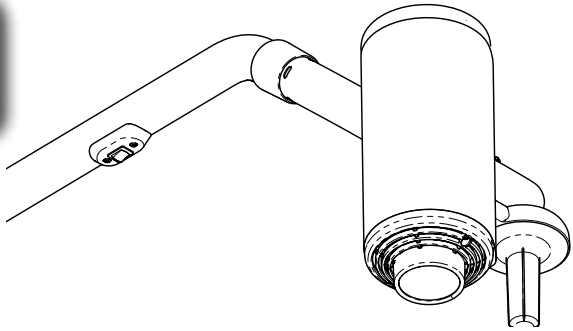




# Troubleshooting Guide: 354 Lights



Contents	Description	Refer To:
<b>Troubleshooting</b>	-	<a href="#"><u>Troubleshooting Chart</u></a>
<b>Adjustments / Repair Procedures</b>	<i>Bulb</i>	<a href="#"><u>Replacing the Bulb</u></a>
	<i>Fuse(s)</i>	<a href="#"><u>Replacing the Fuse (Ceiling)</u></a>
		<a href="#"><u>Replacing the Fuses (Wall)</u></a>
		<a href="#"><u>Replacing the Fuse (Mobile 120V)</u></a>
		<a href="#"><u>Replacing the Fuses (Mobile 230V)</u></a>
	<i>Lamp Tube</i>	<a href="#"><u>Lamp Tube Brake Adjustment</u></a>
		<a href="#"><u>Lamp Tube Pivot Stop Replacement</u></a>
	<i>Cross Tube</i>	<a href="#"><u>Cross Tube Counterbalance Adjustment</u></a>
		<a href="#"><u>Cross Tube Removal / Installation</u></a>
	<i>Down Tube</i>	<a href="#"><u>Down Tube Removal / Installation</u></a>
	<i>Lighthouse</i>	<a href="#"><u>Lighthouse Brake Adjustment</u></a>
		<a href="#"><u>Lighthouse Removal / Pivot Bearing Replacement</u></a>
	<i>Ball Pivot Bearing</i>	<a href="#"><u>Ball Pivot Adjustment</u></a>
		<a href="#"><u>Ball Pivot Repair</u></a>
<a href="#"><u>Ball Pivot Stop Replacement</u></a>		
<i>Main Pivot Stop</i>	<a href="#"><u>Main Pivot Stop Replacement</u></a>	

TP210 Rev. A

# Troubleshooting Chart

<b>Problem</b>	<b>Symptom</b>	<b>Probable Cause</b>	<b>Check</b>	<b>Solution</b>
<b>Light will not illuminate. Fan does not function.</b>	Light / fan do not function. ON / STANDBY switch is ON.	Facility circuit breaker is tripped.	Check facility circuit breaker.	Reset circuit breaker.
		Line fuses(s) blown.	Inspect fuses. If replaced fuse blows, check incoming power.	Replace fuse(s). <a href="#">Ceiling Mtd Lights</a> <a href="#">Wall Mtd. Lights</a> Mobile Lights: (120V) (230V) Contact certified electrician.
		Fuse holder malfunctioning.	Perform continuity check on fuse holder.	Replace fuse holder.
		ON / STANDBY switch malfunctioning.	Perform continuity check on switch.	Replace ON / STANDBY switch.
		Transformer malfunctioning.	With the ON / STANDBY switch ON, check for 20.82 +/-0.62 VAC across output leads of transformer.	If proper voltage is <u>not</u> present, <a href="#">replace transformer</a> .
			Confirm power supply. If wired through florescent fixture can affect life of transformer.	Correctly wire direct and replace defective transformer.
			Check if customer has wired to a non-tested dimmer control.	Correct dimmer and replace defective transformer.
	Damaged / disconnected wiring in the arm assemblies.	Perform continuity check on wiring from transformer to lighthouse.	Repair / replace any damaged or disconnected wiring. ( <a href="#">Wiring Diagrams</a> )	
Light / fan do not function, or function intermittently when lighthouse or arm assemblies are moved.	Damaged / disconnected wiring in the arm assemblies.	Perform continuity check on wiring from transformer to lighthouse.	Repair / replace any damaged or disconnected wiring. ( <a href="#">Wiring Diagrams</a> )	
<b>Light will not illuminate. Fan functions properly.</b>	Light does not function. Fan functions properly. ON / STANDBY switch is ON.	Incorrect bulb.	Inspect and confirm 21V, 150W bulb	<a href="#">Replace bulb</a> .
		Bulb is burned out.	Inspect bulb.	<a href="#">Replace bulb</a> .
		Damaged / disconnected wiring in the lighthouse.	Inspect wiring in lighthouse.	Repair / replace any damaged or disconnected wiring. ( <a href="#">Wiring Diagrams</a> )
		Bulb socket corroded resulting in bad connection, or high resistance.	Inspect / clean bulb socket.	<a href="#">Replace bulb socket</a> .
<b>Fan does not function. Light works properly.</b>	Fan does not function. Light functions properly. ON / STANDBY switch is ON.	Damaged / disconnected wiring in the lighthouse.	Inspect wiring in lighthouse.	Repair / replace any damaged or disconnected wiring. ( <a href="#">Wiring Diagrams</a> )
		Fan malfunctioning.	Inspect fan. Also, check for heat damaged lenses.	<a href="#">Replace fan</a> . If necessary, <a href="#">replace lens(es)</a> .
<b>Lighthouse will not operate properly.</b>	Lighthouse assembly illuminates, but not at the proper intensity.	Incorrect bulb.	Inspect and confirm 21V, 150W bulb	<a href="#">Replace bulb</a> .
		Bulb malfunctioning.		
		Wrong input tap is being used on transformer, or facility voltage has changed since installation.	Check facility input voltage & transformer input tap being used.	<a href="#">Select proper transformer input tap</a> based on facility voltage.
		Transformer malfunctioning	With the ON / STANDBY switch ON, check for 20.82 +/- 0.62 VAC across output leads of transformer.	If proper voltage is <u>not</u> present, <a href="#">replace transformer</a> .
		Bulb socket corroded resulting in bad connection, or high resistance.	Inspect / clean bulb socket.	<a href="#">Replace bulb socket</a> .
		Lenses are clouded, dirty, or damaged.	Inspect lenses.	<a href="#">Replace lenses</a> .

