CUES

OZ II

Pan, Tilt, & Optical Zoom Camera

OPERATION & MAINTENANCE MANUAL

P/N CZ902, Revision 3; 031307

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APPENDICES

CUES® equipment is designed to be easy to use during day to day operation. However, it is powered electrically and thus must be operated with care and safety. PLEASE READ THE INFORMATION ON SAFETY AND MAINTENANCE EVEN IF THE SYSTEM IS SET UP BY SOMEONE ELSE.

Care was taken in the design of this product and in the production of this document and related materials. However, CUES® makes no warranty for the use of its products and assumes no responsibility for any errors or omissions in this document or for incidental or consequential damages resulting from the use of the products or the information contained in this document. Specifications may change without notice.

We would be pleased to hear from you. If you see any errors or desirable extensions or improvements, please write us at the following address, C/O Operator's Manuals: CUES® Corporate Office 3600 Rio Vista Avenue Orlando, Florida 32805

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CUES ® Corporate Office
3600 Rio Vista Avenue
Orlando, Florida 32805
800-327-7791
407-425-1569 FAX

8am - 6pm EST M-Fri

CUES ® Atlanta
3755 Industrial Ct.
NW, Suite 14
Suwannee, GA 30024
770-945-8674
770-945-9604 FAX

8am - 5pm EST M-Fri

CUES West
1943 S. Augusta Ct.
Ontario, CA 91761
909-923-2001
909-923-2091 FAX

7AM - 6PM PST M-Fri

CUES ® Northern California
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Vacaville, CA 95688
Phone: 866-358-CUES
Fax: 707-449-0260

8:00AM - 5PM PST M-Fri

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Phone:: 262-717-3165
Fax: 262-717-3167

7AM – 4PM CST M-Fri

CUES ® Canada
1675 Sismet Rd., #2
Mississauga, Ontario
Canada L4W 1P9
905-238-9178
905-238-5018 FAX

8AM - 5PM EST M-Fri

CUES Northwest
1000 NW Commerce Ct., Suite B
Estacada, OR 97023
Phone: 1.800.432.1549 ext: 403
Fax: 909-923-2051

CUES® toll free hot line for
Customer Service and ordering parts:
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Styles and specifications are subject to change without notice. First version published in 2002.
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CUES STANDARD 12 MONTH WARRANTY

CUES warrants that all parts, components, and equipment manufactured by CUES shall be free from defects in material and workmanship under normal use and service for which it was intended for a period of twelve (12) months from the date of shipment of materials by CUES to the purchaser. CUES' obligation under this warranty is limited, at CUES' option, to replacing or repairing, free of charge, F.O.B. CUES' service facility, any defective materials. For all warranty claims, the materials must be returned in accordance with CUES Material Return Policy; freight, duties, and insurance prepaid to a place designated by CUES. CUES will provide a twelve (12) month warranty on the Camera and Power Control Unit.

Major items of equipment, such as vehicles, generators, etc., furnished, but not manufactured by CUES, will be covered only under the warranty of the third party manufacturer of such equipment. Expendable parts, such as light bulbs, fuses, connectors, etc., are excluded from this warranty.

Purchaser must notify CUES of a breach of warranty not later than the last day of the warranty period; otherwise, such claims shall be deemed waived.

CUES does not warrant the materials to meet the requirements of the safety codes of any federal, state, municipal or other governmental or administrative jurisdiction. Purchaser assumes all risk and liability resulting from the use of its products, whether used singly or in combination with other products, machines or equipment.

This Warranty shall not apply to any materials, or parts which have: (a) been repaired or altered by anyone other than CUES without CUES written consent; (b) been subject to misuse, abuse, negligence, accident, or damage; (c) not been installed or operated in accordance with CUES' printed instructions or; (d) been operated under conditions exceeding or more severe than those set forth in the specifications of design tolerance of the equipment.

THIS WARRANTY AND THE OBLIGATION AND LIABILITIES OF CUES HEREUNDER ARE EXCLUSIVE AND IN LIEU OF (AND PURCHASER HEREBY WAIVES) ALL OTHER WARRANTIES, GUARANTEES, REPRESENTATIONS, OBLIGATIONS, OR LIABILITIES, EXPRESSED OR IMPLIED, ARISING BY LAW OR OTHERWISE, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, REGARDLESS WHETHER OR NOT OCCASIONED BY CUES' NEGLIGENCE.

CUES SHALL NOT BE LIABLE FOR ANY LOSS OR DAMAGE RESULTING, DIRECTLY OR INDIRECTLY, FROM THE USE OR LOSS OF USE OF THE MATERIALS, OR FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, ECONOMIC LOSSES, LOSS OF PROFITS, LOSS OF BUSINESS, OR LOSS OF BUSINESS OPPORTUNITY. Without limiting the generality of the foregoing, this exclusion from liability embraces Purchaser's expenses for downtime or for making up downtime, damages to property, and injury to or death of any persons.

CUES neither assumes nor authorizes any person (including employees, agents, or representatives of CUES) to assume for it any other liability, guarantee, or warranty in connection with the sale or use of the materials, and no oral agreements, warranties, or understandings exist collateral to or affecting this warranty.

This warranty shall not be extended, altered, modified, or waived except by a written instrument signed by CUES.

CUES POLICY ON RETURNING MATERIALS

To ensure the orderly return of CUES products from our customers and to assure proper credit and warranty replacements handled in a timely manner, CUES has implemented a MATERIAL RETURN AUTHORIZATION (MRA) SYSTEM. Please read and follow the instructions below to ensure your MRA is handled properly and efficiently:

1. Once it is determined that a CUES product needs to be returned, call the CUES Parts Department in Orlando at 1-800-327-7791.
2. CUES will provide an MRA number by phone and ask a few questions.
3. CUES will then mail or fax the MATERIAL RETURN AUTHORIZATION (MRA) FORM with the MRA number, or include it with the replacement parts, if applicable.
4. Follow all instructions on the MRA Form. Make 2 copies - one for your records and the other will be used as a packing list.
5. Place an MRA sheet in with the parts that are shipped back to CUES along with a copy of the original packing slip or invoice, if possible. Send only the parts originally agreed upon with your Parts Representative. Any deviations/changes will require an additional MRA.
6. Make sure to include a copy of the MRA form for a packing slip.
7. Write the MRA number on the outside of the box.
8. Please take care in packing the parts that are to be shipped back to CUES. Parts must be individually protected from each other and appropriate packing material must be used to prevent damage during shipping.
9. Freight on the material returned is to be prepaid by the customer. Depending on the warranty determination, CUES, at its' option, may credit freight charges both ways.
10. ***The parts must be returned to CUES within 5 days of receipt of the MRA for credit to be granted.***

Under normal circumstances, a warranty determination can be made within 30 days, and if under warranty, the part will be replaced at no charge. A credit will be issued if you have already received a replacement part. No credits will be issued until CUES receives the defective part.

*******NOTE*******

CUES will not warrant look-alike parts sold by competitors and reserves the right to charge a restocking fee.

CUES shall not be liable for any loss or damage resulting, directly or indirectly, from the use of the materials, or for special, indirect, or consequential damages, economic losses, loss of profits, loss of business, or loss of business opportunity.

Without limiting the generality of the foregoing, this exclusion from liability embraces purchaser's expenses for downtime or for making up downtime, damages to property, and injury to or death of any persons.

CUES neither assumes nor authorizes any person (including employees, agents, or representatives of CUES) to assume for it any other liability, guarantee, or warranty in connection with the sale or use of the materials, and no oral agreements, warranties, or understandings exist collateral to or affecting this warranty.
This warranty shall not be extended, altered, modified, or waived except by a written instrument signed by an authorized CUES representative.

MATERIAL RETURN AUTHORIZATION MRA # _____

CUSTOMER NAME	PHONE	FAX	DATE

CUSTOMER #	SHIP TO #	ORIGINAL S.O. #	S.O. DATE

ORIGINAL INV #	NEW S.O. #	CUSTOMER CONTACT	TERRITORY	PRODUCT REFERENCE CODE

ITEM	PART NUMBER	SERIAL #	QTY	DESCRIPTION	TOTAL
1					$
2					$
3					$
4					$
5					$
6					$

RETURNING MATERIAL FOR: CREDIT ☐ REPLACEMENT ☐ OTHER (NO CREDIT) ☐

REASON: TRADE IN ☐ ORDERED IN ERROR ☐ SHIPPED IN ERROR ☐ RENTAL ☐ DEMO ☐ OTHER ☐ WARRANTY DETERMINATION ☐

RESTOCKING FEE? YES ☐ NO ☐	EXPLANATION:
S. O. # TO BE CREDITED	

PROCESSED BY: _____

To ensure your MRA is handled properly and efficiently, please follow the instructions below.

1. Ship parts back within five (5) business days of receiving your MRA number. Parts ordered in error are subject to a restocking fee.
2. Send only the parts originally agreed upon with your customer service representative. Any deviations will require an additional MRA.
3. Make a copy of this sheet and keep for your records. Attach this copy to parts prior to packaging and use the other for a packing slip.
4. Write the MRA number on the outside of the box.
5. Parts must be individually protected from each other (original packaging would be best) and appropriate packing material must be used to prevent against damage during shipping.

   Note: If parts are not well protected and arrive at our facility damaged in any manner, we will automatically reject them and return them to you without credit.

PARTS WILL BE RETURNED AT CUSTOMER EXPENSE WITHOUT THIS FORM AND MRA NUMBER.

RETURN TO:

"The Standard of the Industry"

CUES

3600 Rio Vista Avenue
Orlando, Fl. 32805
(407) 849-0190
FAX (407) 425-1569
WATS 800-327-7791

For Your Safety...

The fire symbol with an equilateral triangle is intended to caution the user regarding hot surfaces (see below). Therefore, it is advised to use extreme caution to prevent any injury to personnel.

When using certain light sources with a CUES product ....

CAUTION!

HOT SURFACE!

The exclamation point with an equilateral triangle is intended to alert the user that important literature regarding the operation and maintenance (servicing) of the product has been included (see below). Therefore, it should be read carefully in order to avoid any problems.

CAUTION!

RISK OF INJURY TO PERSONS!

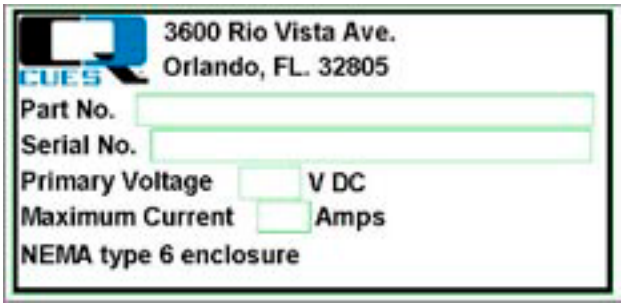
This product is intended for use only with CUES® power control units and/or power supplies. To prevent electric shock, fire hazards, and/or possible injury, do not use with any power sources except those recommended by CUES.

Ensure that all field installations are performed by qualified service personnel and conform to all local codes.

The user of CUES products is responsible for all training and operation of equipment under Federal, State and local codes, guidelines and regulations. This includes, but is not limited to, confined space entry and traffic control.

FYI...

