

1/30/2014



OPERATIONS TECHNOLOGY Inc.

**OPTEK VIDEOMIC
OPERATIONS MANUAL**

Video Measurement and Inspection Workstation

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The following instructions assume the operator is experienced in the use of the Windows® operating system.





System Overview

In response to the ever-increasing demands to improve the quality, decrease the size, and increase the density of a given product, the OPTEK systems have evolved. The VideoMic measurement systems are the latest response to more compact products, imposing greater throughput and accuracy requirements while offering the ability to measure and inspect these new parts in a production environment.

The OPTEK VideoMic offers solutions for these challenging manufacturing problems. Like earlier OPTEK video systems, which offer the ability to measure objects using programmable optical magnification and lighting changes, the VideoMic allows for sensitive feature detection in challenging situations. Superior performance is accomplished through user directed optimization, video edge detection, and accurate transport movement.

The VideoMic offers advanced features such as Precision Controlled Closed-Loop Motors, High Resolution Linear Scales, Modified Bearings and Support Systems, a High Resolution Camera offering a Sub-Micron Pixel size, a Widescreen LCD Monitor, and an Adjustable Operator Station. The combined effect of these improvements is smoother, more stable, and quieter operation, higher accuracy, more rapid and capable sample processing, increased component reliability and decreased maintenance.

Optimal test methods are determined, and saved in a measurement program for automated CNC execution. The icon driven inspection and measurement process is simple and intuitive. Quickly create measurement programs by either recording measurements made on a sample part or by importing CAD (computer-aided design) data and simply selecting the features to inspect. Once completed the tolerance data and information can be saved locally, sent to SPC (Statistical Process Control) software, spreadsheets, databases, or simply printed.



The OPTEK measurement systems work best in a clean, thermally stable environment free of vibration. Always ensure your inspection and measurement machines are in the best environment possible for trouble free operation.

System Installation

Once the machine is in place it will need at least 48 hours to stabilize. For optimal performance, keep the room at a constant $20^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$ ($67^{\circ}\text{-}69^{\circ}\text{F}$) temperature range. The maximum rate of change should not exceed 0.25°C (0.5°F)/Hr with 30% - 80% non-condensing relative humidity.

Machine Uncrating

1. If applicable, remove the $\frac{1}{2}$ " plywood crating from the top and all sides of the machine.
2. Carefully cut away all of the plastic wrap and padding from the machine being cautious not to cut into the machine itself.
3. Remove any boxes found on or around the machine and set them aside.
 - a. These loose parts will be required to finish the Final Assembly of the OPTEK VideoMic and it is best to keep them with the machine.
4. Remove the two side covers from the frame of the machine.
5. Discard the desiccant bags found inside the electronics compartment.
6. Using a $\frac{3}{4}$ " wrench remove the four $\frac{1}{2}$ " lag bolts securing the machine to the pallet.
7. The Machine can now be lifted off the pallet.
 - a. Exercise extreme caution while lifting the machine and ensure it is secure before any movement takes place.

