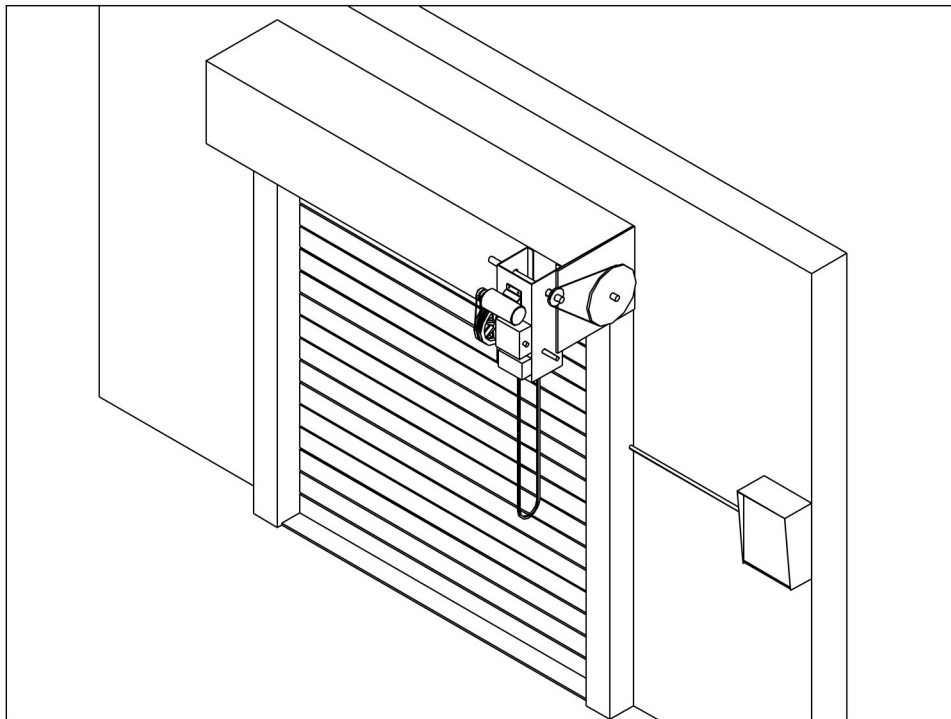


MODEL JH-D

DC BATTERY BACK-UP

JACKSHAFT INDUSTRIAL DOOR OPERATOR

INSTALLATION MANUAL



COOKSON ROLLING DOORS

2417 SOUTH 50TH AVENUE • PHOENIX, ARIZONA 85043



The use of a reversing edge or photoelectric control for pedestrian protection on all automatic or remotely controlled door operators is required.

JH-D OPERATOR INSTALLATION GUIDE

GENERAL PRODUCT INFORMATION

PRODUCT APPLICATION

The model JH-D jackshaft operator will electrically operate service doors, rolling grilles, sectional vertical-lift doors, and sectional high-lift doors (minimum 24 inches of high lift), via DC power with battery back-up capability.

MECHANICAL FEATURES

The Model JH-D jackshaft operator may be mounted in a variety of positions (see Figure 1 on next page). The operator is equipped with a hand chain hoist mechanism in addition to battery back-up in case of power failure. The hand chain should be pre-installed and will operate in the vertical mounting position. A disconnect cable is supplied for engaging the hand hoist from the floor level. Model JH-D jackshaft operator is designed to operate a maximum pull of 90 lbs, and is rated for 15 full cycles of operation per hour maximum.

The motor may be removed without affecting either the limit switch adjustment or optional hand chain operation.

A standard operator is supplied with 5 feet of #50 roller chain and a 12-tooth drive sprocket. Other drive sprockets and door sprockets available.

REDUCTION. The speed reduction is achieved by means of heavy-duty sprockets and a roller chain, which has been prelubricated at the factory.

LIMIT SWITCHES. The limit switches are actuated by rotary motion of a shaft driving a threaded limit nut and are fully adjustable over a wide range.

ELECTRICAL FEATURES

The standard operator is wired for control by an OPEN-CLOSE-STOP push-button station with constant contact on the OPEN and CLOSE buttons. The constant contact feature can be turned on and off via dip switch selection. The operator also can be controlled either open or closed by optional 24 volt, three-wire radio, pull cord, or single-button station.

INSTALLATION INSTRUCTIONS

PREPARATION

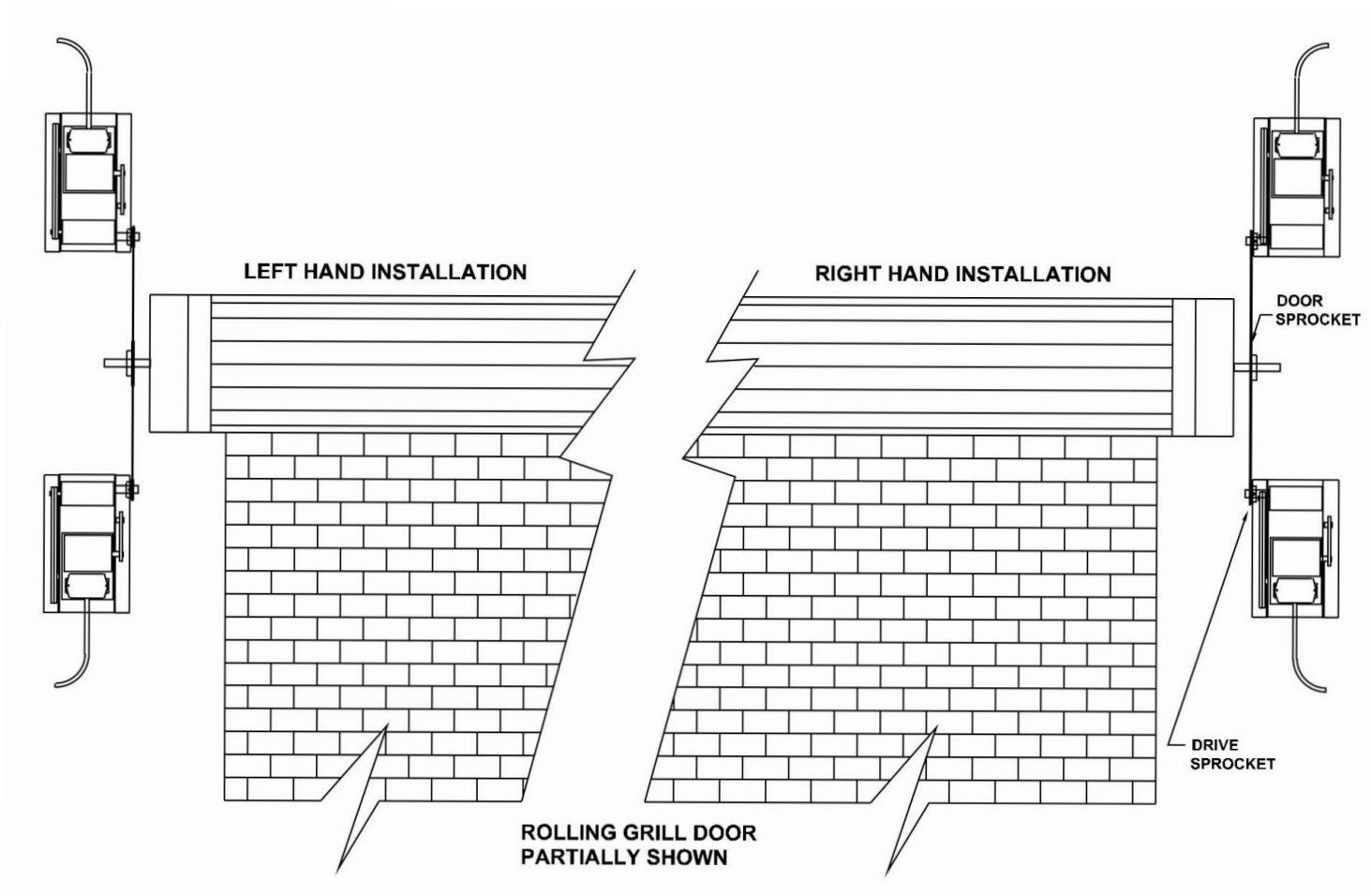
Unpack the carton, checking for possible damage during shipping. Damage claims must be filed with the freight carrier. The following parts are included in the carton:

- (1) Model JH-D Operator
- (1) Cable-Retaining Bracket
- (1) #50 Chain, 5'
- (1) #50 Master Link
- (1) Hand Chain (length to order)
- (1) Cable (length to order)
- (1) Door Sprocket (size to order)

Check to make sure that the power supply to be used is 115-volt single phase.

JH-D OPERATOR INSTALLATION GUIDE

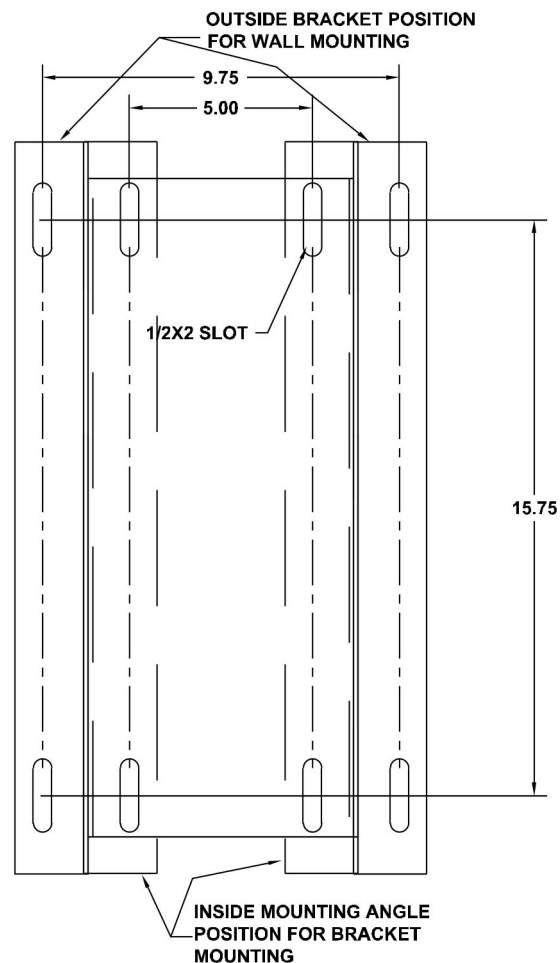
FIGURE 1



Note: This operator is designed to operate a maximum pull of 90 lbs., and is rated for 15 full cycles of operation per hour maximum.

