



SOFTWARE VERSION 2.1

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BAD BOY[®] SPOT LUMINAIRE

FIELD SERVICE MANUAL

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Bad Boy® Spot Luminaire Field Service Manual

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Production Resource Group, LLC
Dallas Office
8617 Ambassador Row, Suite 120
Dallas, Texas 75247
www.prg.com

FOREWORD

Compliance Notice

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: 1) This device may not cause harmful interference, and 2) This device must accept any interference received, including interference that may cause undesired operation.

Conforms to:

UL STD 1573

Certified to:

CAN/CSA STD E598-1

CAN/CSA STD E598-2-17



Safety Notice

It is extremely important to read ALL safety information and instructions provided in this manual and any accompanying documentation before installing and operating the products described herein. Heed all cautions and warnings during installation and use of this product.

Safety symbols used throughout this manual are as follows:



CAUTION advising of potential damage to product.



WARNING advising of potential injury or death to persons.

GENERAL INFORMATION PERTAINING TO PROTECTION AGAINST ELECTRICAL SHOCK, FIRE, EXPOSURE TO EXCESSIVE UV RADIATION, AND INJURY TO PERSONS CAN BE FOUND BELOW.

WARNING: INSTRUCTIONS FOR CONTINUED PROTECTION AGAINST FIRE

- 1) PRG luminaires have been designed for use only with specific lamps. Note lamp type before replacing. Installing another type of lamp may be hazardous.
- 2) PRG luminaires may be mounted on any type of surface as long as mounting instructions are followed. See instructions detailed in this manual.
- 3) Replace fuses with same type and rating only.
- 4) Minimum distance from head to any flammable object is 2m.

WARNING: INSTRUCTIONS FOR CONTINUED PROTECTION AGAINST ELECTRICAL SHOCK

- 1) PRG luminaires are designed for dry locations only. Exposure to rain or moisture may damage luminaire.
- 2) Disconnect power before servicing any PRG equipment.
- 3) Servicing to be performed by qualified personnel only.

WARNING: INSTRUCTIONS FOR CONTINUED PROTECTION AGAINST EXPOSURE TO EXCESSIVE ULTRAVIOLET RADIATION

- 1) PRG luminaires may use an HID type lamp which produces UV radiation. DO NOT look directly at lamp.
- 2) It is hazardous to operate luminaires without complete lamp enclosure in place or when lens is damaged. Lenses or UV shields shall be changed if they have become visibly damaged to such an extent that their effectiveness is impaired.



WARNING: INSTRUCTIONS FOR PROTECTION AGAINST INJURY TO PERSONS

- 1) Exterior surfaces of the luminaire will be hot during operation. Use appropriate safety equipment (gloves, eye protection, etc.) when handling and adjusting hot equipment and components. Service and maintenance should be performed only by qualified personnel as determined by the high pressure lighting fixture manufacturer.
- 2) Arc lamps generate intense heat. Disconnect power and allow lamp to cool for 5 minutes before relamping.
- 3) Arc lamps emit ultraviolet radiation which can cause serious skin burn and eye inflammation. Additionally, arc lamps operate under high pressure at very high temperatures. Should the lamp break, there can exist a danger of personal injury and/or fire from broken lamp particles being discharged.
- 4) The lamp shall be changed if it has become damaged or thermally deformed.
- 5) If lamp is touched with bare hands, clean lamp with denatured alcohol and wipe with lint-free cloth before installing or powering up the luminaire.
- 6) Serious injury may result from the generation of ozone by this lamp system. A proper means of venting must be provided.

Notes de sécurité

Avant de procéder à l'installation des produits décrits dans ce guide et de les mettre en marche, il est extrêmement important de lire TOUS les renseignements et TOUTES les directives de sécurité contenues dans ce guide ainsi que toute documentation jointe. Tenir compte de tous les avertissements et suivre toutes les précautions pendant l'installation et l'utilisation de cet appareil.

Les symboles de sécurité utilisés dans ce guide sont les suivants :



ATTENTION Ce symbole annonce que l'appareil risque d'être endommagé.



AVERTISSEMENT Ce symbole annonce qu'il y a risque d'accident grave ou même fatal.

CETTE SECTION CONTIENT DES INFORMATIONS GÉNÉRALES POUR SE PROTÉGER CONTRE LES DÉCHARGES ÉLECTRIQUES, LES INCENDIES, L'EXPOSITION EXCESSIVE AUX RAYONS UV ET TOUT AUTRE ACCIDENT POUVANT ENTRAÎNER DES BLESSURES.

AVERTISSEMENT: RISQUE D' EXPLOSION.

- 1) Le service et le maintenance ne devront être assurés que par des personnes qualifiées comme précisé par le fabricant des lampes à haute pression.
- 2) Des vêtements de protection et les procédures précisées dans le manuel du fabricant doit être fournies.

AVERTISSEMENT: RÉGLAGE DES LAMPES

- 1) Chaleur intense. Débrancher le matériel et laisser refroidir pendant 5 minutes avant de rallumer.
- 2) Risque l'incendie. N'utilise que des Philips MSR Gold™ FastFit Lamp.

AVERTISSEMENT: DIRECTIVES POUR SE PROTÉGER CONTRE UNE EXPOSITION EXCESSIVE AUX RAYONS UV

- 1) Risque d'explosion en cas de radiation ultraviolet imprantes.
- 2) Ne pas intervenir en l'absence de confinement de la lampe en place ou quand la lentille est abîmée.

AVERTISSEMENT: DIRECTIVES POUR SE PROTÉGER CONTRE LES ACCIDENTS POUVANT ENTRAÎNER DES BLESSURES

- 1) Chaleur intense. Eviter tout contact avec des personnes ou des tissus. Attention, de graves blessures peuvent résulter de production d'ozone par cette lampe. Un système de ventilation adapté doit être fournies
- 2) La température de surface = 300.c
La temperature de l'ambiance = 50.c
- 3) Ne convient pas pour un usage résidentiel.
- 4) Utilisable seulement dans les locaux secs.



Revision History

This manual has been revised as follows:

Version	Release Date	Notes
BASIC	September 22, 2009	Initial release.
A	March 3, 2010	Added CMY luminaire information where applicable.
B	May 4, 2010	Updated Wiring Diagram. Added new Hi-Temp Pinch Fan and Ignitor replacement procedures.
C1	July 16, 2010	Added Front Lens and Retaining Ring info to Maintenance and IPB sections. Added Designer Color and Gobo Wheel standard configurations to Description section.
C2	November 10, 2010	Updated book format. (No change to technical information.)
D	January 5, 2011	Corrected configuration of the Designer Color Wheel standard positions in Description section.
E	June 23, 2011	Added part number for Sonic Belt Tension Meter on Pan and Tilt Drive maintenance procedures.
F	May 23, 2014	Corrected part numbers for Upper Enclosure Intake and Exhaust Covers in Maintenance section.
G	April 3, 2015	Updated for software version 2.13. Removed references to the Quantum version. (All Bad Boy Spot Luminaires have been converted to the CMY version.)



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INTRODUCTION

About This Manual

This manual provides testing, troubleshooting, maintenance procedures, and illustrated parts breakdowns for the following equipment:

- + Bad Boy® Spot Luminaire

This manual is intended for use in field servicing and is not a comprehensive shop-level manual.



WARNING: It is important to read ALL accompanying safety instructions to avoid damage to the product and potential injury to yourself or others.

Additional Documentation

For installation and operation instructions, refer to the following PRG manual:

- + Bad Boy® Spot Luminaire User Manual (02.9812.0001)

Technical updates regarding this equipment are issued by the PRG Dallas office. These updates are in the form of Technical Bulletins, which contain procedures for equipment upgrades, retrofits, and repairs not found in the existing manual(s).

For more information about DMX512 and sACN protocols, refer to the following documents available from the American National Standards Institute (ANSI) at www.ansi.org:

- + ANSI E1.11 - 2008 (R2013)
Entertainment Technology - USITT DMX512-A, Asynchronous Serial Digital Data Transmission Standard for Controlling Lighting Equipment and Accessories
- + ANSI E1.31 - 2009
Entertainment Technology – Lightweight streaming protocol for transport of DMX512 using ACN
- + ANSI E1.20 - 2010
Entertainment Technology-RDM-Remote Device Management over USITT DMX512 Networks

The above documents are also available for free in electronic format at tsp.plasa.org

For more information about Art-Net, refer to the following document available from Artistic Licence Engineering at www.artisticlicence.com:

- + Specification for the Art-Net Ethernet Protocol



Customer Service

For technical assistance, contact the PRG International Service Center or contact your nearest PRG office. Contact information for all PRG office locations can be found on our website at: www.prg.com

PRG Dallas (International Service)

8617 Ambassador Row, Suite 120

Dallas, Texas 75247 USA

Phone: 214.630.1963

Fax: 214.630.5867

Service Fax: 214.638.2125

Service Email: orders@prg.com

For Bad Boy support, please contact: Badboysupport@prg.com

For additional resources and documentation, please visit our website at: www.prg.com



1.

DESCRIPTION

This chapter contains an overview of luminaire components.

+ COMPONENTS

COMPONENTS

Exterior Components

The following illustration shows the exterior Bad Boy components and controls.

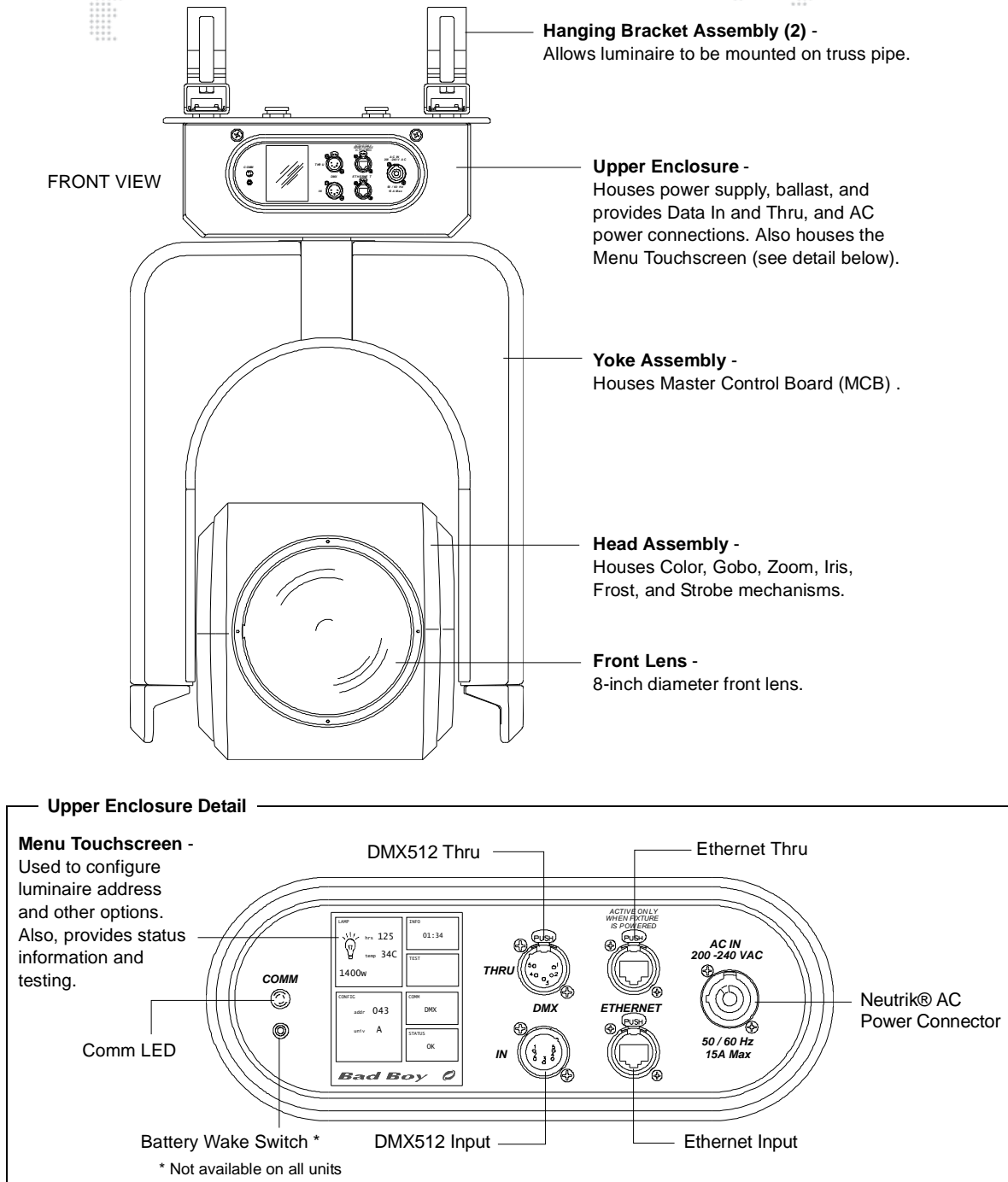


Figure 1-1: Exterior Components

Head and Enclosure Components

The following illustration shows the major sub-assemblies located in the Bad Boy Head and Enclosure.

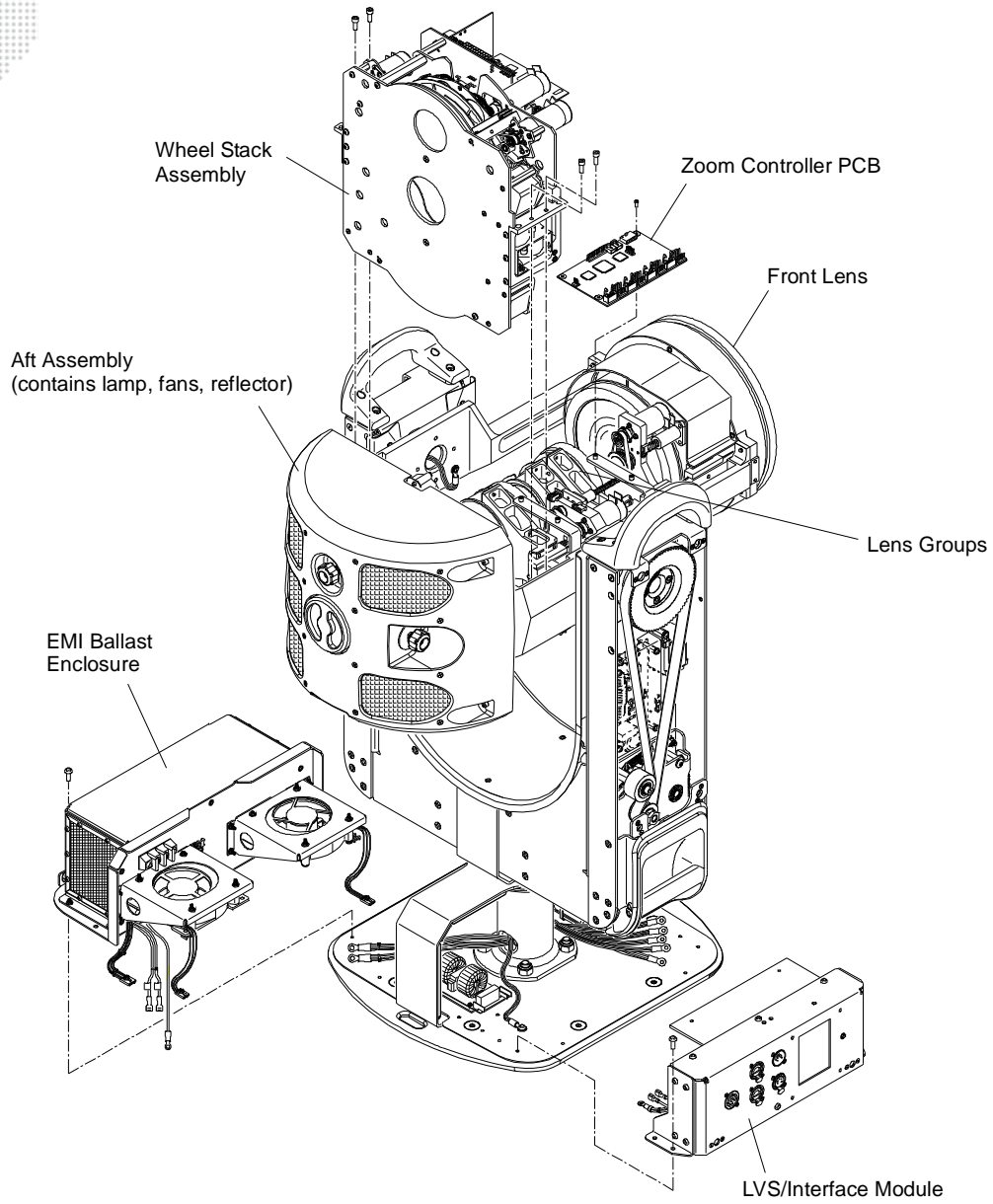


Figure 1-2: Head and Enclosure Components

Yoke Components

Tilt-Side Yoke

The following illustration shows the major sub-assemblies located in the Bad Boy Tilt-Side Yoke Leg.

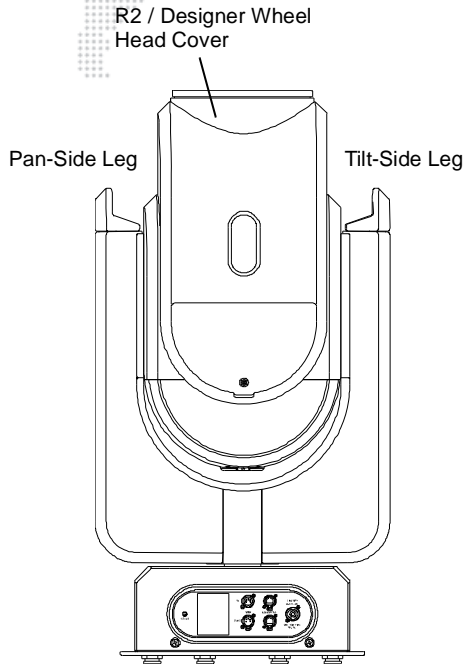


Figure 1-3: Yoke Leg Identification

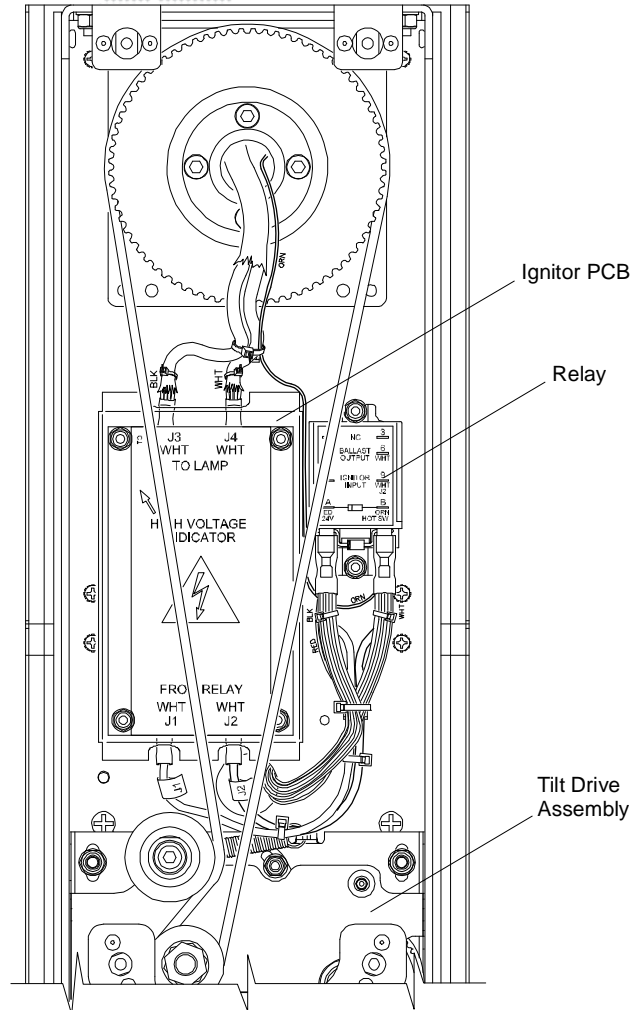


Figure 1-4: Tilt-Side Yoke Leg

Pan-Side Yoke Leg

The following illustration shows the major sub-assemblies located in the Bad Boy Pan-Side Yoke Leg.

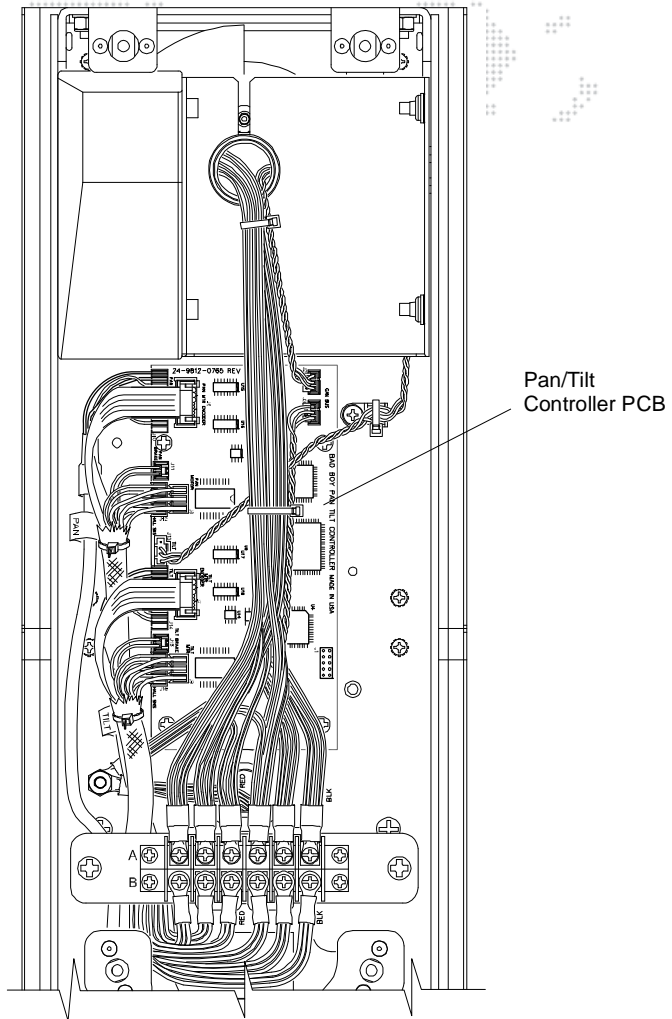


Figure 1-5: Pan-Side Yoke Leg

Designer Color and Gobo Wheel Configurations

Designer Color Wheel Standard Configuration

The following drawing shows the standard Bad Boy Designer Color Wheel configuration.

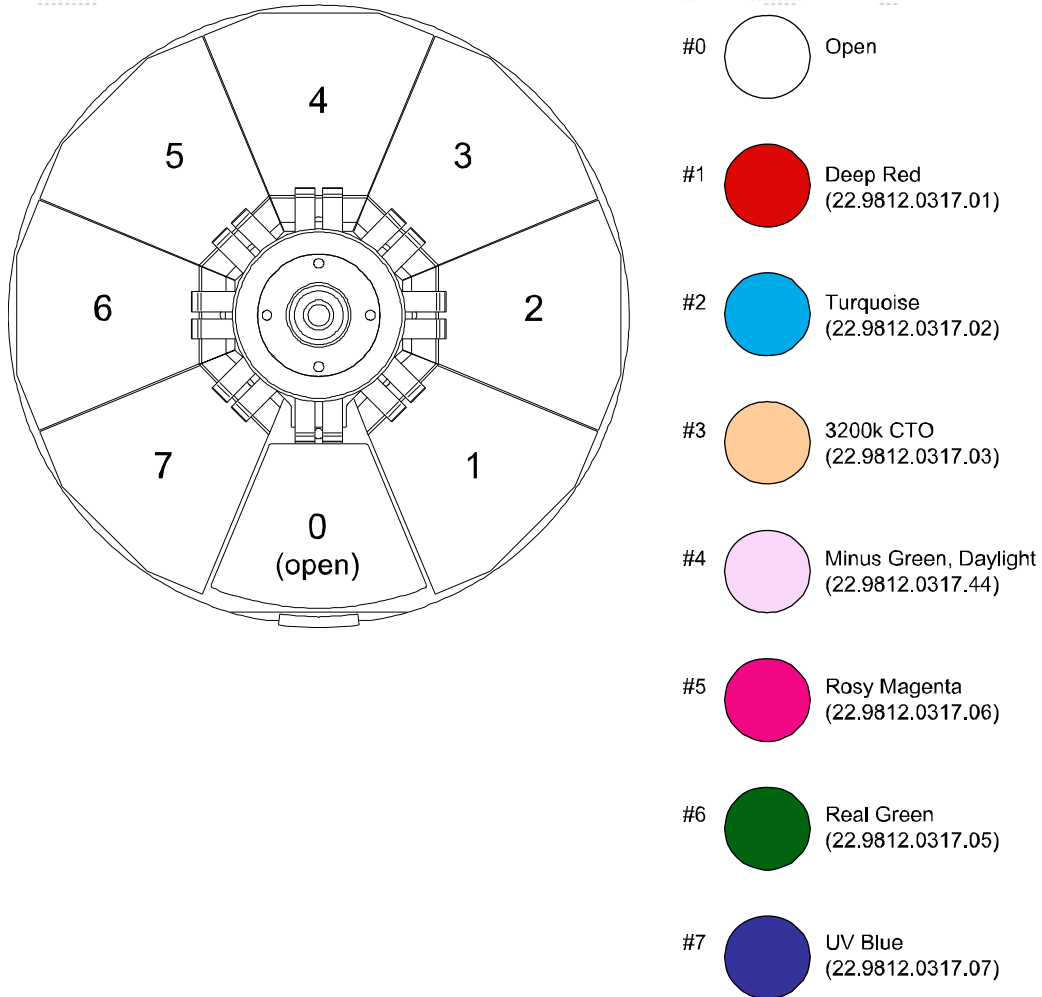


Figure 1-6: Designer Color Wheel Standard Configuration

Standard Gobo Wheel Configuration

The following drawing shows the standard Bad Boy Designer Gobo Wheel configurations.

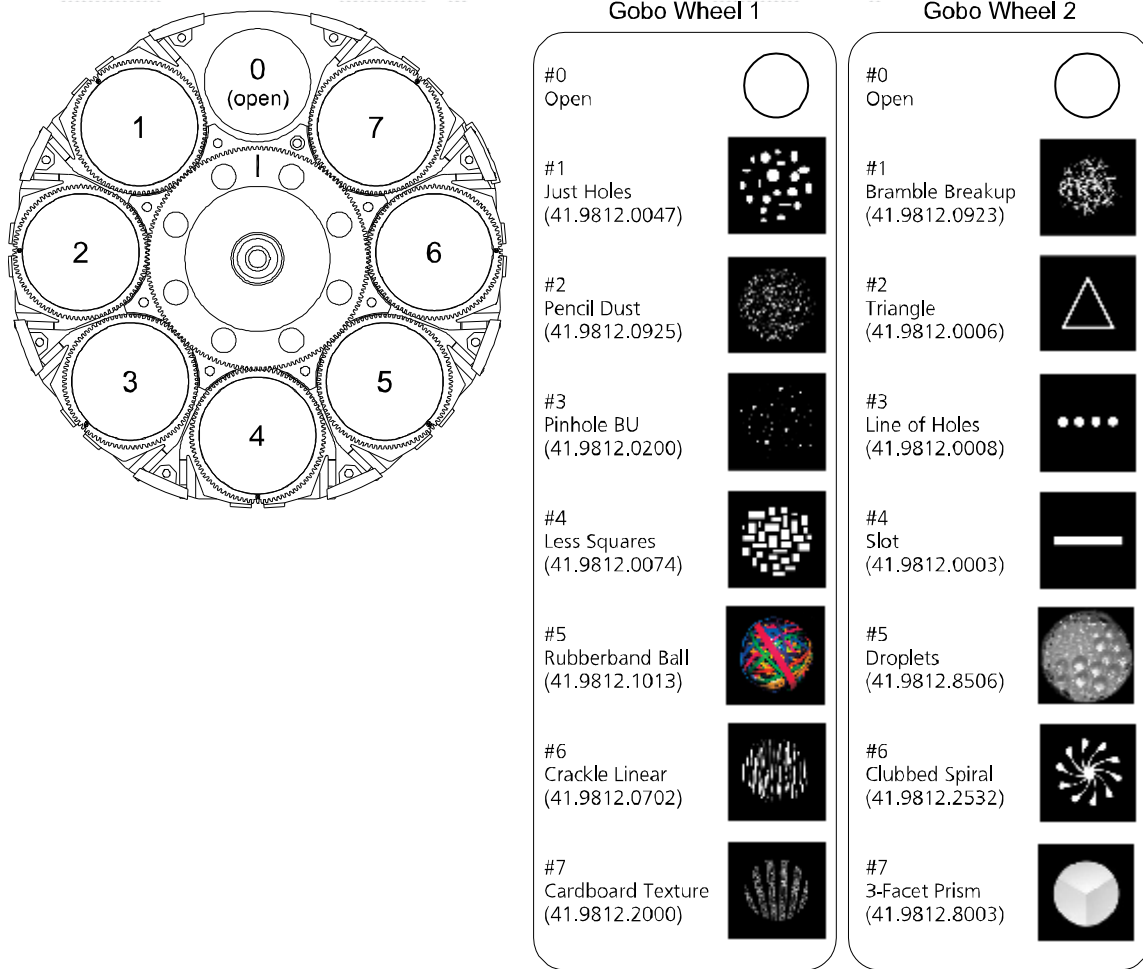


Figure 1-7: Gobo Wheel Standard Configurations

About Moiré Gobos

Moiré gobos contain two pieces of glass: one that is fixed and another that rotates. Since the two pieces of glass are very close together, it creates an interesting interference effect (which is referred to as the "moiré"). Due to this construction they do not contain sensors, and therefore cannot be calibrated to a certain orientation at startup as with standard gobos.



CAUTION: Moiré gobo positions MUST be set using the menu system. Refer to "Test Screen" on page 12.



Notes



2.

TESTING & TROUBLESHOOTING

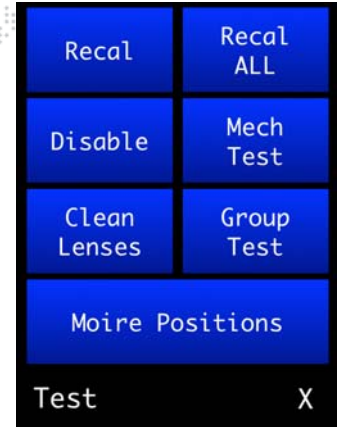
This chapter provides testing and troubleshooting procedures for the luminaire.

- + TESTING
- + TROUBLESHOOTING

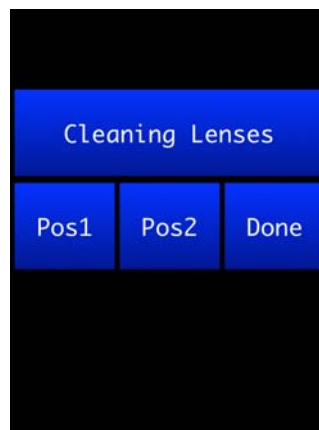
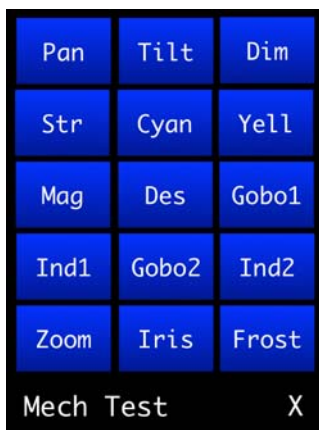
TESTING

Test Screen

- + **Recal** - press to bring up Recalibration Screen. (During recalibration, intensity goes out until all mechanism calibrations are complete and back in position, then fades in.)
- + **Recall ALL** - press to bring up Re-Cal ALL Yes/No options.
- + **Disable** - press to bring up Disable Screen.
- + **Mech Test** - press to bring up Mechanical Test Screen. (See "**Mechanical Test**" on page 13 for more explanation of this screen.)
- + **Clean Lenses** - press to position lenses so that all surfaces may be cleaned with a cloth. (Note that pressing the button does not actually clean the lenses.)
- + **Group Test** - allows multiple Bad Boy luminaires to be run through a configurable test sequence when chained together via DMX512 or Ethernet. (See "**Group Test**" on page 14 for more explanation of this screen.)
- + **Moiré Positions** - press to bring up Moiré Gobos screen, which provides a way to specify the wheel positions containing Moiré gobos. Moiré gobos contain two pieces of glass: one that is fixed and another that rotates. Due to this construction they do not contain sensors, and therefore cannot be calibrated to a certain orientation at startup as with standard gobos.

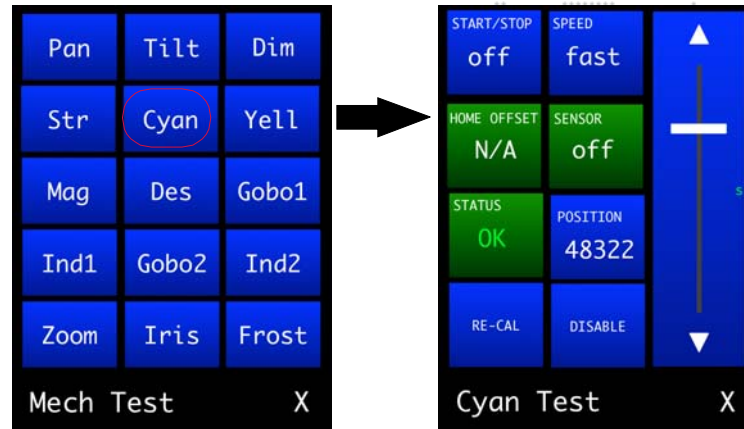


Test Sub-Menu Screens



Mechanical Test

The Mechanical Test menu provides a method for exercising all luminaire mechanisms individually. Each mechanism has a similar Test screen, Cyan is shown in the example below:



The following test functions are available:

- + **Test Chase** - The mechanism will move back and forth between two positions. The START/STOP button starts and stops the motion, and the SPEED button sets the rate of the motion. For mechanisms with sensors, one of the positions will be on the sensor and the other position will be off.
- + **Manual Control** - The slider on the right side of the screen moves the mechanism through its range of travel, manually. Tapping the arrows will move the mechanism in half panel increments.
- + **Feedback** - The current status of the mechanisms encoder (POSITION) and sensor (SENSOR) are shown (if available for that mechanism). STATUS indicates whether the mechanism is in an error state or normal operating state.
- + **Manual Position Entry** - Press POSITION to enter a value for the mechanism's position.
- + **Utility Functions** - Press RE-CAL to recalibrate the mechanism or DISABLE to turn off the motor control to allow the mechanism to move freely.
- + **Configuration Information** - HOME OFFSET indicates whether the home position* has been adjusted to fine tune sensor positions (applies to gobo wheel only, see Control Channel table in the Bad Boy User manual for zero wheel mechanism).

* Due to small variations in sensor and sensor board positions, the open position on a gobo wheel might not be precisely aligned with the optical axis, creating a slight blockage on one side of the open beam. Adjust the wheel position via DMX to get the proper alignment and send the HOME OFFSET command to store the current position as the new "home" position. This position is stored in persistent memory and will be used going forward as the home position.

