

COMMAND LIGHT KNIGHT²



Effective March 2020
This guide supersedes all previous versions

MODEL COVERED:
KL409D

3842 Redman Drive
Fort Collins, CO 80524

1-800-797-7974
www.CommandLight.com

THANK YOU

Please allow us to express a simple thank you for investing in a *COMMAND LIGHT* product. As a company, we are dedicated to producing the very best and most versatile flood lighting package available. We take great pride in the quality of our work and hope that you will find many years of satisfaction from the use of this equipment.

Should you have any problems with your product please do not hesitate to contact us.

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3842 Redman Drive
Fort Collins, CO 80524

PHONE: 1-800-797-7974
FAX: 1-970-297-7099
WEB: www.CommandLight.com



DANGER

PERSONAL RESPONSIBILITY CODE

The member companies of FEMSA that provide emergency response equipment and services want responders to know and understand the following:

1. Firefighting and Emergency Response are inherently dangerous activities requiring proper training in their hazards and the use of extreme caution at all times.
2. It is your responsibility to read and understand any user's instructions, including purpose and limitations, provided with any piece of equipment you may be called upon to use.
3. It is your responsibility to know that you have been properly trained in Firefighting and/or Emergency Response and in the use, precautions, and care of any equipment you may be called upon to use.
4. It is your responsibility to be in proper physical condition and to maintain the personal skill level required to operate any equipment you may be called upon to use.
5. It is your responsibility to know that your equipment is in operable condition and has been maintained in accordance with the manufacturer's instructions.
6. Failure to follow these guidelines may result in death, burns or other severe injury.



Fire and Emergency Manufacturers and Services Association, Inc.
P.O. Box 147, Lynnfield, MA 01940 www.FEMSA.org

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Please take the time to read this manual before installing or operating the *COMMAND LIGHT KNIGHT₂*.

Save this guide for future reference.

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LIMITED WARRANTY

Five Year

COMMAND LIGHT warrants that the equipment is free from defects in materials and workmanship when used and operated for a period of five years. The responsibility of **COMMAND LIGHT** under this limited warranty is limited to the repair and replacement of any parts found defective. Parts must be returned to **COMMAND LIGHT** at 3842 Redman Drive, Ft Collins, Colorado 80524 with transportation charges prepaid (**C.O.D. shipments will not be accepted**).

Prior to returning defective parts to **COMMAND LIGHT**, the original purchaser shall make a claim in writing to **COMMAND LIGHT** at the above address indicating the model number, serial number and type of defect. No parts or equipment will be received by **COMMAND LIGHT** for repair or replacement under this warranty without specific written authority from it in advance.

Any parts damaged by improper installation, overloading, abuse or accident of any type or cause are not covered by this warranty.

All equipment manufactured by us is tested before leaving our plant, and is shipped in good working order and condition. We therefore extend to the original purchasers the following Limited Warranty for the period of five years from the original date of purchase:

1. This warranty does not apply to defects caused by accident, misuse, neglect, or wear and tear, nor can we be held responsible for incidental and consequential expense and loss, nor does this warranty apply to equipment where alterations have been executed without our knowledge or consent. These conditions are readily discernible when the equipment is returned to us for inspection.
2. On all component parts not manufactured by **COMMAND LIGHT**, their warranty is to the extent that the manufacturer of such component warrants them to **COMMAND LIGHT**, if at all. Look in your local business telephone directory for the nearest repair station for the brand of parts you have or write to us for the address.
3. If equipment received has been damaged in transit, a claim should be made against the carrier within three days, as we assume no responsibility for such damage.
4. Any service other than our Authorized Service voids this warranty.
5. This warranty is in lieu of and is intended to exclude all other warranties, express or implied, oral or written, including any warranties of **MERCHANTIBILITY** or **FITNESS** for a particular purpose.
6. Travel time paid at a maximum of 50% and only if pre-approved.

Warranty/Service

COMMAND LIGHT products* come with a industry leading 5 year warranty against any defects in materials and workmanship when used and operated for a period of five years. If during this time period, you have any malfunctions not related to misuse, accident, neglect, or normal wear and tear, please take the following steps in order to have your light tower serviced under COMMAND LIGHT's warranty.

1. Contact us immediately for initial diagnosis and parts if needed at 800-797-7974 or info@commandlight.com
2. You will need to have immediate access to light tower. This process can be done by individuals with little mechanical ability. (Involves pushing buttons and telling us what the light tower is doing or not doing)
3. We then send parts (if needed) and have a technician dispatched (if needed) with a written work authorization number and a base amount of hours allotted to do repair
4. We remain available for service support via phone, email, or video conference while technician completes repair, also to extend original time allotted if additional issue arise
5. Mark repair as completed and validate the work authorization number for hours of labor / travel rates as agreed during diagnosis
6. Finally, we will pay out or credit the invoice when we receive it from person/company performing the repair

Please make contact with us as soon as problems arise in order to execute our warranty. We must have knowledge of the issue and a work order in place in order to pay or reimburse the department with the issue. Any unauthorized service voids this warranty. (No work is authorized until the call is made to us)

Contact Us Early – before any work is done – We'd love to help!

*excludes light producing components (bulbs, lasers, LEDs) These components come with their own manufacturer warranty. Contact us and we can help get it.

Breakage or Damage During Shipment

The transportation company is fully responsible for all shipping damage and will resolve problems promptly if you handle it correctly. Please read these instructions carefully.

Examine the contents of all shipping cases. If you find any damage, call your transportation agent at once and have them make a description on the freight or express bill describing the damage and the number of pieces. Then contact us and we will send you the original bill of lading. Also promptly contact the transportation company and follow their procedure for filing a claim. Each company will have a unique procedure to follow.

Please note, we cannot and will not enter claims for damages. If we filed claim here, it would be sent to your local freight agent for verification and investigation. This time can be saved by you filing the claim directly. Every consignee is on the ground floor, in contact with the local agent who inspects the damaged goods, and thus, each claim can be given individual attention.

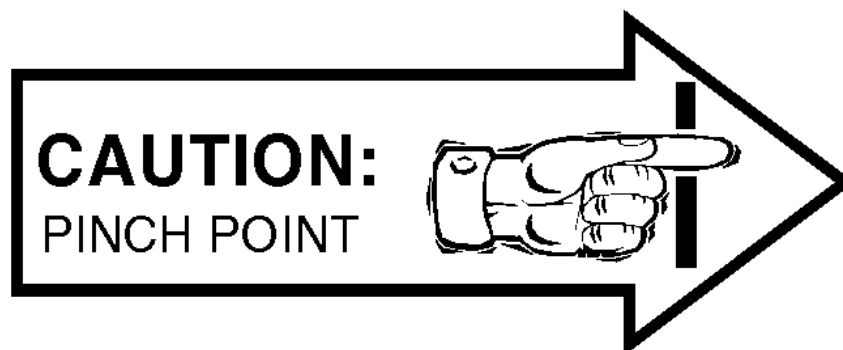
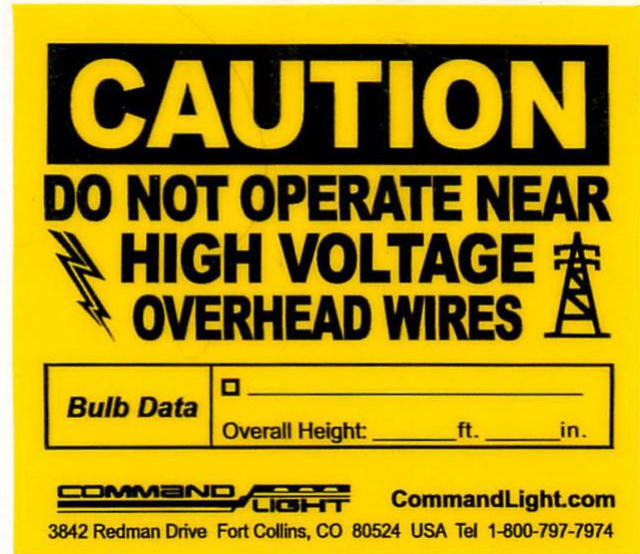
Since our goods are packed to comply with the regulations of all railroad, truck, and express companies, we cannot allow deduction from any invoice because of any damage, however, be sure to file your claim promptly. Our goods are sold F.O.B. factory. We take receipt from the transportation company certifying that the goods were delivered to them in good order and our responsibility ceases.

It is seldom that any breakage or damage occurs in any of our shipments and in no case will the customer be out any expense if they follow the above instructions.

Be sure to keep all damaged goods subject to examination of the truck or express company inspector, who may call on you some time later. These damaged goods, of course, will belong to them, and they will inform you what to do with them. If you dispose of these damaged goods, your claim may not be paid.

Product Safety Precautions

- ⊗ Never operate the **COMMAND LIGHT KNIGHT₂** near overhead high voltage power lines. The **COMMAND LIGHT KNIGHT₂** is manufactured from electrically conductive materials.
- ⊗ Do not use the **COMMAND LIGHT KNIGHT₂** for uses other than its intended purpose.
- ⊗ Do not move emergency vehicle with the light extended. Visually verify that the light is completely nested before moving vehicle.
- ⊗ Do not change light position while people are located within its operating envelope. There are numerous pinch points that can cause serious bodily injury.
- ⊗ Do not use a high-pressure washer or subject the light to high volumes of water when cleaning.
- ⊗ Never use the **COMMAND LIGHT KNIGHT₂** as a lifting device or mobile arm.
- ⊗ Do not use a **COMMAND LIGHT KNIGHT₂** that has been damaged or is not fully functional, including non-working indicator lamps.
- ⊗ Never hold any part of the **COMMAND LIGHT KNIGHT₂** with a hand or foot while it is in motion.
- ⊗ The **COMMAND LIGHT KNIGHT₂** has numerous pinch points. Keep loose clothing, hands and feet clear of moving parts.



General Description and Specifications

The *KNIGHT₂* is designed to provide high intensity emergency scene lighting with quick precision. As with any electromechanical device, take precautionary steps to ensure safe operation.



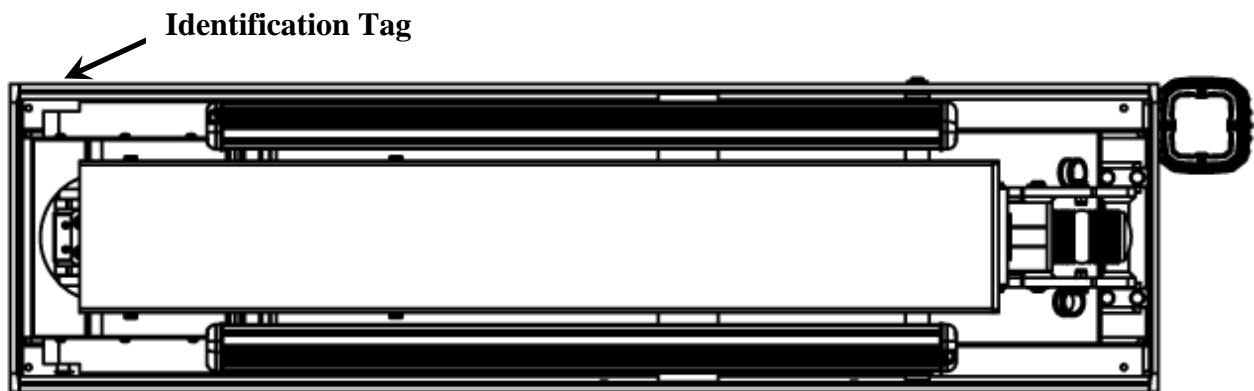
Never operate the *KNIGHT₂* near overhead power lines.

There are several standard lighting options available for the *KNIGHT₂*.

Model #	Description	Minimum Power Requirements
KL409D-H4	4 x LED	100 Amps, 12 VDC

The emergency vehicle generator provides power for the 12 VDC circuitry. The umbilical corded control unit is powered via 12 VDC eliminating hazardous voltage levels within the hand held control box.

The *KNIGHT₂* is manufactured to provide years of service with a minimum of maintenance.