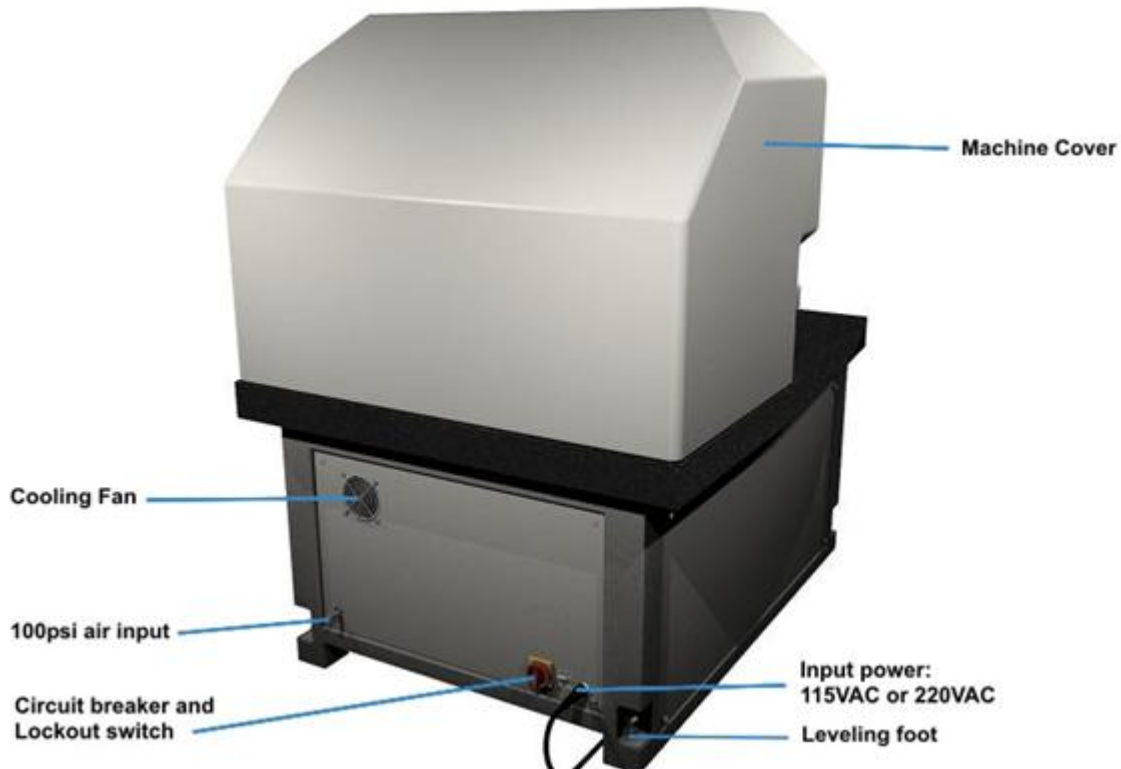
Operations Technology Inc.

