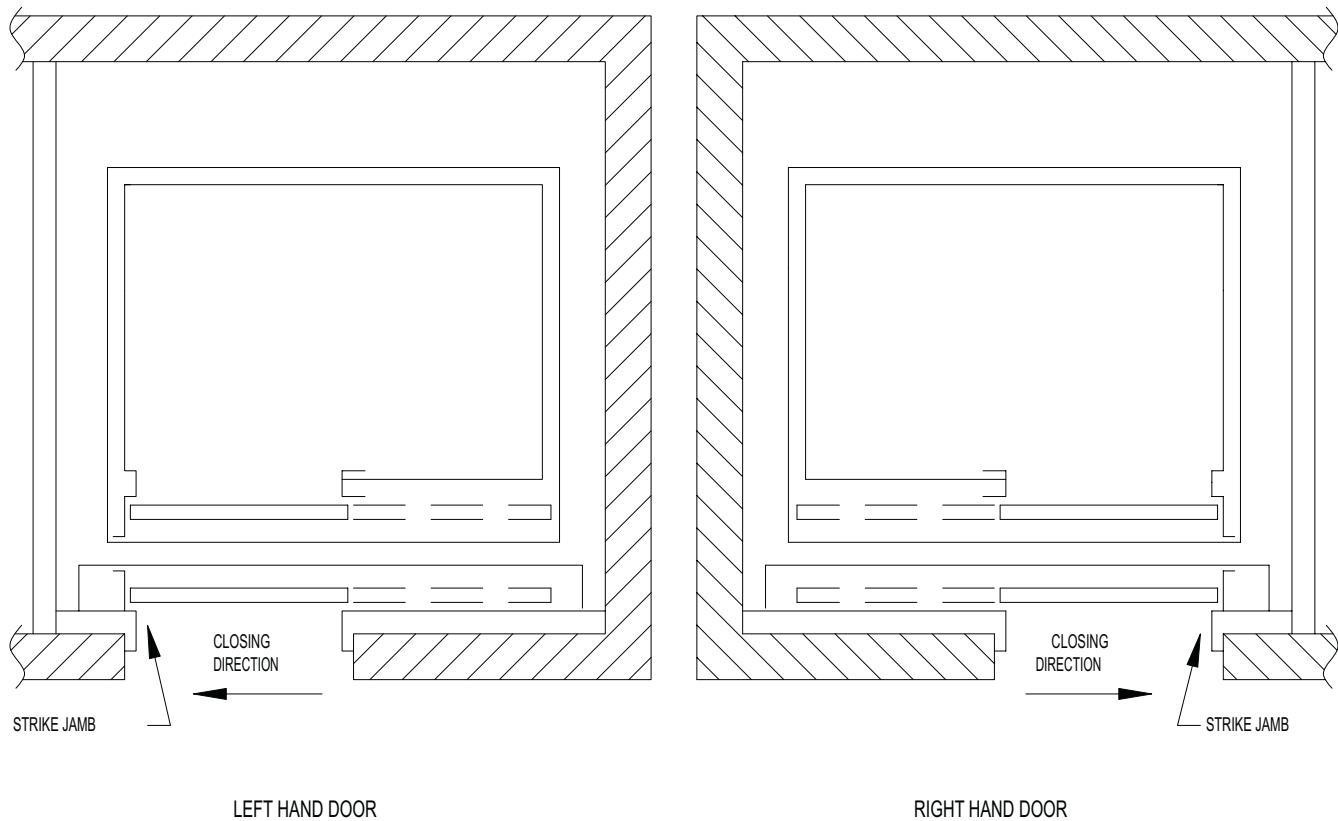
RIGHT HAND SIDE OPENING



CENTER PARTING

2**DETERMINING THE HAND OF THE DOOR**

G.A.L. door operators are available for right hand doors and for left hand doors. (Center parting doors use a variation of the left hand operator). To determine the hand of the door, stand in the lobby facing the elevator doors. If the doors close to the left, it is a left hand door. If the door closes to the right it is a right hand door. The left hand, center parting and right hand operators are not interchangeable. The figures below illustrate the door hand.



3 MOUNTING THE OPERATOR

As with all G.A.L. operators it is important to have the proper mechanical setup. Before continuing, check that doors are hung properly and glide freely with no binding. The spring closer should also be set so that the hoistway door will close fully. The door operator should be mounted in the proper position with the drive arm plumb and the operator arm and pivots set according to the DATA sheets (DATA21 for single speed, DATA22 for two speed). Slight differences are acceptable.

Install the isolation pads.

Isolation pads for the operator base are provided to minimize noise and vibration transmission into the cab. These pads must be glued to the operator base before mounting it to the car top.

Set the header plumb.

Place the operator over the pre-tapped holes in the header assembly. Set the base flush with the face of the header assembly and tighten the front bolts only. Move the operator base and header until the header is perfectly plumb. Temporarily clamp the rear of the base to the operator support to prevent any further movement of the header.

Side opening doors:

With the header assembly correctly installed, the vertical centerline of the operator drive pulley should be 9 $\frac{3}{4}$ " from daylight for a door opening of 22" to 44" and 14 $\frac{3}{4}$ " for a door opening of 45" to 48" (see Figure 3 and Appendix dwgs. # DATA21 & DATA22).

Center parting doors:

With the header assembly correctly installed, the center of the door opening lines up with the center of the header track. The center of the operator drive pulley should also line up with center of the opening (see Figure 6 and Appendix dwg. # DATA23).

Determining the position of the front edge of the door operator base:

Mount the drive arms to the drive arm support brackets on the header assembly for center parting doors and to the drive arm support bracket for slide doors. The mounting brackets are slotted for fine adjustments later, if needed. At this time, position the arms in the center of the bracket and tighten it.

Attach the connecting linkage(s) to the drive pulley, making sure that when the word "closed" is on top, the doors will be closed. Tighten the linkage(s) to the drive pulley.

Attach the clutch assembly to the drive door linkage, then attach the clutch to the drive door using the pre-tapped holes on the door panel. Tighten the clutch assembly to the drive door. Attach the other door (for center parting doors) to its linkage and tighten the door bracket to the center of the slots.

Raise or lower the rear operator support bracket mounted to the cab to vertically level the operator drive pulley. This helps to prevent binds in the opening and closing.

Check that the operator arms hang free and are not forced to or away from the operator drive pulley. Slide the operator forward or backward, if necessary. Turn the drive pulley by hand making sure that the drive arms and connecting links are perpendicular and clear of door and track. If necessary, slide the operator base forward or backward.

Proper positioning of the operator is critical to the life of the arm bearings. Bending of the drive arms will place stress on the bearings reducing their operating life.

Once the operator base is in correct position, drill the holes to permanently fasten the rear of the operator and tighten all mounting bolts.

4 PRE-ADJUSTMENT TIP

BEFORE PROCEEDING TO THE ADJUSTMENT SECTIONS, READ THE FOLLOWING TIP (REFER TO FIGURE 1)

Think of the drive pulley crank arm(s) and the connecting link(s) as each having its own independent role.

The crank arm determines the total door travel. The further the arm is away from the drive pulley, the longer the door travels.

The connecting link determines the door position. The longer the arm, the further the door moves from the jamb.

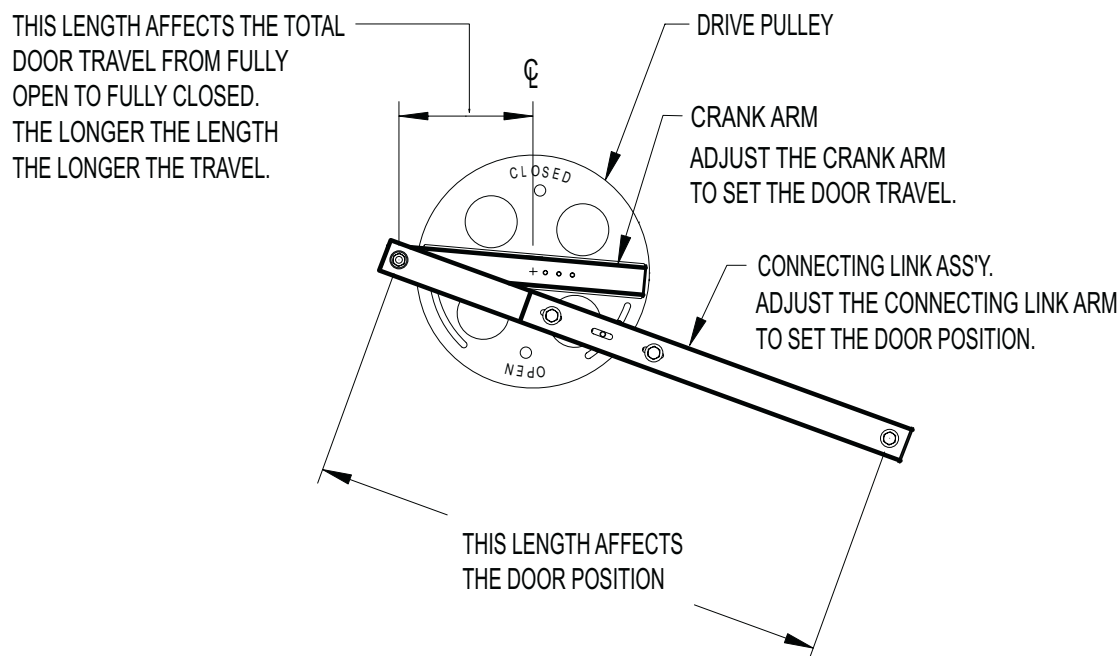
Example:

If the door opening is 42" but the door travels only 40" as stopped by the open and close limit cams, do not alter the cams. The cams have been factory pre-set. Correct the under travel by extending the crank arm outward from the drive pulley until the door travels 42" from fully open to fully closed (as determined by the limit cams), then fasten the crank arm in place.

Now, loosen the connecting link bolts, close the door against the stop roller and tighten one of the link bolts. Open the door until the open limit is activated and check the door position. If the door is not in the proper open position, close the door and readjust the connecting link. Repeat the above steps until the operation is complete and then fasten the two link bolts. Make sure that the closing door is stopped against the stop roller and not the strike post.

Remembering the above two points will facilitate door adjustments.

Bear in mind, that the drive pulley crank arm position and the cams are pre-set by our factory as indicated on the installation drawings



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ADJUSTING THE SINGLE SPEED AND TWO SPEED SLIDE DOORS

5.1 Removing the zone locking device and the bumpers:

Before adjusting the operator, remove the car door bumpers and the locking cam from the zone locking device (see document LWZ-1). Removing the locking cam from the zone locking device, allows unimpeded movement of the doors.

