



INSTALLATION GUIDE & OPERATION MANUAL

MOTOR OPERATOR

**FCS SERIES
MODEL 5045
1/2 HP**

&

**FCS SERIES
MODEL 2545
1/4 HP**

FCS SERIES, U.S. GEAR
COVERED UNDER US PATENTS #6,900,602, #7,055,283 AND ADDITIONAL PATENTS PENDING

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I. GENERAL NOTES



WARNING

To reduce the risk of severe injury or death, read and follow all installation instructions.

- The operator must be installed by qualified door mechanics using proper tools and equipment.
- Make sure the available power supply to be connected to the operator is of the same voltage, frequency and phase as indicated on the nameplate of the control panel.
- Read and understand the manual before installing the operator.
- Read and understand the wiring diagram of the operator, control station and any other equipment to be connected to the operator.
- Always disconnect power when installing or servicing the door operator or door.
- All wiring is to comply with National Electrical Code (NEC) and local code requirements.
- Any change in mounting position may result in change of operator rotation and consequently in change of control functions. Consult factory for any changes.

II. SPECIFICATIONS

INPUT	FCS 2545 (1/4 HP)	FCS 5045 (1/2 HP)
Voltage	120VAC/208~240VAC	120VAC/208~240VAC
Phase	1	1
Frequency	60 Hz	60 Hz
Current	4 amps	4 amps
Wire Gauge	14 AWG	14 AWG

MOTOR	FCS 2545 (1/4 HP)	FCS 5045 (1/2 HP)
Horsepower	1/4	1/2
Voltage	24VDC	24VDC
Current	7 amps	13 amps
RPM	1700	1700
Gear Ratio	43:1	43:1
Output RPM	39	39
Door Speed	9 in/sec	9 in/sec
Output Shaft Gear Speed	28	28
Drive Chain	#40	#40
Duty	10 cycles/hour	10 cycles/hour
Rating ¹	45 ft-lb./sec (540 in-lb./sec)	140 ft-lb./sec (1680 in-lb./sec)
Brake	Friction	Friction
Battery	(2) 12V 18AH or above	(2) 12V 18AH or above
Wiring Diagram	EP 101 A	EP 101 A

¹Ratings tested at the output shaft.

ENTRAPMENT PROTECTION

Sensing Edge	Sensing device attached to the leading edge of the door
Exit Bars	Exit hardware positioned on each side of door to allow emergency exit.

III. INSTALLATION INSTRUCTIONS

1. Installation Positions

Operator:

1/4 HP operators are shipped as a complete unit and are fastened directly to the header using the provided lag screws.

1/2 HP operators are composed of the Chain Drive Operator Mount (which is fastened directly to the header using the provided lag screws) and the motor (which is bolted to the mount).

Drill 1/4" pilot holes prior to installing the lag screws. A template that calls out the proper pilot hole locations will be provided with the operator.

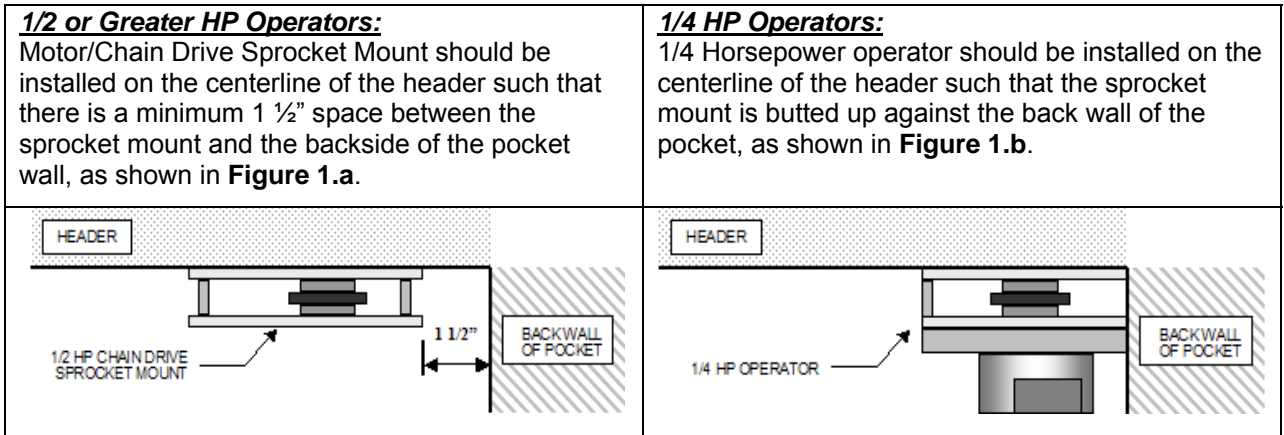


Figure 1.a. Spacing of 1/2 HP Operator Mount in Pocket.

Figure 1.b. Spacing of 1/4 HP Operator Mount in Pocket.