30 Lambert Rd. P.O. Box 408, Blairstown, NJ 07825
Web: OPTEK.net Phone: 1-800-60-OPTEK Fax: (908) 362-5966

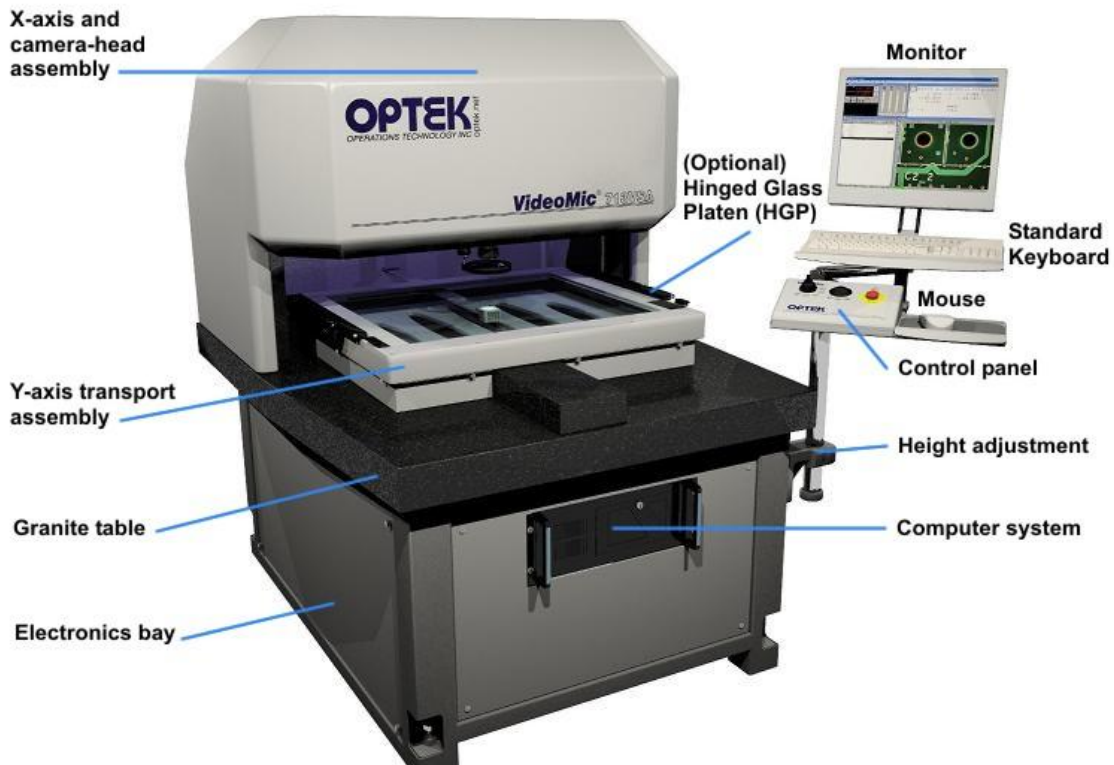
Machine Placement

1. Using a suitably large forklift insert the forks under the frame of the machine.
 - a. Forklift extensions may be required.
 - b. Ensure the forks reach all the way through from one side of the frame to the other.
2. Slowly move the machine to its final location.
3. Be sure to leave ample room around the machine for technician access.
 - a. If insufficient, it may be necessary to move the machine in order to perform routine maintenance or necessary service work.
 - b. The *minimum* requirements are 12" behind and 24" of clearance on the sides.
4. Rotate the Operators Station away from the table and ensure it is in a position where the tray cannot hit the granite or interfere with the Y-Axis stage travel then tighten the setscrews in the collar on top of the tube.
 - a. The height can be adjusted by loosening the two screws tightening the clamp around the tube.
5. Remove the vanity covers from the leveling feet and set them so that they all protrude equally below the frame, about ¼".
6. Using the rear two feet level the X-Axis.
7. Using the front two feet level the Y-Axis.
 - a. Adjust the front feet evenly taking care to make sure all four remain on the ground and the machine does not wobble.
8. Verify the X and Y-Axes are both level and all of the feet are securely on the ground.
 - a. The OPTEK VideoMic should be level within about 0.005"/foot, for best performance.
 - b. Check to ensure the frame is not balancing on only three feet.
9. Once the machine is level, reinstall the vanity covers over the adjustment bolts.
10. Locate the Monitor and install it on the twin post mount at the top of the operator's station.
11. If included, attach the printer arm assembly on the right side of the machine using the pre-drilled holes.
12. Install the printer and connect the cables if applicable.

Rear View



Front View



Parts Description

Configuration may vary based on selected options

- Camera Head Assembly
 - Z-Axis Camera transport
 - Programmable Zoom Lens
 - Light Sources
 - Top Light-Ring, for surface features
 - On-Axis illumination, for indented features
 - Z-Trac lighting for difficult situations
- X/Z-Axis Transport
- Y-Axis Transport
 - Hinged Glass Platen used for securing samples
 - Optional Tooling Fences to secure samples to the stage in a reproducible fashion are also available.
- Table Assembly (Granite)
 - Bottom light for profile work
 - X/Y Transport Stage
- Electronics Area
 - Electronics boards
 - Power supplies and amplifiers
 - Fuses
 - Rear power switch/circuit breaker
 - M3 USB Controller – 2½D CNC Module
- Control panel
 - POWER Button
 - Emergency Stop
 - Joystick for X, Y, and Z-Axes
 - Trackball for precise digital positioning
 - Data entry buttons
- Computer
 - Network Card
 - IK5000 CNC Interface Card - Integrated 3D CNC Controller



The unit must be positioned so all sides of the machine are accessible and the Main Disconnect is within reach.

Connect to an outlet with a protective grounding terminal only.

Caution: A Qualified Service Technician must perform any required maintenance.