Removing the bumpers – Because the car door moves to unlock the hoistway door, it must move approximately 7/16” further than the hoistway door. Removing the car door bumpers makes up some of this difference and allows better door alignment at full open.

5.2 Adjusting the release roller and clutch:

Referring to figure 2A, adjust the lock release rollers so that they will clear the clutch by about 3/16” when the car door is in its final closed position and the drive pulley stop roller is against the stop plate.

Adjust the clutch cam and roller depth as per figures 2C and 2D. The clutch should retract as late as possible in the closing cycle.

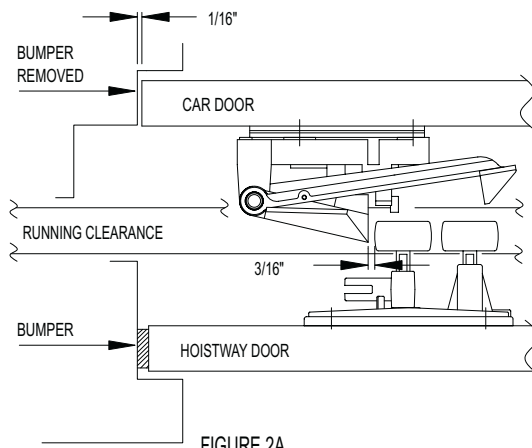


FIGURE 2A
DOORS FULLY CLOSED

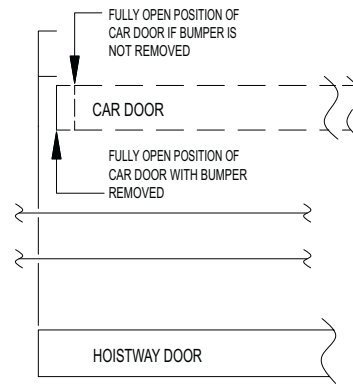


FIGURE 2B
DOORS FULLY OPEN

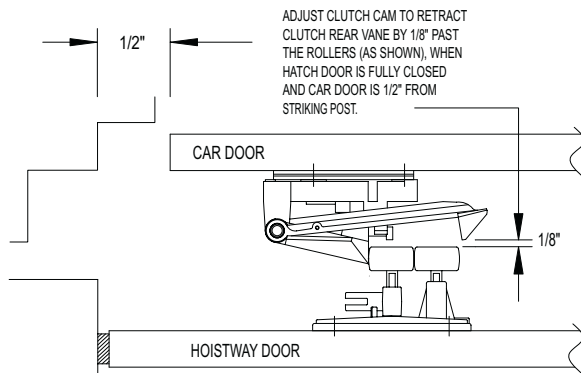


FIGURE 2C
CAR DOORS 1/2" OPEN

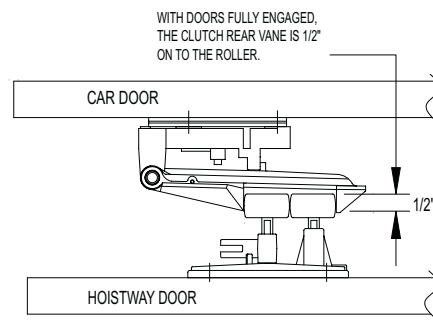
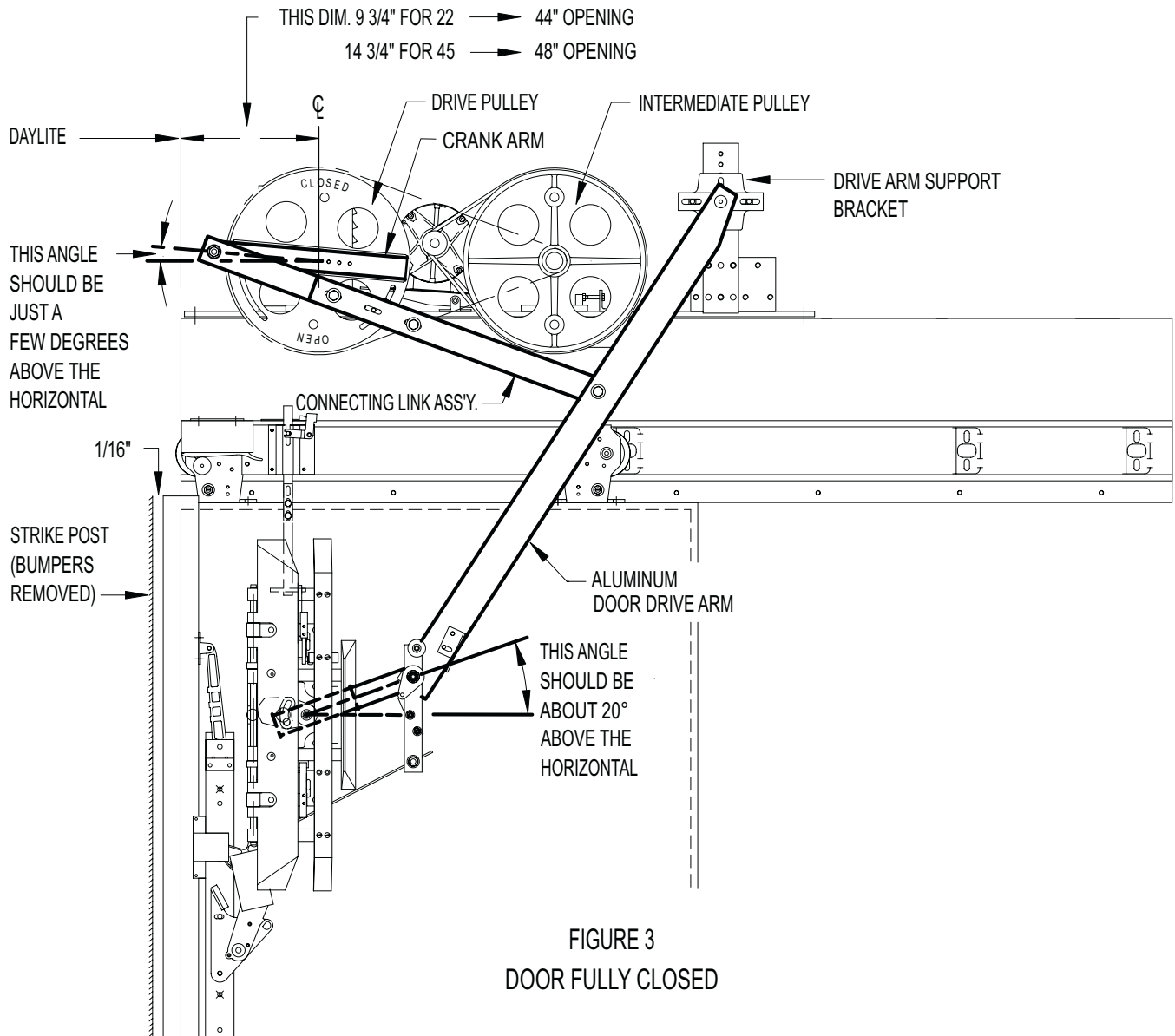


FIGURE 2D
DOORS FULLY ENGAGED

5.3 Crank arm and clutch link positions with door closed:

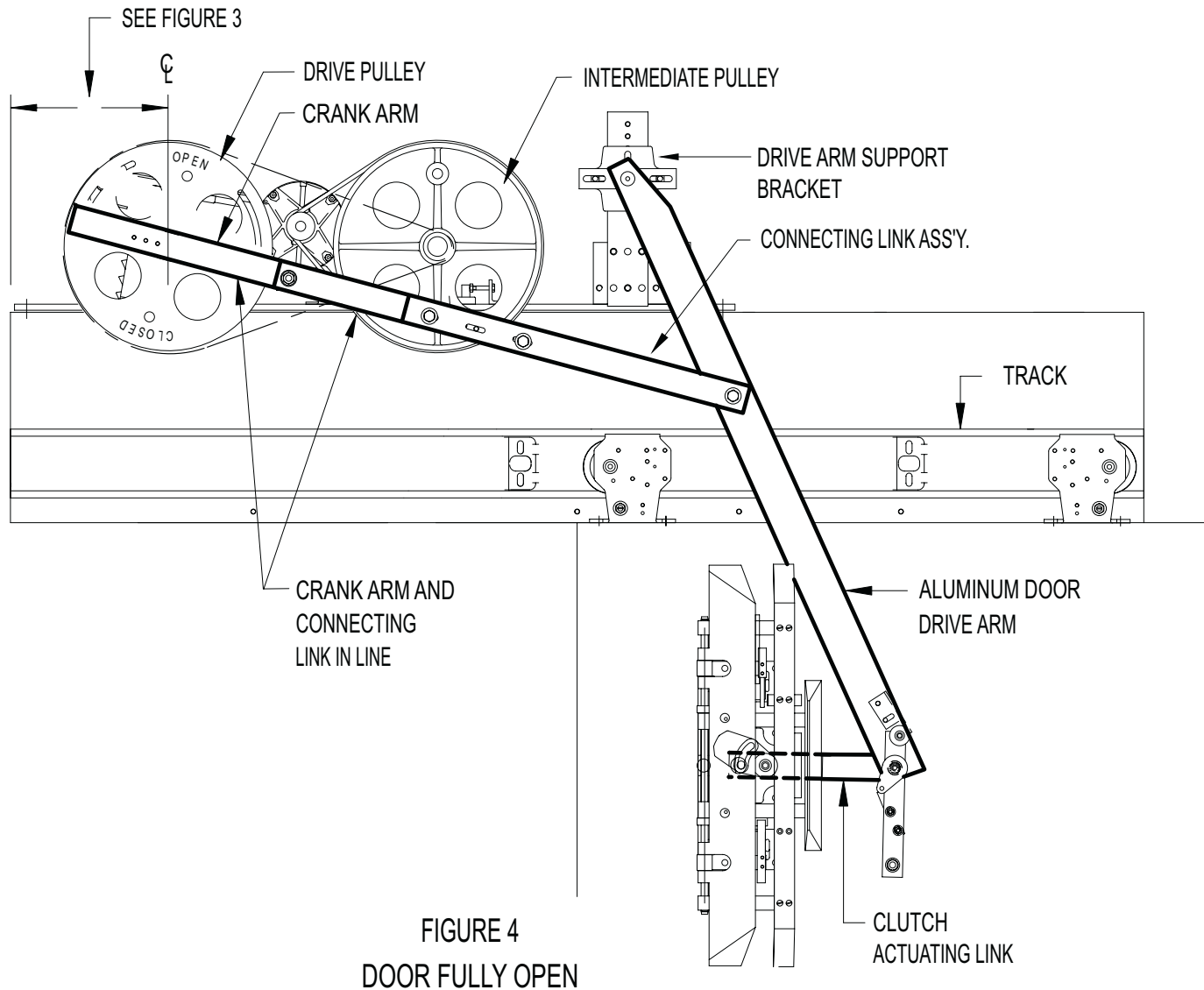
Referring to Figure 3, with the doors fully closed, the crank arm should be just a few degrees above the horizontal and the clutch link about 20 degrees above the horizontal. This setting will help prevent slamming and roll back, yet still allow manual opening of the doors when the car is stopped at a landing during a power failure.