TP210 Rev. A

## Troubleshooting Chart - continued

Problem	Symptom	Probable Cause	Check	Solution
<b>Light will not focus.</b>	Adjustment lever does not control brightness / beam size.	Iris diaphragm malfunctioning.	Inspect iris diaphragm.	<a href="#">Replace iris diaphragm.</a>
		Iris diaphragm is rotating in optic housing.	Check for loose screws holding optic housing to front cover.	<a href="#">Re-align iris diaphragm(s).</a>
		Light out of balance due to missing sterilizable handle:	If handle is in place.	Install sterilizable handle adjust arm.
		Not able to focus with lever.	Missing lever and/or hardware.	Replace missing lever and/or mounting hardware.
<b>Arm assemblies can be rotated farther than specified.</b>	Cross tube can be rotated more than 580° in one direction.	Ball pivot stop is broken.	Inspect ball pivot stop.	<a href="#">Replace ball pivot stop.</a>
	Lamp tube can be rotated more than 540° in one direction.	Lamp tube pivot stop is broken.	Inspect lamp tube pivot stop.	<a href="#">Replace lamp tube pivot stop.</a>
	Lighthouse can be rotated more than 180° in one direction.	Lighthouse pivot bearing stop is broken.	Inspect lighthouse pivot bearing.	<a href="#">Replace lighthouse pivot bearing.</a>
	<b>Ceiling Mtd Lights only:</b> Down tube can be rotated more than 580° in one direction.	Main pivot stop is broken.	Inspect pivot stop.	<a href="#">Replace main pivot stop.</a>
	<b>Wall Mtd Lights only:</b> Fixed arm can be rotated more than 170° (collides with wall).	Stop screw missing / broken.	Inspect fixed arm stop screw.	Replace fixed arm stop screw.
<b>Arm assembly or lighthouse does not rotate freely, or drifts when released.</b>	Cross tube rotates (at ball pivot joint) too stiffly, or drifts when released.	Cross tube counterbalance out of adjustment.	<a href="#">Release tension from ball pivot joint</a> and observe to see if the cross tube counterbalances correctly.	<a href="#">Cross tube counterbalance adjustment.</a> <i>then perform,</i> <a href="#">Ball pivot joint tension adjustment.</a>
		Ball pivot joint tension out of adjustment.	Check for looseness / stiffness in joint.	
	Lamp tube does not rotate freely (at cross tube), or drifts when released.	Lamp tube brake tension out of adjustment.	Check for looseness / stiffness in joint.	<a href="#">Lamp tube brake adjustment.</a>
	Lighthouse does not rotate freely (at lamp tube), or drifts when released.	Lighthouse brake tension out of adjustment.	Check for looseness / stiffness in joint.	<a href="#">Lighthouse brake adjustment.</a>
		Light out of balance due to missing sterilizable handle	If handle is in place.	Install sterilizable handle adjust arm.
	<b>Ceiling Mtd Lights only:</b> Down tube does not rotate, or drifts when released.	Improper installation of ceiling plate. (Plate deflecting too much, or not level)	Inspect ceiling plate. Check for level & excessive flexing.	If ceiling plate is not level, readjust as necessary. If there is excessive flexing, support ceiling structure as necessary. <i>(Refer to installation guide)</i>
	<b>Wall Mtd Lights only:</b> Fixed arm does not rotate freely, or drifts when released.	Improper installation of wall mount plate, or fixed arm not level.	Inspect wall mount plate. Place a level on fixed arm.	Adjust fixed arm leveling screws as necessary. <i>(Refer to installation guide)</i>
<b>Mobile Lights only:</b> <b>Brake caster(s) will not lock.</b>	Base moves when caster brakes are set.	Caster brakes are worn or malfunctioning	Inspect caster brakes.	Replace brake caster(s) as necessary.
	Base not moving freely.	Broken caster.	Condition of caster.	Replace defective caster.
		Dirt not allowing caster to rotate.		Remove dirt and/or replace caster.

TP210 Rev. A

## Replacing the Bulb



### WARNING

The maximum bulb wattage for this light is 150 Watts. There is a risk of fire if this limit is exceeded. Use Midmark part number: 002-0605-00.



### Caution

- To prevent electrical shock, the light must be in STANDBY mode (⏻).
- Allow the light to cool before removing bulb.
- Move the lighthouse away from the exam site to prevent contaminants from falling into the area.



### Equipment Alert

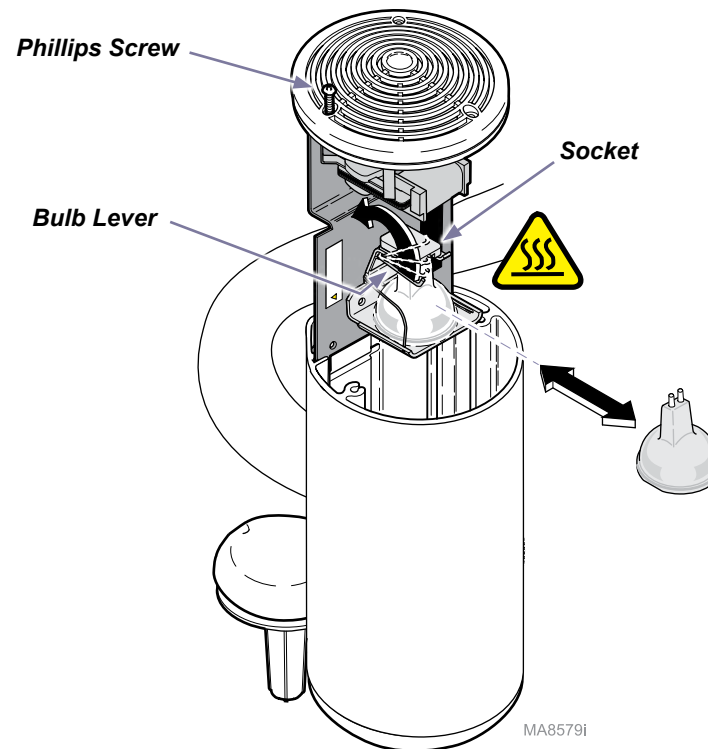
Halogen bulbs are sensitive to body oils. Do not touch the front glass portion of the bulb. If the glass portion of the bulb is handled, wipe with a clean soft lint-free cloth. Wipe with alcohol, then pat dry.

#### To remove old bulb..

- Turn light switch to STANDBY (⏻).
- Loosen** one phillips screw on top of lighthouse. (Do not attempt to remove this screw).
- Slide bulb carriage out of housing.
- Lift the bulb lever upward, then remove bulb.

#### To install new bulb..

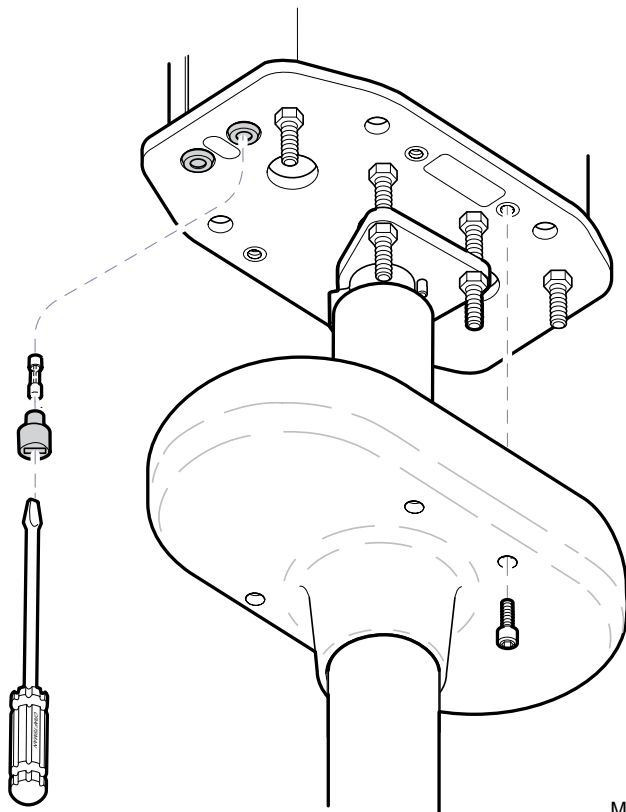
- Push the bulb lever down.
- Align two prongs on bulb with slots in socket, then push bulb inward until it is secure.
- Slide the bulb carriage into housing.
- Tighten phillips screw.