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30 Lambert Rd. P.O. Box 408, Blirstown, NJ 07825
Web: OPTEK.net Phone: 1-800-60-OPTEK Fax: (908) 362-5966

Final Assembly



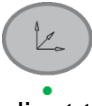


The remaining installation steps require OPTEK personnel or a qualified representative is present on site. However all preparations should be made prior to their arrival in order to facilitate the prompt completion of the remaining steps.

1. If applicable, supply a clean, dry airline, from a filtered source offering a minimum of 3 CFM (85L/m) at 100-120 PSI. (7-8.25 Bar)
 - a. The model designation will indicate the transport type.
 - VideoMic VSA machines float on Air-Bearings while VSM machines use Linear Guide rails with Roller Bearings and have either a large granite rib running down the center or parallel rails respectively.
 - b. The VideoMic VSA models will ship with a ¼” industrial quick-connector.
 - The connector can be exchanged for another ¼” NPT connection if necessary but all pieces required to connect the air supply should be available and ready at the time of the machine installation.
 - c. Ensure the Main Air-Input Regulator is set to 100PSI.
 - d. Confirm the Air-Bearing Regulator is set to 80PSI.
 - e. Verify all the Air-Bearings are equally loaded.
 - Rotate them by hand, the bearings on each axis should feel about the same and none should be loose.
 - f. The Air supply should be left on whenever possible to prevent possible damage from the Air-Bearings touching the surface.
2. If necessary install the correct AC plug onto the power wire.
 - a. Refer to the Serial Number placard on the back of the machine for the power requirements.
 - b. A qualified electrician should confirm correct power requirements and complete the wiring to comply with local safety codes.

	Hot	Neutral	Ground
CE Color	Brown	Blue	Green /Yellow
Standard Color	Black	White	Green
115/230 VAC 60/50 Hz 1.0kW single phase			

3. Shield the Y-Axis transport with something to protect the glass such as a soft blanket, ensure both the glass and blanket are clean in order to prevent debris trapped between the two from scratching the glass.
4. Carefully remove the Machine Cover.
 - a. Pay attention to ensure the cover does not hit the other parts of the machine, especially the optics or Z-Axis motor upon removal.
5. Remove the tagged shipping blocks.
6. Reinstall the Hood.

The Control Panel

- POWER – Lights to indicate machine power is on
 - This supplies power to the machine, turn the system ON or OFF with this button 
 - The computer should be shutdown properly first, always wait until it has finished shutting down before turning off machine power
 - If pressed while the computer is still on any unsaved data will be lost
- Emergency Stop Button 
 - Push to Activate, Rotate to Reset
 - Older units simply pull up to Reset
 - All OPTEK units are equipped with an Emergency Stop Switch
 - Please make all operators aware of its location and purpose
 - This switch will cut power to the machine and is for Emergency use only
 - Use only when immediate loss of power is required to prevent damage to the machine or for operator safety
 - Any unsaved data will be lost and Windows® may require user intervention to start again
- Joystick
 - Provides quick manual input for stage positioning
 - Some machines may be equipped with a 3-Axis Joystick allowing positioning of the X, Y, and Z-Axes simultaneously
- Trackball
 - Offers accurate stage positioning and precision focusing capabilities.
- Z-Axis Toggle – Lights to Indicate Z-Axis mode 
 - Switches the Joystick function from X/Y-Axis movement to Z-Axis focusing
 - If a 3-Axis Joystick is installed twisting the top will always adjust the Z-Axis position and therefore only toggle the Trackball
- Axis Lock 
 - Toggles between single axis linear movement when enabled the ability to manually position multiple axes at once
- Fine Position – Lights to indicate Reduced Speed 
 - Slows the movement of the Joystick and Trackball for more precise manual positioning

- Enter
 - With an applicable tool selected, press this to add data points to a measurement
- OK
 - Press once all necessary points have been gathered or to create calculated features



- There are duplicate Z-Axis toggle, Axis Lock, and Fine position buttons for ambidextrous convenience

Motor Operation

The X and Y-Axis motors are free to move if the Metrology software is not running or even while the machine is off. In the event of a sudden power failure or while the machine is turned off there is residual braking to stop an axis moving as quickly as possible but it will not be mechanically held in place. Air-Bearing machines will float freely as long as air is supplied. Mechanical bearing systems should not be back driven or pushed by hand. The machine should be kept clear of obstructions and care taken to prevent accidental movement of the transport.