If adjustments are necessary, close the car door. Loosen the two connecting link bolts and the two crank arm bolts. Keeping the door fully closed, adjust the link and arms to the proper positions. If necessary move the bolts to new holes. Re-tighten all four bolts when finished.



5.4 Crank arm and clutch link positions with door open:

Referring to figure 4, the best door opening operation occurs when the crank arm and the connecting link are in a straight line, the clutch link is about horizontal and the car door is approximately $\frac{1}{2}$ " past the return jamb. To make this adjustment, turn the drive pulley toward the open direction by hand until the crank arm and the connecting link are in line. Adjust the crank arm to bring the car door to $\frac{1}{2}$ " into the return jamb, then re-adjust the door open limit to stop the door electrically at this position.



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ADJUSTING CENTER-PARTING CAR DOORS

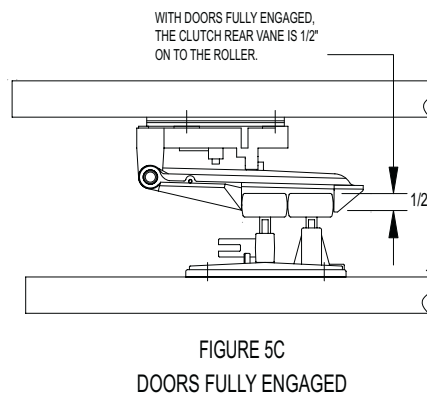
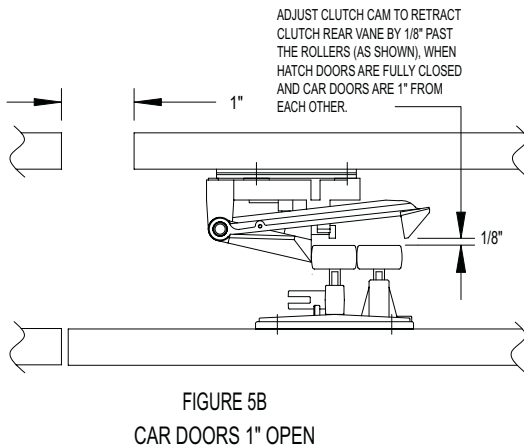
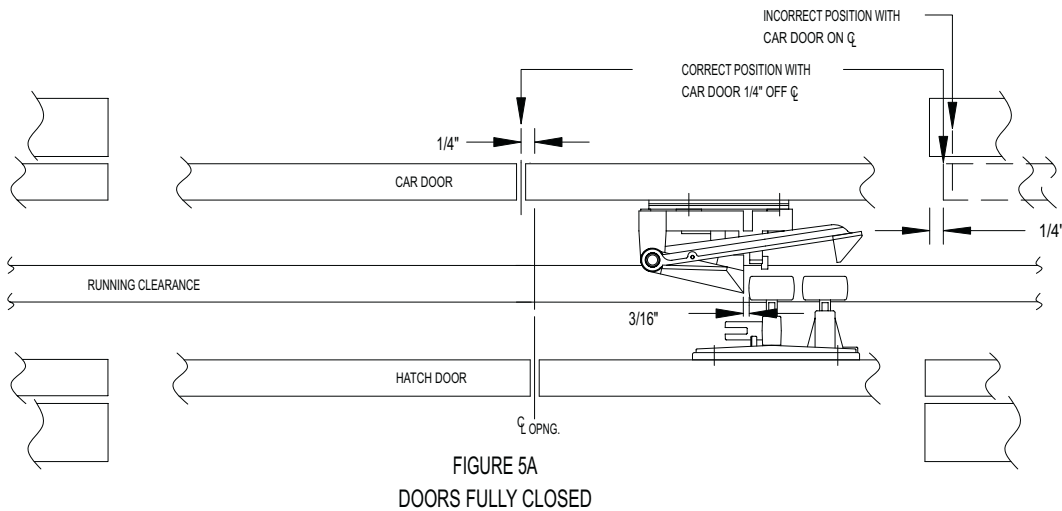
6.1 Adjusting the stop roller:

Referring to figure 5A, we recommend adjusting the driven car door so that it leads the hoistway door by 1/4". This will make the car door more closely match the hoistway door when fully open. Adjust the stop roller on the drive pulley so that the closing doors will be stopped by the roller as they meet. Do not have pressure on the meeting car doors, otherwise it will place unwanted stress on the arms.

6.2 Adjusting the release roller and clutch:

Referring to figure 5A, adjust the lock release rollers so that they will clear the clutch by about 3/16" when the car doors are in their final closed position and the operator stop roller is against the stop plate.

Adjust the clutch cam as per figures 5B and 5C. The clutch should retract as late as possible in the closing cycle.



6.3 Crank arm and clutch link positions with doors closed:

Referring to Figure 6, with the doors fully closed, the connecting links should be about 1 1/2" from the horizontal centerline of the pulley. The clutch link should be at about 20 degrees above the horizontal as shown.

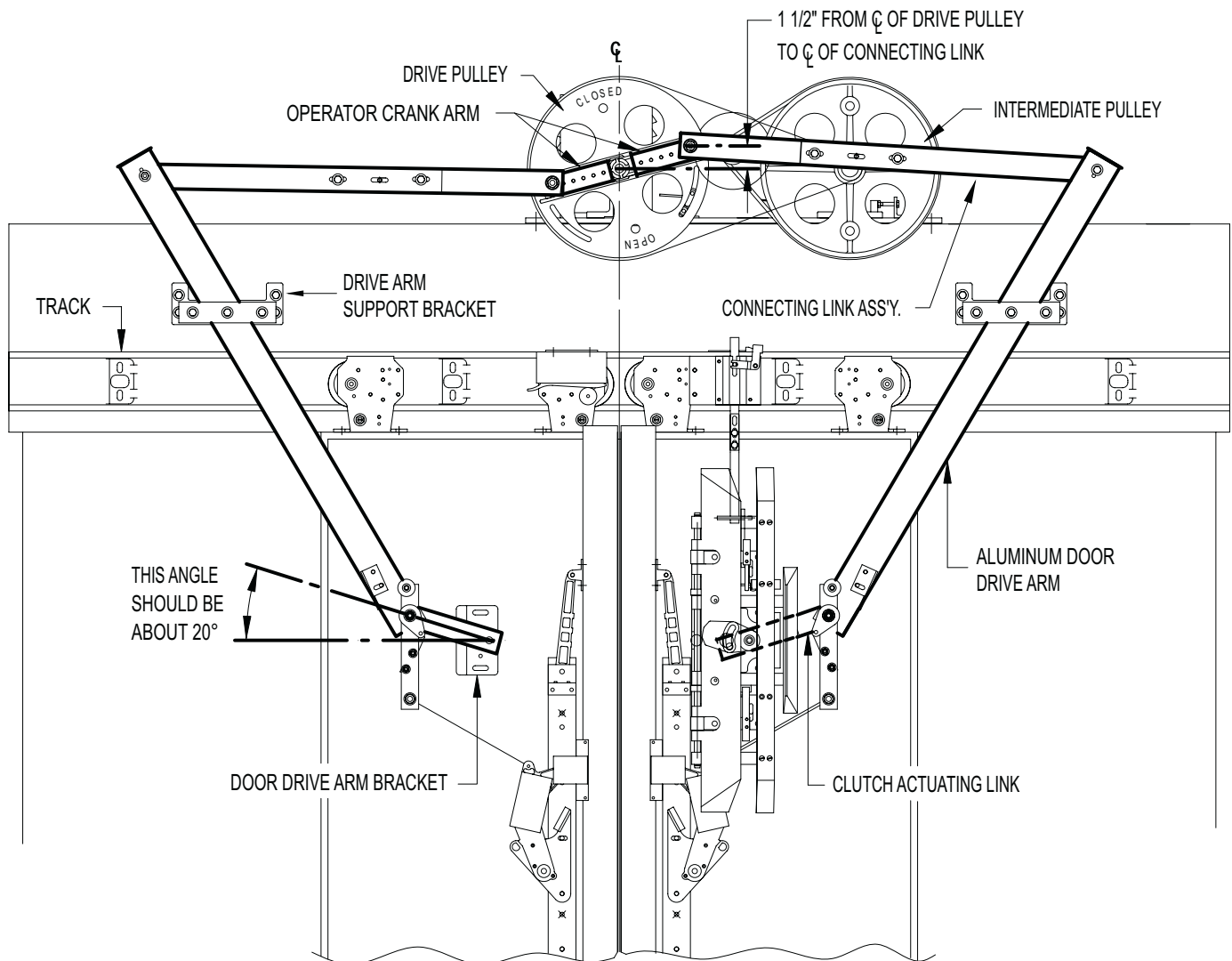


FIGURE 6
DOOR FULLY CLOSED

6.4 Crank arm and clutch link positions with doors open:

Referring to Figure 7, with the door fully open, the connecting links should be about 1½" apart. The clutch link should be about horizontal.