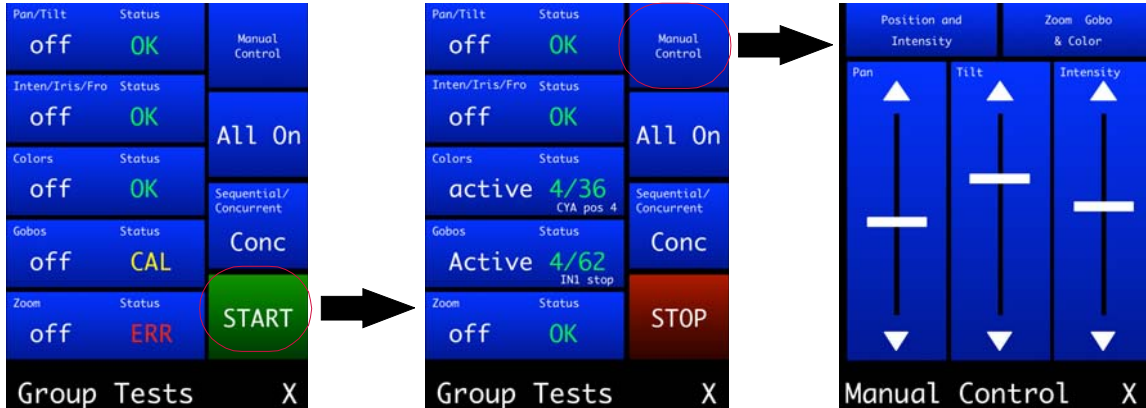
Group Test

The Group Test menu allows multiple Bad Boy Luminaires to be run through a configurable test sequence when chained together via DMX512 or Ethernet.

To perform a group test:

- Step 1. At Group Test screen, select options to run: Pan/Tilt, Intensity, Colors, Gobos, and/or Zoom.
- Step 2. Select test option: *concurrently* (all selected tests are run at once) or *sequentially* (tests are run one at a time as each one finishes).
- Step 3. Press START to begin testing. All Bad Boy luminaires connected to the main fixture (now referred to as the "Master") will become "Slaves" and follow the test routine set on the Master in an endless loop.
- Step 4. To stop the test sequence, press STOP on the Master.

While in group test, a Master can manually change certain values by using the Manual Control screen. From here, you can adjust the levels of parameters not active in the test sequence. For example, if a test were running on gobos and colors, you can adjust the pan and tilt to point the Master and all Slaves to a position where it will be easier see the output of the fixtures.



TROUBLESHOOTING

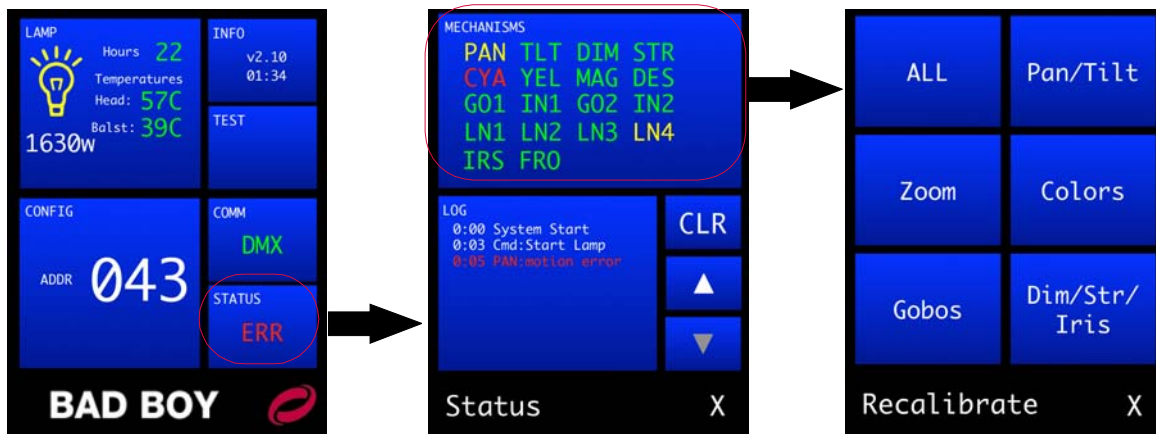
Errors

The Status menus can be used to determine if any luminaire mechanisms are reporting errors. The Status panel at the Home screen will report overall luminaire conditions as follows:

- + CALIBRATION (yellow)
- + OK (green)
- + ERROR (red)
- + LOCKED (white)

Pressing the Status panel will bring up the Status screen (as shown below). The Status screen will indicate which specific mechanisms, if any, have errors. It also provides a log of systems activity. The Status panel operates as follows:

- + **Mechanisms** - displays mechanism status. Mechanism names will be shown in yellow if calibrated, green if okay, and red if an error exists. If an error exists, press the Mechanisms panel to bring up the Recalibration screen. Try recalibrating the mechanism(s) that is reporting the error.
- + **Log** - displays system log. Use touchscreen arrows to scroll up or down. Press CLR to bring up Clear Log Yes/No options.



Mechanism Errors

Errors will be shown after the mechanism code, for example: PAN:Comm Error.

Error Code	Explanation	Solution
Cal Error	Error resetting position values in motion processor at beginning of calibration	Check CAN cables/connections, motor control board
Cal Timeout	An action during calibration took longer than expected	Check CAN cables/connections, motor control board
Comm Error	Error communicating with motion processor	Check CAN cables/connections, motor control board
Command Error	Error while sending commands to the motion processor	Check CAN cables/connections, motor control board
Get Position Error	Error when retrieving current position from motion processor	Check CAN cables/connections, motor control board
Hall Sensor Edge	Found sensor, but couldn't find far edge	Check for mechanism motion, sensor operation
Init Error	Error during initialization of motion processor	Check CAN cables/connections, motor control board
Motion Error	Mechanism's actual position is too far from its commanded position	Check mechanism motion
No Sensor	During calibration, no sensor was found in the range of travel	Check for mechanism motion, sensor operation
No Stop	Mechanism which calibrates to a physical stop did not find that stop	Check mechanism
Profile Change Error	Error while sending profile change command to motion processor	Check CAN cables/connections, motor control board
Sensor Stuck	During calibration, could not find either edge of the sensor or the sensor did not turn off as expected	Check for mechanism motion, sensor operation
Spin Error	Error while sending spin command to motion processor	Check CAN cables/connections, motor control board
Spin Stop Timeout	Spinning mechanism did not come to rest in the given period	Check CAN cables/connections, motor control board
Stop Spin Error	Error while sending stop spin command to motion processor	Check CAN cables/connections, motor control board

Other Errors

Error Code	Explanation	Solution
CAN Comm Error	Stopped receiving CAN messages from motion processor	Check CAN cables/connections, motor control board
Crossload Timeout	Crossload execution took too long due to error	Remove any incoming DMX, retry
Data not crossload format	Data in memory is not proper format for crossload	Load software via computer
DMX busy: cancel crossload	Cannot execute crossload with traffic on DMX line	Remove incoming DMX control for cross load
DMX: UART transmit error	Transmit buffer busy when trying to send	Remove any incoming DMX, retry
Gobo out of zero range	When zeroing gobo wheels, the wheel is too far away from zero to set the position	Move wheel closer to home position before zero command
Lamp Off	Fan Error: Cannot strike lamp while any fan is in error state	Check fan, fan cabling
Lamp over threshold	Lamp hours above recommended maximum	Change lamp
Main Fan Error	Main fan CAN messages not received or fan not running properly	Check fan, fan cabling
Pan/Tilt Aux Encoder Error	Auxiliary encoder value is too far from the main encoder value	Check auxiliary encoder and cabling/connections
Pinch Fan Error	Pinch fan not running properly	Check fan, fan cabling
Stack Fan Error	One or more stack fans not running properly	Check fan, fan cabling
Temp over threshold	Temperature too high	Check fans/filters
UPE Fans Error	Upper Enclosure fans not running properly	Check fan, fan cabling

Basic Troubleshooting

The following table provides a list of common start-up problems and possible solutions. Refer to the Bad Boy Spot Luminaire User Manual for more information about installation and operation.

Symptom	Solution(s)
No power to luminaire.	Ensure power cable is properly connected to Neutrik input connector.
	Ensure power is switched on at source (mains, disconnect box, etc.)
No console control.	Ensure DMX512 or Ethernet data cable is properly connected.
	Ensure DMX512 address setting is correct.
DMX512 control not working correctly throughout daisy-chain.	Ensure data cables are correctly configured.
	Ensure termination connector is installed at last luminaire in data link.
Lamp does not strike at power-up.	Configure lamp to start at power-up.
Comm LED is red indicating that no valid DMX or Ethernet signal is detected.	Ensure DMX512 or Ethernet data cable is properly connected. Check console.
No Ethernet control.	Ensure that luminaire is not also receiving a DMX signal. If both valid DMX and Ethernet control are being received, DMX control will take precedence.
Beam obstructed by gobo in open position.	Set new gobo zero position.
Luminaire won't take software update.	Remove active control (DMX512 or Art-Net).

Component Troubleshooting

This section provides troubleshooting guidelines for isolating problems down to the Spares Kit Sub-Assembly level. (Refer to [page 84](#) for a list of all spares components.)

Lamp Issues

Lamp will not strike or there is a loss of lamp output
<i>Details:</i> A loud popping sound and/or loss of lamp output is an indication of lamp failure.
<i>Procedure:</i> Remove backcap and inspect lamp (page 40).
<i>Solution:</i> Replace Lamp... page 40
Lamp has failed and damage to the UV/IR Window Assembly is suspected
<i>Details:</i> The UV/IR Window can be damaged by a non-passive failure of the lamp. A loud popping sound and/or loss of lamp output indicates the lamp has failed. This almost always breaks the reflector and can crack one or more of the four panes in the UV/IR Window Assembly.
<i>Procedure:</i> Remove backcap and inspect lamp (page 40). Remove what is left of lamp and inspect UV/IR Window for damage.
<i>Solution:</i> Replace UV/IR Window Assembly... page 64
Lamp has failed and damage to the Reflector is suspected
<i>Details:</i> The Reflector can be damaged by a non-passive failure of the lamp. A loud popping sound and/or loss of lamp output indicates the lamp has failed. This almost always breaks the reflector.
<i>Procedure:</i> Remove backcap and inspect lamp (page 40). Remove what is left of the lamp and inspect reflector for damage.
<i>Solution:</i> Replace Reflector... page 65
Lamp will not strike, but there are no fan errors on the Status screen and Ignitor PCB is okay
<i>Details:</i> If the lamp does not strike after the command is given, but there are no fan errors on the Status screen and the Ignitor PCB is known-good, it may indicate that the Ballast has failed.
<i>Procedure:</i> Remove both Enclosure Covers (page 30). Remove the RF screen covering the end of the ballast closest to the Neutrik power input. Apply power again and verify 208 VAC is present at the input terminals on the ballast. (The input terminals are on either side of the two fuses.) If you have 208 VAC coming into the ballast, you will need to verify if the ballast is outputting 400 VDC. Remove power from fixture and carefully remove lamp (page 40). Power-up the fixture and when the calibration is complete, start the lamp from the Menu Touchscreen and measure the voltage across the ballast output terminals. You should read 400 VDC across the two terminals. If you do not read 400 VDC, power down the fixture and unplug the 6-pin Ballast Control Cable from the ballast. Using a 2-pin jumper or a Berg Header, install the jumper on the 2-pin header above where the ballast control cable was connected. When these two pins are shorted, the ballast will automatically strike as soon as power is applied. Apply power to fixture and carefully check to see if you read 400 VDC across the ballast output terminals. If you have 208 VAC on the input, and with the test jumper installed you do not see 400VDC on the output terminals, the ballast is faulty and needs to be replaced.
<i>Solution:</i> Replace EMI Ballast Enclosure... page 68
Lamp will not strike, but there are no fan errors on the Status screen and Ballast is okay
<i>Details:</i> If the lamp does not strike after the command is given, but there are no fan errors on the Status screen and the Ballast is known-good, it may indicate that the Ignitor PCB has failed.
<i>Procedure:</i> Remove Tilt-Side Yoke Cover to access Ignitor PCB (page 6). Verify that relay is wired correctly and engages upon fixture power-up. Verify the polarity of the power input cables to the Igniter and ensure they are on the correct terminals. Carefully remove lamp from fixture (page 40). When the Lamp Start command is given, you should read 400 VDC on the input terminals of the Ignitor and a red neon lamp will glow on the PCB. If red neon lamp does not glow, then the Ignitor has failed.
<i>Solution:</i> Replace Ignitor PCB... page 72

Wheel Stack and/or Frost (Diffusion) Issues

Status screen is displaying errors for Dimmer, Strobe, Color Wheels, Gobo Wheel, Iris and/or Frost mechanisms

Details: Upon power-up, all mechanisms in the fixture will execute a calibration routine. Each mechanism must pass its calibration test or it will disable itself and possibly other mechanisms. The Wheel Stack Assembly contains 12 separate functions that it will test. After calibration, the status of each of these mechanisms, or mechanisms controlled outside the Wheel Stack such as the Frost function, will be displayed on the Status screen by the color of their mechanism name abbreviation or "sub-code." These mechanisms are:

- + Dimmer Wheel - DIM
- + Strobe - STR
- + Cyan Filter Wheel - CYA
- + Yellow Filter Wheel - YEL
- + Magenta Filter Wheel - MAG
- + Designer Filter Wheel - DES
- + Gobo Wheel 1 - GO1
- + Gobo Wheel 1 Index - IN1
- + Gobo Wheel 2 - GO2
- + Gobo Wheel 2 Index - IN2
- + Beam Size Iris - IRS
- + Diffusion (Frost) Paddle - FRO

If the sub-code is green, that particular function on the Wheel Stack has passed the calibration test. If the sub-code is red, that function did not pass and is disabled. (Refer to [page 15](#).)

Procedure: Ensure that all Wheel Stack cables are securely connected. Check for blown fuses. On each of the three Wheel Controller PCB's, there are four (4) motor drivers. There is a 2 Amp Timed (Slo-Blow) Fuse to protect each of the four drivers. They provide power for both the servo motors and the stepper motors. If during calibration or operation, you observe a mechanism servo motor or stepper motor that appears to have no power, locate the Wheel Controller PCB and the driver for that motor. Check the driver and fuse for that motor. If cables are secure and there are no blown fuses, replace the Wheel Stack Assembly.

CAUTION: There are no field-serviceable parts in the Wheel Stack Assembly. Do not attempt to disassemble the Wheel Stack Assembly. Replace with a spare assembly in the event of a failure.

Solution: Replace 2A Fuse... [page 66](#)

Solution: Replace Wheel Stack Assembly... [page 49](#)

Output beam is not diffusing or has a different degree of diffusion than other fixtures, and the Status screen does not indicate a frost calibration error (FRO: Cal Error)

Details: The most common cause of this problem is that one or more of the two diffusion filters have detached from the paddle frame.

Procedure: Remove Head Cover and examine the Diffuser Paddle Assembly. There should be two different frost paddles attached to the paddle frame. If there is not, replace the Diffuser Paddle Assembly.

Solution: Replace Frost/Diffuser Paddle Assembly... [page 53](#)

"FRO: Cal Error" is displayed in Status Log and FRO sub-code is red

Details: During calibration, the FRO sub-code will be red on the Status screen if problems exist with the Diffuser Sensor PCB.

Procedure: At Recalibrate screen, initiate a re-calibration of the mechanism. If it remains red, remove Head Cover and ensure that the Diffuser Sensor Cable is firmly connected to the header on the Sensor PCB. Initiate calibration for the diffuser again. You will see the paddle assembly move toward the Sensor PCB. The sensor's red LED should be *on*. The paddle has a magnet that will pass over the sensor and it should turn green when it comes in proximity to the magnet. If it does not turn green, replace the Diffuser Sensor PCB.



Solution: Ensure Diffuser Sensor Cable is properly seated.

Solution: Replace Diffuser Sensor PCB... [page 56](#)

A mechanism motor appears to have no power during calibration or operation

Details: On each of the three Wheel Controller PCB's there are four (4) motor drivers. There is a 2 Amp Timed (Slo-Blow) Fuse to protect each of the four drivers. They provide power for the motors. The silkscreen on the Motherboard PCB has each mechanism identified near the driver for each of the three Wheel Controller PCBs.

Procedure: If during calibration or operation, you observe a mechanism servo motor or stepper motor that appears to have no power, locate the driver for that motor. Verify all cables are installed properly. With power off, visually inspect the driver for damage. If the driver chip has visible damage, then replace the driver's PCB. If not, carefully remove the fuse. Check for continuity to determine if the fuse is open. If the fuse has blown, then inspect the mechanism for shorts or other problems. Replace any blown fuses and recalibrate the fixture.

Solution: Replace 2A Fuse... [page 66](#)

Fan/Cooling Issues

Tip Pinch Fan is buzzing or... "Pinch Fan Err" is displayed in Status Log

Details: If the fan is buzzing, it is an indication that it is starting to fail. If it stops turning, the lamp will douse and the Status Log will display "Pinch Fan Err."

Solution: Replace Tip Pinch Fan... [page 63](#)

Main Head Fan is buzzing or... "Main Fan Err" is displayed in Status Log

Details: If the fan is buzzing, it is an indication that it is starting to fail. If it stops turning, the lamp will douse and the Status log will display "Main Fan Err."

Solution: Replace Main Head Fan... [page 60](#)

Lens Issues

Lenses fail to calibrate or lenses not operating correctly, and Zoom Sensors are good

Details: There are four (4) Zoom Sensors, one for each Lens Group 1, 2, 3, and 4. Group 4 is farthest from the lamp. Each sensor contains an LED which is helpful in determining failures. After calibration, the status of each Lens Group will be displayed on the Status screen by the color of its name abbreviation or "sub-code." These are:

- + Lens Group 1 - LN1
- + Lens Group 2 - LN2
- + Lens Group 3 - LN3
- + Lens Group 4 - LN4

WARNING: Before starting this test, it is highly recommended you remove all tools and body parts from the lens travel areas. The moving lens groups will pinch fingers between several contact points in the assembly and can cause extreme discomfort. The motors are fused to stop, but injury can occur.

Procedure: Before the Zoom calibration starts, all four of the LED's on the sensors should be red. If any are not red, stop here and change that sensor ([page 57](#)). When you get all four LED's on red, start the calibration process. Once calibration starts, each lens starting with Group 1 will travel toward its sensor one by one. There is a spring-loaded gold plated pin at the end of a screw that will come into contact with each lens group's sensor. The gold sensor pin has been precisely set for optimum performance of that lens group. (Do not adjust any of the gold pins on any lens group for any reason. They are factory set.) When the spring loaded gold tip of the screw touches the gold pad on the Zoom Sensor, the LED will turn green and the lens group will stop moving. Immediately, Group 2 will duplicate the movement towards its sensor. If each lens group 1 through 4 sequentially locates its sensor and the red LED's each turn green, then the Zoom Assembly is functioning properly. If any of the four sensors does not change from red to green, the calibration process will stop, ensuring the lens groups do not collide. In addition, all four lens sub-codes in the Status screen will turn red, indicating a failure to calibrate. The most common sensor failures will be defined by an incorrect LED color when the gold pin touches the gold pad on the sensor. These would be a failure to turn green from red, turning from red to yellow (both green and red) or the red LED turns off after contact with the gold pin during the calibration procedure.

Solution: Ensure all Zoom Lens Sensor cables are properly seated.

Solution: Replace Zoom Controller 2A Fuse... [page 66](#)

Solution: Replace Zoom Controller PCB... [page 56](#)

Lenses fail to calibrate or lenses not operating correctly, and Zoom Controller PCB is good

Details: There are four (4) Zoom Sensors, one for each Lens Group 1, 2, 3, and 4. Group 4 is farthest from the lamp. During Zoom calibration, a gold, spring-loaded screw will move with each lens group towards its EOT sensor. When the pin touches the gold pad on the Zoom Sensor, the red LED on the sensor should turn green and the lens group will stop moving. This repeats for the other three lens groups. The Zoom Controller PCB has four (4) motor drivers. There is a 2 Amp Timed (Slo-Blow) Fuse to protect each of the four drivers. They provide power for both the motors.

Procedure: Check for blown fuses. Replace any blown fuses and recalibrate the fixture. If the LED on the Zoom Sensor stays red, turns off, or changes to yellow, both red and green on, it has failed and needs to be replaced.

Solution: Replace Zoom Controller 2A Fuse... [page 66](#)

Solution: Replace Zoom Sensor PCB... [page 57](#)

A zoom lens motor appears to have no power during calibration or operation

Details: The Zoom Controller PCB has four (4) motor drivers. There is a 2 Amp Timed (Slo-Blow) Fuse to protect each of the four drivers. They provide power for both the motors. The silkscreen on the Motherboard PCB has each mechanism identified near the driver for each of the three Wheel Controller PCBs and the Zoom Controller.

Procedure: If during calibration or operation, you observe a mechanism servo motor or stepper motor that appears to have no power, locate the driver for that motor. Verify all cables are installed properly. With power off, visually inspect the driver for damage. If the driver chip has visible damage, then replace the driver's PCB. If not, carefully remove the fuse. Check for continuity to determine if the fuse is open. If the fuse has blown, then inspect the mechanism for shorts or other problems. Replace any blown fuses and recalibrate the fixture.

Solution: Replace 2A Fuse... [page 66](#)



Menu Display Issues

If power is applied and the Menu Display Touchscreen does not come up or the fixture does not start the calibration routines

Details: The Interface/LVS Module controls several functions. It contains the 24VDC LVS that provides the low voltage power for all the electronic components in the fixture, with the exception of the Ballast. It contains the Master Control PCB that runs the Menu Touchscreen user interface and controls the DMX and Ethernet communications. In addition, it generates the communication data that controls and monitors all the internal mechanisms of the fixture. When power is applied to the fixture, the LVS will supply 24VDC to all the mechanisms. Next the MCB will display the Menu fixture status, detect the external communication, and initiate the internal communication bus that starts the calibration routines for every mechanism in the fixture.

Procedure: If power is applied and the Menu Display does not come up *or* the fixture does not start the calibration routines, the most common cause will be a lack of 24VDC from the LVS. Remove the Pan-Side Yoke Cover (page 7) and check to see if you have 24VDC on the red and black wires attached to the terminal strip. If you do not have 24VDC, replace the Interface/LVS Module.

Solution: Replace Interface/LVS Module...page 70

If power is applied to the fixture and it begins to calibrate Pan and Tilt, but you do not see any status information come up on the Menu Display Touchscreen

Details: The Interface/LVS Module controls several functions. It contains the 24VDC LVS that provides the low voltage power for all the electronic components in the fixture, with the exception of the Ballast. It contains the Master Control PCB that runs the Menu Touchscreen user interface and controls the DMX and Ethernet communications. In addition, it generates the communication data that controls and monitors all the internal mechanisms of the fixture. When power is applied to the fixture, the LVS will supply 24VDC to all the mechanisms. Next the MCB will display the Menu fixture status, detect the external communication, and initiate the internal communication bus that starts the calibration routines for every mechanism in the fixture.

Procedure: If power is applied to the fixture and it begins to calibrate Pan and Tilt, but you do not see any status information come up on the Menu Display, most likely the Display or MCB have failed and you will need to replace the Interface/LVS Module.

Solution: Replace Interface/LVS Module...page 70

If power is applied to the fixture and calibration completes, and you can see the Status for the mechanisms displayed on the touchscreen, but you have no external control of the fixture

Details: The Interface/LVS Module controls several functions. It contains the 24VDC LVS that provides the low voltage power for all the electronic components in the fixture, with the exception of the Ballast. It contains the Master Control PCB that runs the Menu Touchscreen user interface and controls the DMX and Ethernet communications. In addition, it generates the communication data that controls and monitors all the internal mechanisms of the fixture. When power is applied to the fixture, the LVS will supply 24VDC to all the mechanisms. Next the MCB will display the Menu fixture status, detect the external communication, and initiate the internal communication bus that starts the calibration routines for every mechanism in the fixture.

Procedure: If power is applied to the fixture and calibration completes, *and* you can see the Status for the mechanisms displayed on the touchscreen, but you have no external control of the fixture, it is most likely a MCB failure. When you have valid communication to the fixture, a green LED will be present on the front panel. If you remove the DMX or Ethernet cable controlling the fixture from the data input on the front panel, the LED will turn red. If you have known-good DMX or Ethernet, but no green LED, the MCB has failed and you will need to replace the Interface/LVS Module.

Solution: Replace Interface/LVS Module...page 70

Pan/Tilt Issues

Tilt continues to move past center during calibration, and... "TILT: no sensor" is displayed in Status Log and TLT sub-code is red

Details: During initial Pan/Tilt calibration at power-up, Tilt will line up between the yoke legs and Pan will rotate looking for its mechanical stop. If Tilt continues to move past center, it is an indication that the COT sensor has failed or is unplugged from the Pan/Tilt Controller PCB. In addition, the Status Log will display error "TILT: no sensor" and the TLT sub-code will be red.

Solution: Re-connect Pan/Tilt COT Sensor Cable.

Solution: Replace Pan/Tilt COT Sensor... [page 75](#)

PAN sub-code is red and Status Log contains one or more Pan-related error codes, and/or... TLT sub-code is red and Status Log contains one or more Tilt-related error codes

Details: Upon power-up, the Pan/Tilt Controller PCB performs a calibration procedure that the Pan and Tilt must pass before allowing control of these two functions. The Tilt moves to a position between the two yoke legs and stops. The Pan rotates the yoke until it contacts the pan stop and reverses directions for half a turn then stops. The Status screen will show the PAN and TILT sub-codes in green if they pass. If the Pan/Tilt Controller PCB is faulty, or if either mechanism fails, the sub-codes will appear on the Status screen in red and there will be one or more entries in the Status Log containing an error message.

Procedure: Remove the Pan-Side Yoke Cover ([page 7](#)) and verify all connections to the Controller PCB are secure. If all connections are good, and the Pan and/or Tilt still fail, replace the Pan/Tilt Controller PCB with a tested "known-good" PCB. If the failures continue, follow up on the error codes to isolate the source of the failure. If the failures stop, replace the Pan/Tilt Controller PCB.

Solution: Replace Pan/Tilt Controller PCB... [page 74](#)

Pan motor does not stop running after calibration, or... "Pan Aux Encoder Fail" is displayed in Status Log and PAN sub-code is red

Details: Upon power-up, the Pan moves all the way around to the pan stop and stops moving, then rotates 180 degrees and stops again. If it reaches the first stop and the pan motor continues to run, the Pan Drive Assembly has most likely failed. If upon power-up, the Pan calibrates and the Status Log displays "Pan Aux Encoder Fail," the Pan Drive Assembly's auxiliary encoder has failed.

Procedure: Verify that all Pan and Tilt cables are properly connected to the Pan/Tilt Control PCB ([page 7](#)). It could save time by installing a known-good Pan/Tilt Control PCB to eliminate that component as a cause of the malfunction. If installing a good Pan/Tilt Control PCB does not fix the problem, the Pan Drive Assembly should be replaced.

Solution: Replace Pan Drive Assembly... [page 77](#)

Tilt continues to move after it has reached center position between yoke legs during calibration, or... "Tilt Aux Encoder Fail" is displayed in Status Log and TLT sub-code is red

Details: Upon power-up, the Tilt will move to a position between the yoke legs and stop moving. If the Tilt continues to move after it has reached the center position between the yoke legs, the Tilt Drive Assembly has most likely failed. If upon power-up, the Tilt calibrates and the Status Log displays "Tilt Aux Encoder Fail," the Tilt Drive Assembly's auxiliary encoder has failed.

Procedure: Verify that all Pan and Tilt cables are properly connected to the Pan/Tilt Control PCB ([page 7](#)). It could save time by installing a known-good Pan/Tilt Control PCB to eliminate that component as a cause of the malfunction. If installing a good Pan/Tilt Control PCB does not fix the problem, the Tilt Drive Assembly should be replaced.

Solution: Replace Tilt Drive Assembly... [page 80](#)

Pan Drive or Tilt Drive Mechanism has no power

Details: A 3 Amp Timed (Slo-Blow) Fuse protects the two drivers for the Pan/Tilt Controller PCB.

Procedure: If power is lost to either the Pan Drive or Tilt Drive Mechanisms, visibly check drivers for any damage. Verify all cables are properly installed. Replace the Pan/Tilt Controller PCB if any damage is detected. Inspect the cables to ensure they are not damaged or shorted. Replace any blown fuses and recalibrate the fixture.

Solution: Replace Pan/Tilt Controller PCB... [page 74](#)

Solution: Replace 3A Fuse... [page 67](#)



3.

MAINTENANCE

This chapter provides maintenance procedures for the luminaire.

- + EQUIPMENT HANDLING
- + ROUTINE MAINTENANCE
- + REMOVE AND REPLACE PROCEDURES

EQUIPMENT HANDLING

Proper Lamp Servicing and Operation

Servicing

- + When handling a lamp, hold it by the ceramic base while wearing cotton gloves or finger cots. Do not touch the glass envelope (bulb). If you touch the glass with bare fingers, wipe off any fingerprints with alcohol.

Heat

- + When lamps are lit, the interior of the luminaires becomes very hot. To aid in the airflow circulation within the luminaires, after dousing the lamps, wait 5 minutes before removing power to the luminaires. This will provide enough time for the equipment fan to cool off the unit.

Lamp Life

- + When operating arc lamps, allow luminaires to operate for at least 3 minutes. It takes about 3 minutes for the fill components (mercury and halogen-metal compounds) in the lamp tubes to vaporize completely. If the lamps are switched off earlier than 3 minutes, the fill components are partially vaporized. The inadequately vaporized fill components and the electrode material (tungsten) are deposited in the areas of the lamp tubes that have remained cool. As a result, the lamp tubes blacken prematurely and reduce the service lives of the lamps.
- + If system will be unattended for more than 3-4 hours, luminaire lamps should be doused.
- + The Bad Boy lamp indicator (available on the menu Home screen) displays total lamp hours. Lamp hours are shown in green if under threshold, yellow at 750 hours, and red at 900 hours. *It is mandatory that the lamp be changed before 900 hours.*



CAUTION: It is mandatory that the lamp be changed before 900 hours.

Wheel Stack Road Case Instructions

A special road case is provided for shipping Bad Boy Wheel Stack Assemblies. The case is necessary to protect the fragile components of the Wheel Stack Assembly during storage, transport and shipping.

Pre-printed labels (addressed to the PRG Dallas office) are provided for ease of shipping. The labels can be found in a plastic bag taped to the inside of all wheel stack road cases.

The illustrations in **Figure 3-1** show how the Wheel Stack Assembly should be packed and unpacked inside the case.

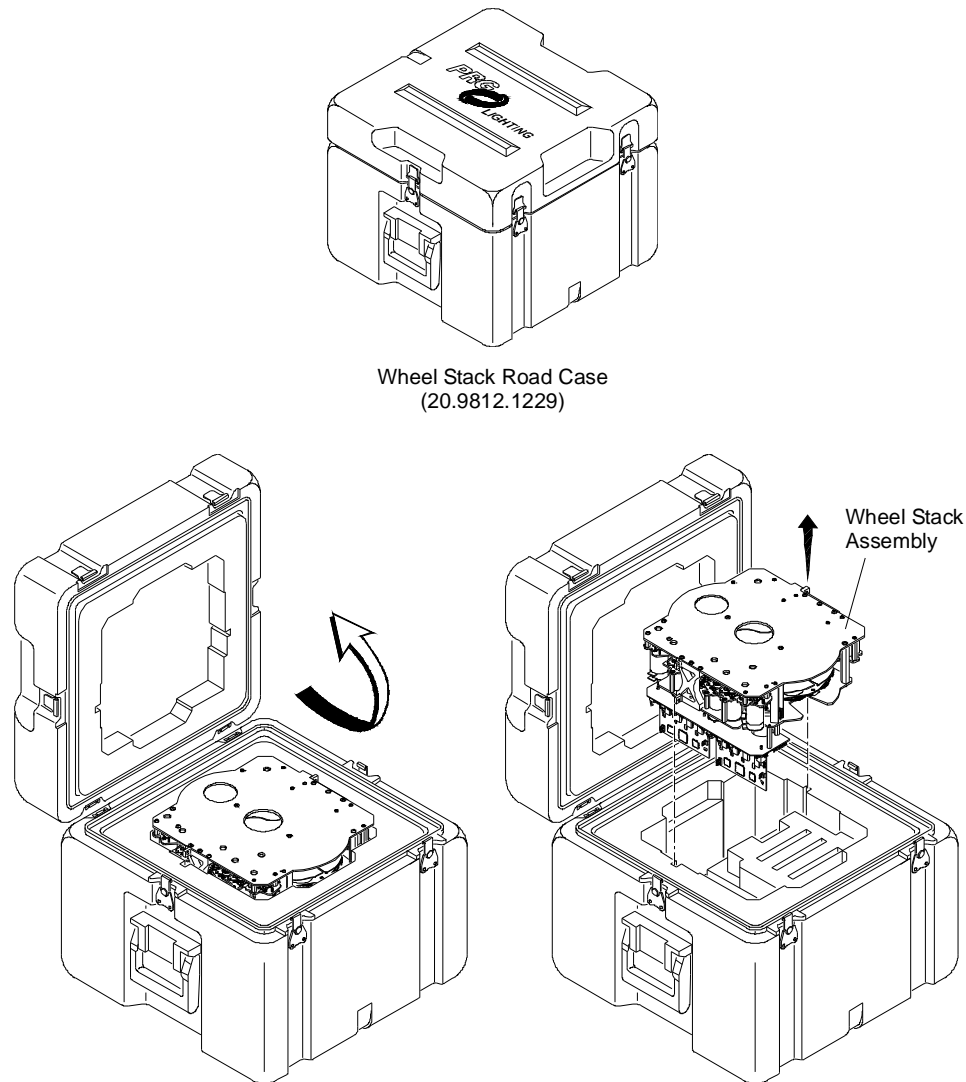


Figure 3-1: Wheel Stack Road Case

ROUTINE MAINTENANCE

Removing the Head Covers

To access some interior head components, one or both of the Head Covers may need to be removed.

Parts:

21.9812.0630 2 EA ASSY, HEAD COVER

Tools:

#2 Philips screwdriver (manual screwdriver only)

To remove Head Covers:

- Step 1. At Head Cover, remove two 8-32 x 3/8" PPB screws (Figure 3-2).
- Step 2. Remove Head Cover from luminaire.