JH-D OPERATOR INSTALLATION GUIDE

FIGURE 2



Because the chain hoist on the Model JH-D is centrally located, there is no need to modify the assembly when changing right- and left-hand installations.

BRACKET MOUNTING

The operator is set up for direct mounting to a prepared door bracket. Refer to the door manufacturer's installation instructions for mounting details.

WALL MOUNTING

Generally, the operator should be installed below the door shaft (see Figure 1 on previous page) and as close to the door as possible. The optimum distance between the door shaft and the operator output shaft is 12-15 inches. A greater distance can be allowed if conditions prevent installation as prescribed.

1. Reposition the mounting legs by removing the carriage bolts and reversing the mounting angles.
2. For a secure installation, the operator should be mounting using 1/2" through bolts. If the wall construction prohibits the use of through bolts, lag bolts and shields of sufficient size may be used. At this point, hand-tighten the bolts only.

DRIVE CHAIN INSTALLATION

1. Slide the door sprocket and key over the end of door shaft. Align the drive sprocket on the operator with the door sprocket. Tighten set screws in both sprockets.
2. Connect the two sprockets with the drive chain. If the chain supplied is too long, shorten it to the proper length using a chain tool or by using a punch to drive out the necessary rivets. Lock the chain with the master link.
3. Adjust the chain so there is no more than 1/4" of slack when the chain is depressed between the sprockets.
4. Tighten all mounting bolts.

CABLE-RETAINING BRACKET

Mount the cable-retaining bracket on the wall at a location near the free-hanging pull chain.

JH-D OPERATOR INSTALLATION GUIDE

LIMIT NUT ADJUSTMENTS

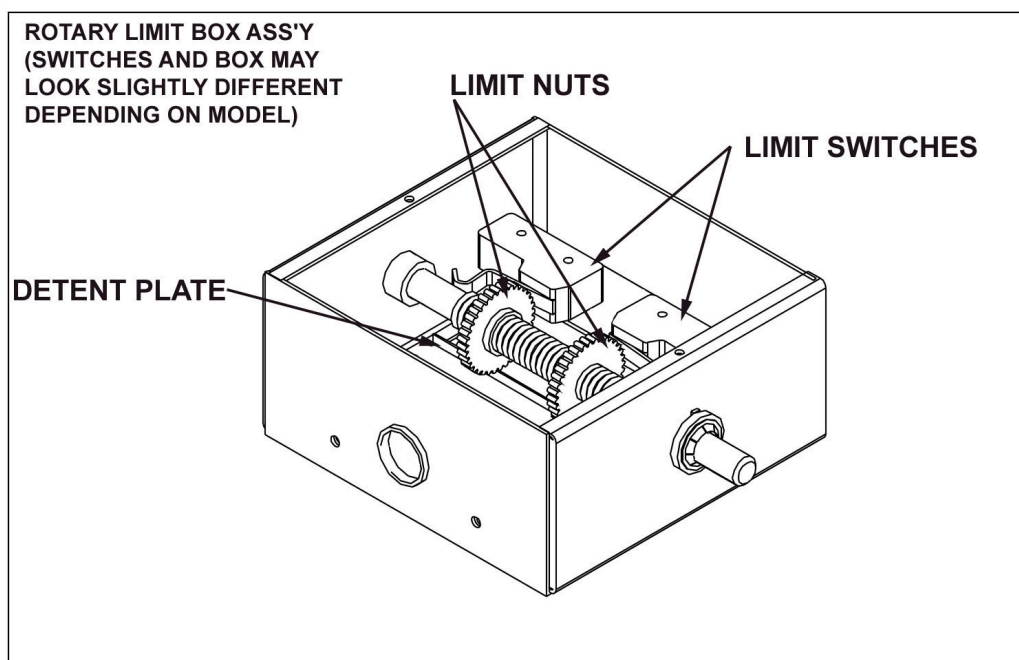
The limit nuts are not preset at the factory and must be adjusted for the height of the door the operator is installed on. The limit switches are activated by two threaded nylon rotary limit nuts which are attached to a threaded shaft and driven by chain and sprockets. Remove the cardboard filler before attempting to adjust the limit nuts.

With the door connected to the door operator in a mid-travel position, and the power disconnect switch turned **OFF**, disconnect the operator by using the manual disconnect lever. Instructions for the manual disconnect can be found in the individual operator owner's guides. Once the operator has been disconnected, manually move the door by hand to within a foot of its fully open position.

Once the door is in this position, adjust the open limit nut until it activates the limit switch for open, **LSO-1**. Press down on the detent plate and rotate the nut along the threaded shaft.

Once the open limit nut is set, repeat the above process for the close direction nut, (and **LSC-1** limit switch).

After finishing the initial limit nut adjustments, reposition the door to approximately its center of travel. Re-engage the operator and turn the power disconnect **ON**. Stand clear of any moving parts and press the **OPEN** button on the three-button station. If the door begins to close instead of open, press the **STOP** button immediately. Find the dip switch block on the main control board and switch the hand of operation (dip switch #4, see page 13) and try to open the door again. Observe the door as it runs through a complete cycle in both directions, and adjust your limits again if necessary. Fine levels of adjustment can also be achieved by adjusting a few teeth on the nut at a time. If the door stops in midtravel, the open or close current sensor adjustment or the maximum run timer may need adjustment (see page 13).



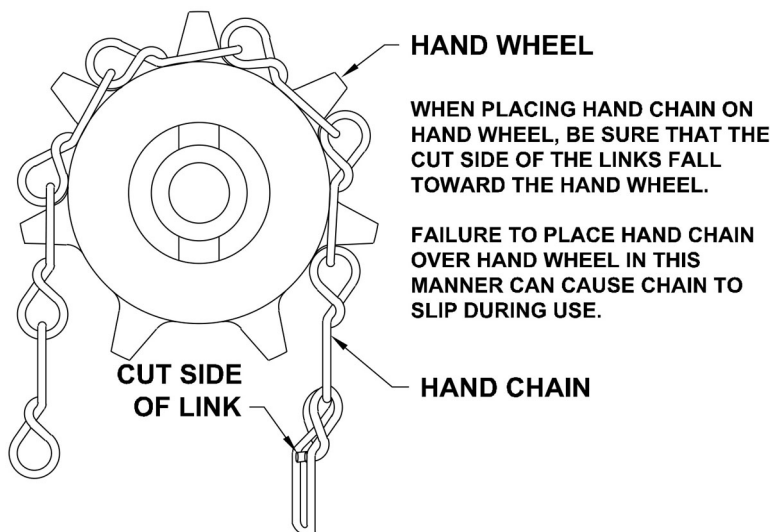
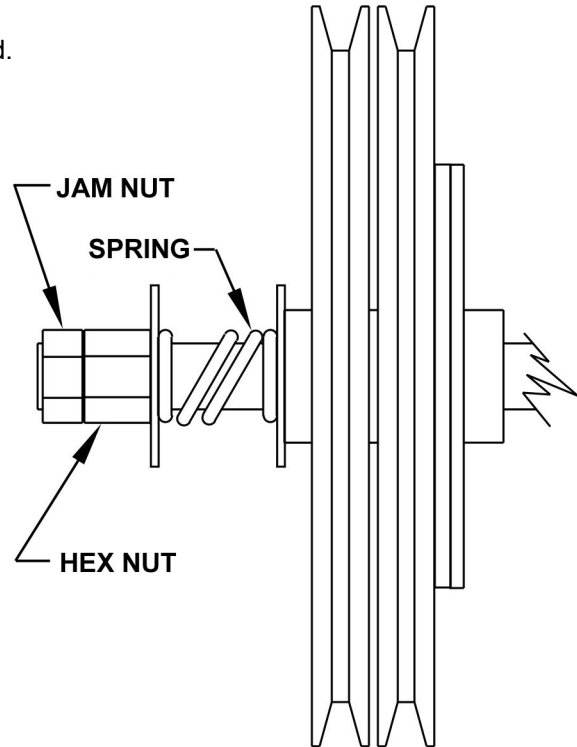
JH-D OPERATOR INSTALLATION GUIDE

TORQUE LIMITER ADJUSTMENTS

Before adjusting the torque limiter, make sure the door is in good working condition. One person should be able to move the door by hand. Torque limiters are set light at the factory and must be adjusted during installation. Adjust the torque limiter tight enough to keep it from slipping during normal operation.

To adjust the torque limiter in the Model JH-D:

1. Loosen the jam nut.
2. *To increase the output*, turn the adjustment nut clockwise one flat, or 1/6 turn, at a time until desired output is obtained.
To reduce the output, turn the adjustment nut counterclockwise one flat, or 1/6 turn, at a time until desired output is obtained.
3. Tighten the jam nut against the adjustment nut when finished.