The following identification plate is located on the unit:



The electrical ratings for the OZ II cameras are listed below:

PART NUMBER	PRIMARY VOLTAGE	MAXIMUM CURRENT RATING
CZ300	82VDC	0.80
CZ300-1	82VDC	1.10
CZ300-2	82VDC	0.80
CZ300-3	82VDC	1.10
CZ300-4	82VDC	1.10
CZ300-5	82VDC	0.80
CZ300-6	82VDC	1.10
CZ300-7	82VDC	0.80
CZ300-L	82VDC	0.80
CZ300-1L	82VDC	1.10
CZ300-2L	82VDC	0.80
CZ300-3L	82VDC	1.10
CZ300-4L	82VDC	1.10
CZ300-5L	82VDC	0.80
CZ300-6L	82VDC	1.10
CZ300-7L	82VDC	0.80
CZ300-S	82VDC	0.80
CZ300-1S	82VDC	1.10

ADDITIONAL SAFETY PRECAUTIONS

Precautions must always be taken when operating electronic equipment. Exposed wires, damaged equipment, or improper operation can lead to a dangerous situation.

Please take a few minutes and read this entire manual prior to operating your equipment. Follow all safety procedures and thoroughly inspect equipment prior to use each day. This will help you obtain the full value of the equipment and will reduce the risk of injury, property, and/or equipment damage.

- **Read the entire manual before attempting to connect or operate any equipment.**
- **Connect and disconnect cables only when the electric power is turned OFF.**
- **Never remove protection covers from the equipment or power generator. Internal repairs should only be done by an authorized CUES technician.**
- **Always start-up and operate a generator in an open area.**
- **Upon receipt of the equipment, check for visible damage. If there is any evidence of rough handling, if damage is found, or if any equipment is missing, please contact the CUES Customer Service at 1-800-327-7791.**

PERSONAL SAFETY EQUIPMENT

CUES stresses the use of appropriate safety equipment during system operations. Recommended minimum safety equipment includes, but is not limited to, the following:

Safety Goggles
Work Gloves
Steel Toe Boots
Hard Hats
Flashlights
Safety Lines
Gas Detectors
Respirator
First Aid Kit
Ventilating Fans

CUES ® makes no warranty for the use of its products and assumes no responsibility for any errors or omissions in this document or for incidental or consequential damages resulting from misuse of the products.

1 INTRODUCTION

This manual includes setup, operation, trouble-shooting, and maintenance instructions for the CUES Optical Zoom II Camera (OZII). The OZII incorporates the latest video technology to provide up-close imaging of pipe walls and surfaces during sewer line inspections.

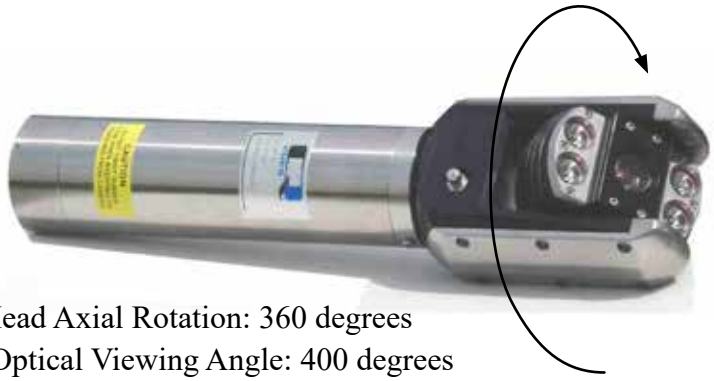
Due to the various functions of the camera, step-by-step operating instructions have been included in this manual. Please read all operating instructions in this manual prior to operating any equipment. For additional support, contact CUES Technical Support at 1-800-327-7791.

The OZII Camera is a unique pan, tilt, and zoom inspection camera designed to pan 285 degrees and rotate 360 degrees with 10x optical and 4x digital zoom ranges to provide total up/down and side to side views during pipeline inspections.

Manual focus is provided, as well as manual iris and automatic focus, to assure the highest picture quality in unusual or special conditions.

The OZII camera is designed to run on any CUES television inspection system. The instructions provided in this manual are for multi and single conductor systems. Multiconductor cable is approximately ½" in diameter and contains 8 to 12 conductors, depending on the age of the system. If you have any questions or are uncertain about your specific system, please contact the CUES Customer Service Department at 1-800-327-7791.

For OZII Camera features and benefits, please refer to the next page.



Camera Head Axial Rotation: 360 degrees
Rotation Optical Viewing Angle: 400 degrees

Lateral Pan: 285 degrees
Pan Viewing Angle Range: 331 degrees

OZII Features & Benefits:

Features:	*Benefits:*
♦ 10X optical zoom and 4X digital zoom; total 40:1 zoom capability	® Enhances image details from faraway distances for inspection and assessment
♦ NTSC at 470 H lines of resolution	® Higher image resolution means sharper pictures with maximum detail
♦ 3 lux sensitivity at f/ 1.4, 1/ 4 to 1/ 10,000 second shutter speed, 20 steps	® Increased sensitivity provides brighter pictures with reduced lighting requirements
♦ 360 x 285 degree pan and rotate viewing capability	® Detailed lateral inspection up to 250 feet without having to traverse the lateral
♦ Four field replaceable lights (50 watts total – 250 hour lamp life)	® Internal lights are directional with the moving camera head for optimum illumination in various pipeline conditions
♦ Back light compensation	® No spotlight reflection blooming in image
♦ Auto-tracking white balance	® Perfect color under all conditions
♦ Auto-focus	® Quickly focus on an area of interest
♦ Manual override of focus, iris, and shutter	® Flexible for unusual or special conditions
♦ Pan, rotate, zoom, and focus homing	® Quick and easy to reorient to the current location
♦ Waterproof to 50 psi	® Camera can be submerged in water over 100 feet deep without compromising integrity
♦ 400 degree rotation optical viewing angle; 331 degree pan viewing angle range	® View minute defects and voids around the entire diameter of the pipe wall
♦ Compatible with up to 4000' multi-conductor cable and up to 2000' single-conductor cable	® Camera is compatible with existing CUES TV inspection systems with minimal modification
♦ Compatible with existing CUES PCU's	® Camera can be used without the need for modification if utilizing one of the following PCU's: Multi-conductor versions: 1208 Mainline and Inspector General; Single-conductor versions: S/ C 2000 CCU
♦ Overall length of 17.7", a head length of 6.6", and a camera barrel of 3"	® Can be used in pipelines as small as 5".
♦ Optical-grade sapphire camera window	® Helps prevent image distortion
♦ Includes an internal diagnostic system	® Continually monitors camera functions, including run time, serial number identification, camera head temperature, humidity, light supply voltage, and camera input voltage.

2 EQUIPMENT OVERVIEW

The OZII Camera consists of the following (reference the pictures below):

A Camera Housing - The camera mechanics and electronics are housed in a high strength, damage resistant, aluminum housing with stainless steel tube.

B Mounting Fork - The mounting fork is the forward-most portion of the camera and includes the mounting fork, camera head, and lighting. The mounting fork rotates 360 degrees with an optical viewing angle of 400 degrees and allows the camera head to pan mechanically 285 degrees with a pan viewing angle of 331 degrees.

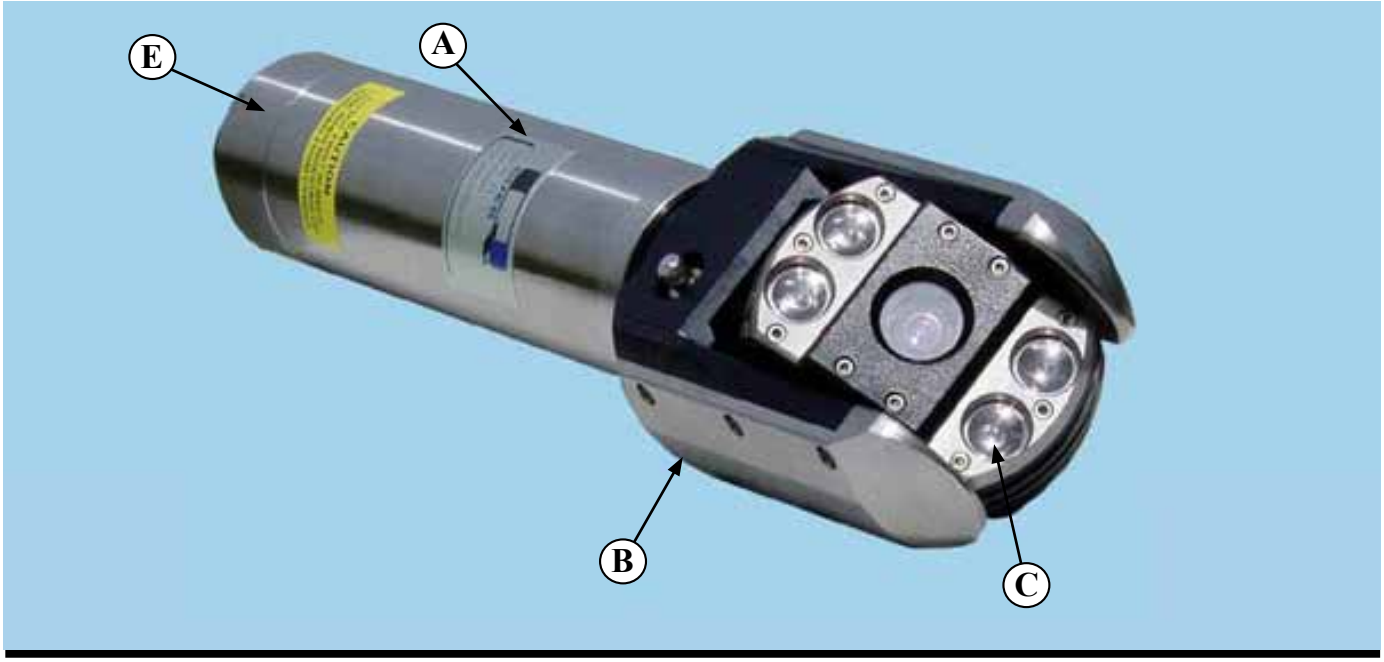
C Camera Lighting - The lighting is integrated into the camera and includes four (4) 12.5 watt xenon lamps, for a total of 50 watts.

D Stand-alone Camera Controller - The controller provides remote control of the camera assembly and includes a joystick to move the camera head in four directions: up/down/left/and right. ***For information regarding the desk-mounted camera controller, refer to Chapter 4.***

OPTIONAL EQUIPMENT

E Sonde - A sonde, built into the camera housing, is available on OZII* cameras. A sonde helps accurately locate the camera in metallic and non-metallic pipes. The sonde can operate with any constant tone 512 Hz locator/receiver and can be turned ON/OFF remotely by activating/deactivating the internal lights.

*The sonde is not available with OZII cameras that include inclinometer capabilities.



3 SETUP & INSTALLATION

Prior to connecting the system, ensure that all of the equipment is turned to the OFF (O) position and read the entire manual before attempting to connect or operate the OZII™.

PROCEDURE: Connecting the System

1. Connect or disconnect cables only when the power switch for the PCU is in the OFF (0) position.

2. With the equipment OFF, start up the generator. Run the generator for five minutes before turning on any equipment to protect the electronics from power surges and failures (refer to your generator manual for more information).

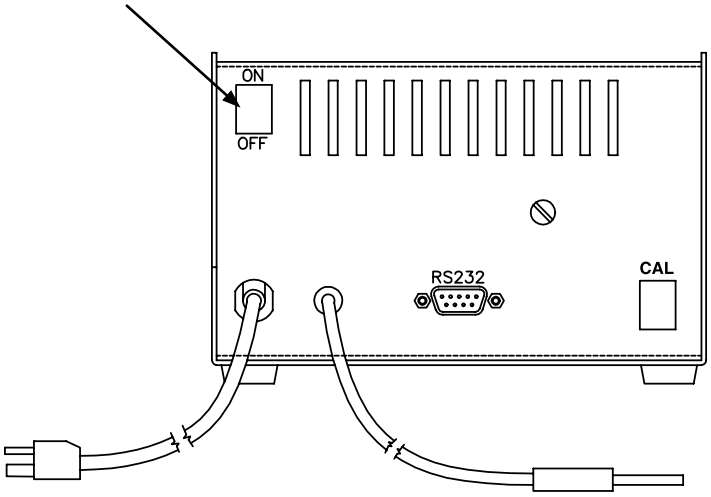
3. While waiting for the generator to warm up, ensure that the cable for the 110-volt power is secured at the back of the OZII™ Controller and the power source. The OZII™ Controller cable should be connected to the Power Control Unit.

