A-Series™ Surgical Operating Microscope System

GLOBAL SURGICAL™ CORPORATION

OWNER'S MANUAL

Controlled Document
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M A730 Series

110-013-079 REV E
ECO 202802

Date Effective: JUNE 2017

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Customer Order Number:_____

GLOBAL
SURGICAL™ CORPORATION

3610 TREE COURT INDUSTRIAL BLVD.
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Congratulations on your purchase of the A-Series Surgical Operating Microscope System. We truly appreciate your business, and we're grateful for the trust you've placed in us.

TABLE OF CONTENTS

Section 1 Important Safety Instructions 1-1
1.1 Symbol Definitions 1-1
1.2 Warnings and Cautions 1-2

Section 2 Unpacking Instructions 2-1

Section 3 Product Information 3-1
3.1 A-Series Surgical Operating Microscope Systems 3-1
3.2 Microscope Support Systems Configurations 3-1

Section 4 Accessories 4-1
4.1 Microscope Components and Accessories 4-1
4.2 Installation of Optical Accessories 4-7
4.3 Installation of the Multi Focal Objective Lens 4-8

Section 5 Operating Instructions 5-1
5.1 Turning On The System 5-1
5.2 Description and Location of Controls 5-1
5.3 Counterbalancing Adjustment 5-2
5.4 Spring Arm Tension Adjustment 5-2
5.5 Pivot Adjustment 5-3
5.6 Roll Angle Adjustment 5-3
5.7 Pitch Angle Adjustment 5-3
5.8 Floorstand Locking Casters 5-3
5.9 Microscope Maneuvering Handles 5-3
5.10 Microscope Components 5-4
5.11 Magnification Selection 5-4
5.12 Focusing The Microscope 5-5
5.13 M A801-LED Light Source Operation 5-6
5.14 Brightness Settings and Memory 5-7
5.15 Filter 5-7
5.16 Binocular Adjustment 5-8
5.17 Eyepieces 5-8
5.18 Diopter Adjustment 5-8
5.19 Fuse Replacement 5-9

TABLE OF CONTENTS

Section 6 Care and Maintenance 6-1
6.1 Cleaning and Disinfecting 6-1
6.2 Cleaning the Microscope Optics 6-1

Section 7 Troubleshooting 7-1
7.1 Troubleshooting 7-1

Section 8 Service and Warranty 8-1
8.1 Warranty Information 8-1
8.2 Technical Services Department 8-2

Section 9 Technical Information 9-1
9.1 Microscope Support System Specifications 9-1
9.2 Binocular Focal Lengths 9-1
9.3 M A801-LED Storage and Operations Specifications 9-2
9.4 A-Series Microscope Total Magnification Chart 9-3
9.4 Finding Total Magnification 9-4
9.5 Effects of Changing Components 9-4

WARNING **THE SAFETY AND SATISFACTION OF OUR CUSTOMERS AND THEIR PATIENTS ARE THE HIGHEST PRIORITIES OF GLOBAL SURGICAL CORPORATION. THIS MANUAL CONTAINS IMPORTANT INFORMATION REGARDING THE SAFE AND PROPER USE OF THIS EQUIPMENT AND SHOULD BE READ THOROUGHLY BY ALL OPERATORS PRIOR TO THEIR FIRST USE OF THE EQUIPMENT. FAILURE TO READ AND UNDERSTAND THIS MATERIAL COULD RESULT IN INJURY TO PATIENTS OR PERSONNEL OR IN DAMAGE TO THE EQUIPMENT.**

1.1 Symbol Definitions

This symbol on the product is an attention symbol, alerting the user to read the Owner's Manual for important installation, operating instructions or safety information.

This symbol on the product indicates a potential electrical shock hazard and alerts the user to read the Owner's Manual for important safety information.

Symbol indicating "not for general waste." Recycle per the EUROPEAN WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE) DIRECTIVE.

This symbol indicates earth ground.

For Professional Use Only.

Do Not Push.

This symbol indicates a surface that could be hot to the touch.

This symbol alerts the user that this product emits bright light.

This symbol indicates an explosion hazard.

WARNING This symbol indicates a situation in which incorrect handling through disregard of a warning might result in death or serious personal injury.

CAUTION This symbol indicates a situation in which incorrect handling through disregard of a caution might result in personal injury or may result in damage to property.

NOTICE This symbol indicates a message to avoid property damage or additional information to help complete a procedure.

1.2 Warnings and Cautions

ONLY QUALIFIED PERSONNEL SHOULD WORK ON OR AROUND THIS EQUIPMENT AFTER BECOMING THOROUGHLY FAMILIAR WITH ALL WARNINGS, SAFETY NOTICES AND MAINTENANCE PROCEDURES CONTAINED HEREIN. FOR THE PURPOSES OF THIS MANUAL AND PRODUCT LABELS, A QUALIFIED PERSON IS ONE WHO HAS BEEN TRAINED ON THE INSTALLATION, CONSTRUCTION, OPERATION AND MAINTENANCE OF THIS EQUIPMENT AND WITH THE HAZARDS INVOLVED.

DISCONNECT ALL ELECTRICAL POWER PRIOR TO CLEANING AND DISINFECTING. RISK OF ELECTRIC SHOCK RESULTING IN DEATH OR INJURY IS POSSIBLE IF THE ELECTRICAL POWER IS NOT DISCONNECTED PRIOR TO CLEANING THE UNIT.

TO AVOID THE RISK OF ELECTRIC SHOCK, THIS EQUIPMENT MUST ONLY BE CONNECTED TO A SUPPLY MAINS WITH PROTECTIVE EARTH (=GROUND).

THIS UNIT MUST BE USED ONLY WITH HOSPITAL GRADE EARTH-GROUNDED AC OUTLETS.

RISK OF EXPLOSION IF USED IN THE PRESENCE OF FLAMMABLE ANESTHETICS.

CONNECTING EQUIPMENT TO THE MULTIPLE SOCKET-OUTLET EFFECTIVELY LEADS TO CREATING A MEDICAL ELECTRICAL SYSTEM AND THE RESULT CAN BE A REDUCED LEVEL OF SAFETY.

IT IS HIGHLY RECOMMENDED THAT THE INSTALLATION OF THIS EQUIPMENT BE PERFORMED BY QUALIFIED TECHNICIANS. INSTALLATION BY UNQUALIFIED INDIVIDUALS COULD RESULT IN PERSONAL INJURY.

MINIMIZE SKIN EXPOSURE BY FOCUSING THE LIGHT ON THE AREA WHERE SURGERY IS BEING PERFORMED.

START THE MICROSCOPE WITH MINIMAL LIGHT INTENSITY AND INCREASE THE INTENSITY GRADUALLY. AVOID MAXIMUM INTENSITY OR USE IT FOR AS SHORT A TIME AS POSSIBLE.

NO MODIFICATION OF THE EQUIPMENT IS ALLOWED.

FAILURE TO FOLLOW THESE INSTRUCTIONS WILL RESULT IN DAMAGE TO THIS SYSTEM OR POSSIBLE INJURY (RECEIVER'S RESPONSIBILITY).

WHEN OPENING THE SHIPPING CARTON THE PLASTIC BANDS WILL SPRING APART WHEN CUT. ENSURE THEY WILL NOT HIT ANYONE OR ANYTHING. EYE PROTECTION SHOULD BE WORN WHEN REMOVING THE PLASTIC BANDS. WATCH FOR SHARP EDGES.

CONTACT GLOBAL TECHNICAL SERVICES BEFORE REPLACING THE FUSE.

WARNING **DISCONNECT ALL ELECTRICAL POWER PRIOR TO REPLACING FUSE.**

WARNING **USE ONLY A 5MM X 20MM CYLINDER, SLOW-BLOW, 6 AMP 250 VOLT FUSE.**

WARNING **NEVER REPLACE A BLOWN FUSE WITH A HIGHER-AMP FUSE. ALWAYS REPLACE THE FUSE WITH ONE WITH THE SPECIFIED AMP RATING.**

CAUTION **Contents are fragile and should be removed carefully.**

CAUTION **Some of the parts may be damaged by knives, open boxes carefully.**

CAUTION **After opening boxes check the serial numbers of the optics against the packing slip.**

CAUTION **Open boxes containing the optics over a table or counter.**

CAUTION **When handling the optics do not touch the glass with your fingers.**

CAUTION **Do not clean any surface with petroleum-based solvents such as acetone or M.E.K. (Methyl Ethyl Ketone). These solvents will remove paint and cause permanent damage to plastic surfaces. Using these solvents also presents a danger to individuals if the solvents are opened in a poorly ventilated room.**

CAUTION **Replacement parts, such as cables, must be purchased through Global Surgical to ensure proper compliance requirements. The use of other cables may affect EMC performance. Unauthorized use of these items will void warranty and may cause injury to you, others and/or the equipment.**

CAUTION **When used in clinical or residential areas near radio or TV units, this equipment may be subjected to radio interference. To avoid adverse electromagnetic effects, do not operate this equipment near RF energy equipment.**

CAUTION **To prevent any potential electromagnetic interference, do not use any kind of cellular phone near the equipment.**

NOTICE Check for damage before discarding the shipping material and notify Global Surgical Customer Service if shipping damage is observed.

NOTICE Contents are packed in several boxes. Before discarding any packaging ensure no components are still within.

NOTICE Save this manual for future reference.

NOTICE If you have ordered accessories, then some of these may be assembled to the unit while others are supplied unassembled. Please examine the content of the box thoroughly. If any accessories require assembly, then instructions will be included.

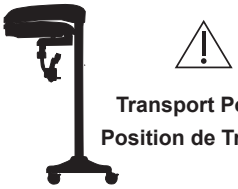
CAUTION

This equipment needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in the installation manual 110-013-080 M A730 Series Installation Manual.

NOTICE

Portable and mobile RF communications equipment can affect medical electrical equipment.

See the owner's manual for each electrical component for specific safety and use information.



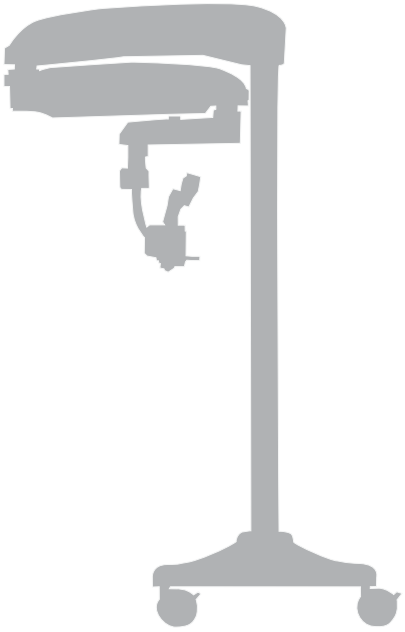
Transport Position
Position de Transport

CAUTION

ARMS SHOULD BE FOLDED AND LOCKED IN STORAGE POSITION, AS SHOWN IN THIS FIGURE FOR SAFE TRANSPORT. FAILURE TO DO SO COULD RESULT IN DAMAGE TO THE SYSTEM OR PERSONAL INJURY.