Computer Configuration

The OPTEK VideoMic is a precision measurement tool, while it may use a Windows[®] based PC each component has been carefully chosen and configured specifically to work together with the software installed as well as the various hardware used. No changes to Windows[®], the configuration, or any other component should be made without the direction of Operations Technology Inc. or a qualified representative. If absolutely necessary, any changes should be kept to the bare minimum and only done with OPTEK personnel or a trained representative on hand before training begins in order to verify proper operation.

Upon the completion of the Machine install, initial calibration, and after making the appropriate software backups save a new System Image disk. Afterwards periodic backups in the Metrology Software as well as Windows[®] should be continued as often as necessary to ensure the recovery of any pertinent data that may be lost in the event of a computer related problem. If the need to restore the computer to factory specifications should arise, an OEM System Image disk is included. The OEM disks provided are the only way to restore the computer back to the original settings as it has left the factory. These disks are irreplaceable. Take care to store them somewhere safe, and accessible, in case they should be required in the future.

The standard Windows[®] installation will not configure the machine correctly and will require additional time and labor in order to finish the configuration to guarantee trouble free operation of the machine. Always use the most recent backup available or the supplied System Image to restore the computer.

Operations Technology Inc.

30 Lambert Rd. P.O. Box 408, Blirstown, NJ 07825
Web: OPTEK.net Phone: 1-800-60-OPTEK Fax: (908) 362-5966



System Setup

To ensure the safe operation of the machine and those around it always keep the granite clear of any obstructions in the path of travel. Anything that interferes with the transport movement could result in damage to the machine or its operator.

1. Verify correct power.
2. Close the circuit breaker then turn on the Main Power switch.
3. Locate and install the Control Panel.
 - a. Confirm the Emergency Stop is working, with the button pressed down push the POWER button.
 - Nothing should happen
 - b. Now reset the Emergency Stop switch and hit the POWER button again, the machine should begin turning on.
4. While the computer is booting if there is no video displayed press the power button on the monitor.
5. Connect the computer to the company network if desired.
 - a. The I.T. department should be on hand to work with the technician in setting up the computer if necessary.
 - b. Do not Change, Alter, or modify the computer, or any other part of the machine without the direction of Operations Technology Inc. or a qualified representative.
6. Launch the equipped Metrology Software.
7. Carefully move each axis to confirm the scale is reading correctly.
 - a. If supplied with the IK5000 software shutdown the computer and power off the machine then connect the CNC cable to the back of the computer.

Machine Operation

System Description

The OPTEK VideoMic series provides rapid, non-contact 3-Axis coordinate measurement with remarkable speed and accuracy. This capability allows the user to verify critical dimensions on first articles, production samples, or entire runs. By setting tolerances on reports, thresholds can be set to enable timely corrections to the process or, when necessary, interruption of production to minimize scrap. Precise closed loop motors position the stage accurately, quietly, and quickly. High magnification optics relay the image to a high-resolution CCD camera and from there to the computer where our sub-pixeling algorithm permits sub-micron measurements. The user can display a magnified view of the measured feature on the screen and can store it with all relevant data or print it on the optional color printer. Once measured, the feature coordinates can be stored, analyzed, and/or exported to other software programs for further in-depth analysis. The OPTEK system can take measurements in all three axes and allows movement in six directions. The X-Axis moves Left and Right, while the Y-Axis moves Forward and Back, and the Z-Axis Up and Down.

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Metrology Software

To meet the needs of our customers Operations Technology Inc. offers two alternative Metrology Software packages on the VideoMic measurement systems. Therefore, the operation of the software in question will vary and the appropriate documentation will be included with the software package chosen.