Operation

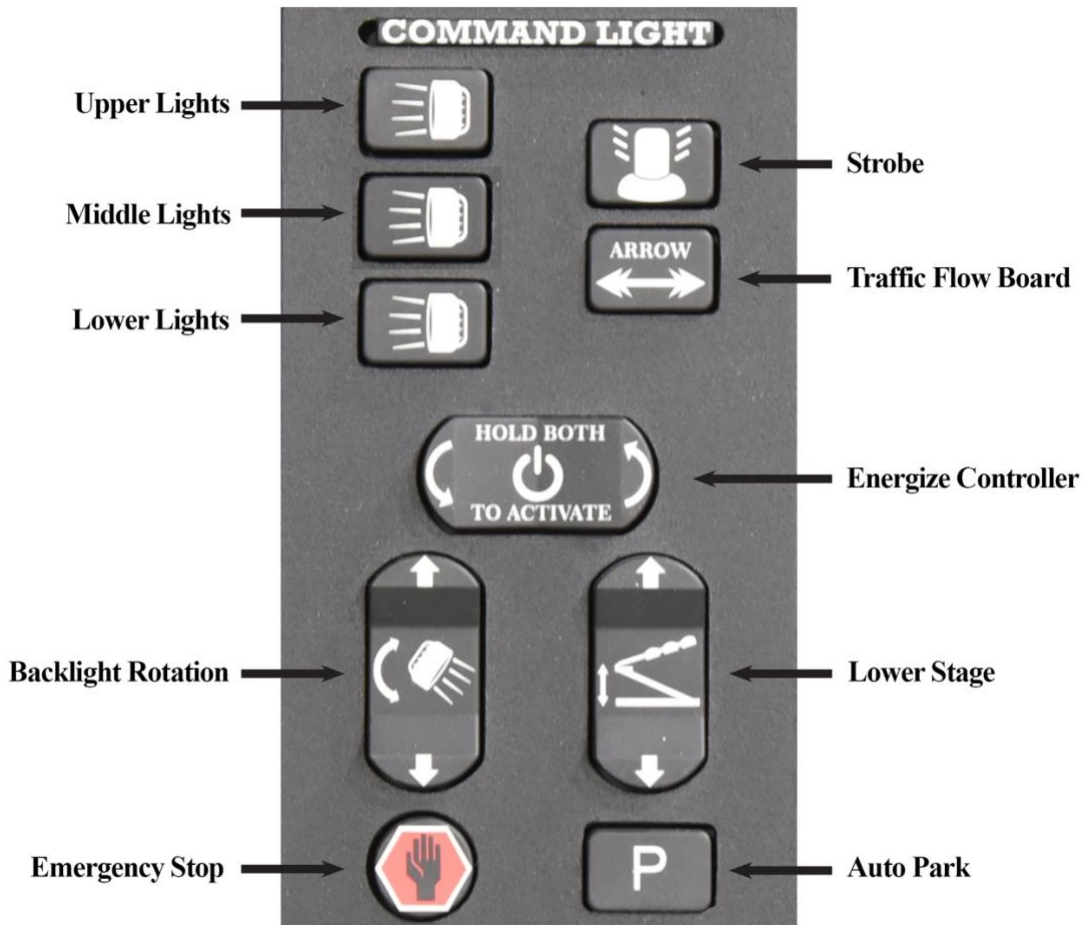
Raising the light from the nested position

Using the control box, raise the lower or upper stage. You may also activate both stages simultaneously. Control switches are of momentary action style and must be held in the “on” position to actuate the stages.

The **KNIGHT₂** has an override system that precludes rotation of the upper stage until the lower stage has elevated approximately 16” from the nested position. When the lower stage is below 16” the following conditions exist:

- Upper stage is prevented from rotating.
- All lights are turned off, including strobe light if equipped, regardless of light switch positions.
- Prevents the upper stage from moving down if upper stage is not centered.

If the supply from the generator is marginal, position the **KNIGHT₂** before turning on lights.



Returning the light to the nested position

The *KNIGHT₂* is equipped with an Autopark function as a standard feature. The green button on the control box initiates the Autopark sequence. Once initiated, the “Emergency Stop” red button indicator is illuminated. Pressing the “Emergency Stop” button will cancel the Autopark sequence.

Autopark Sequence

Press green button on the controller once. It does not need to be held in position. The Autopark sequence begins:

1. “Emergency Stop” light is illuminated.
2. Lamps are extinguished.
3. Upper stage begins rotation to the center position.
4. Once upper stage is centered, rotation stops, lower stage begins retracting.
5. After lower stage has fully retracted, upper stage begins retracting. Upon upper stage retracting fully, “Emergency Stop” light turns off.

Installation

The *KNIGHT₂* must be installed by a designated installation facility by qualified personnel only. All safety precautions must be thoroughly understood before installation. Please consult the factory for additional installation information assistance.

Installation Kit

Included with the *KNIGHT₂* is an installation kit. Verify that the kit contains the following items:

- | | |
|--------------------------------------------|-----------------------------------------------------|
| (1) 50 feet of 2GA-2 Conductor power cable | (1) 50 feet of 22GA-20 conductor cable |
| (1) Pre-wired HOLSTER BOX w/cover | (1) Handheld Controller |
| (1) Small hardware parts bag with: | |
| (4) mounting spacers | (4) 5/16-18 x 2 1/2” bolts |
| (4) 5/16-18 nylon lock nuts | (8) 5/16” flat washers |
| (4) large diameter flat washers | (2) 1/4-20 x 5/8” Phillips flat head machine screws |
| (2) 1/4” flat washers | (2) 1/4-20 nylon lock nuts |
| (4) 1/2” 90° sealing connector w/nut | (1) 1” 90° sealing connector w/nut |

Tools Required

Lifting device (crane, forklift, block and tackle, etc.)

Sling for lifting

Drill

21/64", 17/64" drill bits

Hole punch for metal with 7/8" and 15/16" diameter capacity

Phillips head screwdriver, #2

Command Light flat blade screwdriver (included with light)

7/16" and 1/2" combination wrenches and/or ratchet and 7/16" and 1/2" sockets

8" adjustable wrench

Tongue and Groove Pliers

Wire stripper or razor blade knife

Solder-less wire connector crimp tool

Silicone based gasket sealer, RTV™ recommended

Installation Notes

The ***KNIGHT***₂ weighs approximately 150 pounds. Use mechanical assistance to lift the light into installation position such as a forklift or crane.

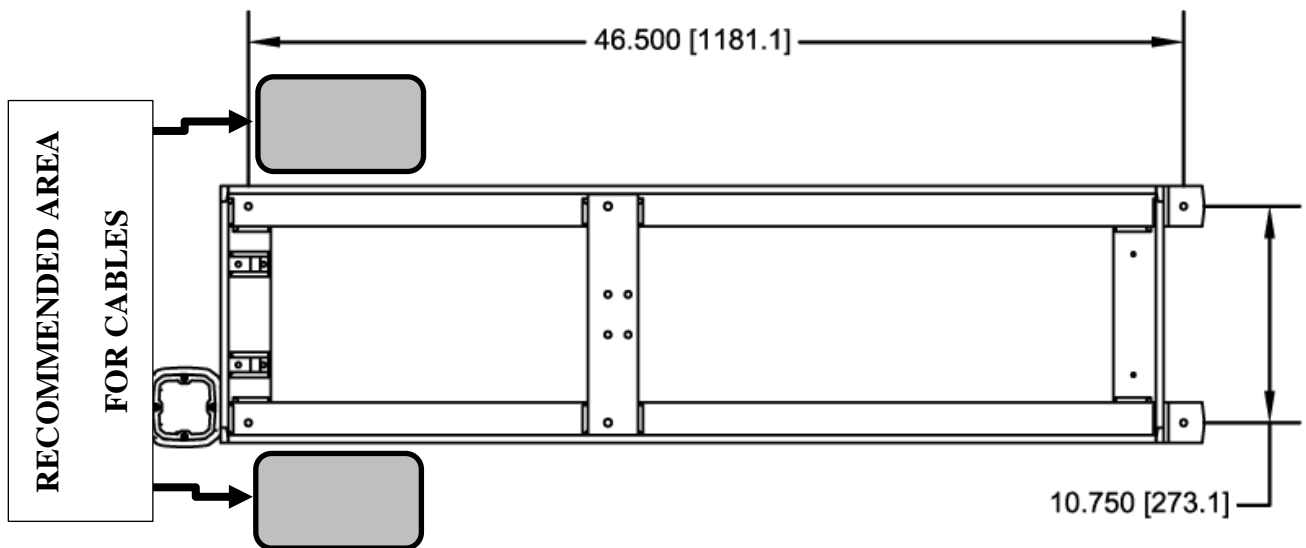
Use the provided fender washers under the mounting surface to distribute the weight load evenly.

When routing the connecting electrical wires take care to avoid sharp bends, hot components or other hazards to the wire.

The ***KNIGHT***₂ is not designed to be operated in a raised position while the vehicle is in motion. The ***KNIGHT***₂ includes warning circuit wiring to enable a warning device.

Location Requirements

The standard **KNIGHT₂ Model 409D** can be mounted on any location that is 50" x 13". The surface should be flat or have only a slight crown. For a recessed installation allow for a minimum of 60" x 20". Consult with factory before construction of recessed installation. Verify all dimensions before installation to ensure proper operation of light will not infringe on other installed components. For all other installations refer to the dimensional drawing included in the back of this guide that represents your particular model of light. The drawings reflect the dimensions of the "working envelope" of a typical light tower. Make certain sufficient clearances are incorporated in your installation to allow for variations (vehicle body flex, environmental conditions, future servicing needs, etc.) If your light is not represented, call the factory prior to beginning any construction of a recessed installation.



Four mounting bolt holes are required. Additional holes may be drilled in the frame ends if necessary to clear obstructions.

Access holes for the power cord cabling should be in close proximity to the light. Installing the cords with a sweeping 90° or 180° bend will provide better results.

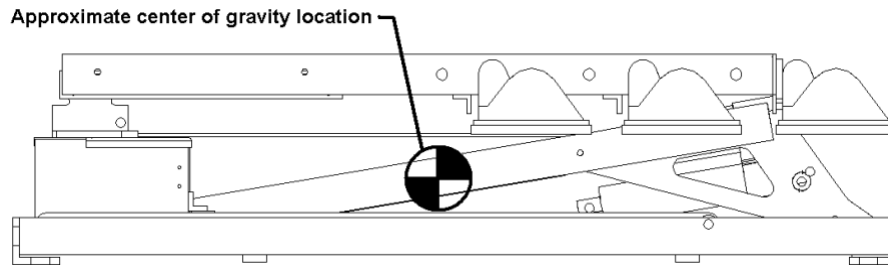
The control box holster should be mounted in an area shielded from the weather. Allow a minimum of 10" clearance above the control box holster mounting location for easy access to the controller.

Mounting

Place the provided spacers in the location of the light mounting holes. The spacers may be modified to conform to the contour of the mounting location.

Remove any obstructions below the mounting surface such as headliners.

Attach any necessary lifting attachments to the **KNIGHT₂**. The center of gravity (balance point) is slightly behind the lower bank of lights.



Slowly lift the **KNIGHT₂** and check for balanced lifting. Lower and make any necessary adjustments to the lift points.

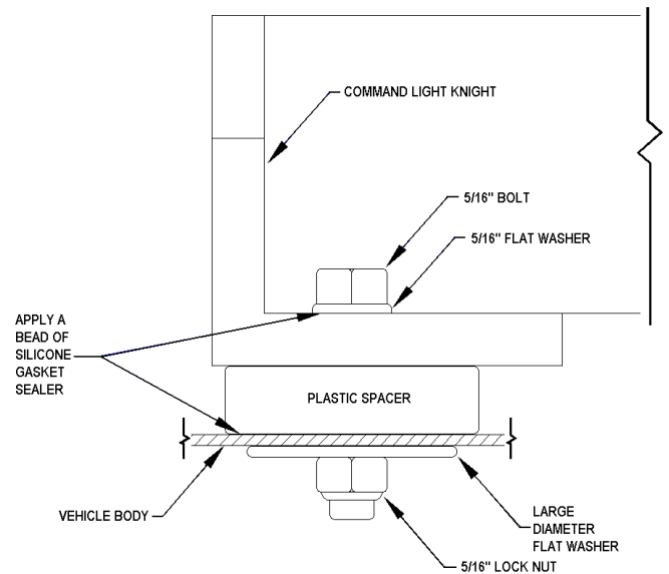
Lift and place the **KNIGHT₂** into position above the spacers. Before placing the full weight of the unit on the spacers align spacers with the holes in the end frame castings.

Drill $\frac{21}{64}$ " holes in the mounting surface using the end casting holes as a template.

Fasten the light using the provided hardware. To ensure a weather-tight installation apply a thin bead of silicone based gasket sealer to the base of the spacer and underside of bolt head.

Remove any lifting straps and devices from the **KNIGHT₂**.

Locate and drill the wire feed holes.



Holster Mounting

Using the holster mount as a template, mark hole locations.

Drill $\frac{17}{64}$ " mounting holes.

Drill any holes required to route the control cable from the holster to the **KNIGHT₂** relay box. Attach the holster to the holster mount with the provided hardware.

Electrical Wiring

Please Note: Detailed internal wiring schematics are located at the back of this user guide.