CAUTION

DO NOT PUSH UNTIL SUPPORT SYSTEM IS IN TRANSPORT POSITION.



WARNING **FAILURE TO FOLLOW THESE INSTRUCTIONS WILL RESULT IN DAMAGE TO THIS SYSTEM OR POSSIBLE INJURY (RECEIVER'S RESPONSIBILITY).**

WARNING **THE PLASTIC BANDS WILL SPRING APART WHEN CUT ON THE SHIPPING BOX. ENSURE THEY WILL NOT HIT ANYONE OR ANYTHING. EYE PROTECTION SHOULD BE WORN WHEN REMOVING THE PLASTIC BANDS. WATCH FOR SHARP EDGES.**

CAUTION **Contents are fragile and should be removed carefully.**

CAUTION **Some of the parts may be damaged by knives, open boxes carefully.**

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CAUTION **Open boxes containing the optics over a table or counter.**

CAUTION **When handling the optics do not touch the glass with your fingers.**

NOTICE Check for damage before discarding the shipping material and notify Global Surgical Customer Service if shipping damage is observed.

NOTICE Contents are packed in several boxes. Before discarding any packaging ensure no components are still within.

NOTICE Save this manual for future reference.

NOTICE If you have ordered accessories, then some of these may be assembled to the unit while others are supplied unassembled. Please examine the content of the box thoroughly. If any accessories require assembly then instructions will be included.

All shipping materials should be retained until it has been determined that the unit was not damaged during shipment.

If damage is discovered, complete the following:

1. Do not refuse shipment.
2. Make a notation on the delivery receipt and inspect the carton for damage.
3. Take pictures of damage to the equipment and to the packaging (if evident).
4. If damage is discovered, leave in original container and request immediate inspection from the carrier within 3 days.
5. Contact the Global Surgical Customer Service Department at 1-800-861-3610.

If the product is damaged electrically or mechanically and in the event the original packing materials are no longer available, contact Global Surgical Technical Services Department.

Refer to Section 8 of this manual regarding Technical Service contact information and proceed as instructed.

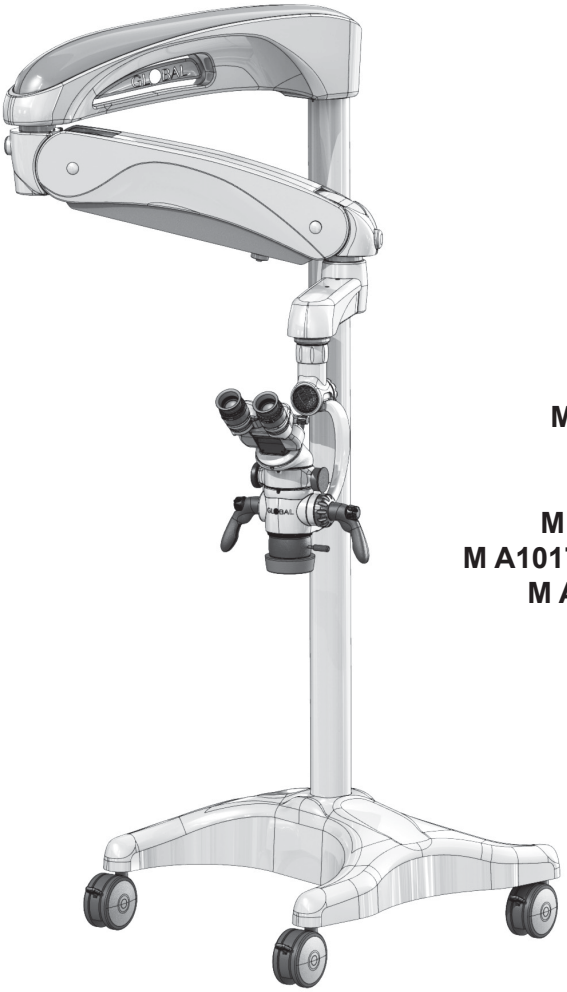
3.1 A-Series Surgical Operating Microscope Systems

The Surgical Operating Microscope is a system of modular components intended to improve ergonomics, vision, and lighting during dental and medical procedures/examinations. If the options are chosen, the microscope system may also aid in documentation. Components may include, but are not limited to, support system, binoculars, objective lens, light source, beamsplitters, and video/photography systems. There are four support system options to choose from to meet the clinician's needs: a floor stand model, a floor mounted model, a wall mounted model and a ceiling mounted model. All support system models provide maneuverability and sturdy, stable support for the microscope and coupler arm assemblies. These systems fold into convenient storage positions when not in use.

3.2 Microscope Support Systems Configurations

The A-Series Microscope Support System is available in four configurations:

Floor Stand Support System Model (M A730F) The floor stand support system model is designed for portability around the office/examination room. It uses a compact H-Base with four large casters, occupying minimal floor space. All four casters may be locked to prevent rolling. As the floor stand support system is mobile, care must be taken to ensure safe transportation and to avoid any personal injury or damage to the system.



M A730F
FLOOR STAND

shown with
M A730-HA Arm System,
M A1006 Microscope
M A1022-10 Binocular
M A1061-D50 Beamsplitter
M A1017 Carr Binocular Extender, 45°
M A1028-250 Objective Lens

Ceiling Mount Support System Model (M A730-C8, M A730-C9 and M A730C-10) The ceiling mount support system model is designed to permit maximum range of operation while eliminating the use of floor space.

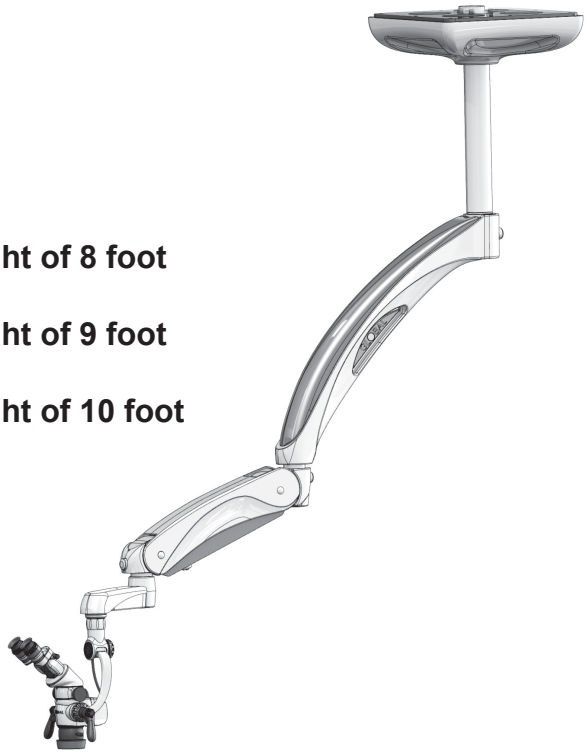
M A730C
CEILING MOUNT

M A730-C8 Ceiling Mount for a mounting height of 8 foot

M A730-C9 Ceiling Mount for a mounting height of 9 foot

M A730-C10 Ceiling Mount for a mounting height of 10 foot

shown with
M A730-45A Arm System,
M A1006 Microscope
M A1022-10 Binocular
M A1061-D50 Beamsplitter
M A1017 45° Binocular Extender
M A1028-250 Objective Lens



Floor Mount Support System Model (M A730FM) and Thru The Floor Mount (M A730FMT)
The floor mount support system model is designed to be installed on the floor in a fixed location within the office/examination room.