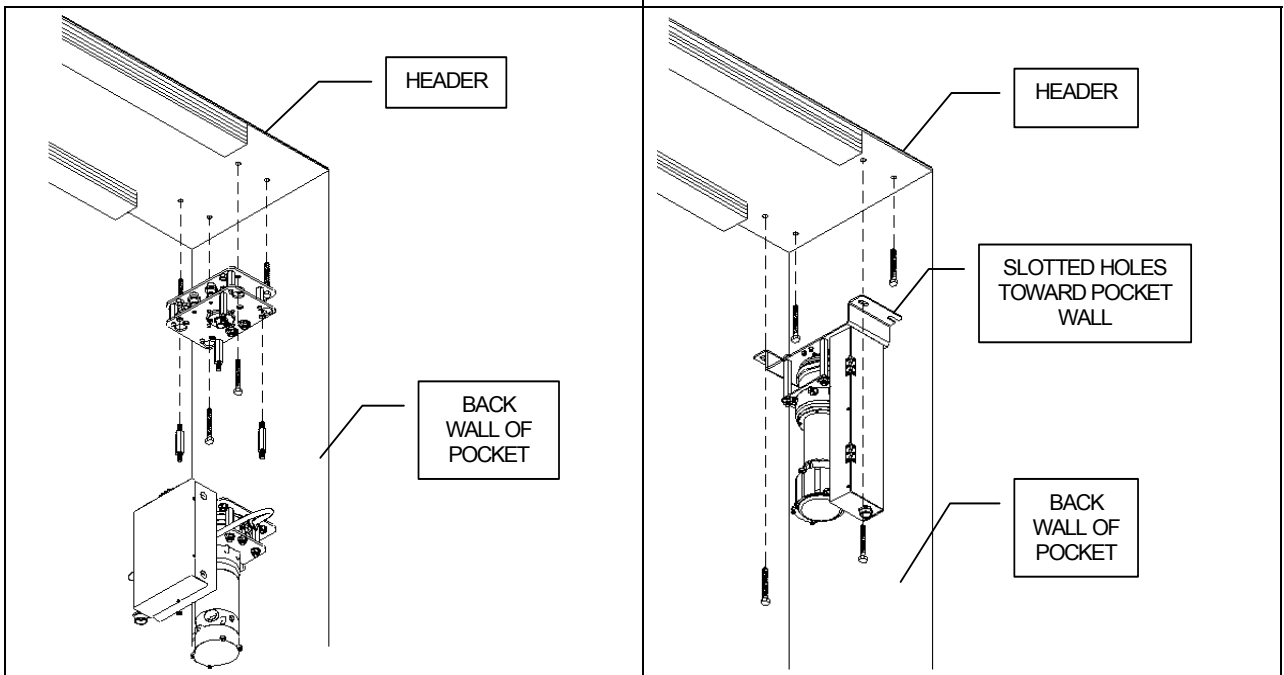


Figure 1.c. Installing a 1/2 HP Operator

Figure 1.d. Installing a 1/4 HP Operator.

2. Control Installation

A. Control Box Mounting

Locate and unpack the control box marked Box A and Box B. The Control Box should be installed on the back wall of the pocket using the appropriate fasteners based on the wall construction (not provided by Cornell). See **Figure 2.a**. The bottom of the Control Box should be at least 24" from the finished floor to provide ample room for any junction boxes and wiring. Use the measurements provided in Figure 1.f to mark the required hole locations. Partially insert the top (2) fasteners, leaving approximately 1/4" between the back wall of the header and the fastener head. Position the Control Box mounts over the installed fasteners via the large area of the keyhole. Slide the operator down so that the fasteners are positioned in the narrow, top portion of the keyhole. Tighten the fasteners. Insert fasteners in the narrow, top portion of the keyholes on the bottom (2) mounts.

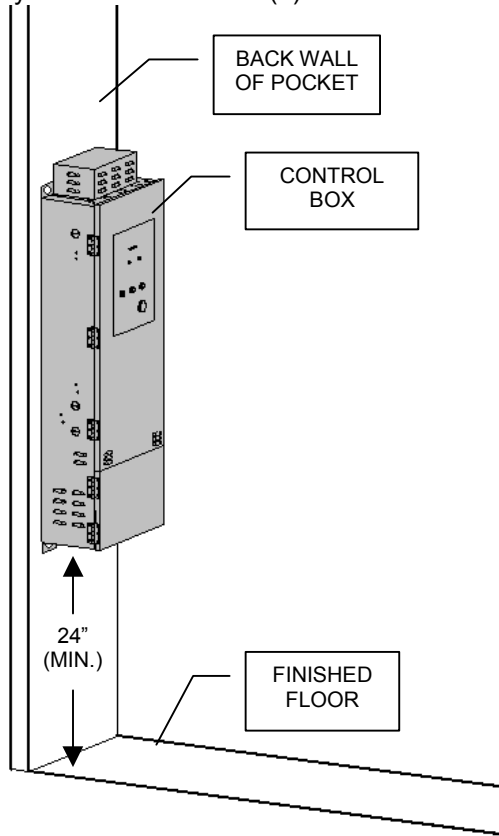


Figure 2.a. Installed Control Box.

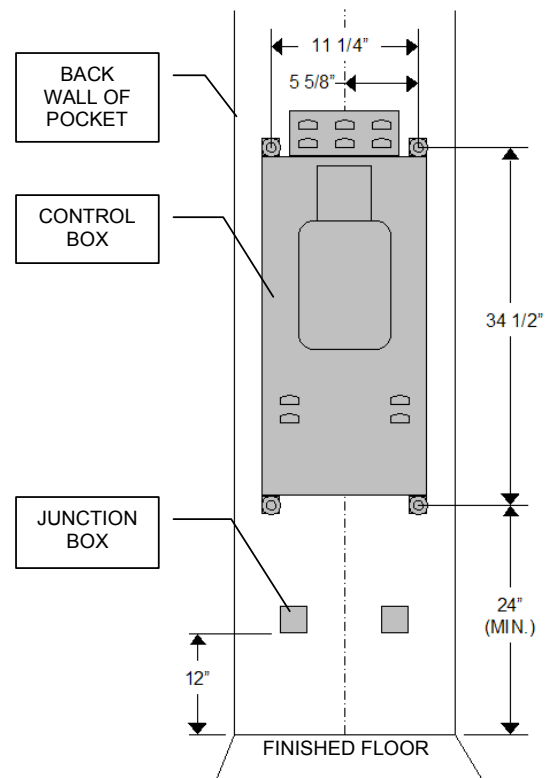


Figure 2.b. Control Box Hole Locations.