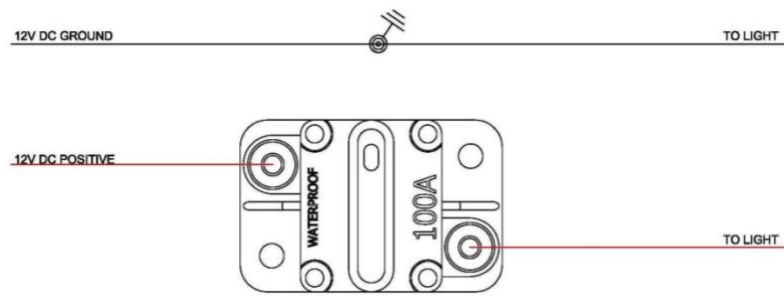
Run the control wire from the control box holster to the **KNIGHT₂**.

Run the power wire from the breaker box or generator to the **KNIGHT₂**. A 100 Amp breaker is recommended on DC models.

Make the control connections in the **KNIGHT₂** relay box.

The Model KL409D series **KNIGHT₂** comes pre-wired to connect to 12 VDC.

12 VDC



Holster Wiring

Determine if an elevated warning device will be used in conjunction with the light tower. If a warning device will be used, use the wiring diagram on the next page, otherwise, use the wiring diagram in the back of the user guide.

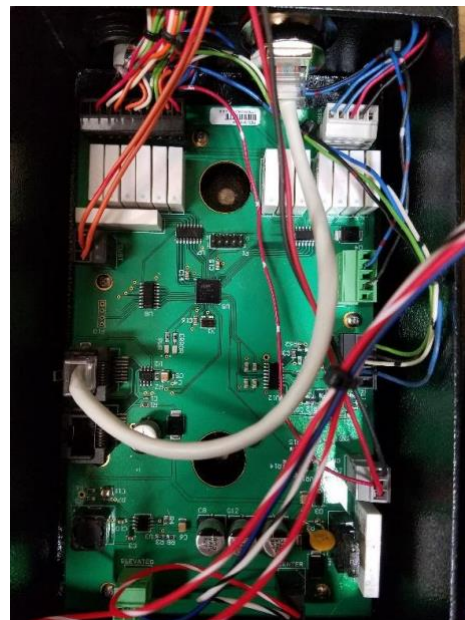
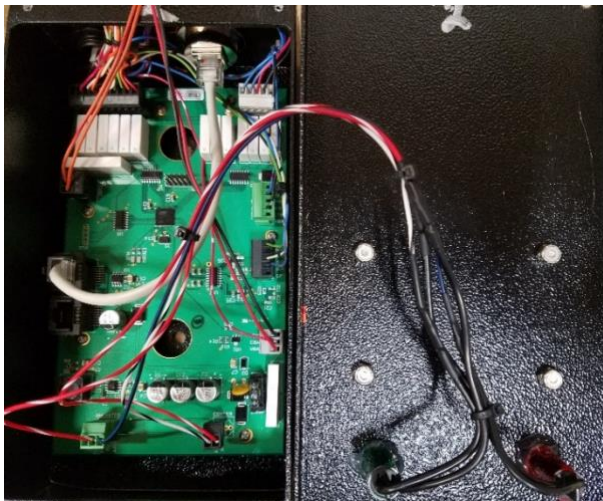
After routing the control cable into the holster through the sealing connector, attach individual wires to the provided connectors and insert the connectors into the proper ports on the circuit board

Warning Device Wiring

Tools Required:

- 3/32" Flathead Screwdriver
- Wire Strippers
- Small Torch or Lighter

Wire the gray 22-20 control cable wires to the small connectors using the wiring schematics provided. There are 2 different schematics, one is the standard version and the other is the version for dual control with wireless controllers or V-Mux control. The standard schematic will be used for V-Mux or any other multiplex system if it is only being used for elevated warning. A V-Mux wiring schematic and circuit board troubleshooting guide are included.



Detaching & Attaching the Controller

1. Loosen the small nut.

2. Loosen the large nut.

3. Gently slide the connector away from the holster.

4. Disconnect the cable by pressing down on the tab and pulling.



Make sure the tab on the ethernet (CAT 5) connector is in the slot before attaching the cord. Lock the large nut, make sure the ethernet cord is pushed all the way in, lastly tighten the small nut onto the cord.

KL409D (KL Slim) Relay Box Wiring

Tools Required:

- 1/8" Flathead Screwdriver
- #2 Phillips Screwdriver
- Wire Strippers
- 7/16" Nut driver or Wrench
- Wire Crimpers
- Large Cable Crimpers
- Bosch Crimpers
- 15/16", 1 1/16", 1 5/8" Wrenches or Channel Locks
- Small torch or lighter

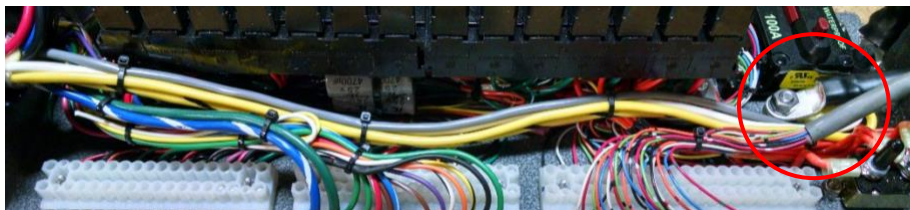
Route Cables from Light Tower to Relaybox



Crimp Large Bosch connectors on the 10 Awg black, red, blue, & orange wires in the larger cable, these are the Lamp Power wires. Insert the Bosch connectors into the open slot in the relay modules and then insert the relays.



Crimp 10-12 Awg / 1/4" ring connectors on the 10 Awg white, gray, yellow, & yellow/black wires in the larger cable, these are the lamp ground wires. Put the rings on the 1/4" ground stud, the 2 Awg black cable will go on top of these.



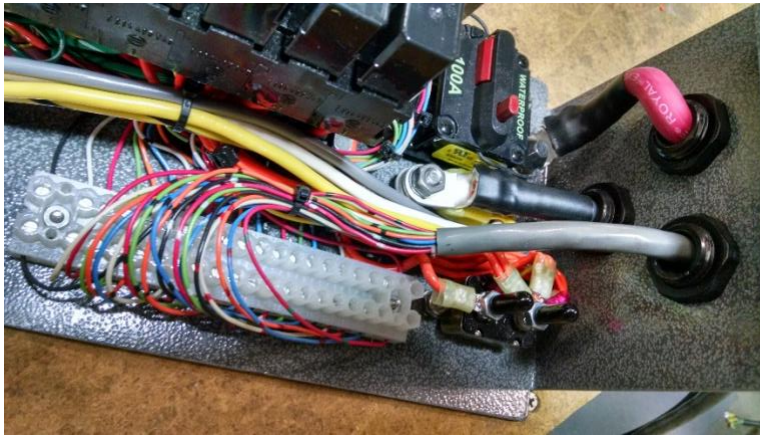
Wire the 10 Awg blue/white and green wires to the middle pole strip in the relaybox. Also wire the smaller cable into the middle pole strip in the relaybox.

Order:

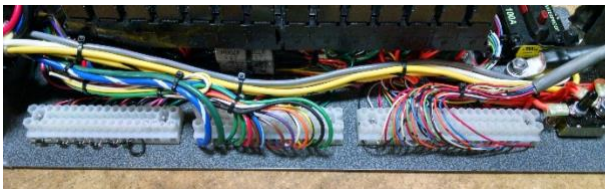
1. 10 Awg Blue/White
2. 10 Awg Green
3. 16 Awg Green/Black
4. 16 Awg Green/White
5. 16 Awg Red/White
6. 16 Awg Brown
7. 16 Awg Blue/White
8. 18 Awg Brown/White
9. 18 Awg Purple
10. 18 Awg White/Black
11. 18 Awg Orange
12. 18 Awg Yellow/Black
13. 18 Awg Black
14. 16 Awg Green



Wire the small gray 22-20 control cable to the 20 pole strip color for color. Crimp the provided 2 Awg / 1/4" hole connectors on the black and red 2 Awg cables, red goes to the open "BAT" stud on the breaker and black goes to the 1/4" ground stud with the lamp ground wires.



Make sure all wires are tied back so they will not be crushed when the relaybox lid is put on.



Maintenance

Cleaning

The **KNIGHT₂** is constructed with corrosion resistant aluminum and stainless steel fasteners. To further enhance corrosion resistance all exposed surfaces receive a powder coated paint finish. To ensure years of trouble free service periodically clean all external surfaces with a mild detergent solution and a gentle spray of water. **DO NOT USE A HIGH-PRESSURE WASHER**, which will force water into sensitive electric circuitry.

Lamp lenses may be cleaned with any commercially available glass cleaner.

Upper and lower stage actuators are sealed units and do not require adjustment or lubrication. The actuators have slip-clutches to compensate for minor stroke tolerances at the limits of its travel as well as internal limit switches. The actuator may produce a ratcheting sound at each end of the stroke which is normal. The actuators should not be made to ratchet excessively, this can lead to premature actuator clutch failure.

All pivot points on the **KNIGHT₂** are self-lubricating thermal polymer. Periodic cleaning with a moisture displacing cleaner and soft bristle brush, without disassembly, to remove accumulated dirt and debris will minimize wear.

Center Switch Adjustment

Caution: For best results, angle of vehicle should be less than 15 degrees.

1. Raise lower section high enough to comfortably work on, and above the set safety limit (i.e. Lights will turn on), then raise lamp tree to a 45 degree angle.
2. Visually verify the centering cam on the rotation spindle is contacting the roller of the center switch arm.
3. Ensure that when the point of the centering cam is aligned with the roller of the center switch arm, there is some play in the center switch arm. Without this play, the switch could be crushed or damaged during rotation.
4. Rotate off center, then press the auto park button and let light tower proceed through sequence until the lamp tree is a couple inches above the nested position, hit emergency stop.
5. Visually determine which side the lamp tree will be hitting the lift arm, then lower lamp tree completely using the motion switch on the handheld controller.
6. Raise lower section above safety limit and to comfortable working height.
7. Loosen screw on center switch cam slightly.
8. Tap centering cam toward the side that the lamp tree is hitting the lift arm.
9. Fully tighten the screw holding the center switch cam.
10. Raise lamp tree to a 45 degree angle, rotate off center.
11. Repeat steps 4-9 until satisfied with centering of the lamp tree.
12. If it looks like center is now adjusted properly, raise lamp tree to a 45 degree angle, and lower stage all the way up, press autopark and let it go through the entire sequence.
13. If it is still hitting off center, repeat previous steps.
14. If problems adjusting center still persist you may need to adjust the center switch bracket, or call Command Light at 1-800-797-7974 for further assistance.

Notes:

- Making a mark next to the cam on the bottom of the spindle will make judging the adjustments much easier.



- With the centering cam slightly loose, it may be easier to adjust its position by tapping on its edge with the assistance of a socket driver rather than attempting to move by hand.
- Having the lamp tree at either extreme of fully up or down, will affect the degree of centering. Setting center while the lamp tree at a 45 degree angle produces the best results.

If problems persist, please call Command Light at 1-800-797-7974.

Rotation Belt Adjustment

1. Raise lamp tree to permit easy access.
2. Remove the (6) screws from the 2-piece midplate cover.
3. Remove the (4) screws that retains the midplate surround cover. Rotate the cover up and away from the main lift arm, around the pivot point.
4. Lower lamp tree fully and rotate away from motor to access rotation motor screws.
5. Loosen, but do not remove, screws that retain rotation motor.
6. Make sure both pulleys are parallel and in alignment with each other. To adjust any misalignment loosen the (2) set screws securing the small drive pulley to motor shaft. Adjust as required and tighten set screws.
7. Belt should fit snugly, neither too loose nor too tight. Avoid any preload, which can cause premature failure.
8. Using a suitable pry bar, apply gentle pressure between rotation motor case and sheet metal motor mount. Use caution to not over tighten drive belt. Rotate lamp tree 180 degrees to verify that belt is not too tight. If belt is too tight, rotation motor noise level will rise noticeably.
9. Replace all covers before returning light tower to active service.

Power Failure

The *KNIGHT₂* can be retracted manually if power to the unit is lost. If power loss is temporary, reestablishing power may be easier than manually retracting the light.

Note: Disconnect power source from the *KNIGHT₂* before manual operation.

Rotate to center

Locate the belly plate on the bottom of the lift arm and remove it by loosening all 4 screws and only removing 2 of them. Disconnect the Red/White and Brown wires from one side of the connecting terminals using a small flat blade screw driver.

Slowly apply pressure to the lamp tree to manually rotate to the centered position. Trying to rotate too quickly or with too much pressure can break the rotation motor shaft. Be certain that you rotate in the proper direction; the upper stage can rotate a full 360°. Generally, you need to rotate the lamp tree in the direction that requires the least amount of travel in order to reach a centered position. If manual rotation causes the rotation belt to slip, this is alright if minimized. Excessive slippage on the belt may cause enough damage for the need of belt replacement.