M A730FM
FLOOR MOUNT

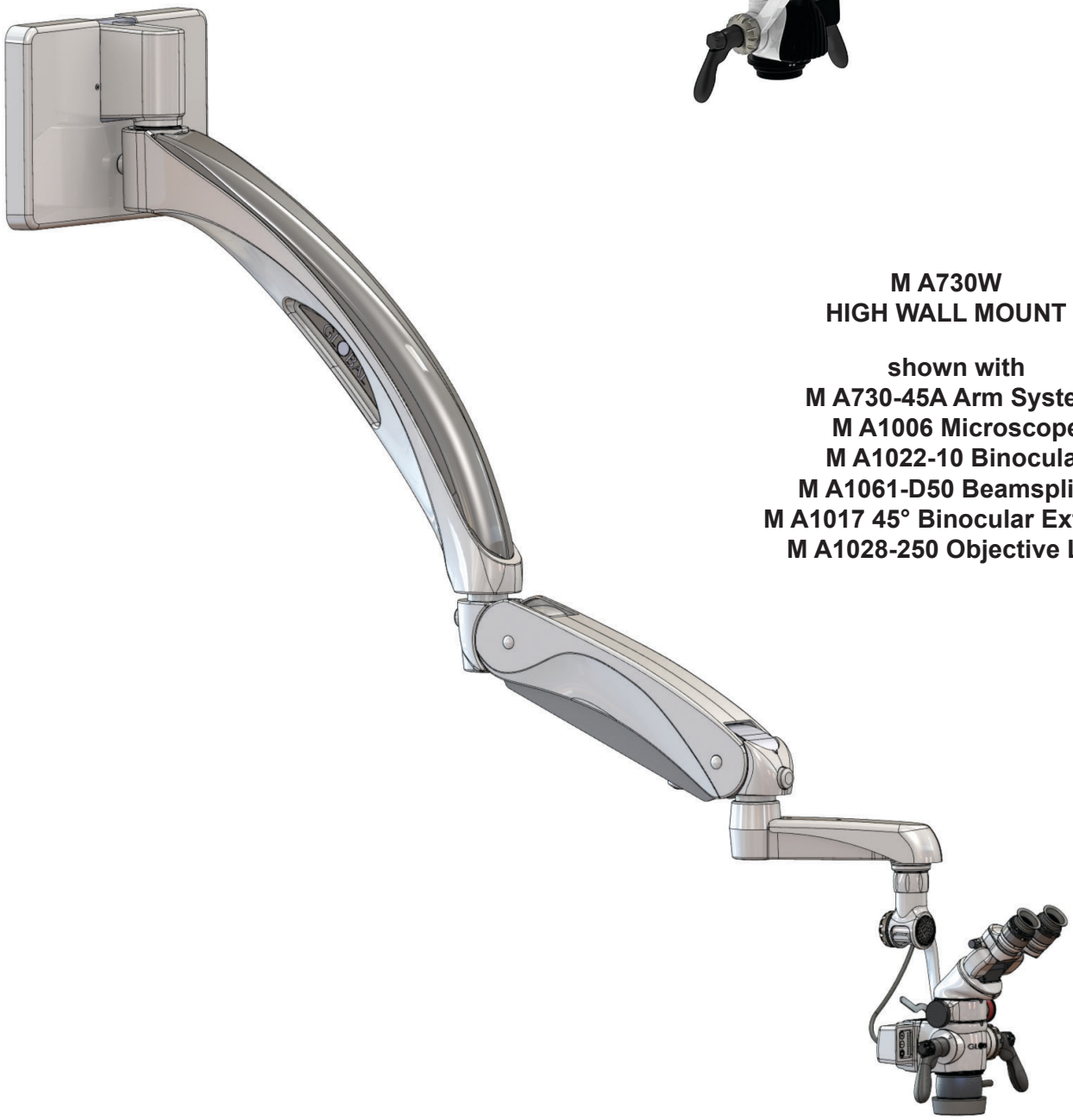
M A730FMT
FLOOR MOUNT THROUGH
THE FLOOR

shown with
M A730-HA Arm System,
M A1006 Microscope
M A1022-10 Binocular
M A1061-D50 Beamsplitter
M A1017 45° Binocular Extender
M A1028-250 Objective Lens

Wall Mount Support System Model (M A730W) The wall mount support system model is designed for areas with limited floor space. It provides an unobstructed range of working area and folds flat against the wall for convenient storage.

M A730W
WALL MOUNT

shown with
M A730-HA Arm System,
M A1006 Microscope
M A1022-10 Binocular
M A1061-D50 Beamsplitter
M A1017 45° Binocular Extender
M A1028-250 Objective Lens



M A730W
HIGH WALL MOUNT

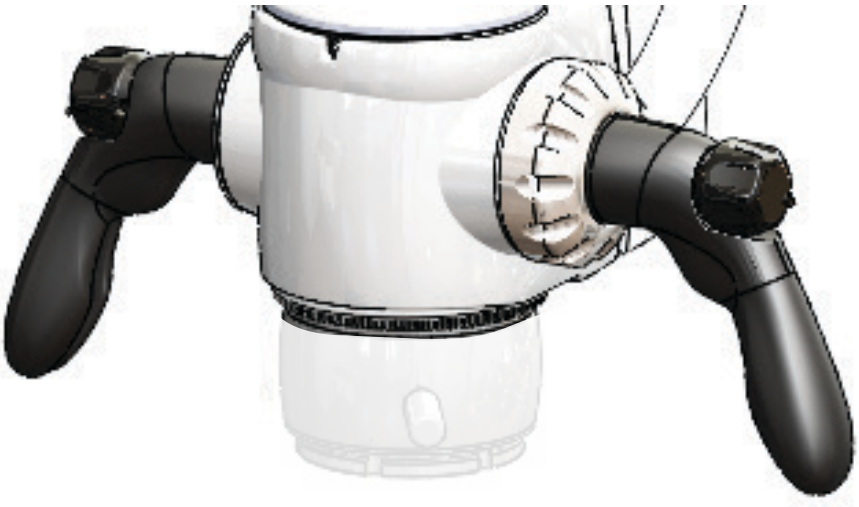
shown with
M A730-45A Arm System,
M A1006 Microscope
M A1022-10 Binocular
M A1061-D50 Beamsplitter
M A1017 45° Binocular Extender
M A1028-250 Objective Lens

4.1 Microscope Components and Accessories

Microscope Head

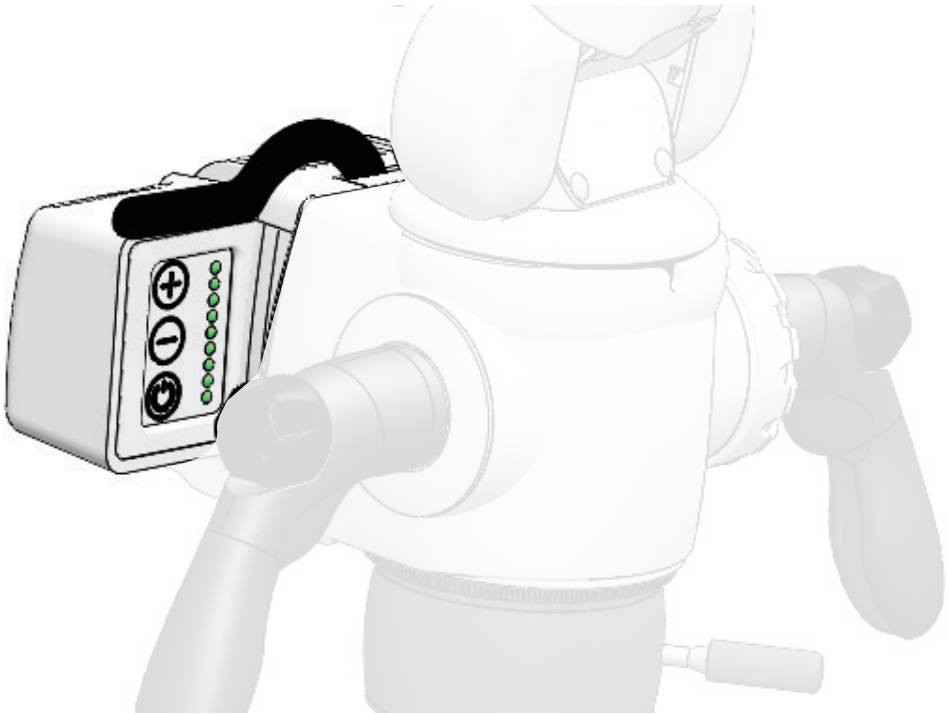
The A-Series M A1003 Microscope provides the user with 3 steps of magnification, the M A1004 provides 4 steps of magnification and the M A1006 Microscope provides 6 magnification steps.

Each of the A-Series Microscopes may be used with a variety of A-Series binoculars, objective lenses and other accessories.



M A801-LED

The A-Series M A801-LED Light Source provides light to the surgical site for illumination and improved optical clarity.



M A1047LFM Laser Filter

This laser filter is meant for use with a corresponding specific wavelength laser and A-Series Microscope System equipped with a M A1047LFM laser filter module.

M A1047LFM

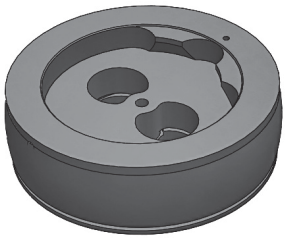
M 1047LFARG

M 1047LFERB

M 1047LFYG3

M 1047LFEC2

M A1019 Binocular Rotation Ring



Allows for better operator positioning. Rotates the binocular +/- 25 degrees.

M A512 Dual Iris Diaphragm

Allows for greater depth of field which is particularly valuable for photography.

M A1061-D50 & M A1061-DVA50 Dual Port Beamsplitter

The dual port beamsplitter models have two (2) mounting ports for camera adapters. This allows the simultaneous use of a still camera and video camera if so desired, but other configurations are certainly feasible. The dual port beamsplitters can be configured with either one 50/50 prism and one 95/5 prism, M A1061-DVA50 or with two 50/50 prisms, M A1061-D50. The beamsplitter can mount to the microscope with either prism on the right or left, depending on personal preference. The choice of which prisms to use should be based on the type of cameras intended to be mounted to the microscope.

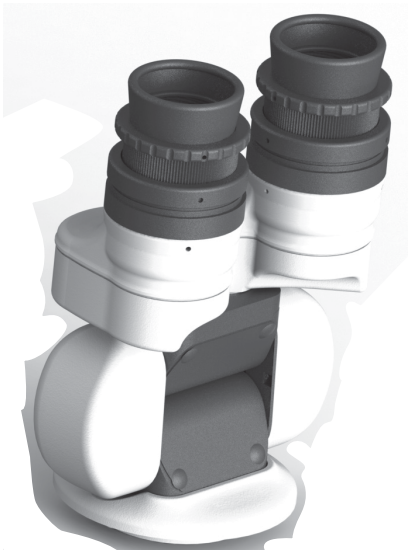
M A1061-SVA & M A1061-S50 Single Port Beamsplitter

The single port beamsplitter models have one (1) mounting port for a camera adapter. The beamsplitter can be configured with a 50/50 prism M A1061-S50 or 95/5 prism M A1061-SVA. The M A1061-S50 model directs 50% of the light through the microscope toward a camera mounted on the side of the beamsplitter, while the other 50% of light passes through to the user's eye. The M A1061-SVA prism directs only 5% of the light toward the camera while the other 95% of the light passes through to the user's eye. The beamsplitter can mount to the microscope with the port oriented toward the user's right or left, depending on personal preference. The choice of which prism to use should be based on the type of camera intended to be mounted to the microscope.

M A1017 Carr Adapter, 45° Binocular Extender

Provides ergonomic benefits by positioning the binocular higher and further from the microscope body.

M A1022 Series Binoculars



The inclinable binoculars allow for 0-220 degrees of tilt articulation. This feature accommodates multiple user heights while maintaining optimal ergonomic posture. It also allows the user to maintain this posture while moving the microscope head.

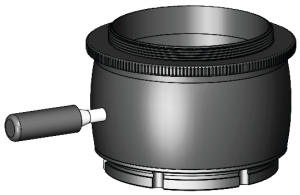
M A1021 Series Binoculars,

The inclined binoculars are a more economical choice, but limited to a fixed 45 degree tilt angle.

M A1020 Series Binoculars

The straight binoculars are for use in ENT and otolaryngology and may also be used with the binocular co-observation systems.

M A1028-200, M A1028-250, M A1028-300 Objective Lens



Convenient fine focus feature allows for easy adjustment of objective lens. Range of 20mm allows for easy focus adjustment without moving the microscope. The M A1028-200 provides 200mm working distance between the lens and the surgical site; the M A1028-250 provides 250mm and the M A1028-300 provides 300mm.