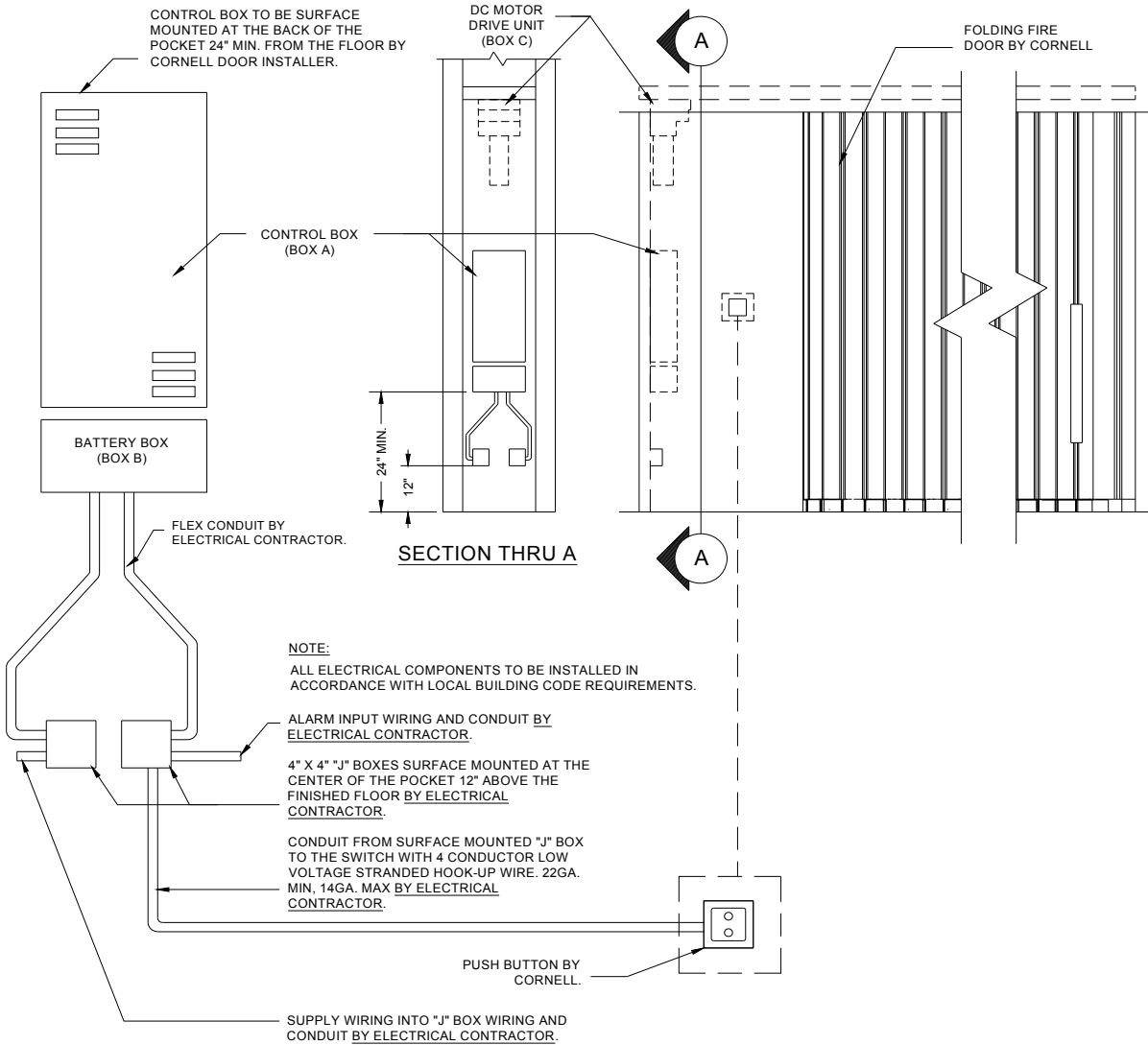


Figure 2.c. Installed Operator and Control Box

B. Wiring Procedure for Operator and Control Panel

1. For BOX (A) Main Control Panel connections to Motor Operator BOX(C)
 - A separate circuit is recommended for the operator.
 - The flexible cable provided with the Main Control Panel contains all the wires that must be connected to the Motor Operator. Connections are already made in the Main Control Panel.
 - Attach flexible cable to Box (C).
 - Field connections required at the Motor Operator are clearly marked on the terminal block end of all wires.

! WARNING

Make sure circuit breaker within Control Box is switched OFF. Check polarity of all battery wires before connecting.

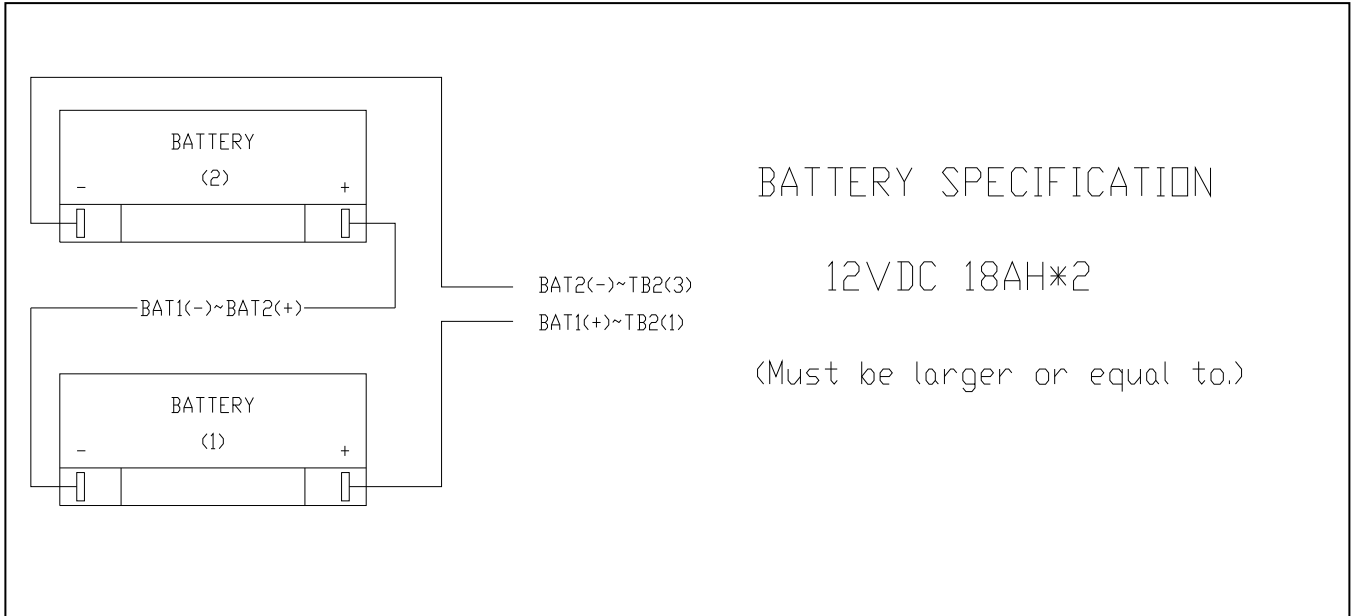


Figure 2.d. Battery Diagram

2. For BOX (B) Battery Enclosure

- Remove any protective packing material from around battery.
- Batteries may already be wired. If not, or if replacing batteries connect as follows:

1	BAT1(-)	→	BAT2(+)
2	BAT1(+)	→	TB2-1
3	BAT2(-)	→	TB2-3

3. Connections required at Motor Operator BOX(C):

Wire Color		Block #	Terminal #
BLACK	→	TB9	1
BLACK	→	TB9	3
PINK	→	TB10	1
GREEN/YELLOW	→	TB10	3
BLACK	→	TB11	13
RED	→	TB11	14
YELLOW	→	TB11	15
BLUE	→	TB11	41
PURPLE	→	TB11	42
GREY	→	TB11	47
WHITE	→	TB11	48
BROWN	→	TB11	74