## Replacing the Fuses: Ceiling Mounted Lights

### To replace fuses...

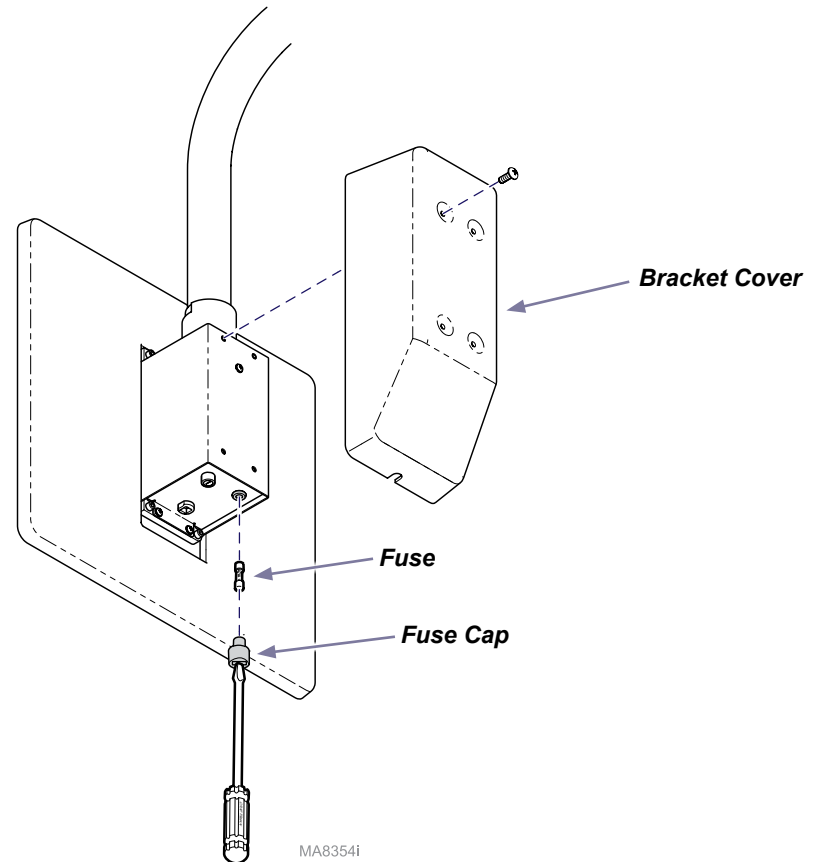
- A) Turn light switch to STANDBY (⓪).
- B) Remove four screws, then lower ceiling cover.
- C) Using a flat-bladed screwdriver, rotate fuse cap counter-clockwise 1/4 turn, while pushing upward.
- D) Pull fuse out of fuse cap to inspect.
- E) Insert fuse into fuse cap.
- F) Using a flat-bladed screwdriver, rotate fuse cap clockwise 1/4 turn, while pushing into fuse socket.
- G) Install ceiling cover.



## Replacing the Fuses: Wall Mounted Lights

### To replace fuses...

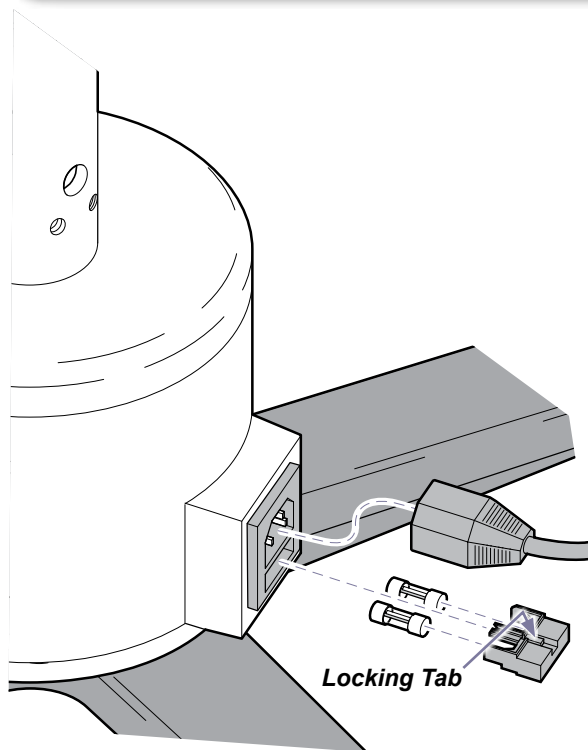
- A) Turn light switch to STANDBY (⓪).
- B) Remove bracket cover.
- C) Using a flat-bladed screwdriver, rotate fuse cap counter-clockwise 1/4 turn, while pushing upward.
- D) Pull fuse out of fuse cap.
- E) Insert fuse into fuse cap.
- F) Using a flat-bladed screwdriver, rotate fuse cap clockwise 1/4 turn, while pushing into fuse socket.
- G) Install bracket cover.



## Replacing the Fuses: Mobile Lights (120V models)

### To replace fuses...

- Turn light switch to STANDBY (⏻).
- Disconnect power cord from light.
- Using a flat-bladed screwdriver, push in on locking tab, then pull fuse drawer out.
- Pull fuses out of fuse drawer to inspect.
- Insert fuses into fuse drawer.
- Insert fuse drawer into AC inlet.  
(Push in until you hear a clicking sound).
- Connect power cord.



MA8475i

## Replacing the Fuses: Mobile Lights (230V models)

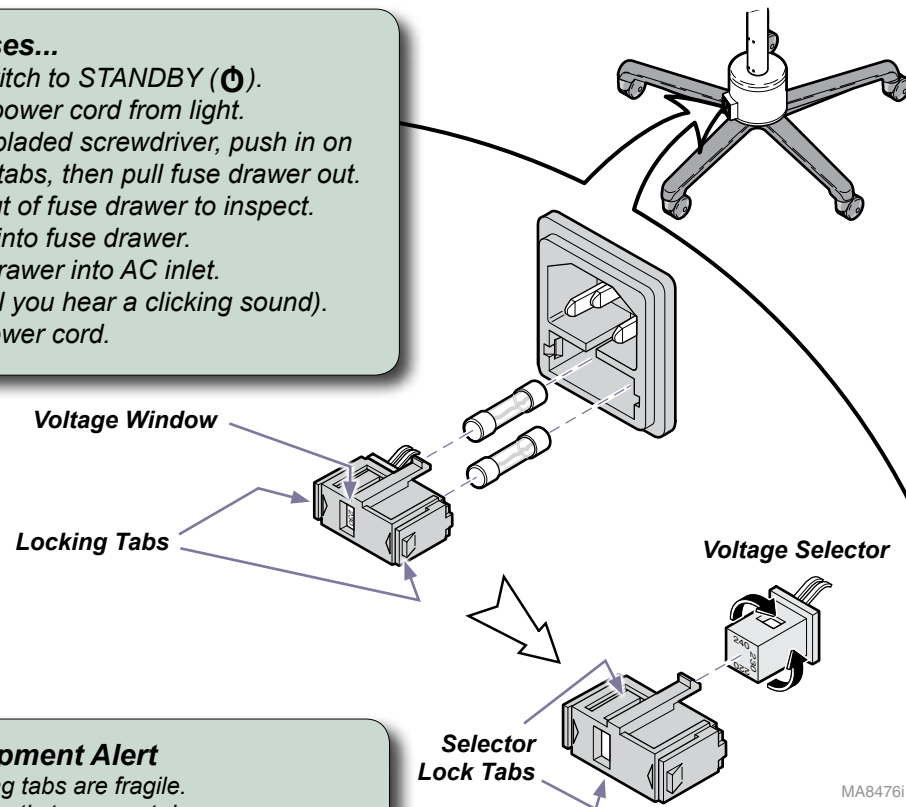


### Equipment Alert

The voltage setting that appears in the window of the fuse drawer, must match the facility voltage. To adjust the voltage setting, refer to **Electrical Input Setting** procedure.

### To replace fuses...

- Turn light switch to STANDBY (⏻).
- Disconnect power cord from light.
- Using a flat-bladed screwdriver, push in on two locking tabs, then pull fuse drawer out.
- Pull fuses out of fuse drawer to inspect.
- Insert fuses into fuse drawer.
- Insert fuse drawer into AC inlet.  
(Push in until you hear a clicking sound).
- Connect power cord.



MA8476i



### Equipment Alert

Locking tabs are fragile.  
Pull gently to prevent damage.