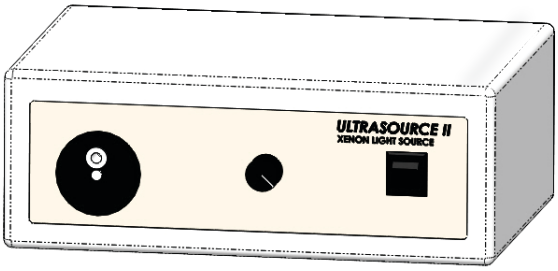
M 1028ML Multi-Focal Objective Lens

The Multi-Focal Objective Lens allows the user to focus the microscope on an object anywhere between 200 and 350mm away from the microscope without having to move the microscope. This promotes optimal ergonomic comfort and minimal adjustment throughout multiple procedures.

M A517HD1080 Series HD Color Video Camera

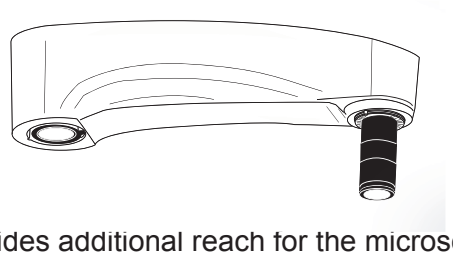
The M A517HD1080 Series high definition camera outputs HDMI video at true 1080p HD resolution. The 1/3” C-mount design offers a compact and lightweight HD video solution. The on-camera push-button is used for one-push white balance and push-hold for image flip. Use with camera adapter M A528STHDC.

M A794XA-730 UltraSource II™ Xenon LightSource



The UltraSource II™ Xenon LightSource is a high efficiency light source utilizing Xenon illumination technology.

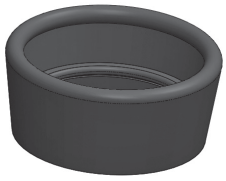
M A730-717 17” Support Extension Arm



Provides additional reach for the microscope system for use in a wide variety of office applications. This arm can be used to avoid other obstacles in offices such as x-ray units or cabinets.

Eyecups

M 1039GL



Long Silicone Eyecup for A and G-Series Binocular

5/8 inches tall for Aand G-Series binocular this is the ideal eyecup for users who do not wear glasses.

M 1039G

Low Profile
Short Silicone Eyecup for A-Series Binocular

Low profile 5/16 inches silicone eyecup for A-Series binocular. This is the ideal eyecup for users who wear glasses.

Multiple Socket-Outlet

WARNING

ONLY CONNECT ITEMS THAT GLOBAL SURGICAL HAS SPECIFIED AS BEING COMPATIBLE WITH THE MICROSCOPE SYSTEM. CONNECTING EQUIPMENT THAT IS NOT INTENDED FOR USE WITH THE MICROSCOPE SYSTEM TO THE MULTIPLE SOCKET OUTLETS MAY RESULT IN INJURY AND/OR DAMAGE TO THE MICROSCOPE SYSTEM.

WARNING

CONNECTING ELECTRICAL EQUIPMENT TO THE MULTIPLE SOCKET OUTLETS EFFECTIVELY LEADS TO CREATING A MEDICAL EQUIPMENT SYSTEM AND THE RESULT CAN BE A REDUCED LEVEL OF SAFETY.

WARNING

ADDITIONAL MULTIPLE SOCKET OUTLETS AND/OR EXTENSION CORDS SHOULD NOT BE CONNECTED TO THE MICROSCOPE SYSTEM'S MULTIPLE SOCKET OUTLETS.

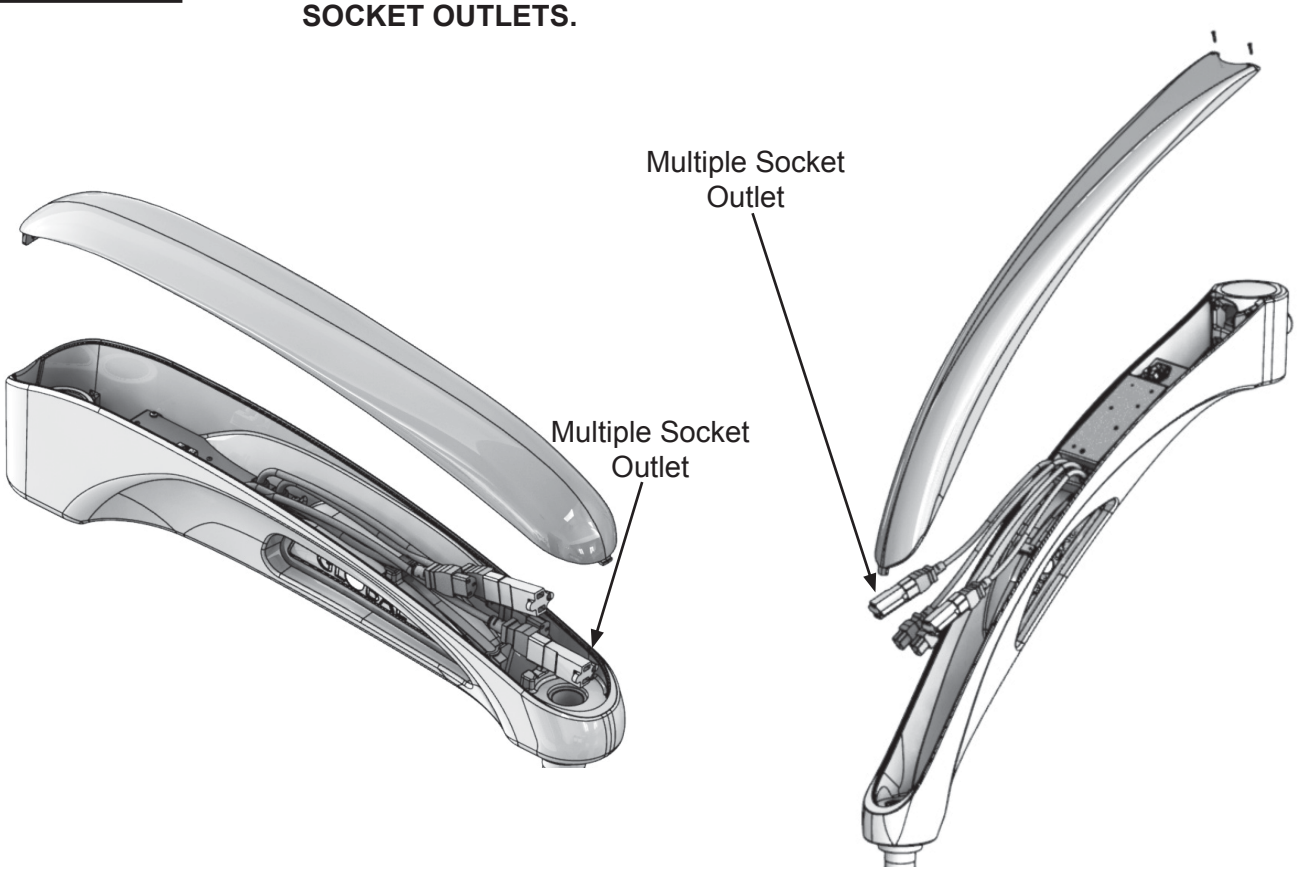


Figure 4-1 Multiple Socket Outlet

The multiple socket outlet provided with the microscope system allows for attaching additional equipment to aid in vision, lighting and documentation.

These outlets should only be used for supplying power to equipment that is intended to form part of the medical equipment system: digital camera, video camera, Xenon Ultrasource LightSource, and TV monitor. Please refer to International Standard IEC 60601-1:2005, Medical electrical equipment – Part 1: General requirements for basic safety and essential performance, for the requirements that are applicable to a medical equipment system.

The maximum permitted load for the microscope system is 240 VAC.

4.2 Installation of Optical Accessories

Installation of the A-Series Binocular

To install the binocular, **Refer to Figure 4-2** and proceed as follows:

1. Loosen the set screw on the microscope body with a 5/64” hex wrench so it will not interfere with the dovetail-shaped bottom of the binocular head.

2. Slide the binocular head into the retaining ring so the dovetail-shaped bottom slides under the two wedge-shaped tabs at the rear of the retaining ring.

3. To align the binocular, position the binocular head so the U-Shaped slot at the rear of the binocular base is installed over the slotted screw in the binocular retaining ring.

4. Tighten the set screw. When the microscope body and the binocular head are properly aligned, the binocular head will not rotate in the binocular retaining ring.

NOTICE

M A1047LFM Laser Filter, M A1019 Binocular Rotation Ring, M A512 Dual Iris Diaphragm, M A1061-D50 & M A1061-DVA50 Dual Port Beamsplitter, M A1061-SVA & M A1061-S50 Single Port Virtual Beamsplitter, M A1017 Carr Adapter will install in very much the same way. See the installation instructions that are included with each accessory.