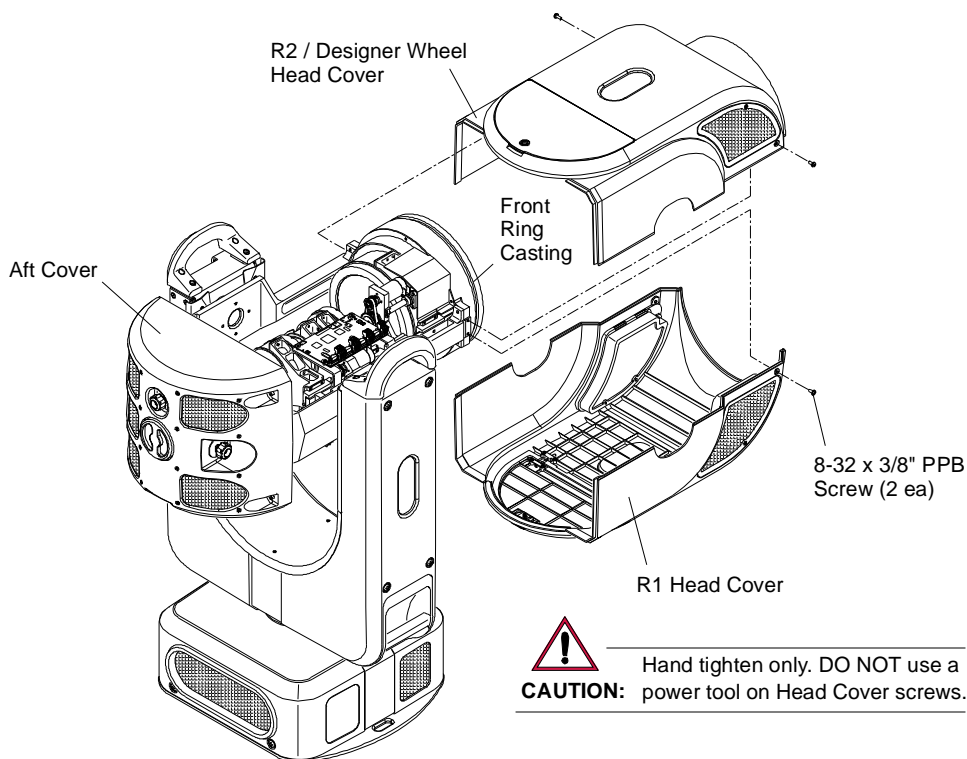


Figure 3-2: Removing Head Covers



CAUTION: DO NOT use a power screwdriver when re-installing the 8-32 x 3/8" PPB screws. This may damage the hole threads. *Use a manual screwdriver only!*

- Step 3. Replace Head Cover as follows:
 - a. Set cover in place and slide rear corners under lip of Aft Cover.
 - b. At front of Head Cover, press with equal pressure on both sides until leading edge of cover snaps into place under front ring casting. (You will hear a "pop" when the cover snaps into place.)
 - c. Using manual #2 Philips screwdriver, re-install screws.

Removing the Aft Cover

To access some interior head components, the Aft Cover may need to be removed.

Parts:

21.9812.0612 1 EA ASSY, AFT COVER w/ BAFFLE

Tools:

5/32" Allen wrench, T-bar

To remove Aft Cover:

- Step 1. At Aft Cover, remove X, Y, and Z Adjustment Knobs (**Figure 3-3**).
- Step 2. Remove four 10-32 x 3/8" socket head screws.
- Step 3. Carefully remove Aft Cover from luminaire.

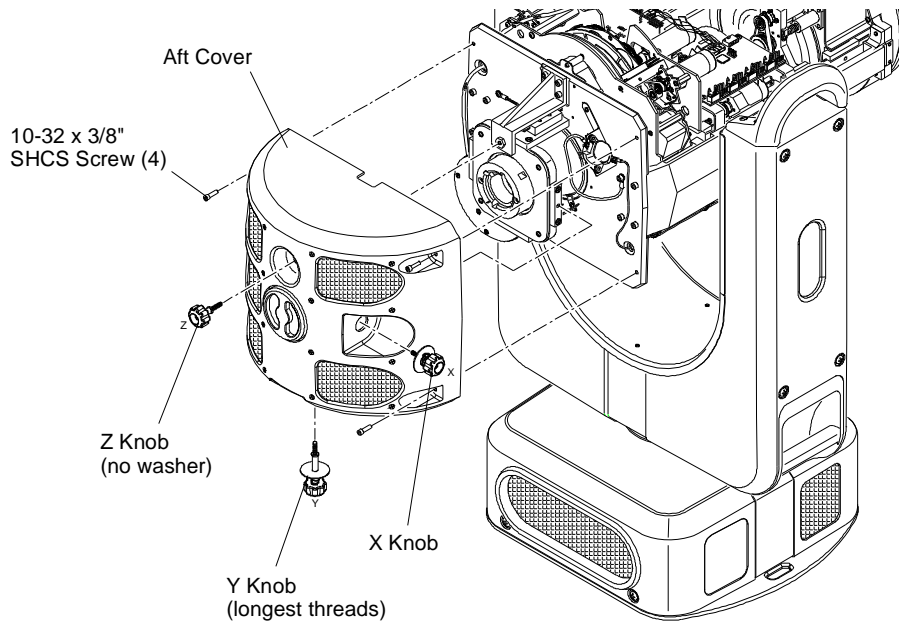


Figure 3-3: Removing Aft Cover

- Step 4. Replace Aft Cover as follows:
 - a. Slide cover into place.
 - b. Re-install X, Y, and Z Adjustment Knobs. *Note that each knob is different. Be sure to install the correct knob in the correct location.*
 - c. Re-install four 10-32 x 3/8" socket head screws.
 - d. Re-align lamp. (Refer to **"Adjusting the Lamp"** on page 42.)

Note: In order to prevent heat from escaping the rear bulkhead area and moving into the main head assembly, aluminum tape has been used to seal the backcap perimeter, fan wire hole, and back side of pinch fan. Re-apply new tape before re-installing the Aft Cover. Refer to technical bulletin BAD-002 for more information.

Removing the Enclosure Covers

To access interior enclosure components, one or both of the Upper Enclosure Covers may need to be removed.

Parts:

21.9812.0820	1 EA	ASSY, EXHAUST COVER, UPPER ENCLOSURE
21.9812.0830	1 EA	ASSY, INTAKE COVER, UPPER ENCLOSURE

Tools:

#2 Philips screwdriver

To remove Upper Enclosure Covers:

- Step 1. At Upper Enclosure Cover, loosen two captive screws.
- Step 2. Remove cover by pulling straight out until lip clears yoke support.



CAUTION: The Upper Enclosure Covers are not identical. One is for the Intake side and one for the Exhaust side. Be sure to re-install covers in the proper location.

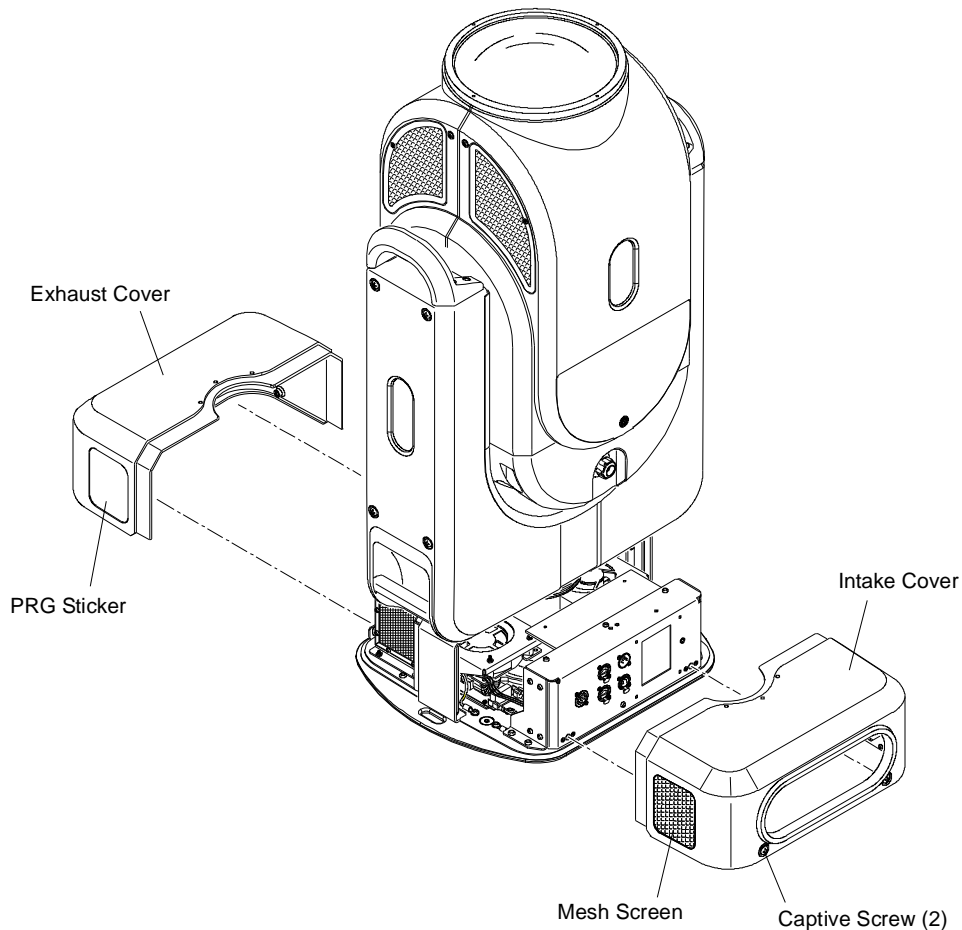


Figure 3-4: Removing Upper Enclosure Covers

Cleaning the Head Electrostatic Filters

The electrostatic filters should be cleaned or replaced when they are dirty. The frequency will depend on how often and in what conditions the luminaire is used.

Parts:

10.9812.0661	2 EA	HEAD AIR FILTER FOAM
10.9812.0662	2 EA	HEAD AIR FILTER ELECTROSTATIC

Tools:

#2 Phillips screwdriver
Compressed air *and/or* water

To clean head filters:



WARNING: Remove power from luminaire before performing any maintenance procedures.

- Step 1. Remove power from luminaire.
- Step 2. At each mesh cover, loosen one captive screw (**Figure 3-5**).
- Step 3. Remove foam and electrostatic filters.
- Step 4. Clean foam and electrostatic filters with compressed air *and/or* by washing with water.
- Step 5. Re-install components.
- Step 6. Repeat for second set of filters.

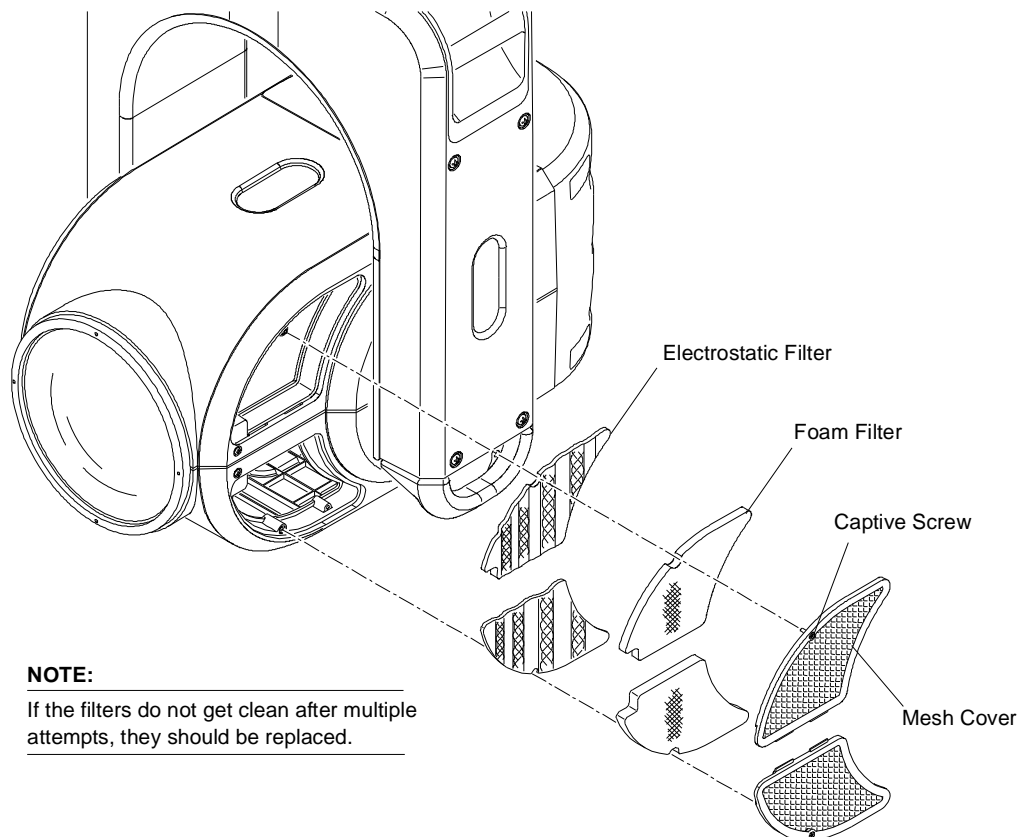


Figure 3-5: Removing Head Filters

Cleaning the Enclosure Intake Filters

The intake filters should be cleaned or replaced when they are dirty. The frequency will depend on how often and in what conditions the luminaire is used.

Parts:

40-9812-0834 2 EA AIR INTAKE FILTER

Tools:

#2 Phillips screwdriver
Compressed air *and/or* water

To clean enclosure intake filters:



WARNING: Remove power from luminaire before performing any maintenance procedures.

- Step 1. Remove power from luminaire.
- Step 2. Remove Intake Cover by first loosening two captive screws, then pulling away from Upper Enclosure as shown in **Figure 3-6**.

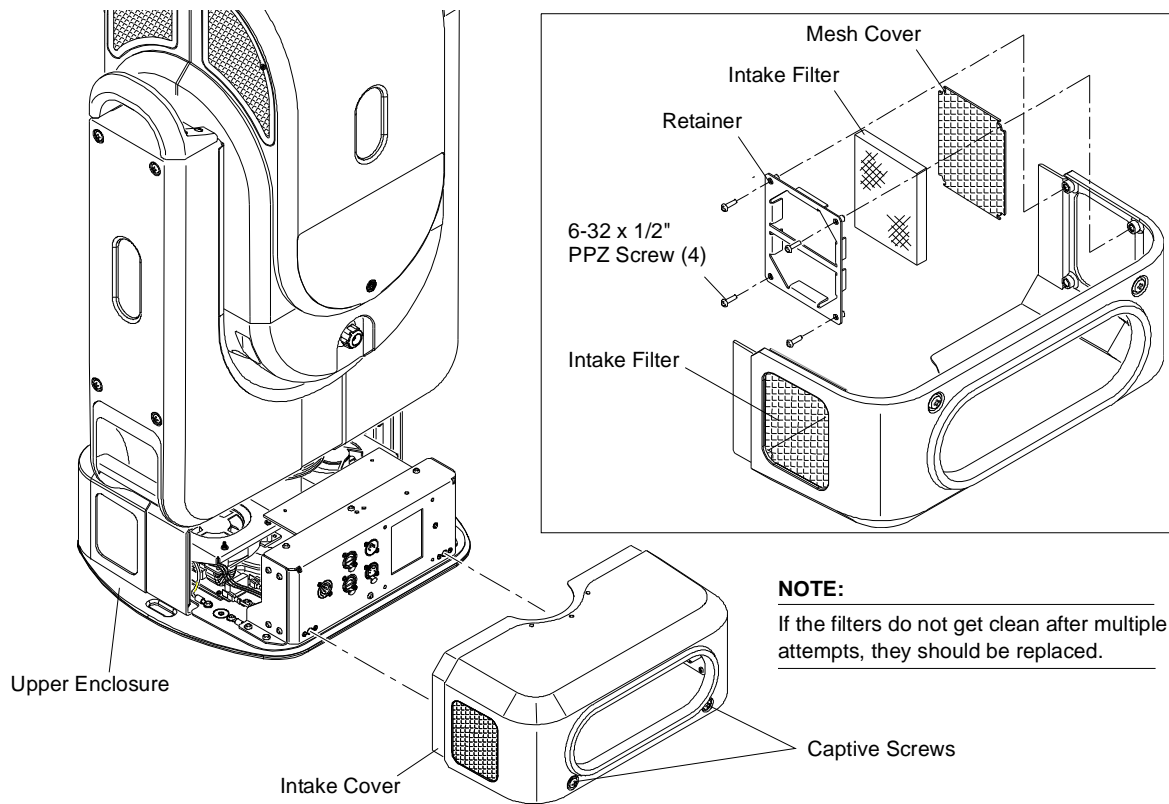


Figure 3-6: Removing Enclosure Intake Filters

- Step 3. At retainer, remove four 6-32 x 1/2" PPZ screws.
- Step 4. Remove intake filter.
- Step 5. Clean filter with compressed air *and/or* by washing with water.
- Step 6. Re-install components.
- Step 7. Repeat for second intake filter.

Cleaning the Luminaire Exterior

Tools:

- Lint-free cloth
- Window cleaner
- Vacuum cleaner with brush nozzle or compressed air
- #2 Phillips screwdriver

To clean luminaire:



WARNING: Remove power from luminaire before this procedure.



CAUTION: Use ONLY OptiMax™ Ultra Pure Cleaning Solution to clean optical components. DO NOT use Window Cleaner on lens!

- Step 1. Remove power from luminaire.
- Step 2. Using vacuum cleaner with brush nozzle or compressed air, clean dust from external components. *If using compressed air to clean out luminaire, DO NOT allow fans or blower to spin at high speeds, as this will damage their bearings.*
- Step 3. Using window cleaner and a clean, lint-free cloth, wipe outside surface of luminaire.
DO NOT use window cleaner on lens!

Cleaning the Lenses

Tools:

- (2) Micro Fiber cloths (06.6085.0001.0)
- OptiMax™ Ultra Pure Cleaning Solution (06.6084.0001.0)
- Cotton gloves or finger cots
- #2 Phillips screwdriver
- Hook & Pick tool

To clean lenses:

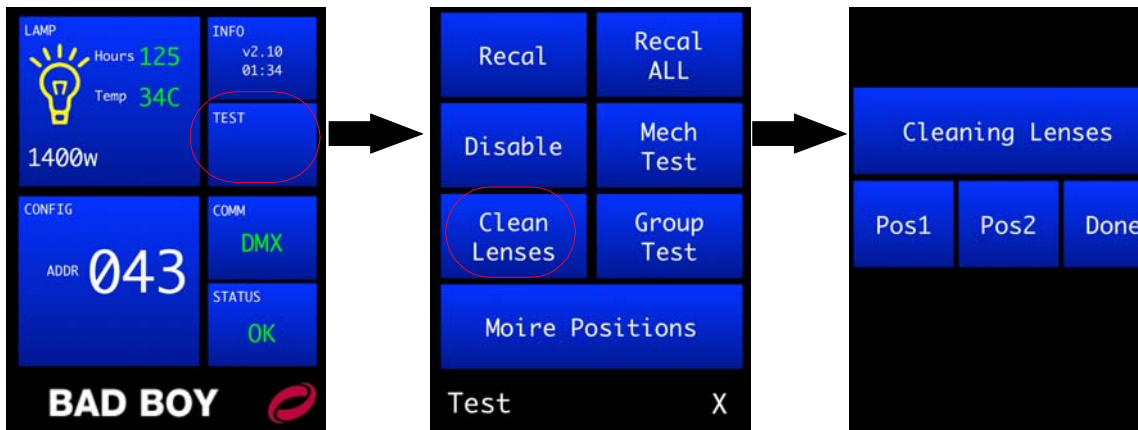


CAUTION: Use caution when handling lenses. Avoid scratching optical surfaces.



CAUTION: Use ONLY OptiMax™ Ultra Pure Cleaning Solution to clean optical components. DO NOT use Window Cleaner on lenses! Wear cotton gloves or finger cots when handling lenses/glass.

- Step 1. Apply power to luminaire and set intensity to 20%. (A beam will be necessary to see dirt and dust on the lenses.)
- Step 2. Remove R1-side head cover to access Zoom Lens Assembly (head cover doors have a label to identify them). See **Figure 3-8** on page 36.
- Step 3. At menu TEST screen, press "Clean Lenses." The Cleaning Lenses screen will open.
- Step 4. Press "Pos1" to position lenses in first cleaning configuration.



CAUTION: When cleaning, do not allow the cleaning cloth to come into contact with the lens carrier rail. The rail has lubrication that will contaminate the cleaning cloth. Wear cotton gloves or finger cots.

- Step 5. If lenses are only dusty, use Micro Fiber cloth to carefully wipe lens surfaces. If further cleaning is required, use OptiMax™ Ultra Pure Cleaning Solution and a Micro Fiber cloth to clean. **DO NOT use window cleaner!**
- Step 6. At menu, press "Pos2" to position lenses in second cleaning configuration. (This will allow access to the remaining lens surfaces.)
- Step 7. As in Step 5 above, clean remaining lens surfaces and front of luminaire Front Glass.
- Step 8. To clean backside of Front Glass and front of Lens Group 4, remove Front Glass as follows:
 - a. Position luminaire head so that Front Glass is facing upward. (To prevent it from falling onto the floor when the Retaining Ring is removed in the next step.)
 - b. Insert hook & pick tool under notch in Front Lens Retaining Ring. Carefully remove Retaining Ring.
 - c. Remove Front Glass and place facedown on a Micro Fiber cloth.

- d. Using OptiMax™ Ultra Pure Cleaning Solution and a Micro Fiber cloth, clean both sides of Front Glass and front of Lens Group 4. ***DO NOT use window cleaner!***
- e. Re-install Front Glass.

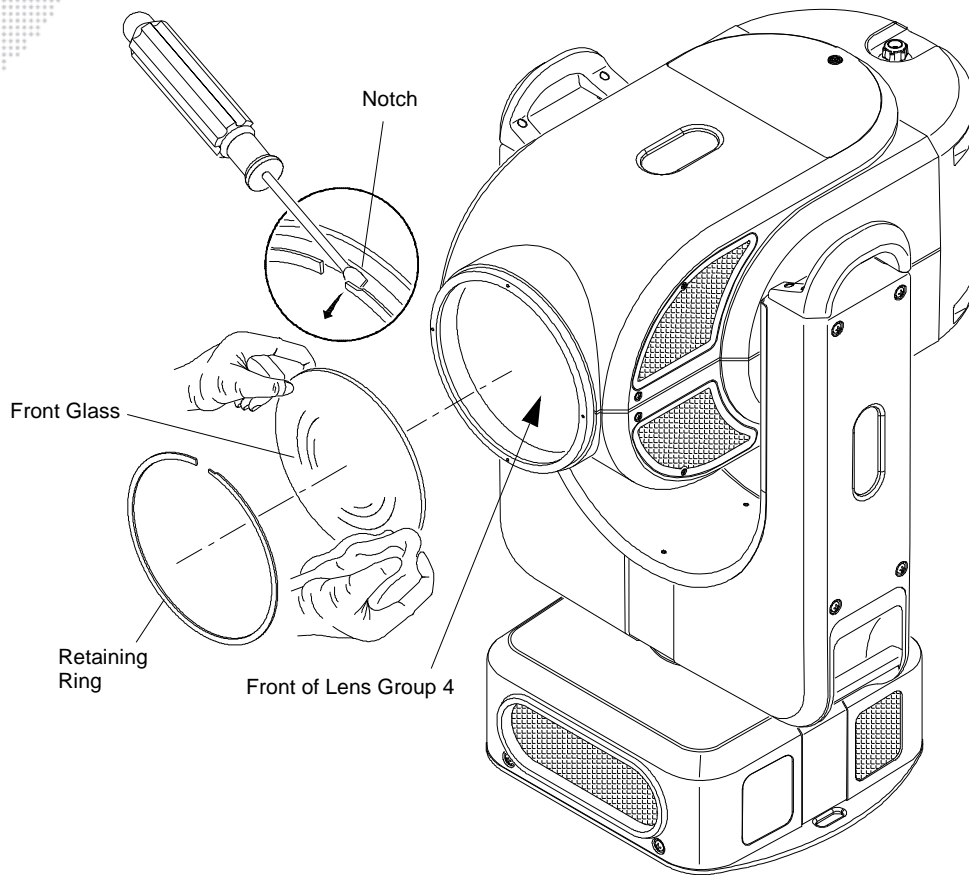


Figure 3-7: Cleaning Front Glass



CAUTION: "Done" MUST BE pressed at the menu to complete the procedure. If the lens motors are left in the cleaning configuration for too long, they may be damaged due to overheating.

Step 9. At menu, press "Done." This will free the motors and recalibrate the lenses.

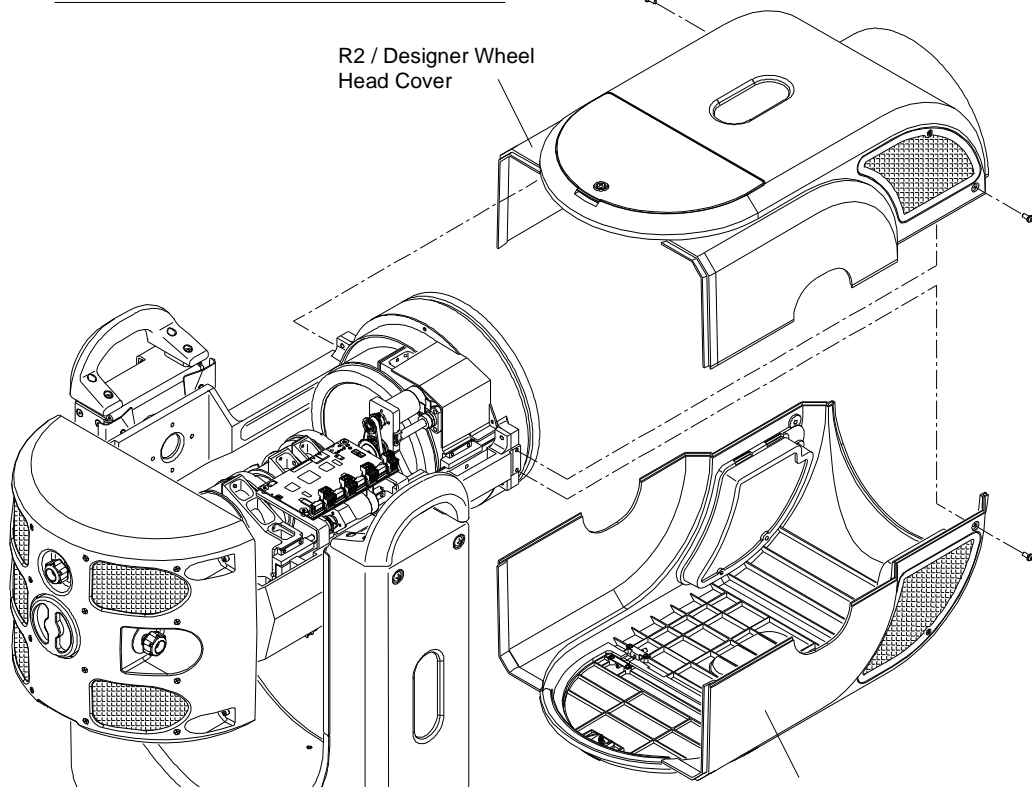
Step 10. Replace head cover.



CAUTION: Hand tighten only. DO NOT use a power tool on Head Cover screws.

8-32 x 3/8" PPB Screw (2 ea)

R2 / Designer Wheel Head Cover



R1 Head Cover
Remove to Access Lenses

ZOOM LENS ASSEMBLY DETAIL

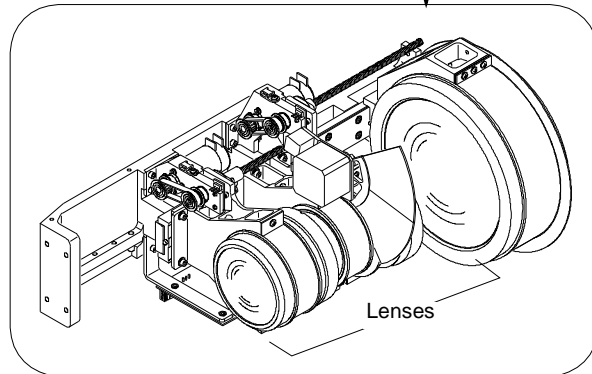


Figure 3-8: Accessing Zoom Lens Assembly

Cleaning Gobo, Color and Dimmer Wheels

Tools:

- Micro Fiber cloth (06.6085.0001.0)
- OptiMax™ Ultra Pure Cleaning Solution (06.6084.0001.0)
- Cotton gloves or finger cots
- #2 Phillips screwdriver

To clean gobo, color and dimmer wheels:



CAUTION: Use ONLY OptiMax™ Ultra Pure Cleaning Solution to clean optical components. DO NOT use Window Cleaner on gobo, color, or dimmer wheels! Wear cotton gloves or finger cots when handling optical components.



CAUTION: The optical components are very fragile, use extreme caution when cleaning! Color gobos have thin layers applied to one side that can be damaged if cleaned too roughly. Use caution.



WARNING: Remove power from luminaire before this procedure.

- Step 1. Remove power from luminaire.
- Step 2. Remove Head Covers. (Refer to "Removing the Head Covers" on page 28.)
- Step 3. To clean Gobos:
 - a. Remove each gobo. (Refer to "Replacing a Gobo" on page 43.)
 - b. Using OptiMax™ Ultra Pure Cleaning Solution and a Micro Fiber cloth, carefully clean gobos. *DO NOT use window cleaner!*
- Step 4. To clean Designer Wheel:
 - a. Remove each filter. (Refer to "Replacing a Designer Color Filter" on page 46.)
 - b. Using OptiMax™ Ultra Pure Cleaning Solution and a Micro Fiber cloth, carefully clean filters. *DO NOT use window cleaner!*
- Step 5. To clean Color Wheels:
 - a. Using OptiMax™ Ultra Pure Cleaning Solution and a Micro Fiber cloth, carefully clean color wheels. *DO NOT use window cleaner!*
 - b. Rotate wheels to access all surfaces. It will also be necessary to rotate the Gobo Wheel in order to use the gobo "open" position to access some parts of the Color Wheel.
- Step 6. To clean Dimmer Wheel:
 - a. Using OptiMax™ Ultra Pure Cleaning Solution and a Micro Fiber cloth, carefully clean Dimmer Wheel. *DO NOT use window cleaner!*
 - b. Rotate wheel to access all surfaces. It will also be necessary to rotate the Color Wheels in order to use the "open" position to access some parts of the Dimmer Wheel.
- Step 7. Replace Head Covers.

Cleaning the Reflector

Tools:

- Micro Fiber cloth (06.6085.0001.0)
- OptiMax™ Ultra Pure Cleaning Solution (06.6084.0001.0)
- #2 Phillips screwdriver

To clean reflector:



CAUTION: Use ONLY OptiMax™ Ultra Pure Cleaning Solution to clean optical components. DO NOT use Window Cleaner on the reflector!



WARNING: Remove power from luminaire before this procedure.

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. Remove Wheel Stack Assembly. (Refer to "Replacing the Wheel Stack" on page 49.)
- Step 3. Remove UV/IR Window Assembly as required. Refer to "Replacing the UV/IR Window Assembly" on page 64.
- Step 4. Using OptiMax™ Ultra Pure Cleaning Solution and a Micro Fiber cloth, clean reflector.
DO NOT use window cleaner!
- Step 5. Re-assemble luminaire.

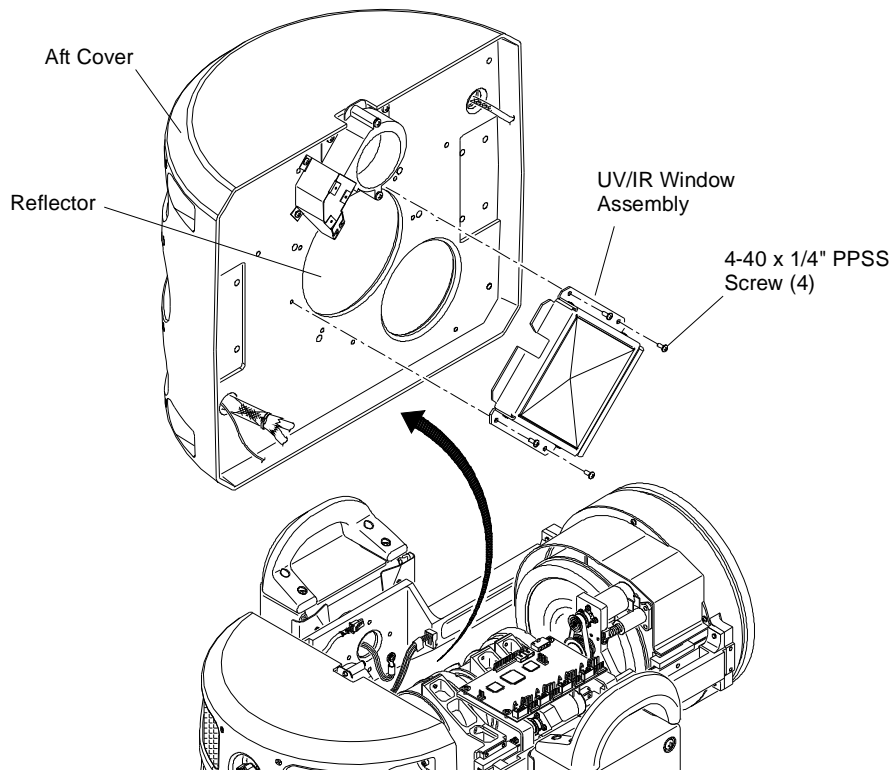


Figure 3-9: Cleaning Reflector

Cleaning the UV/IR Window

Tools:

- Micro Fiber cloth (06.6085.0001.0)
- OptiMax™ Ultra Pure Cleaning Solution (06.6084.0001.0)
- #2 Phillips screwdriver

To clean UV/IR Window:



CAUTION: Use ONLY OptiMax™ Ultra Pure Cleaning Solution to clean optical components. DO NOT use Window Cleaner on the UV/IR glass!



WARNING: Remove power from luminaire before this procedure.

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. Access UV/IR Window Assembly as required. Refer to "Replacing the UV/IR Window Assembly" on page 64.
- Step 3. Using OptiMax™ Ultra Pure Cleaning Solution and a Micro Fiber cloth, clean UV/IR glass as required. **DO NOT use window cleaner!**
- Step 4. Re-assemble luminaire.

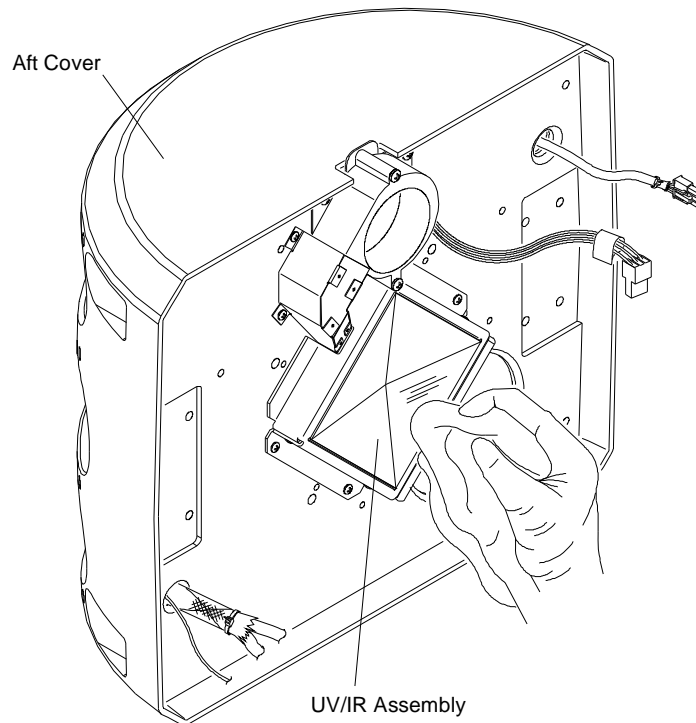


Figure 3-10: Cleaning UV/IR Window

REMOVE AND REPLACE PROCEDURES

Replacing the Lamp

Parts:

71.2566.1200.0 1 EA LAMP, FASTFIT, PHILIPS MSR GOLD™

Tools:

Cotton gloves or finger cots



WARNING: Remove power from luminaire before performing any maintenance procedures.