JH-D OPERATOR INSTALLATION GUIDE

WIRING SPECIFICATIONS

General Specifications

1. All wiring must conform with all local codes and ordinances.
2. All wire connections must be made with MTW or THHN type wire, with insulation thickness of at least 1/32".

Power Connection Specifications

1. Select the appropriate wire gauge from the chart at the bottom of the page based on length of run. The distance shown on the chart is measured in feet from the operator to the power source. **DO NOT EXCEED THE MAXIMUM DISTANCE!** These calculations have been based on standard 115 Volt supplies with a ten percent (10%) drop allowance, taking into account motor inrush and other operator requirements. Calculations are based on the National Electrical Code, Article 430.
2. When large gauge wire is used, a separate junction box (not supplied) may be needed for the operator power connection.

Control and Accessory Specifications

1. Control wiring must be run in a separate conduit from power wiring. Running them together may cause interference and faulty signals in some accessories.
2. All control devices are now 24 Volt DC, which can be run considerable distances.

Power Unit to Control Box Specifications

1. All wires running from the power unit to the control box must be enclosed in rigid or flexible metal conduit. Wire connections must be mechanically and electrically sound, with accepted crimp type or wire nuts at the power unit and spade terminals or stranded conductors with all strands soldered together at the control box terminal strip.
2. Wires from the control box to the power unit for motor power (M1 and M2) must be minimum 12-gauge wire.
3. Wires from the control box to the power unit for limit switches must be minimum 18-gauge wire.

USE COPPER WIRE ONLY!

MODEL JH-D

Power Wiring			
Volts & HP	Max Distance Single	Dual	Wire Gauge
115V	970	485	12
	1542	771	10
	2452	1226	8
1/2 HP	3898	1949	6
	6200	3100	4

ACCESSORY WIRING

All DC Models		
Volts	Maximum Distance (ft.)	Wire Gauge
24VDC	0-2000	14
*Over 350 ft. use DC power.		

JH-D OPERATOR INSTALLATION GUIDE

TROUBLESHOOTING

Operator fails to start:

- A. Make sure you have power at the master distribution panel and that the power has not been turned off.
- B. The secondary fuse on the control board may have blown. Replace the fuse (refer to control box parts list on page 21).

Motor operates, but door does not move:

- A. In operators with torque limiters and friction pad clutches, check for signs of slipping. You can mark the pulley and clutch with a yellow or white grease pen and watch for the lines to move apart if slipping is taking place. Adjust the torque limiter tighter if this is the problem.
- B. Check for broken chain or worn belts.
- C. Check all setscrews on pulleys and sprockets and tighten them if necessary, and check for keys which may have fallen loose from keyways.

Motor sounds like it is working harder than normal:

- A. Make sure the door is moving freely and without binding throughout its entire travel.
- B. Check the drive chain for obstructions (if the operator has one).

Limit switch getting out of time:

- A. Check for proper tension on all limit chains to be sure there is no jumping taking place. Mark one tooth and its corresponding link and run the door. If the marks have moved, the chain is skipping.
- B. Check the setscrews in the limit sprockets for tightness. In rotary limit boxes, check the rotary limit nut for sloppiness or stripped threads. Replace if necessary.
- C. Check the detent plate in the limit switch box to see that the edge of the detent plate is inserted into the V-groove of both nylon limit nuts (see page 5).

Door stopping part way open or closed (but no visible obstruction):

(Also see page 13 for additional information regarding control board adjustments)

- A. The control board may have received a false obstruction input triggered by current sensing set too low. Make sure the door moves freely through its entire travel before adjusting the current sensing.
- B. The maximum run timer may have counted down and expired. This can be caused by having the timer set too low, if a chain or belt is broken, or if a sprocket or pulley is slipping. When the timer expires, the door stops and the stop button must be pressed to reset the operator.
- C. An obstruction signal from an accessory wired to the obstruction input may have triggered falsely. Check the control board for lit L.E.D. indicators for any of the following inputs: safety, shadow, open obstruction, close obstruction, stop, etc. If any are lit when the operator should be running, remove all devices hooked to that function and hook them up one at a time and try to run the operator until the problem device is found. Refer to page 17 for details on the control board indicators.

Door staying open with automatic system:

- A. If there are vehicle detectors in your operator which are connected to reverse, one of your loops or loop detectors may be sending a false signal. Disconnect the wire harness by pulling harness off the loop detector and try running the operator.
- B. An opening or reversing device may be stuck or malfunctioning. Try disconnecting these devices and hook them back up one at a time and try running the operator until the malfunctioning device is found.
- C. Make sure the close limit switch isn't activated. If it is, the operator will think the door is already closed.

Technical Service assistance is always available at the Cookson Company. If after following the troubleshooting suggestions above and your operator still does not function properly, contact the Technical Service Department direct at 1-800-294-4358.

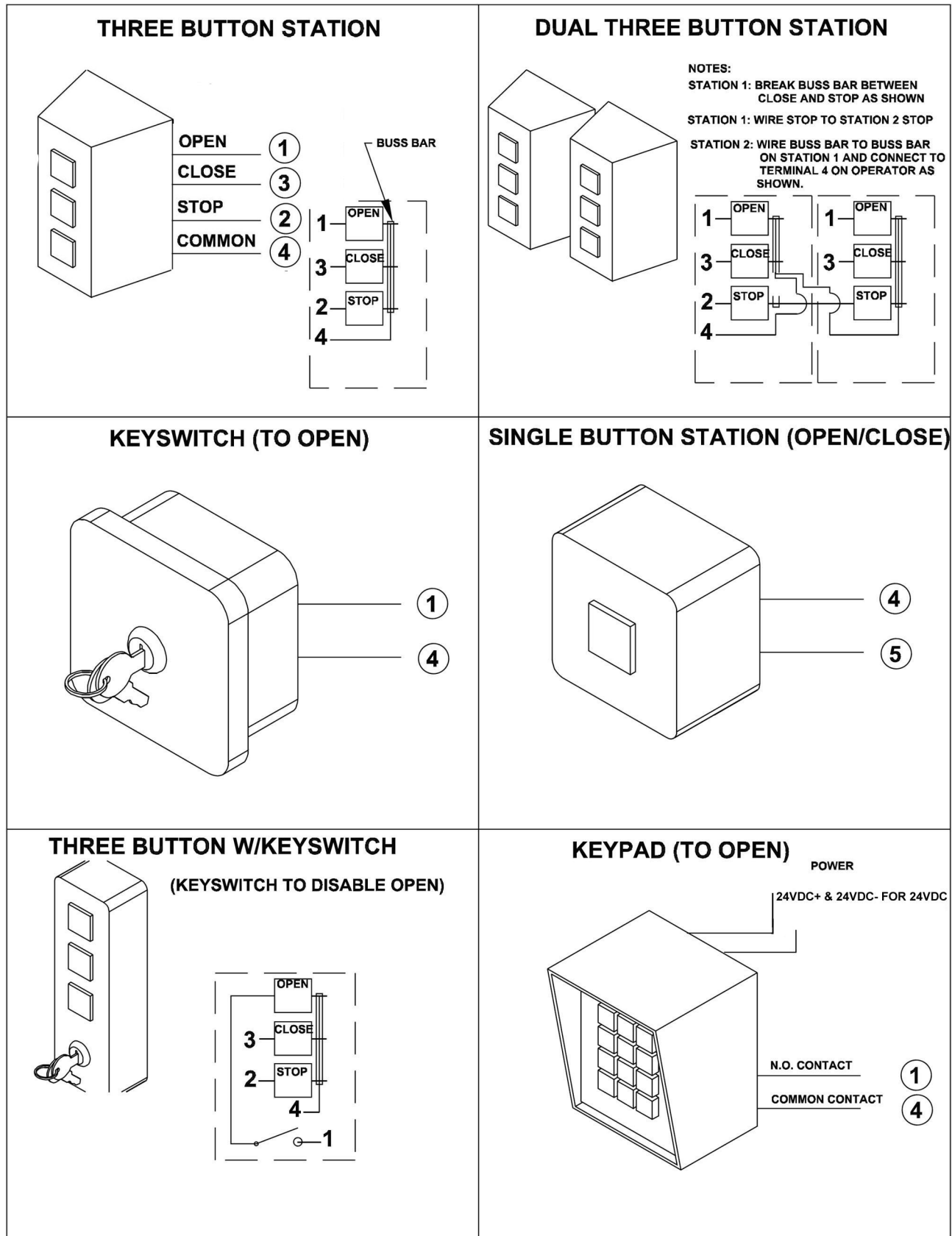
HOW TO ORDER REPLACEMENT PARTS

Use the part numbers listed on the parts list pages. Contact your Cookson Door dealer to order parts.

1. Supply the model number and serial number of your operator.
2. Specify the quantity of pieces needed and order by part number and name of part.
3. State whether to ship by freight, truck, parcel post, UPS or air express.
4. State whether transportation charges are to be prepaid or collect.
5. Specify name and address of person or company to whom parts are to be shipped.
6. Specify name and address of person or company to whom invoice is to be sent.