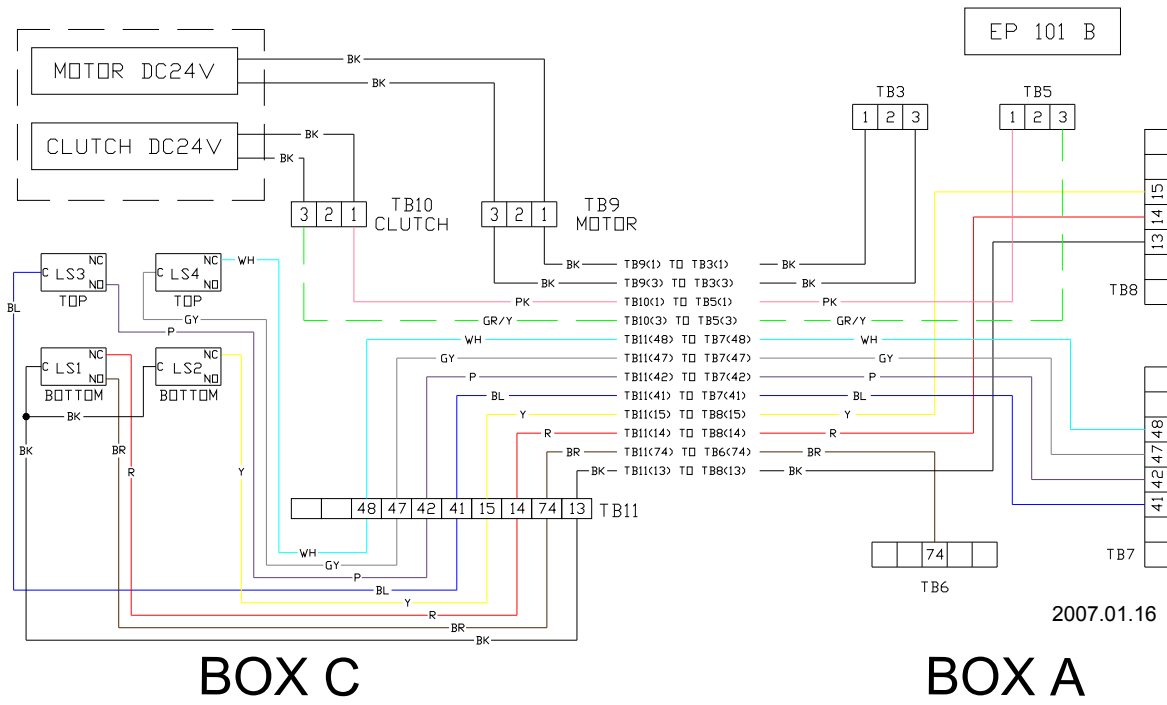


Figure 2.e. DC Motor Terminal Connections

C. Wiring Push Button or Key Switch

Push button supplied as standard by Cornell. Key Switch option is available.

1. If possible, position the push button or key switch such that the door is visible while operating.
2. See **Figure 2.f.** for wiring information. (Continuous Mode shown.)

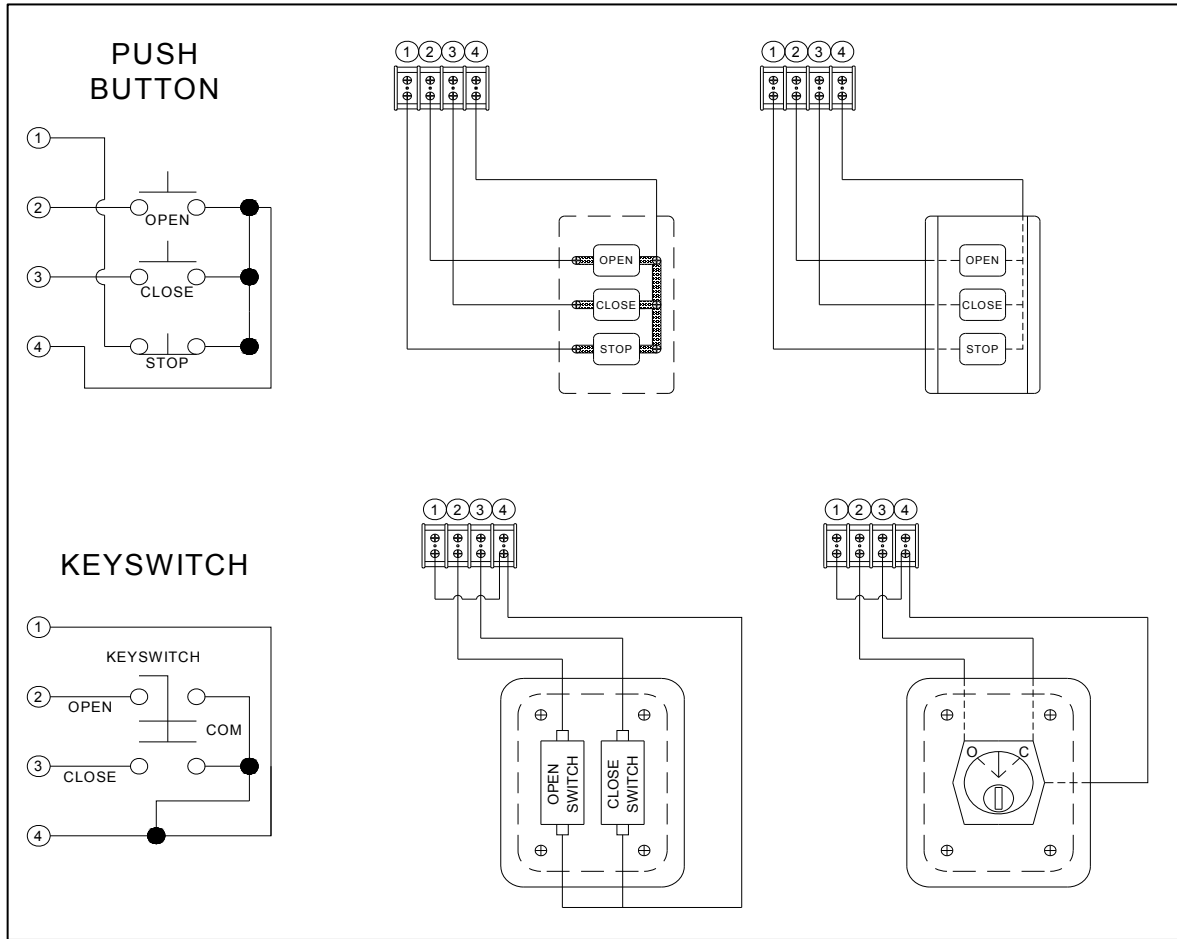


Figure 2.f. Control Station Wiring Diagram

3. Limit Switch Adjustment


WARNING

To avoid serious injury or death, disconnect power before manually moving limit switch cams.

Make sure the open and close limit cams are positioned between the limit switch actuators before proceeding with adjustments. Refer to **Figure 3.a.**

1. The operator is factory set so that the limit switch is bypassed in order to prevent possible damage when threading the chain. Before setting the limits, remove the screw shown in **Figure 3.b** in order to engage the limit switch assembly.
2. Make sure the power switch inside the controller is off. The clutch will not be engaged. You will be able to manually move the lead post trolley by pushing it.