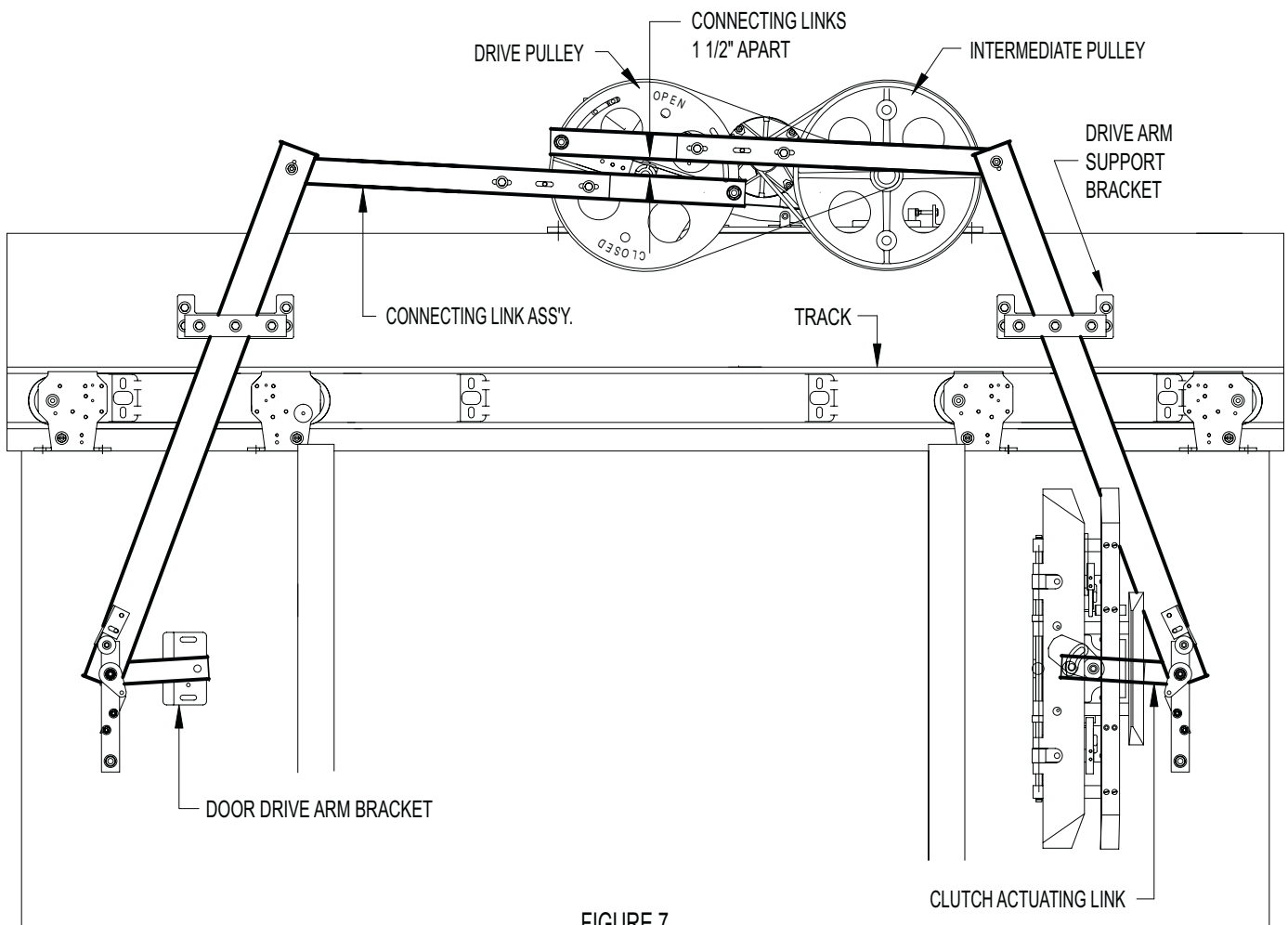


FIGURE 7
DOOR FULLY OPEN

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ELECTRICAL ADJUSTMENTS**ADJUSTING INSTRUCTIONS FOR THE G.A.L. VARIABLE FREQUENCY
CLOSED LOOP DOOR OPERATOR TYPE MOVFR.****7.1 Overview:**

The MOVFR is an AC door operator controlled by a variable voltage variable frequency (VVVF) closed loop drive. The controls include the AC motor, a VVVF Drive, and a PC board. It features keypad programming with digital display, electronic door position optical cams, sequential lights for speed and door positions, obstruction detection signal and DPM Fault Monitor* signal. It accepts universal input signals, from dry contacts to signal voltage, from 24 to 230 volts AC or DC**. The output contacts are rated at 10 amp 230 volts AC including door open limit, door close limit, re open signal and DPM signal.

* The Fault Monitor is a G.A.L. patented door lock and gate switch protection device used to meet ASME A17.1 RULE 210.15 and CAN/CSA-B44-M90 RULE 3.12.1.5.

** If the input signal voltage is 60 volts or less, the input board resistor must be cut (see connection diagram Dwg. No. 8032).

7.2 Adjustment aids:

Switches, Pilot lights and a Parameter unit are available to aid in the adjustment of the operator:

- A.** Three toggle switches and one push button have been provided to facilitate the adjusting procedure as described below:
1. RUN—CAM SETUP switch. The RUN position is for normal operation, the CAM SETUP position allows adjusting the cams and turning on the appropriate pilot lights without applying power to the motor.
 2. AUTO—MAN. switch The AUTO position is for normal operation, the MAN position allows opening and closing the door by means of the OPEN—CLOSE switch.
 3. OPEN—CLOSE switch allows constant pressure opening and closing when the AUTO—MAN. switch is in the MAN position.
 4. NUDG. switch allows closing the door at reduced speed (nudging speed) when in the MAN and CLOSE mode.
 5. RESET button allows manual reset of faults. Pressing this button will reset any drive feature that may have caused the operator to shutdown. The Drive green pilot light indicates drive has power, the red pilot light indicates an alarm has occurred and shutdown the Drive. If this occurs, make a visual inspection of the door, if there are no visible problems, place the AUTO-MAN switch in the MAN position, press the RESET button and operate the door with the OPEN—CLOSE switch making sure that all is clear before returning it to the AUTO mode. Use the Parameter unit to view the alarm history (See section VIII para. C).

B. Pilotlights:

A pilot light is provided on each of the three input boards (open-close-nudging) (Note: The input board resistor must be cut if the input signal voltage is 60 volts or less). Twelve additional pilot lights have been provided to indicate the position of the speed cams, limit cams and modes of operation. When a cam blocks the optical sensor, the function is activated and the corresponding pilot light turns on. The twelve pilot lights are:

1. HSC. High speed close.
2. FSC. Final slow speed close.
3. DCL. Door close limit (DCL output relay is energized when pilot light turns on).
4. SSO. Slow start open.
5. HSO. High speed open.
6. MSO. Medium speed open.
7. FSO. Final slow speed open.
8. DOL. Door open limit (DOL output relay is energized when pilot light turns on).
9. HOLDING. Door is in its full open or full closed position. (when the door is fully open or fully closed, a minimal amount of power is applied to the motor to prevent drifting).
10. NUDG. Door closing at reduced speed (nudging).
11. RE-OPEN. Door re-opening feature has been activated (such as when striking an object).
12. STALL REVERSE. The operator has electronically detected an obstruction.
13. DPM. Auxiliary car door closed contact for customer's use (such as for Fault Monitor). (DPM output relay is energized when pilot light turns on).

C. The Parameter unit plugs into the drive and permits changing the values of pertinent parameters (see section **IV**).

7.3 Preliminary checks:

(This procedure will assure that the motor is turning in the correct direction, if replacing the motor, and that all speed signals are in working order).

- A.** Place the AUTO--MAN switch in the MAN position and the RUN--CAM SETUP switch in the RUN position.
- B.** With the doors fully closed, hold the OPEN—CLOSE switch in the OPEN position while observing door movement. If replacing the motor check its direction. If turning in the wrong direction, you must swap any two of the three motor leads. The door should change speed as the various cams operate the speed controlling sensors. The door should start moving at a slow speed with the SSO sensor blocked accelerating to high speed (HSO) as the SSO sensor opens and then slowing down as the slowdown sensors are blocked (MSO then FSO). When the doors are fully open, hold the switch in the CLOSE position the door should accelerate to high speed (HSC) and then slowdown when the FSC sensor is blocked.

7.4 Speed adjustments using the parameter unit:

Speed values, acceleration, deceleration and torque are changed by means of the Parameter unit. If the FR-PUO4 parameter unit is used, it is advisable to copy the factory pre-set parameters into this unit before making any changes. Once copied, the factory pre-set parameters can be downloaded back into the drive unit, if necessary. See section **VIII** for copy and downloading procedures.

A. How To set parameters with the FR-PUO4 hand held unit:

1. Press **SET**
2. Enter Pr. Number
3. Press **READ** (The current value is displayed).
4. Enter new value
5. Press **WRITE** After pressing **WRITE**, another parameter can be entered directly without pressing **SET** by entering the new parameter number. If a mistake is made before pressing **WRITE**, press the **ESC** button and re-enter the new value; Otherwise press the **SET** button and start over.

B. How to set parameters with the FR-PAO2 unit:

1. Open the parameter cover.
2. Press the mode button until it reads **Pr ..**
3. Press the up arrow (•'3f) to display the desired parameter number.
4. When the desired parameter number is displayed, press the **SET** button. The display will show the current value of that parameter.
5. Enter the new value using the up and down arrows.
6. Press the **SET** button and hold it depressed until the displays flashes the new value alternatively with the parameter number. The newly set value can be changed again by repeating steps 5 and 6. To change another parameter, repeat steps 2 thru 6.
7. To return the display to monitor mode press the **MODE** button three times, after that the **SET** button can pressed to change the display from Hz to Amps to Volts.
8. If the **STOP/RESET** button is pressed, door motion will stop. The system can be restarted by momentarily pressing the reset button on the PC board or by momentarily disconnecting main power.

7.5 Parameter Adjustments: Speed, Rate, Torque.

Caution! All equipment must be installed and adjusted to meet Federal, State and Local codes.

Note 1: The closing kinetic energy is affected by speed which may be affected by torque and it must not exceed code limits.

Note 2: The closing torque is affected by the torque adjustments as well as the speed.

Note 3: Whenever changing any of the close adjustments, the door should be rechecked to meet code requirements.

Caution! Do not change any parameter (Pr.) not listed below.



TIP: Before increasing the high speed parameter value, first decrease the deceleration parameter by at least the same percent value in order to avoid door slamming.

Example: If the parameters have been set as in the table below, and you wish to increase the high speed opening parameter 25 from 45 to 50, an increase of approx. 12%, first decrease the deceleration parameter 45 from 10 to 8.5.

See pages 6, 7 and 8 for tables, cams and graphs.

A. Closing :

HSC (Pr. # 4):

This is the high speed close parameter. It is the most important speed for overall closing times. Higher speeds (higher settings) will give faster closing times.

FSC (Pr. # 5):

This is the final closing speed. It should be adjusted so that the DCL and the close stop roller are reached without slamming.