JH-D OPERATOR INSTALLATION GUIDE

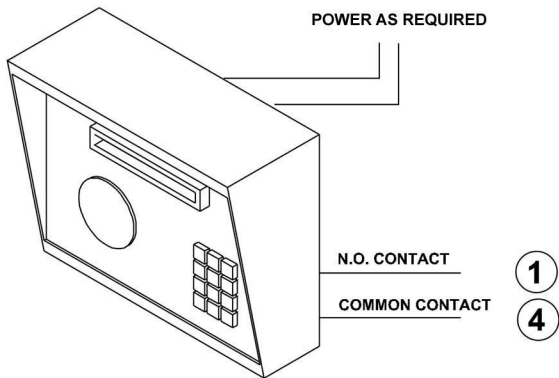
CONTROL and ACCESSORY CONNECTION ILLUSTRATIONS



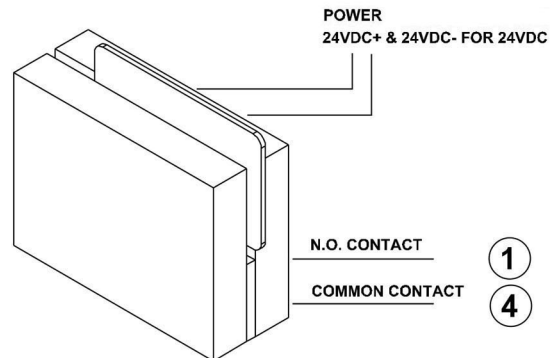
JH-D OPERATOR INSTALLATION GUIDE

CONTROL and ACCESSORY CONNECTION ILLUSTRATIONS

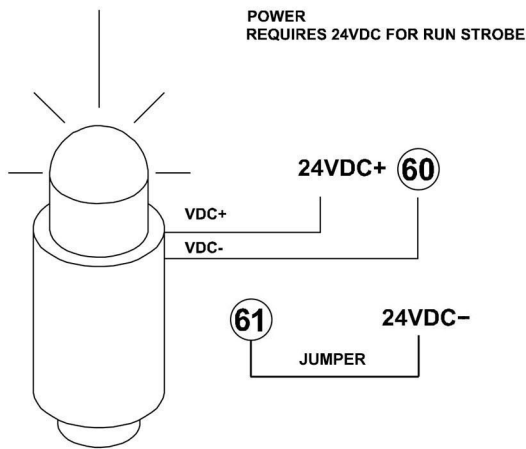
TELEPHONE ENTRY SYSTEM (TO OPEN)



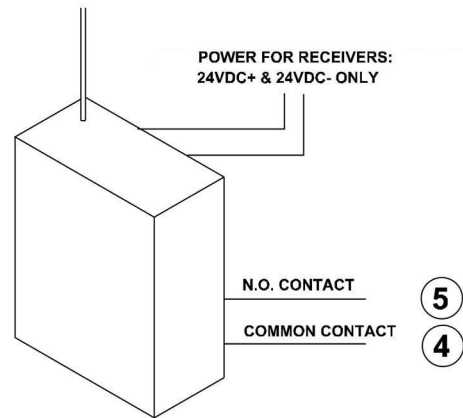
CARD READER (TO OPEN)



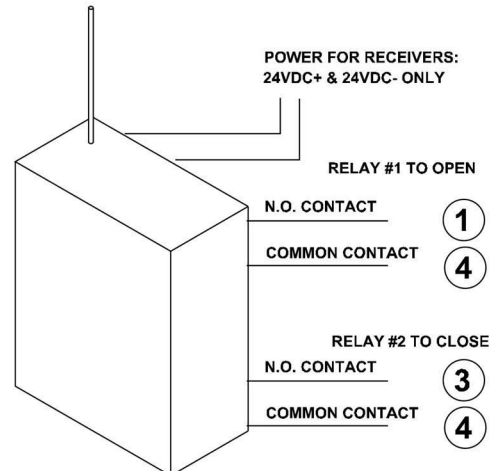
STROBE (WIRED FOR RUN)



FOUR WIRE RECEIVER (OPEN/CLOSE)



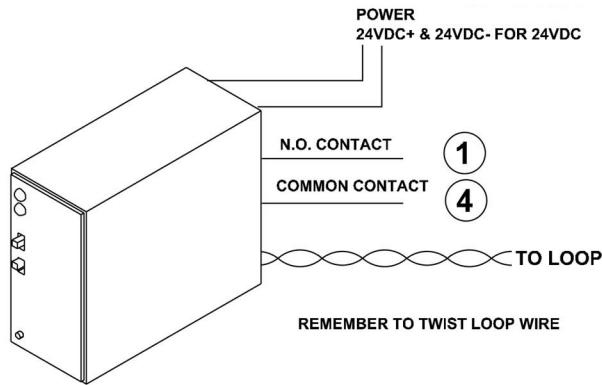
TWO CHANNEL RECEIVER (OPEN/CLOSE)



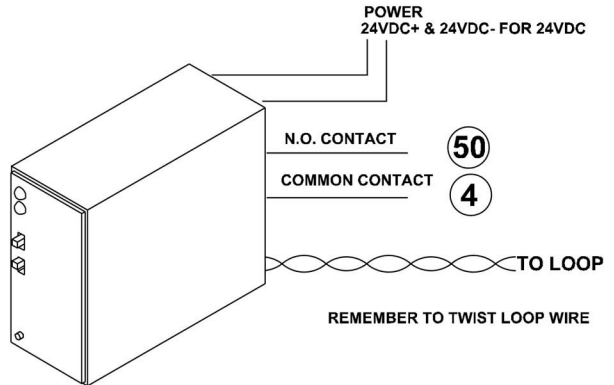
JH-D OPERATOR INSTALLATION GUIDE

CONTROL and ACCESSORY CONNECTION ILLUSTRATIONS

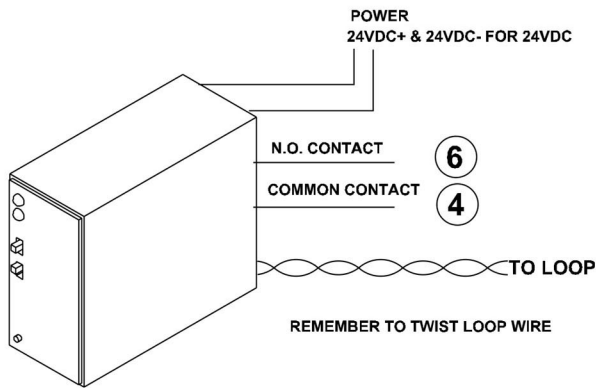
LOOP DETECTOR (OPEN/FREE EXIT)



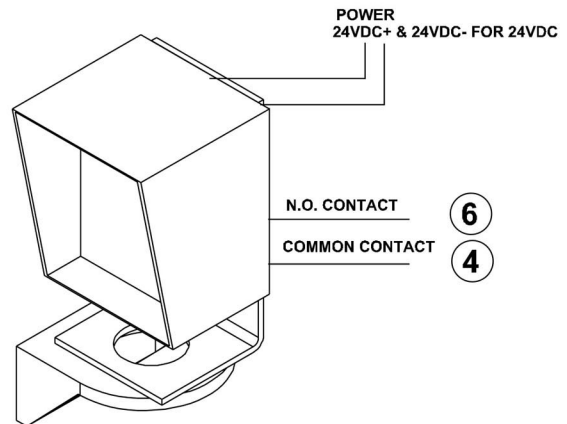
LOOP DETECTOR (OPEN/RESET)



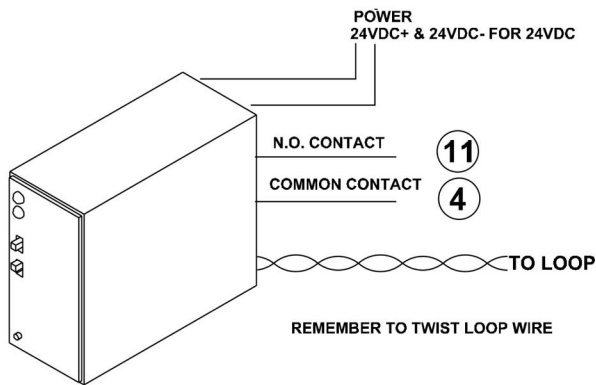
LOOP DETECTOR (TO REVERSE)



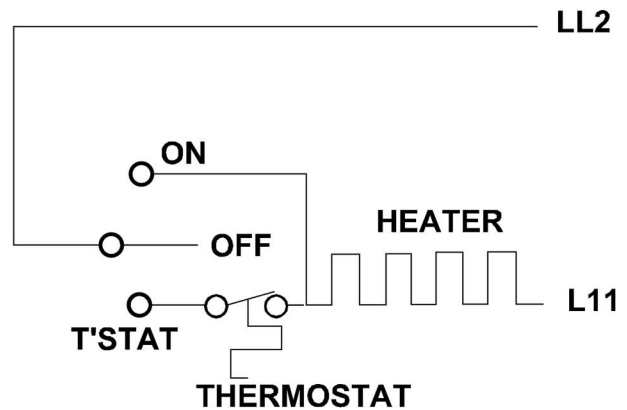
PHOTOEYE (REVERSE)



LOOP DETECTOR (RESET)