Standard Power On Procedure

M3 equipped machines will enable the motors as part of the initial startup procedure meaning the motors will have power at all times while the machine is on. The manual controls will be active regardless of the computer state or if the Metrology Software is running.

1. With the transport near the center of travel ensure the granite and measurement area are clear of obstructions then press the POWER button on the control panel.
2. Once the computer has finished its start up procedure, launch the Metrology Software.

Homing Sequence

Launch the Metrology Software and a window will appear asking to perform an Automatic Homing Sequence. Before the machine can perform any automated operations, the Homing Sequence must be completed successfully. The operator should always hit "Yes" when asked to Home the machine, if there are some extenuating circumstances where this is not desirable or automatic movement is not advisable correct the situation as soon as possible then Home the machine. To prevent damaging the machine and for the safety of the Operator it should never be left without a machine reference frame any longer than necessary.

1. Launch the Metrology Software.
2. Hit "Yes" to confirm automatically Homing the machine.
 - a. The measurement area should be kept clear as all three axes will move in order to determine the stage location.
3. After establishing the Machine Reference frame the Homing Sequence will be completed and the machine ready to use.
 - a. The default Zero based on the machine reference is in the center of travel for each axis.

Calibration

A complete calibration consists of both optical and mechanical adjustment, as well as software compensation. All OPTEK VideoMic Systems are thoroughly tested and calibrated before leaving the facility, contact Operations Technology Inc. or your local authorized representative for any additional information.

Pixel Calibration

Using a calibrated Pixel Slide the end user can check the Pixel Calibration and make any necessary changes by following the steps below.

- Zoom in to the highest magnification equipped
- Find the largest circle that can reasonably fit within the field of view and ensure it is sharply in focus
- Adjust the bottom light to a value bright enough to illuminate the edges of the circle
 - Turn off the remaining lights
- Enter the Artifact Diameter using the Calibrated size of the circle in question
 - Refer to the applicable Metrology Software's manual for further details
- Measure the circle in the center of the Field of View

Machine Maintenance

All maintenance must be performed by OPTEK personnel or a qualified factory representative.

System Cooling

- Check the fans and clean out any dust or debris if necessary
 - Verify the rear fan is working immediately once the POWER button is pressed
 - The integral computer fans may periodically turn on or off automatically

General Care

- Keep the system clean. The working environment should be as clean, dry, and dust free as possible.
- Do not take things apart
- Do not remove any covers or components from the system
 - Leave all screws intact
- If repair is needed, contact your OPTEK representative or Call Operations Technology Inc. at (908) 362-6200 with any questions or problems



Cleaning Exterior Surfaces

Clean the painted surfaces of the equipment with a damp cloth. Use an all-purpose cleaning solution. Clean the granite with Granite Surface Plate Cleaner only. Wax or other types of polish will build up causing the precision surface to lose its flatness.

Caring for the Linear Guides

Keep the Linear Guide and bearing surfaces clean of all dust, debris, and contamination, avoid contact with oil, coolant, or other fluids.

If applicable, clean the Linear Guide and bearing surfaces with air pressure applied. Use ISOPROPYL ALCOHOL ONLY. Do not clean bearings or guide surfaces with ketones. Clean by applying alcohol to a clean dry cloth and wiping surfaces thoroughly. Allow guide surfaces to dry completely before passing bearings over cleansed area.

Caring for the Air-Bearings

Whenever possible proper pressure of 80PSI should be maintained on the Air-Bearings. Do not operate or try to move Air-Bearings without an appropriate air supply from an ISO quality source free of moisture, oil, or any other contaminants.

Always use a high quality filtered air source.

ISO QUALITY CLASSES			
QUALITY CLASSES	DIRT (Particle size μm)	WATER (Pressure Dew point $^{\circ}\text{F}$ (PPM/Vol) at 100 PSIG)	OIL (including vapor) mg /cubic meter
1	0.1	-94 (0.3)	0.01
2	1.0	-40 (16)	0.1
3*	5.0	-4 (128)	1.0
4	15	+37.4 (940)	5.0
5	40	+44.6 (1240)	25
6	-	+50 (1500)	-

Operations Technology Inc. Recommends ISO Class 3 or better air quality.