Retract the lower stage

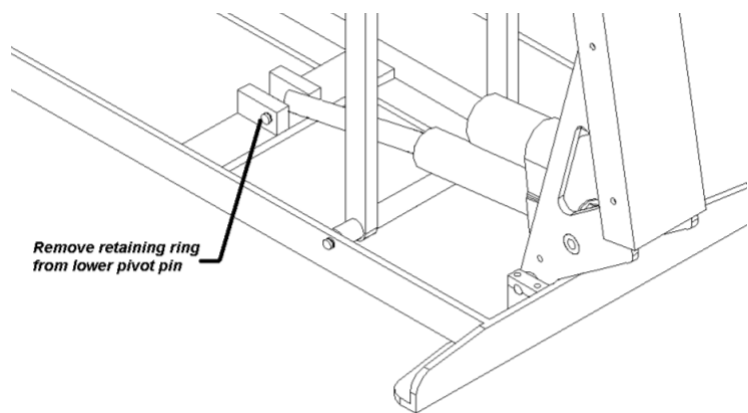
Slowly apply pressure to the rotation platform to manually rotate to the centered position. Trying to rotate the platform too quickly or with too much pressure can break the rotation motor shaft or cause the toothed drive belt to shear a tooth. The upper stage can be rotated in either direction.

Generally, you need to rotate the platform in the direction that requires the least amount of travel in order to center the platform.

Support the midplate assembly with temporary blocking to relieve the tension on the lower actuator pivot pins.

Using a small flat blade screw driver, remove the retaining rings that secure the lower pivot pin in place. New retaining rings must be installed before returning light to service.

Use a brass drift punch to remove the pivot pin from the extension end of the actuator. Avoid using a hardened steel punch which couldpeen the end of the shaft thus damaging the bore within the aluminum pivot blocks.



Note the upper stage of the light weighs in excess of 100 pounds, use caution. Apply upward pressure on the main lift arm to remove support blocking then slowly lower the lift arm allowing the actuator shaft to extend past the lower pivot blocks.

Retract the upper stage.

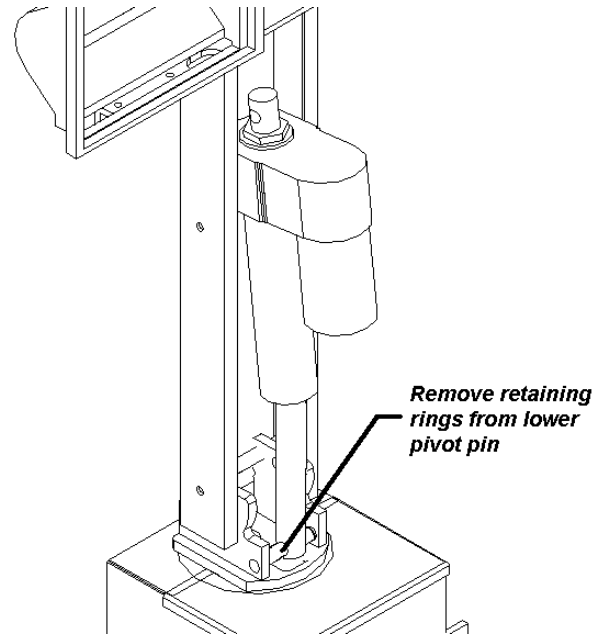
Support the lamp tree with temporary blocking to relieve the tension on the upper actuator pivot pins.

Disconnect the two actuator wires from the connecting blocks located near the bottom bank of lights. The actuator wires are Green/Black and Green/White.

Using a small flat blade screw driver remove the 4 e-clips securing the lower pin of the upper actuator. While supporting the lamp tree, lamp tree weighs between 27 – 46 pounds depending on configuration, use a brass drift to remove the pin.

Lift up on lamp tree to remove support blocking. Rotate the actuator towards the front of the light. The upper stage will not be completely lowered but should provide ample clearance to transport the light.

Cushion and secure the actuators and other components as necessary before transporting.



Troubleshooting

<i>Problem</i>	<i>Possible Cause</i>	<i>Solution</i>
Unit will not extend	No power to the unit	Check power input connections.
	Incorrect installation	Refer to installation instructions.
Upper stage will not rotate	Lower stage not raised above safety limit (16" above base)	Raise lower stage higher.
	Rotation motor failure.	Consult with factory.
Lights will not illuminate.	Lower stage not raised above safety limit (16" above base)	Raise lower stage higher.
	Circuit breaker tripped.	Check circuit breaker at power supply.
	No power to the unit.	Check power supply operation/output.
	Lamp filament broken.	Replace lamp.
Rotation coasts after switch is released	Rotation belt is loose.	Adjust belt to provide no more than ¼" slack
Unit will not nest	Upper stage not centered.	Raise lower stage higher than 16". Center upper stage (green light illuminated)
	Unit being operated on a slope >15°.	Lower lamp tree to horizontal. Using a pike pole, hold unit level while lowering to nest position.
Autopark button must be held in to park unit	Faulty or stuck nest switch.	Check nest switch ground and operation. Rubber boot may have shrunk and is holding in switch.
	Water in electronics.	Remove moisture from ground points and electronics. Do not use a pressure washer to clean unit.
Upper Actuator & Rotation start at the same time	Down limit switch stuck or damaged.	Aluminum plunger which activates down limit switch should move freely. Verify proper switch operation.
No lights or rotation	Check safety limit sensor, bad, etc.	Contact factory for replacement part.
Autopark is off Center	Center switch out of alignment.	Refer to instructions on page 16.



PWR AND ERROR LED GUIDE BOARD REV 5. FIRMWARE 3.1

<p>PWR ERROR</p> <p>FAST FLASH OFF</p>	<p>READY TO GO</p>
<p>PWR ERROR</p> <p>OFF OFF</p>	<p>NO POWER AND/OR NO GROUND CHECK VBAT, CBAT, AND GND TERMINALS. SHOULD HAVE 12-18 VDC CHECK 2 AMP FUSE AT MAIN BOARD</p>
<p>PWR ERROR</p> <p>FAST FLASH 1 SECOND ON 1 SECOND OFF</p>	<p>EXTERNAL E-STOP TRIPPED (IF INSTALLED). CHECK BLACK/RED WIRE. SHOULD HAVE 12-18VDC ALL THE TIME. TERMINATED IN BLACK 5 PIN CONNECTOR, LABELED "STP"</p>
<p>PWR ERROR</p> <p>FAST FLASH 1/2 SECOND ON 1/2 SECOND OFF</p>	<p>COMMUNICATION ERROR. CHECK ALL CAT 5 CONNECTIONS BETWEEN THE MAIN BOARD AND THE KEYPAD BOARD INCLUDING COIL CABLE</p>
<p>PWR ERROR</p> <p>SLOW FLASH OFF</p>	<p>NO CBAT POWER AT 3 PIN GRAY CONNECTOR "CBAT" TERMINAL, CHECK FOR 12-18 VDC AT THIS TERMINAL WITH GENERATOR RUNNING. IF NO POWER, CHECK WIRING CONNECTIONS AT COMMAND LIGHT AND AT MAIN BOARD</p>
<p>PWR ERROR</p> <p>ON STEADY OFF</p>	<p>INDICATES THE BOARD DOES NOT HAVE CONTROL OR WIRING ERROR. CHECK "CTRL" TERMINAL FOR 12-18 VDC AT GREEN 5 PIN CONNECTOR.</p> <p>FOR V-MUX SYSTEMS, CHECK DUAL CONTROL BOARD IS SWITCHING BETWEEN V-MUX AND COMMAND LIGHT CONTROL. IF NOT, CHECK THAT BLUE/RED WIRE IS TERMINATED AT GREEN 5 PIN CONNECTOR "REQ" TERMINAL. VMUX ONLY!!!</p>
<p>PWR ERROR</p> <p>ON STEADY FLASH TWICE</p>	<p>DID NOT TAKE CONTROL WHEN REQUESTED AT LOGIN. V-MUX SYSTEMS - CHECK DUAL CONTROL BOARD CHECK THAT BLUE/RED WIRE IS HOOKED TO GREEN 5 PIN "REQ" TERMINAL ON MAIN BOARD (VMUX ONLY!)</p> <p>CHECK FOR 12-18 VDC AT GREEN 5 PIN, "CNTRL" TERMINAL</p>
<p>ON OFF OFF ON BOTH ON BOTH OFF</p> <p>PWR ERROR PWR ERROR PWR ERROR PWR ERROR</p>	<p>DOES NOT HAVE CBAT PWR. ENSURE GENERATOR IS RUNNING. CHECK FOR 12-18 VDC AT GRAY 3 PIN CONNECTOR TERMINAL "CBAT"</p>
<p>ON OFF OFF ON BOTH ON OFF ON</p> <p>PWR ERROR PWR ERROR PWR ERROR PWR ERROR</p>	<p>COMMUNICATIONS ERROR AND NO CBAT POWER. CHECK ALL CAT 5 CONNECTIONS CHECK FOR 12-18 VDC AT GRAY 3 PIN CONNECTOR LABELED "CBAT"</p>

Technical Specifications – Standard DC Models (409D-H4)

Dimensions (with strobe and ½” mounting spacers) – May vary by model:

	Height(Depth)	Length	Width	
Retracted	12”	51”	13”	
Extended	88”	54”	13”	
Recessed installation	14”	60”	20”	Minimum

Weight:

190 pounds

Wiring:

Main Power VDC	2/2 SO cord	50’ provided
Control wiring	22/20 PVC Jacketed	50’ provided

Relay protection:

Lights	Cole-Hersey	3055	80 amps
Other electrical	Cole-Hersey	3055	40 amp

Current Draw / Power Requirements:

	Average	Generator Requirement
2 x 60 Watt LED	12 VDC/55 amps	1 kW minimum
2 x 270 Watt LED		

Lift actuators and rotation motor will cause higher current draw during use.

Motor Duty Cycle:

(All motors thermally protected, specifications are to thermal relay trip):

Lower stage	1:3 (90 seconds maximum per 5 minute)
Upper stage	1:3 (90 seconds maximum per 5 minute)
Rotation	5-6 Revolutions

Motor Speed:

Lower stage	1.0 inches per minute	12 seconds to full extension
Upper stage	0.5 inches per minute	12 seconds to full extension
Rotation	2.75 RPM at lamp tree	

Operation:

Angle of vehicle 15° maximum incline

Wind load:

Design maximum	60 mph
Maximum tested	55 mph

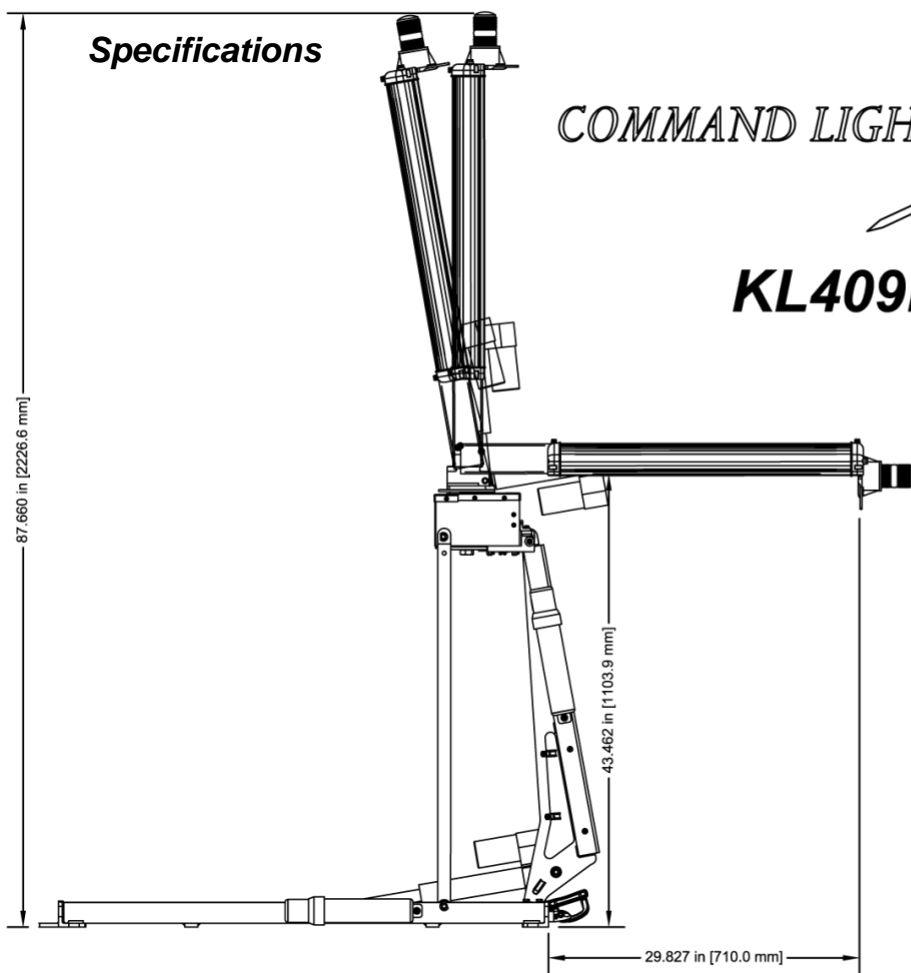
Specifications

COMMAND LIGHT

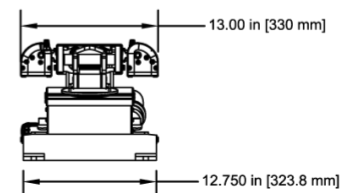
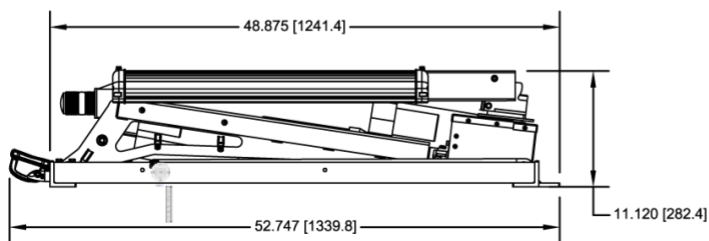
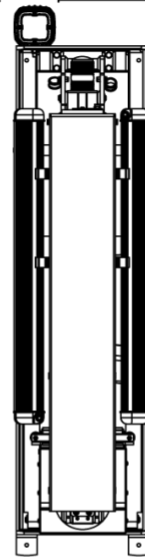
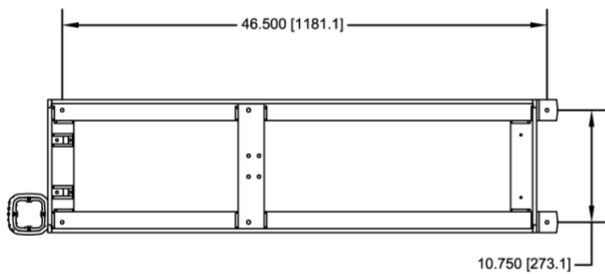
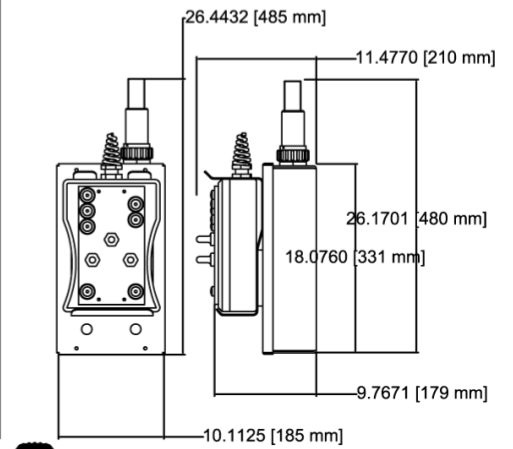


KNIGHT

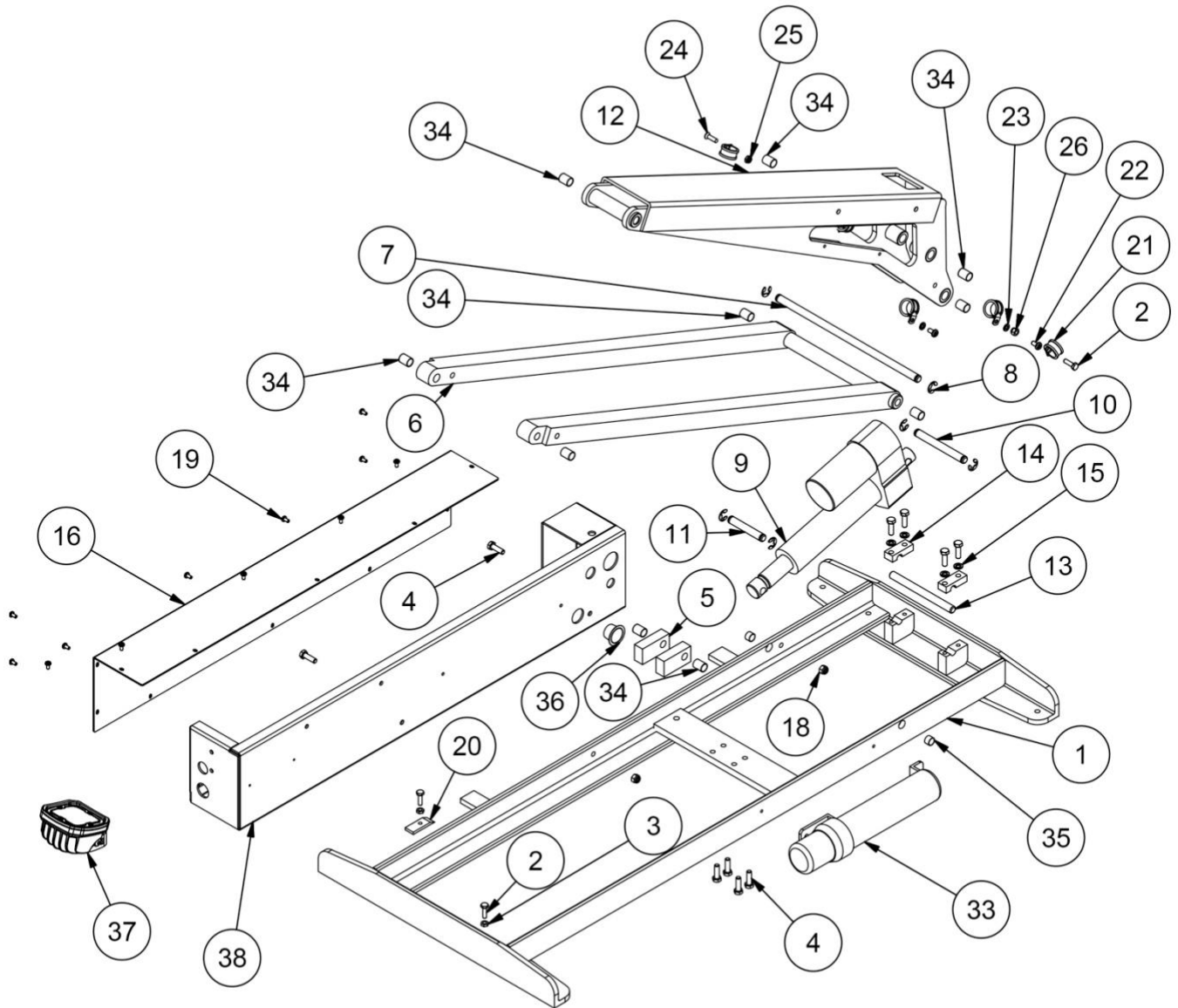
KL409D-H4



MINIMUM CLEARANCES
FOR CONTROL & HOLSTER
INSTALLATION



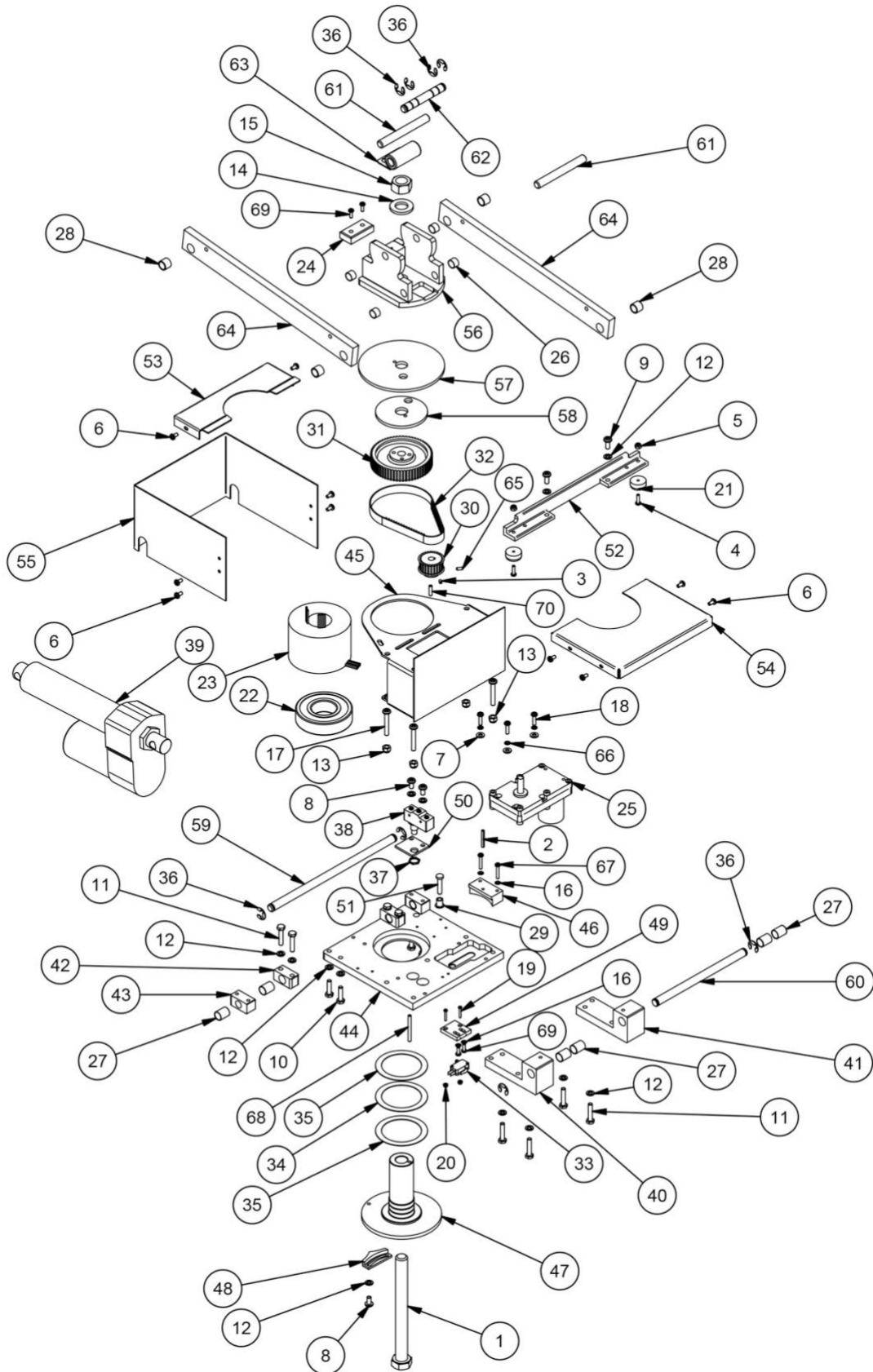
Exploded View (Lower Stage)



Parts List (Lower Stage)

PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	075-01000A	FRAME, COMPLETE, WELDMENT, KNIGHT2
2	2	STD HARDWARE-HHCS-05	SCREW,HH,1/4-20x7/8,SS
3	2	STD HARDWARE-N-001	Nut,HEX,FULL,1/4-20UNC,SS
4	8	STD HARDWARE-HHCS-32	SCREW,HH,5/16-18x1,SS
5	2	075-01600	BLOCK,PIVOT,LOWER ACTUATOR, KNIGHT2
6	1	075-01700W	ARM, STABILIZER, WELDMENT, KNIGHT2
7	1	075-06010	PIN,STABALIZER,LOWER
8	6	SSER-22	E-Ring, 5133-50, .044T, SS
9	1	075-06050	PIN,LOWER ACTUATOR,UPPER LIFT ARM
10	1	075-06080	PIN,LOWER ACTUATOR, BASE PIN
11	1	075-02000WR	ARM,LIFT,KNIGHT,2GEN
12	1	075-06040	PIN,MAIN LIFT,LOWER,KNIGHT2
13	2	075-01300	CAP,MAIN LIFT PIN
14	8	STD HARDWARE LW39	WASHER,LOCK,SPRING,REGULAR, 5/16", SS
15	1	075-07300	COVER,RELAY BOX,KL4XX
16	2	STD HARDWARE-HHCS-30	SCREW,HH,5/16-18x3/4,SS
17	2	034-11057	NUT,NYLOCK, 5/16-18 UNC,SS
18	12	STD HARDWARE--55	SCREW,PHP,10-24 UNCx0.375
19	1	075-06500	STRIKE PLATE,DELIRIN
20	5	065-12861	CLAMP,LOOM,#8,SS
21	4	STD HARDWARE--80	SCREW,PHP,1/4-20 UNCx0.5
22	4	STD HARDWARE LW35	WASHER,LOCK,SPRING,REGULAR, 1/4", SS
23	4	STD HARDWARE-FHMS-131	SCREW,FHPMS,1/4-20 UNC x 7/8 in,SS
24	1	034-11116	NUT,NYLOCK,THIN, 1/4-20 UNC,SS
25	2	034-11033	NUT,NYLOCK, 1/4-20 UNC,SS
26	2	STD HARDWARE-HHCS-04	SCREW,HH,1/4-20x3/4,SS
27	1	Assembly	
28	1	075-07201	SIDE,2,RELAY BOX,KL4XX
29	1	075-07202	BOX,RELAY,SIDE 2,KV2
30	1	075-07203	BOX,RELAY,BASE,KL4XX
31	1	075-07001	PLATE,SWITCH,RELAY BOX
32	2	065-15000	CANISTER,DOCUMENT,BLACK
33	1	065-15355	ACTUATOR,LOWER 6 IN
34	4	STD HARDWARE--90	SCREW,PHP,5/16-18 UNCx0.625
35	4	065-13845	BUSHING. .5 X.375 X .03125
36	10	065-13846	BUSHING, .5 X .75 X .03125
37	1	065-12854	STRAIN RELIEF,DOMED,SCR .51-.71,3/4 NPT,BLACK
38	1	065-12852	STRAIN RELIEF,DOMED,SCR .24-.47,1/2 NPT,BLACK
39	1	065-14783	LOOK UP LIGHT,HI VIZ,4 RND,48 IN CABLE
40	1	075-08084W	FRAME, COMPLETE, WELDMENT, KL SLIM
41	1	Lookup_Light_RTb	LOOKUP LIGHT,LED, KNIGHT,SHADOW
42	1	STD HARDWARE-MHHCS-61	SCREW,HH,M8x1.25x30,SS
43	1	STD HARDWARE--NNM3	NUT,NYLOCK, 8mm,SS
44	2	065-12367	CLAMP,LOOM,#12,SS
45	2	STD HARDWARE W23	WASHER,FLAT,SAE, 5/16", SS