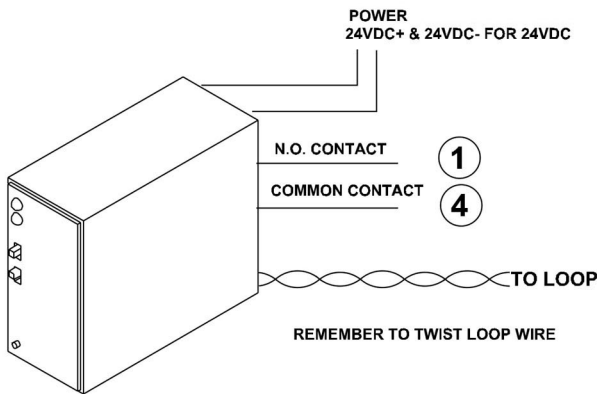
HEATER ASSEMBLY



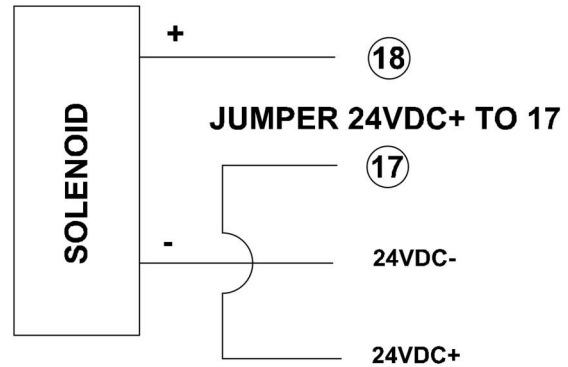
JH-D OPERATOR INSTALLATION GUIDE

CONTROL and ACCESSORY CONNECTION ILLUSTRATIONS

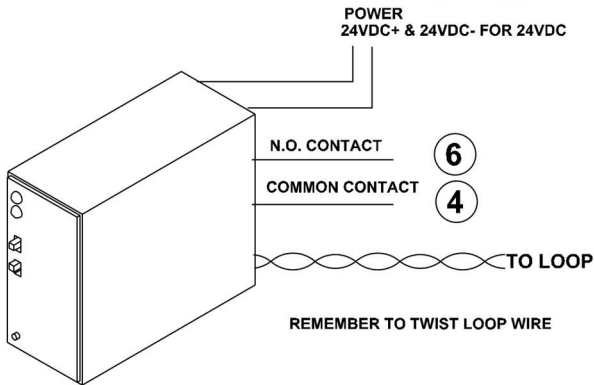
LOOP DETECTOR (OPEN/FREE EXIT)



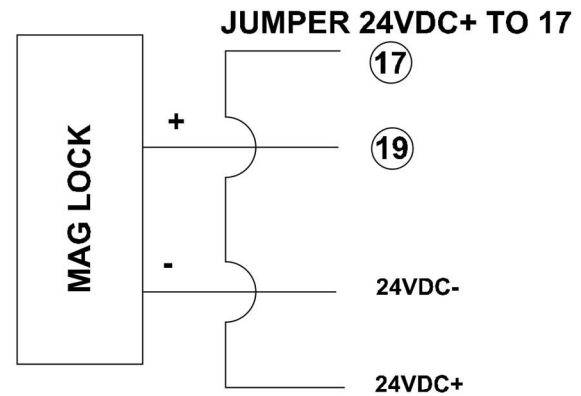
SOLENOID LOCK



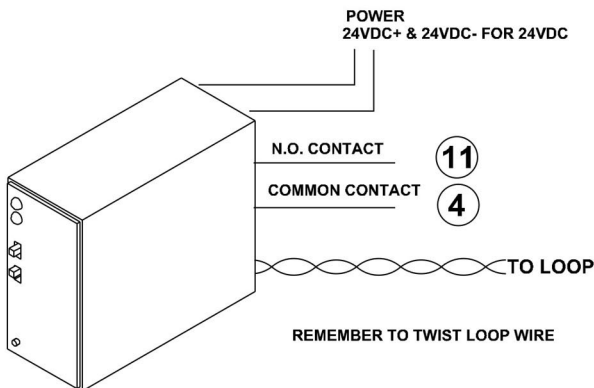
LOOP DETECTOR (TO REVERSE)



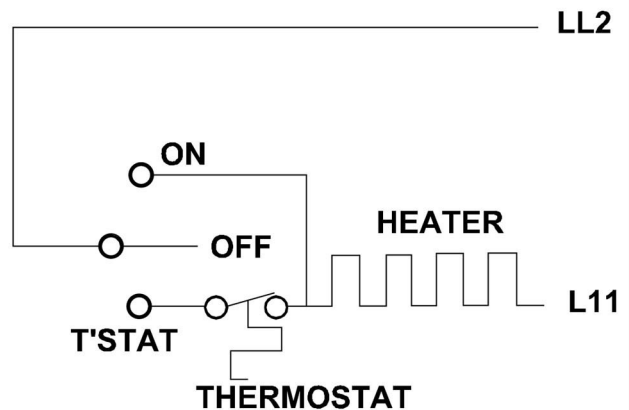
MAG LOCK



LOOP DETECTOR (SHADOW/HOLD OPEN)

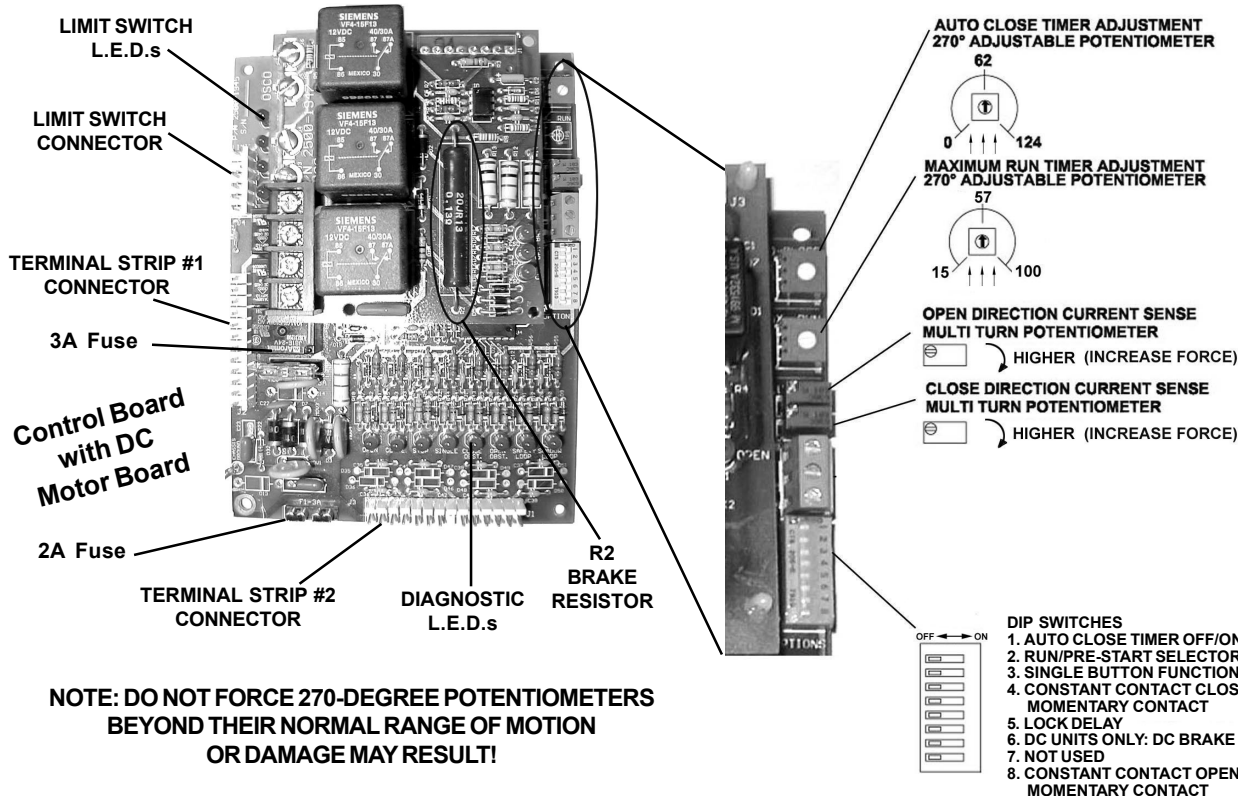


HEATER ASSEMBLY



JH-D OPERATOR INSTALLATION GUIDE

CONTROL BOARD ADJUSTMENTS



Auto Close Timer Adjustment: This 270-degree adjustable potentiometer will signal the operator to close automatically, provided no open, reversing or obstruction signals are present from the fully-open position. This timer is adjustable from 0 to 124 seconds. This feature is turned on or off using dip switch #1.

Maximum Run Timer Adjustment: This 270-degree adjustable potentiometer will signal the operator to stop running once it counts down, unless a limit switch is reached or an input is received first. Each time the motor starts, this timer will begin counting. This timer is adjustable from 15 to 100 seconds. If the timer expires, the unit locks out and the stop button must be pressed to reset the operator.

Open Direction Current Sense Adjustment: This multi-turn potentiometer is used to calibrate the built-in current sensing feature for detection of obstructions while running in the open direction.

Close Direction Current Sense Adjustment: This multi-turn potentiometer is used to calibrate the built in current sensing feature for detection of obstructions while running in the closed direction.


Dip Switches:


- #1 This switch turns the auto close timer off/on.
- #2 This switch is used in conjunction with alarms and flashing lights that may be added to the operator. When the switch is in the **ON** position, these devices will start approximately two seconds prior to the operator starting. In the **OFF** position, the devices will only work while the operator is running.
- #3 This switch is used in conjunction with single-button controls and radio receivers. In the **ON** position, successive inputs will cause signals in the order of **OPEN-STOP-CLOSE-STOP**. In the **OFF** position, inputs will cause an **OPEN** signal unless the door is fully open, in which case it will signal **CLOSE**.
- #4 This switch will enable momentary contact to close when turned on (a sensing edge is required on the door if you use this feature).
- #5 When turned **ON**, this switch will allow a one-second delay for solenoid locks to unlock before the motor starts.
- #6 In the **ON** position, this switch will disable the inherent DC brake in **DC operators only**. In addition, the R2 brake resistor on the DC motor board must be cut from the board (refer to the picture above). In the **OFF** position, the DC brake will function.
- #7 Not used at this time.
- #8 This switch will enable momentary contact to open when turned on.