CAUTION: Refer to "Proper Lamp Servicing and Operation" on page 26 before handling the lamp.

To replace lamp:

- Step 1. Remove power from lamp and allow lamp to cool for at least 5 minutes.
- Step 2. Remove power from luminaire.
- Step 3. At rear of luminaire, rotate backcap counter-clockwise to remove (it will still be connected by a tether). Refer to **Figure 3-11** on next page.
- Step 4. Remove existing lamp by rotating lamp base counter-clockwise and pulling straight out of backcap.
- Step 5. Position new lamp as shown in **Figure 3-11** DETAIL A and insert into rear bulkhead. Rotate 45 degrees clockwise to lock in place. You will hear a click when properly seated.
- Step 6. Replace backcap.
- Step 7. Reset Lamp Hours. Refer to the Bad Boy User Manual (02.9812.0001).
- Step 8. Optimize lamp. (Refer to "Adjusting the Lamp" on page 42.)



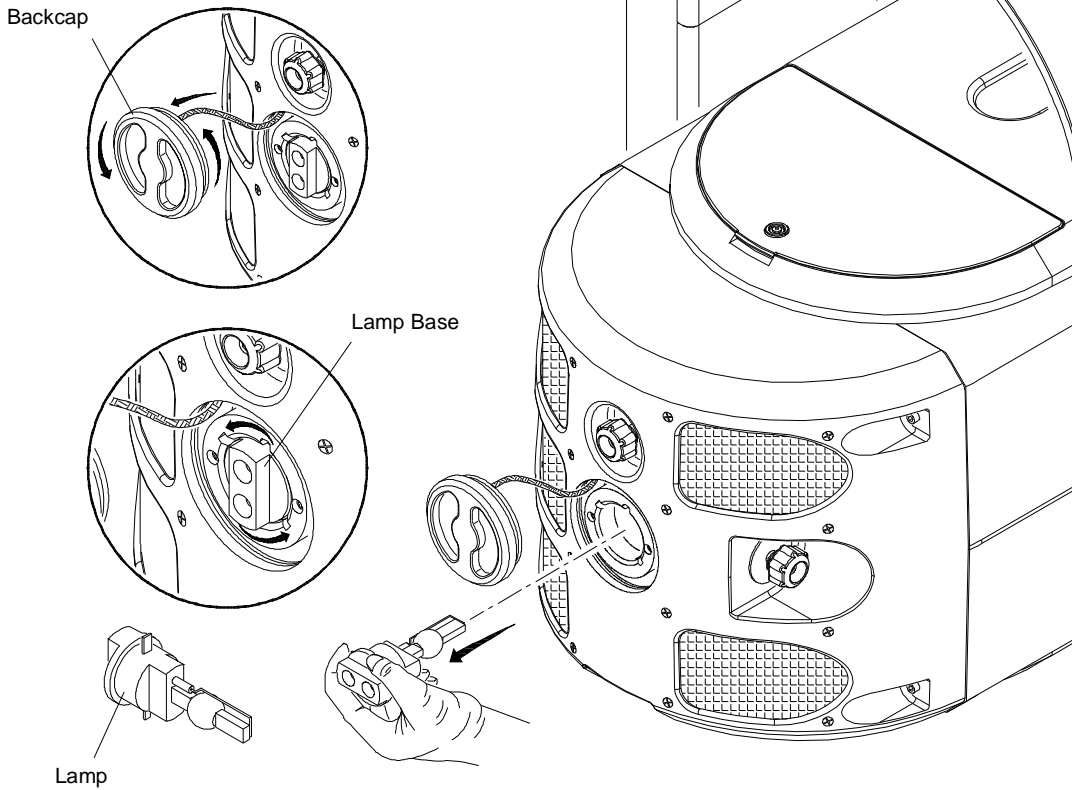
CAUTION: Wear cotton gloves or finger cots while servicing lamp. Touching the lamp glass with bare fingers will leave oil and cause the lamp to explode or burn out early. If touched, use alcohol to thoroughly clean glass.



CAUTION: Do not touch lamp or reflector with bare fingers.



CAUTION: Allow lamp to cool before servicing.



DETAIL A: LAMP ORIENTATION

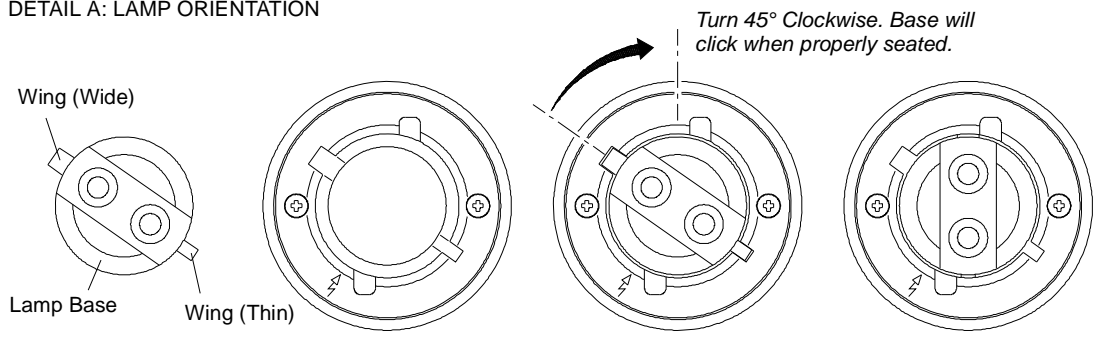


Figure 3-11: Replacing the Lamp

Adjusting the Lamp

After a new lamp is installed, it will be necessary to align the lamp in order to center and flatten the hot spot. Knobs located at the luminaire's backcap allow for adjustment.

Tools:
none



WARNING: Backcap may be HOT during lamp operation.

To adjust lamp:

- Step 1. Power up luminaire and allow to warm up for at least ten minutes.
- Step 2. Set intensity to 100%.
- Step 3. Position beam on a white wall at a distance of 10' to 20'.
- Step 4. Using control console, open beam size iris, set zoom for mid-range, and adjust for hard edge.
- Step 5. At backcap, using horizontal (X) and vertical (Y) knobs, adjust hot spot to center of beam (**Figure 3-12.**)
- Step 6. Using focus (Z) knob, adjust beam to flatten hot spot.

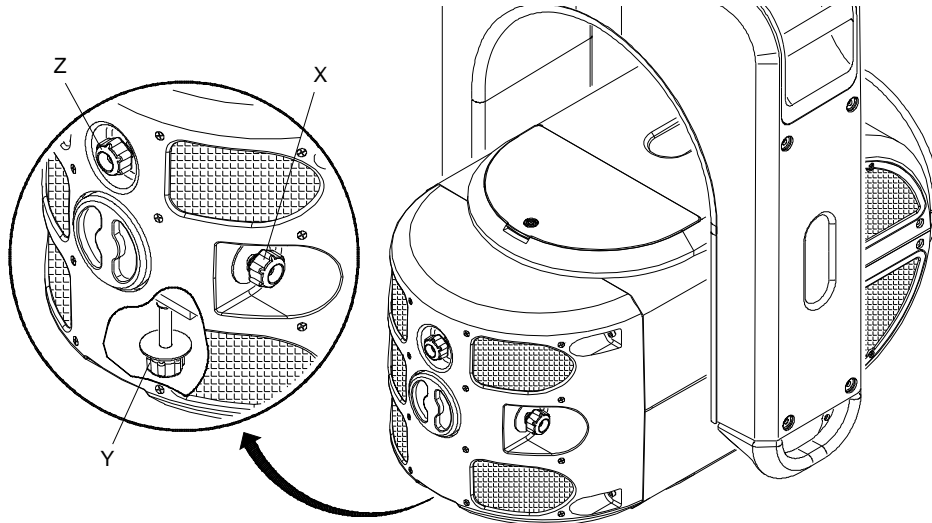


Figure 3-12: Adjusting the Lamp

Note: Be sure to reset Lamp Hours when installing a new lamp.

Replacing a Gobo

Parts:

Standard or Custom Gobo(s), as required.
(Refer to "[Standard Gobo Wheel Configuration](#)" on page 9.)

Tools:

#2 Phillips screwdriver
Cotton gloves or finger cots



WARNING: Remove power from luminaire before performing any maintenance procedures.

To replace a gobo:

- Step 1. Remove power from luminaire.
- Step 2. Locate appropriate head cover door for access to Rotating Gobo Wheel 1 (R1) or Rotating Gobo Wheel 2 (R2) as shown in **Figure 3-13**. (Doors are identified by a label.) Turn captive screw to open door.



CAUTION: Do not touch gobos with bare fingers. Wear cotton gloves or finger cots when handling.

- Step 3. Rotate wheel until desired gobo is accessible.
- Step 4. Rotate Color Wheels so that their "open" position lines up next to the gobo you wish to replace. (This will avoid potential damage to the adjacent wheels as the gobo is being replaced.)

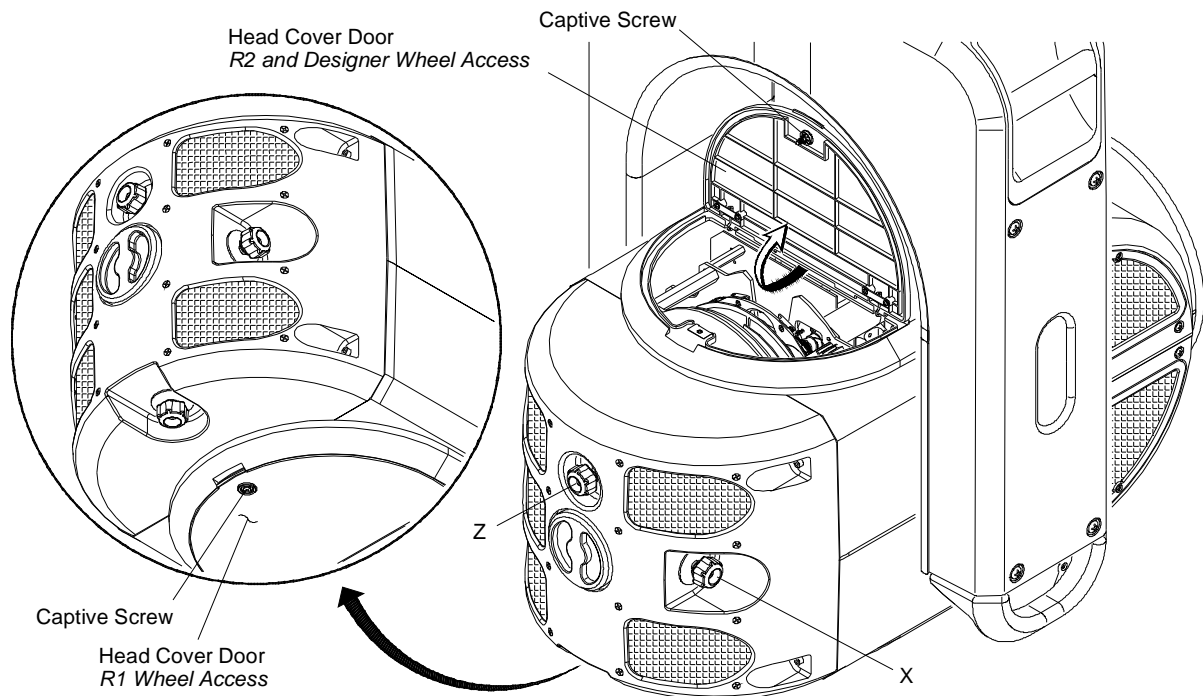


Figure 3-13: Accessing Gobo and Designer Color Wheels

Step 5. Using fingers, grasp frame of gobo and pull out of wheel (**Figure 3-14**).

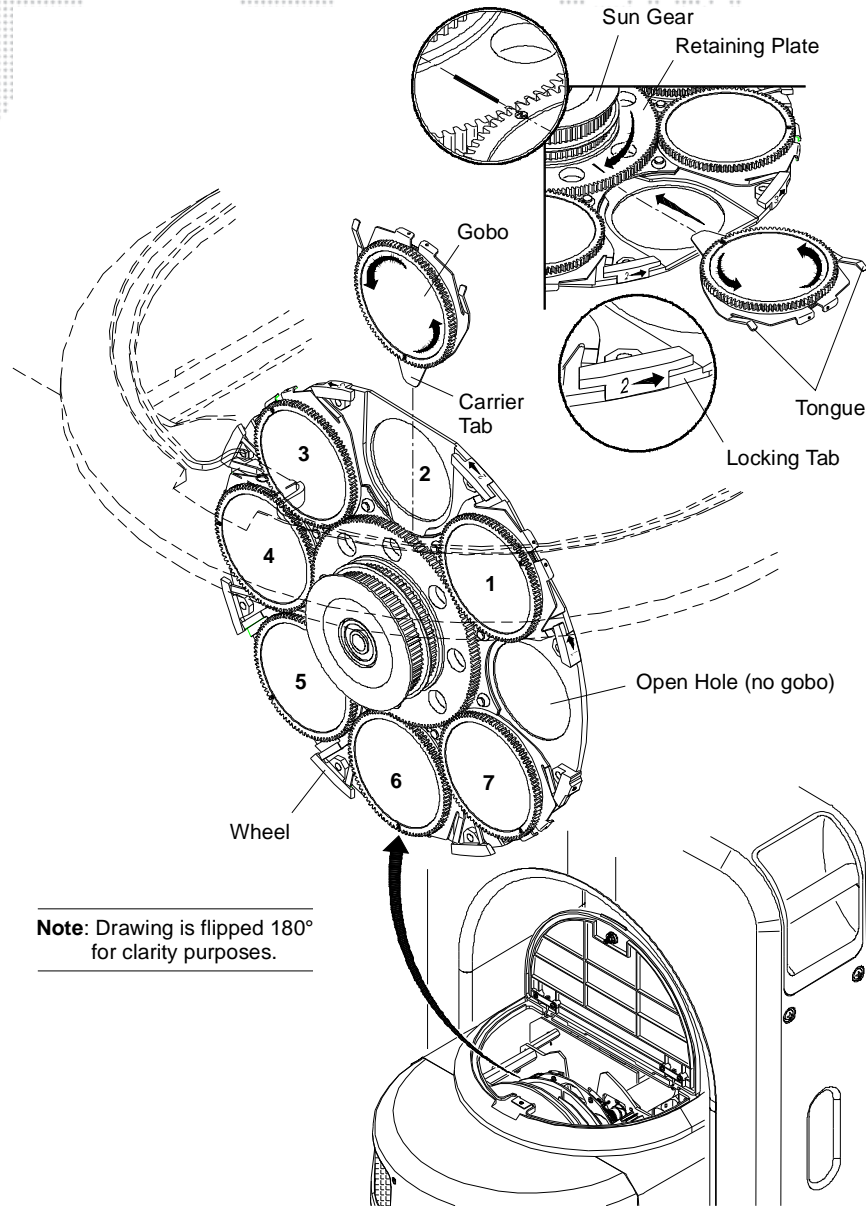


Figure 3-14: Replacing a Gobo

Step 6. Noting proper orientation, insert new gobo into wheel. Ensure that the "tongue" of the gobo clip goes under the retaining plate (under the sun gear). Press and gently rotate the gobo bearing to help mesh the gobo gear to the sun gear. Refer to **Figure 3-15** on next page for an overview of gobo positions and alignment.

Step 7. Close head cover access door.



CAUTION: The gobos must be seated properly, especially the gear mesh.

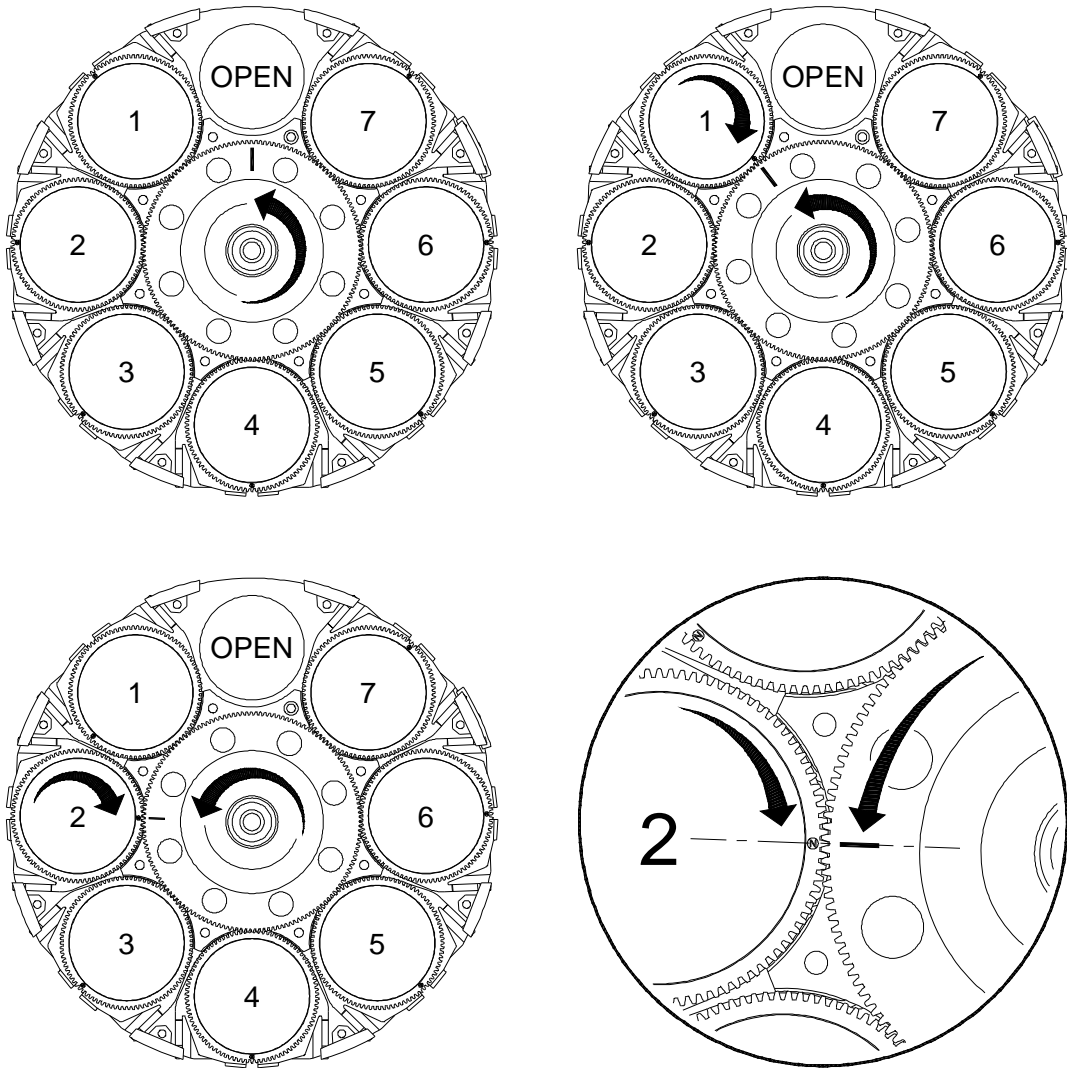


Figure 3-15: Gobo Positions and Alignment

Replacing a Designer Color Filter

Parts:

Designer Color Filter(s), as required.
(Refer to "**Designer Color Wheel Standard Configuration**" on page 8.)

Tools:

#2 Phillips screwdriver
Cotton gloves or finger cots



WARNING: Remove power from luminaire before performing any maintenance procedures.

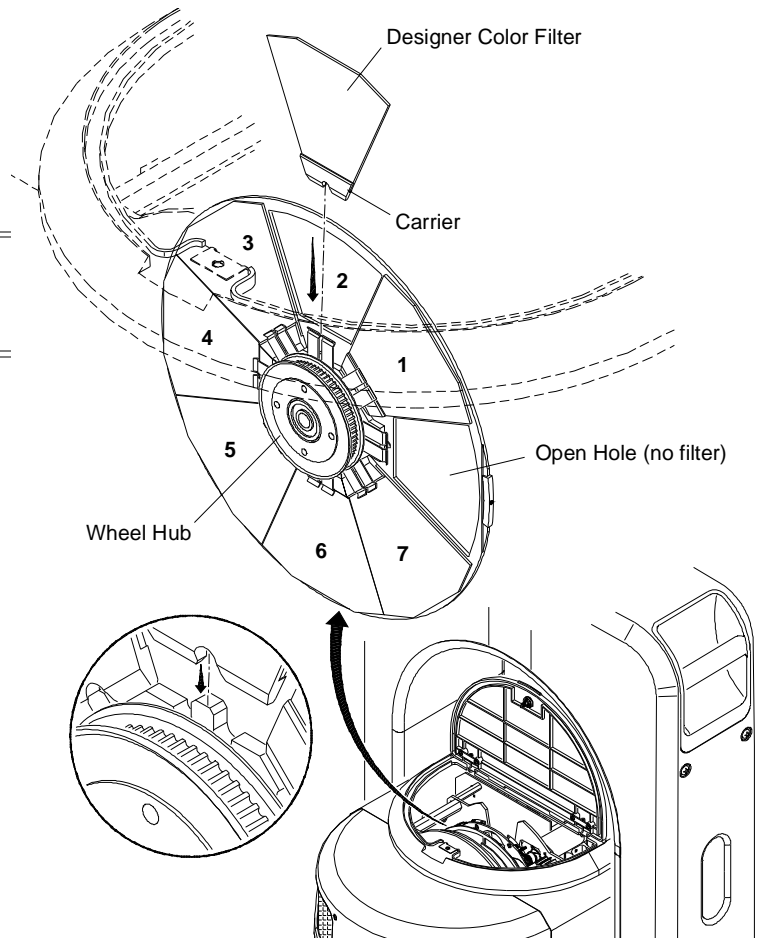
To replace a designer color filter:

- Step 1. Remove power from luminaire.
- Step 2. Locate appropriate head cover door for access to Designer Color Wheel as shown in **Figure 3-13** on **page 43**. (Doors are identified by a label.) Turn captive screw to open door.



CAUTION: Do not touch color filters with bare fingers. Wear cotton gloves or finger cots when handling.

- Step 3. Rotate wheel until desired designer color filter is accessible.
- Step 4. Rotate Color and Gobo 2 Wheels so that their "open" position lines up next to the designer color filter you wish to replace. (This will avoid potential damage to the adjacent wheels as the filter is being replaced.)
- Step 5. Using fingers, grasp frame of color filter and pull out of wheel hub (**Figure 3-16**).
- Step 6. Noting proper orientation of carrier, insert new designer color filter into position and push until carrier clicks into place. Refer to **Figure 3-17** on next page for an overview of designer filter positions.
- Step 7. Close head cover access door.



Note: Drawing is flipped 180° for clarity purposes.

Figure 3-16: Removing Designer Color Filter

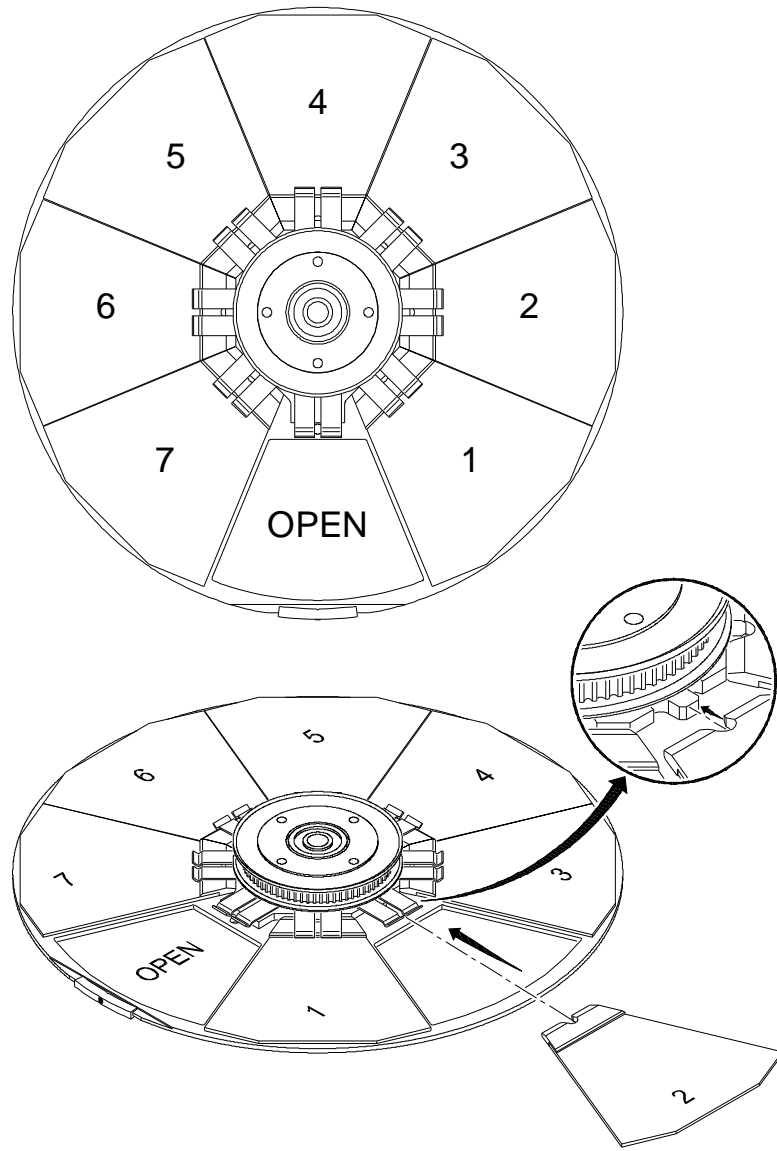


Figure 3-17: Installing Designer Color Filter

Replacing the Front Glass

Parts:

12.9812.0629	1 EA	RETAINER, FRONT GLASS PAINTED
41.9812.0628	1 EA	FRONT GLASS

Tools:

Hook & Pick tool



WARNING: Remove power from luminaire before performing any maintenance procedures.

To replace the Front Glass:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. Position luminaire head so that Front Glass is facing upward. (To prevent it from falling onto the floor when the Retaining Ring is removed in the next step.)
- Step 3. Insert hook & pick tool under notch in Front Lens Retaining Ring. Carefully remove Retaining Ring.
- Step 4. Remove Front Glass.
- Step 5. Install new Front Glass by doing steps in reverse.

Note: Clean Front Glass with OptiMax™ Ultra Pure Cleaning Solution and Micro Fiber cloth only. *DO NOT use window cleaner!* Refer to "Cleaning the Lenses" on page 34 for more information.

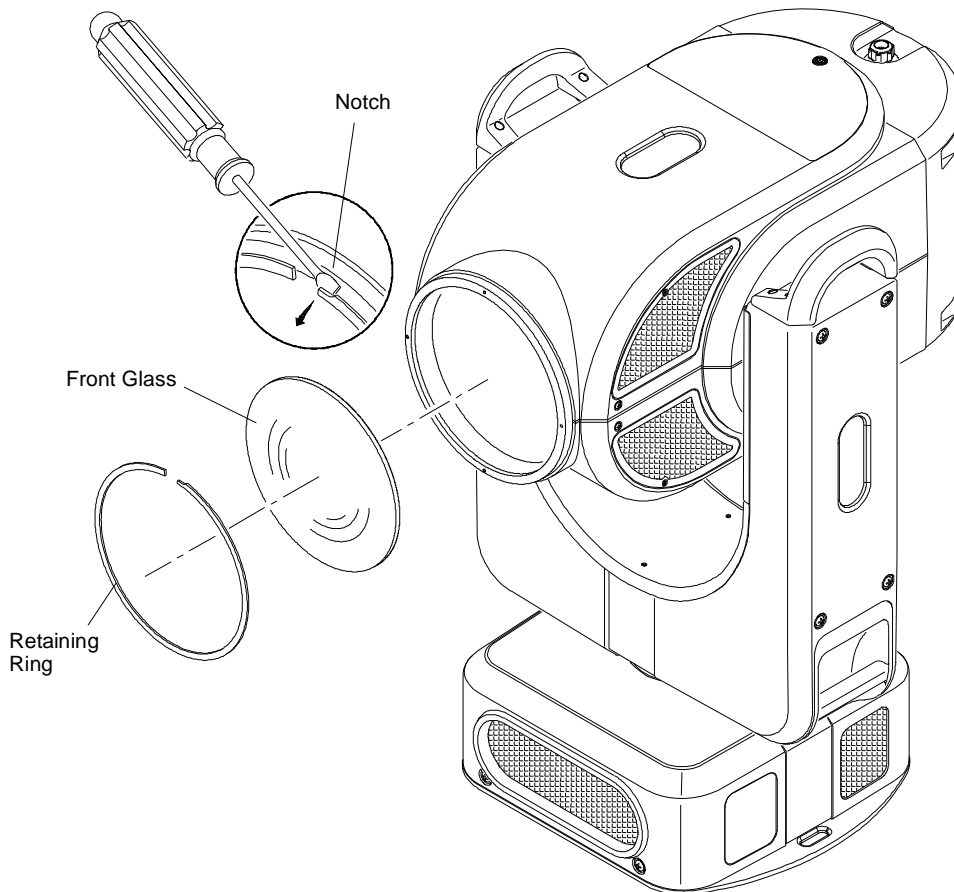


Figure 3-18: Removing Front Glass



Replacing the Wheel Stack

Parts:

21.9812.0696 1 EA ASSY, CMY WHEEL STACK, LESS GOBOS

Tools:

#2 Philips screwdriver
9/64" Allen wrench, T-bar



WARNING: Remove power from luminaire before performing any maintenance procedures.

To replace the Wheel Stack Assembly:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. Remove both Head Covers. (Refer to "[Removing the Head Covers](#)" on page 28.)
- Step 3. At top of head assembly, disconnect the following Wheel Stack wiring (**Figure 3-19**):
- From Zoom Controller PCB:
 - Zoom Cable.
 - CAN Bus Cable.
 - From Wheel Stack Motherboard:
 - Tip Pinch Fan Cable.
 - Main Fan Cable.
 - Main Power Cable.
 - Two CAN Bus Cables.
 - Free cable harness from twist-lock holders and lay cables out of the way so that Wheel Stack Assembly can be removed.
- Step 4. At bottom of head assembly, disconnect the following Wheel Stack Wiring (**Figure 3-19**):
- Frost Sensor Cable.
 - Frost Motor Cable.
 - Free sensor/motor cable harness from tie-wrap saddle on back of motor.

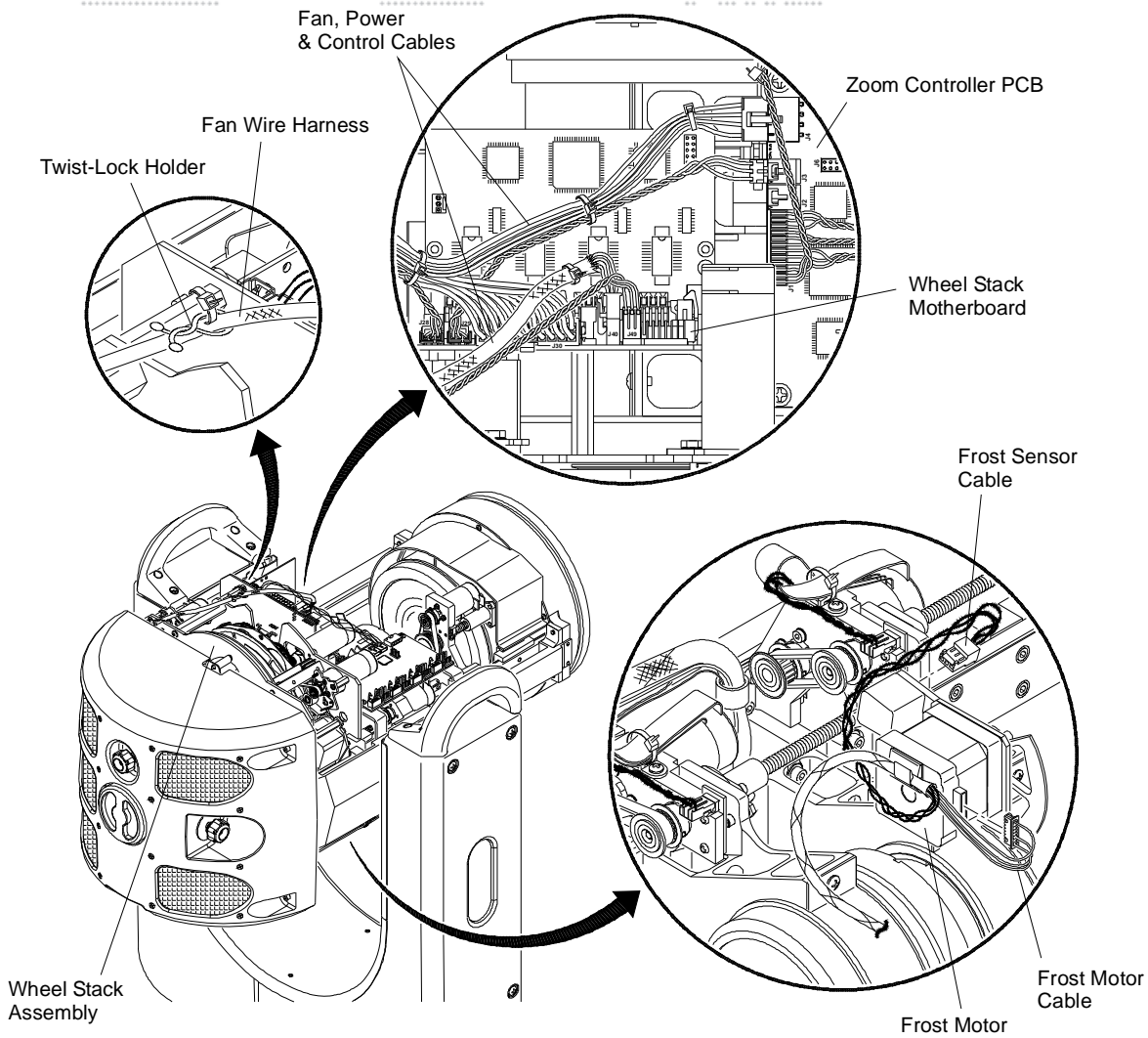


Figure 3-19: Disconnecting Wheel Stack Wiring

- Step 5. At Wheel Stack Assembly, remove four 8-32 x 1/2" socket head screws (**Figure 3-20**).
- Step 6. Verify that Lens Group 1 will not interfere with removal of Wheel Stack Assembly. If lenses are in the way, turn Group 1 pulley until lenses are clear.
- Step 7. Grasp Wheel Stack Assembly on either side and lift straight up and out of luminaire head.