PROCEDURE: Powering Up

1. Turn ON the PCU power.

2. Turn ON the OZII Controller power (located at the rear of the controller as shown below).

3. Await illumination of the controller’s LED while the diagnostic self-test is performed approximately 15 seconds).



PROCEDURE: Viewing Camera Diagnostics

The camera is equipped with an internal diagnostics system to continually monitor the camera functions.

The following diagnostics will be displayed in cyclical order:

- Serial Identification Number
- Operating Hour Meter
- Camera Type (OZII / P&T)
- Lights Limit (HIGH / LOW)
- Autoexposure (ON / OFF)
- Relative Humidity (see below)
- Temperature
- Light Voltage
- Camera Voltage

1 To view the diagnostics at any time, press the ***Diagnostic*** or ***Calibration*** button. Continue to press the ***Diagnostic*** button to scroll through all of the options.

2 To adjust the light supply voltage, turn the lights ON and the light voltage will be displayed for 10 seconds for adjustment purposes.

IMPORTANT! The OZII includes a humidity sensor designed to indicate if the camera is leaking or has significant water intrusion. Always ensure that the relative humidity display is below 80%. If at any time the humidity display goes over 80% during use, contact CUES Customer Service at 1-800-327-7791.

NOTE: Camera functions are inoperable while viewing the diagnostics.

4 FUNCTIONAL CHECKOUT

It is important to perform this checkout prior to placing the OZII in the pipe. This checkout is designed to uncover possible functional problems while the camera is still on the surface.

Before performing the functional checkout, ensure that all of the equipment is connected as described in the Set-Up and Installation chapter.

PROCEDURE: Functional Checkout, OZII Camera Controller

The functions of the OZII camera are controlled with the stand-alone controller or the optional desk-mounted, multi-camera controller.

For exisiting CUES customers with an OZI camera, one of the forementioned controllers is required to operate the OZII camera.

The desk-mounted controller is designed to operate the Night Owl, Pan and Rotate, and OZ cameras and will be added at a later date.

The stand-alone OZII controller is equipped with the following functions and controls:

A Shutter Push Button
B Iris Push Button
C Focus Push Button
D Shutter Indication LED
E Joystick
F Automatic Focus/Lamps Push Button
G Zoom Push Button
H Tilt Home/Pan & Tilt Home Push Button

NOTE:
If the functions of the controller are not operating properly, refer to the Troubleshooting section in this manual or contact the CUES Customer Service Department at 1-800-327-7791.

CONTROLLER OPERATIONAL DETAILS

CAMERA CONTROLLER - The controller includes the following toggle switches: ZOOM, SHUTTER, IRIS, LAMPS, AUTO FOCUS, FOCUS, and HOME for control of magnification, shutter speed, iris f-stop, lamps, auto focus, manual focus, and homing of the field of view.

JOYSTICK OPERATIONS - The joystick is used to control the movement of the camera head.

Most OZ-II cameras are at their "home" position when the fork supporting the camera head is vertical and the camera head itself is free to move from home within the fork both to the left and to the right. This is the "standard" camera orientation. OZ-II cameras can also be ordered with a different "home" position - the fork supporting the camera head is horizontal and the camera head itself is free to move from home within the fork both upwards and downwards. This is done by rotating the camera barrel 90-degrees so the fork supporting the camera head is horizontal and rotating the camera module within the camera head by 90-degrees so that the picture is upright at this "home" position. Whereas, in the "standard" camera orientation, left or right movement of the joystick causes the camera head to move left or right within the supporting fork and up or down movement of the joystick causes the fork to rotate, the opposite is desired for this 90-degree-rotated orientation.

The following procedure allows selection of the desired joystick orientation as being "standard," "right," or "left." Either "right" or "left" joystick orientation may be preferred by the operator.

The "right" orientation causes the joystick-camera relationship to function similar to an aircraft flight stick:

- Forward movement of the joystick causes the camera head to pitch down like the nose of an aircraft.
- Rearward movement of the joystick causes the camera head to pitch up like the nose of an aircraft.
- Left and right movement of the joystick causes the supporting fork to roll in that direction like an aircraft.

The "left" orientation causes the joystick-camera relationship to function opposite to an aircraft flight stick:

- Forward (upward) movement of the joystick causes the camera head move upwards.
- Rearward (downward) movement of the joystick causes the camera move downwards.
- Left and right movement of the joystick causes the supporting fork to rotate in either direction.

Procedure: Selecting the Joystick for Use with a Standard or 90-degree Rotated Camera Module (IMPORTANT: The default is already set at the factory as 'standard'.)

1 Turn off the PCU/CCU. Note: If controller is equipped with an on/off switch, turn the controller off.
2 While depressing the home button, hold the joystick left or right and power up the PCU/CCU.
3 Turn on the controller (if applicable).
4 Once the LED illuminates on the controller, release control buttons.
5 Verify the operation.

continued....

CONTROLLER OPERATIONAL DETAILS

A camera which is in the "standard" orientation, described on the previous page, is provided with two options for joystick control of the supporting fork's rotation. These two options are termed "rotational" control and "directional" control:

• "Rotational" control is the historic norm, wherein upward movement of the joystick causes the supporting fork to rotate one way and downward movement of the joystick causes it to rotate the other way.

• "Directional" control is intended as more intuitive. When the camera head has been panned to the "home" position, control is identical to the "rotational" control described above. However, if the camera head has been panned out of the "home" position, upward movement of the joystick causes the fork to rotate in such a direction that the field of view moves upwards in the pipe and downward movement of the joystick causes the fork to rotate in such a direction that the field of view moves downwards in the pipe.

Procedure: Selecting the Joystick Tilt Sense as Rotational or Directional ***(IMPORTANT: The default is already set at the factory as 'rotational'.)***

1 Turn off the PCU/CCU. Note: If controller is equipped with an on/off switch, turn the controller off.
2 While depressing the home button, hold the joystick up or down and power up the PCU/CCU.
3 Turn on the controller (if applicable).
4 Once the LED illuminates on the controller, release control buttons.
5 Verify the operation.

For 'rotational' joystick operations:
1 Move the joystick left/right to move the panning head left/right.
2 Move the joystick up to rotate the camera clockwise.
3 Move the joystick down to rotate the camera counter-clockwise.

For 'directional' joystick operations (note: the directional tilt sense is only available if the joystick orientation is set for a standard camera module as explained in the previous procedure):

When the camera is left or right of 'home':
1 Move the joystick upwards to view upwards in the pipe.
2 Move the joystick downwards to view downwards in the pipe.

FOCUS PUSH-BUTTON - Toggle the button to focus NEAR and FAR.

ZOOM PUSH-BUTTON - Toggle the zoom push button at any time during the inspection to zoom the OZII™ camera IN and OUT.

IRIS PUSH-BUTTON - Toggle the iris push-button to OPEN or CLOSE the camera iris.

AUTOEXPOSURE -
Procedure: Enabling/Disabling the Autoexpo-sure ***(IMPORTANT: The default is already set at the factory as 'enabled'.)***
1 Turn off the PCU/CCU. Note: If controller is equipped with an on/off switch, turn the controller off.
2 While holding down the iris CLOSE or OPEN and the home button, power up the PCU/CCU.
3 Turn on the controller (if applicable).
4 Once the LED illuminates, release control buttons.
5 Verify the operation.

AUTOMATIC FOCUS/LAMPS PUSH-BUTTON -

Usually the operator will find that the automatic initiation of autofocus when the camera head is panning will be helpful; however, under certain circumstances this automatic feature may be found to be a hindrance. By example, the operator may spend some considerable time attempting to focus on something beyond a cloud of mist or fog and then pan the camera head slightly in an attempt to better center the viewed image. If autofocus were enabled, the camera may well refocus on the cloud itself, necessitating that the operator repeat the lengthy focusing chore. The procedure below details the method for disabling autofocus.

Procedure: Enabling/Disabling the Autofocus ***(IMPORTANT: The default is already set at the factory as 'enabled'.)***

1 Turn off the PCU/CCU. Note: If controller is equipped with an on/off switch, turn the controller off.
2 While holding down the FOCUS NEAR or FOCUS FAR button and the home button, power up the PCU/CCU.
3 Turn on the controller (if applicable).
4 Once the LED illuminates, release control buttons.
5 Verify the operation.

If the autofocus is enabled:

* Toggle the automatic focus/lamps push-button to "AutoFocus". The camera will autofocus on the current scene.

The camera electronics are well designed thermally to prevent heat buildup and, in the unlikely event of overheating, a protection circuit will reduce or turn off the lights, the greatest source of that heat. Most cameras will never experience such an overheating event; however, under certain circumstances it can occur. By example, if the camera were operated continually for an extended period of several hours with the lights at full brightness in small diameter pipe with minimal airflow and elevated ambient temperature, this could occur. For this reason, a selectable light voltage limit of "high" or "low" is provided. Importantly, in such circumstances of small diameter pipe, less lighting is necessary to illuminate the scene, so no degradation of the video would be anticipated.

Procedure: Selecting the Light Voltage Limit as HIGH or LOW ***(IMPORTANT: The default is already set at the factory as 'HIGH'.)***

1 Turn off the PCU/CCU. Note: If controller is equipped with an on/off switch, turn the controller off.
2 While depressing the home button, hold down the lamps button.
3 Turn on the controller (if applicable).
4 Once the LED illuminates, release control buttons.
5 Display the diagnostics screen to verify proper light voltage limit settings.
6 To turn the camera lights ON or OFF, toggle the automatic focus/lamps pushbutton to LAMPS.

When the switch is in the "Lamps" position, the internal lamps will toggle on and off. If inadequate voltage is detected, the lamps will not illuminate and the following message will be displayed on the monitor: 'Power Too Low'. Note that the lights can be adjusted while this message is being displayed.

CONTROLLER OPERATIONAL DETAILS

OLD AND NEW OZII CAMERAS -

At Cues, we are constantly improving our products and adding new features. At the same time we strive for backwards compatibility in support of our many longtime customers. Recent enhancements to the OZ-II controller necessitate that the controller know whether the attached OZ-II camera is old or new.

Procedure: Selecting Controller Operation with an Old or New OZ-II Camera:

To toggle between old and new cameras:

1 Turn off the PCU/CCU. Note: If controller is equipped with an on/off switch, turn the controller off.
2 While holding down the ZOOM IN or ZOOM OUT button and the home button, power up the PCU/CCU.
3 Turn on the controller (if applicable).
4 Once the LED illuminates, release control buttons.
5 Observe the current selection on the copyright screen. If the last character is a period, the camera is old; an exclamation point designates a new camera.
6 Verify the operation.

SHUTTER PUSH-BUTTON -

The shutter push-button is a two-position rocker switch labeled "Fast" and "Slow". The shutter function controls the electronic shutter and frame store integration to enable visibility in low-light conditions.