Exploded View (Midplate)

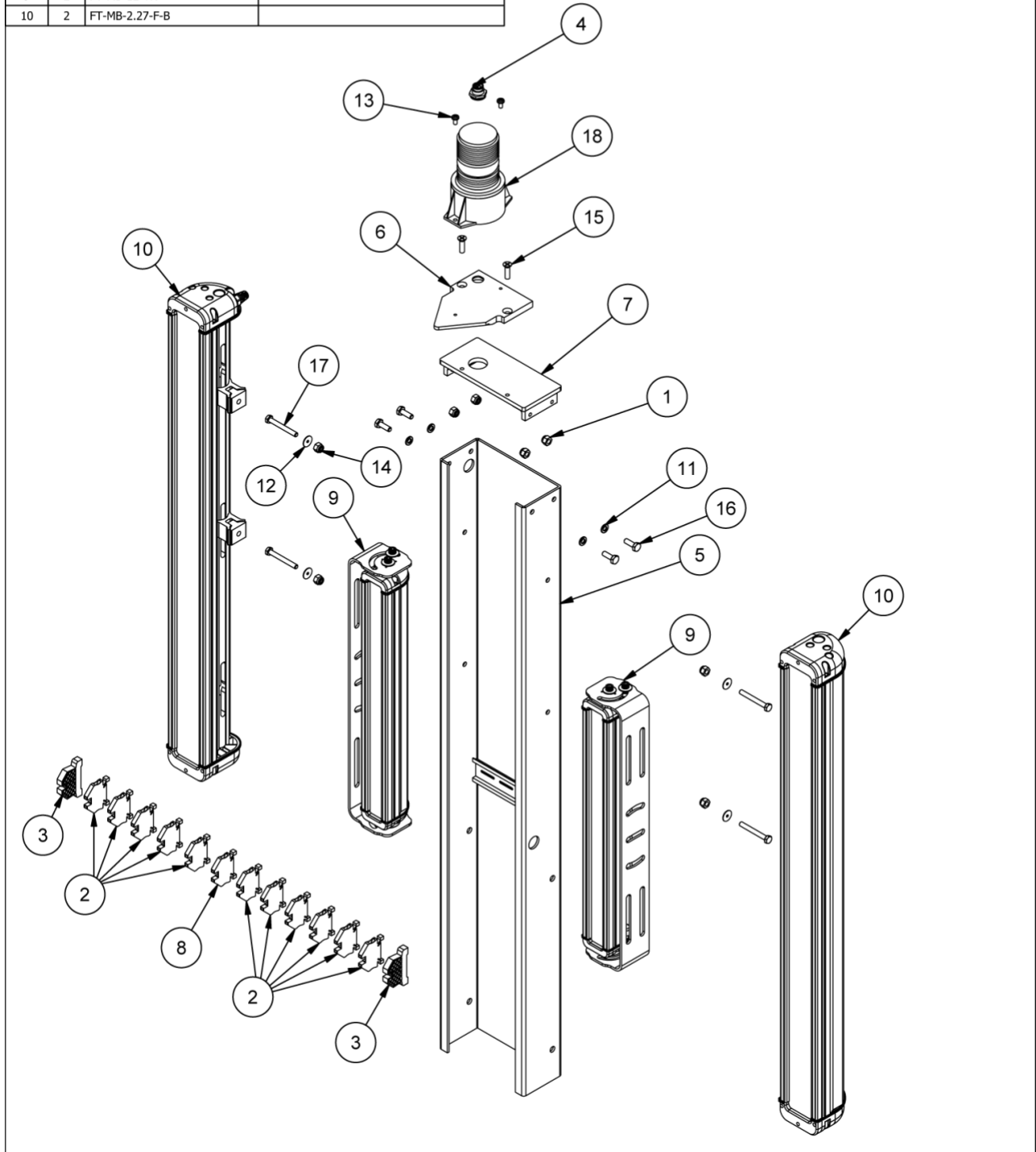


USER GUIDE

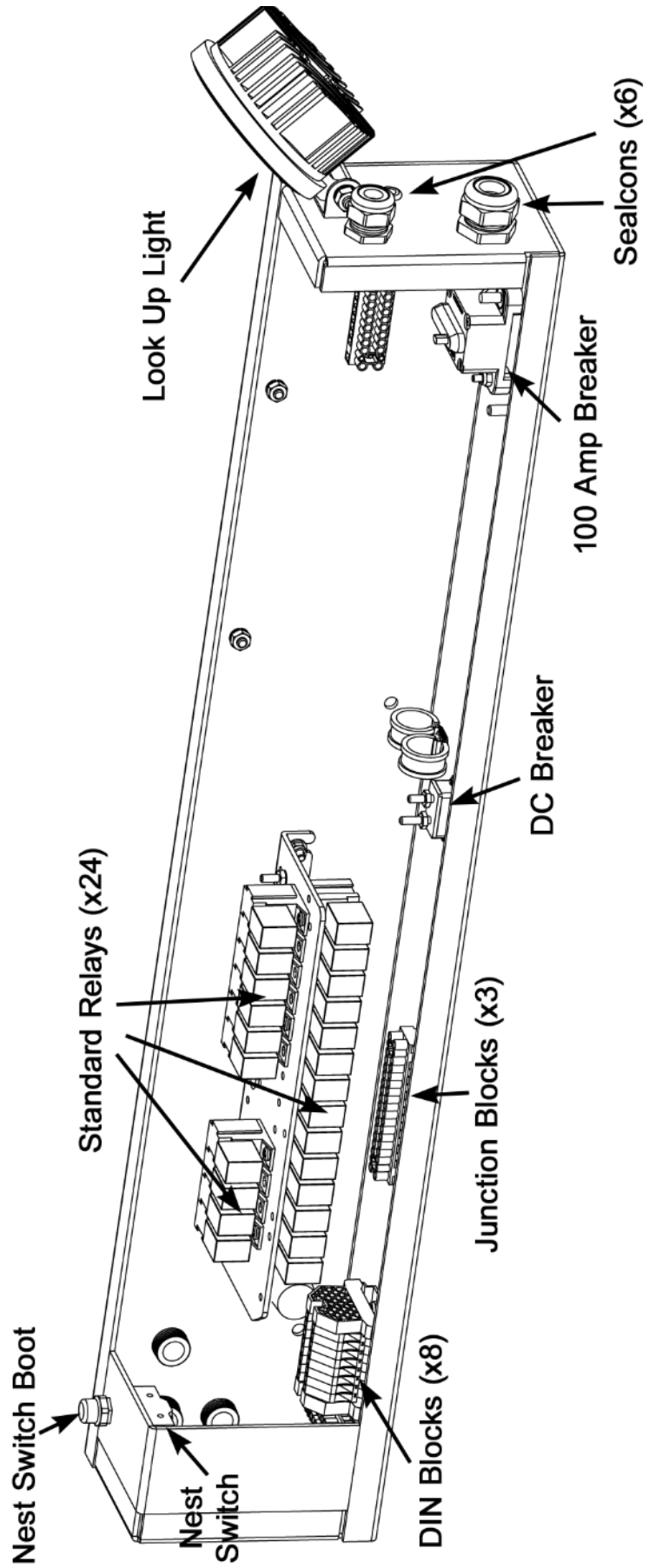
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	032-10116	SCREW,HH,3/4-20x7 3/8 ,SS
2	1	034-10101	ROLL PIN, 5/32 x 1 1/4, SS, CL - KL
3	1	034-10936	8-32 UNC x 1/4 SH Set Screw SS
4	2	034-10940	SCREW,PHP,8-32 UNCx0.625
5	2	034-10951	NUT,NYLOCK, 8-32 UNC,SS
6	10	034-10961	SCREW,PHP,10-24 UNCx0.375
7	3	034-10977	WASHER,FLAT,USS, #10, SS
8	3	034-11001	SCREW,PHP,1/4-20 UNCx0.5
9	2	034-11002	SCREW,PHP,1/4-20 UNCx0.625
10	4	034-11017	SCREW,HH,1/4-20x1,SS
11	8	034-11018	SCREW,HH,1/4-20x1-1/4,SS
12	17	034-11028	WASHER,LOCK,SPRING,REGULAR, 1/4", SS
13	4	034-11033	NUT,NYLOCK, 1/4-20 UNC,SS
14	1	034-11108	WASHER,FLAT,SAE, 3/4", SS
15	1	034-11150	Nut,HEX,FULL,3/4-10UNC,SS
16	4	034-11175	WASHER,LOCK,18-8SS,INTERNAL,#8
17	4	034-12959	SCREW,PHP,1/4-20 UNCx1.75
18	3	034-13039	SCREW,PHP,10-32 UNFx0.75
19	2	034-13288	SCREW,PHP,4-40 UNCx0.75
20	2	034-13672	NUT,NYLOCK, 4-40 UNC,SS
21	2	065-10577	FEET, RUBBER, ROUND, 0638-MW
22	1	065-12800	BEARING,SS,S6308-2RS,KL
23	1	065-12817	SLIP RING, LITTON, AC4837-12
24	1	065-13013	FEET, RUBBER, RECTANGULAR, CL
25	1	065-13829	MOTOR, LOW GEAR, 12V, CL, KL
26	4	065-13845	BUSHING, .5 X .375 X .03125
27	8	065-13846	BUSHING, .5 X .75 X .03125
28	4	065-13847	BUSHING, .500 X .500 X .0625
29	1	065-13854	BUSHING, .25x.5x.0625,FLANGED,THRML POLYM
30	1	069-14151	PULLEY, MOTOR, CL8XX - BL, KL4XX - ROT
31	1	069-14152	Pulley, 5mm Pitch, 15mm Wide, Knight2
32	1	069-14153	BELT,TIMING,GATES,KL
33	1	069-14229	SWITCH,SPDT,5A,250V,ON-MOM,QC
34	1	069-15334	BEARING, NEEDLE, NTA-4052,KL
35	2	069-15335	RACE, TORRINGTON, TRA-4052, KL
36	8	069-15336	E-Ring, 5133-50, .044T, SS
37	2	069-15360	NUT,SWITCH, DOWN LIMIT / NEST / BL LIMIT
38	1	069-15360	SWITCH, DOWN LIMIT / NEST / BL LIMIT
39	1	069-15383	ACTUATOR,UPPER,KL
40	1	075-03000	PIVOT,RIGHT,UPPER,MAIN LIFT,KNIGHT2
41	1	075-03002	PIVOT,LEFT,UPPER,MAIN LIFT,KNIGHT2
42	2	075-03003	BLOCK, PIVOT,INSIDE,STABILIZER, KNIGHT2
43	2	075-03100	BLOCK, MIDPLATE PIVOT, KNIGHT2
44	1	075-03200	MIDPLATE, ROTATION, KNIGHT V2
45	1	075-03209W	MOUNT,ROTATION,MOTOR,KLxxx,R3
46	1	075-03300	Block, Retainer, Slip Ring, Knight2
47	1	075-03400	Spindle, Rotation, Knight2
48	1	075-03410	PLATE, CAM SWITCH
49	1	075-03500	Plate, Center Switch, Knight2
50	1	075-03510	Plate, Down Limit Switch, Knight2
51	1	075-03520	PLUNGER,DOWN LIMIT,KL4xx
52	1	075-03531	STOP, MIDPLATE, EXTENDED, KL2
53	1	075-03600	COVER,FRONT,MIDPLATE SURROUND,KL2
54	1	075-03605	COVER,FRONT,SURROUND,KV2
55	1	075-03610	SURROUND,MIDPLATE,KV2
56	1	075-04000	SADDLE, ROTATION, WELDMENT, KNIGHT2
57	1	075-04300	DISK,ROTATION,UPPER,KV2
58	1	075-04310	DISK,ROTATION,LOWER,KV2
59	1	075-06021	PIN,STABILIZER, REINFORCED,UPPER,KV2
60	1	075-06031	PIN,MAIN LIFT,UPPER REINFORCED,KV2
61	2	075-06060	Pin, Tree Mount, Knight2
62	1	075-06070	PIN, UPPER ACTUATOR, LOWER, KL4XX
63	1	075-06122	GUIDE,WIRE, LONG, KL4XX
64	2	075-25000	Arm, Mount, Tree, Knight2
65	1	034-13084	8-32 UNC x 3/8 SH Set Screw SS
66	3	034-10979	WASHER,LOCK,SPRING,REGULAR, #10, SS
67	2	034-10942	SCREW,PHP,8-32 UNCx1
68	1	069-15376	DOWEL PIN, 3/16 X 2, STEEL
69	4	034-10939	SCREW,PHP,8-32 UNCx0.5
70	1	034-10112	10-24 UNC x 3/4 SH Set Screw SS