JH-D OPERATOR INSTALLATION GUIDE

TERMINAL CONNECTION DESCRIPTIONS

TERMINALS	FUNCTION	DESCRIPTION OF FUNCTION
24VAC 24VAC N	24VAC	Provides 24Volt AC power for accessories. Note: DC models will NOT have 24Volt AC power available.
24VDC+ 24VDC- COMM.	24VDC	Provides 24Volt DC power for accessories.
1 & 4	OPEN	Opens the operator. Several accessories such as button stations, keypads, transmitters and card readers can be wired to open.
3 & 4	CLOSE	Closes the operator. Use caution when wiring accessories to these terminals. The door must be clearly visible from the location of any accessories wired to close.
4 & 5	KEY SWITCH OR SINGLE-BUTTON	Performs the single-button function which will alternate between open and close or open, stop and close - depending on dip switch #3. (See page 13 for details.)
2 & 4	STOP	Stops the operator. If no stop button is used, a jumper is required across 2&4 .
4 & 6	REVERSE	This function will cause a reversal when the door is traveling closed and will travel back to the fully open position. Loop detectors are often wired for reverse.
4 & 50	OPEN OBSTRUCTION	This function works only while the operator is opening. Any signal to this function will cause the door to stop, reverse a short distance, and then stop again. At this time the auto close timer is disabled, and a renewed input will be required to start the door again. Should the door be restarted and the signal occur again prior to reaching a limit, the door will stop again, and this time will sound the emergency alarm and lock out.
4 & 51	CLOSE OBSTRUCTION	This function works exactly like the OPEN OBSTRUCTION, except that it will only work in the closing direction.
4 & 11	SHADOW/HOLD	This function will keep the door in its fully open position while the signal is present. This is typically used with a loop and loop detector to keep a door open while vehicular traffic is passing through.
24VDC+ & 60	RUN/PRE-START	A 24Volt DC device such as a strobe light or alarm can be wired to these terminals. Depending on dip switch #2, these devices will either begin two seconds before the operator starts, or only while the motor is running. (See page 13 for details.)

 **You must follow all required safety precautions and instructions at all times. Review the safety brochure included with the operator. If any pages are missing or unreadable, contact the Cookson Company at 1-800-294-4358 to request additional copies.**

 **Do not adjust the circuit board current sensing feature too high. It should be adjusted high enough to keep the door from falsely triggering the sensing, but no higher than necessary for the door to operate. Do not defeat the purpose of this function!**

 **A sensing edge is required on the door when the close circuit is set up for momentary contact (dip switch #4 is on).**

JH-D OPERATOR INSTALLATION GUIDE

CURRENT SENSING ADJUSTMENTS

Because doors vary in construction and may have different force requirements in the open and close directions to move, the OSCO control board has separate multi-turn potentiometers for adjusting in both directions independently. The adjustment should be set light enough to maintain minimal force (15-25 lbs.) should an obstruction occur, but high enough to keep the door moving under normal conditions without interruption.

Prior to adjusting the operator current sensing functions, make sure the door moves freely in both directions. A badly aligned or poorly maintained door may cause false triggering of the current sensor. Refer to page 13 when following the instructions below. A factory adjustment tool has been supplied to make these adjustments easier. This tool has been taped to the control box for your convenience.

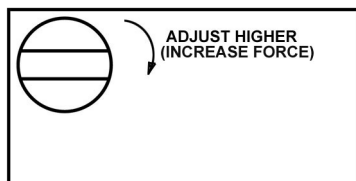
CLOSE DIRECTION CURRENT SENSE ADJUSTMENT

When the door operator leaves the factory, it has been preset for a relatively light door function and will require additional adjustment. Begin by starting the door going closed. If the operator stops and reverses, turn the close direction potentiometer (see page 13) one turn higher, press the **STOP** button, and try again. Repeat this process until the door no longer causes false tripping of the current sensor. Note that each time the door operator reverses, the **STOP** button must be pressed.

OPEN DIRECTION CURRENT SENSE ADJUSTMENT

Repeat the same process with the open direction potentiometer while running the door in the open direction. Once this is done, run the door through several complete cycles and make sure the door does not false trip in either direction.

Multi-turn Potentiometer



Remember it is important not to set the adjustment too high! Doing so will defeat the purpose of the current sensing as an obstruction detecting feature.

MAXIMUM RUN TIMER ADJUSTMENT

This adjustable potentiometer sets the maximum length of time the motor will run before shutting down. It should be configured for the time it takes to run the door fully open or closed, plus an additional 15 seconds. See page 13 for details.

AUTO CLOSE TIMER ADJUSTMENT

This adjustable potentiometer sets the length of time which elapses before the door operator automatically closes the door, from the fully open position, provided no open, reversing, or obstruction signals are present. This feature can be turned on or off via dip switch selection. See page 13 for details. **Do not use the auto close timer without an appropriate reversing device installed!**

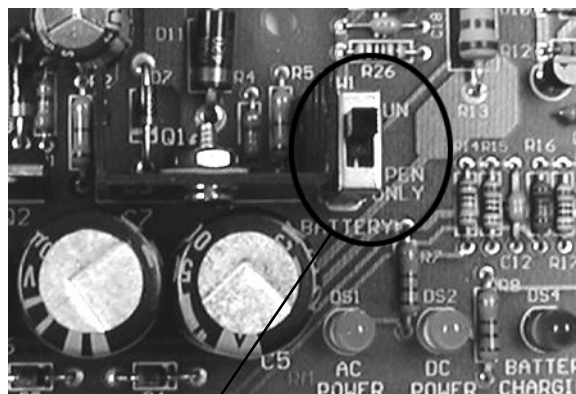
BATTERY BACK-UP

FOR DC MODELS ONLY

CHARGER BOARD CONFIGURATION

To set the voltage monitor, see the picture below. The **RUN position** will monitor the voltage of the battery only after AC voltage has been interrupted. It will allow the operator to continue to function until the batteries have dropped to 17 volts. When the batteries have reached 17 volts, the operator will open and shut down until AC power has been restored. In the **OPEN ONLY position** when AC power has been interrupted the operator will open and shut down until AC power is restored.

Note: If the charger board is set to open only, removing incoming power will cause the operator to run to full open position. Turn off power switch in operator before removing incoming power!



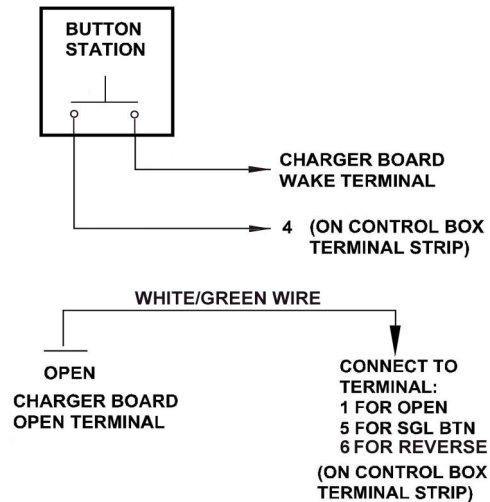
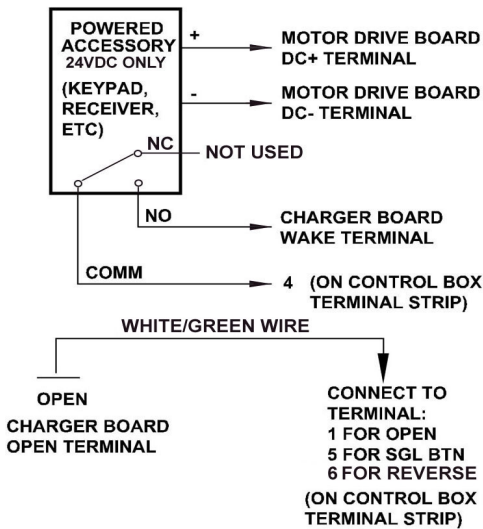
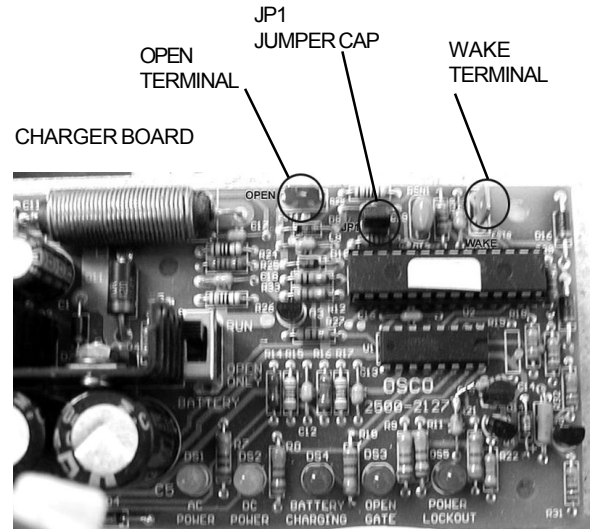
VOLTAGE MONITOR SHOWN
ABOVE IN THE RUN POSITION

JH-D OPERATOR INSTALLATION GUIDE

CHARGER BOARD SLEEP MODE

When primary AC power is not available, the operator will continue to operate in battery only mode if the charger board is set in its RUN mode (see **Battery Backup Charger Configuration**). Accessories wired into the operator will continue to draw power, even when the operator is not opening or closing the gate. This can dramatically reduce the amount of standby time available from the batteries.

To extend the available standby time, the charger board has a “sleep” mode feature which will turn off power to all controls except for any that are wired according to the schematics below. By removing the black jumper cap **JP1** located in the upper right hand corner of the charger board this feature can be enabled. After fifteen minutes of inactivity, all controls except those wired as shown below will turn off. Those wired as shown will continue to have power at all times and will upon activation generate first a “wake” signal that will power all controls back up, and then create either an open signal or single button signal, depending on how the wire jumper shown below is connected.