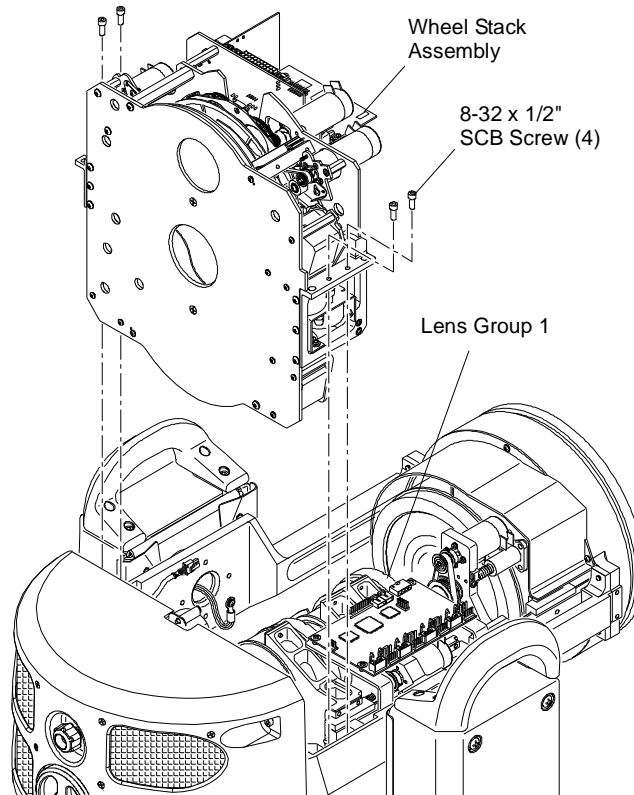


Figure 3-20: Removing Wheel Stack Assembly

- Step 8. Replace Wheel Stack Assembly by doing steps in reverse.

To pack Wheel Stack Assembly for shipping:

If a Wheel Stack Assembly is to be shipped to a PRG Service Center, a Wheel Stack Road Case (20.9812.1229) should be used. This will protect the fragile components of the Wheel Stack Assembly during storage, transport and shipping.

- Step 1. Carefully lower Wheel Stack Assembly into road case as shown in **Figure 3-21**.
- Step 2. Document luminaire serial number and reason for failure.
- Step 3. Apply a pre-printed shipping label to top of case. (Labels can be found in a plastic bag taped to the inside of the road case.)

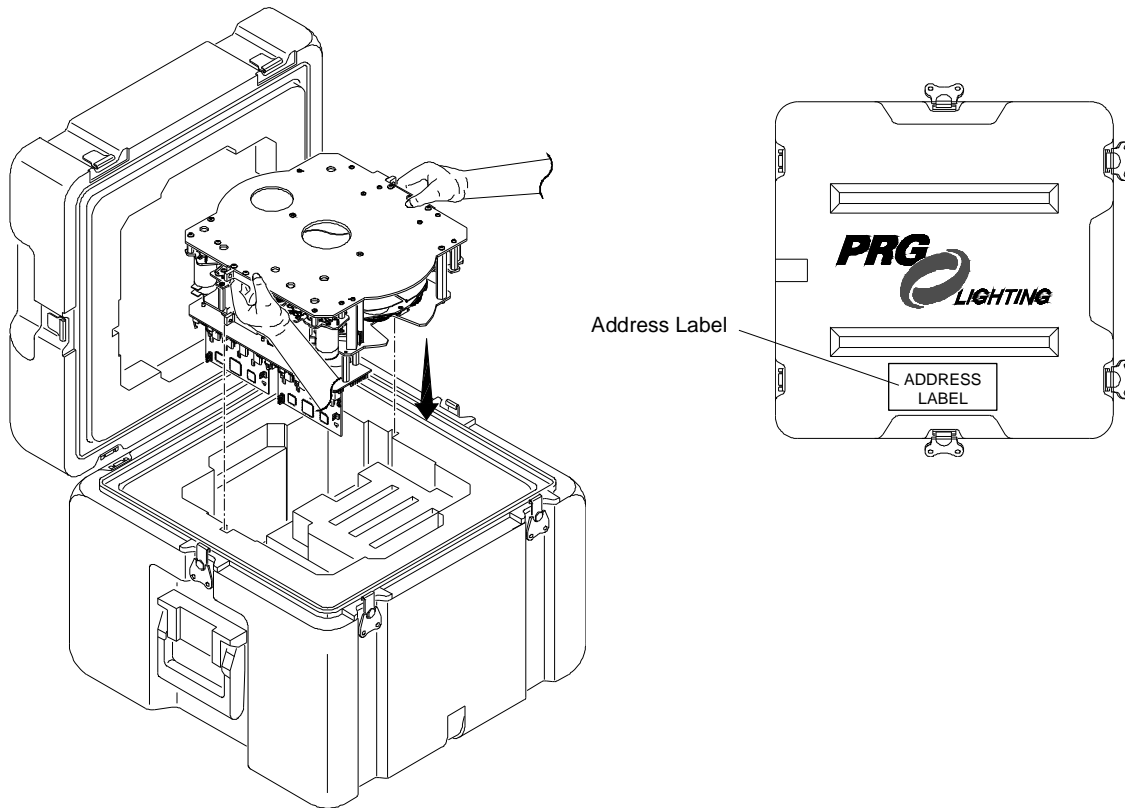


Figure 3-21: Packing Wheel Stack Road Case

Replacing the Frost/Diffuser Paddle

Parts:

22.9812.0557 1 EA ASSY, DIFFUSER PADDLE

Tools:

#2 Philips screwdriver
2mm Allen wrench
Spacer Tool (10.9812.0584)



WARNING: Remove power from luminaire before performing any maintenance procedures.

To replace the Frost/Diffuser Paddle Assembly:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. Remove R2/Designer Wheel Head Cover. (Refer to "[Removing the Head Covers](#)" on page 28.)

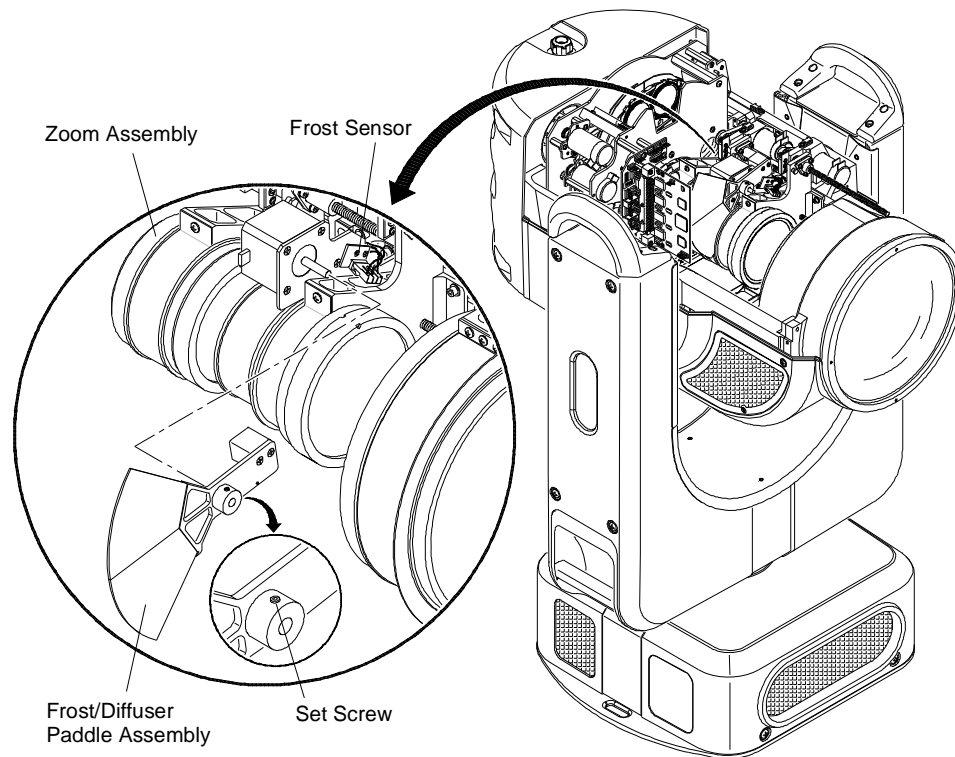
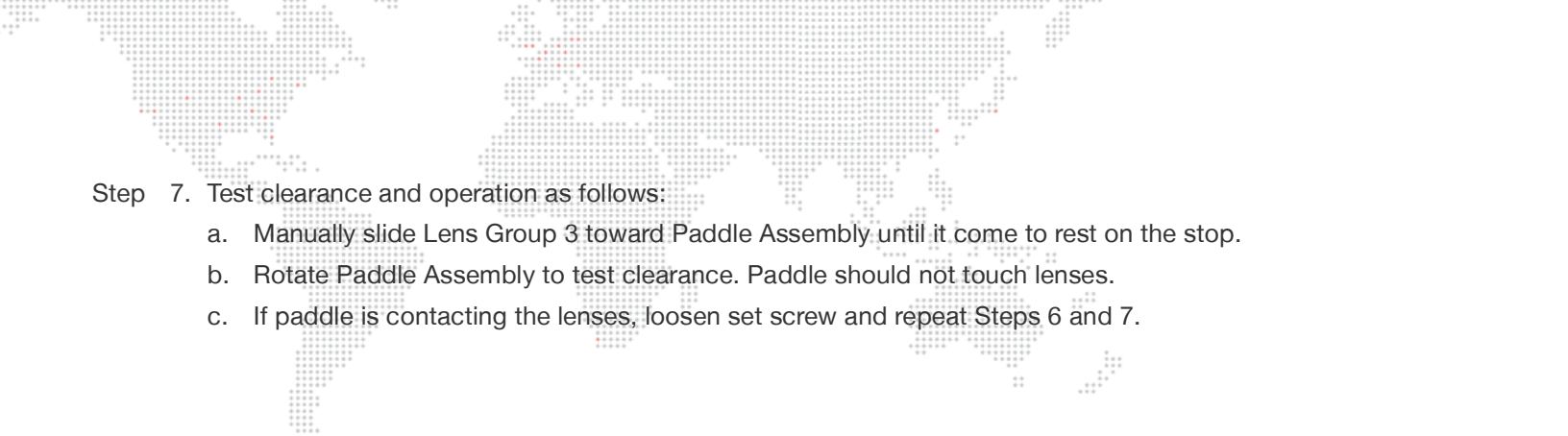


Figure 3-22: Removing Frost/Diffuser Paddle Assembly

- Step 3. Disconnect Frost Sensor Cable.
- Step 4. Rotate Frost/Diffuser Paddle Assembly to access set screw. Loosen set screw.
- Step 5. Ensure paddle will clear Frost Sensor PCB (rotate if necessary), and remove Frost/Diffuser Paddle Assembly.
- Step 6. Replace Frost/Diffuser Paddle Assembly as follows:
 - a. Slide new Paddle Assembly onto motor shaft.
 - b. Insert Spacer Tool between Paddle Assembly and motor, aligning the tool's notch over the motor shaft.
 - c. Tighten set screw.
 - d. Remove Spacer Tool.



Step 7. Test clearance and operation as follows:

- a. Manually slide Lens Group 3 toward Paddle Assembly until it come to rest on the stop.
- b. Rotate Paddle Assembly to test clearance. Paddle should not touch lenses.
- c. If paddle is contacting the lenses, loosen set screw and repeat Steps 6 and 7.

Replacing the Diffuser Sensor PCB

Parts:

24.9812.0570 1 EA PCB ASSY, DIFFUSER SENSOR

Tools:

#2 Philips screwdriver
Small slotted screwdriver



WARNING: Remove power from luminaire before performing any maintenance procedures.



CAUTION: Always use anti-static precautions when working with PCBs.

To replace the Diffuser Sensor:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. Remove R1 Head Cover. (Refer to "**Removing the Head Covers**" on page 28.)
- Step 3. At Diffuser Sensor, disconnect cable (**Figure 3-23**).
- Step 4. Remove Diffuser Sensor by removing two 4-40 x 3/16" PFSS screws.
- Step 5. Replace Diffuser Sensor by doing steps in reverse. *Make sure header is below 4-40- x 3/16" screws as shown in Figure 3-23.*

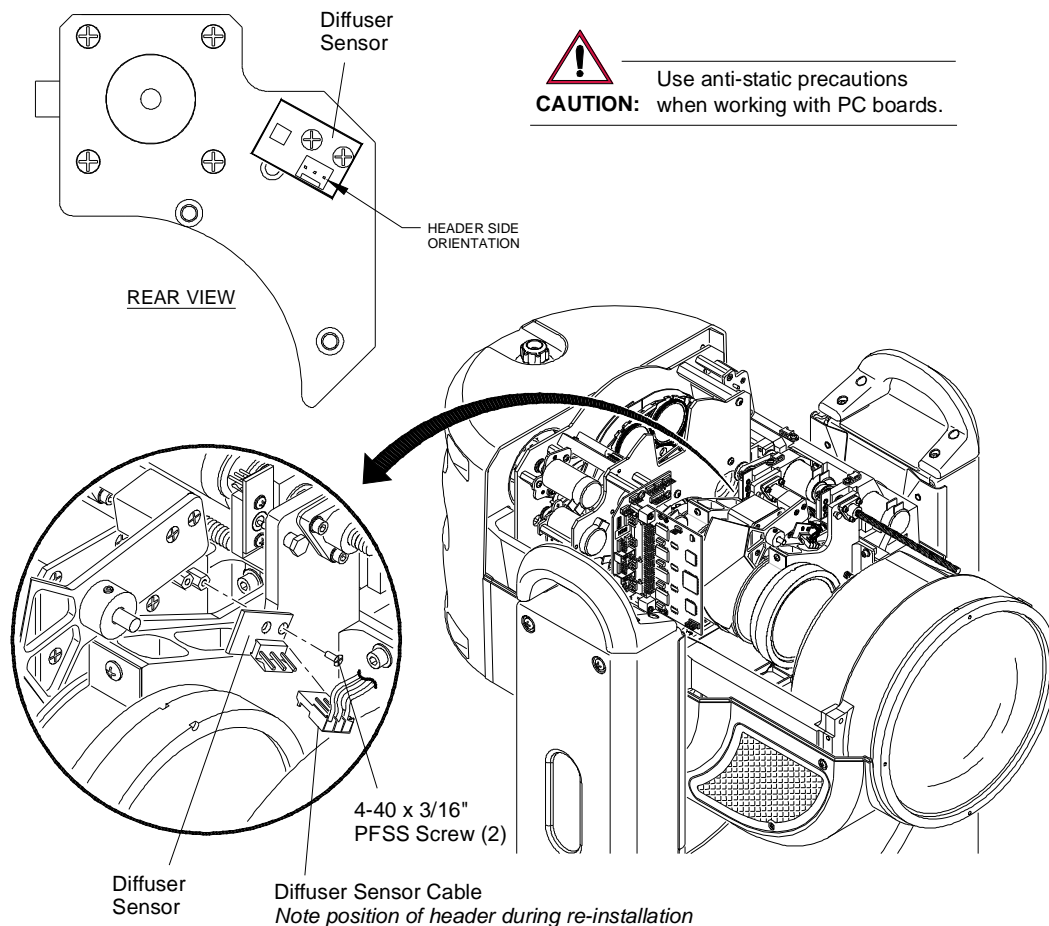


Figure 3-23: Removing Diffuser Sensor

Replacing the Zoom Controller PCB

Parts:

24.9812.0511.0 1 EA PCB ASSY, ZOOM CONTROLLER

Tools:

#1 and #2 Philips screwdrivers



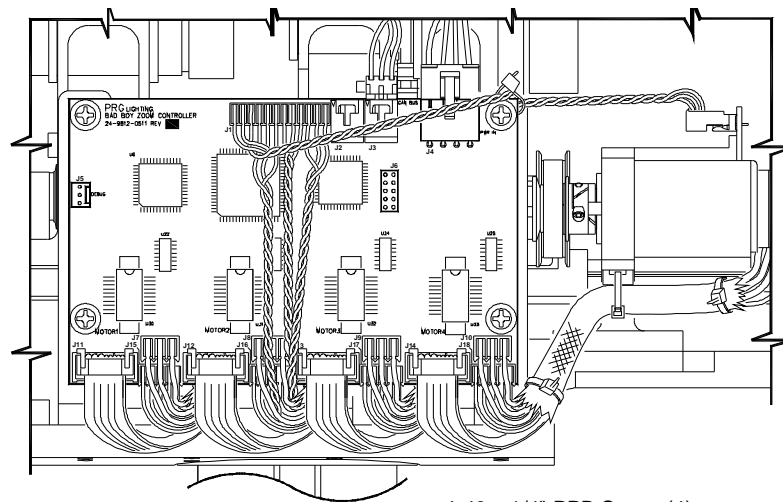
WARNING: Remove power from luminaire before performing any maintenance procedures.



CAUTION: Always use anti-static precautions when working with PCBs.

To replace the Zoom Controller PCB:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. Remove R2/Designer Wheel Head Cover. (Refer to "Removing the Head Covers" on page 28.)
- Step 3. At Zoom Controller PCB, disconnect all cables.
- Step 4. Remove Zoom Controller PCB by removing four 4-40 x 1/4" PPB screws. (Note the placement of the tie-wrap which secures the Zoom Sensor 4 cable under the Zoom PCB corner screw.)
- Step 5. Replace Zoom Controller PCB by doing steps in reverse. *When installing new Zoom Controller PCB, be sure to secure Zoom Sensor 4 cable tie-wrap under Zoom Controller PCB corner screw.*



Use anti-static precautions
CAUTION: when working with PC boards.

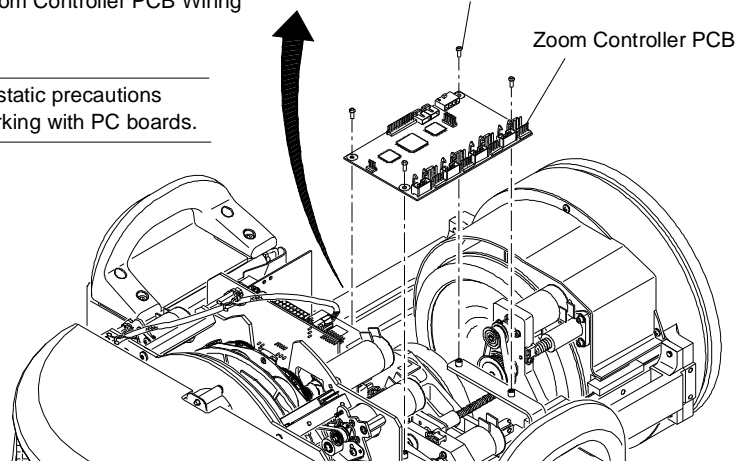


Figure 3-24: Removing Zoom Controller PCB

Replacing a Zoom Sensor PCB

The Zoom Assembly contains four Zoom Sensor PCBs (one for each Zoom Lens Group). This procedure provides instructions for changing any one of the four sensors.

Note that two (2) Zoom Sensor PCBs are located on the top side of the Head Assembly (under the R1 cover) and two (2) Zoom Sensor PCBs are located on the bottom side of the Head Assembly (under the R2 cover).

Parts:

24.9812.0510 4 EA 24.9812.0510

Tools:

#2 Philips screwdriver

#1 Right-angle Philips screwdriver or #1 Philips screwdriver, as required



WARNING: Remove power from luminaire before performing any maintenance procedures.




CAUTION: Always use anti-static precautions when working with PCBs.

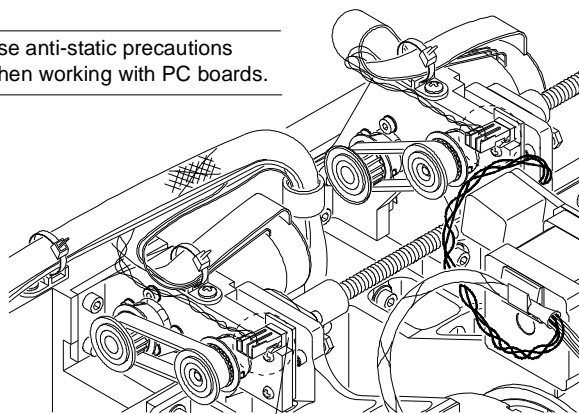


CAUTION: NEVER adjust the brass spring-loaded standoff. It is set at the factory.


To replace a Zoom Sensor:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. To remove Zoom Sensors 1 or 3:
- Remove R1 Head Cover. (Refer to "**Removing the Head Covers**" on page 28.)
 - At required Zoom Sensor, disconnect cable from header (**Figure 3-25**).
 - Remove Zoom Sensor by removing two 2-56 x 1/4" PPZ screws.
- Step 3. To remove Zoom Sensor 2:
- Remove R2/Designer Wheel Head Cover. (Refer to "**Removing the Head Covers**" on page 28.)
 - At Zoom Controller PCB, remove four 4-40 x 1/4" PPB screws. (The PCB will still be connected by wiring.) Move Zoom Controller PCB to the side in order to access Zoom Sensor 2 as shown in **Figure 3-26**.
 - At Zoom Sensor, disconnect cable from header (**Figure 3-26**).
 - Remove Zoom Sensor by removing two 2-56 x 1/4" PPZ screws.
- Step 4. To remove Zoom Sensor 4:
- Remove R2/Designer Wheel Head Cover. (Refer to "**Removing the Head Covers**" on page 28.)
 - At Zoom Sensor, disconnect cable from header (**Figure 3-26**).
 - Remove Zoom Sensor by removing two 2-56 x 1/4" PPZ screws.
- Step 5. Replace a Zoom Sensor by doing steps in reverse.

 Use anti-static precautions
CAUTION: when working with PC boards.



Zoom Sensor

 Hand tighten only. DO NOT use a power tool on Head Cover screws.
CAUTION:

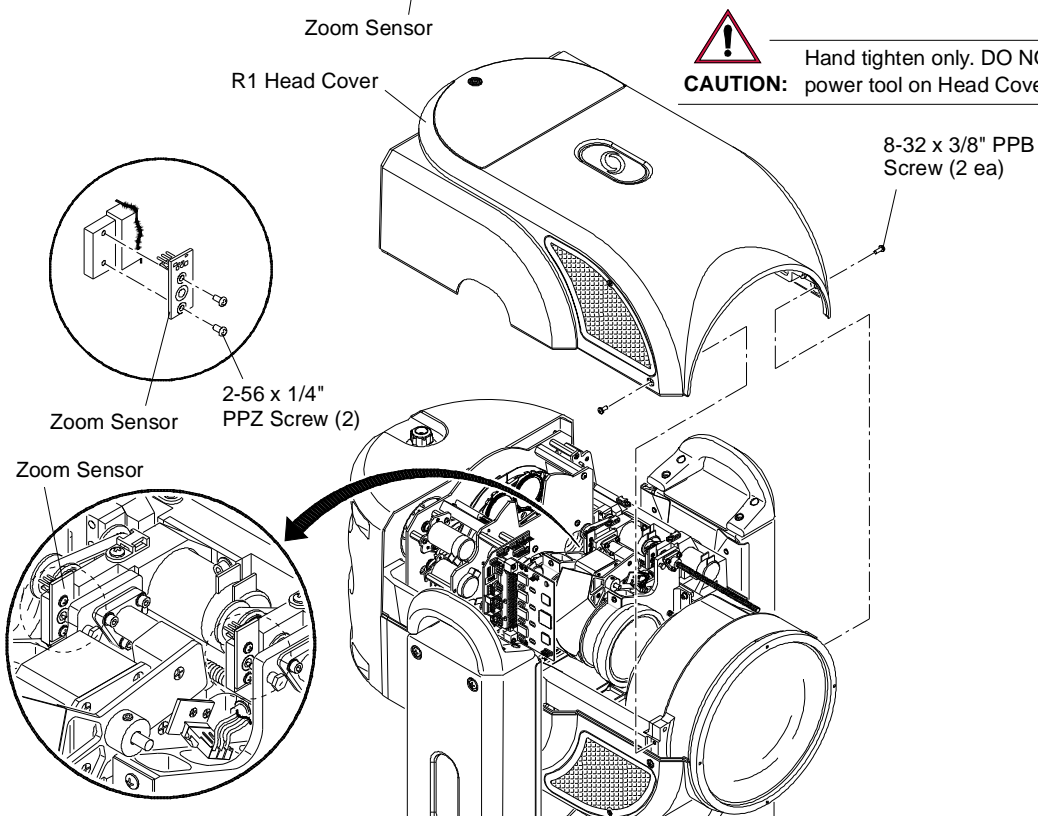


Figure 3-25: Removing Zoom Sensors 1 & 3



Use anti-static precautions
CAUTION: when working with PC boards.

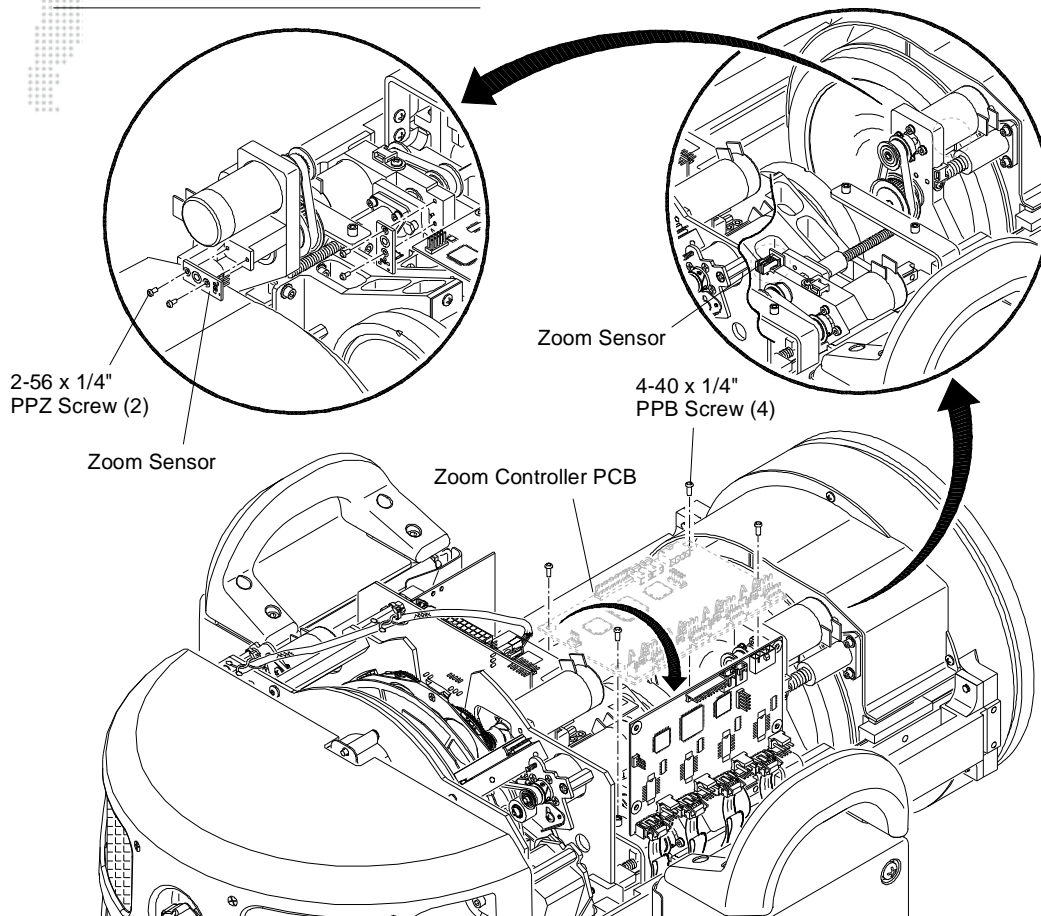


Figure 3-26: Removing Zoom Sensors 2 & 4

Replacing the Main Head Fan

Parts:

23.9812.0993 1 EA ASSY, MAIN HEAD FAN

Tools:

#2 Philips screwdriver
5/32" Allen T-wrench



WARNING: Remove power from luminaire before performing any maintenance procedures.

To replace the Main Head Fan:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. Remove Head Covers. (Refer to "[Removing the Head Covers](#)" on page 28.)
- Step 3. Remove lamp. (Refer to "[Replacing the Lamp](#)" on page 40.)
- Step 4. Remove X, Y, Z Adjustment Knobs and Aft Cover. (Refer to "[Removing the Aft Cover](#)" on page 29.)

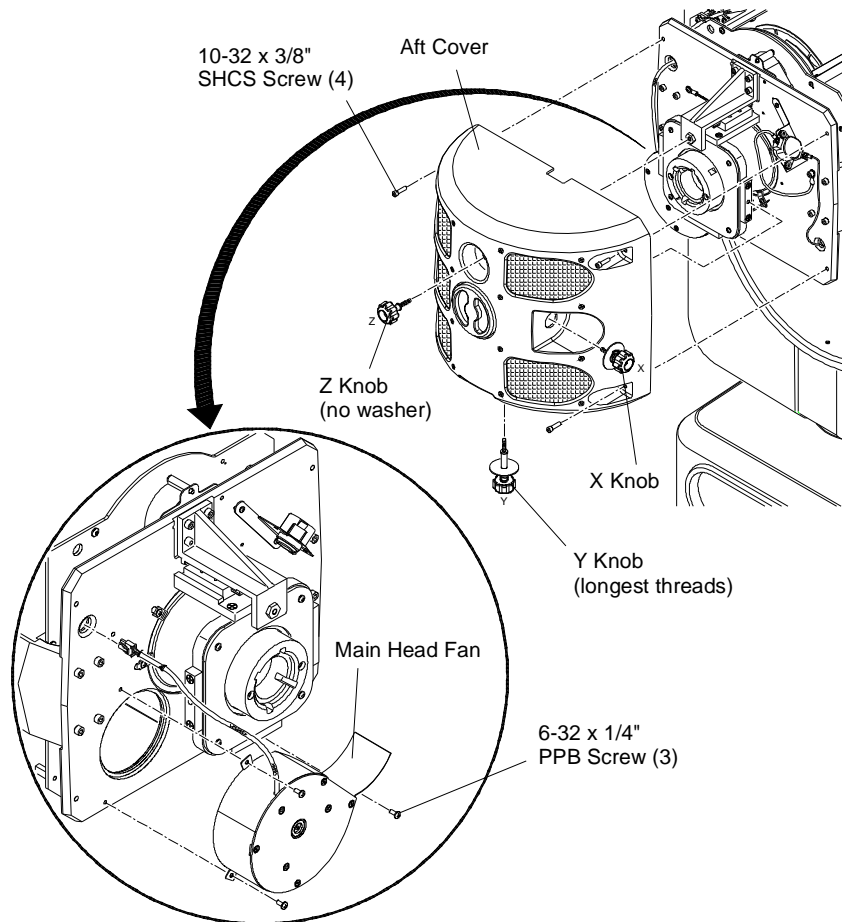


Figure 3-27: Removing Main Head Fan

- Step 5. At Motherboard PCB, disconnect Main Head Fan Cable (labeled HI TEMP).
- Step 6. Release cable from twist-lock cable ties and feed through hole in Aft Assembly.
- Step 7. Remove Main Head Fan by removing three 6-32 x 1/4" PPB screws.



CAUTION: The Main Head Fan has been upgraded. Be sure to install *only* the latest hi-temp fan. The hi-temp fan can be identified by a red ring around the spinner.

Note: In order to prevent heat from escaping the rear bulkhead area and moving into the main head assembly, aluminum tape has been used to seal the backcap perimeter, fan wire hole, and back side of pinch fan. Re-apply new tape before re-installing the Aft Cover. Refer to technical bulletin BAD-002 for more information.

Step 8. Replace Main Head Fan by doing steps in reverse. *Be sure to re-apply aluminum sealing tape as noted above.*

Replacing the Tip Pinch Fan (Original Version)

The Tip Pinch Fan has been upgraded in most Bad Boy Luminaires. Refer to the procedure on the following page if the new Hi-Temp fan version has already been installed.

Parts:

23.9812.0990 1 EA ASSY, TIP PINCH FAN, 12V

Tools:

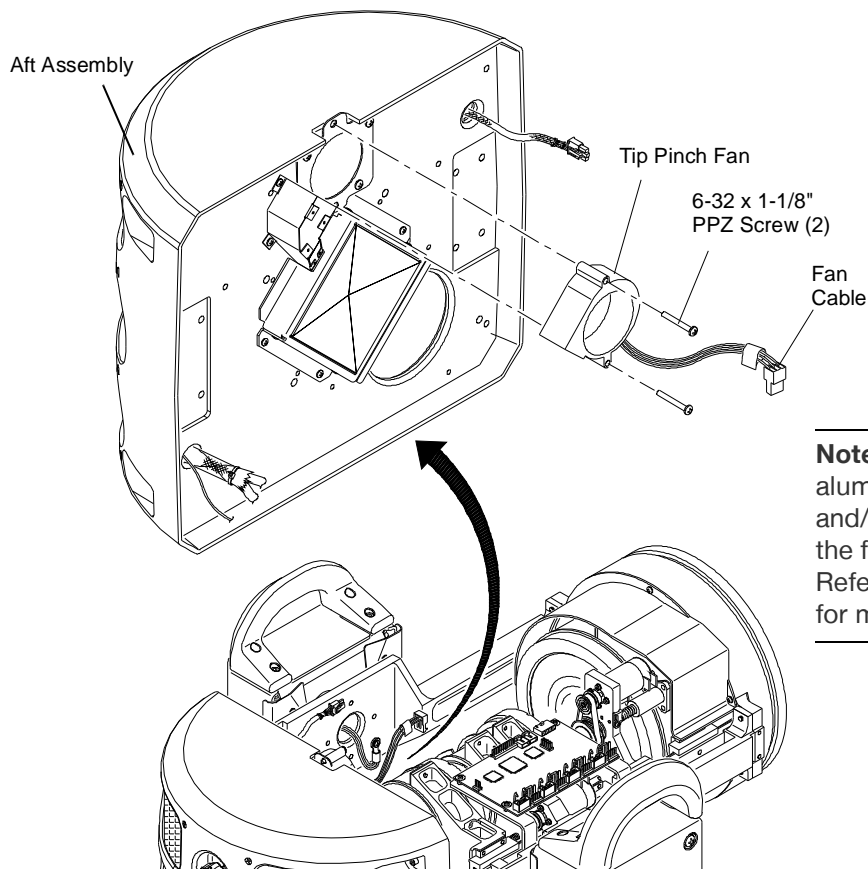
#2 Philips screwdriver



WARNING: Remove power from luminaire before performing any maintenance procedures.

To replace the Tip Pinch Fan:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. Remove Head Covers. (Refer to "[Removing the Head Covers](#)" on page 28.)
- Step 3. Remove Wheel Stack Assembly. (Refer to "[Replacing the Wheel Stack](#)" on page 49.)
- Step 4. Disconnect Tip Fan Cable (labeled TIP FAN J49) and release from twist-lock cable ties.
- Step 5. Remove Tip Pinch Fan by removing two 6-32 x 1-1/8" PPZ screws.



Note: Be sure the new fan has aluminum tape covering the back and/or aluminum tape is blocking the fan hole on the Aft Assembly. Refer to technical bulletin BAD-002 for more information.

Figure 3-28: Removing Tip Pinch Fan

- Step 6. Replace fan by doing steps in reverse.

Replacing the Tip Pinch Fan (Hi-Temp Version)

The Tip Pinch Fan has been upgraded in most Bad Boy Luminaires. If the Hi-Temp fan version has *not* been installed yet, refer to the procedure on the previous page.

Parts:

23.9812.0994 1 EA ASSY, HI-TEMP TIP PINCH FAN, 12V

Tools:

#2 Philips screwdriver



WARNING: Remove power from luminaire before performing any maintenance procedures.

To replace the Tip Pinch Fan:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. Remove Head Covers. (Refer to "[Removing the Head Covers](#)" on page 28.)
- Step 3. Remove Wheel Stack Assembly. (Refer to "[Replacing the Wheel Stack](#)" on page 49.)
- Step 4. Disconnect Tip Fan Cable (labeled TIP FAN J49) and release from twist-lock cable ties.
- Step 5. Remove Tip Pinch Fan (and Insulator) by removing two 6-32 x 3/8" screws.