3. Move the lead post toward the striker (Closing direction). Note the movement of the white limit cams. They will be moving toward the close limit switches.
4. Position the lead member trolley so the front of the trolley is 3 1/2 inches from the back of the striker. Refer to **Figure 3.c**.
5. Set the close limit by depressing the spring-loaded locking bar (G). Rotate the white limit cam closest to the close limit until it trips the bottom switch on the close limit side. Release the locking bar (G) and make sure the upturned lip is engaged in a slot on each limit cam. This insures that your setting is maintained.
6. Manually move the lead post into the pocket. The white limit cam will be moving toward the open limits.
7. Position the lead post trolley in the pocket area so the front of the trolley is 6 inches behind the front of the pocket (or front of the pocket door). Refer to **Figure 3.d**.
8. Repeat **Step 4** of the **Initial Limit Switch Adjustment** to set the open limit.
9. This completes the initial limit switch setting. Final adjustments may have to be made after installation of door is complete. Note that each notch on the limit switch cam will change the door position by approximately 3/8 inch.
10. If installing a door, refer back to **Section 5. Door Section Install** on **page 13** of the Door Installation Guide once the initial limits are set.

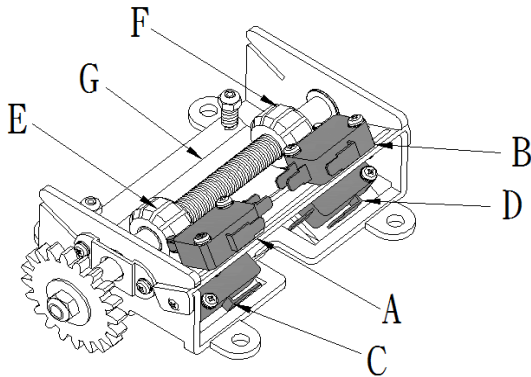


Figure 3.a. Limit Switch Adjustment

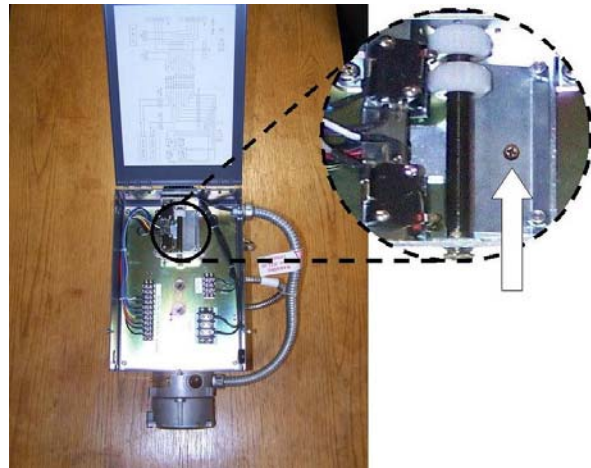


Figure 3.b. Limit Switch Bypass Screw

NOTE: (A/C) is normally the OPEN limit switch and (B/D) is normally the CLOSE limit switch.

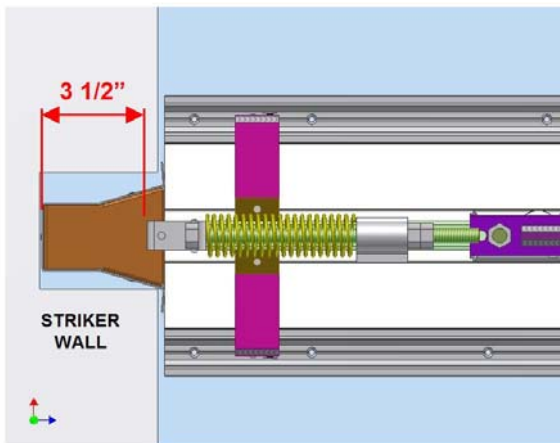


Figure 3.c. Closed Limit Position (Bottom View)

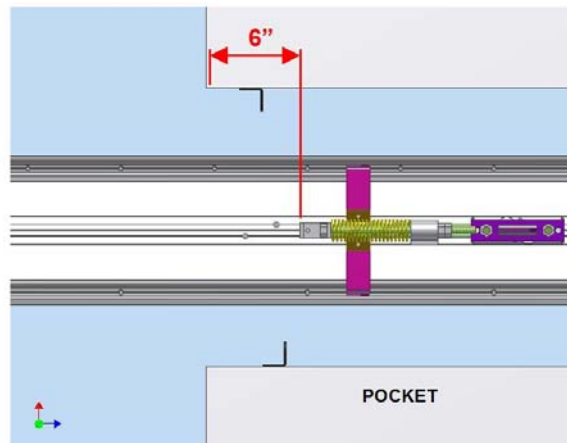


Figure 3.d. Open Limit Position (Bottom View)

4. Lead Post Wiring Instructions



WARNING

Disconnect power at the fuse box and the operator before proceeding with any wiring.

A. Precautions

1. Do not install any wiring or attempt to run this operator without checking the wiring diagram located on the inside of the control box cover.
2. Do not turn on power until you have finished making all power and control wiring connections.
3. Any wire connecting to the control panel must be protected by conduit or other means to ensure the safety and permanency of the wiring.
4. Use copper wire inside the control panel.
5. The operator must be properly grounded. The ground screw, plated green, is located inside the control panel.



WARNING

Failure to properly ground the operator could result in electric shock and serious injury or death.

B. Procedure

1. Do not run control wiring in the same conduit as power wiring.
2. Any wire connecting to the control panel must be protected by conduit or by other means to ensure the safety and permanency of the wiring.
3. After installation, be sure that the operator, controls, and sensing edge or other entrapment protection devices have been tested and function properly.
4. Refer to **Figure 4**.