ACCEL (Pr. # 7):

Slower rates (higher settings) produce slightly smoother operation. Faster rates (lower settings) produce quicker closing times.

DECEL (Pr. # 8):

After setting FSC, the deceleration rate should be set so that the FSC speed is reached just prior to the uncoupling of the doors resulting in a smooth final closing.

Holding (Pr. # 2 & 0):

Activated by DCL at full close and DOL at full open.

When the door is fully open or fully closed, the door is kept from drifting or rolling back by maintaining reduced power on the motor. Parameter 2 (holding speed) is the same for open and close and should be set at about 2 or 3 Hz to produce just enough speed to move and hold the drive pulley against the stop roller. Parameter 0 should be set for a holding current of about 0.8 amps. Note that Pr. 0 also affects the closing torque.

Caution! To prevent unnecessary heating of the motor, the holding amps should be limited to a max of 0.9 amps.

Torque and Holding Torque (Pr. # 3 & 0):

The factory settings for torque and holding torque should be suitable for the initial adjustments. After completion of closing adjustments including Pr. 0, above, measure torque for code requirements and adjust Pr. 3 to meet code limitations. The higher the value of Pr. 3, the lower the torque. Jobs that may experience wind conditions should have the closing torque set just below the 30 lb. code limit.

Caution! Closing torque affects the holding amps to a small degree.

Stall Reverse Force (Pr. #150):

This parameter is factory set at 40% of the inverter rated current. When the current is determined to be above this value, the existence of an obstruction is assumed, and the operator generates a stall reverse condition. The value of this parameter should be increased, as necessary, if nuisance activation of the stall reverse conditions occurs.

B. Opening :**Torque and Slow Speed Torque (Pr. # 47 & 46):**

The factory settings of these values should be sufficient for all door sizes and weights. Field adjustments may not be necessary. Pr. # 47 should not be set less than 60.

SSO (Pr. # 24):

When the door starts to open, this is the speed at which the interlock rollers unlock the hoistway door. A slower speed produces smoother and quieter unlocking. For fast door openings this should be set as fast as possible (higher settings) while allowing smooth and quiet operation.

HSO (Pr. # 25):

Can be activated as soon as the hoistway door is unlocked (approx. after first 1/2" of car door movement). This is the high speed open parameter. It is the most important speed for overall opening times. Higher speeds (higher settings) will give faster opening times. See tip on previous page.

MSO (Pr. # 26):

This speed is used for a fast reopening in the final 1/3 to 1/4 of the opening. When properly adjusted, this speed will have no effect during the full opening cycle because the doors decelerate through this zone from HSO to FSO. The factory setting of this speed is slow so that the full opening can be adjusted without interference from MSO. See paragraph VI on reopening for proper adjustment of MSO.

FSO (Pr. # 27):

This is the final opening speed. It should be adjusted so that the DOL and the open stop roller are reached without bouncing.

ACCEL (Pr. # 44):

Slower rates (higher settings) produce slightly smoother operation. Faster rates (lower settings) produce quicker opening times.

DECEL (Pr. # 45):

After setting FSO, the deceleration rate should be set so that the FSO speed is reached just prior to the DOL and the final open position without bouncing. For a very fast opening, it may be desirable to have a quick deceleration rate (a lower value of Pr. 45) with a shorter MSO zone.

Holding (Pr. #2):

Activated by DOL at full open or DCL at full close, see closing parameter adjustments.

C. Re-opening:

After adjusting the closing cycle and the full opening cycle, the re-opening can be set.

Quick Stop (Pr.#12):

Parameter 12 determines how quick the closing door is stopped when a reopen signal is activated. This should be adjusted when a reopen signal occurs with the door half closed (mid-opening). Do not set this parameter at 0. A low setting produces a smoother longer stop which is better for the equipment. The best setting is for a 1" to 2" stopping distance.

MSO(Pr.#26):

Before increasing MSO from the factory setting, observe how the door reaches the final open position and /or the open stop roller during a full open cycle. Start the closing cycle let door close approximately 1/4 to 1/3 of the distance and reopen the door (approximately the full MSO zone). Increase the MSO speed to produce a quick reopening in that zone. Once again observe the full open cycle. It should be the same as before. **If it is more abrupt or bounces on the stop roller, decrease MSO slightly.**

7.6 Adjusting the speed parameters and the position of the speed and limit cams

Parameter values, speed and limit cams have been factory preset. Minor adjustments may be required to suit actual job conditions.

Parameters values can be changed even during door motion, Cams are best set when the RUN—CAM SETUP switch is in the CAM SETUP position. In this position, power is disconnected from the motor but not from the position pilot lights. The drive pulley can be turned by hand while observing the pilot lights.

The tables found in the appendix list the parameter values and the associated cam settings.

7.7 Using the FR-PUO4 hand held unit to copy the pre-set parameters and others:

Before any parameter changes are made and again after all adjustments have been satisfactorily completed, the parameter settings should be copied into the parameter unit for future use. If the drive settings are unintentionally changed, the original settings can be downloaded back into that drive or into a replacement drive or the Parameter unit can be taken to a similar installation and downloaded into that door operator's drive.

This procedure is especially useful on group jobs that have the same openings. After completing the adjustment on one car, the Drive parameters can be copied into the parameter unit and then downloaded into the other cars and each door will operate exactly the same.

A. Procedure for copying (READ) parameters from the Drive into the Parameter unit.

Caution! This procedure will erase all settings from the Parameter unit and replace them with whatever settings are in the Drive. Once completed it cannot be undone.

1. Press **SET**
2. Press the up arrow (▲).
3. Press **READ** and wait for the completed signal.
4. Press **MON**

- B.** Procedure for downloading (WRITE) parameters from the Parameter unit into the Drive.
Caution! Factory shipped Parameter units have not been pre-programmed with parameter values. Before downloading, READ first the parameters from a proper Drive using the procedure in paragraph A above.
1. Press **SET**
 2. Press the up arrow (▲).
 3. Press **WRITE** and wait for the completed signal.
 4. Reset the drive by momentarily pressing the reset button on the PC board or by momentarily disconnecting main power.
- C.** Viewing and resetting the alarm history.
Press HELP twice. Scroll to Alarm Hist to view the alarms or to Alarm Clear to clear the alarm history. Press READ. To clear the alarm history press WRITE.
- D.** Viewing running hz, amps and volts.
To view HZ, press MON. Press SHIFT to display amps. Press SHIFT again to display volts. Press SHIFT a total of five times to display all three functions simultaneously.
- E.** How to reset the Drive.
The Drive can be reset with the Reset button on the operator as explained In Section II A 5. It can also be reset with the PU04 parameter unit by pressing HELP twice, scrolling to INV. RESET, pressing READ and then pressing WRITE.

7.8 How to replace the Drive:

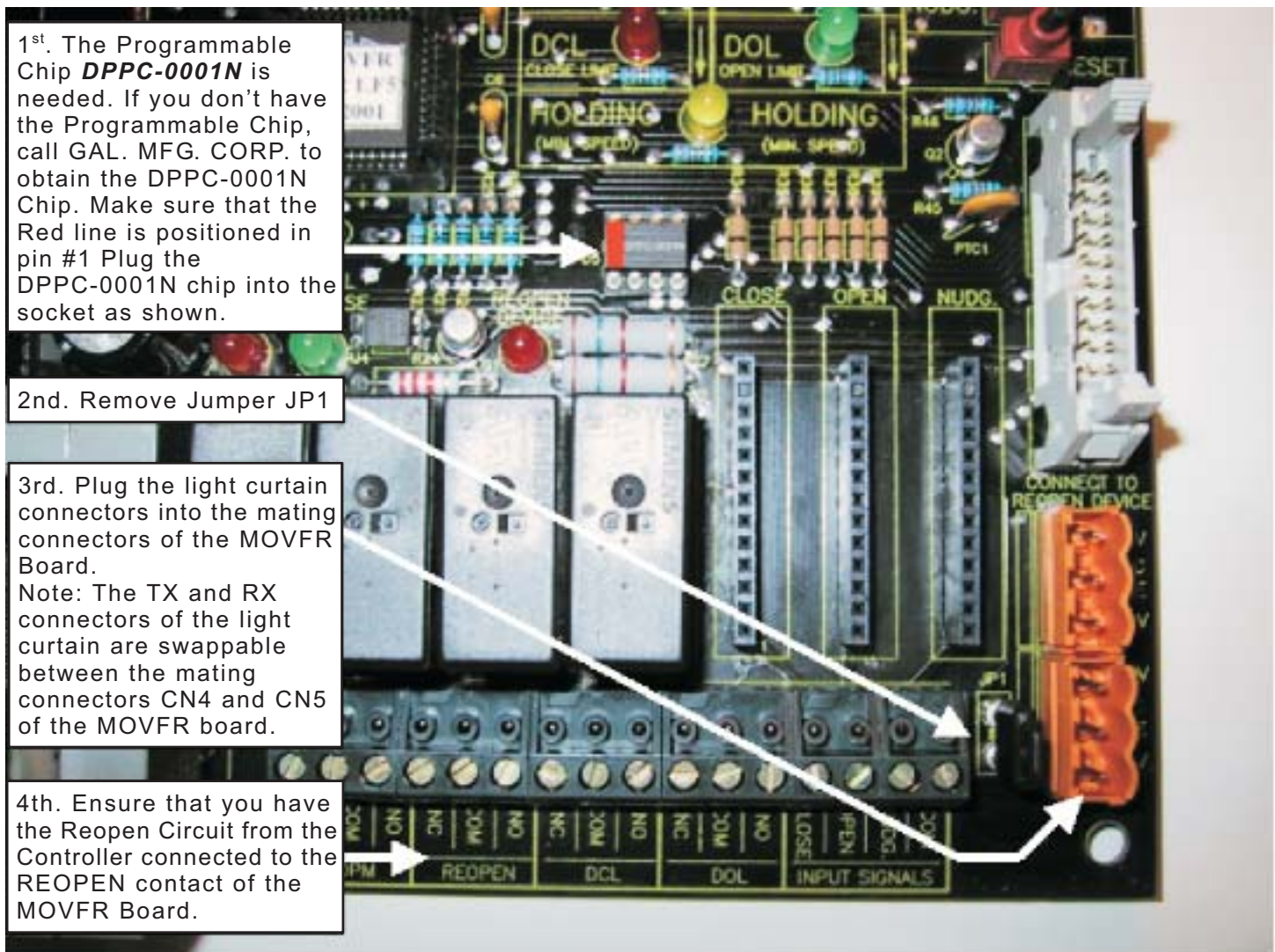
1. Disconnect the door operator power from the machine room.
2. Flip ON – OFF switch on operator board to OFF position and the AUTO-MAN switch to the MAN position. Wait 10 minutes for the Drive's internal capacitor to completely discharge.
3. Unplug the two ribbon cables from the Drive.
4. Remove the two Drive mounting screws leaving the remaining wires attached to the Drive and move it to the side.
5. Install the new Drive.
6. Remove one wire at a time from the old Drive and connect it to the corresponding terminal on the new Drive.
7. Plug-in the two ribbon cables into the proper connectors.
8. Reapply power to the Drive but leave the switch in the MAN position for now.
9. WRITE the parameters from the parameter unit into the Drive as explained above.
10. Check door operation with the OPEN-CLOSE switch before returning the system to AUTO.