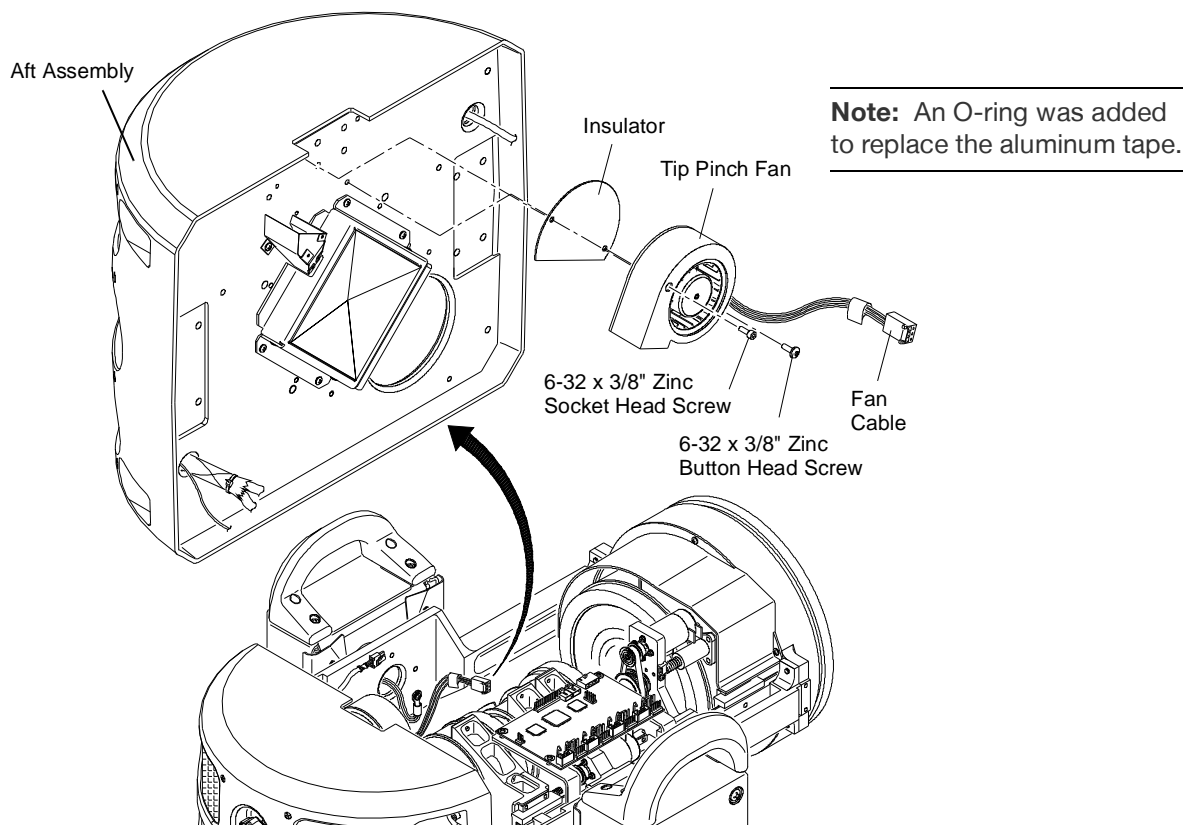


Figure 3-29: Removing Tip Pinch Fan

- Step 6. Replace fan (and Insulator) by doing steps in reverse.

Replacing the UV/IR Window Assembly

Parts:

22.9812.0616 1 EA ASSY, UV/IR WINDOW

Tools:

#2 Philips screwdriver
#1 Philips screwdriver, stubby



WARNING: Remove power from luminaire before performing any maintenance procedures.



CAUTION: Do not touch UV/IR Window with bare fingers. If dirty, clean with OptiMax™ Ultra Pure Cleaning Solution and a Micro Fiber cloth.

To replace the UV/IR Window Assembly:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. Remove Head Covers. (Refer to "[Removing the Head Covers](#)" on page 28.)
- Step 3. Remove Wheel Stack Assembly. (Refer to "[Replacing the Wheel Stack](#)" on page 49.)
- Step 4. Remove UV/IR Assembly by removing four 4-40 x 1/4" PPSS screws (**Figure 3-30**).
- Step 5. Replace UV/IR Assembly by doing steps in reverse. *Be sure to align fan ducts.*

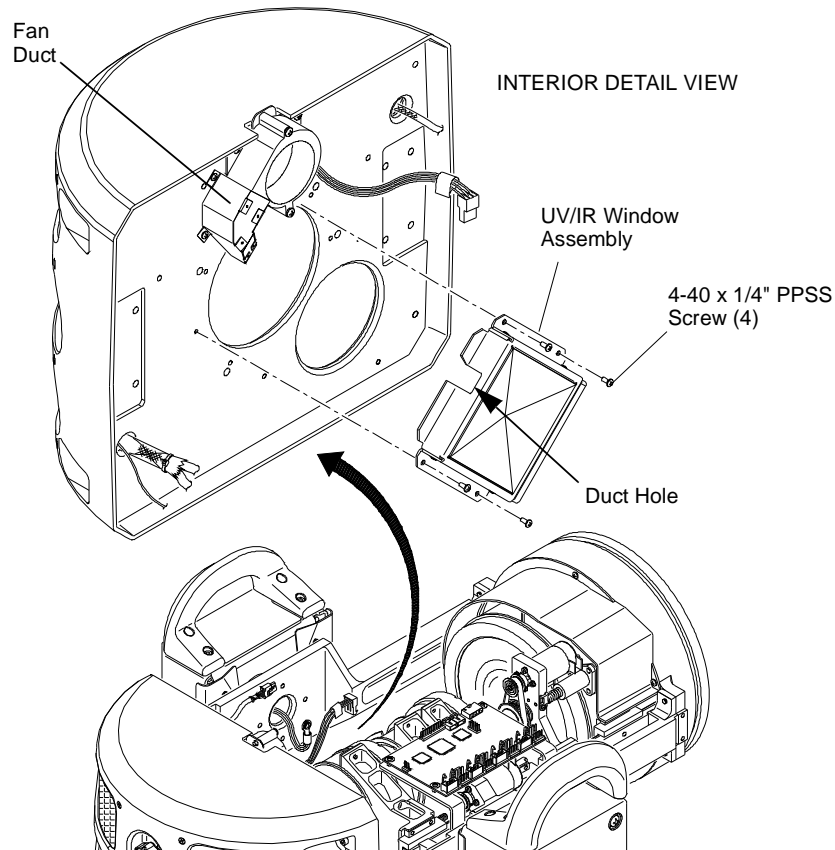


Figure 3-30: Removing UV/IR Window Assembly

Replacing the Reflector

Parts:

42.9812.0160 1 EA REFLECTOR, 36 LUNES, COATED

Tools:

#2 Phillips screwdriver, long *or* #2 Phillips screwdriver, right-angle
Cotton gloves or finger cots



WARNING: Remove power from luminaire before performing any maintenance procedures.



CAUTION: Do not touch reflector with bare fingers. If dirty, clean with OptiMax™ Ultra Pure Cleaning Solution and a Micro Fiber cloth.

To replace the Reflector:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. Remove Aft Cover. (Refer to "**Removing the Aft Cover**" on page 29.)
- Step 3. At Reflector, loosen four 6-32 x 1/4" PPB screws to free mounting clips (**Figure 3-31**).
- Step 4. Remove Reflector by carefully sliding out from under XYZ Assembly. (Insulator will come loose during removal. Do not lose Insulator.)
- Step 5. Replace Reflector by doing steps in reverse.

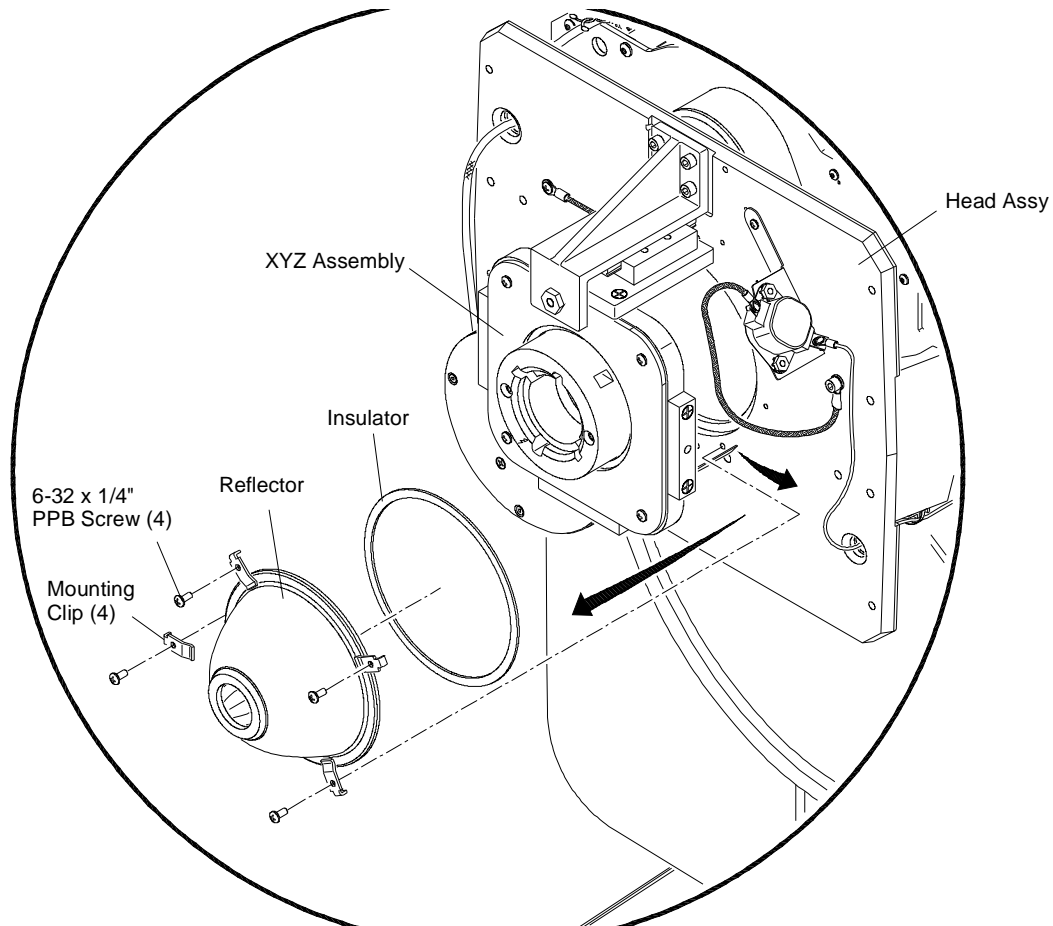


Figure 3-31: Removing Reflector

Replacing a 2A Fuse

2 Amp fuses are located on the Zoom Controller PCB (4 each) and the Wheel Controller PCB (4 each).

Parts:

70.3769.0002.0 8 EA FUSE, 2AMP SLO-BLO

Tools:

#2 Philips screwdriver
Needle-nose pliers, small



WARNING: Remove power from luminaire before performing any maintenance procedures.

To replace a 2A Fuse:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. Remove Head Cover(s) as required. (Refer to "**Removing the Head Covers**" on page 28.)
- Step 3. At required PCB, use needle-nose pliers to carefully remove and replace 2A fuse.

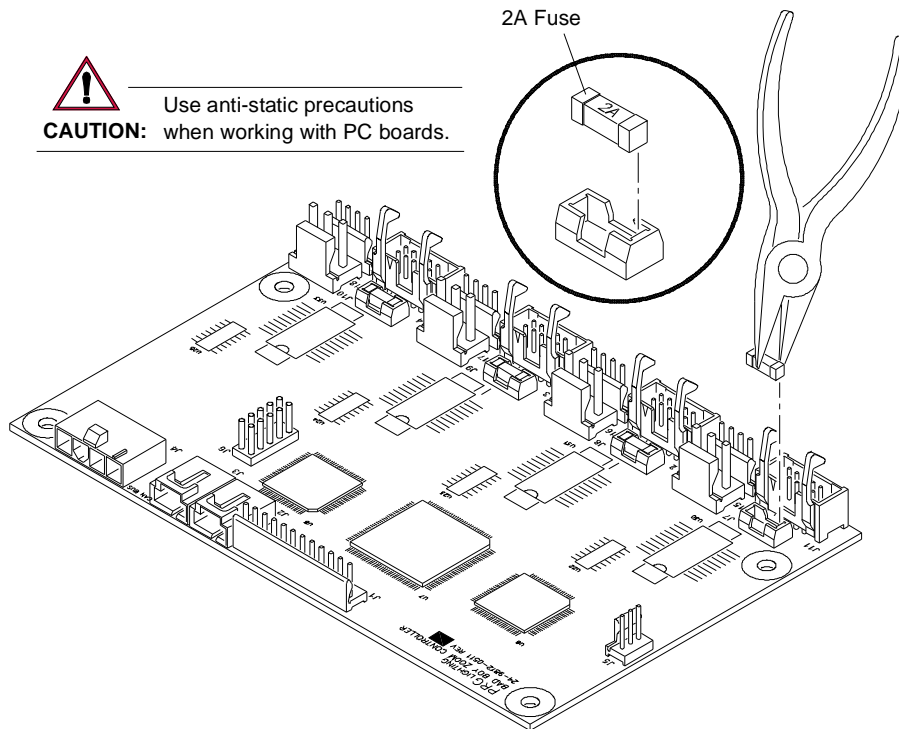


Figure 3-32: Removing 2A Fuse

Replacing the 3A Fuse

The 3 Amp fuse is located on the Pan/Tilt Controller PCB.

Parts:

70.3769.0003.0 1 EA FUSE, 3AMP SLO-BLO

Tools:

Needle-nose pliers, small



WARNING: Remove power from luminaire before performing any maintenance procedures.

To replace the 3A Fuse:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. At Pan Yoke Leg, remove Yoke Leg Cover.
- Step 3. At Pan/Tilt Controller PCB, use needle-nose pliers to carefully remove and replace 3A fuse.

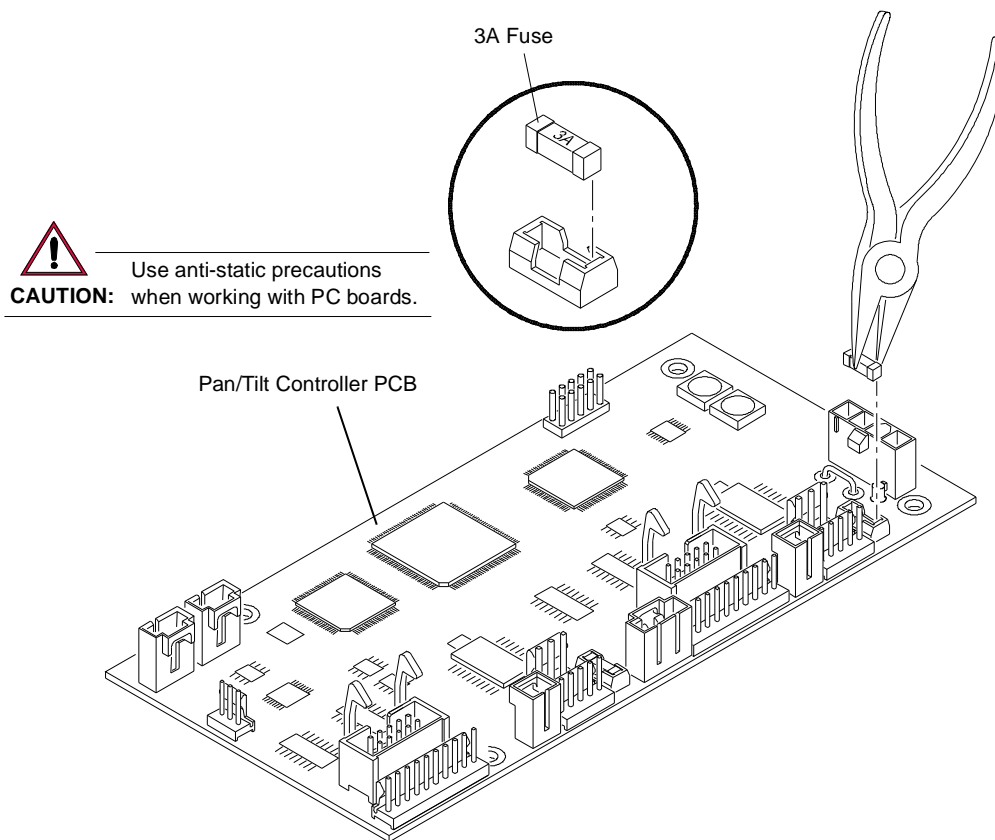


Figure 3-33: Removing 3A Fuse



Replacing the EMI Ballast Enclosure

Parts:

23.9812.0810 1 EA ASSY, EMI BALLAST ENCLOSURE

Tools:

#2 Philips screwdriver
Wire cutters
Tie-Wraps
Loctite 242



WARNING: Remove power from luminaire before performing any maintenance procedures.

To replace the EMI Ballast Enclosure:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. Remove both Upper Enclosure Covers. (Refer to "Removing the Enclosure Covers" on page 30.)
- Step 3. Disconnect the following wiring (**Figure 3-34**):
- APS Cable.
 - Two Fan Cables.
 - Ground Cable.
 - Lamp Power Ballast Output Cables (white and black).
- Step 4. At EMI Ballast Enclosure, remove four 10-32 x 3/8" PPB Black SEMS screws. (Assembly will still be connected by wiring.)
- Step 5. Move EMI Ballast Enclosure away from the luminaire as far as the cabling will allow. (This will provide access to disconnect the remaining cables.)
- Step 6. At EMI Filter, disconnect two output cables.
- Step 7. Cut tie-wrap to free Lamp Power Ballast Output Cables.
- Step 8. Remove EMI Ballast Enclosure.



CAUTION: Be careful to maintain correct polarity of the lamp wires.

- Step 9. Replace EMI Ballast Enclosure by doing steps in reverse. *Use Loctite 242 when re-installing ground wire as shown in **Figure 3-34**.*

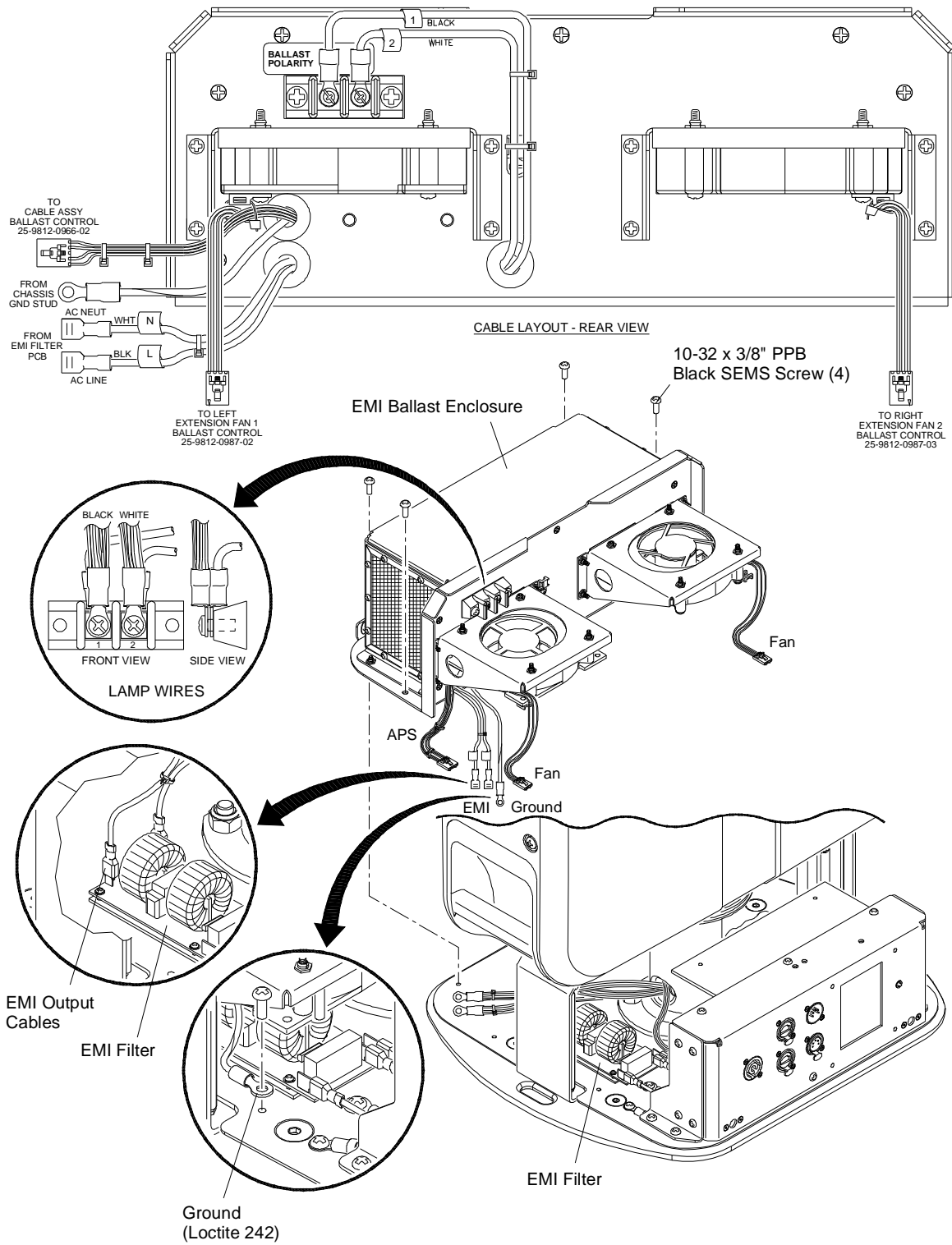


Figure 3-34: Removing EMI Ballast Enclosure



Replacing the Interface/LVS Module

Parts:

23.9812.0812 1 EA ASSY, INTERFACE/LVS MODULE

Tools:

#2 Philips screwdriver



WARNING: Remove power from luminaire before performing any maintenance procedures.

To replace the Interface/LVS Module:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. Remove Intake Cover. (Refer to "[Removing the Enclosure Covers](#)" on page 30.)
- Step 3. At Interface/LVS Module, remove four 10-32 x 3/8" PPB SEMS screws (**Figure 3-35**).
- Step 4. At left side of Interface/LVS Module, disconnect the following wiring:
- Fan cable.
 - APS Control Line cable.
 - Neutral (white) cable.
 - Line (black) cable.
 - Ground cable.
- Step 5. At right side of Interface/LVS Module, disconnect the following wiring:
- Fan cable.
 - CAN Bus cable.
 - Power cables (red and black).
- Step 6. Remove Interface/LVS Module from enclosure.

Note: The battery pack cable is intentionally NOT connected. Do not re-connect.

- Step 7. Replace Interface/LVS Module by doing steps in reverse. *Do not connect battery pack cable. Leave this cable disconnected.*

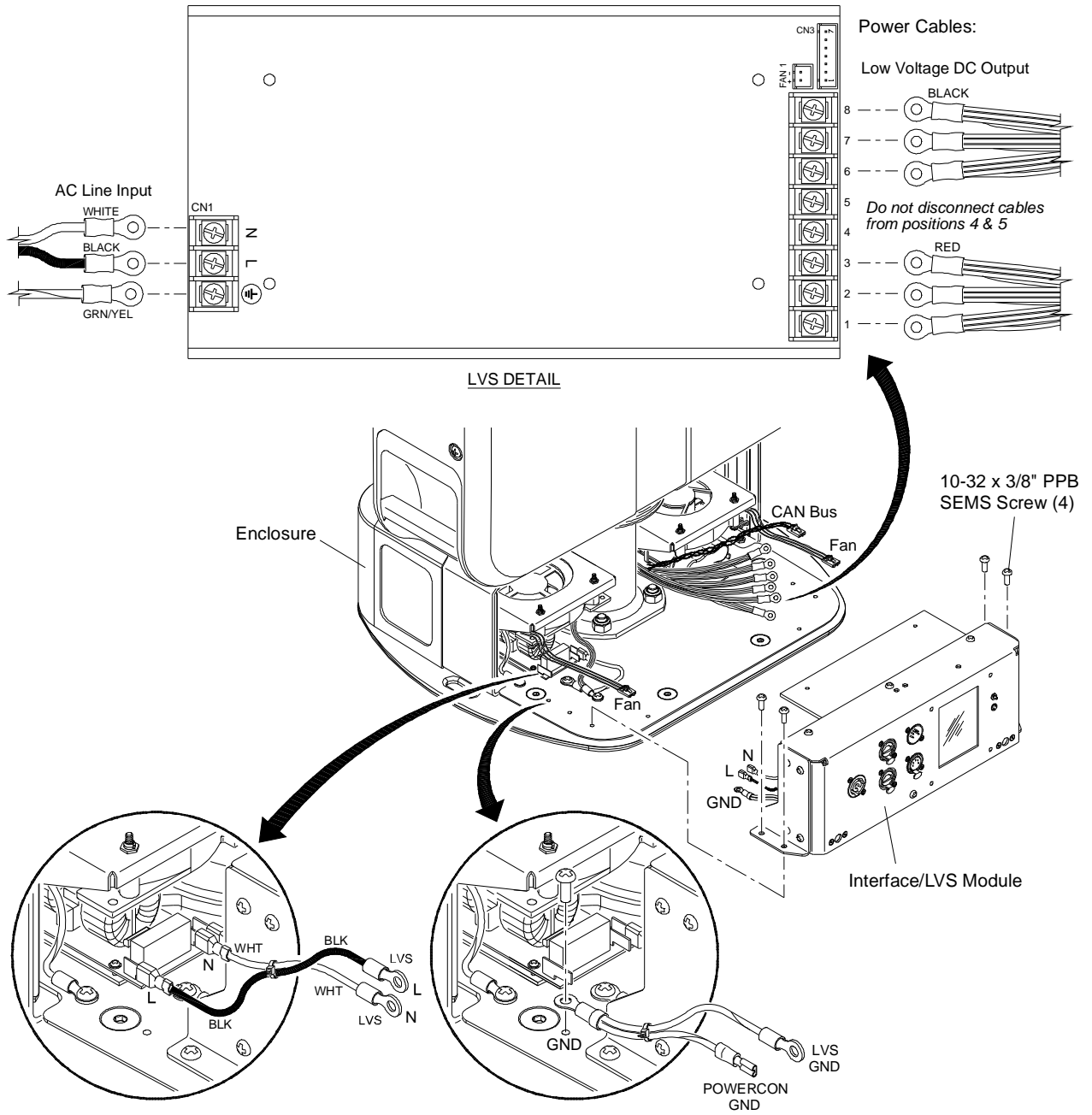


Figure 3-35: Removing Interface/LVS Module

Replacing the Ignitor PCB

Parts:

24.9812.0775 1 EA PCB ASSY, SOLID STATE IGNITOR

Tools:

#2 Philips screwdriver
1/4" Nutdriver
Loctite 242



WARNING: Remove power from luminaire before performing any maintenance procedures.



CAUTION: Always use anti-static precautions when working with PCBs.

To replace the Ignitor PCB:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
Step 2. At Tilt Yoke Leg, remove Yoke Leg Cover.
Step 3. At Ignitor Cover, remove four 6-32 nylon insert nuts and four #6 nylon washers. Remove Ignitor Cover.

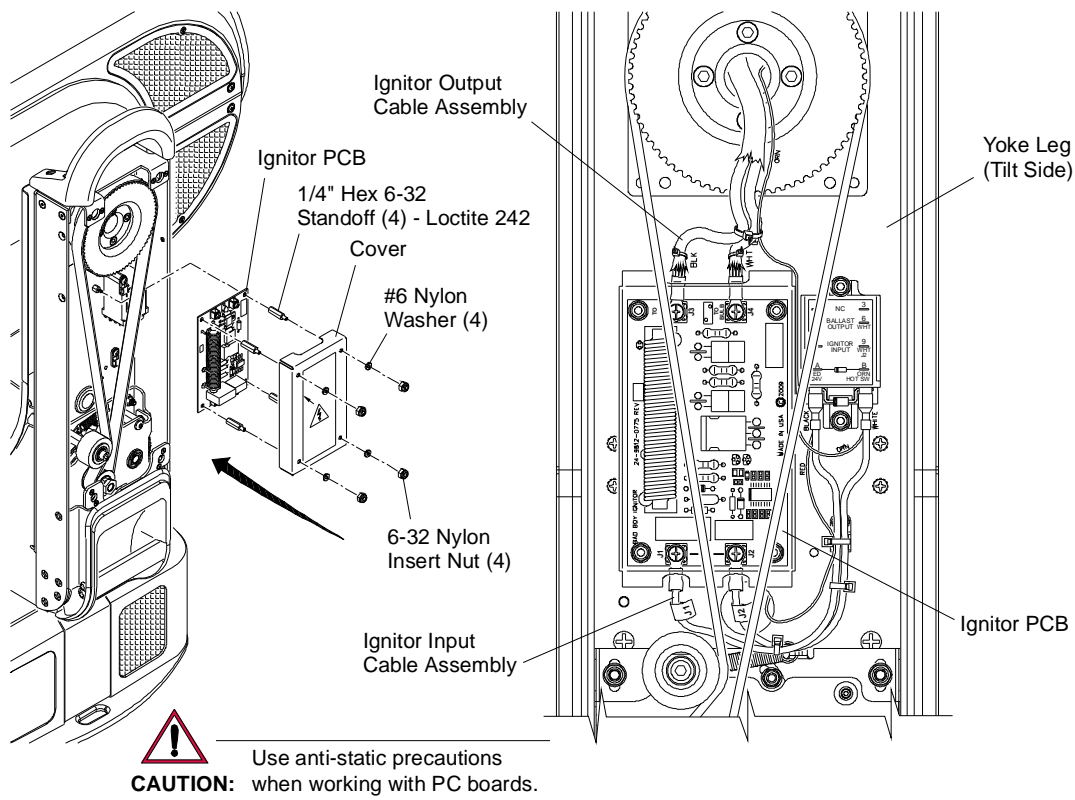


Figure 3-36: Removing Ignitor PCB



CAUTION: Be careful to maintain correct polarity of the lamp wires.

- Step 4. At Ignitor PCB, disconnect input and output cables.
Step 5. Remove four 1/4" 6-32 hex standoffs and remove Ignitor PCB.



Step 6. Replace Ignitor PCB by doing steps in reverse. *Use Loctite 242 when re-installing standoffs as shown in Figure 3-36.*

Note: Be sure you install the NEW Ignitor (24.9812.0775). This component has been upgraded.

Replacing the Pan/Tilt Controller PCB

Parts:

24.9812.0765 1 EA PCB ASSY, CONTROLLER PAN/TILT

Tools:

#2 Philips screwdriver



WARNING: Remove power from luminaire before performing any maintenance procedures.



CAUTION: Always use anti-static precautions when working with PCBs.

To replace the Pan/Tilt Controller PCB:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. At Tilt Yoke Leg, remove Yoke Cover.
- Step 3. At Pan/Tilt Controller PCB, disconnect all cables.
- Step 4. Remove Pan/Tilt Controller PCB by removing four 6-32 x 5/16" PPZ screws (**Figure 3-37**).
- Step 5. Replace Pan/Tilt Controller PCB by doing steps in reverse.

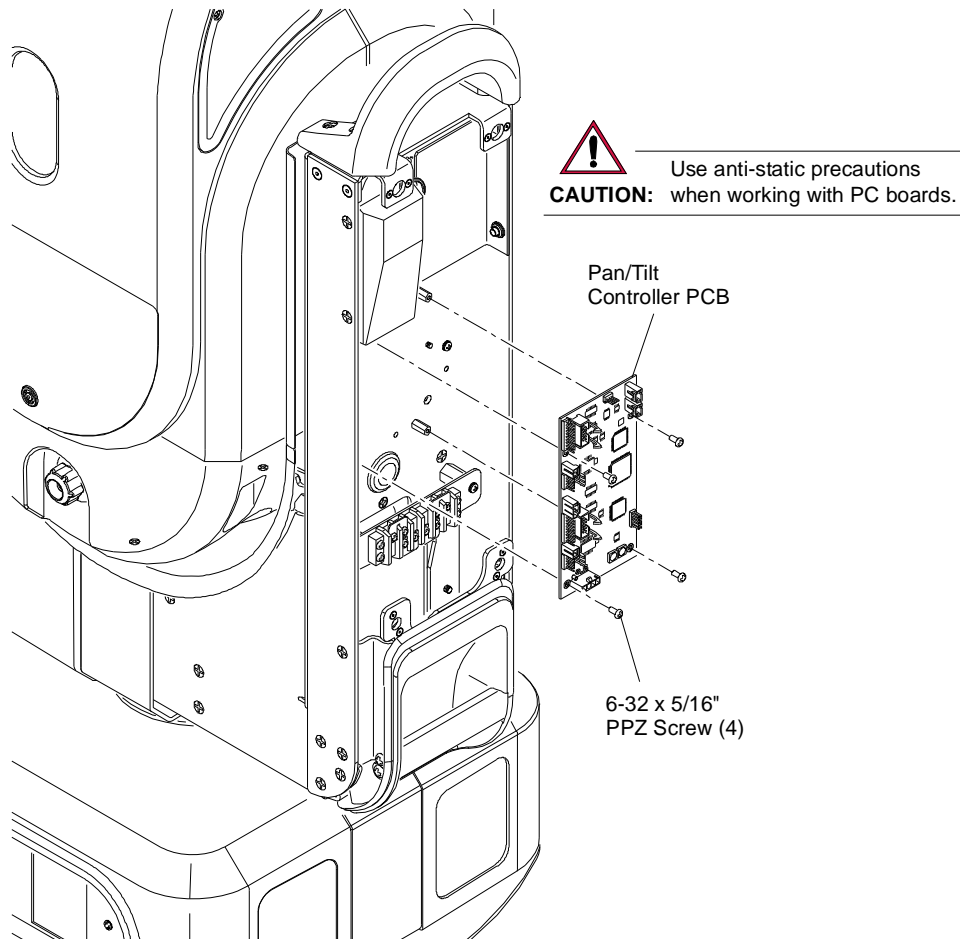


Figure 3-37: Removing Pan/Tilt Controller PCB

Replacing the Pan/Tilt COT Sensor PCB

Parts:

24.9679.0750 1 EA PCB ASSY, PAN/TILT COT SENSOR

Tools:

#1 and #2 Philips screwdrivers



WARNING: Remove power from luminaire before performing any maintenance procedures.



CAUTION: Always use anti-static precautions when working with PCBs.

To replace the Pan/Tilt COT (Center of Travel) Sensor PCB:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. At Pan Yoke Leg, remove Yoke Leg Cover.
- Step 3. Remove Cable Routing Plate by removing four 10-32 x 3/8" PFZ screws (**Figure 3-38**). Plate will remain attached by cabling, so just allow to it hang out of the way during this procedure.

Note: The Counterweight was added as a retrofit. If the Counterweight is not present, it should be added. Refer to technical bulletin BAD-001 for instructions.