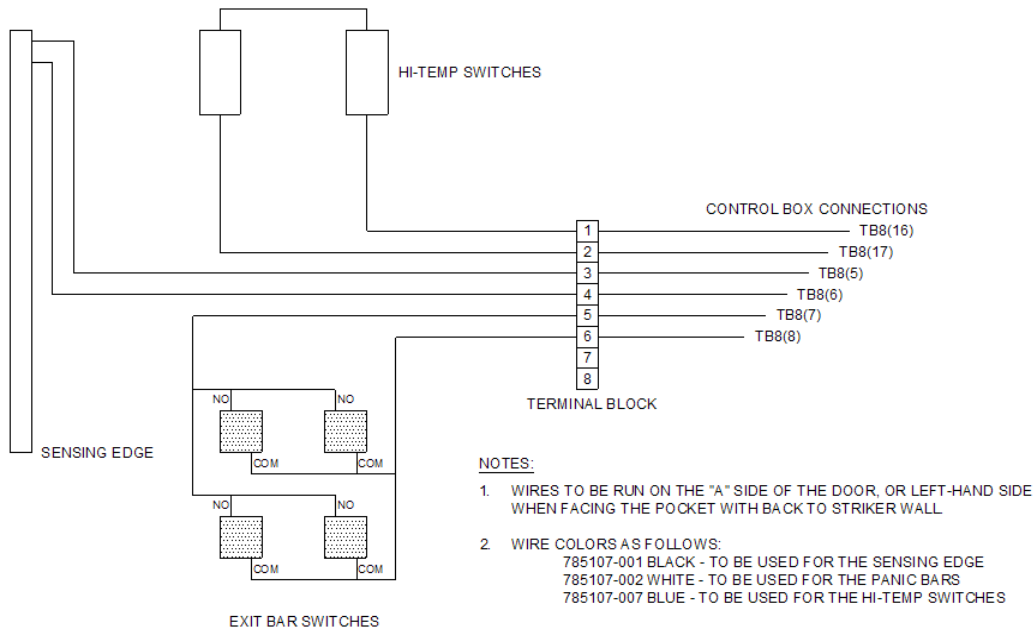


Figure 4. Lead Post Wiring Diagram (Reference when wiring Lead Post Assembly to Control Box)

5. Check List

- Make sure all wires are connected, supply power is **OFF**, the circuit breaker located inside the control box is switched **OFF**, and the charger is **ON** (*Factory default for charger is **ON***).
- Make sure Alarm Wires are connected.
 - TB8 termination 11 & 12 normally closed for dry contact.
 - TB8 termination 9 & 10 connected for 24VDC signal.
- Jump High Limit connection, TB8 (16 & 17).
- Do **NOT** jump Security Door option, TB8 (18 & 19).
- Check that Battery wires are connected and correct.
 - Connect 120VAC main power.
 - Turn charger to **ON** (Factory default is already **ON**).
 - Switch Master Switch to **ON**.
 - Green light and battery indicator lights are **ON**.
- Set open and close limits and keep the door at the close limit before removing High Limit jumper.
- Adjust Emergency Opening Distance (if required)
 - T1 Timer is opening travel time.
 - Factory Default: T1 is 8 seconds
 - Total travel distance should be no less than 60 inches.
 - Standard door speed is 9 inches per second.

6. Diagrams

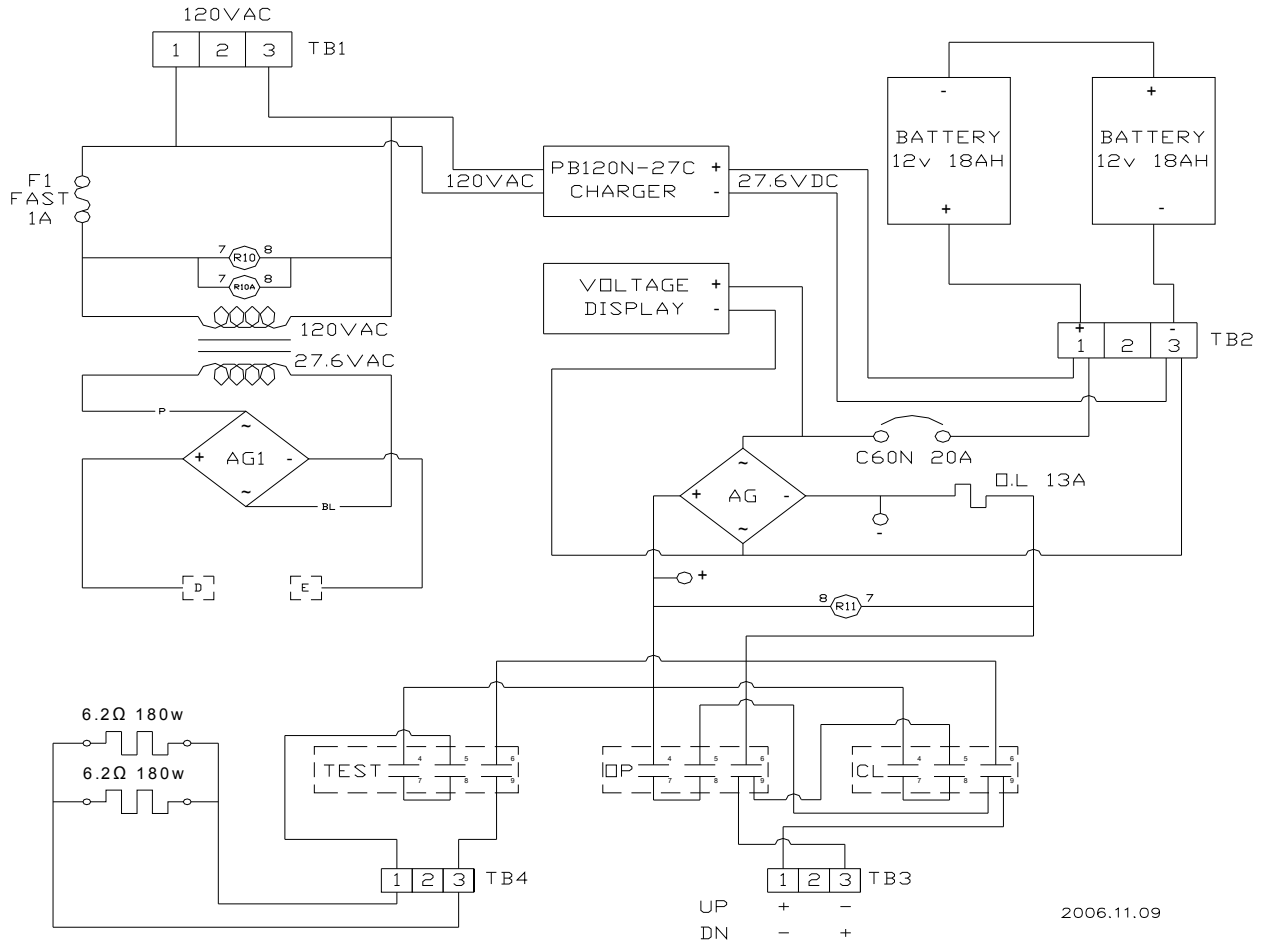


Figure 6.a. Power Supply Schematic.