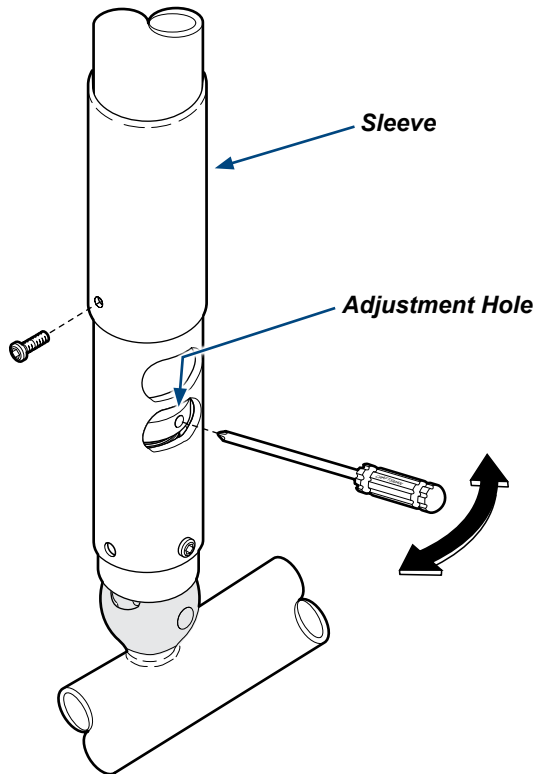
### To adjust Electrical Input Setting...

- Pull out on two selector lock tabs, then pull voltage selector out of fuse drawer.
- Rotate voltage selector until the correct setting aligns with the voltage window.
- Insert voltage selector into fuse drawer.

## Ball Pivot / Cross Tube Counterbalance Adjustments

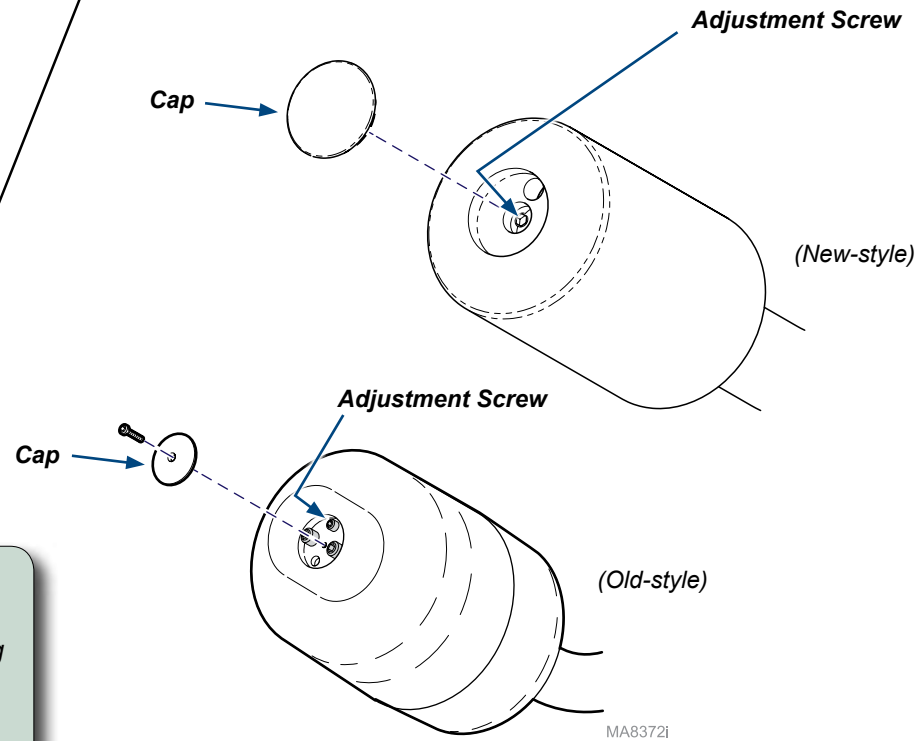
### To release ball pivot tension...

- A) Slide sleeve up to expose opening.
- B) Insert screwdriver into adjustment hole.
- C) Move the screwdriver LEFT until tension is fully released.



### To adjust cross tube counterbalance...

- A) Remove cap from counterbalance.
- B) Loosen / tighten the adjustment screw until the cross tube balances in horizontal position.
- C) Install cap onto counterbalance.



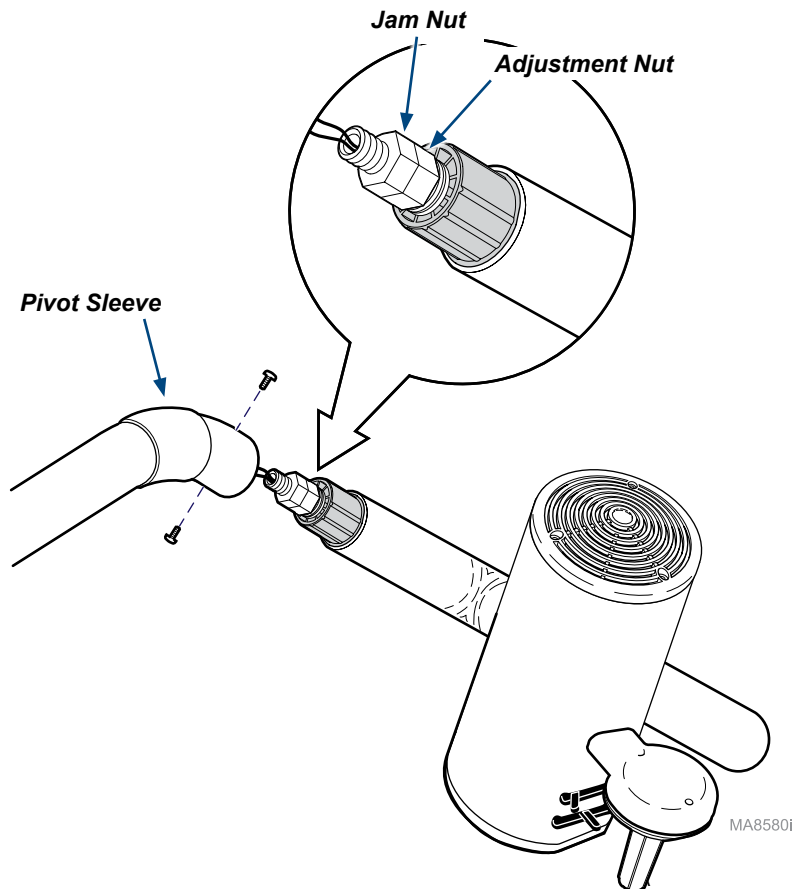
### To adjust ball pivot tension...

- A) Insert screwdriver into adjustment hole.
- B) Move the screwdriver LEFT / RIGHT to adjust tension setting (LEFT: **decreases** tension / RIGHT: **increases** tension)
- C) Remove screwdriver, and check for desired tension. Repeat until desired tension is achieved.
- D) Slide sleeve down, then install screw.

## Lamp Tube Brake Adjustment

### To adjust lamp tube brake tension...

- A) Slide pivot sleeve up, then remove two screws.
- B) Separate lamp tube from cross tube.
- C) Loosen jam nut.
- D) Loosen / tighten adjustment nut as necessary.
- E) Hold adjustment nut in place, then tighten jam nut to 20-30 ft-lbs (27-40.7 N•m).
- F) Reattach lamp tube / cross tube, secure with two screws.
- G) Check for proper operation. Repeat if necessary.