The shutter indication LED will illuminate during frame store integration. The LED flashes once for $^1/_{30}{}^{th}$ second integration ($^1/_{25}{}^{th}$ second for PAL) , twice for $^1/_{16}{}^{th}$ second integration, three times for $^1/_{8}{}^{th}$ second integration, and four times for $^1/_{4}{}^{th}$ second integration. After the LED flashes the appropriate number of times, it will turn off for a short period and then repeat this process.

TILT HOME/PAN & TILT HOME PUSH-BUTTON

The tilt home/pan & tilt home push-button is a two-position rocker switch labeled "Tilt Home" and "Pan & Tilt Home."

- To move the camera to the home position in the tilt axis, toggle the switch to the "Tilt Home" position.
- To move the camera to the home position in both the pan and tilt axes, toggle the switch to the "Pan & Tilt Home" position. The camera will also zoom out and set the shutter speed to $^1/_{60}{}^{th}$ of a second.

DESK-MOUNTED CAMERA CONTROLLER

The desk-mounted controller is designed to operate Night Owl, Pan and Rotate, and OZ cameras. The instructions included in this section pertain to the OZII desk-mounted controller functions.

For information regarding the Night Owl and Pan and Rotate controller functions, please refer to the applicable manual for operating instructions.

MAINTENANCE TERMINAL OPERATION

A dumb terminal may be interfaced to the OZ™ camera controller via a DB9 connector on the back panel for RS-232 communication. The terminal or terminal emulator should be configured to operate at 9600 bps, 8 data bits, 1 stop bit, no parity, and no terminal echo. Emulation of a VT100 or VT220 is ideal.

While the front panel of the OZ™ camera controller provides all controls necessary for day-to-day operation, the maintenance terminal is useful for specialty tasks, system setup, and maintenance diagnostics.

Logging on, gaining access, and logging off.

Once the maintenance terminal is connected to the OZ™, the user may log on at the terminal keyboard at any time. The user may log on with any user name by inputting: "logon=" followed by the desired user name and a carriage return, <cr>. Alternatively, the user need not log on.

If not logged on, the user's access level will be zero, which the user may observe by inputting, "ACCESS<cr>," to which the system will respond, "ACCESS=0." With an access level of zero, the user may still interact with the system by reading system data. A minimum of access level one is required to write data to the system. Level 0 commands include all the commands, but are read only.

If logged on, the user's access level will be one, which the user may observe by inputting, "ACCESS<cr>," to which the system will respond. "ACCESS=1." With an access level of one, the user may not only read data from the system but also write data to the system through several of the commands, which are not password-protected.

Password-protected write commands may be accessed by inputting the correct password for the level of access desired using the command, "ACCESS=," followed by the correct password and a <cr>. For security reasons, the password as entered is not echoed to the terminal screen, rather asterisks overlay the typed characters. Three password-protected access levels provide increasing access to write commands. These access levels are numbered 2, 3, and 4.

The access level 2 password is normally known at the supervisor level and provides the capability of saving new default setup parameters to nonvolatile storage.

The access level 3 password is known only to CUES personnel and provides capabilities intended for factory use and troubleshooting.

When the user is finished with a session at the maintenance terminal, it is very important to log off the system. This applies whether the user is logged on or not. Input the command QUIT and the system will return to normal operation. Alternatively, the system will reset to normal operation by cycling power.

MAINTENANCE TERMINAL OPERATION

Downloading a parameter setup file.

A parameter setup file contains ASCII text in the form of a list of write commands just as they would be input from the maintenance terminal keyboard and can be downloaded to the system. Certain commands can be used to cause the system to output its parameter setup for capturing in a file. That file could then be used to setup another system identically to the first.

Level 3 access is required to perform the download. After logging on and gaining level 3 access, the user must type LOGON=DOWNLOAD. The system will indicate that after the download, the user should type QUIT in order to exit the download function (alternatively, the QUIT command can be embedded at the end of the download file). After the system prompts that it is waiting for the download, the user sends the file (same baud rate, etc.).

A simple text editor can be used to create the parameter setup file. Alternatively, the user can issue the SHOWSET, DEFAULTS, or RESET command to the system and then capture the output. SHOWSET would list the currently active parameters, DEFAULTS would list the nonvolatile default parameters, and RESET would list the factory default parameters. Done in this fashion, the file may require slight modification if extraneous characters are captured by whatever terminal emulator application was used. Also, the user may desire to change the values from those which were read from the system or, as stated earlier, to add the QUIT command to the end of the file.

Inputting commands.

Within this text the commands are shown in their entirety; however, the user need enter only enough letters to differentiate the command desired from all other commands. For the IRIS command, IR would be sufficient, but PAG would be required for the PAGE command since PASSWORD also begins with PA. For the LOG command, the entire command must be entered since the LOGON command also begins with LOG. This applies for both read and write commands.

Read commands are differentiated from write commands by the appending of the equals sign to the command name or command root. Most read and write commands with the same command root are closely if not identically associated. Not all command roots have both read and write commands associated with them. Command parser error text attempts to assist the user in the inputting of valid commands. It detects misspellings and suggests correction; it detects extraneous characters appended to the command root and suggests shortening the input; it detects ambiguities and suggests spelling out more of the command name.

LIST OF COMMANDS - The following list contains definitions, syntax, limits, and examples for the commands available.

ACCESS

Read access level/enter password.

ACCESS [=<password>]

Valid password: ACCESS=CUES2003

ACCESS is a read command of the user's current access level. The system responds with the user's current access level, either 0, 1, 2, or 3. (0=No Access;1=Read Access;2=Write Access;3=Global Access)

ACCESS= is a write command for gaining access to system commands. The user must follow the equal sign with a valid system password. If the password input matches a stored password for a higher access level, the system will grant that higher access level to the user, and display the system prompt. If the password input does not match a stored password, the system will respond with an error message. There is no limit on the number of tries that the user can attempt to input a correct password. For security reasons, the characters of the password as typed are not echoed to the terminal, rather they are overlaid with asterisks.

APERTURE

Description: Read/write aperture gain.

Format: APERTURE[= (<gain>/+/-)]

Limits: -1 < gain < 16

Example: APERTURE=6

Aperture adjusts the enhancement of the edges of objects in the picture.

AUTOFOCUS

Description: Read/set autofocus on/off/one-push/infinite and sensitivity.

Format: AUTOFOCUS[=<autofocus>[,<mode>[,<sensitivity>]]]

Limits: autofocus(ON/OFF)
mode(OnePush/Infinite)
sensitivity(High/Low)

Example: AUTOFOCUS=On,OnePush,High

AutoFocus automatically adjusts the focus position to maximize the high frequency content of the picture in a center measurement area, taking into consideration the high luminance and strong contrast components

BACK LIGHT

Description: Read/enable/disable backlight compensation.

Format: BACKLIGHT[=<enable>]

Limits: enable(ON/OFF)

Example: BACKLIGHT=On

Back light compensation will make the subject appear clearer when the background of the subject is too bright.

BLUEGAIN

Description: Read/set blue again.

Format: BLUEGAIN [= (<magnitude>/+/-)]

Limits: -1 < magnitude < 256

Example: BLUEGAIN=100

Blue gain is the level of amplification of the video's blue signal components.

BRIGHTNESS

Description: Read/set brightness.
Format: BRIGHTNESS [= (<magnitude>/+/-)]
Limits: -1 < magnitude < 24
Example: BRIGHTNESS=12

Brightness sets the black level of the video image.

CAMERA (for factory use only)

Description: Enable/disable camera module, set ID, hours, and camera type.
Format: CAMERA[=<enable>[,<ID>[,<hours>[,<zoom enable>]]]]
Limits: enable(On/Standby)
0 < id < 100
-1 < hours < 32768
zoom enable(On/Off)
Example: CAMERA=On,99,32000,On

CLOCK

Description: Read/reset operating clock.
Format: CLOCK[=RESET]
Limits: RESET
Example: CLOCK=RESET

CLOCK is a read command of the system's operating clock. The system responds with the clock's value in hours and minutes. This clock keeps a running total of the hours and minutes of system operation and is used as the time stamp for diagnostic log entries.

COMPENSATION

Description: Read/enable/disable/set exposure compensation.
Format: COMPENSATION [= (<enable> [, (<dB of gain>/+/-)]]
Limits: enable(On/Off)
dB of gain (-10.5/-9/-7.5/-6/-4.5/-3/-1.5/0/1.5/3/4.5/6/7.5/9/10.5
Example: COMPENSATION=On, 4.5

Exposure compensation offsets the internal reference brightness level used in the autoexposure mode by steps of 1.5 dB.

DATETIME

Description: Read/write/enable/disable date and time (24 hour clock).
Format: DATETIME[= <date>, <time>, [, <year>/<month>/<day> - <hour>:<minute>]]
Limits: date(On/Off)
time(On/Off)
year(On/Off)
month(On/Off)
day(On/Off)
hour(On/Off)
minute(On/Off)
Example: DATETIME=On,On,03/11/03-14:03

DEFAULTS

Description: Read defaults/get defaults as active/put active as defaults.
Format: DEFAULTS[=<action>]
Limits: action(GET/PUT)
Example: DEFAULTS=GET

DEFAULTS is a read command of system default parameters. The system responds by displaying system setup default values from nonvolatile storage.

DISPLAY

Description: Enable/disable display.
Format: DISPLAY[=<enable>]
Limits: enable(On/Off)
Example: DISPLAY=On

DUTYCYCLE

Description: Sets pan and tilt motors' lower limit on duty cycle.
Format: DUTYCYCLE[=<pan limit>[,<tilt limit>]]
Limits: limits(100/87.5/75/62.5/50/37.5/25/12.5)
Example: DUTYCYCLE=25,37.5

Duty cycle in a pulse-width modulated control of a motor is the percent of the time that the motor is being driven.

DZOOM

Description: Enable/disable digital zoom.
Format: DZOOM[=<enable>]
Limits: enable (On/Off)
Example: DZOOM=Off

Digital zoom enlarges the the subject by expanding each image in both the vertical and horizontal directions. The effective picture elements in each direction may be reduced by as much as ¼ and the overall resolution deteriorates.

EXPOSURE

Description: Read/set exposure mode.
Format: EXPOSURE[=<mode>]
Limits: mode(AutoExposure/ManualExposure/Bright/IrisPriority/ShutterPriority
Example: EXPOSURE=IrisPriority

Manual exposure mode allows manual adjustment of shutter (22 steps), iris (18 steps), and gain (16 steps).
Autoexposure mode automatically adjusts iris and gain with a fixed shutter speed of 1/60th second for NTSC and 1/50th second for PAL.
Bright exposure mode adjusts both the gain and iris using an internal algorithm according to a brightness level set by the user. Exposure is controlled by gain when dark and by iris when bright. Only when the exposure mode is set to autoexposure mode or shutter priority exposure mode can the user switch to bright exposure mode.
Shutter priority exposure mode allows the user to set the shutter speed manually. If a shutter speed greater than 1/60th second is set, the iris and gain are set automatically according to the brightness of the subject.
Iris priority exposure mode allows the user to set the iris manually and the gain and shutter speed are set automatically according to the brightness of the subject.

FACTORY

Description: Read/write factory text.
Format: FACTORY[=<text>]
Limits: Maximum 29 printable characters
Example: FACTORY=CUES_110347-999,11/3/2001

FACTORY is a read command of factory-stored system information. It displays customer specific information, including model number, serial number, configuration number, etc.

FOCUS

Description: Read/write focus speed, position, and near limit.
Format: FOCUS [=<speed>/+/-) [,<position>/+/-) [,<limit>/+/-)]]]
Limits: -1 < speed < 8\n\t4095 < position < 49153\n\t4095 < limit < 49153
Example: FOCUS=4, 32888, 49152

Focus position and speed may be set by the user.