Exploded View (Lamp Tree)

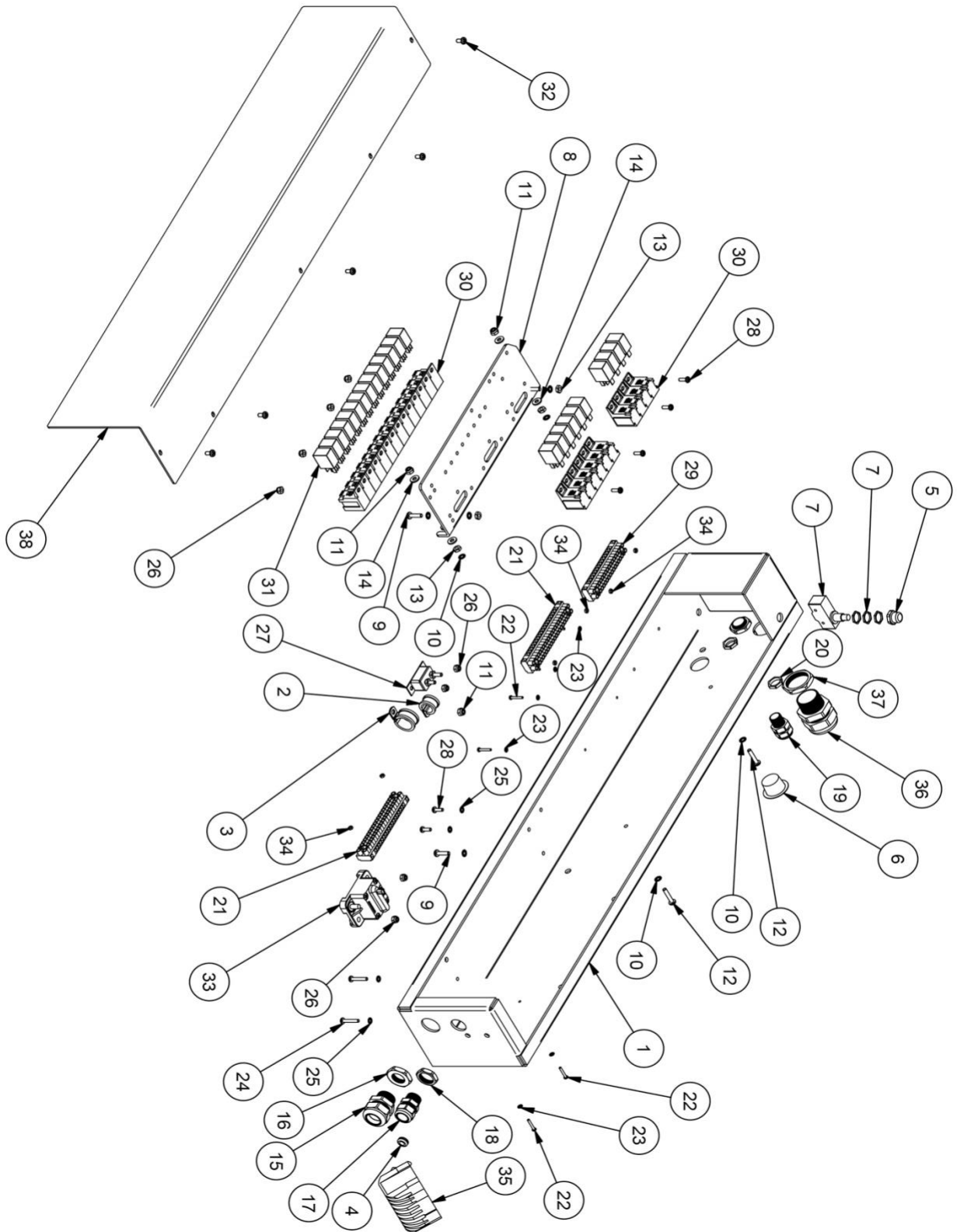
PARTS LIST				PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	4	034-11033	NUT,NYLOCK, 1/4-20 UNC,SS	11	4	STD HARDWARE LW35	WASHER,LOCK,SPRING,REGULAR, 1/4", SS
2	11	065-10069	BLOCK,TERMINAL,DIN,DN-T10-BLACK	12	4	STD HARDWARE W13	WASHER,FLAT,FENDER, #6, SS
3	2	065-10075	BRACKET,END,DIN,DN-EB35	13	2	STD HARDWARE--55	SCREW,PHP,10-24 UNCx0.375
4	1	069-15352	CONXALL, MINICON, 2 PIN, PANEL	14	4	STD HARDWARE--NNM2	NUT,NYLOCK, 6mm,SS
5	1	075-05301KLS	TREE,LAMP,KL SLIM,WELDMENT	15	2	STD HARDWARE-FHMS-131	SCREW,FHPMS,1/4-20 UNC x 7/8 in,SS
6	1	075-05400	Plate, Nest, Tree, Knight2	16	4	STD HARDWARE-HHCS-04	SCREW,HH,1/4-20x3/4,SS
7	1	075-08090W	MOUNT, STROBE, KL SLIM, WELDMENT	17	4	STD HARDWARE-MHHCS-36	SCREW,HH,M6x1.0x50,SS
8	1	DN-T10-GREEN_BLACK	BLOCK,TERMINAL,DIN,DN-T10-GREEN	18	1	Strobe	STROBE, PRE-WIRED, INDICATE COLOR
9	2	FT-MB-12-TR					
10	2	FT-MB-2.27-F-B					



RELAY BOX TERMINOLOGY



Exploded View (Relay Box)

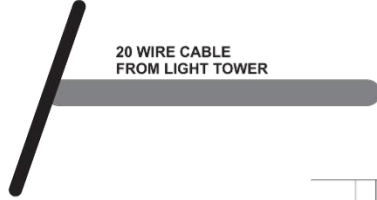


Parts List (Relay Box)

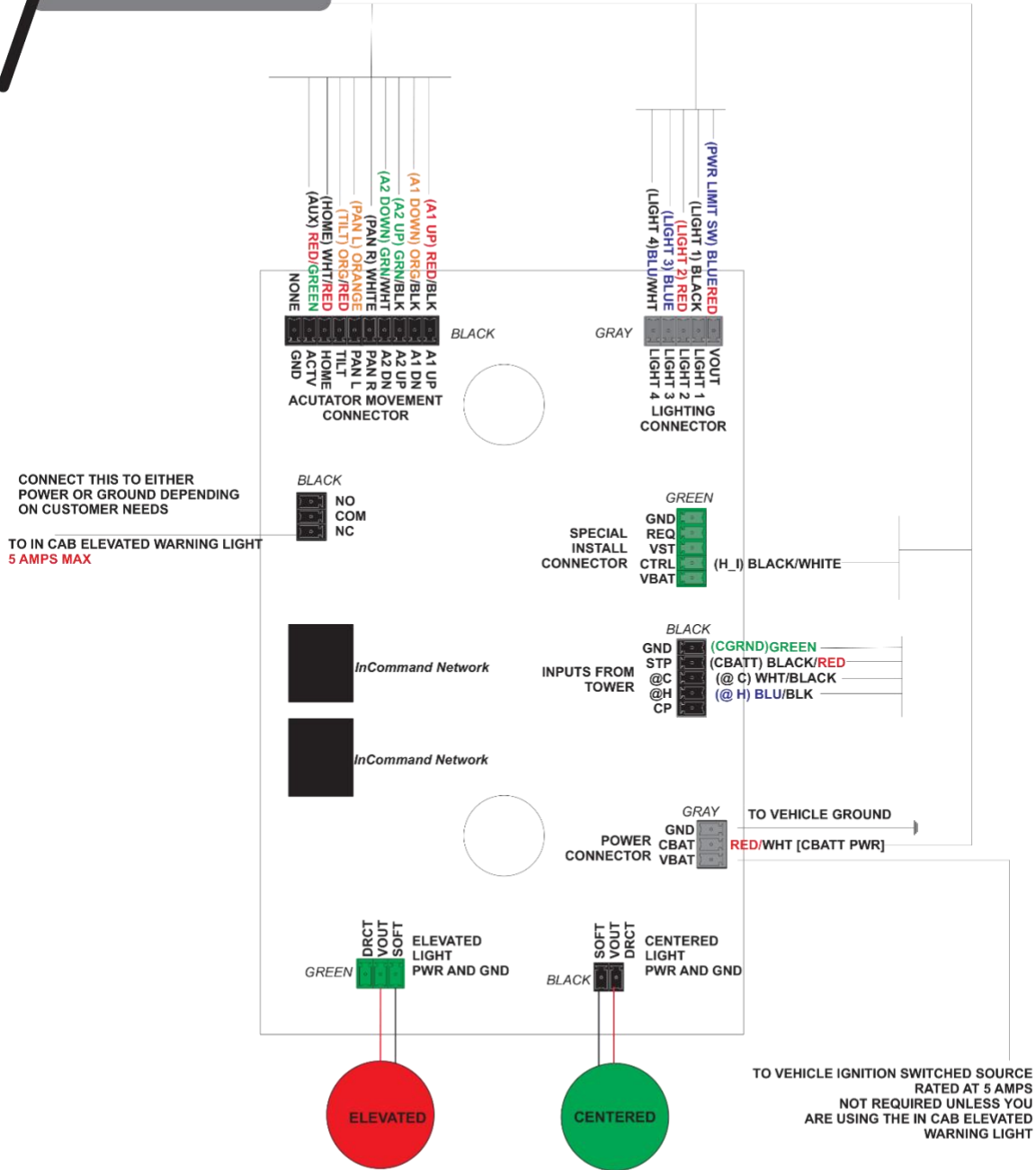
PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	075-07203	WELDMENT, BOX, RELAY, BASE, KL4XX
2	1	065-12365	CLAMP, LOOM, #6, SS
3	1	065-12861	CLAMP, LOOM, #8, SS
4	1	9600K15	GROMMET, PUSH-IN, 0.2812 ID, 0.5625 OD, 0.0625 GROOVE
5	1	065-12935	BOOT, PUSHBUTTON, BLK, BACK LIGHTS
6	1	065-13851	PLUG, RELAYBOX, KNIGHTLIGHT
7	1	069-15360	SWITCH, DOWN LIMIT / NEST / BL LIMIT
8	1	075-07100	PLATE, RELAY MOUNT, KNIGHT V2
9	3	034-10966	SCREW, PHP, 10-24 UNCx0.75
10	9	034-10978	WASHER, LOCK, 18-8SS, INTERNAL, #10
11	3	034-10981	NUT, NYLOCK, 10-24 UNC, SS
12	2	034-10968	SCREW, PHP, 10-24 UNCx1
13	4	034-13100	NUT, MS, HEX2, 10-24UNC, SS
14	4	034-10977	WASHER, FLAT, SAE, #10, SS
15	1	065-12854	STRAIN RELIEF, DOMED, SCR .51-.71, 3/4 NPT, BLACK
16	1	065-12857	LOCKNUT, NYLON, 3/4 NPT, BLACK
17	2	065-12852	STRAIN RELIEF, DOMED, SCR .24-.47, 1/2 NPT, BLACK
18	2	065-12856	LOCKNUT, NYLON, 1/2 NPT, BLACK
19	1	065-12875	STRAIN RELIEF, DOMED, SCR .16-.31, 3/8 NPT, BLACK
20	2	065-12831	LOCKNUT, NYLON, 3/8 NPT, BLACK
21	2	065-12890	STRIP, BARRIER, 20 POLE
22	6	034-13288	SCREW, PHP, 4-40 UNCx0.75
23	6	034-14283	WASHER, LOCK, 18-8SS, INTERNAL, #4
24	2	034-10942	SCREW, PHP, 8-32 UNCx1
25	4	034-11175	WASHER, LOCK, 18-8SS, INTERNAL, #8
26	8	034-10951	NUT, NYLOCK, 8-32 UNC, SS
27	1	065-13529	BREAKER, 12V 20A, SINGLE POLE
28	6	034-10939	SCREW, PHP, 8-32 UNCx0.5
29	1	065-12828	TERMINAL STRIP, 16 POLE
30	24	065-13730	Socket, Single Pole, Relay
31	24	065-13738	RELAY, 12V, SINGLE POLE
32	5	034-10961	SCREW, PHP, 10-24 UNCx0.375
33	1	065-13507	BREAKER, 100 AMP, MANUAL RESET
34	6	034-13100	NUT, MS, HEX2, 4-40UNC, SS
35	1	065-14784	LOOK UP LIGHT, 4 RD, 48 IN CABLE, TECNIQ
36	1	065-12792	STRAIN RELIEF, DOMED, SCR .71-.98, 1 NPT, BLACK
37	1	065-12791	LOCKNUT, NYLON, 1 NPT, BLACK
38	1	075-08099W	LID, RELAY BOX, KL4XX, CONFINED SPACE