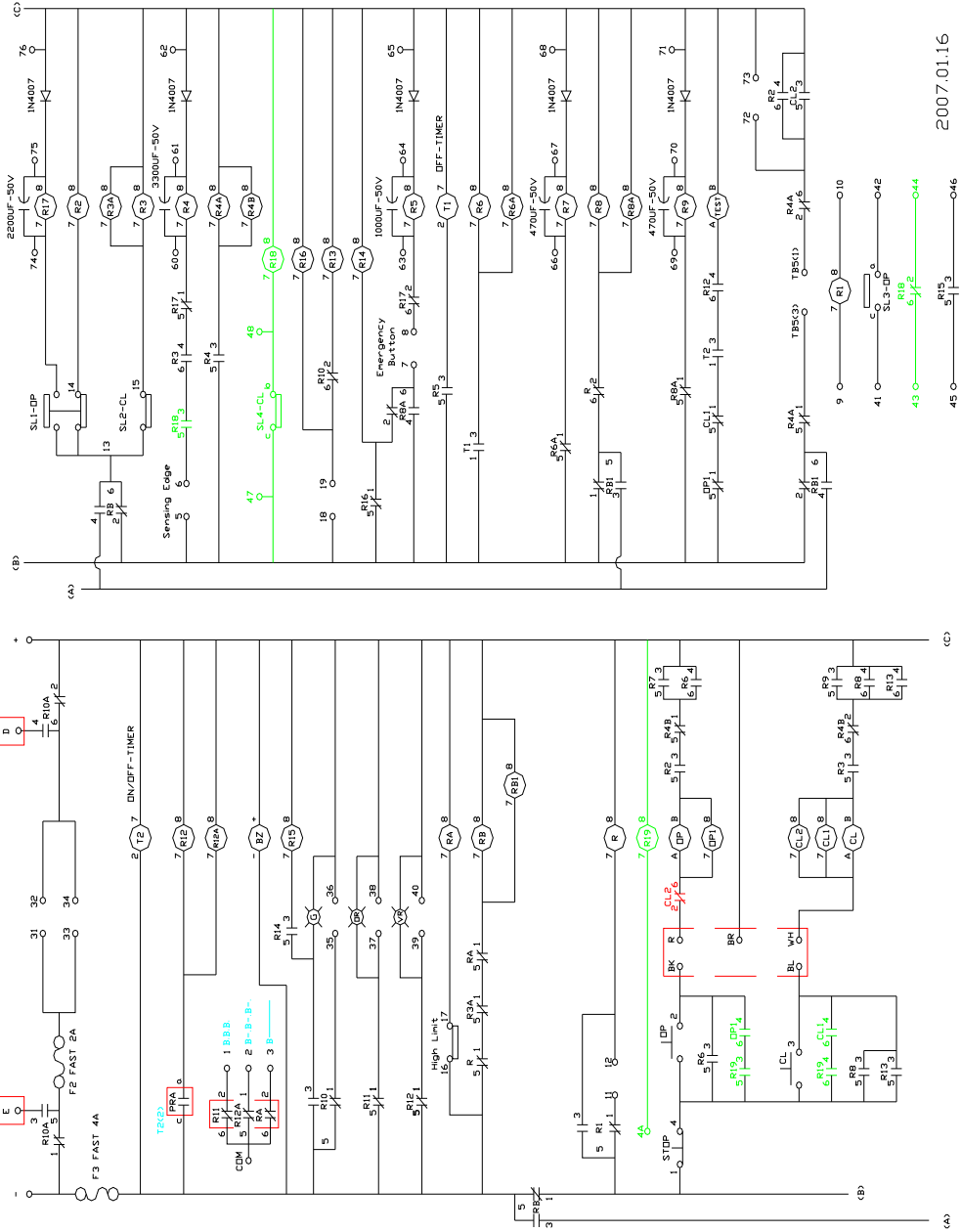
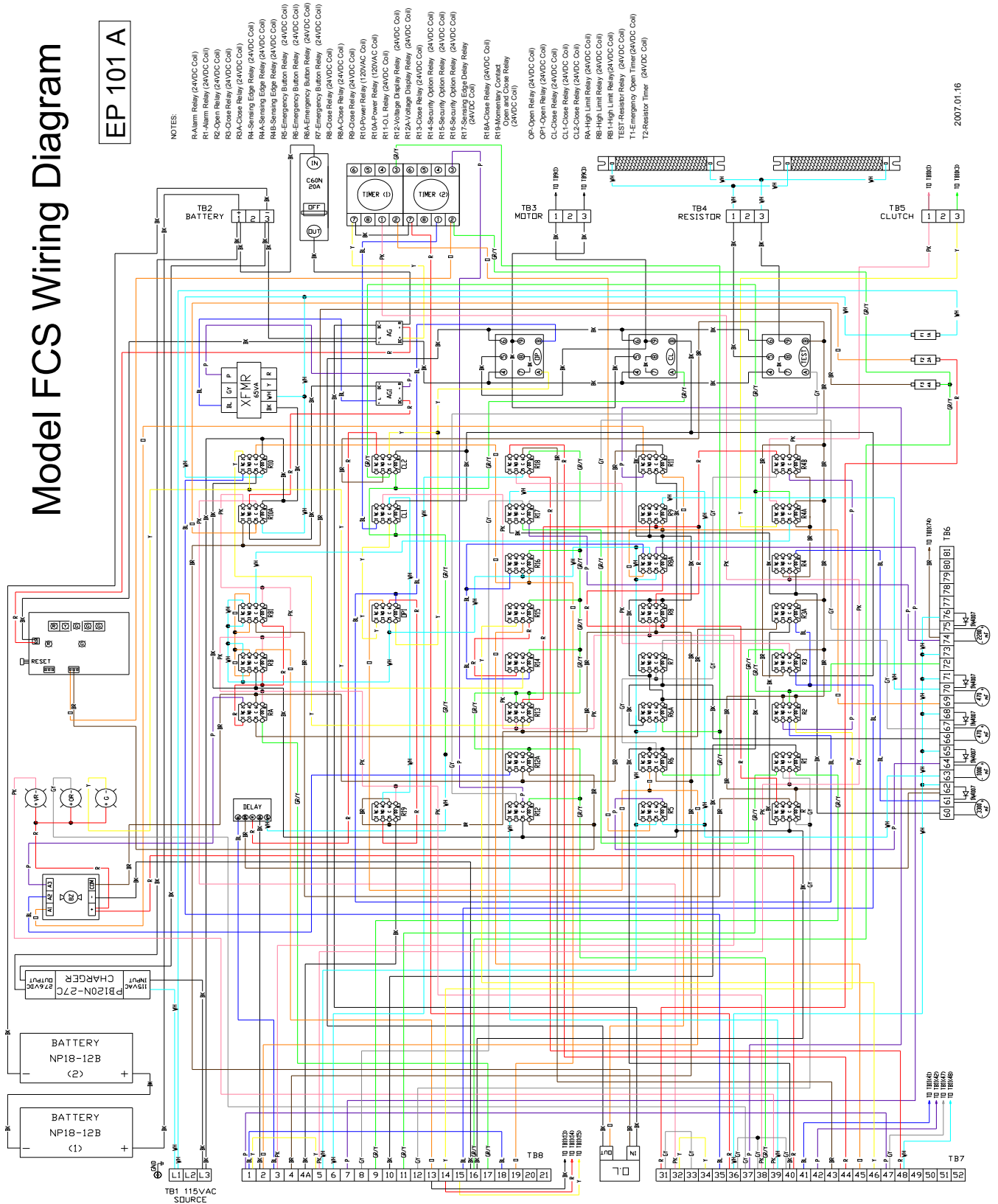


Figure 6.b. Control Schematic.