FREEZE

Description: Read/enable freeze mode.
Format: FREEZE [=<enable>]
Limits: enable(On/Off)
Example: FREEZE=On

Freeze mode is a picture effect which captures an image in the field memory of the camera so that it can be output continuously.

GAIN

Description: Read/set gain.
Format: GAIN [=<dB of gain>/+/-)]
Limits: dB of gain (-3/0/2/4/6/8/10/12/14/16/18/20/22/24/26/28)
Example: GAIN=8

Gain is the level of amplification of the signal.

HELP

Description: Read helpful info, list of commands, or info on a command.
Format: HELP[CMD/<command>]
Limits: Read_only
Example: HELP DEFAULTS

HELP is a read command of generally helpful information. The system responds with a page or two of text explaining the use of on-line HELP, its notation, and provides phone numbers and addresses for technical assistance. HELP CMD is a read command of the list of commands available to the user. A brief description of each command is also provided.

HELP <command> are read commands and may be used for any command available in the system (e.g., HELP FOCUS provides help specific to the FOCUS command.). The system responds with three lines of text. The first line is a description of the command's use, the second line provides the command syntax indicating optional fields, the third line provides an example of the command's usage.

IRIS

Description: Read/set iris.
Format: IRIS [= (<f-stop>/+/-)]
Limits: f-stop (Closed/28/22/19/16/14/11/9.6/8/6.8 /5.6/4.8/4/3.4/2.8/2.4/2/1.8)
Example: IRIS=1.8

Iris is the adjustable lens opening that regulates the amount of light entering the camera.

LOG

Description: Read maintenance log.
Format: LOG
Limits: read_only
Example: LOG

LOG is a read command of the system event log. It displays all of the events currently listed in the nonvolatile system event log. The event log table indicates the event number, the time of occurrence, and a description of the event.

LOGON

Description: Begin maintenance session.
Format: LOGON=<username>
Limits: Maximum 19 printable characters
Example: LOGON=Sandy

LOGON is a read command of the user's name currently logged on to the system. The system responds with the user's name or an error message if no user is currently logged on.

LOGON= is a write command used for logging onto the system. The LOGON= should be followed by the user's name (any keyboard characters are accepted). The system responds with a greeting. Internally, the user's access level is increased from zero to one providing the user access to several write commands.

MIRROR

Description: Read/enable left/right mirror.
Format: MIRROR [=<enable>]
Limits: enable (On/Off)
Example: MIRROR=On

Mirror mode is a picture effect which allows the viewed image to be reversed left and right.

MONITOR

Description: Enable/disable command monitoring.
Format: MONITOR [=<enable>]
Limits: enable (On/Off)
Example: MONITOR=On

Monitor mode disables normal camera operation and instead displays the raw serial commands which have been intercepted. This is for factory use only.

PAGE

Description: Read/write terminal page length.
Format: PAGE[=<value>/+/-)]
Limits: 5<value<256
Example: PAGE=40

PAGE is a read command of the terminal page length or screen height (setting the page length appropriate to the monitor in use allows the user to read lengthy text one screen at a time.). The system responds with the current page length.

PASSWORD

Description: Change to new password
Format: PASSWORD[=<password>]
Limits: Eight alphanumeric characters
Example: PASSWORD=CUES2000

PRESET

Description: Store/retrieve camera preset.
Format: PRESET [=<memory>,<action>]
Limits: -1 < memory> < 6
action(Reset/Store/Recall
Example: PRESET=3,Recall

Presets allow storage and recall of up to six sets of camera shooting conditions including zoom position, digital zoom on/off, focus auto/manual, focus position, exposure mode, shutter control parameters, brightness control, iris control parameters, gain control parameters, exposure compensation on/off, exposure level, backlight compensation on/off, slow shutter auto/manual, red gain, blue gain, and aperture.

PICTURE

Description: Read/set picture effects.
Format: PICTURE [=<mode>/+/-)]
Limits: mode(Off/Negative/BlackWhite)
Example: PICTURE=Negative

Picture effects include monochrome (i.e., black and white) and negative-positive reversal.

QUIT

Description: Lose changes and exit.
Format: QUIT
Limits: Control-only
Example: QUIT

QUIT is a control command for ending a session at the terminal. The system responds with a "Goodbye" message. Mostly transparent to the user, the system also returns to a more normal mode of operation and the user's access level is returned to zero.

REDGAIN

Description: Read/set red gain.
Format: REDGAIN [=<magnitude>/+/-)]
Limits: -1 < magnitude < 256
Example: REDGAIN=100

Red gain is the level of amplification of the video's red signal components.

RESET

Description: Read factory settings/write as defaults/write as active.
Format: RESET[=<parameter-group>]
Limits: parameter-group (DEFAULTS/ACTIVE ** Secret **)
Example: RESET=DEFAULTS

RESET is a read command of factory default parameters. The system responds by displaying factory default values from program storage.

SHOWSET

Description: Read active/default/factory system setup parameters.
Format: SHOWSET[=[<parameter-set>]]
Limits: parameter-set (RAM/EEPROM/ROM)
Example: SHOWSET=Ram

SHOWSET is a read command of active setup parameters. The system responds by displaying the active setup values that are being used in the current operation.

SHUTTER

Description: Read/set shutter speed and mode.
Format: SHUTTER [=<speed>/+/-) [,<mode>]]
Limits: speed (1, 1/2,1/4,1/8,1/15,1/30,1/60,1/90,1/100,1/125,1/180,1/250,1/350,1/500

1/725,1/1000,1/1500,1/2000,1/3000,1/4000,1/6000,1/10000)
mode (AutoSlow/ManualSlow)
Example: SHUTTER=1/60,AutoSlow

Shutter speed is the adjustable speed with which each frame image is captured. Auto slow shutter mode ensures that the slow shutter is engaged automatically when the brightness drops which may occur only when the exposure mode is automatic. Manual slow shutter mode is the default setting.

SPOTEXPOSURE

Description: Read/setspot exposure mode and location.
Format: SHOWEXP [=<enable> [, (<X-position>/+/- [, (<Y-position>/+/-)]]]
Limits: enable (On/Off) \n\t\
-1 < X-position < 16\n\t\
-1 < Y-position < 16
Example: SPOTEXP=ON,3,13

Spot exposure allows a particular spot within the image to be designated which will govern automatic exposure mode.

STATUS

Description: Read system status.
Format: STATUS
Limits: read_only
Example: STATUS

STATUS is a read command of system status. The system responds by displaying the current user access level, current magnification and location, firmware version, firmware checksum, operation clock, date, time, factory-stored device information, name of user currently logged on, serial mode in effect, and video characteristics.

TEST

Description: Read last test results/initiate built-in-test.
Format: TEST[=<function>]
Limits: function(ALL/INPUT/ROM/EEPROM/RAM/DATA/STACK/SCI/MICRO)
Example: TEST=ALL

TEST is a read command of built-in-test and self-test results. The system responds by listing the tests by name followed by the test status: PASSED, FAILED, or INCOMPLETE.

TEXT

Description: Read/write display text.
Format: TEXT[=<text>]
Limits: maximum of 20 characters of text
Example: TEXT=The quick brown fox.

Text can be displayed onscreen per the user's discretion (up to 20 characters).

TITLE

Description: Read/enable/write titles.
Format: TITLE [=<enable> [, (<vertical>/+/-) [, (<horizontal>/+/-) [, (<color>/+/-)
[, (<blink>]]]]]
Limits: enable (On/Off)
-1 < vertical < 11
-1 < horizontal < 24
color(White/Yellow/Violet/Red/Cyan/Green/Blue)
blink (On/Off)
Example: TITLE=On,2,13,Red,Off

Title text (see "text" above) can be displayed at a location and in a color of the user's choosing.

VERSION

Description: Read firmware version and checksum.
Format: version
Limits: read_only
Example: VERSION

VERSION is a read command of the firmware version and the program's hexadecimal checksum. The system responds by naming the parameters to be displayed followed by a display of their values.

WHITEBALANCE

Description: Read/set white balance.

Format: WHITEBALANCE[= (<setting>/+/-) [, <OnePushTrigger>]]

Limits: setting(AUTO/INDOOR/OUTDOOR/ONEPUSH/AUTOTRACKING/MANUAL)
ONEPUSHTRIGGER (TRIGGER)

Example: WHITEBALANCE=OnePush, Trigger

- Auto white balance computes the white balance value output using color information from the entire screen. It outputs the proper value using the color temperature radiating from a black subject based on a range of values from 3000 to 7500K. This is the default setting.

- Autotracking white balance ranges from 2000 to 10000K.

- Indoor white balance is 3200K base mode.

- Outdoor white balance is 5800K base mode.

- One-push white balance mode is a fixed white balance mode that may be automatically readjusted only at the request of the user by employing the trigger, assuming that a white subject, in correct lighting condition, and occupying more than ½ of the image is in the field of view of the camera.

- Manual white balance allows manual control of red and blue gain.

ZOOM

Description: Read/set zoom speed and position.

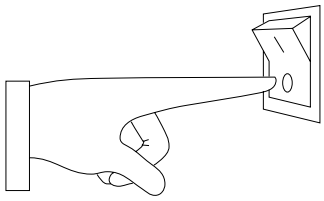
Format: ZOOM [=<spped>/+/-) [, (<position>/+/-)]]

Limits: -1 < speed < 8
\n\t\-1 < position < 28673 (with Digital Zoom On)
\n\t\-1 < position < 16385 (with Digital Zoom Off)

Example: ZOOM=5,3000

Zoom allows manual control of the 10x optical zoom lens.

After the inspection, retrieve all of the equipment and turn all of the components, including the camera controller, to the OFF (0) position BEFORE shutting down the generator. This will help protect the equipment when the generator is started up for the next use.



PROCEDURE: Maintaining the OZII Camera

GENERATOR -

The OZ™ Camera is a sensitive piece of electronic equipment. Power surges and abrupt shutdowns can cause it to fail. It is strongly suggested to keep the mobile generator properly adjusted. The generator should deliver a steady 110 to 120 volts. Should the Engineering Control Panel indicate that the generator is operating outside these guidelines, see the Generator Manual for the proper adjustments or contact authorized service personnel.

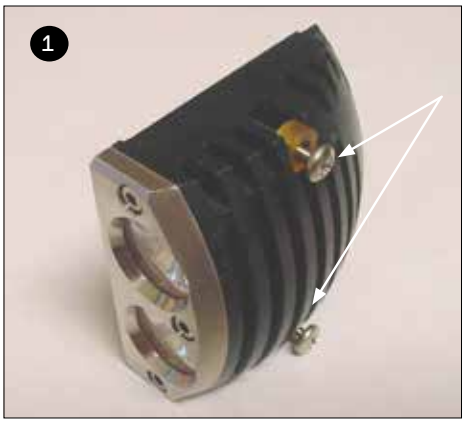
CLEANING -

To keep the OZ™ camera clean, use a damp cloth to wipe down the front panel. Any other maintenance MUST be performed by CUES. If there are any problems with the OZII™ camera, contact CUES Customer Service/Technical Support at 1-800-327-7791. Attempting to perform any other maintenance will void the warranty.