7.9 Interfacing procedure between G.A.L. Certified light curtain and MOVFR:

To take full advantage of the MOVFR and simplify the REOPENING circuit for the Door Operator, the REOPEN relay in the MOVFR board should be used to Reopen the door in cases of:

- Exceeding the Limit of the Torque allowed.
- Obstructing the Light Curtain.

The exceeding torque feature has already been built in the MOVFR board. The following illustration shows the interfacing procedure of a **G.A.L. Certified Infra-Red Light Curtain** and **G.A.L. MOVFR** board.



Followings are G.A.L. Certified Infra-Red Light Curtains that are available from G.A.L. MANUFACTURING CORP.:

- Formula Systems
- Tritronics
- TL Jones (Microscan E)
- Janus
- Adams

10 KINETIC ENERGY AND CLOSING FORCE

Code definitions: ft = foot; lbf = pound (force); N = Newton; J = Joule.

ASME A17.1-1996 Rule 112.4 requires that the force necessary to prevent closing of the door from rest shall not be more than 30 lbf (133 N). The kinetic energy for the average closing speed shall not exceed 7 ft-lbf (9.49 J) where a re-opening device is used and 2.5 ft-lbf where the re-opening device is disconnected or not used.

In addition, requirement 2.13.4.2.4 of ASME A17.1 2000 stipulates that a data tag be attached to the door operator or car crosshead. If you are in a jurisdiction that has adopted the 2000 code, you must comply with this requirement. A blank data tag is supplied with each operator, and must be filled out by the GAL customer using the GAL kinetic energy tables for your particular door configuration.

The data tag is required to show:

- The minimum code closing time for the door system that will result in average kinetic energy of less than 7.37 foot pounds.
- The minimum code closing time for the door system, when in nudging, that will result in average kinetic energy of less than 2.5 foot pounds.

The minimum closing times to meet the above requirements can be found by referring to the kinetic energy tables found in the download section of GAL's website (www.gal.com). If you use all GAL equipment, and follow GAL instructions, these tables will give you the minimum code closing time for all of the normal door configurations, sizes, and operator models available.

Notes:

Code Closing Distance / Time

On side opening, the code distance starts 2" from the jamb and goes to 2" from full close (opening size – 4"). On center opening, code distance starts 1" from the jamb and goes to 1" from full close (still opening size – 4"). Times shown are minimums for the code closing distance.

Average Kinetic Energy (7.37 ft lbs)

This is what is reflected in the times shown on the spread sheets. The rotational inertia of the motor and operator is included in these calculations. GAL's calculations include "equipment rigidly connected thereto" and accommodate all hangers, rollers, clutches, closers, releases, and any normal reopening devices.

Actual (peak) Kinetic Energy (17 ft lbs)

With GAL equipment and following GAL instructions, if your times comply with the requirements shown for average KE, you will not exceed the requirement for actual (peak) KE.

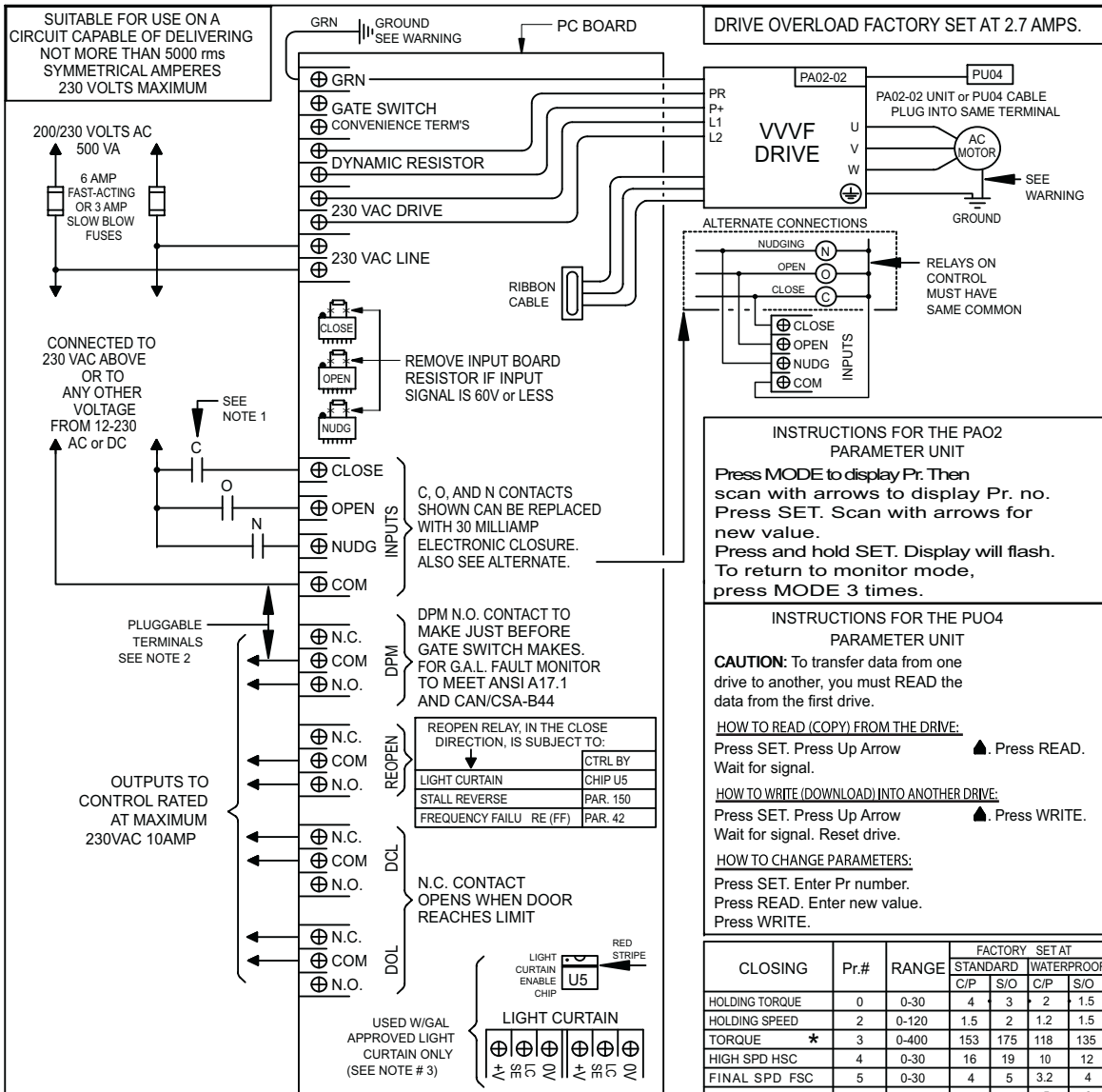
Nudging Kinetic Energy (2.5 ft lbs)

If you take the minimum code closing time for your application and double it, you will have a safe time to use for the requirement under nudging. Note – this is a very conservative time, if you really want to close your door quickly while in nudging, you can call GAL for an absolute minimum.

Non Standard Systems

If you have a non-standard application, like three speed doors, or panels that are so heavy or light

9
APPENDIX



TYPE	MFG.	LIGHT CURTAIN CONNECTIONS						INTERCONNECTIONS
		TRANSMITTER-TX CN4			RECEIVER-RX CN5			
		+V	LC SE	0V	+V	LC SE	0V	
DPFS	FORMULA SYSTEMS	BLK	BLK	GRN YEL	BLK	BLK	GRN YEL	NONE
DPTL	T.L. JONES	RED	YEL	BLK	RED	YEL	BLK	NONE
DPJE	JANUS	RED	BLU	ORG	NONE	NONE	ORG	TX-WHT TO RX-WHT
DPTT	TRI TRONICS	RED	WHT	BLK				

NOTES:

- 1-POWER IS MAINTAINED AUTOMATICALLY ON DOORS AT THEIR LIMITS. FOR THIS REASON THE DOOR CLOSE SIGNAL CAN BE REMOVED WHEN THE DOOR IS FULLY CLOSED OR WHEN THE ELEVATOR IS RUNNING. THE "C" RELAY CAN DROP OUT WITH THE DOOR CLOSE LIMIT OR CAN REMAIN ENERGIZED, THE SYSTEM WILL WORK EITHER WAY. THE LIMIT CAN BE USED FOR FIRE SERVICE ONLY.
- 2-HEAVY LINES REPRESENT CONNECTIONS FROM ELEVATOR CONTROLLER TO DOOR OPERATOR PC BOARD.
- 3-FOR PROPER LIGHT CURTAIN OPERATION, MAKE SURE ENABLE CHIP U5 IS PROPERLY PLUGGED INTO SOCKET.

WARNING:

ALL EQUIPMENT MUST BE INSTALLED AND ADJUSTED TO MEET FEDERAL, STATE AND LOCAL CODES. TO PREVENT AN ELECTRICAL SHOCK, THE FLEXIBLE METALLIC CONDUIT MUST BE FASTENED FIRMLY TO THE MOTOR AND CONTROL BOX. THE CONTROL BOX MUST BE GROUNDING.