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ONBOARD L.E.D. INDICATOR DESCRIPTIONS

Control Board L.E.D. Indicators:

OPEN	This indicator is lit when an open signal is present. This signal can come from such devices as button stations, radio receivers, keypads and telephone entry systems.	
CLOSE	This indicator is lit when a closed signal is present. This signal typically comes from three-button stations.	
STOP	This indicator is lit when there is a break in the stop circuit. Make sure there is a stop button wired in and working properly.	
SINGLE	This indicator is lit when a signal from a single-button station or radio receiver is present.	
CLOSE OBST	This indicator is lit when a close obstruction signal is present. This signal can come from edges and photo eyes which have been wired to the close obstruction inputs.	
OPEN OBST	This indicator is lit when an open obstruction signal is present. This signal can come from edges and photo eyes which have been wired to the open obstruction inputs.	
REVERSING LOOP	This indicator is lit when a reversing signal is present. This signal is generated by a loop detector wired to the safety loop terminals.	
SHADOW LOOP	This indicator is lit when a shadow/hold open signal is present. This signal is generated by a loop detector wired to the shadow loop terminals.	
LH	RH	
LSC-1	LSO-1	These indicators are lit when the open limit switch is activated on a right-hand operator, or the close switch on a left-hand. If this indicator is lit and the door is not in its full open/closed position, the limit may need adjusting or the limit switch may need replacing.
LSC-2	LSO-2	
LSO-1	LSC-1	These indicators are lit when the close limit switch is activated on a right-hand operator, or the open on a left-hand. If this indicator is lit and the door is not in its full open/closed position, the limit may need adjusting or the limit switch may need replacing.
LSO-2	LSC-2	

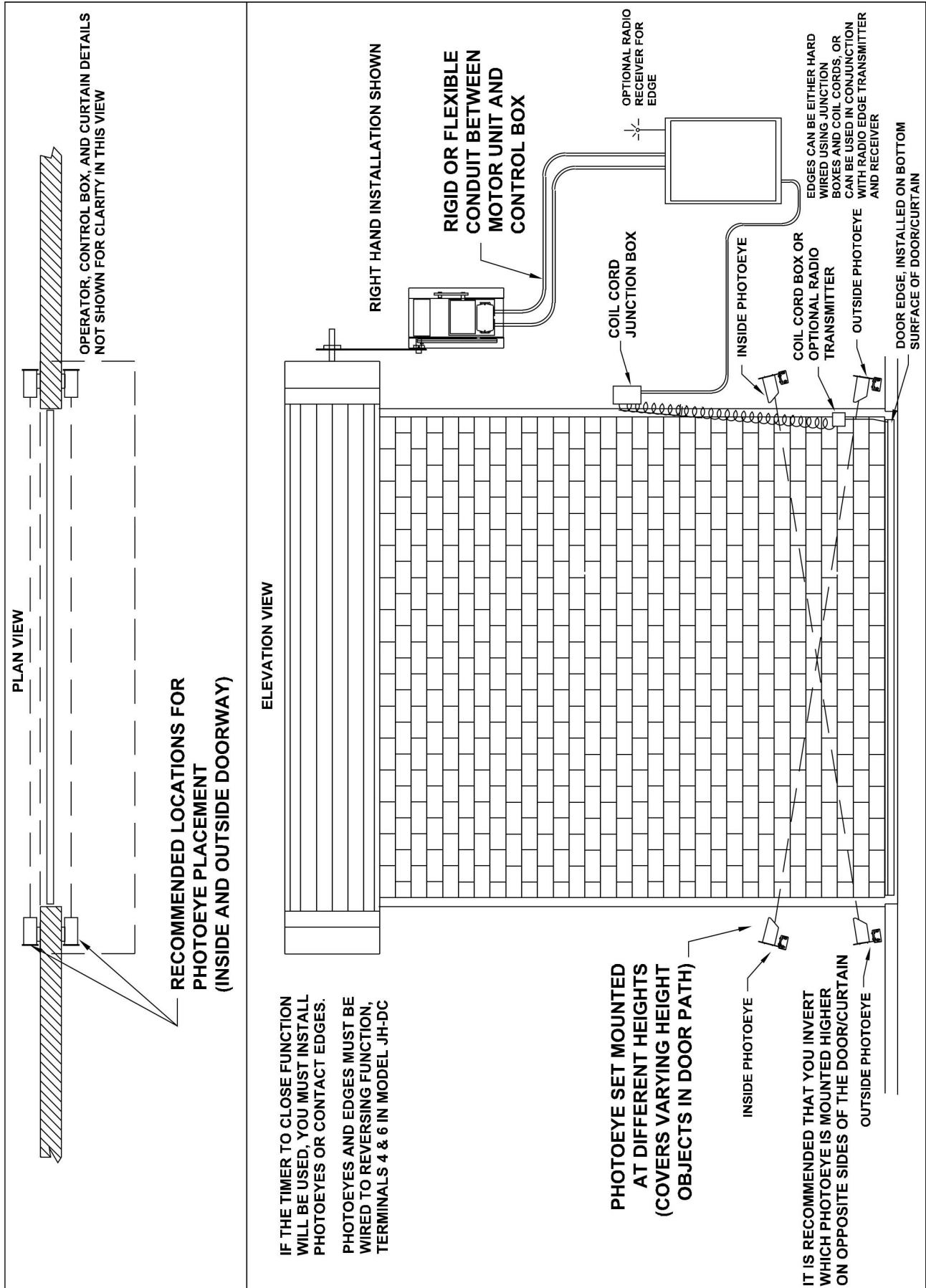
Motor Board L.E.D. Indicators:

NON LABELED	One of these two indicators will be lit when the motor is running the door open, and the other is lit when the motor is running the door closed.
BRAKE REL.	This indicator is lit when the brake is NOT applied.

DC Operators Only:

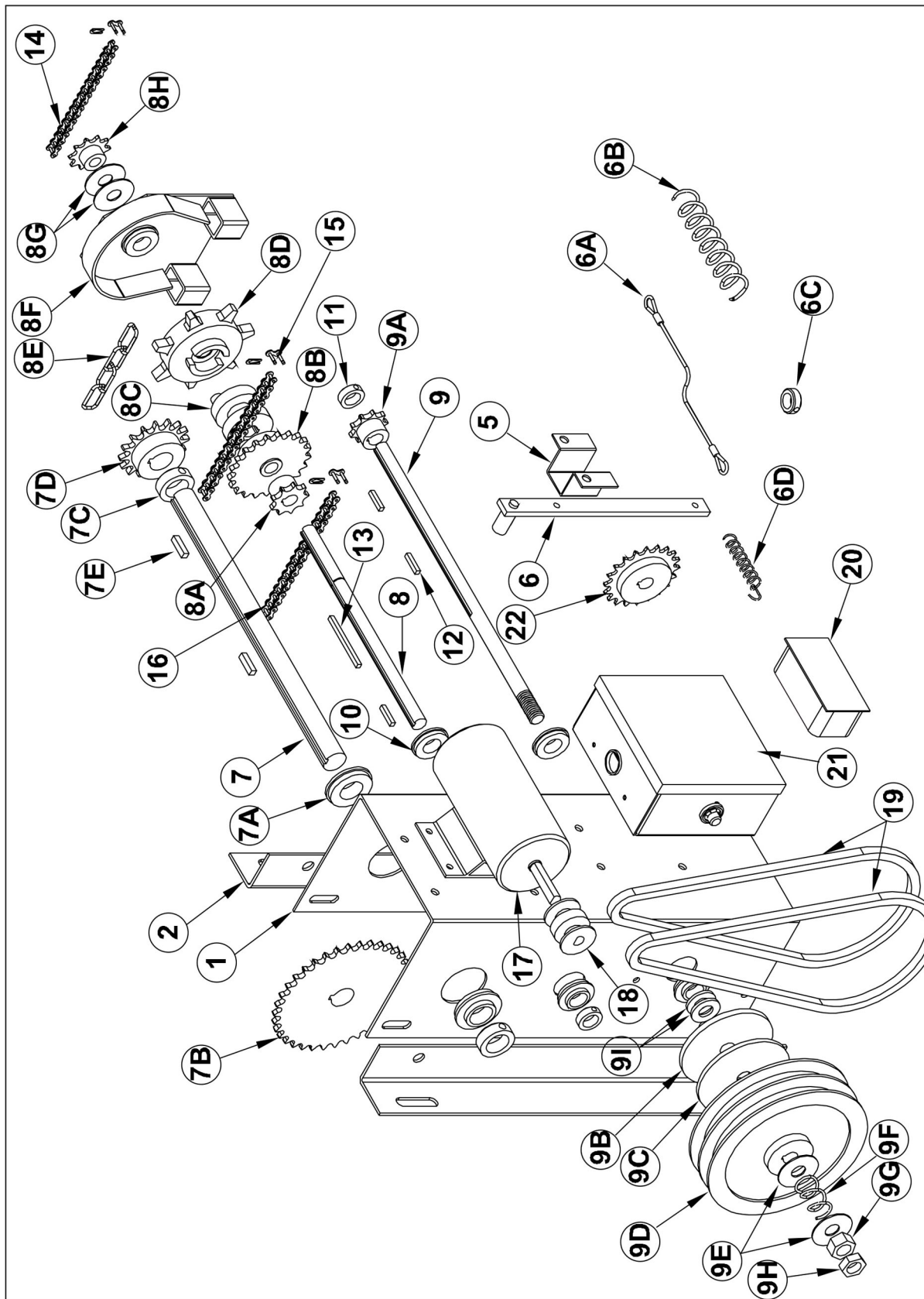
AC POWER	Indicates AC power is supplying the unit.
DC POWER	Indicates the operator is running on batteries.
BATTERY CHARGING	Indicates batteries are being charged. Light goes out when batteries reach 90% of full charge.
OPEN GATE	Operator is in open then lockout stage.
POWER LOCKOUT	Flashes when controls/motor are in lockout mode.