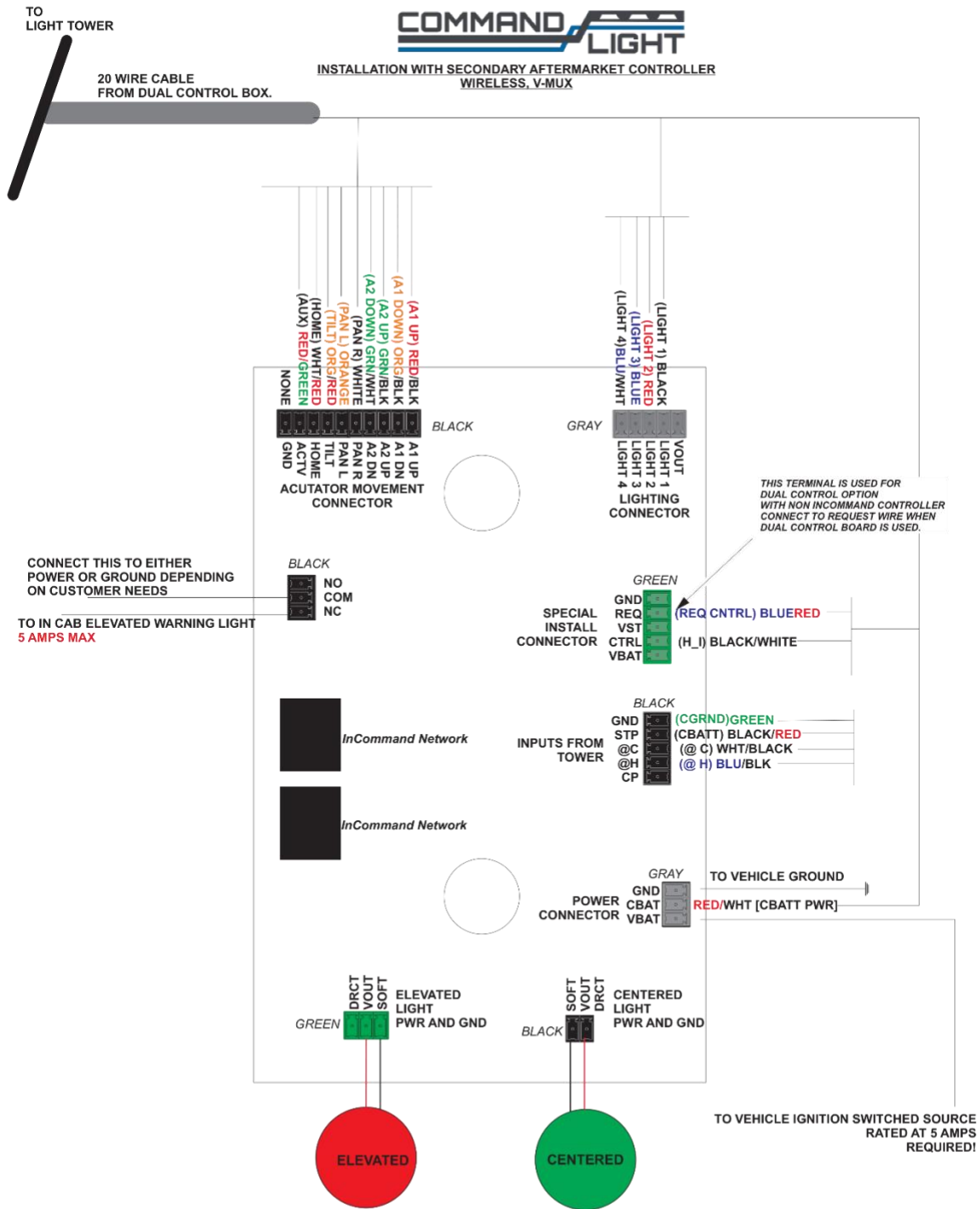
Holster Box

TO LIGHT TOWER



STANDARD INSTALLATION

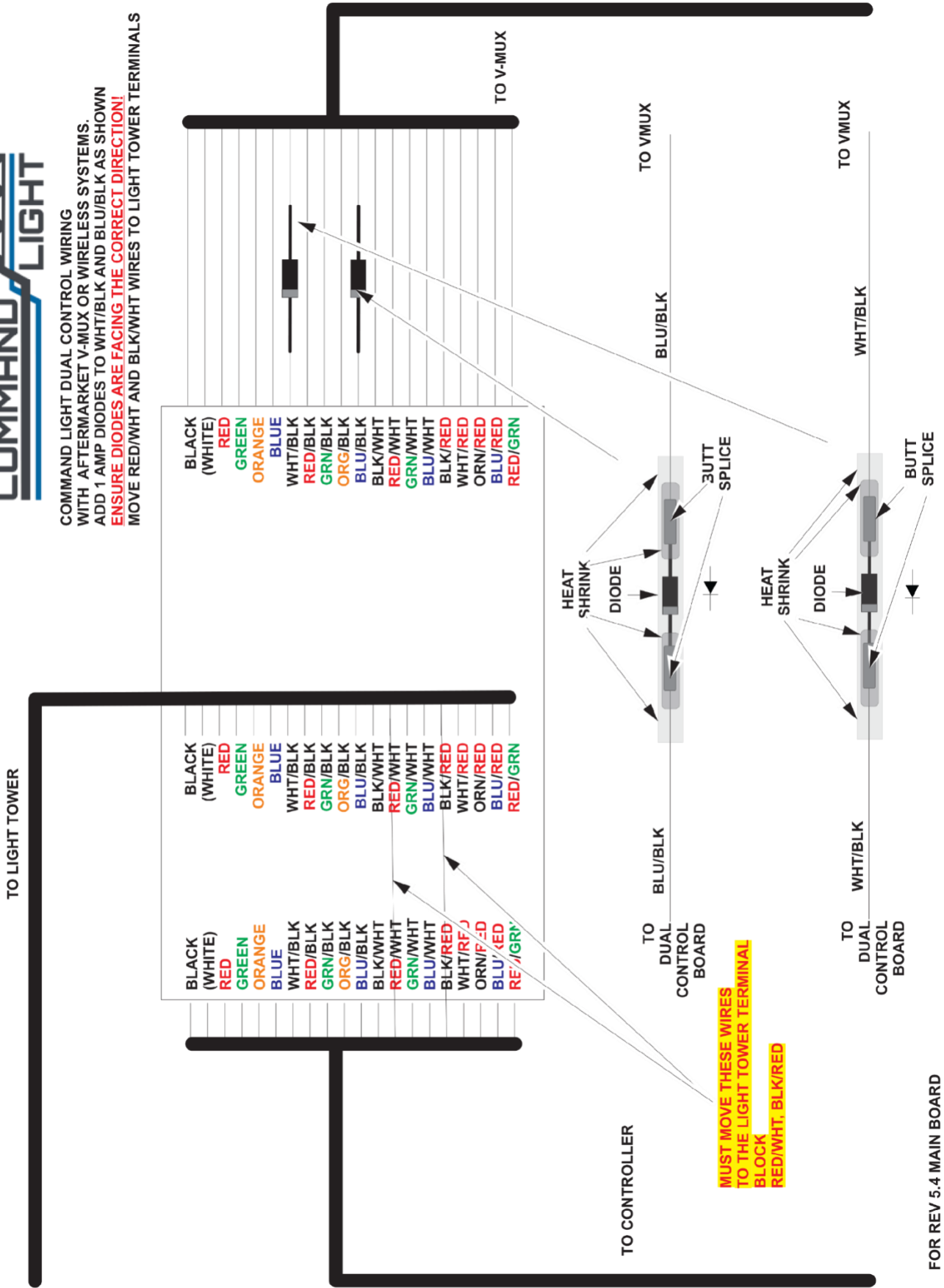




FOR USE WITH ALL COMMAND LIGHT MODELS
 MAIN BOARD REV 5.4, DIAGRAM REV 3

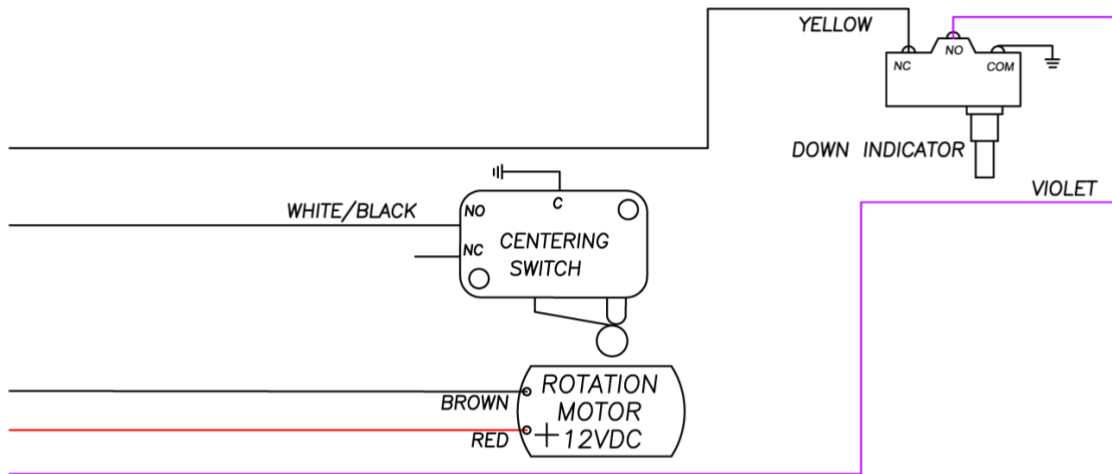
COMMAND LIGHT

COMMAND LIGHT DUAL CONTROL WIRING WITH AFTERMARKET V-MUX OR WIRELESS SYSTEMS. ADD 1 AMP DIODES TO WHT/BLK AND BLU/BLK AS SHOWN. **ENSURE DIODES ARE FACING THE CORRECT DIRECTION!** MOVE RED/WHT AND BLK/WHT WIRES TO LIGHT TOWER TERMINALS



FOR REV 5.4 MAIN BOARD WITH FIRMWARE 3.1 ONLY!!

Midplate
COMMAND LIGHT KNIGHT²
 3/7/2017 DC STROBE



TO RELAY BOX

GREEN/WHITE	SLIP RING	UPPER ACTUATOR RETRACT	GREEN/WHITE
GREEN/BLACK		UPPER ACTUATOR EXTEND	GREEN/BLACK
GREEN		GROUND	GREEN
BLUE/WHITE		+12 VDC STROBE	BLUE/WHITE
WHITE		UPPER LEFT LAMP -	WHITE
GRAY		UPPER RIGHT LAMP -	GRAY
YELLOW		LOWER LEFT LAMP -	YELLOW
BLUE		LOWER LEFT LAMP +	BLUE
RED		UPPER RIGHT LAMP +	RED
BLACK		UPPER RIGHT LAMP +	BLACK
ORANGE		LOWER RIGHT LAMP +	ORANGE
YELLOW/BLACK	LOWER RIGHT LAMP -	YELLOW/BLACK	

TO LAMP TREE

MIDPLATE

Lamp Tree