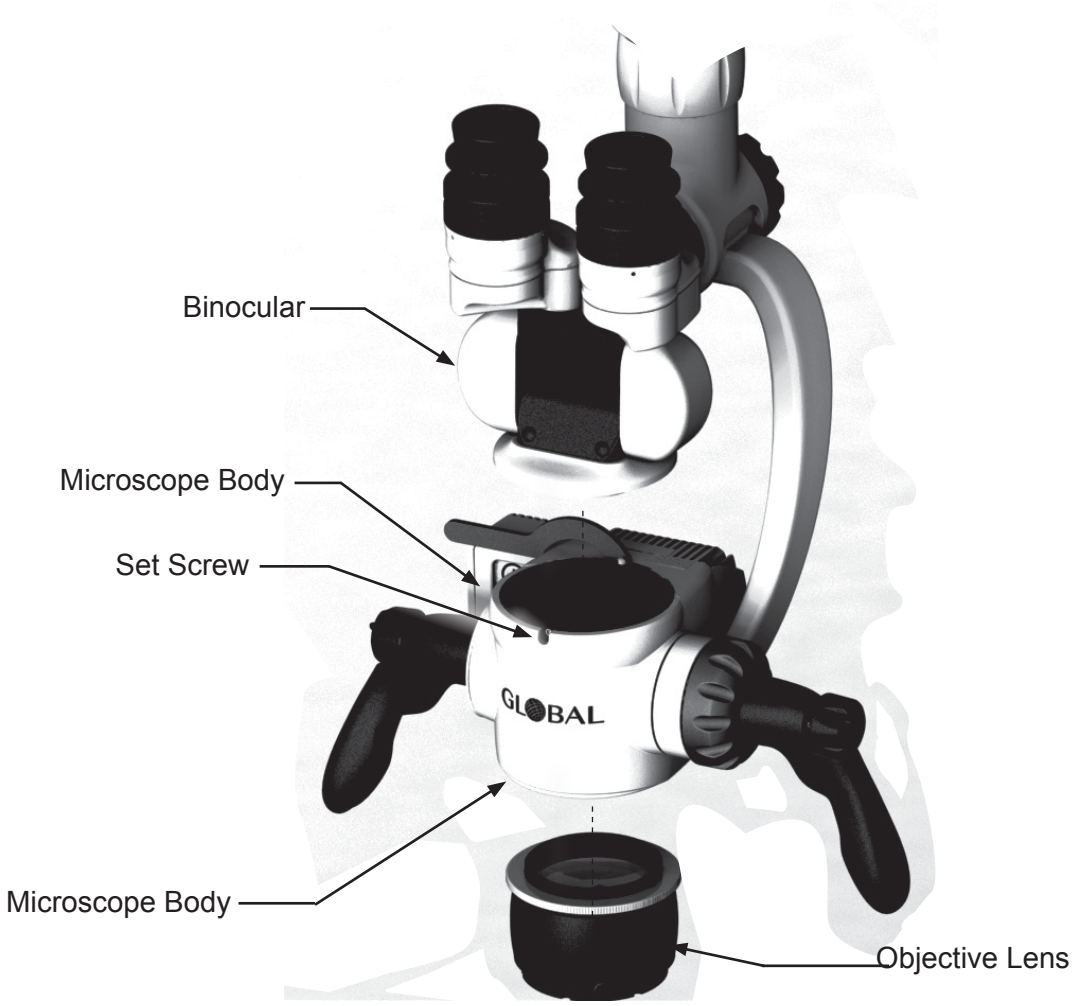


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Figure 4-2 Installation of the A-Series M A1003, M A1004, and M A1006 Optics

4.3 Installation of the Multi Focal Objective Lens

To install the threaded objective lens to the microscope body, **Refer to Figure 4-3** and proceed as follows:

NOTICE The knob is shipped unattached. Do not attach until after the multi-focal lens is assembled to the microscope.

1. Ensure the lock ring is threaded down fully on the Multi Focal lens before installing the lens on the microscope body.

2. Thread the Multi Focal lens into the microscope body in the direction of the arrow shown until the lens stops.

3. The knob location can be positioned for user comfort. Back the lens out of the microscope body (NO MORE THAN 1 FULL TURN) to position the knob shaft in the desired location (right side for right-handed user or left side for left-handed user is recommended).

4. While holding the multi-focal lens body, turn the lock ring until it is tight against the bottom of the microscope body. This prevents the multi-focal lens from rotating after installation.

5. Attach the knob by pushing it onto the shaft until fully seated.

NOTICE The M A1028-200, M A1028-250 and M A1028-300 fine focus will install in very much the same way. See the installation instructions that are included with each accessory.

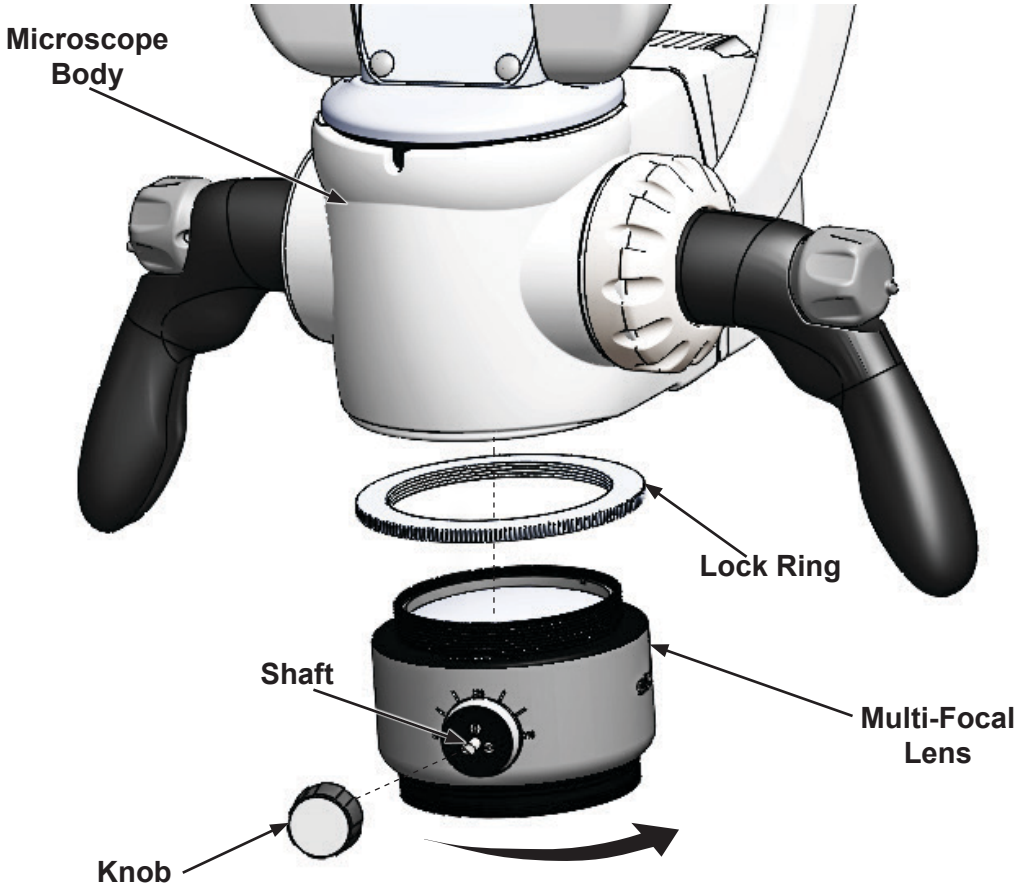


Figure 4-3 Installation of the A-Series™ M A1028ML Multi-Focal Lens

5.1 Turning On The System

WARNING **THIS UNIT MUST BE USED ONLY WITH HOSPITAL GRADE EARTH-GROUNDED AC OUTLETS.**

Plug in the system into a hospital grade earth-ground AC outlet. Turn power on to the system by depressing the LED power button. The green indicator light(s) at the lowest setting will come on indicating that there is power to the system and the intensity setting. When the LED power button is depressed again the light(s) will extinguish indicating that the power to the system is turned off. Depress the power button again and the LED will come on at the last intensity setting used. **See Section 5.13** "M A801-LED Light Source Operation" or the LED owner's manual 110-013-081 for instructions.

If set up with a wall switch make sure the wall switch is turned on and then depress the LED power button.

To safely terminate the operation of the microscope system, unplug the microscope or turn off the microscope via wall switch where applicable.

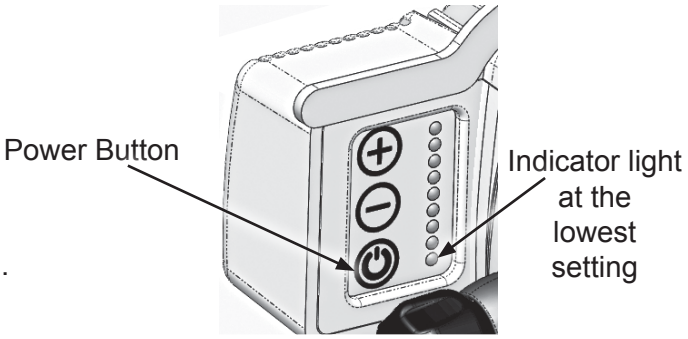


Figure 5-1 Power Button

5.2 Description and Location of Controls

Figure 5-2 shows the location of the system controls.

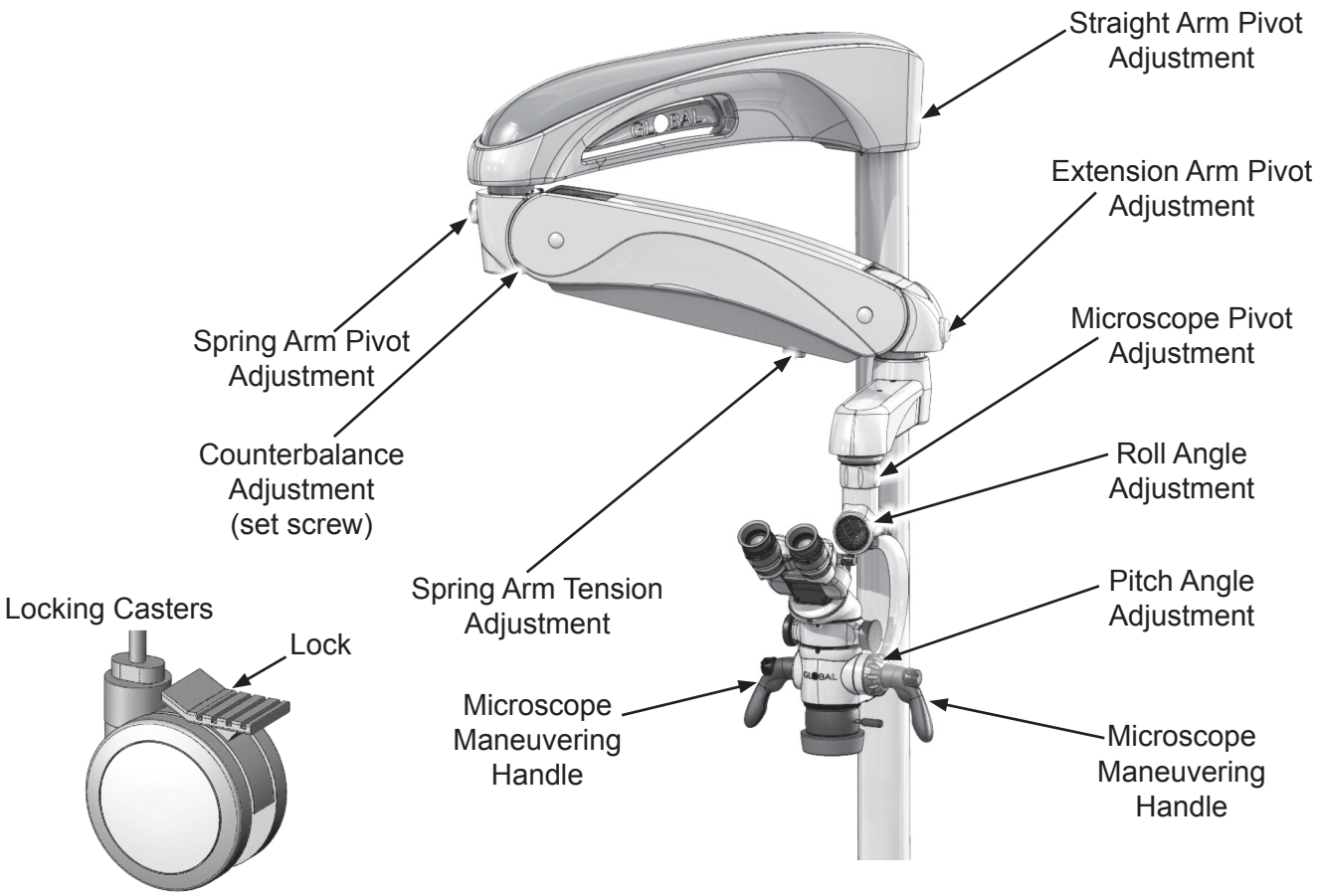


Figure 5-2 Location of Controls

It is best to set the feel of the microscope before attempting to use the microscope so the user comfort is optimized for the microscope procedures.