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MODEL JH-D MECHANICAL PARTS EXPLODED VIEW

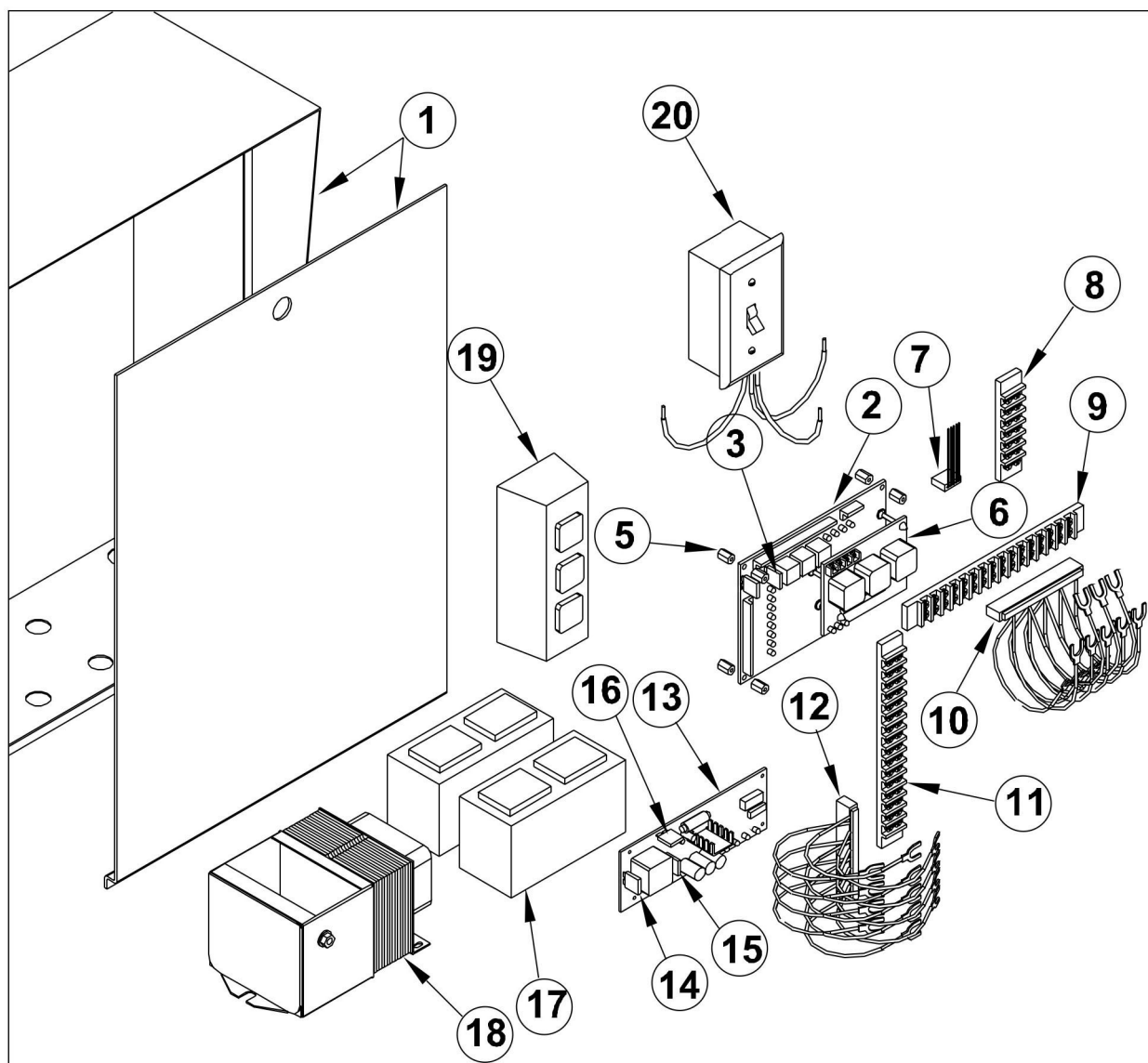


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MODEL JH-D MECHANICAL PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
1	2100-793	Main Frame	10	2200-215	Radial Flange Bearing, 5/8"
2	2100-350	Mounting Angle	11	2200-233	Shaft Collar, 5/8"
5	2100-1740	Disconnect Bracket	12	2400-222	Key, 3/16" x 3/16" x 1"
6	2110-065	Disconnect Handle	13	2100-297	Key, 3/16" x 3/16" x 2 3/4"
6A	2200-255	Disconnect Cable, per foot	14	2200-453	#48 Roller Chain, 19 Links
6B	2200-363	Disconnect Spring		2200-010	#48 Master Link
6C	2200-233	Shaft Collar, 5/8"		2200-438	#48 Half Link
6D	2200-361	Disconnect Return Spring	15	2200-463	#41 Chain, 17 Links
7	2100-176	Output Shaft, 1"		2200-027	#41 Master Link
7A	2200-001	Radial Flange Bearing, 1"	16	2200-058	#41 Chain, 21 Links
7B	2500-051	Sprocket, 41 B 36, 1" Bore		2200-027	#41 Master Link
7C	2200-015	Shaft Collar, 1"		2400-128	#41 Half Link
7D	2200-498	Sprocket, 50 B 12, 1" Bore	17	2500-1902	24VDC Motor
7E	2400-004	Key, 1/4" x 1/4" x 1"	18	2200-883	Double Pulley, 1 1/2" OD
8	2100-290	Intermediate Shaft	19	2200-080	V-Belt, 4L34
8A	2200-213	Sprocket, 41 B 9, 5/8" Bore	20	2500-2037	Junction Box
8B	2110-066	Sprocket with Bearing, 41 B 21, 5/8" Bore	21	2520-396	Limit Box Assembly
8C	2200-444	Shifter Block		2110-162	Limit Box Assembly with Cover
8D	2110-142	Chain Wheel with Bearing		2100-1764	Fixed Limit Switch Bracket
	2200-282	Bearing for Chain Wheel		2100-261	Detent Plate
8E	2200-051	Hand Chain, per foot		2100-057	Limit Shaft
8F	2110-306	Chain Guide with Bearing		2200-030	Nylon Limit Nut
	2200-078	Bearing only for Chain Guide		2500-440	Limit Switch
8G	2400-066	Flat Washer, 5/8"	22	2200-276	Sprocket, 48-B-20, 1/2" Bore
8H	2200-218	Sprocket, 48 B 10, 5/8" Bore	Parts Not Shown on Drawing:		
9	2100-920	Clutch Shaft, 5/8"			
9A	2200-213	Sprocket, 41 B 9, 5/8" Bore		2400-475	Conduit Box Spacer, 1/2"
9B	2110-600	Clutch Hub			
9C	2300-168	Clutch Disc			
9D	2220-026	Double Pulley, 7", with Bearing			
	2200-230	Bearing, 7/8" OD x 5/8" ID x 1 1/2" LTB			
9E	2400-066	Flat Washer, 5/8"			
9F	2200-306	Clutch Spring			
9G	2400-061	Hex Nut			
9H	2400-062	Jam Nut			
9I	2400-187	Thrust Washer			

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MODEL JH-D CONTROL BOX PARTS LIST

REF NO.	PART NO.	DESCRIPTION	REF NO.	PART NO.	DESCRIPTION
1	2120-460*	Enclosure	14	2500-2018	15 Amp Fuse
2	2510-269	DC Control Board	15	2500-2019	20 Amp Fuse
3	2500-1975	3 Amp Fuse for Control Board	16	2500-1975	3 Amp Fuse
5	2500-1948	Control Board Standoff	17	2510-182	Battery Assembly
6	2500-1947	DC Motor Drive Board		2500-1118	12V Battery, 2 required
7		Limit Harness		2300-450	Velcro Tape, per foot
8	2500-087	Terminal Strip, 4-141	18	2510-223	Transformer Assembly
	2500-086	Terminal Strip, 9-141 (alternate)		2500-1768	Bridge Rectifier
9	2500-071	Terminal Strip, 16-141		2500-1776	Transformer only, 115/24V, 250 VA
10	2510-250	Output Wire Harness Assembly		2500-1819	Fuse Holder
11	2500-071	Terminal Strip, 16-141		2500-1742	Fuse, 6 Amp, Slow-Blow
12	2510-249	Input Wire Harness Assembly	19	2500-033	Three-Button Station
13	2500-2127	DC Charger Board	20	2510-266	Power On/Off Switch Assembly
				2300-878	Vent Plug (not shown)

*Specify color when ordering

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BATTERY MAINTENANCE

The gel-cell batteries in this operator require no routine maintenance. For assured continued performance, they should be replaced every year.

If power is to be removed for one week or more, disconnect the negative wire from the batteries as this will prevent deep discharging.

Fully charge before use after storage or upon initial installation.

BRUSH REPLACEMENT

Brushes should be inspected every 100,000 cycles, or yearly, whichever comes first. The motor has two brushes, one on each side.

Original brushes are approximately 3/4" long and should be replaced when they are 1/4" long, or sooner. If brushes are allowed to wear beyond this point, permanent damage to the motor may result.

To inspect the brushes, remove retaining cap (A), with straight-blade screwdriver, and carefully pull assembly straight out. Measure remaining brush material (B).

To reinstall, place brush in hold, aligning rounded indentation (C), correctly with motor shaft. Gently push in spring and align contact with oval carrier, push in with retaining cap (D). Hold in place and thread cap into brush carrier. Do not overtighten or cap will crack! Repeat for other brush.