REV	DESCRIPTION	DATE
I	REVISED REOPEN RELAY	2/18/04
H	REVISED C/P PARAMETERS	2/26/03
G	REVISED CLOSE SPEED RANGE	10/25/02
E	REVISED F.S. CONNECTIONS	9/30/02
D	REVISED TRITRONICS CONNECTION	9/24/02
B/C	C.S.A./ REVISED DETAILS	3/05/02

TITLE: MOVFR DOOR OPERATOR CONNECTION DIAGRAM

G.A.L. MANUFACTURING CORP.
50 EAST 153rd STREET BRONX, N.Y. 10451

DWG. BY	T.P.	ENGR.	P.L.E	DATE	2-18-04
SCALE		PART No.		DWG No.	8032
F/N	DOOR EQUIPMENT	WD	8032	REV I.dwg	SHEET 1 OF 1

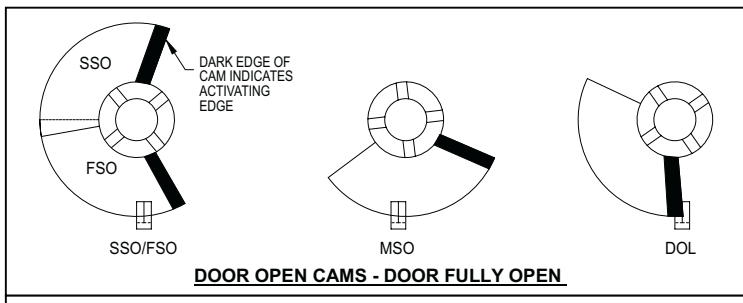
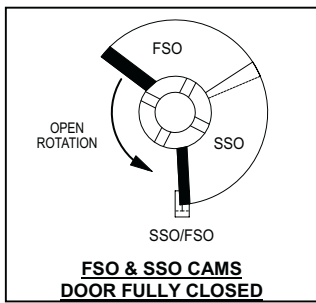
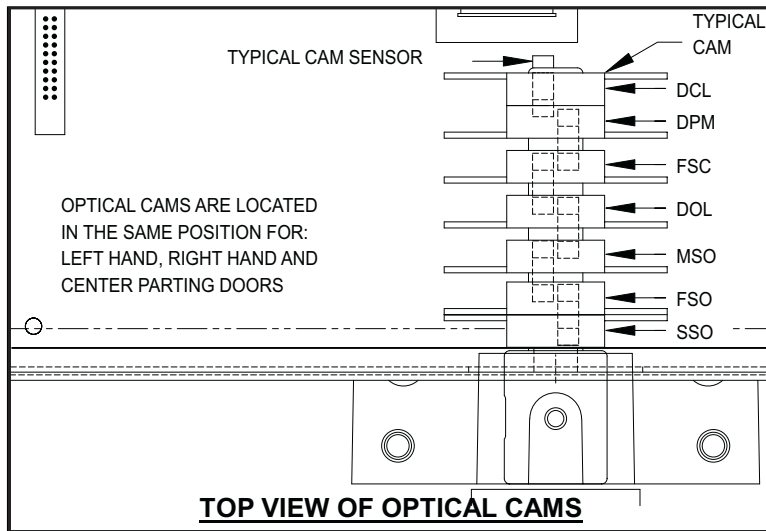
REV. I

Table of closing functions:

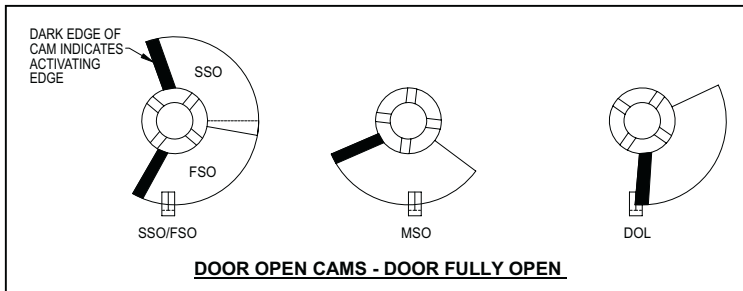
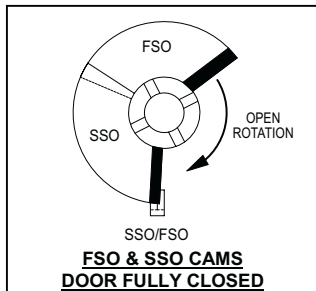
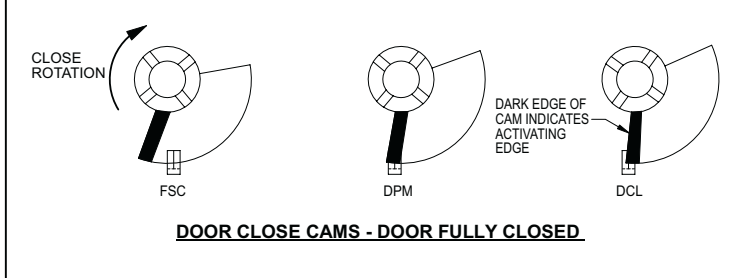
CLOSING FUNCTION	LED PILOT LIGHT	Pr. No	PARAMETER RANGE	FACTORY SETTINGS		HIGHER SETTING	CAM CHANNEL SETTINGS				DISTANCE ACTIVATED / PARAMETER COMMENT
				C/P	S/O		FSC	OPENED	DPM	BLOCKED	
Torque	--	3	0 - 400hz	225	175	Lower Closing Force Note: Set this for less than "Code Force"					Set for Closing Force only after setting Holding Torque, Pr. No. 0
Acceleration	--	7	0 - 360s	6	6	Longer accel time					
Deceleration	--	8	0 - 360s	10	10	Longer decel time					
High Speed	HSC	4	0 - 400hz	23	19	Faster speed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Until 4" from final close
Final speed	FSC	5	0 - 400hz	6	5	Faster speed	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Last 4" of close range
Fault Monitor	DPM	--	--	--	--	---	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Just before gate switch is activated
Holding speed	HOLD & DCL	2	0 - 120hz	2	2	Stronger holding power and higher holding amps.	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	1/4" from close stop roller (Holding Torque, Pr. No. 0 must be set before setting Torque Pr. No. 3)
Holding torque		0	0 - 30%	3	3						
Nudge speed	NUDG	6	0 - 400hz	11.5	9	Faster speed					

Table of opening functions:

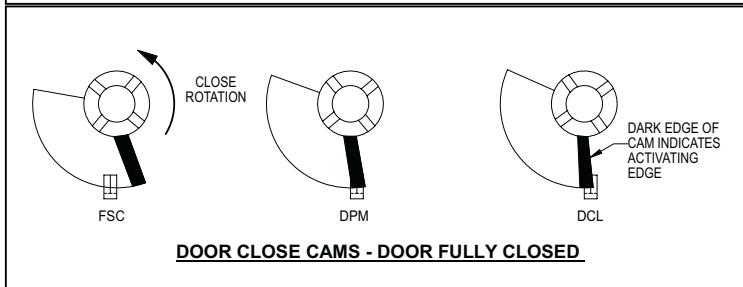
OPENING FUNCTION	LED PILOT LIGHT	Pr. No.	PARAMETER RANGE	FACTORY SETTING		HIGHER SETTING	CAM CHANNEL SETTINGS				DISTANCE ACTIVATED / PARAMETER COMMENT
				C/P	S/O		SSO/FSO	OPENED	MSO	BLOCKED	
Slow Speed Torque	--	46	0 - 30%	0	0	Higher torque					
Torque	--	47	0 - 400hz	80	80	Lower running torque					
Acceleration	--	44	0 - 360s	4	4	Longer accel time					
Deceleration	--	45	0 - 360s	9	10	Longer decel time					
Slow start	SSO	24	0 - 400hz	5	5	Faster speed	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	First 1/2 inch of opening
High speed	HSD	25	0 - 400hz	45	45	Faster speed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1/2 inch to 3/4 open
Med speed	MSO	26	0 - 400hz	20	20	Faster speed	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Last 1/4 of opening
Final speed	FSO	27	0 - 400hz	5	5	Faster speed	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Last 4" of open
Holding speed	HOLD & DOL	2	0 - 120hz	2	2	Stronger holding power and higher holding amps.	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	1/4 inch from open stop roller (Holding Torque, Pr. No. 0 must be set before setting Torque Pr. No. 3)
Holding torque		0	0 - 30%	3	3						
Quick stop	REOPEN	12	0 - 30%	1	15	Quicker stop					
Stall rev. force	REOPEN	150	0 - 200%	40	40	Stronger stall force					