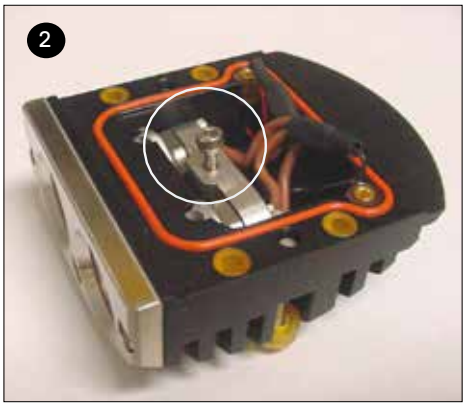
LIGHT BULB REPLACEMENT -

For light bulb replacement, determine whether you're utilizing the standard lighthead assembly with incandescent light bulbs or the LED lighthead assembly and then refer to the applicable procedure on the following pages

PROCEDURE: Replacing Standard (Incandescent) Light Bulbs on the CZ301 Lighthead Assembly

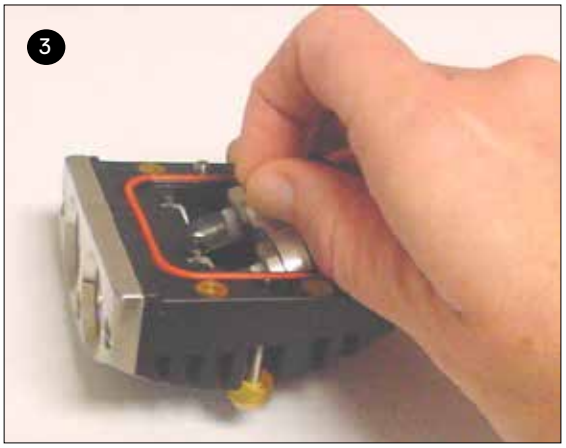


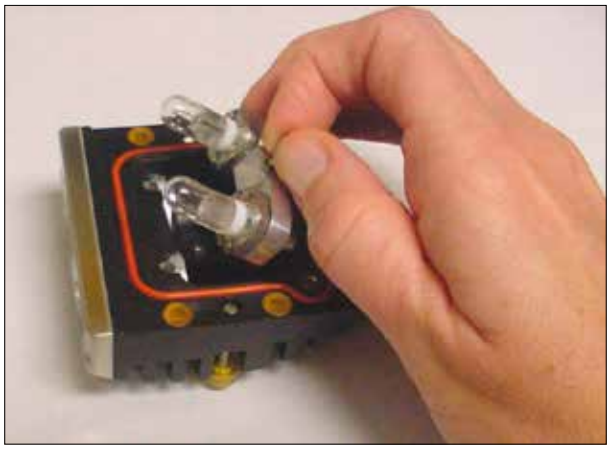
1 To remove the lighthead module assembly from the camera body, loosen the 2 captive screws.



2 On the inner-side of the lighthead module assembly, loosen the captive screw located in the middle of the lamp clamp.

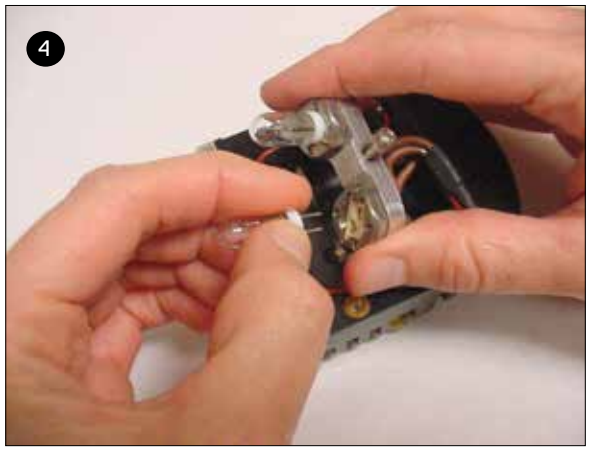
3 Grasp the captive screw head and carefully pull the light bulb/lamp clamp assembly out of the lighthead housing, ensuring not to twist or entangle the attached wires.





CAUTION! Lamp bulbs are pressurized. Always wear safety goggles and handle the bulbs with a cloth during removal and reinsertion. Refer to the Safety Instructions and Personal Safety Equipment in the preface of this manual for additional information.

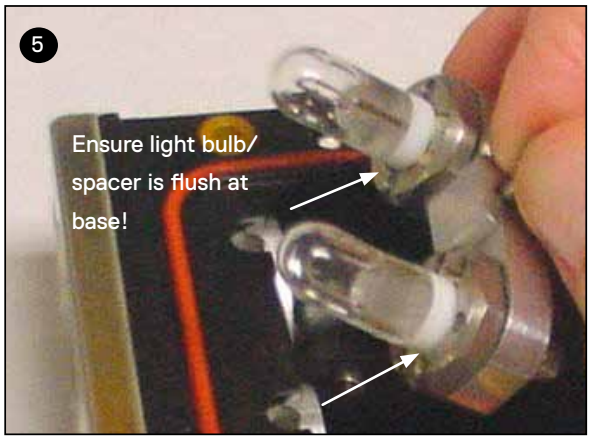
PROCEDURE: Replacing Standard (Incandescent) Light Bulbs on the CZ301 Lighthead Assembly



4 To remove the old light bulb, hold the lamp clamp and carefully pull the light bulb away from the 2-pin connector.

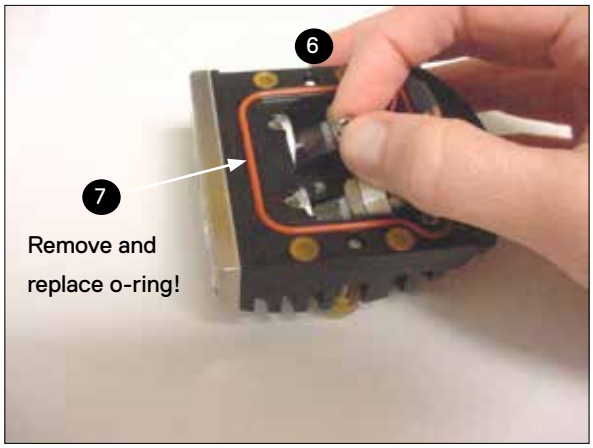
Replace the light bulb(s) with CUES P/N EC124. To install the light bulb, hold the lamp clamp and insert the bulb (and spacer) into the 2-pin connector.

It's suggested to use a cloth or gloves when handling new bulbs! If it's necessary to handle the bulbs with bare hands, wipe the bulbs clean with a cloth after installation to remove any residue.



5 Push the light bulb inward until the base of the spacer is flush with the lamp clamp.

DO NOT force the bulbs into the connector as damage to the bulb and/or connector will occur!



6 Grasp the captive screw on the lamp clamp and carefully re-insert the light bulb assembly into the housing. Fasten the captive screw.

7 Remove and replace the o-ring. Prior to inserting the new o-ring, clean the o-ring groove and ensure that the mating surface on the camera head is clean.

Ensure that the o-ring is in the proper position and then reinstall the lighthead module assembly to the camera body by fastening the captive screws (not shown).

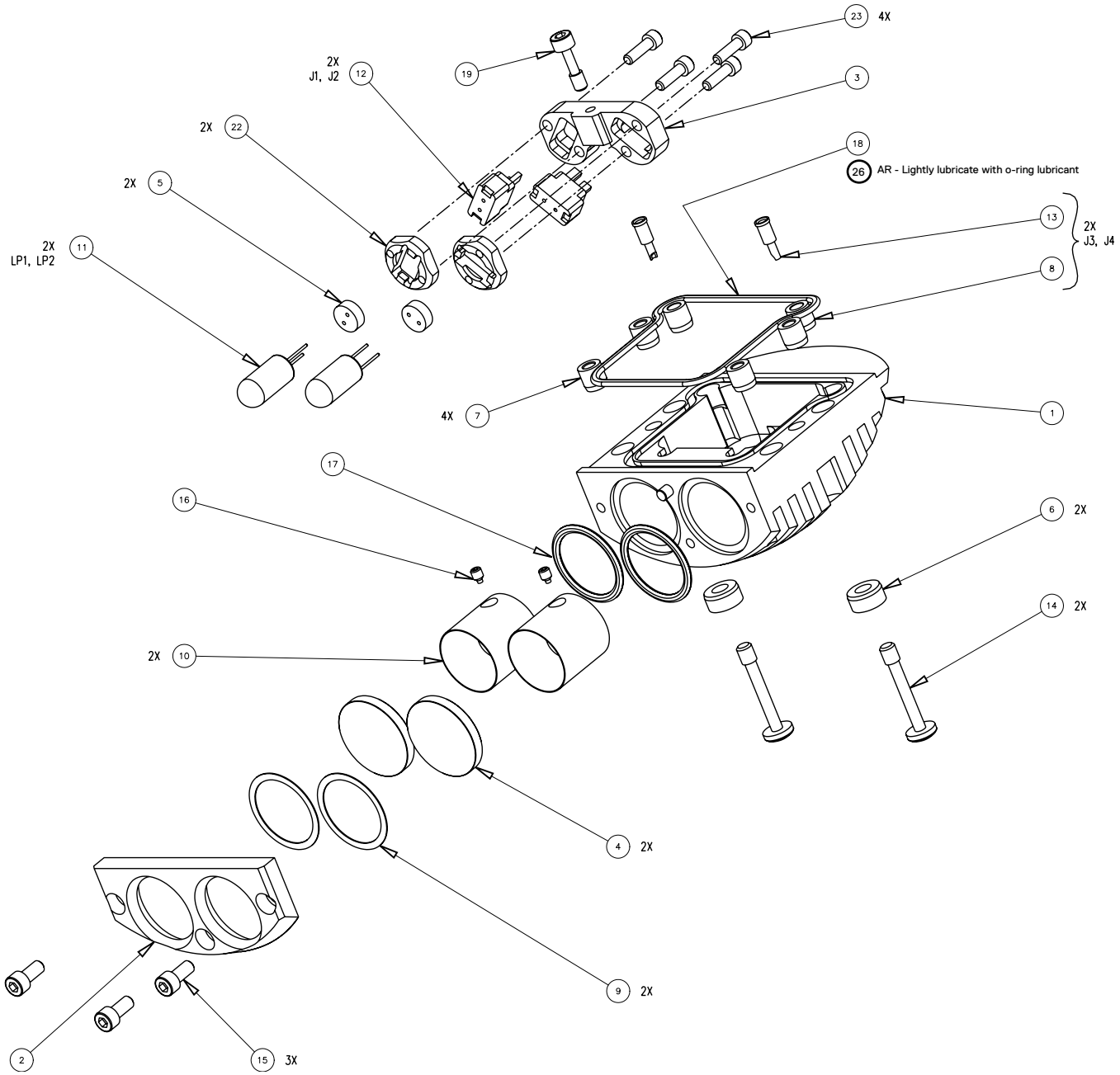
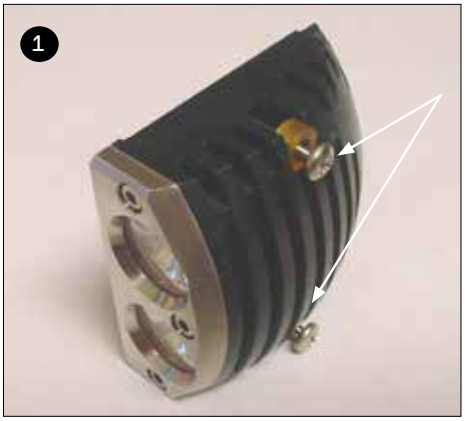