5.3 Counterbalancing Adjustment

Counterbalancing is done to ensure the microscope head moves with very little pressure (typically from user pressing on the eyecups) To do this the weight of the microscope head must be counterbalanced with the spring arm.

The upward lift of the spring arm assembly can be adjusted to match the weight of the microscope and its accessories. This adjustment is called “counterbalancing”. Before adjusting the counterbalance, ensure that all accessories are installed on the microscope and the spring arm tension adjustment knob is loose. To loosen the spring arm tension adjustment knob turn the knob clockwise. Insert the 3/16” hex wrench into the center hex-socket screw (located under the end of the spring arm assembly that attaches to the horizontal arm) and turn the tool to the right (clockwise) if the microscope falls when released, or turn the tool to the left (counter-clockwise) if the microscope rises when released.
See Figure 5-3

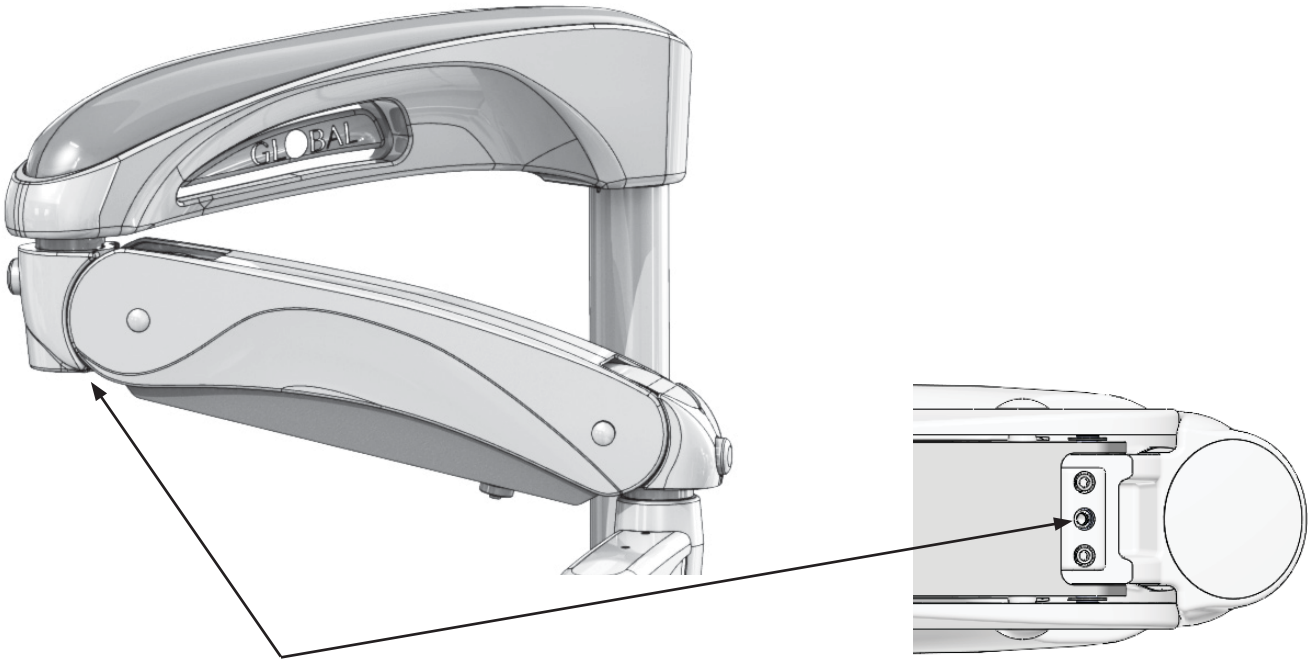


Figure 5-3 Counterbalancing Adjustment

5.4 Spring Arm Tension Adjustment

Adjusts the amount of tension required to move the spring arm up and down. Turn the knob to adjust the spring arm tension. **See Figure 5-2**

5.5 Pivot Adjustment

Adjusts the amount of effort required to rotate the spring arm and extension arm from side to side. Push in the pivot knob until it pops out. Turn the pivot adjustment knob to the right to tighten the tension or turn to the left to loosen the tension. **See Figure 5-4**

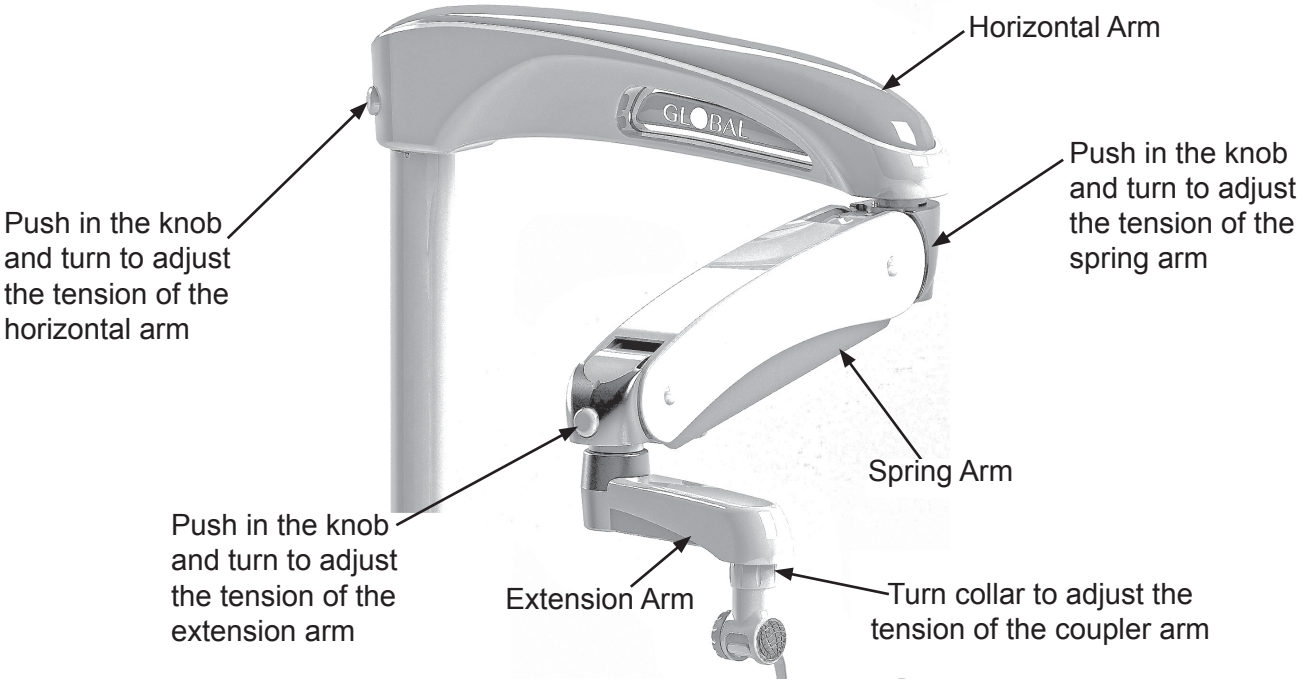


Figure 5-4 Pivot Adjustment

5.6 Roll Angle Adjustment

Adjusts the amount of tension required to rotate the microscope right or left. It can be adjusted by tightening or loosening the roll angle adjustment knob. This knob is located at the rear of the coupler arm. **See Figure 5-5**

5.7 Pitch Angle Adjustment

Adjusts the amount of tension required to rotate the microscope forward or backward. It is adjusted by tightening or loosening the pitch angle adjustment knob. This knob is located on the right side of the microscope body. **See Figure 5-5**

5.8 Floorstand Locking Casters

To secure the support system after it is rolled to its desired location, engage the locks on the casters. The lock is pushed down to obstruct regular wheel movement. This fixes the support system into a desired place. You can pull up the caster lock to release the wheel and move the support system, if necessary. **See Figure 5-2**

5.9 Microscope Maneuvering Handles

Maneuvering handles can be adjusted to user's preferred position. To change the position of the maneuvering handles, depress the handles in towards the body of the microscope. While depressing the handles, position the handles to a position comfortable for your purposes and then release the handles. The handles will lock into place. **See Figure 5-5**