Lubricating Mechanical Bearings and Rails

Operations Technology Inc. recommends cleaning and re-lubricating the rails and bearings monthly, do not use or mix different lubricants.

To clean the rails wipe all races with lint free cloth moving the transport to expose all accessible portions of the rail. Put a thin coating of high quality grease on the rails then exercise the transport system through its entire travel to ensure even distribution of the grease. Always use grease sparingly as to much can attract dirt and trap contaminants.



Removal of the Manual Hinged Glass Platen

If equipped with an optional HGP follow the steps below for its removal.

- For removal of the Hinged Glass Platen ensure the transport is positioned near the front center of the table
- Remove the four Allen head cap screws holding the HGP pivot brackets to the transport
- Lift the HGP off the transport at the outside mounting brackets near where the gas spring cylinders attach

For a Powered HGP contact Operations Technology Inc. or your local authorized representative for additional instructions.

Cleaning Optics

It is not required to clean the optics as a part of the routine maintenance schedule. Only clean the lens system when necessary.

Avoid touching the lens with bare skin. Most solvents used to clean optics are harmful, wear protective gloves to prevent oil deposits or other contamination.

Only use a streak free cleaning solution and soft lint free cloth or disposable wipes intended for cleaning lens' such as those found in a retail lens cleaning kit. For heavier deposits use compressed "Air-In-A-Can" to carefully blow debris off the lens.

Never rub the lens or try and wipe off debris, doing so may scratch the lens or damage the optical coatings.

LED lighting replacement

The OPTEK VideoMic Measurement systems use LED lighting for all light sources. If a problem should arise with a light source, Individual LED's are not replaceable. Obtain replacement light modules through Operations Technology Inc. or a local representative.

Recommended Consumables

Operations Technology Inc. recommends the following products to achieve the best possible performance on the OPTEK VideoMic measurement system. Contact OPTEK or your local representative to purchase any necessary maintenance products.

1. Mobeolith SHC220 or equivalent NLGI grade 2 Lithium based grease
2. TCS Granite Surface Plate Cleaner (Z 212)

Caution - A qualified service technician must perform all maintenance on the OPTEK VideoMic Measurement Systems.

Preventive Maintenance Schedule

The preventive maintenance schedule detailed below is the minimum recommended timeframe. The intervals can be adjusted as necessary based on the environment in which the machine is kept, lubricate the recommended parts sparingly.

- Check the air filter/ regulators on the pneumatics panel, located on the right hand side of the machine, behind the operator's station
 - Check the regulator bowls for dirt and moisture and clean as required
 - Turn OFF or remove the incoming air source and relieve residual air pressure prior to bowl removal
- Keep the Granite, Bearings, and/ or rails clean and free of debris
- Periodically lubricate the ball screw axis where applicable
 - Do not over lubricate, too much grease will attract and/ or trap contaminates
- Lubricate the roller bearings and rails on the applicable axes
 - Do not over lubricate, too much grease will attract and/ or trap contaminates
 - Never put anything other than the recommended surface plate cleaner on an Air-Bearing surface

The OPTEK VideoMic machines require minimal preventive maintenance. The key to the longevity of these machines is cleanliness and a stable environment. Following this simple preventive maintenance schedule will provide a long trouble free service life.

Maintenance	Frequency
Clean exterior surfaces of equipment	As needed, based on the operating environment
Clean and lubricate the rail system	Every month
Lubricate the ball screws	Every six months
Clean Pneumatic Filters & Separators	Every month
Clean the lens system	Prior to calibration or when required

However, if the system is not kept clean and lubricated where applicable, excessive wear will occur leading to premature failure, binding, and loss of accuracy.