Figure 1: ***Lighthead Module Assembly, OZII, CZ301***

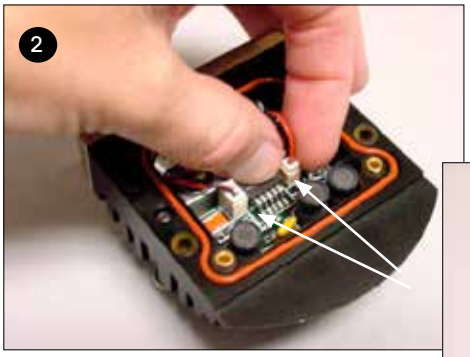
Lighthead Module Assembly, OZII, CZ301

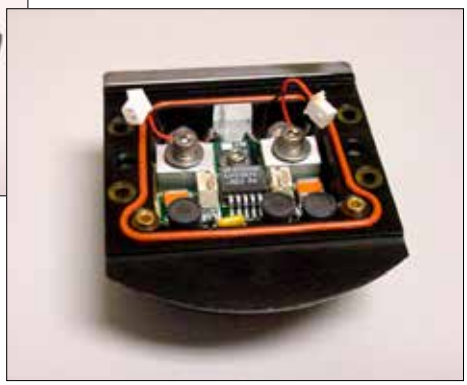
Fig# 1-	Description Lighthead Module Assembly, CZ301, Rev. B	P/N CZ301	Qty 1
- 1	Housing,Lighthead,OzII	CZ010	1
- 2	Bezel,Window,Lighthead,OzII	CZ009	1
- 3	Clamp,Lamp,Lighthead Socket,OzII	CZ005	1
- 4	Lens,Planocon,Lghthd Window,OzII	CZ003	2
- 5	Spacer,Ushio Lamp,OzII	CZ076	2
- 6	Insulator,Thrml,Captive Screw,OzII	CZ015	2
- 7	Insulator,Thrml,1/8 Dowel Pin,OzII	CZ014	4
- 8	Insulator,Thrmal,Contact,Sckt,OzII	CZ012	2
- 9	Washer,Teflon,.910 Odx.760idx.010tk	HW649	2
- 10	Reflector,Parabolic	CZ011	2
- 11	Bulb,Xenon,T-2.5,12V,12W	EC124	2
- 12	Socket,Lamp-Holder,G4,Ceramic	EC123	2
- 13	Socket,Contact	EC125	2
- 14	Screw,Captive,Ph 8-32x1.0 Phil SST	HW643	2
- 15	Screw,Cap,Skt Hd,6-32x5/16,SST	HW475	3
- 16	Screw,Set,4-40 X.125,Silver-Tip,SST	HW642	2
- 17	O-Ring,2-018,Silicone	HW683	2
- 18	O-Ring,Molded,Light Head,OzII	CZ059	1
- 19	Screw,Captive,Shcs,6-32 X 1/2 SS	HW1040	1
- 20	Wire,#24 Black Teflon	713335	0.5
- 21	Wire,#24 Red Teflon	713337	0.5
- 22	Holder,Lamp Socket,Light Head,OzII	CZ067	2
- 23	Screw,Cap,Skt Hd,4-40x3/8,SST	100054	4
- 24	Tube,Shrink,Black 3/32" 4'lengths	712595	1
- 25	Mro-Removable Lck,Nd 121200-50,Blue	440061	1
- 26	Mro-Lubricant,O-Ring 2 Oz Tube	439986	1

PROCEDURE: Replacing LED's on the CZ303 Lighthead Assembly



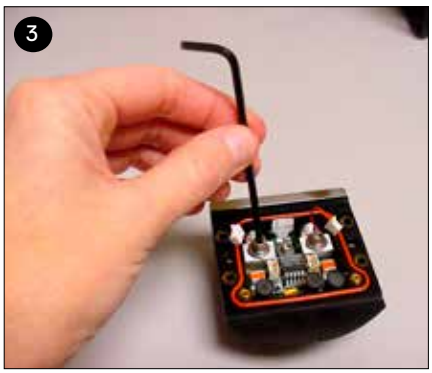
1 To remove the lighthead module assembly from the camera body, loosen the 2 captive screws.

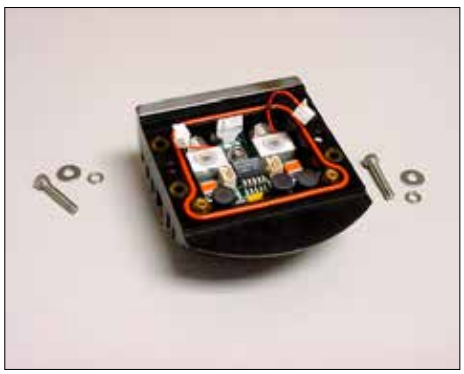




2 On the inner-side of the lighthead module assembly, carefully grasp and unplug the (2) white plug connectors as shown.

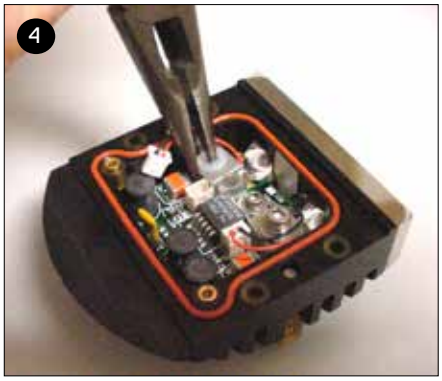
3 Using a 7/64 allen wrench, remove the (2) captive screws, (2) split washers, and (2) flat washers that secure the LED assemblies to the lighthead.

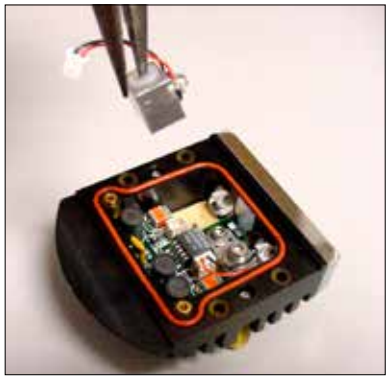




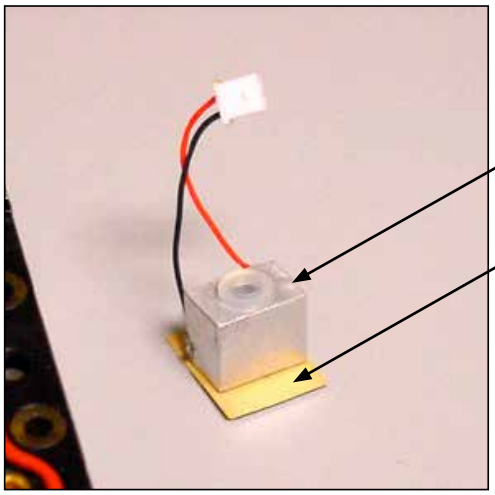
PROCEDURE: Replacing LED's on the CZ303 Lighthead Assembly

4 Using needle-nose pliers, carefully grasp the back side of the LED assembly and the inside of the plastic shoulder washer as shown. Slowly pull the LED assembly back and upwards to remove.* See important note below.





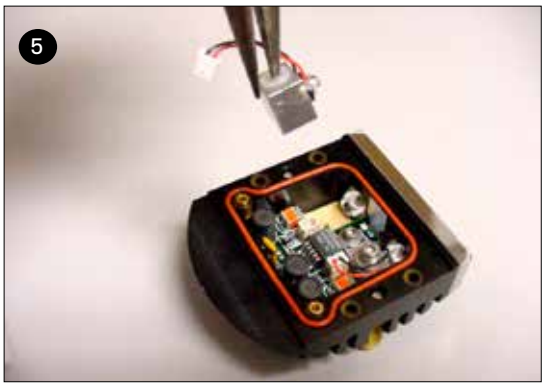
*IMPORTANT NOTE: In the event the thermal pad is removed with the LED assembly (shown below), ensure that the thermal pad is replaced in the lighthead assembly prior to inserting the new LED assembly(s).



LED Assembly P/N: CZ304
Thermal Pad P/N: CZ086 (part of CZ304 above)

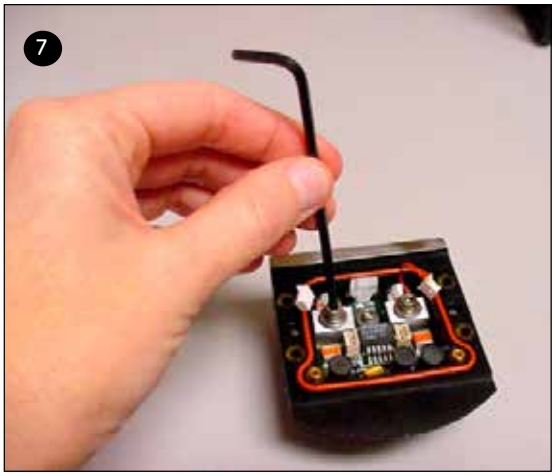
Ensure that the thermal pad is placed in the lighthead assembly prior to inserting the new LED assembly!

PROCEDURE: Replacing LED's on the CZ303 Lighthead Assembly

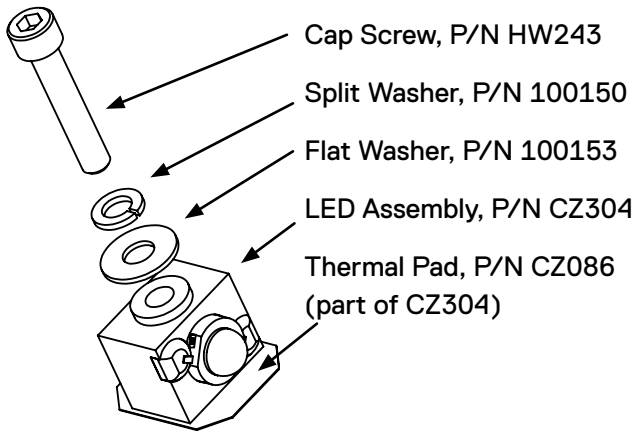


5 Using needle-nose pliers, replace the LED(s) with CUES P/N CZ304 only. Do not force the LED assembly(s) into the lighthead housing as damage may occur.

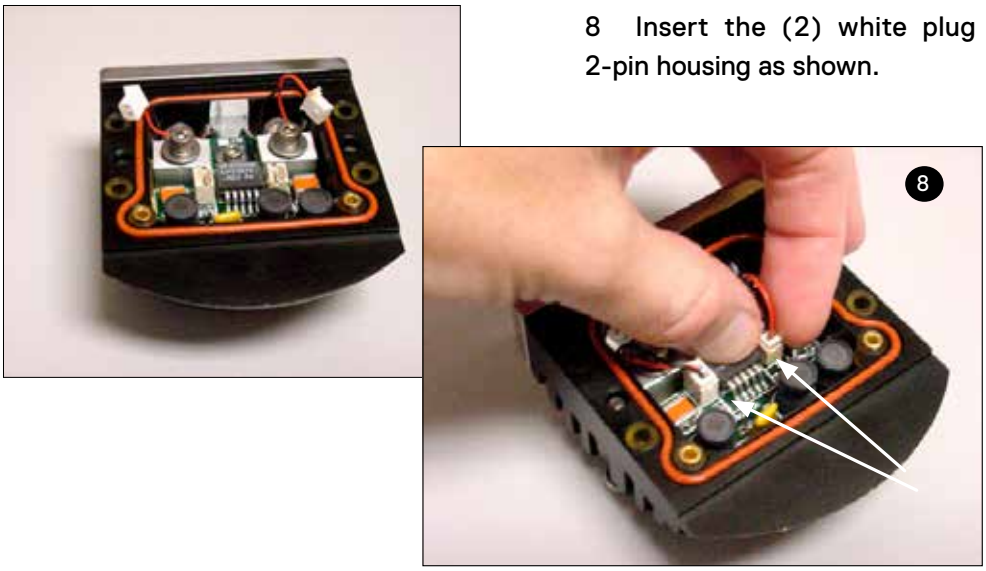
6 Prior to securing, ensure that the thermal pad P/N CZ086 is under each LED and is flush with the lighthead assembly (the arrows on the picture at the left are pointing to the beige-colored thermal pad underneath the LED assembly).