5.10 Microscope Components

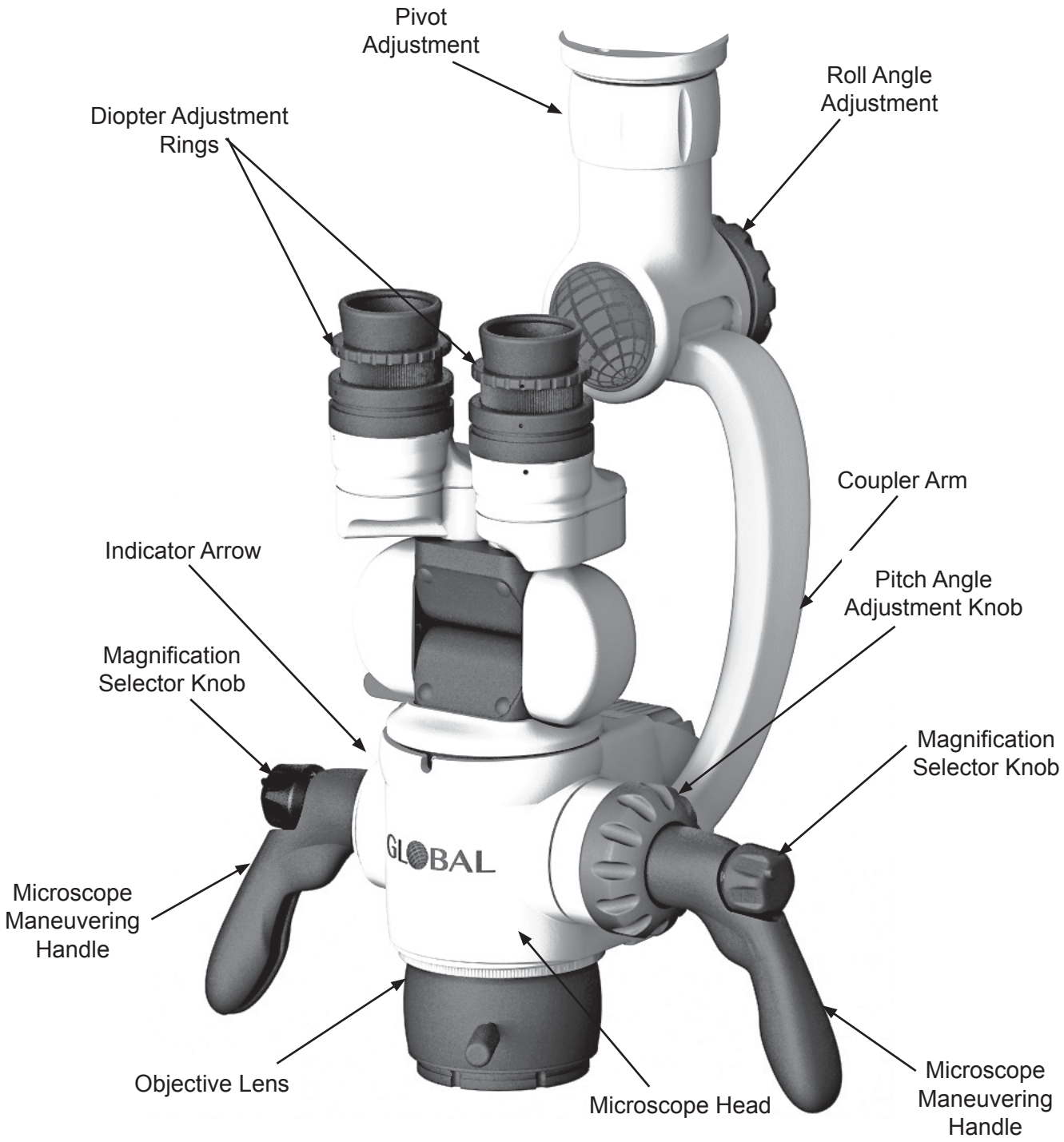


Figure 5-5 Microscope Components

5.11 Magnification Selection

All A-Series M A1003, M A1004 and M A1006 Microscopes have two magnification factor selection knobs, one on each side of the microscope body. Either of these knobs should be turned until the desired magnification factor is facing the indicator arrow on the left side of the microscope body.

See Section 9, Technical Information, for the magnification and focal length information.

5.12 Focusing The Microscope

The coarse focus on the microscope system is achieved by raising or lowering the microscope assembly with the spring arm. Fine focus is obtained by moving the fine focus objective lens.

The parfocal adjustment of the microscope allows the user to adjust the eyepieces to correct for nearsightedness or farsightedness. It is essential to perform the parfocal adjustment prior to using any still or video camera applications. If the parfocal adjustment is not performed, the microscope can still be focused on a selected magnification, but other magnification settings may not be in focus.

The steps listed below should be followed for making the parfocal adjustments on the microscope:

1. Each operator of the microscope will require his or her own parfocal settings which should be set before any procedures are performed. Due to changes in eye correction associated with time, it is recommended that this procedure be performed by each operator a minimum of one time per year.

2. Position the microscope above a flat stationary surface, with the bottom of the objective lens parallel to the surface.

3. Using a pen or pencil, mark an “X” on a piece of white paper for a focusing target and place it in the center of the illumination field of the microscope.

4. Depress the diopter tension lever and set the diopter adjustment rings on both eyepieces to “0”. **See Section 5.18** for additional information.

5. Without looking through the binoculars, adjust the fine focus objective lens to its approximate midpoint.

6. Set the magnification to the highest setting. Raise or lower the microscope vertically until the “X” is in optimum focus.

7. Adjust the fine focus objective lens until a sharp focus is acquired.

8. Tighten the spring arm tension adjustment (**See Figure 5-2** for location) on the spring arm assembly to prevent the microscope from moving. Set the magnification to the lowest setting. Focus both eyepieces, one at a time, by turning the diopter adjustment ring until the image is clear and sharp.

NOTICE It is particularly important to perform the parfocal procedure when an image through the microscope is clear but the same image through a still or video camera is not focused, or vice-versa.

Use direct vision whenever possible to free hands for instruments.

5.13 M A801-LED Light Source Operation

Once the light source is installed, it is ready for operation. The light source has instant on/off capabilities. The power button will toggle power off and on with each press of the button. When power is first applied to the light source, the green bottom indicator light will turn on. When the power button is pressed off and then on again the last level used will be illuminated. **See Figure 5-6**

WARNING **BEFORE operating the light source, refer to the Owner's Manual 110-013-081 for any warnings and cautions associated with the use of the Light Source to ensure safe operation.**

NOTICE **The LED light source has been tested according to IEC 60601-2-57 Non-laser light source. The test results show no photobiological hazard associated with the use of this LED light source as it is intended, to include hazards associated with blue light wavelengths.**

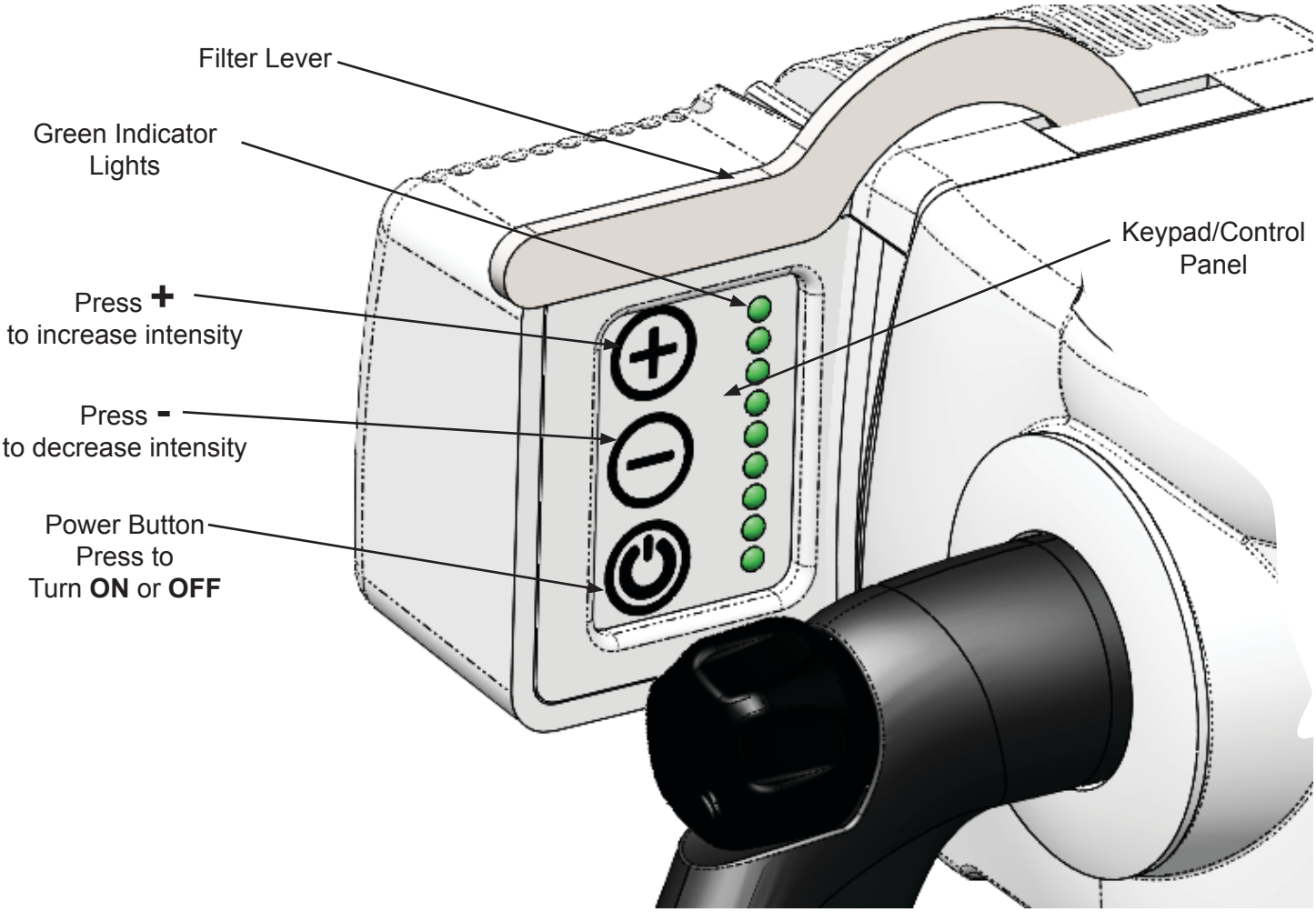


Figure 5-6 LED Control Panel

5.14 Brightness Settings and Memory

There are nine levels of brightness which can be selected using the ⊕ and ⊖ buttons while the power is on. The level of brightness is indicated by the green indicator lights located on the keypad/control panel. An indicator light will light up for each increase in brightness. **See Figure 5-6.**

The ⊕ button is used to increase brightness setting. Each press will increase light source brightness. Any additional press of ⊕ will have no effect once the highest setting is reached.

The ⊖ button is used to decrease brightness setting. Each press will decrease light source brightness. Any additional press of ⊖ will have no effect once the lowest setting is reached.

Each button performs its intended function when the button is pressed. Holding a button has no effect. For example to increase the brightness from minimum to maximum, the user must press and release the ⊕ button eight times. Pressing and holding the ⊕ button will only increase the brightness to the next higher setting.

The light source has a recall feature. This feature remembers the last level of brightness used before being powered off. Any time the light source is powered on, the brightness level will be at the last level used.

5.15 Filter

The LED light source emits white light, which includes all the colors of light combined in the visible light spectrum. Depending on what area of the patient is illuminated, a filter may be used to enhance the observation through the microscope. The LED light source has two kinds of filters: an amber filter (composite) and a green filter.

The use of the amber filter (composite) helps reduce the emissions of wavelengths below 520 nm (blue light) which are used to cure dental resins.

The use of the green filter provides a higher contrast of tissue by reducing the emissions of wavelengths around 650 nm (red light).