## Lighthouse Brake Adjustment

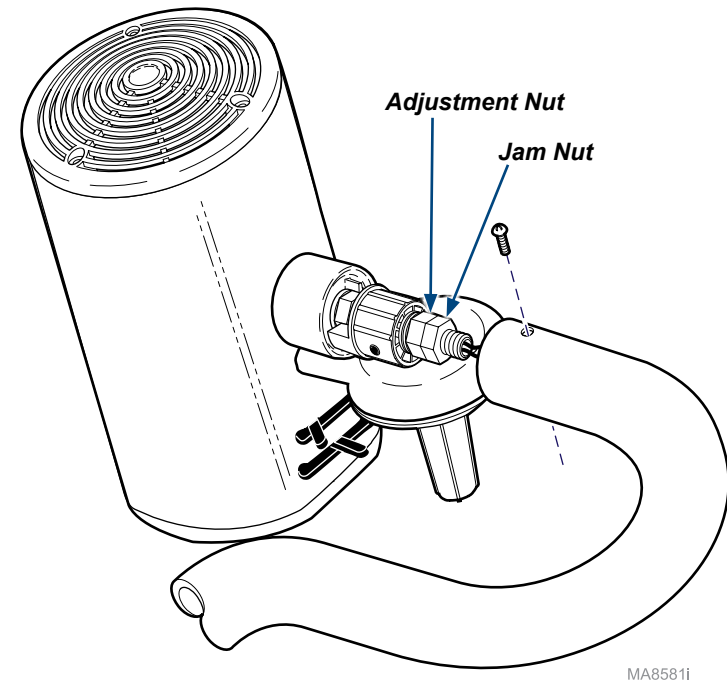


### WARNING

Screws securing lamp tube / lighthouse **must** installed properly. Failure to do so may allow lighthouse to fall, resulting in injury.

### To adjust lighthouse brake tension...

- A) Remove two screws.
- B) Separate lamp tube from lighthouse.
- C) Loosen jam nut.
- D) Loosen / tighten adjustment nut as necessary.
- E) Hold adjustment nut in place, then tighten jam nut to 20-30 ft-lbs (27-40.7 N•m).
- F) Reattach lamp tube / lighthouse, secure with two screws.
- G) Check for proper operation. Repeat if necessary.





## Lighthouse Removal / Pivot Bearing Replacement

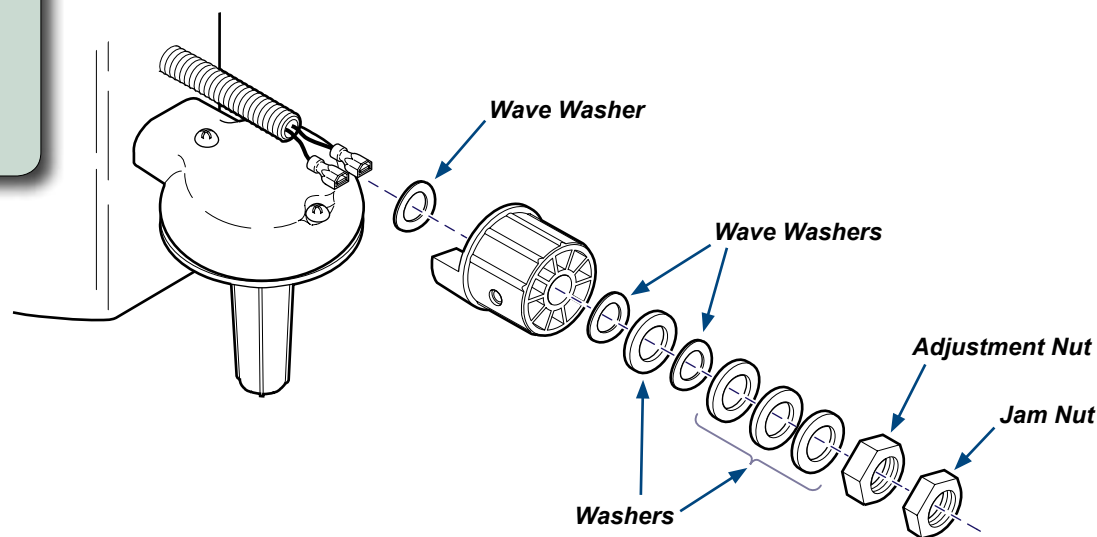
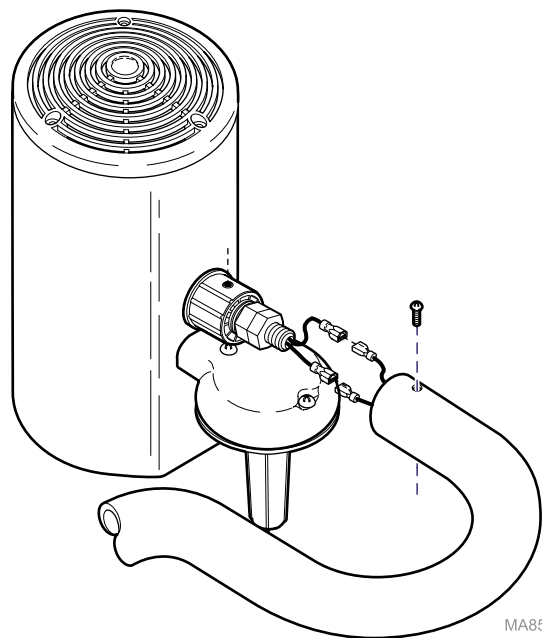


### WARNING

Disconnect power to the light before performing the following procedure. Failure to comply may result in electric shock.

#### Step 1: Remove lighthouse pivot bearing.

- A) Disconnect power to light.
- B) Remove two screws, then separate lamp tube from lighthouse,
- C) Disconnect two wires.
- D) Remove two nuts, washers, and pivot bearing.



### WARNING

Screws securing lamp tube / lighthouse must installed properly. Failure to do so may allow lighthouse to fall, resulting in injury.

#### Step 2: Install lighthouse pivot bearing.

- A) Install pivot bearing and washers as shown in illustration.
- B) Install two nuts, but do not tighten at this time.
- C) Loosen / tighten adjustment nut as necessary.
- D) Hold adjustment nut in place, then tighten jam nut to 20-30 ft-lbs (27-40.7 N•m).
- E) Connect two wires.
- F) Reattach lamp tube / lighthouse, secure with two screws.
- G) Check for proper operation. If necessary, separate lighthouse, and loosen / tighten adjustment nut.

## Lamp Tube Pivot Stop Replacement



### WARNING

Disconnect power to the light before performing the following procedure. Failure to comply may result in electric shock.

### Step 1: Remove lamp tube pivot stop.

- A) Disconnect power to light.
- B) Remove two screws, then separate lamp tube from lighthouse.
- C) Disconnect two wires.
- D) Slide pivot sleeve back, then remove two screws.
- E) Separate lamp tube from cross tube.
- F) Cut two connectors off of wires coming out of the lamp tube.
- G) Pull two wires out of lamp tube.
- H) Remove two nuts, washers, pivot bearing, and pivot stop.