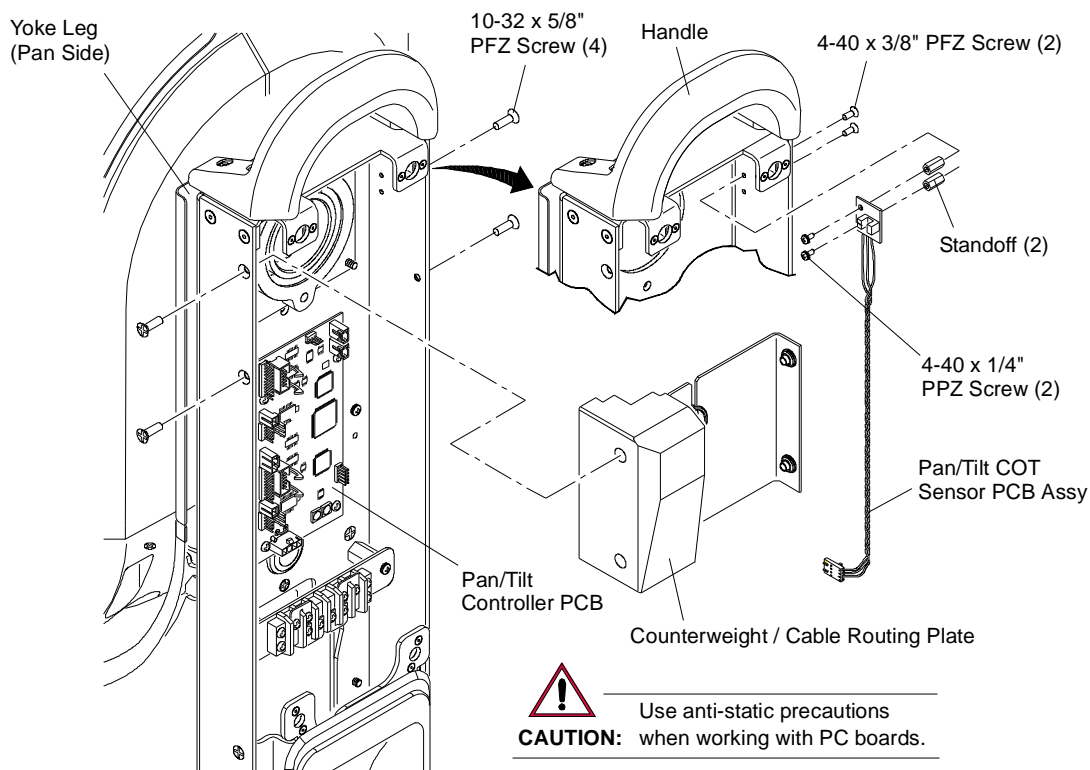


Figure 3-38: Removing Pan/Tilt COT Sensor PCB

- Step 4. At Pan/Tilt Controller PCB, disconnect Pan/Tilt COT Sensor cable.
- Step 5. At outside of yoke leg, remove two 4-40 x 3/8" PFZ screws (which secure standoff to yoke leg). This will free Pan/Tilt COT Sensor PCB Assembly.
- Step 6. Remove two standoffs from Pan/Tilt COT Sensor PCB Assembly by removing two 4-40 x 1/4" PPZ screws.



Step 7. Install standoffs on new Pan/Tilt COT Sensor PCB Assembly.

Step 8. Install new Pan/Tilt COT Sensor PCB Assembly by doing steps in reverse. *When re-assembling, route Pan/Tilt COT Sensor cable BEHIND standoffs.*

Replacing the Pan Drive Assembly

Parts:

21.9812.0718 1 EA ASSY, PAN DRIVE MECHANISM

Tools:

#2 Philips screwdriver
5/32" Allen wrench
7/16" open-ended wrench
Sonic Tension Meter, Model 507C (07.3082.1052.0)



WARNING: Remove power from luminaire before performing any maintenance procedures.

To replace the Pan Drive Assembly:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. Remove both Yoke Covers by loosening four captive screws (**Figure 3-39**).

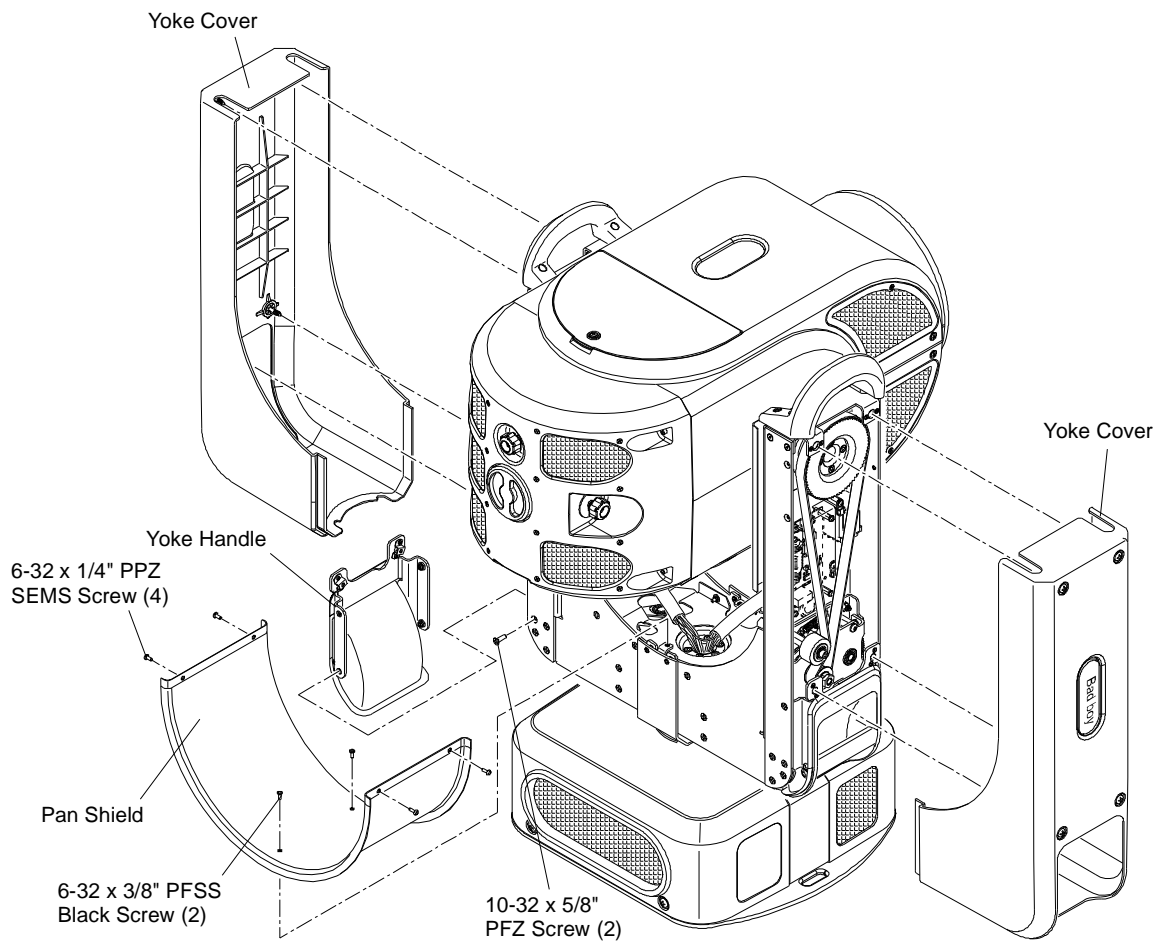


Figure 3-39: Removing Yoke Covers, Handle and Pan Shield

- Step 3. At Pan-Side Yoke Leg, remove Yoke Handle by removing two 10-32 x 5/8" PFZ screws.
- Step 4. Remove Pan Shield by removing two 6-32 x 3/8" PFSS black screws and four 6-32 x 1/4" PPZ SEMS screws.
- Step 5. At Pan/Tilt Controller PCB, disconnect Pan Drive Assembly cable harness.
- Step 6. Loosen Pan Cable Routing Plate by removing five 10-32 x 5/8" PFZ screws (**Figure 3-40**).

- Step 7. Move Pan Cable Routing Plate out of the way enough to access belt and pulley.
- Step 8. At Pan Drive Assembly, loosen (but do not completely remove) four 10-32 x 5/8" socket head screws. This will begin to loosen the belt.
- Step 9. Release belt tension by loosening two belt adjustment screws and slip belt off of pan pulley (**Figure 3-41**).
- Step 10. Remove four 10-32 x 5/8" socket head screws and two #10 flat washers from Pan Drive Assembly.
- Step 11. At Bus Bar, *remove* screw on left-hand side and *loosen* screw on right-hand side. Rotate Bus Bar up and out of the way. (This will make it easier to remove the Pan Drive Assembly.)
- Step 12. Remove Pan Drive Assembly from yoke.
- Step 13. Replace Pan Drive Assembly by doing steps in reverse.
- Step 14. Set proper belt tension. Refer to "**Setting Pan/Tilt Belt Tension**" on page 81.

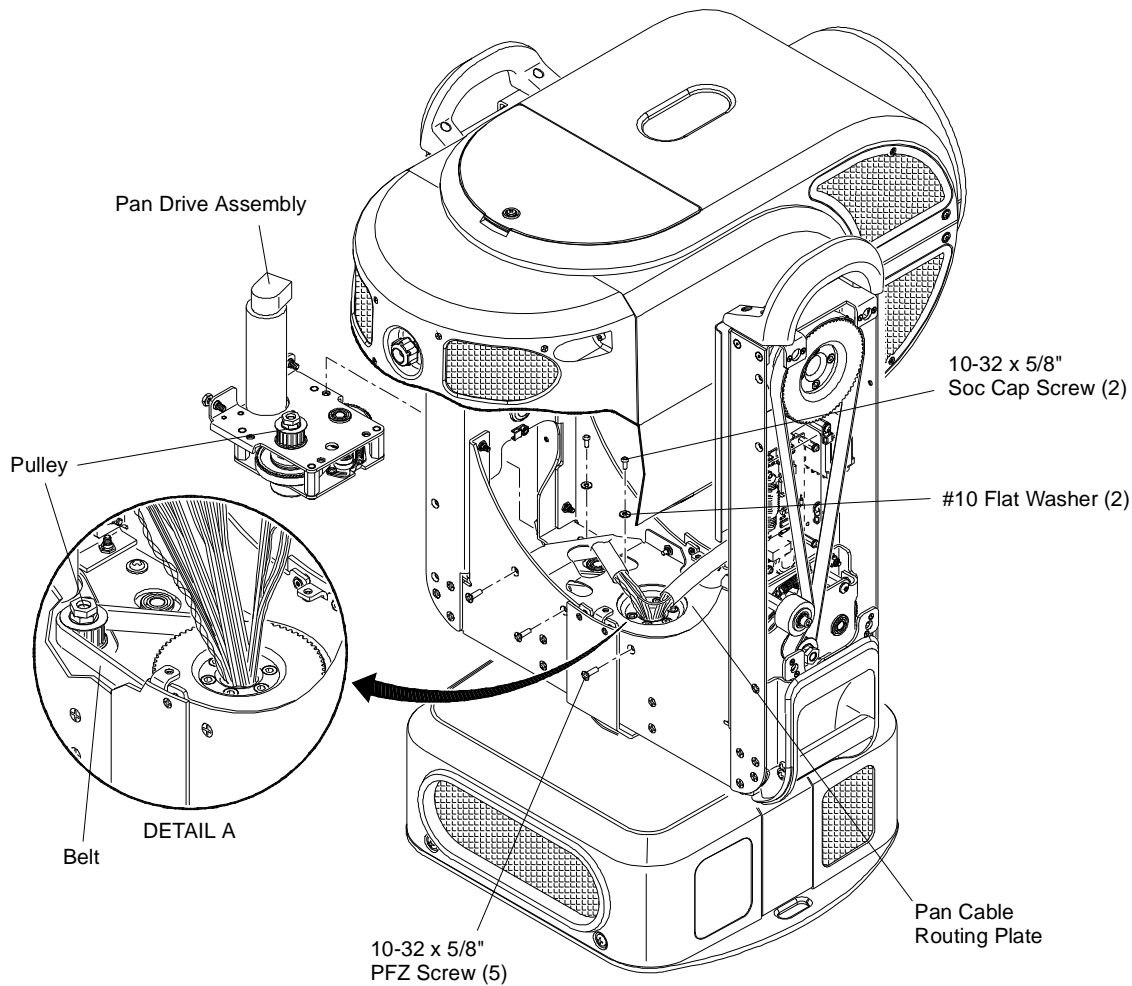


Figure 3-40: Removing Pan Drive Assembly (View 1)

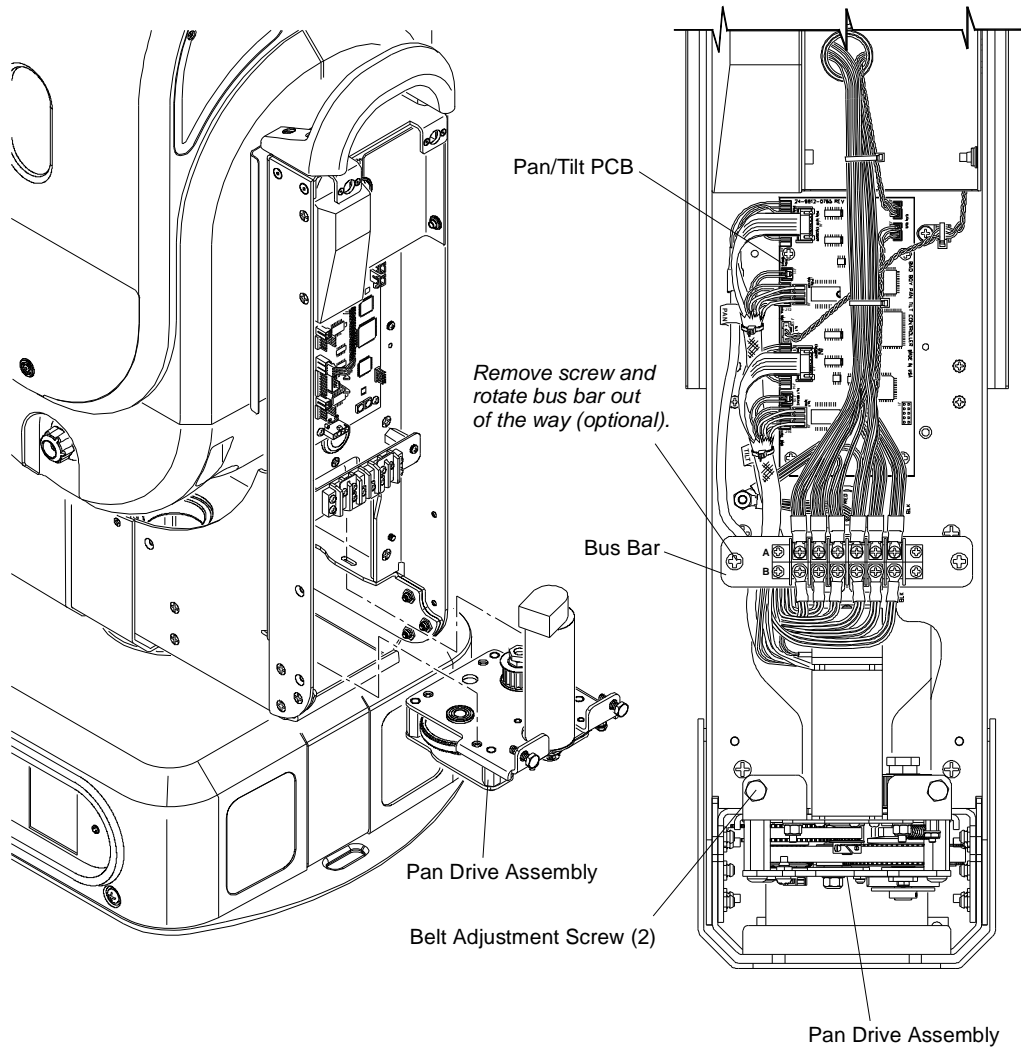


Figure 3-41: Removing Pan Drive Assembly (View 2)

Replacing the Tilt Drive Assembly

Parts:

21.9812.0719 1 EA ASSY, TILT DRIVE

Tools:

#2 Philips screwdriver
7/16" open-ended wrench
3/8" Nutdriver
Sonic Tension Meter, Model 507C (07.3082.1052.0)



WARNING: Remove power from luminaire before performing any maintenance procedures.

To replace the Tilt Drive Assembly:

- Step 1. Remove power from luminaire and allow components to cool for at least 5 minutes.
- Step 2. Remove both Yoke Covers by loosening four captive screws (**Figure 3-39**).
- Step 3. At Tilt-Side Yoke Leg, remove Yoke Handle by removing two 10-32 x 5/8" PFZ screws (**Figure 3-42**).

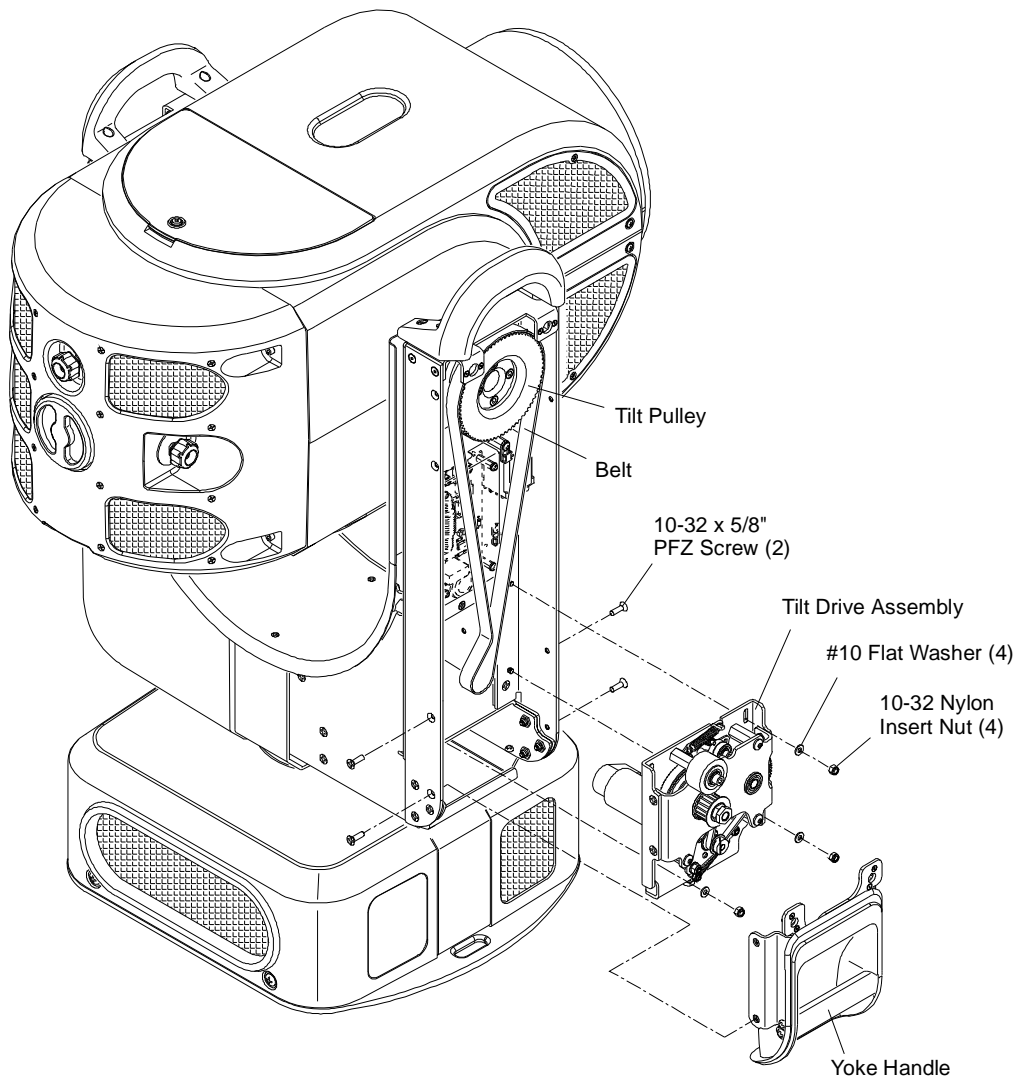


Figure 3-42: Removing Tilt Drive Assembly

- Step 4. Remove Pan Shield by removing two 6-32 x 3/8" PFSS black screws and four 6-32 x 1/4" PPZ SEMS screws (**Figure 3-39**).
- Step 5. At Pan/Tilt Controller PCB, disconnect Tilt Drive Assembly cable harness.
- Step 6. At Tilt Drive Assembly, loosen (but do not completely remove) four 10-32 nylon insert nuts (**Figure 3-42**). This will begin to loosen the belt.
- Step 7. Release belt tension by loosening two belt adjustment screws and slip belt off of tilt pulley.
- Step 8. Remove four 10-32 nylon insert nuts and four #10 flat washers from Tilt Drive Assembly.
- Step 9. Remove Tilt Drive Assembly from yoke.
- Step 10. Replace Tilt Drive Assembly by doing steps in reverse.
- Step 11. Set proper belt tension. Refer to "**Setting Pan/Tilt Belt Tension**" on page 81.

Setting Pan/Tilt Belt Tension

Loose pan/tilt drive belts can create calibration problems. When the luminaire reaches the end of travel, excess belt slack can produce a vibration causing the encoder to continue producing a movement output signal to the processor (even though the luminaire is at its stop).

When properly set, the belt should not show bilateral deflection. Bilateral deflection may be observed by loosening the tension adjustment bolt(s) and rotating the head assembly. As the head is rotated back and forth, tension is created on one side and deflections are created on the other.

There are two ways to set proper belt tension:

- 1) Using a Sonic Tension Meter (recommended).
- 2) By manually tightening until no bilateral deflection is present.

When using the Sonic Tension Meter, it will be necessary to program separate presets for the Pan and Tilt Drive belts as follows:

Preset	Belt	Mass	Width (mm)	Span (mm)	Tension (lbs.)
1	Pan Drive	4.1	15	109	80-100
2	Tilt Drive	4.1	15	326	80-100

Tools:

7/16" open-ended wrench, *or*
Sonic Tension Meter, Model 507C (07.3082.1052.0)



CAUTION: Do not overtighten belt, pulley will break and/or bearings will fail.

To set belt tension using a meter:

- Step 1. Set Pan and Tilt presets on the Tension Meter as given above.
- Step 2. Orient head as shown in **Figure 3-43** on next page.
- Step 3. Slowly tighten belt adjustment bolt(s). Use Tension Meter to verify correct tension.



CAUTION: Do not overtighten belt, pulley will break and/or bearings will fail.

To set belt tension manually:

- Step 1. Orient head as shown in **Figure 3-43**.
- Step 2. Manually move the luminaire head back and forth (tilt) or around (pan), noting the tension created on one side of belt and deflections on the other.
- Step 3. Using wrench, tighten belt adjustment bolt(s) until no bilateral deflection occurs.

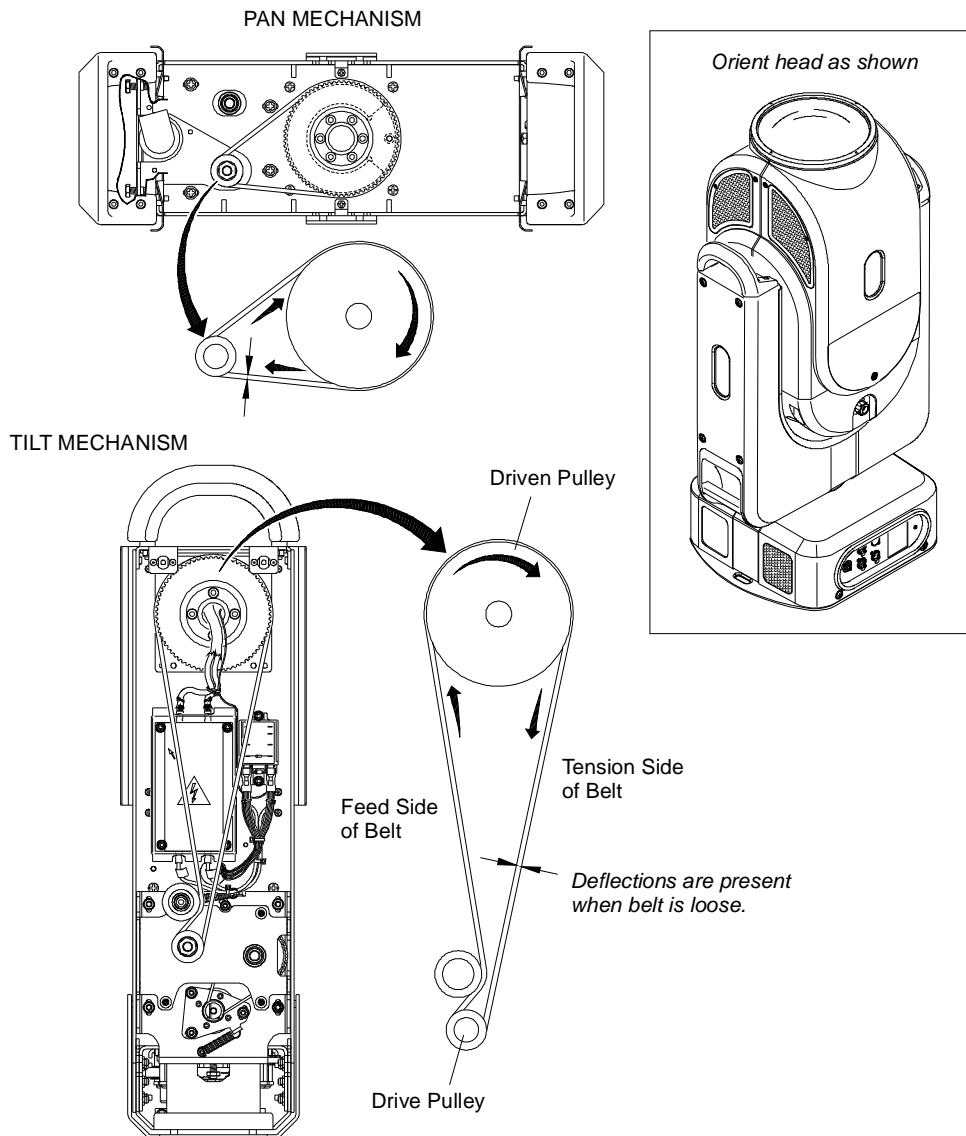


Figure 3-43: Belt Tension Adjustment



4.

ILLUSTRATED PARTS BREAKDOWN

This chapter provides illustrated parts breakdowns for all luminaire spares components.

- + OVERVIEW
- + PARTS BREAKDOWN

OVERVIEW

About this IPB

The Illustrated Parts Breakdown is intended for use with Field Service of the luminaire. The items identified here match the spares assemblies which are supplied with the Bad Boy Spares Kit (28.9812.1000), along with basic components such as Covers and Mounting Brackets. This IPB is not a complete shop-level breakdown.

The Bad Boy Spares Kit includes the following items:

28.9812.1000 Rev A0

Item	Qty Each	Description
20.9812.1229	1	ASSY, ROAD CASE, WHEEL STACK *
21.9812.0696	1	ASSY, WHEEL STACK, LESS GOBOS
21.9812.0718	1	ASSY, PAN DRIVE
21.9812.0719	1	ASSY, TILT DRIVE
22.9812.0616	1	ASSY, UV/IR WINDOW
22.9812.0557	1	ASSY, DIFFUSER PADDLE
23.9812.0810	1	ASSY, EMI BALLAST ENCLOSURE
23.9812.0812	1	ASSY, INTERFACE/LVS MODULE
23.9812.0990	1	ASSY, FAN CABLE TIP PINCH 12V
23.9812.0993	1	ASSY, MAIN HEAD FAN
24.9679.0750	1	PCB ASSY, PAN/TILT COT SENSOR
24.9679.1275	1	PCB ASSY, SOLID STATE IGNITOR
24.9812.0510	1	PCB ASSY, ZOOM SENSOR
24.9812.0511.0	1	PCB ASSY, ZOOM CONTROLLER
24.9812.0570	1	PCB ASSY, DIFFUSER SENSOR
24.9812.0765	1	PCB ASSY, CONTROLLER PAN TILT
28.9812.1301	1	KIT, BAD BOY HARDWARE, FIELD SERVICE
28.9812.1302	1	KIT, BAD BOY OPTICS CLEANING
42.9812.0160	1	REFLECTOR, 36 LUNES, COATED
70.3769.0002.0	12	FUSE, 2AMP SLO-BLO
70.3769.0003.0	6	FUSE, 3AMP SLO-BLO

* For more information about Wheel Stack Road Case, refer to "[Wheel Stack Road Case Instructions](#)" on page 27.

Additional replacement items are as follows:

Item	Qty Each	Description
12.9812.0629	1	RETAINER, FRONT GLASS PAINTED
41.9812.0628	1	FRONT GLASS

PARTS BREAKDOWN

Covers and Included Items

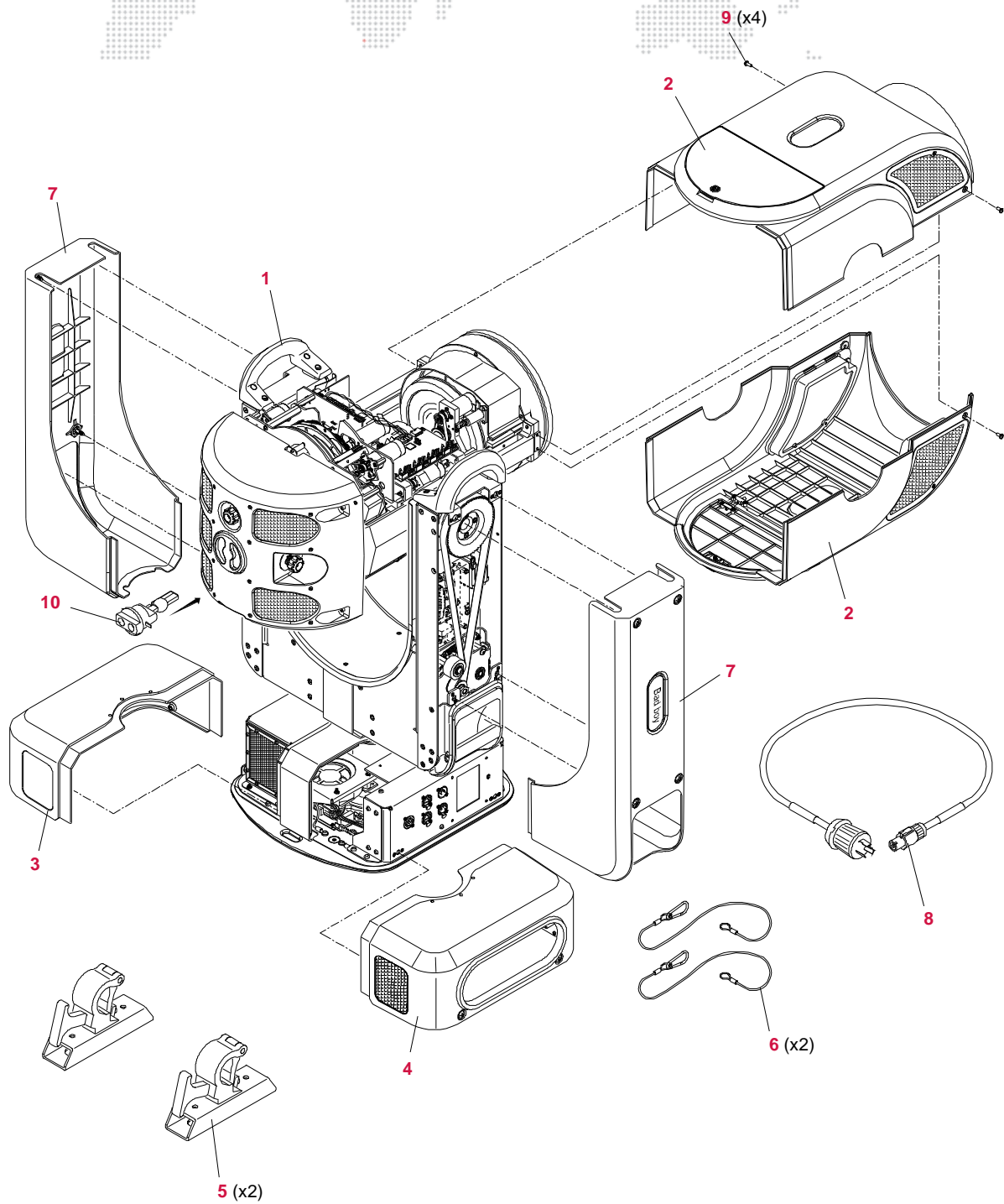
20.9612.0001 Rev A0

No.	Item	Qty	UM	Description	Procedure
1	21.9812.0020	1	EA	SUBASSY, BAD BOY	-
2	21.9812.0630	2	EA	ASSY, HEAD COVER	page 28
3	21.9812.0820	1	EA	ASSY, EXHAUST COVER, UPPER ENCLOSURE	page 30
4	21.9812.0830	1	EA	ASSY, INTAKE COVER, UPPER ENCLOSURE	page 30
5	21.9812.0863	2	EA	ASSY, HANGING BRACKET	-
6	22.9620.0194	2	EA	ASSY, LAMP SAFETY CABLE	-
7	22.9812.0716	2	EA	ASSY, YOKE ARM COVER	-
8	25.9812.0902.5	1	EA	CABLE ASSY, AC LINE CORD 2.5' 14/3 L6-20	-
9	53.6545.0001	4	EA	SCREW, 8-32 x 3/8 PPB	-
10	71.2566.1200.0	1	EA	LAMP, MSR GOLD 1200 FAST FIT	page 40
-	04.9812.0040	1	EA	LABEL, COMPLIANCE	-
-	04.9812.0041	1	EA	LABEL, RELAMPING & UV SAFETY	-
-	04.9812.0043	1	EA	LABEL, OPTICS RAIL	-
-	04.9812.0046	1	EA	LABEL, BELT TENSION	-
-	04.9812.0047	1	EA	LABEL, R1 SIDE	-
-	04.9812.0048	1	EA	LABEL, R2 SIDE	-
-	04.9812.0049	1	EA	LABEL, AIR FILTERS	-
-	04.9812.0050	1	EA	LABEL, LENS CLEANING/CAUTION	-
-	04.9812.0051	1	EA	LABEL, PATENT	-
-	04.9812.0052	1	EA	LABEL, WHEEL STACK CAUTION	-

Refer to illustration on next page.