Model FCS Wiring Diagram

EP 101 A



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Figure 6.d. Model FCS Wiring Diagram.

7. Field Wiring Terminal Strip Connections.

TB7																					
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Opened limit signal. Continuity when door is open.		Closed limit signal. Continuity when door is closed	Security Door signal. Contact continuity when not in security mode	Control wiring, do not connect							
24VDC Source.	24VDC during alarm closing.		AC power loss warning signal: 24VDC	Overload warning signal: 24VDC	Low battery warning signal: 24VDC																
	Total 2A Output.																				

TB8																					
1	2	3	4	4A	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Control Station Key Switch	Open	Close	Com	Jump for momentary contact close and open	Sensing edge connection N/O	Panic Bar Assembly	24VDC Alarm connection	<input type="checkbox"/>	<input type="checkbox"/>	Dry contact alarm connection		Door opened limit, Door closed limit	High Limit (Jump when not connected to high limit)	Jump for security door option							
	Stop									NOTE: Panic Bar works only during alarm conditions.											

NOTES:

- For terminals 41&42, 43&44 and 45&46, no power is provided. These are dry contacts.
- When using Key Switch without a stop button, terminals 4&4A should **NOT** be jumped for momentary contact close and open.

8. Functions Table

Condition/Function	Normal Operation	Alarm Situation	Security Option
Emergency/Exit Bar (Terminals 7&8)	<ul style="list-style-type: none"> • Door will open for preset time. • Factory default is 8 seconds and travel distance should be no less than 60 inches. • Adjust timer for open distance. 	<ul style="list-style-type: none"> • Door will open to preset time, no pause, then fully close. • Factory default is 8 seconds and travel distance should be no less than 60 inches. • Adjust timer for open distance. 	<ul style="list-style-type: none"> • Cease to function under normal condition. • Begin to function under alarm condition.
Battery	<ul style="list-style-type: none"> a) Self-monitoring trickle charge system. b) Self load testing every 30 hours. If battery drops below 22VDC, warning light and buzzer will turn on and output 24VDC warning signal. c) Must change battery or press reset button to reset. d) The system will continue to function until the battery dies completely. 		
Security Option (Terminals 18&19)	<ul style="list-style-type: none"> a) All functions normal except the Exit bar assembly. b) When the door is closed, Exit bar assembly will not function. 	<ul style="list-style-type: none"> a) All functions normal including the Exit bar assembly. b) The door will close fully due to the alarm condition. c) The door will continue to close if reopened. 	
Key Switch/Push Button (Terminals 1&2&3&4)	<ul style="list-style-type: none"> a) Constant pressure open and close b) When button or key switch is released, door will stop. 	Door can be opened, but will close automatically due to alarm.	Function normally.
Sensing Edge (Terminals 5&6)	<ul style="list-style-type: none"> a) Door will stop. b) Pressure on the edge will disengage clutch. c) Sensing Edge is nonfunctional for the first 12" of closing. 	← Same, with exception that door will pause briefly after edge is released, then continue to close.	← Same
High Temperature Switch (Terminals 16&17)	<ul style="list-style-type: none"> a) If any high temperature switch trips when the door is fully closed and in alarm, the Exit bars will not open the door. b) The Exit bar assembly <u>will</u> function if the high limit trips while the door is in the open position or in motion. c) If the alarm is normal and the high limit trips, the door and Exit bars will function normally. (A beeping signal will sound when high limit trips.) d) It is a normally closed contact. e) A jumper must be used during installation. 		
Warning Signal	<ul style="list-style-type: none"> a) LED green light for 120VAC power when 120VAC is present. b) LED red lights for low battery power and overload trip, when too low or in trouble. c) (3) distinguishable beeping sounds for low battery, overload and high limit. d) When not normal, 24VDC output for each separate conditions: 120VAC (Terminals 35&36), low battery (Terminals 39&40) and overload (Terminal 37&38). Can be connected to warning or signal relay. 		

Functions Table (Continued)

Condition/Function	Normal Operation	Alarm Situation	Security Option
Connections	a) Dry contact alarm connection. (Terminal 11&12) b) 24VDC alarm connection. (Terminal 9&10) c) (2) extra 24VDC power terminals, independent of motor function. Total 2A output. (Terminal 31&32, 33&34) d) Set of N/O contact for door closed position. (2 terminals) (Terminal 43&44) e) Set of N/O contact for door open position. (2 terminals) (Terminal 41&42) f) Set of dry contact for security option notification. (Terminals 45&46)		

IV. OPERATING INSTRUCTIONS

Three Button Control Station

Action	Response
Press OPEN	Door should open
Press CLOSE	Door should close
Press STOP while holding either OPEN or CLOSE	Door should stop
Removing pressure from CLOSE during motion	Door should stop


Key Switch Control Station

Action	Response
Turn key to OPEN	Door should open
Turn key to CLOSE	Door should close
Press STOP while holding key on OPEN or CLOSE	Door should stop
Removing key from CLOSE position during motion	Door should stop

 **WARNING**

Turn off power to the operator before manually operating the door.

V. MAINTENANCE INSTRUCTIONS

 **WARNING**

- ✘ Disconnect power supply to the operator before servicing.
- ✘ Do not place hands or tools in or near the operator when the power is connected or when testing control or safety devices. Always disconnect power before adjusting the operator.

- The brake is a self-adjusting brake. It is maintenance free. The brake assembly requires no additional adjustments for its lifetime.
- Do not lubricate motor. Lubrication could cause damage.
- Inspect and service whenever a malfunction of either door or operator is observed or suspected.
- Before servicing, always disconnect power supply to the operator.
- Replace fuses only with those of the same type and rating.
- All replacement parts must be compatible with those originally provided.