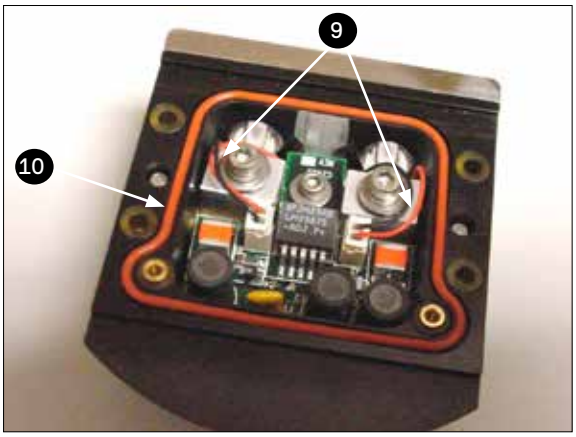
7 Place the following in consecutive order on top of the LED assembly: flat washer, split washer and then the captive screw. Using a 7/64 allen wrench, secure the LED assembly to the lighthead assembly (not shown).



PROCEDURE: Replacing LED's on the CZ303 Lighthead Assembly

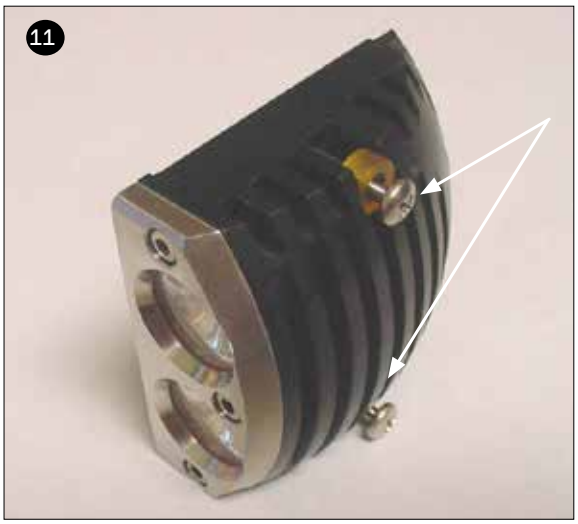


8 Insert the (2) white plug connectors back into the 2-pin housing as shown.



9 Ensure that the plug connector wires are routed around the screw heads as shown.

10 Remove and replace the o-ring. Prior to inserting the new o-ring, clean the o-ring groove and ensure that the mating surface on the camera head is clean. Ensure that the o-ring is in the proper position and then reinstall the lighthead module assembly to the camera body by fastening the captive screws (not shown).



11 Reinstall the lighthead module assembly to the camera body (not shown) by fastening the captive screws.

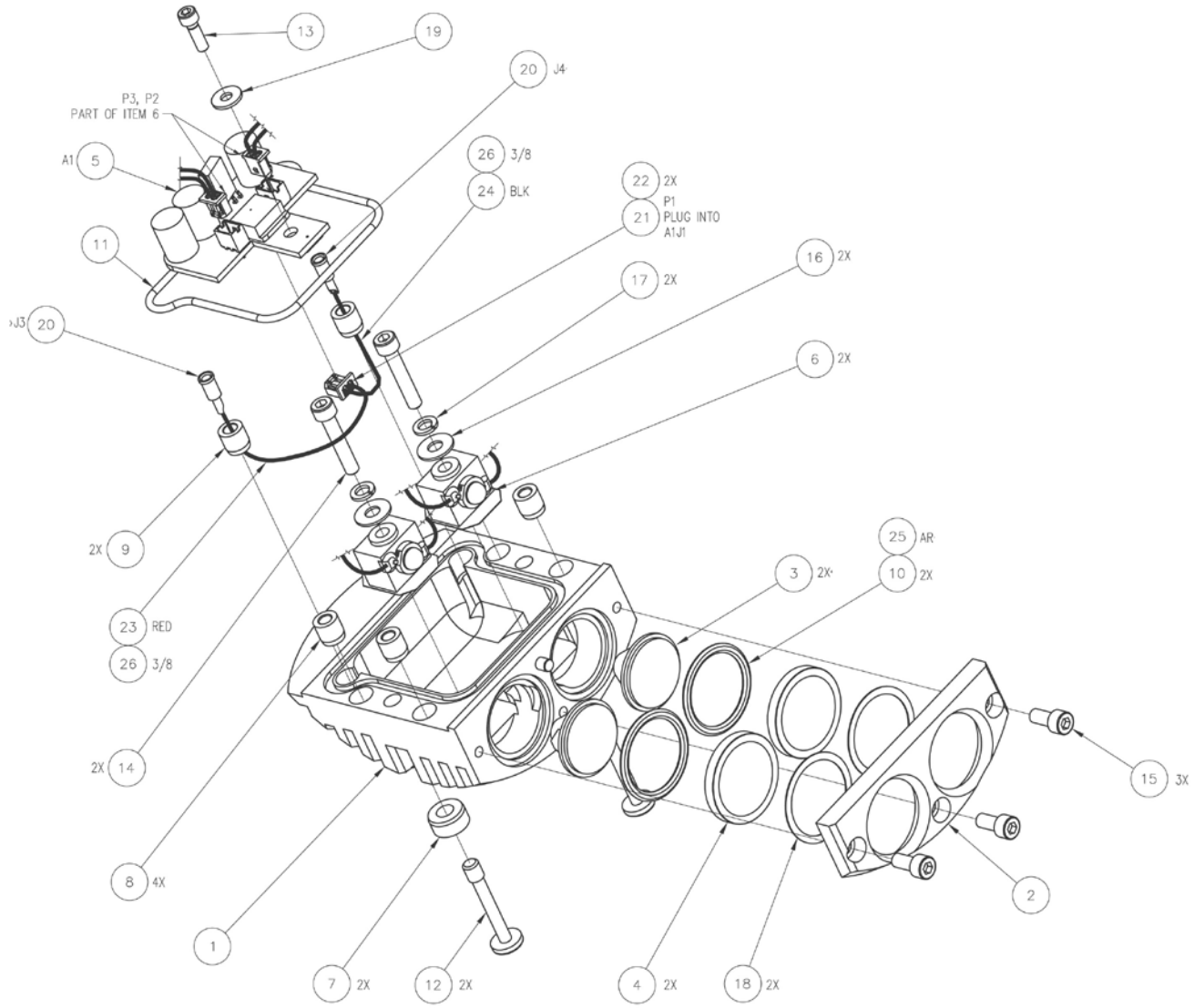


Figure 2: ***Lighthead Module Assembly, LED, OZII, CZ303***

Lighthead Module Assembly, LED, OZII, CZ303

Fig#	Description	P/N	Qty
1-	Lighthead Module Assembly, LED, CZ303, Rev. B	CZ303	1
- 1	Housing,Led Lighthead,Oz Ii	CZ087	1
- 2	Bezel,Window,Lighthead,Oz Ii	CZ009	1
- 3	Collimator,Mod.W/Flts,Led Lthd,Ozii	CZ084-1	2
- 4	Lens,Planocon,Lghthd Window,Oz Ii	CZ003	2
- 5	Pcb Assy,Led Lighthead,Oz Ii	CZ403	1
- 6	Led Assy,Led Lighthead,Oz Ii	CZ304	2
- 7	Insulator,Thrml,Captive Screw,Oz Ii	CZ015	2
- 8	Insulator,Thrml,1/8 Dowel Pin,Oz Ii	CZ014	4
- 9	Insulator,Thrmal,Contact,Sckt,Oz Ii	CZ012	2
- 10	O-Ring,2-018,Silicone	HW683	2
- 11	O-Ring,Molded,Light Head,Oz Ii	CZ059	1
- 12	Screw,Captive,Ph 8-32x1.0 Phil Sst	HW643	2
- 13	Screw,Cap,Skt Hd,4-40x3/8,Sst	100054	1
- 14	Screw,Cap,6-32x3/4 Sst	HW243	2
- 15	Screw,Cap,Skt Hd,6-32x5/16,Sst	HW475	3
- 16	Washer,Flat,#6 Uss Stl	100153	2
- 17	Washer,Split #6 Sst	100150	2
- 18	Washer,Teflon,.910 Odx.760idx.010tk	HW649	2
- 19	Washer,Flat,#4 Sst	100171	1
- 20	Socket,Contact	EC125	2
- 21	Housing,2-Pin,2mm	712864	1
- 22	Contact	715087	2
- 23	Wire,#24 Red Teflon	713337	1
- 24	Wire,#24 Black Teflon	713335	1
- 25	Mro-Lubricant,O-Ring 2 Oz Tube	439986	1
- 26	Tube,Shrink,Black 3/32" 4'lengths	712595	1

RECORD OF REVISIONS

This Record of Revision page is designed to allow the manual user to determine the engineering/manufacturing level that the manual is written to. As engineering changes to this hardware are made at CUES, necessary information in the manual will be revised to reflect those changes. The latest change level and the rationale for any change(s) will be explained in tabular format on this page should the need arise to call CUES regarding technical information.

Original Manual	Revision	Revision Date	Change Description
	1	04/01/04	*update the controller operational functions per the latest design modifications; added lightbulb & LED replacement procedures.
	2	01/01/06	* added built-in sonde information
	3	03/06/07	* updated controller functions to latest design

Video Inspection System Warranty:

CUES products carry a one (1) year parts and labor warranty (except glass, light bulbs, cable, connectors and appearance items) where defects in material or workmanship have resulted in failure. Products of other manufacturers are subject to the original manufacturer standard warranty (monitor, VCR, etc.) Only defects in material or workmanship, which have resulted in failure, are covered by this warranty. The user is liable for all failure due to misuse or abuse. **CUES** reserves the right to repair or replace equipment as **CUES** sees fit. In no event shall **CUES** be liable for special, indirect or consequential damages. The user's remedies shall be limited to repair or replacement under the terms as stated above.

No further warranties, expressed or implied, including warranty of merchantability or fitness for use is offered or given unless specifically warranted elsewhere in writing.

Defective items shall be sent prepaid to **CUES** for warranty adjustment. Most repairs will be handled by the **CUES** service depot. Equipment manufactured by another may be returned to the original manufacturer for warranty service.

Parts & Service:

CUES parts and service depot is located at 3600 Rio Vista Ave., Orlando, Florida 32805, **800-327-7791**. Parts and service turnaround is normally 72 hours or less from receipt at our depot, weekends and holidays excepted. All shipments received collect will be refused upon delivery unless previously authorized by **CUES** personnel.

For West Coast Customers, the service depot is located at 8926 Benson Ave., Suite F, Montclair, CA 91763, **909-946-0221**.

For Canadian Customers, the service depot is located at 1675 Sismet Road, Unit 2 & 3, Mississauga, Ontario L4W1P9, **905-238-9178**.

Limited Warranty:

The warranty does not apply in cases of natural wear and tear, damage due to improper handling, use of non-original and/or unsuitable parts or materials, and other operations not normally encountered in normal recommended usage. Proper handling includes the observance of all operational instructions, including maintenance, as outlined in the **CUES** Operation & Maintenance Manual.

Justified warranty is limited to the repair and replacement of parts to return the equipment to an operational condition. Determination as to justification of a warranty claim shall be at our sole judgment. Warranty service will be provided F.O.B. Orlando, Florida USA. **CUES** shall not be responsible for merchantability, loss of use, or consequential damages.

OPERATOR NOTES