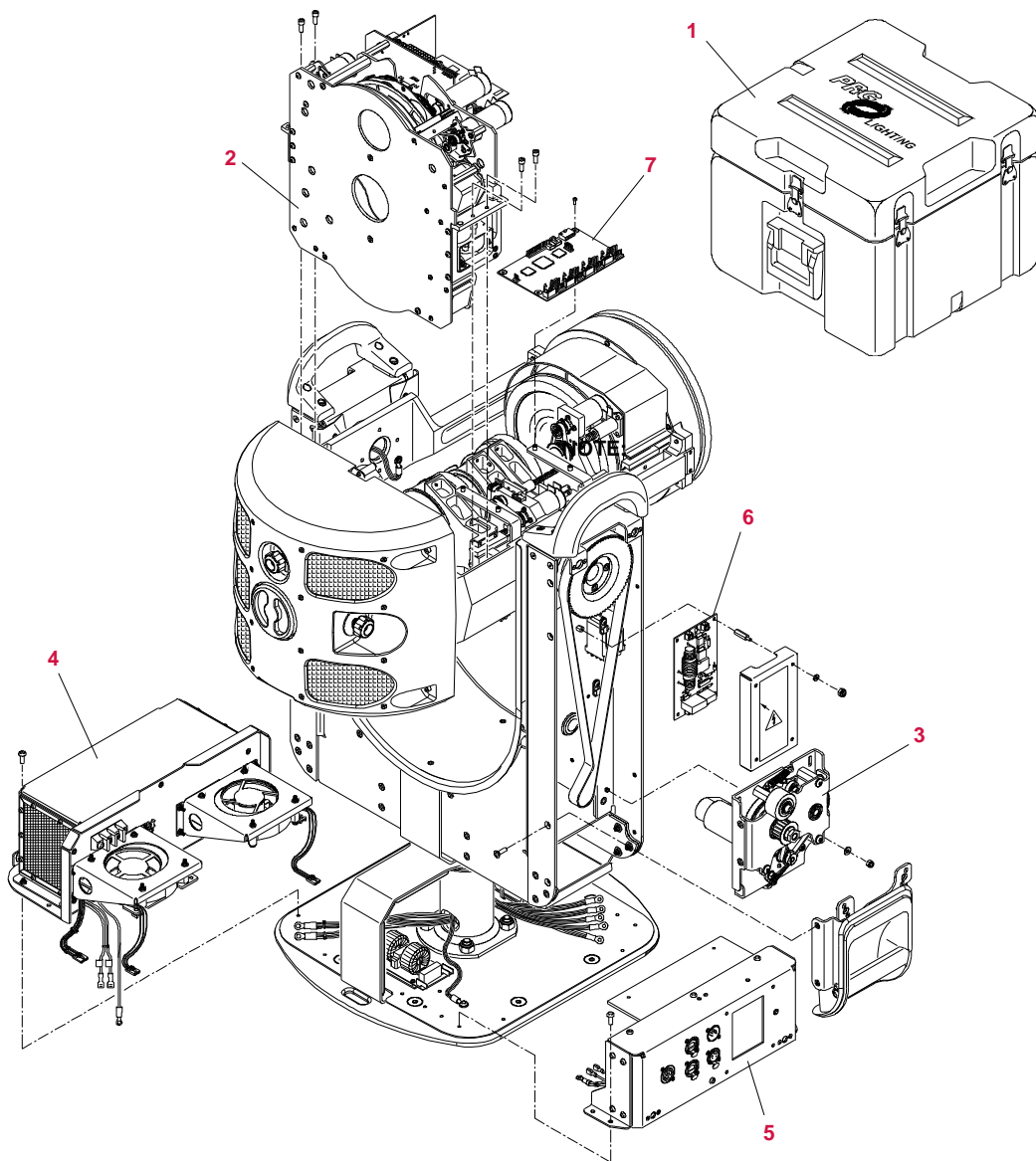
Bad Boy Spot Luminaire (continued)

Refer to Parts List on previous page.



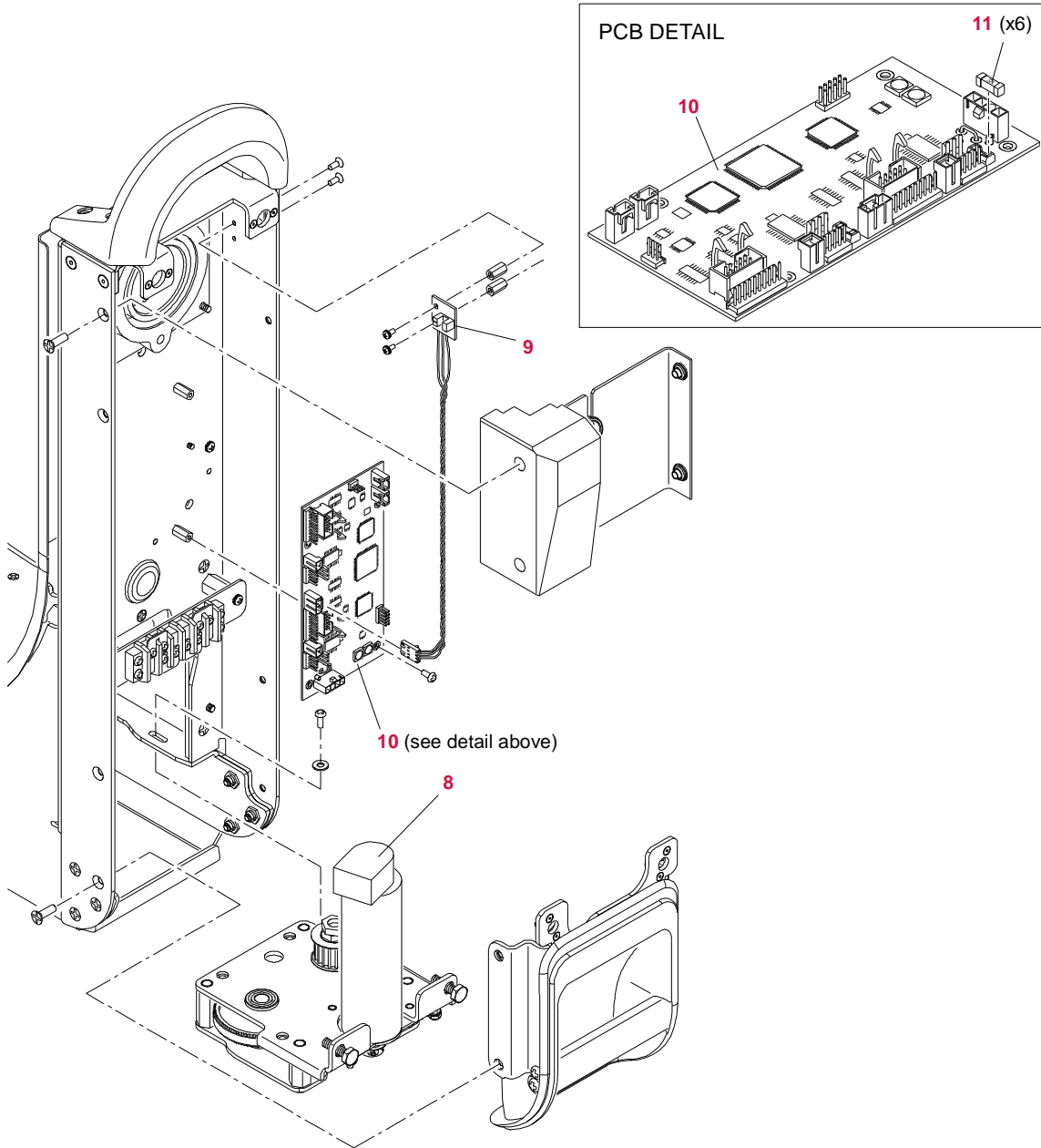
Bad Boy Spares Kit

No.	Item	Qty	UM	Description	Procedure
1	20.9812.1229	1	EA	ASSY, ROAD CASE, WHEEL STACK	page 49
2	21.9812.0696	1	EA	ASSY, CMY WHEEL STACK, LESS GOBOS	page 49
3	21.9812.0719	1	EA	ASSY, TILT DRIVE	page 80
4	23.9812.0810	1	EA	ASSY, EMI BALLAST ENCLOSURE	page 68
5	23.9812.0812	1	EA	ASSY, INTERFACE/LVS MODULE	page 70
6	24.9812.0775	1	EA	PCB ASSY, SOLID STATE IGNITOR	page 72
7	24.9812.0511.0	1	EA	PCB ASSY, ZOOM CONTROLLER	page 56



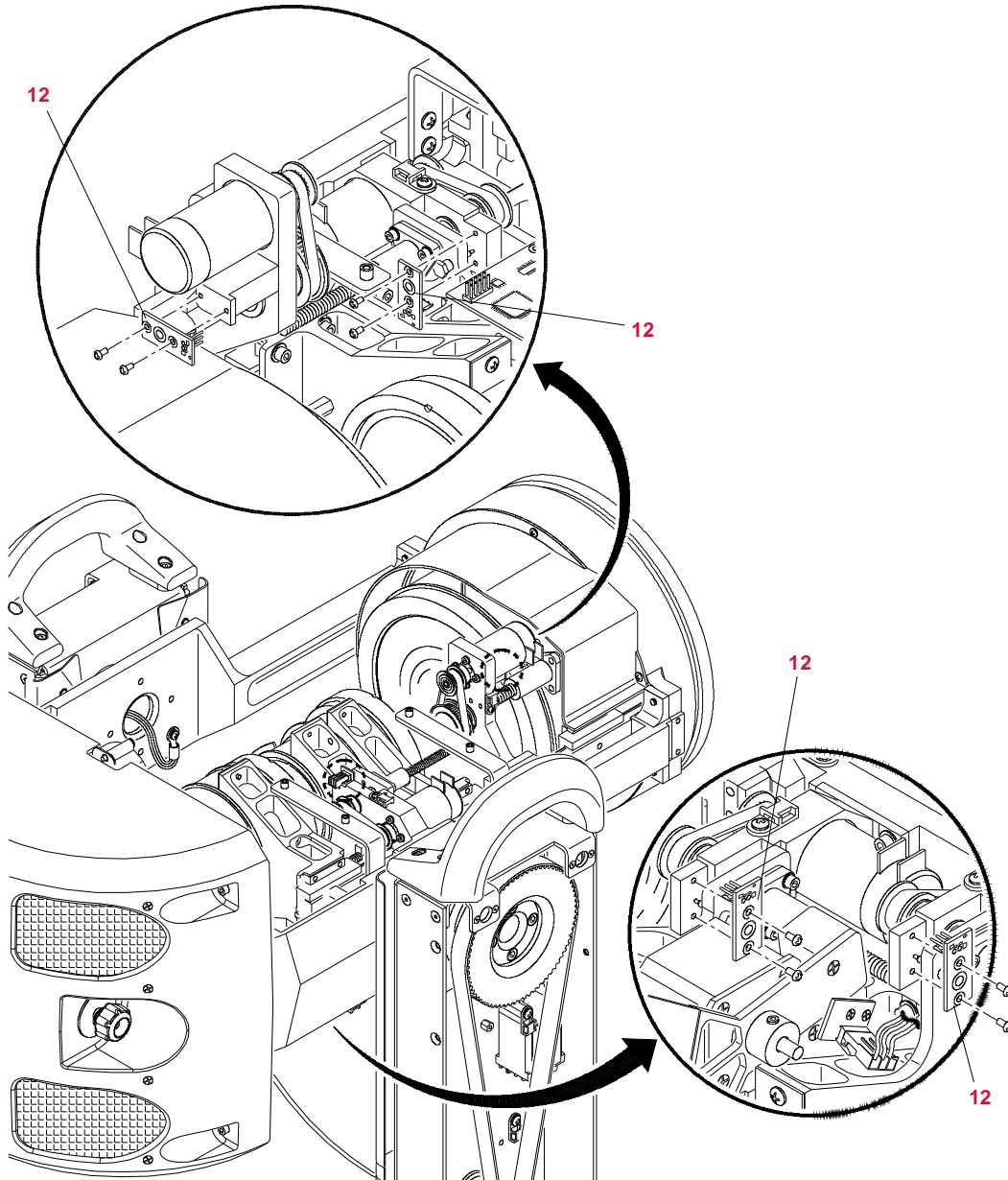
Bad Boy Spares Kit (continued)

No.	Item	Qty	UM	Description	Procedure
8	21.9812.0718	1	EA	ASSY, PAN DRIVE	page 77
9	24.9679.0750	1	EA	PCB ASSY, PAN/TILT COT SENSOR	page 75
10	24.9812.0765	1	EA	PCB ASSY, CONTROLLER PAN TILT	page 74
11	70.3769.0003.0	6	EA	FUSE, 3AMP SLO-BLO	page 67



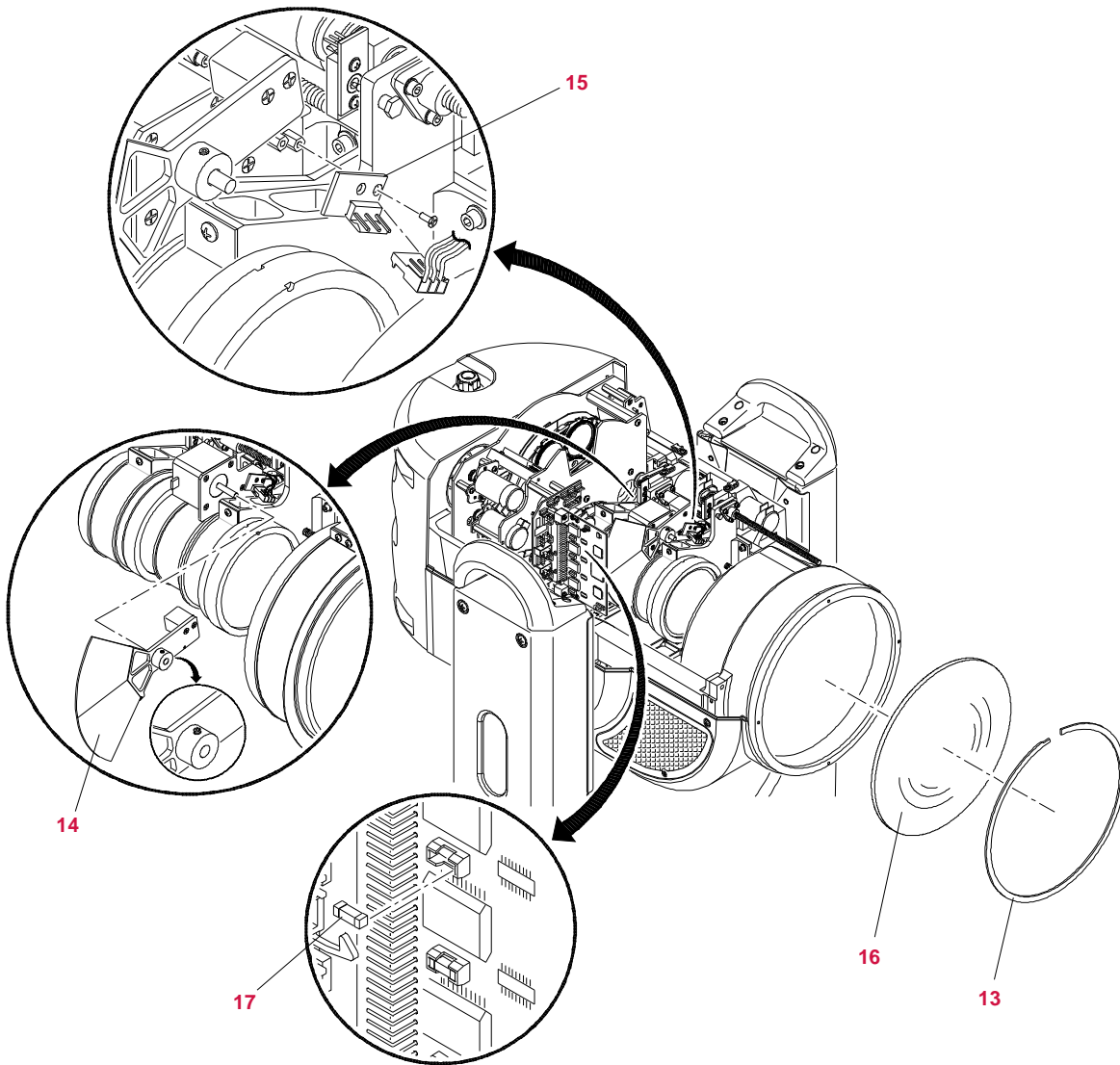
Bad Boy Spares Kit (continued)

No.	Item	Qty	UM	Description	Procedure
12	24.9812.0510	1	EA	PCB ASSY, ZOOM SENSOR	page 57



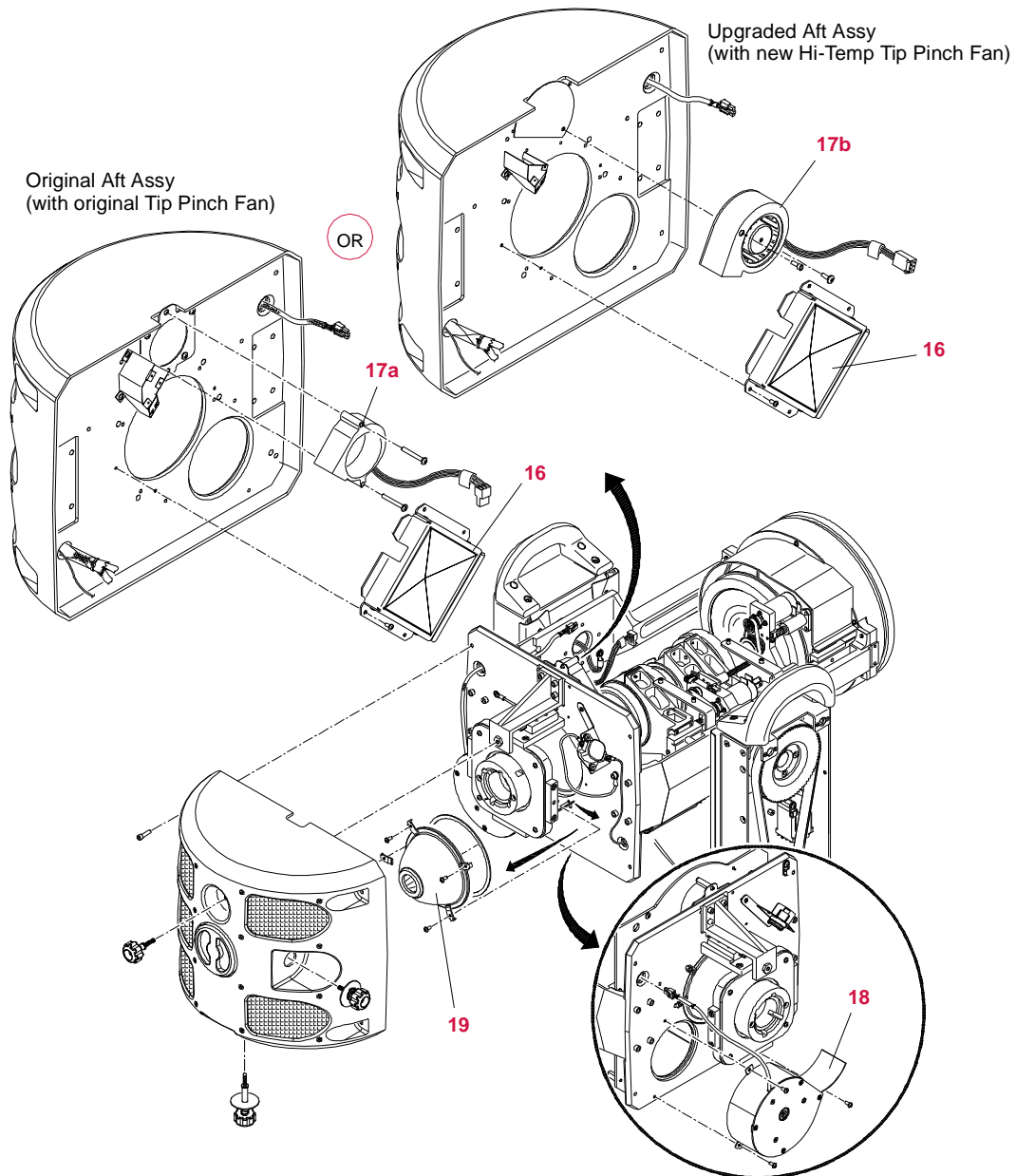
Bad Boy Spares Kit (continued)

No.	Item	Qty	UM	Description	Procedure
13	12.9812.0629	1	EA	RETAINER, FRONT GLASS PAINTED	page 48
14	22.9812.0557	1	EA	ASSY, DIFFUSER PADDLE	page 53
15	24.9812.0570	1	EA	PCB ASSY, DIFFUSER SENSOR	page 55
16	41.9812.0628	1	EA	FRONT GLASS	page 48
17	70.3769.0002.0	12	EA	FUSE, 2AMP SLO-BLO	page 66



Bad Boy Spares Kit (continued)

No.	Item	Qty	UM	Description	Procedure
16	22.9812.0616	1	EA	ASSY, UV/IR WINDOW	page 64
17a	23.9812.0990	1	EA	ASSY, TIP PINCH FAN, 12V (original)	page 62
17b	23.9812.0994	1	EA	ASSY, HI-TEMP TIP PINCH FAN, 12V (new)	page 63
18	23.9812.0993	1	EA	ASSY, MAIN HEAD FAN	page 60
19	42.9812.0160	1	EA	REFLECTOR, 36 LUNES, COATED	page 65





Notes



A.

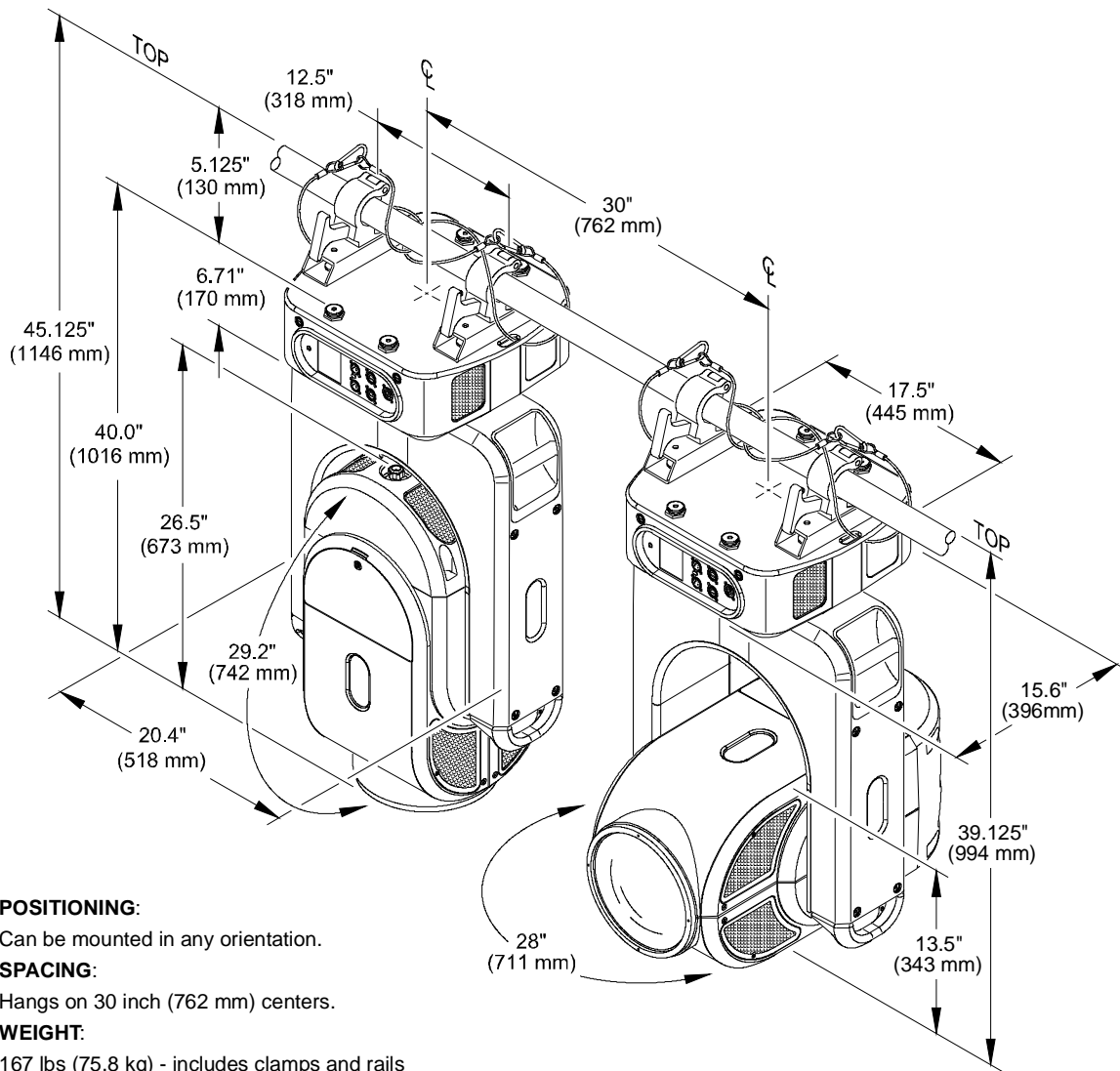
TECHNICAL SPECIFICATIONS

- + BAD BOY SPOT LUMINAIRE
- + BAD BOY ROAD CASE
- + AC LINE CURRENT / POWER VS. VOLTAGE



Bad Boy Spot Luminaire

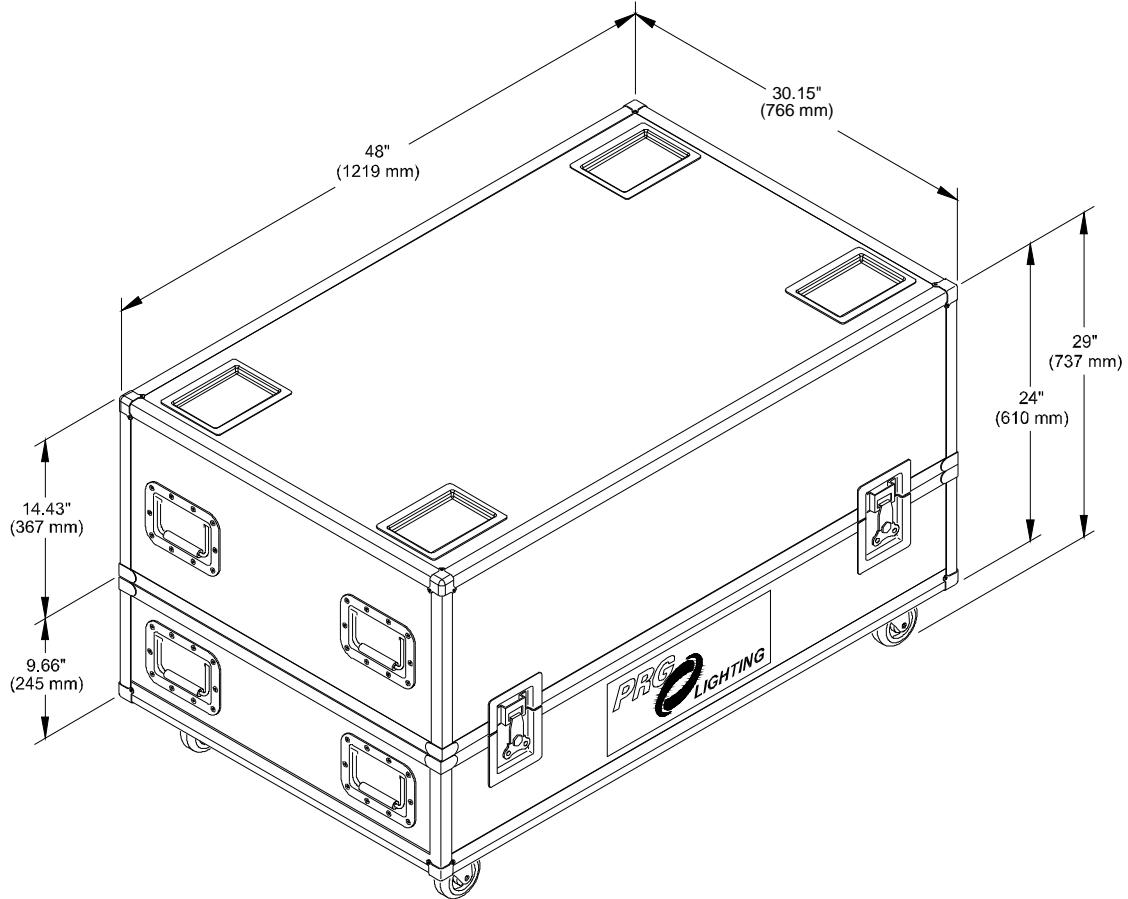
SOURCE:	Philips MSR Gold™ 1200W FastFit Lamp. Can be set to levels 900W, 1200W, or 1400W.
OUTPUT:	48,000 lumens
OPTICAL EFFICIENCY:	40%
REFLECTOR:	Precision glass reflector with dichroic cold mirror coating.
OPERATING TEMP:	-20° to 120°F (-29° to 49°C)
COOLING:	Forced air.
CONTROL:	Compatible with all PRG consoles and a wide variety of DMX512 and Art-Net consoles. An internal Ethernet switch allows for daisy-chaining fixtures.
POSITIONING:	Can be mounted and operated in any orientation.
SPACING:	Hangs on 30 inch (762 mm) centers.
WEIGHT:	167 lbs (75.8 kg) - includes clamps and rails
ON-BOARD CONTROL:	Built-in LCD display with touchscreen featuring menu system control.
ZOOM RANGE:	8:1 from narrow spot of 7° to wide flood of 56°.
ZOOM CONTROL:	Four (4) groups of lenses — each independently controlled for accuracy while maintaining focus during zoom changes
BEAM SIZE CONTROL:	In addition to the zoom optics, a mechanical iris provides continuous beam size control for both rapid changes and smooth timed beam angle changes.
EDGE CONTROL:	Maintains gobo focus and allows gobo morphing.
INTENSITY:	Full-field dimming from 0 to 100% with accurate slow-speed control and fast bumps.
STROBE:	Servo-powered, lightning fast strobe.
FROST:	Variable frost for smooth diffusion.
COLOR:	CMY color system featuring three (3) cross-fading color wheels (Cyan, Magenta, and Yellow), plus one (1) designer wheel with user-changeable color filters.
ROTATING GOBOS:	Two (2) indexable, rotating gobo wheels with seven (7) gobos per wheel. Gobos are individually calibrated so the unit will automatically index the orientation of each gobo regardless of placement.
PAN & TILT:	Three-phase, high-speed servo motors.
RANGE:	Pan - 540°, Tilt - 270°
MAX VELOCITY:	4.1 seconds for 540° of pan and 3.2 seconds for 270° of tilt.
ACCURACY:	0.2° resolution.
AC INPUT:	200-240 VAC, 50/60 Hz, 15A maximum



Bad Boy Road Case

EMPTY WEIGHT: 190 lbs (86.18 kg)

LOADED WEIGHT: 357 lbs (161.93 kg) - includes (1) one luminaire with clamps and rails



AC Line Current / Power vs. Voltage

TEST	VOLTS	FREQ	AMPS	VA	POWER	PF
1	170	50Hz	10.27	1746	1735	0.998
2	180	50Hz	9.62	1732	1721	0.995
3	200	50Hz	8.56	1712	1713	0.994
4	200	60Hz	8.57	1714	1709	0.996
5	210	60Hz	8.16	1714	1707	0.997
6	220	50Hz	7.77	1709	1704	0.991
7	230	50Hz	7.47	1718	1708	0.998
8	240	50Hz	7.14	1714	1705	0.993
9	240	60Hz	7.16	1718	1702	0.996
10	250	50Hz	6.83	1708	1704	0.992
11	260	50Hz	6.62	1721	1701	0.989
12	270	50Hz	6.45	1742	1689	0.966

Notes:

- + Tested while running all motors except Intensity/Iris/Frost functions to allow ballast to remain stable at 1400W output to lamp.
- + Under-Voltage Lock-Out (UVLO)
 - Ballast UVLO = 165V/50Hz, 185V to recover
 - 24VDC LVS UVLO = 75V/50Hz, 85V to recover

About UVLO

UVLO is an acronym for Under-Voltage Lock-Out.

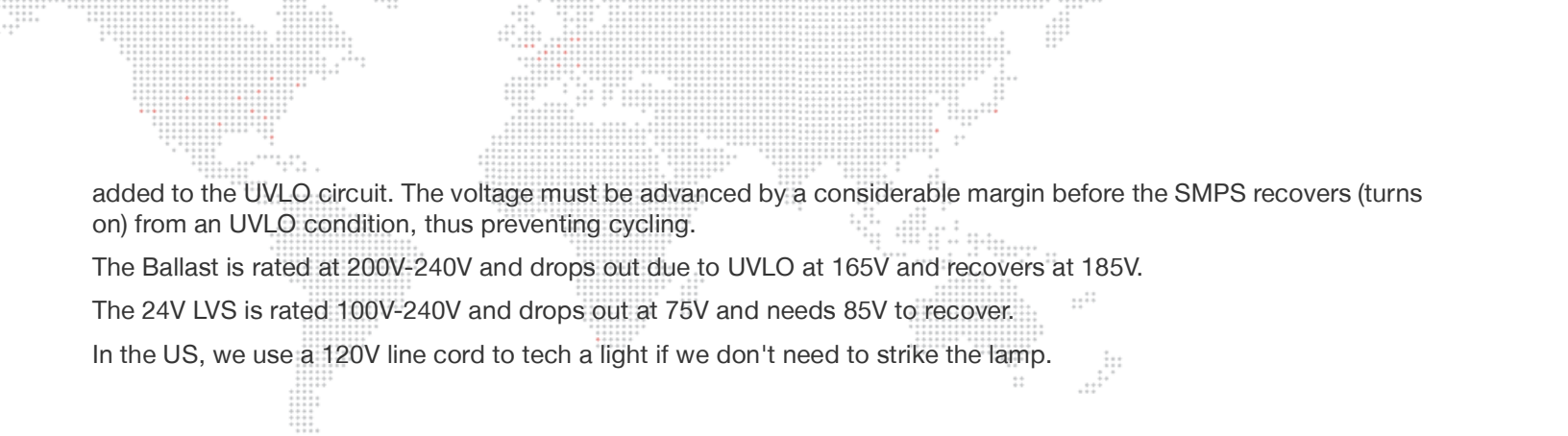
On a SMPS (Switch-Mode Power Supply) the input power is regulated by a PWM (Pulse-Width Modulator). Input power is held constant by the PWM at a value equal to the load power divided by the efficiency of the SMPS (usually .85 to .95). The Bad Boy Electronic Ballast and the 24V DC LVS (Low-Voltage Supply) are both SMPS units.

In the table above, the input power for the Bad Boy stays constant at just over 1700 Watts throughout the usable voltage range. As input voltage is reduced further, the input current rises to unacceptable levels for the wiring, the circuit breaker, and the PWM transistor. There are fuses on the inputs of each SMPS that prevent fires in case of shorts on the PCB or overvoltage at the input, but these could also be blown by a voltage sag that would cause the input current to rise. Enter the UVLO. It is a dedicated electronic circuit added to the SMPS to monitor its input voltage and shut down the PWM if leaving it on would cause damage.

Every high-power SMPS needs this circuit to prevent damage to the components, not just semi-conductors, but current sensing resistors, too.

The UVLO is not adjustable, it is set by the manufacturer to what he considers a safe value for his selection of components. We have chosen vendors that provide a conservative margin for a more reliable product. We also want to prevent nuisance dropouts.

As voltage is decreased to UVLO level, the increasing current causes additional voltage drop in the supply lines. When the UVLO activates, (shuts down the PWM) the voltage will rise again to its no-load value. To prevent on-off cycling (slow oscillation) based on a sensitive threshold voltage being crossed by load/no-load conditions, hysteresis is



added to the UVLO circuit. The voltage must be advanced by a considerable margin before the SMPS recovers (turns on) from an UVLO condition, thus preventing cycling.

The Ballast is rated at 200V-240V and drops out due to UVLO at 165V and recovers at 185V.

The 24V LVS is rated 100V-240V and drops out at 75V and needs 85V to recover.

In the US, we use a 120V line cord to tech a light if we don't need to strike the lamp.



Bad Boy® Spot Luminaire Field Service Manual

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Production Resource Group, LLC
Dallas Office
8617 Ambassador Row, Suite 120
Dallas, Texas 75247
www.prg.com