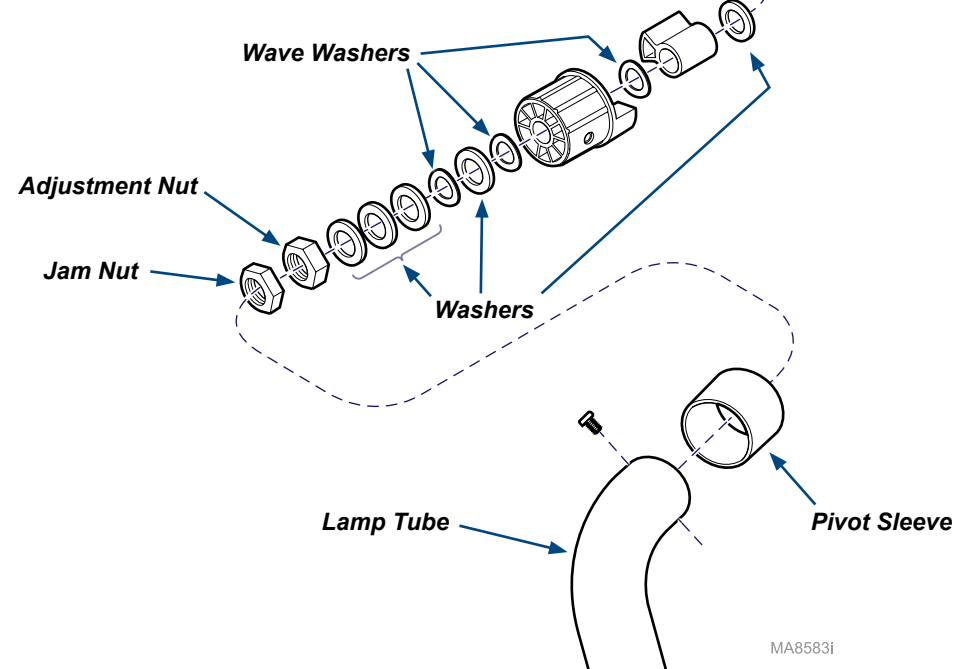
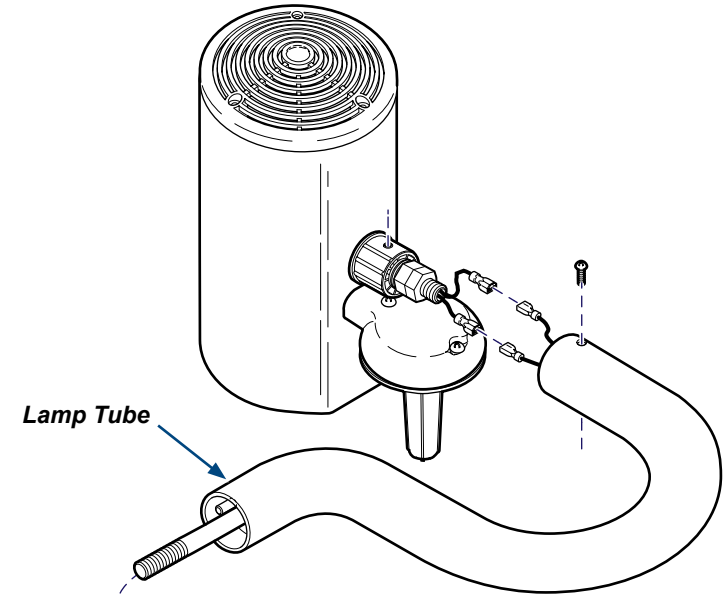


### WARNING

Screws securing lamp tube / lighthouse must installed properly. Failure to do so may allow lighthouse to fall, resulting in injury.

### Step 2: Install lamp tube pivot stop.

- A) Install pivot stop, pivot bearing, & washers as shown in illustration.
- B) Install two nuts, but do not tighten at this time.
- C) Feed two wires thru lamp tube, then install two connectors.
- D) Connect two wires from lamp tube to lighthouse.
- E) Reattach lamp tube / lighthouse, secure with two screws.
- F) Loosen / tighten adjustment nut as necessary.
- G) Hold adjustment nut in place, then tighten jam nut to 20-30 ft-lbs (27-40.7 N•m).
- H) Reattach lamp tube / cross tube, secure with two screws.
- I) Check for proper operation. If necessary, separate cross tube, and loosen / tighten adjustment nut.



MA8583i

## Cross Tube Removal / Installation



### WARNING

Disconnect power to the light before performing the following procedure. Failure to comply may result in electric shock.

The cross tube / lighthouse is very heavy. To prevent injury, use an assistant for the following procedure.

### To remove cross tube...

- A) Disconnect power to light.
- B) Remove screw, then slide pivot sleeve up.
- C) While supporting cross tube / lighthouse, remove two screws, then separate cross tube from down tube.
- D) Disconnect two wires and remove cross tube.



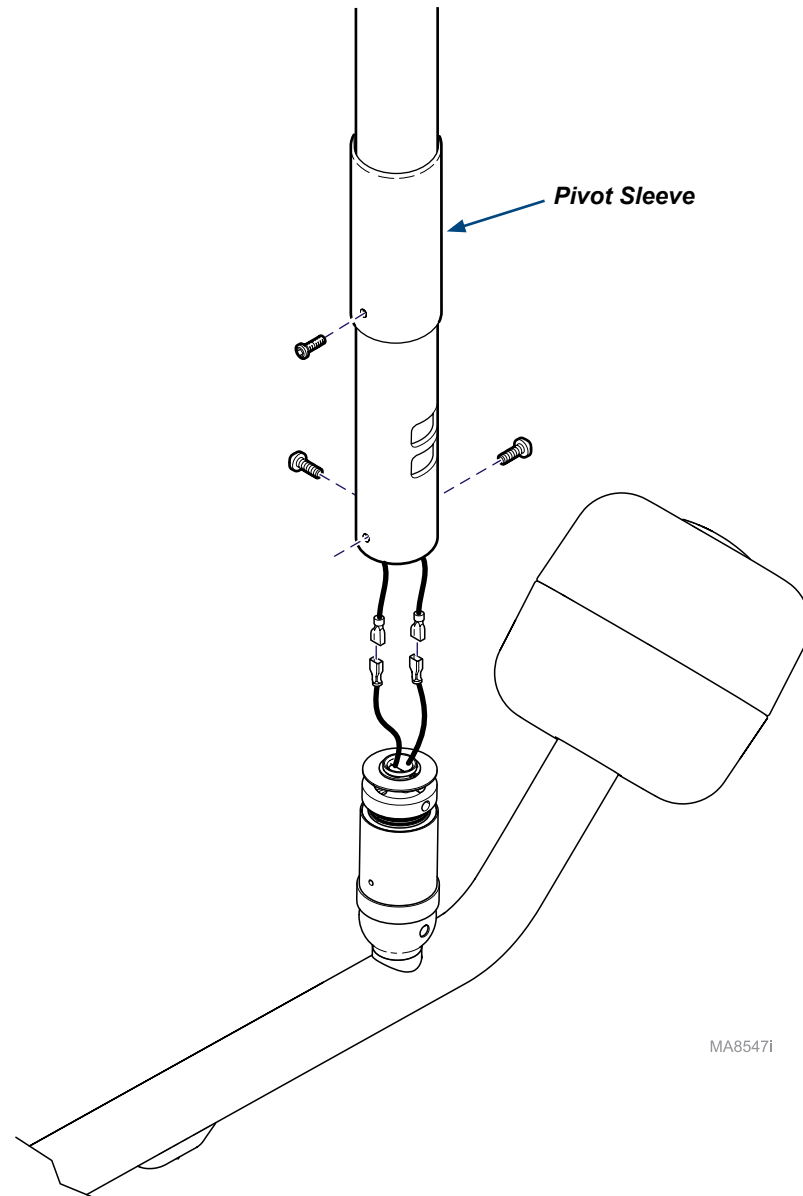
### WARNING

Screws securing cross tube must be installed properly. Failure to do so may allow lighthouse to fall, resulting in injury.

### To install cross tube...

- A) Connect wires as shown.  
(Install new wire connectors if necessary)
- B) Insert cross tube into down tube. (Do not pinch wires).
- C) Secure cross tube with two screws. (See NOTE)
- D) Refer to 'Ball Pivot Tension Adjustment' if necessary.
- E) Slide pivot sleeve down, secure with screw.

NOTE: There are three holes in ball pivot bearing. Two holes are larger with coarser threads. Use these two holes to secure cross tube. The other hole is pivot sleeve screw.



MA8547i

## Down Tube Removal / Installation (Ceiling Lights)

**Step 1: Remove cross tube / lighthead.**  
Refer to: "Cross Tube Removal / Installation".

**Step 2: Remove down tube.**

- A) Remove four screws and ceiling cover.
- B) Remove two screws, then separate down tube.
- C) Pull two wires up thru down tube.