***DANGER- REMOVE ALL POWER TO THE MACHINE
DISCONNECT THE POWER CORD FROM THE ELECTRICAL OUTLET
PRIOR TO ANY SERVICE TO AVOID INJURY OR DAMAGE TO THE
EQUIPMENT.***

Troubleshooting

Problem	Possible Cause	Potential Solution
The System does not turn on	The Power Cord is unplugged.	Verify correct voltage and outlet function
	The Emergency Stop has been pressed	Reset the Emergency Stop Switch
The Computer didn't turn on	The Machine was not off long enough to reset	Press the Power button on the Computer itself
	The computer is unplugged or turned off	Verify the correct voltage
No Video On Screen	Are the Monitor/ Power light On?	Verify Power Press the Power button on the Monitor to turn it on
	No Image or an Orange Power Light	Check the Video Cable is securely connected at both ends (Computer & Monitor) Is the Computer On? (Press the Power button if necessary)
No Live Video	Are the lights properly adjusted	At Low Mag ensure an unobstructed view and adequate lighting
	Camera Configuration	Confirm Windows [®] has connected to the camera. (Consult your rep for more details)
The Transport does not move as expected or is limited	Motors May be disabled	If Applicable - Check Air Supply
		Consult Metrology Software Error messages for indication
	Transport drifting	Confirm all Control Panel cables are connected securely Verify proper Joystick Teach
	Has the Homing Sequence Finished Successfully?	Shutdown the entire machine (Control Panel power) and restart



Warranty

LIABILITY OF WARRANTY

Operations Technology Inc. warrants to the original purchaser that the equipment sold under this agreement shall be free from defects in material and workmanship.

Defective materials will be replaced or repaired at the discretion of Operations Technology Inc. Liability will be determined by Operations Technology Inc. All liability is expressly limited to said repair or replacement of defective parts, all other damages and warranties, statutory or otherwise, being expressly waived by the purchaser. The warranty is "null and void" if the equipment failure is due to negligence, accident, abuse, or improper operation. It is also nullified by tampering, altering, or unauthorized repair of subject equipment or components. This warranty does not include lamps, which are considered consumable items. The user shall return allegedly defective materials to Operations Technology Inc. via approved routing, charges prepaid. Upon determination of liability, Operations Technology Inc. will either submit a quotation for repairs or rectify the defect at no charge to the user.

This warranty cannot be countermanded by the purchaser and is the only warranty relative to this transaction. No other warranty, expressed, implied or statutory, shall apply.

Always turn off the power prior to working on the unit.

OPTEK PERSONNEL OR A QUALIFIED FACTORY REPRESENTATIVE MUST PERFORM ALL MAINTENANCE.

Operations Technology Inc.

30 Lambert Rd. P.O. Box 408, Blirstown, NJ 07825
Web: OPTEK.net Phone: 1-800-60-OPTEK Fax: (908) 362-5966



PERIOD OF WARRANTY

Operations Technology Inc. warrants their products to be free of defects in material or workmanship for a period defined below commencing on the shipping date of the items covered.

- Standard Equipment
 - One year
- Special Equipment
 - Ninety (90) days

ITEMS COVERED BY THIS WARRANTY

- Standard Equipment
 - This is defined as all equipment, which is outlined and defined on the Operations Technology Inc. product lists
- Special Equipment
 - This is defined as all options and equipment designed and constructed to fulfill a specific function utilizing unique variations in mechanics or technologies from our standard products

ITEMS NOT COVERED BY THIS WARRANTY

The computer and associated components are covered to the extent of the original equipment manufacturer's warranty.

Contact Information

Operations Technology Inc.

30 Lambert Road
P.O. Box 408
Blairstown, NJ 07825-0408
United States of America

Phone Number: (908) 362-6200

Fax Number: (908)362-5966

OPTEK.net

Operations Technology Inc.

30 Lambert Rd. P.O. Box 408, Blairstown, NJ 07825
Web: OPTEK.net Phone: 1-800-60-OPTEK Fax: (908) 362-5966