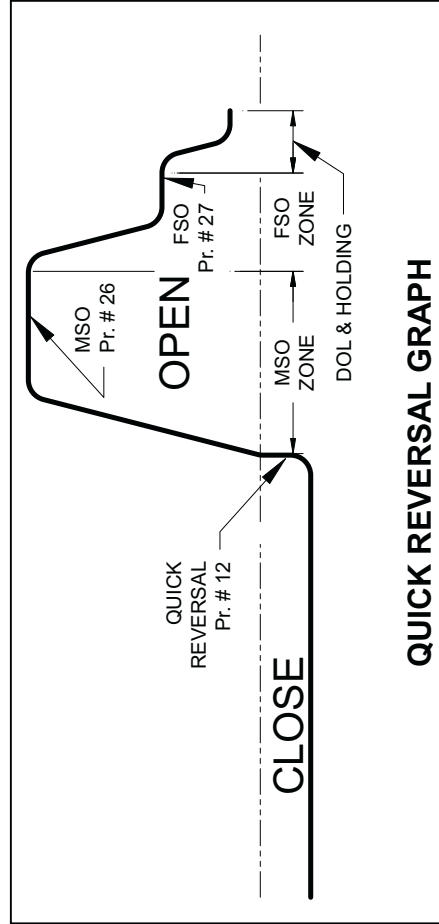
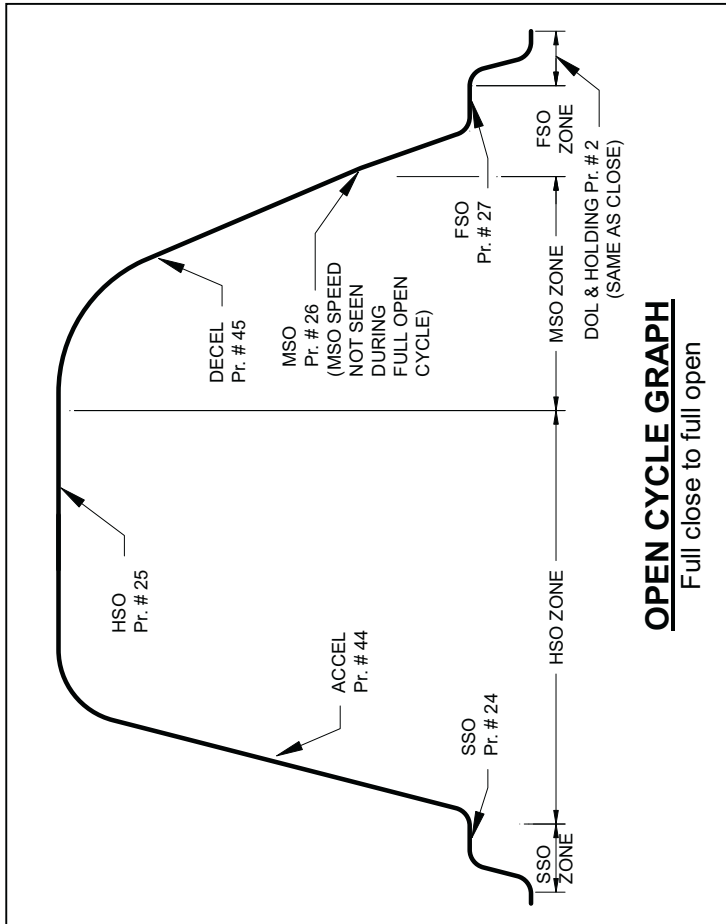
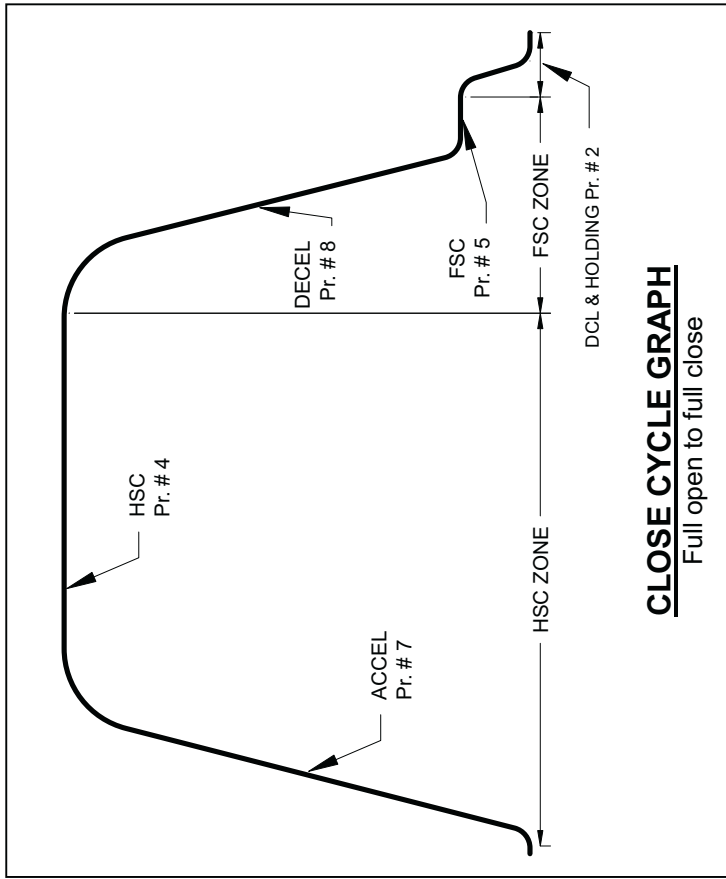


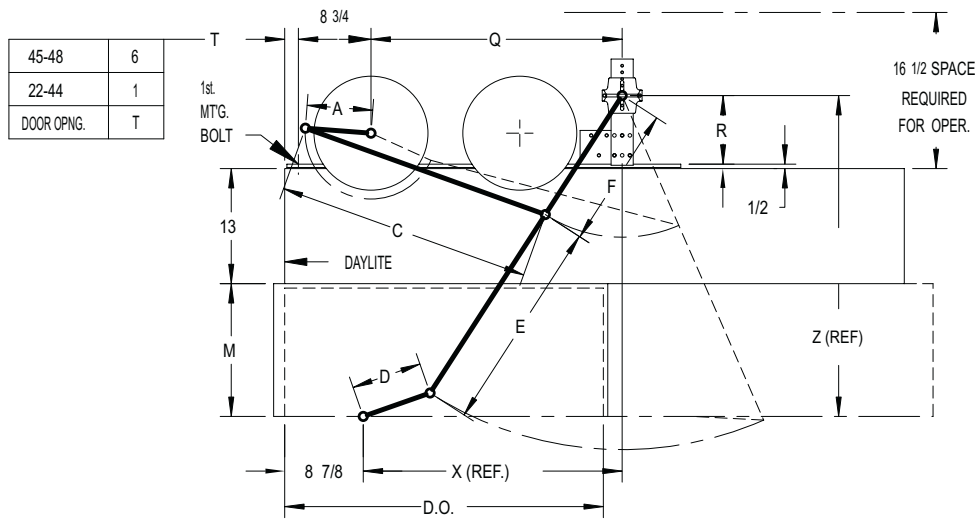
LEFT HAND AND CENTER PARTING CAMS




RIGHT HAND CAMS

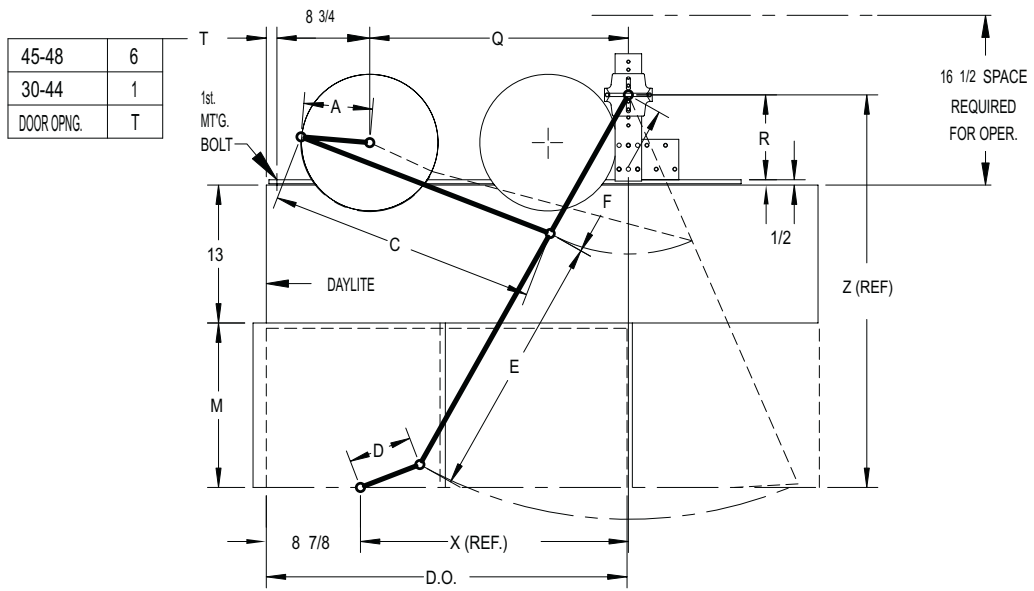







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47	9 7/8	34 1/8	12	31	21	23	39 5/8	47 1/2	33 3/4	11
46	9 11/16	33 15/16	12	31	21	23	39 5/8	47 1/2	33 3/4	11
45	9 1/2	33 3/4	12	31	21	23	39 5/8	47 1/2	33 3/4	11
44	9 7/8	34 3/4	10	26	20	19	34 5/8	42	33 3/4	9 1/2
43	9 11/16	34 9/16	10	26	20	19	34 5/8	42	33 3/4	9 1/2
42	9 7/16	34 3/8	10	26	20	19	34 5/8	42	33 3/4	9 1/2
41	9 3/16	34 3/16	10	26	20	19	34 5/8	42	33 3/4	9 1/2
40	9	34	10	26	20	19	34 5/8	42	33 3/4	9 1/2
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37	7 5/8	29	8	24	16	15	29 1/4	36 1/4	28 3/8	7 3/4
36	7 7/16	28 13/16	8	24	16	15	29 1/4	36 1/4	28 3/8	7 3/4
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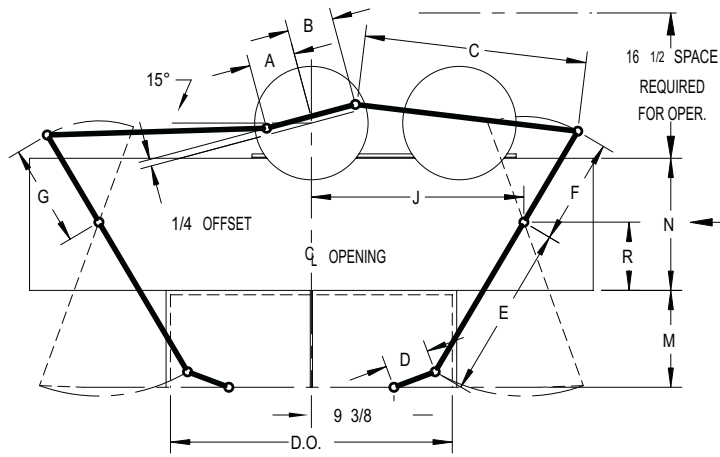
INCHES	A	C	D	E	F	M	X	Z	Q	R
DOOR OPENING	OPERATOR ARMS		DOOR ARMS			CLUTCH	PIVOT		OPERATOR	
 SINGLE SPEED 22-48 D.O. OPERATOR DATA TABLE										NOV. 11, 1994
										DATA21



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46	9 11/16	33 15/16	12	31	21	23	39 5/8	47 1/2	33 3/4	11
45	9 1/2	33 3/4	12	31	21	23	39 5/8	47 1/2	33 3/4	11
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INCHES	A	C	D	E	F	M	X	Z	Q	R
DOOR OPENING	OPERATOR ARMS		DOOR ARMS			CLUTCH	PIVOT		OPERATOR	

	<h2 style="margin: 0;">TWO SPEED 30-48 D.O. OPERATOR DATA TABLE</h2>	<p style="margin: 0;">AUG. 23 1994</p> <p style="margin: 0; font-size: 1.5em; font-weight: bold;">DATA22</p>
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30-49	15
DOOR OPNG.	N

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58	7 5/8	8 1/16	35 1/8	8	29 1/2	15	14 1/2	19	7 3/4	34
57	7 1/2	7 15/16	35 1/4	8	29 1/2	15	14 1/2	19	7 3/4	34
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30	4 13/16	5 1/8	25 1/2	5	19 3/4	12	11 1/2	11	7 3/4	24 1/8
INCHES	A	B	C	D	E	F	G	M	R	J

DOOR OPENING	OPERATOR ARMS	DOOR ARMS					CLUTCH	PIVOT
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CENTER OPENING 30-59 D.O. OPERATOR DATA TABLE

NOV. 11, 1994
DATA23