Apply removable threadlocking adhesive.  
(Torque: 40 to 50 in-lbs (4.5 to 5.6 N·m))

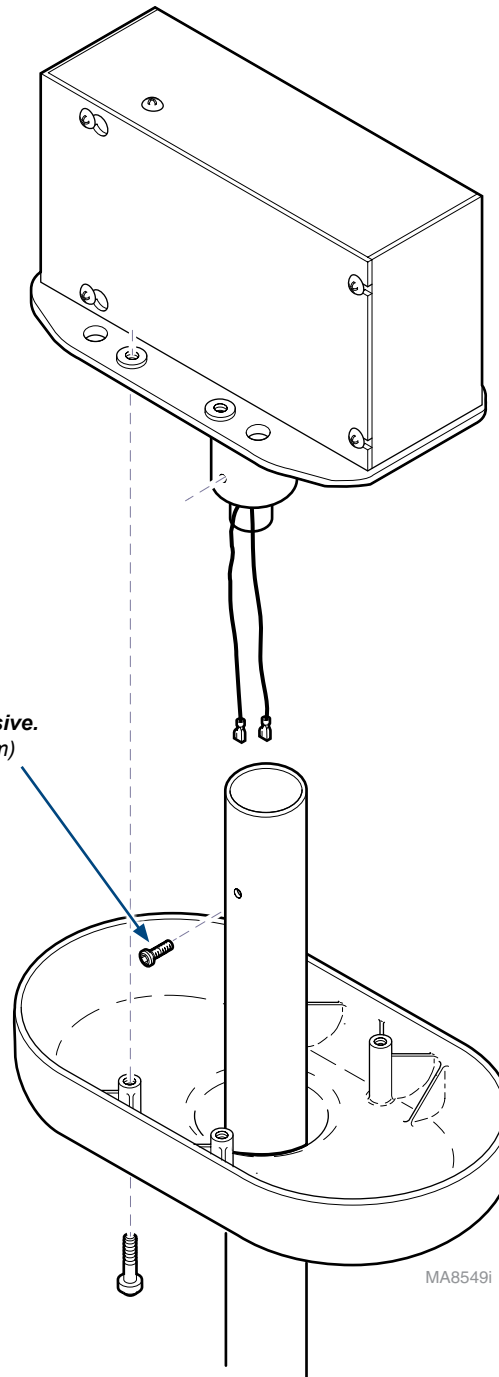


**WARNING**

Screws securing down tube must installed properly.  
Failure to do so may allow lighthead to fall, resulting  
in injury.

**To install down tube / ceiling cover...**

- A) Install down tube, then secure with two screws\*.  
Tighten screws to 40 to 50 in-lbs (4.5 to 5.6 N·m)  
(\* apply removable threadlocking adhesive to screws)
- B) Position ceiling cover, then secure with four screws.



## Main Pivot Stop Replacement (Ceiling Lights)

### Step 1: Remove cross tube.

Refer to: "Cross Tube Removal / Installation".

### Step 2: Remove down tube.

Refer to: "Down Tube Removal / Installation".



### Equipment Alert

Strain relief knot must be **above** the groove pin.  
Be sure that groove pin is between two wires, and that wires do not get pinched when pin is installed.

### Step 3: Replace main pivot stop.

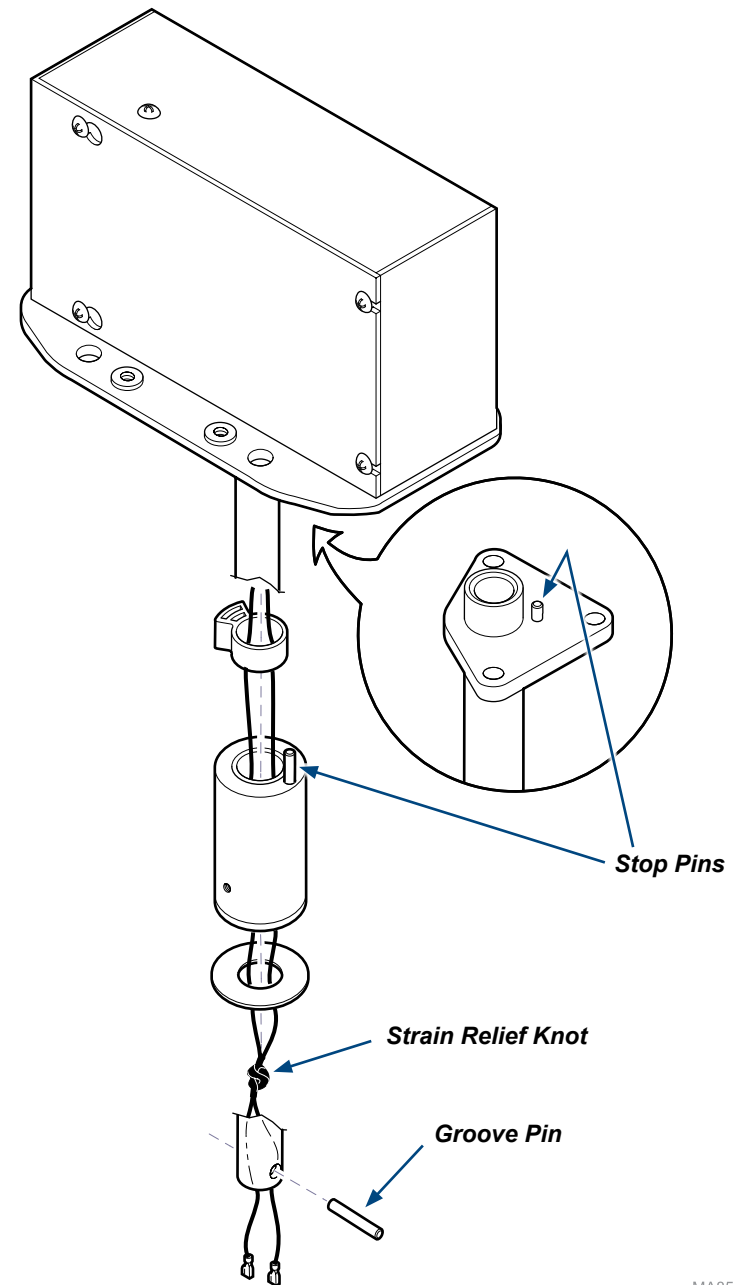
- A) Using a punch, remove groove pin.
- B) Remove washer, pivot housing, and pivot stop.
- C) Inspect two stop pins. Replace pin(s) if damaged.
- D) Install main pivot stop, pivot housing, and washer onto shaft.
- E) Install groove pin.

### Step 4: Install down tube.

Refer to: "Down Tube Removal / Installation".

### Step 5: Install cross tube / lighthouse.

Refer to: "Cross Tube Removal / Installation".



MA8550i

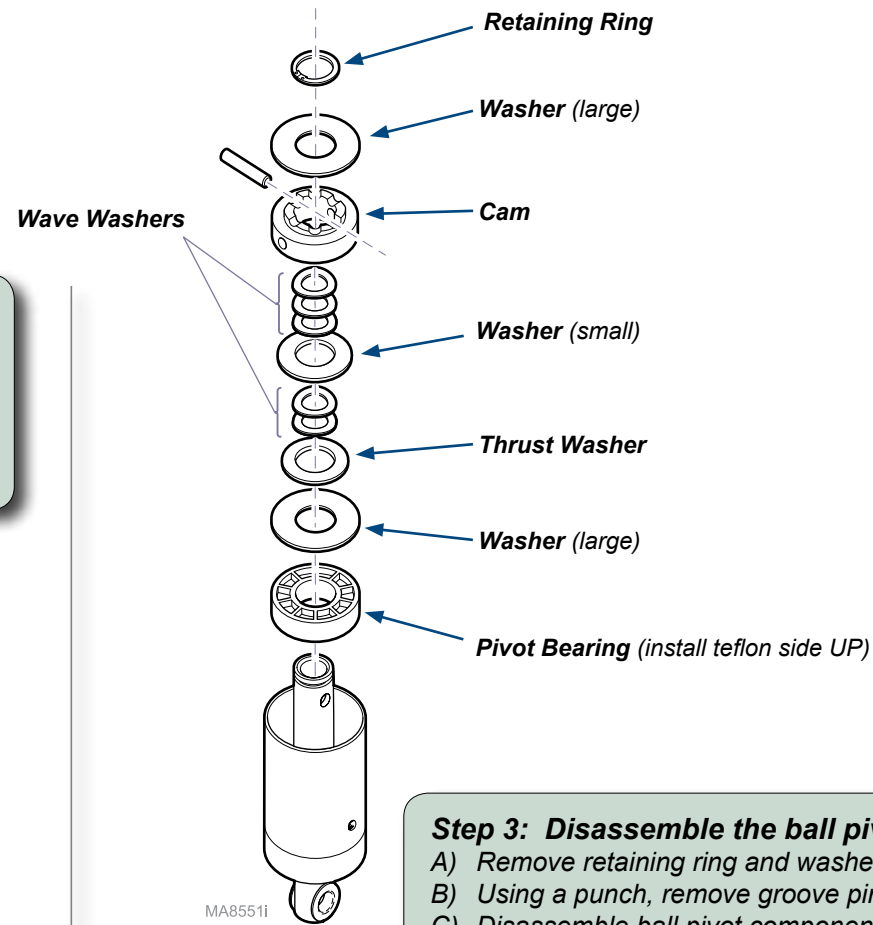
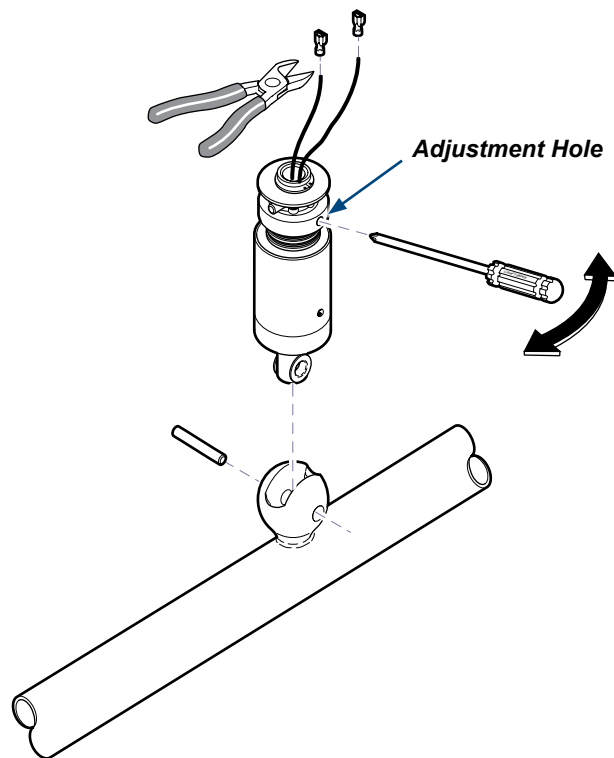
## Ball Pivot Repair

### Step 1: Remove cross tube.

Refer to: "Cross Tube Removal / Installation".

### Step 2: Remove ball pivot assembly.

- Insert screwdriver into adjustment hole.
- Move the screwdriver **LEFT** until tension is fully released.
- Cut wire connectors from two wires.  
(Preserve as much wire length as possible)
- Using a punch, remove groove pin.



### Step 3: Disassemble the ball pivot.

- Remove retaining ring and washer from ball pivot shaft.
- Using a punch, remove groove pin. (see NOTE)
- Disassemble ball pivot components from shaft / housing.
- Inspect pivot bearing for excessive wear.  
Replace if necessary.

NOTE: Groove pin has serrations on one end. Do not drive serrations thru ball pivot shaft.

### Step 4: Assemble the ball pivot.

- Install pivot bearing, washers, and cam as shown.
- Install groove pin.
- Install washer, then secure with retaining ring.

## Ball Pivot Stop Replacement

### Step 1: Disassemble the ball pivot.

Refer to: "Ball Pivot Repair".

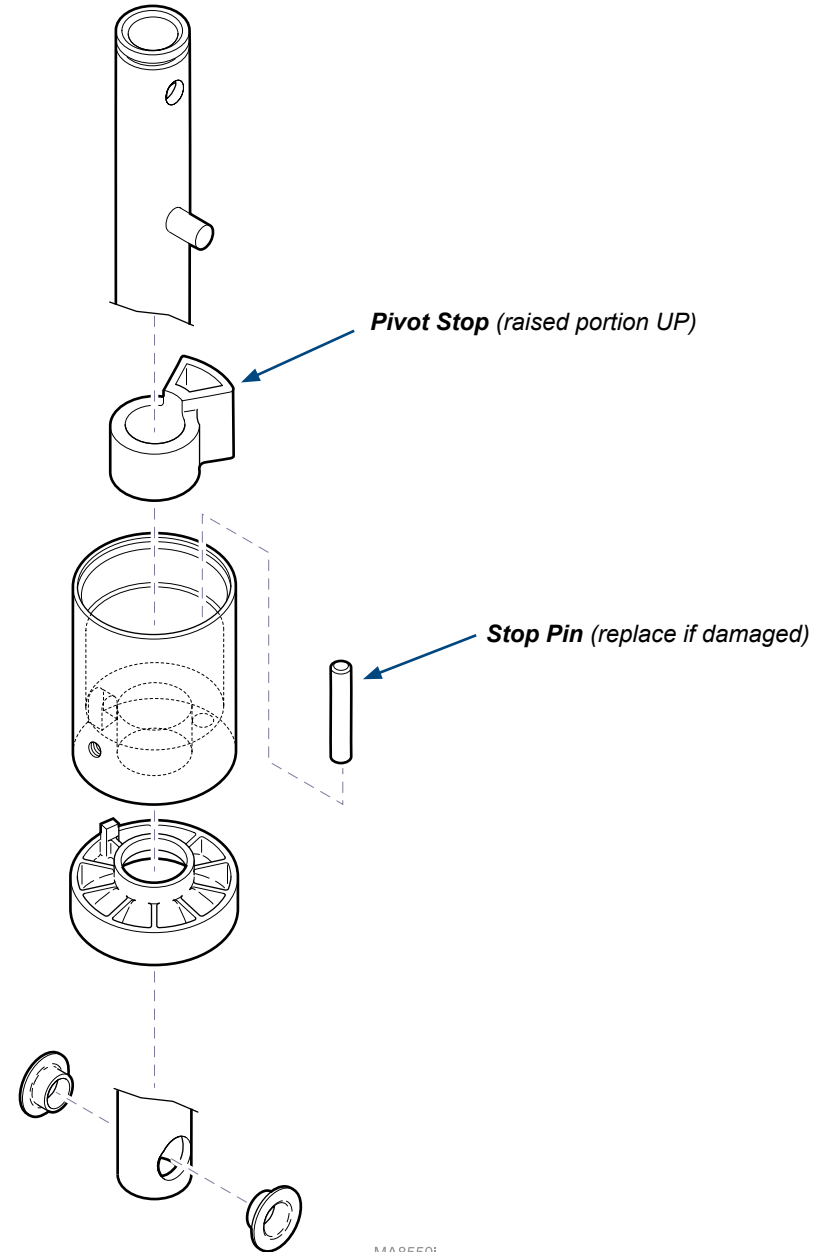
### Step 2: Replace ball pivot stop.

- A) Remove two flange bearings.
- B) Disassemble shaft / housing components.
- C) Inspect stop pin. Replace if necessary.
- D) Install pivot stop (with raised portion facing UP), housing, and brake onto shaft.
- E) Install two flange bearings into shaft.

NOTE: Groove pin has serrations on one end.  
Do not drive serrations thru ball pivot shaft.

### Step 3: Assemble the ball pivot.

Refer to: "Ball Pivot Repair".



MA8550i