See M A801-LED Owner's Manual 110-013-081 for operation informati

Filter Lever **DOWN**
for
NO FILTER

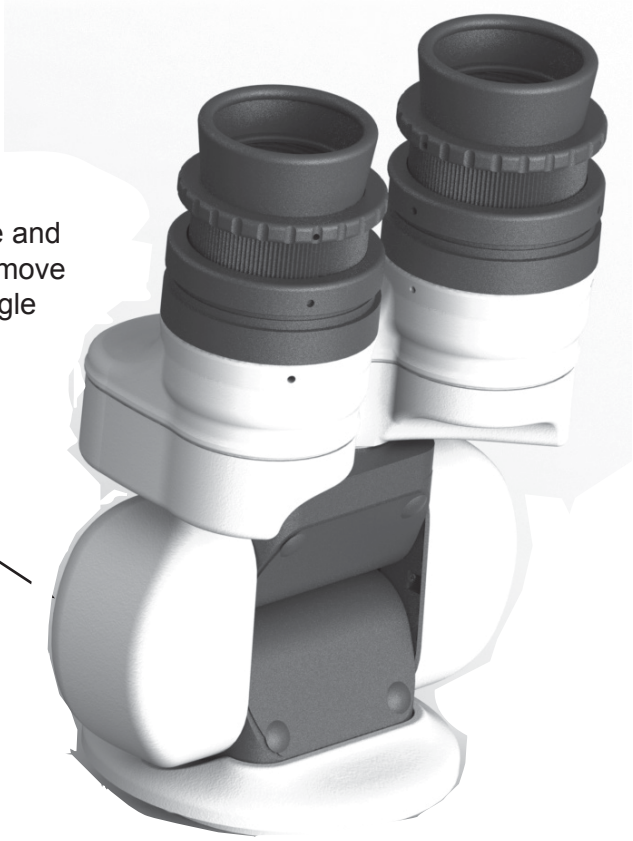
Filter Lever **CENTER**
for
AMBER DENTAL COMPOSITE FILTER

Filter Lever **UP**
for
GREEN FILTER

Figure 5-7 LED Filter

5.16 Binocular Adjustment

The distance between the user's eyes is called the **inter-pupillary distance**. The inter-pupillary distance of the binocular **must** be adjusted to match the user's eyes in order to maintain proper stereoscopic vision. To adjust the binocular, the user should look into both eyepieces, grasp the binocular by the side and spread the eyepieces apart or move them closer together until a single image forms. A grid of the inter-pupillary distance in millimeters is engraved on the binocular for reference.



5.17 Eyepieces

The eyepieces used on A-Series Microscopes are high eye point eyepieces. This means that a full-sized image is formed approximately one inch (25 mm) above the eyepiece to assist users who wear glasses.

Eyecups are used to position the user's head at the correct distance from the eyepiece without the user becoming fatigued. The eyecups on the A-Series M A1003, M A1004, M A1006 Microscopes are adjustable to provide maximum comfort for the user. To lower the eyecup, grasp the rubber eyecup and turn it clockwise. Turning it counterclockwise will raise the eyecup. The eyecups are properly adjusted when the user's eyes (or glasses) are touching the eyecups with the image through the microscope in full view. Reference lines are provided on the outside surface of the eyecups to verify that both are adjusted to the same height.

5.18 Diopter Adjustment

Each binocular eyepiece is equipped with a diopter adjustment ring which is marked in plus(+) or minus(-) one diopter increments. To adjust the diopter setting, firmly grasp the diopter adjustment ring and adjust the settings until the image is clear and sharp.

The diopter adjustment corrects for the user's vision prescription, providing relaxed 20/20 vision with or without glasses or contact lenses. The diopter adjustment has a correction range of +5 diopters to -5 diopters. Users with natural correction outside this range must wear additional corrective lenses to achieve relaxed 20/20 vision.

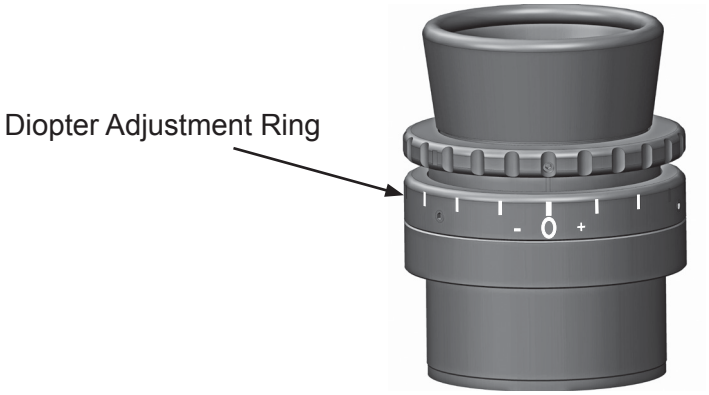
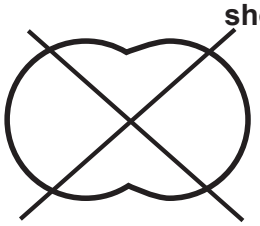
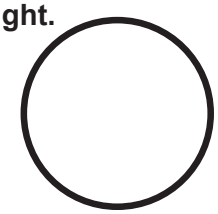


Image through the Binocular should form a single circle as shown at the right.



IPD Wrong



IPD Correct

Figure 5-9 Diopter Adjustment

5.19 Fuse Replacement

WARNING **CONTACT GLOBAL TECHNICAL SUPPORT BEFORE REPLACING THE FUSE.**

WARNING **DISCONNECT ALL ELECTRICAL POWER PRIOR TO REPLACING FUSE.**

WARNING **USE ONLY A 5MM X 20MM CYLINDER, SLOW-BLOW, 6 AMP 250 VOLT FUSE.**

WARNING **NEVER REPLACE A BLOWN FUSE WITH A HIGHER-AMP FUSE. ALWAYS REPLACE THE FUSE WITH ONE WITH THE SPECIFIED AMP RATING.**

The fuse protects your electrical components in the system from a sudden and unexpected power surge.

To replace the fuses follow the steps below:

1. Unplug the power cord from the outlet to remove power to the system.
2. Remove the screw(s) holding the cover on the arm. **See Figure 5-10**
3. Remove the cover.
4. Open the fuse compartment cover.
5. Remove both fuses even if only one fuse is blown.
6. Replace with two (2) new 5mm x 20mm cylinder, slow-blow, 6 Amp 250 Volt Fuses.
7. Replace arm cover and insert screw(s) into arm and tighten.
8. Plug the power cord back into the outlet.

NOTICE If your new fuse blows soon after installing it, you could have problems in that circuit. Contact Global Surgical Technical Support for assistance.

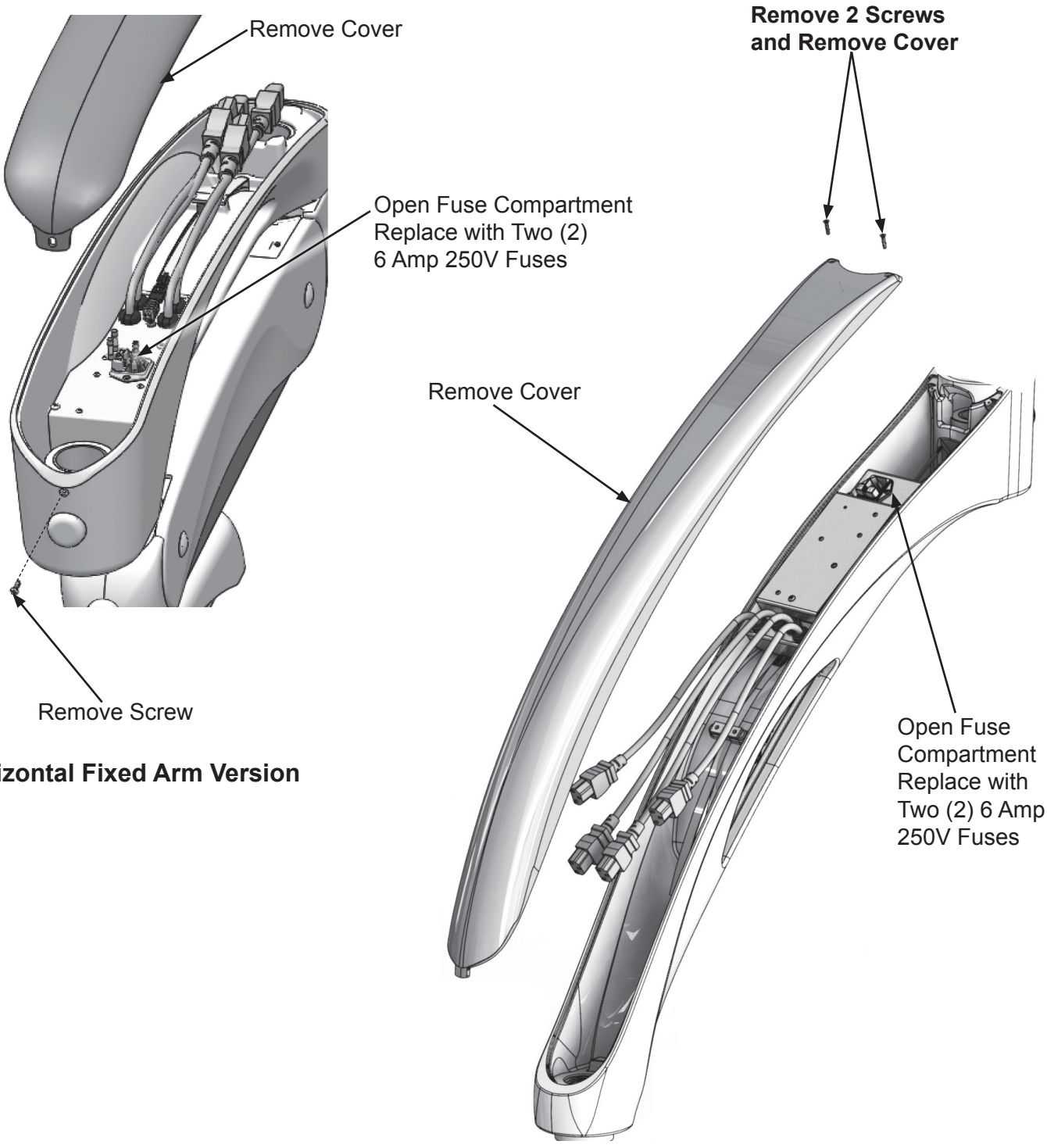


Figure 5-10 Fuse Replacement

WARNING **DISCONNECT ALL ELECTRICAL POWER PRIOR TO CLEANING AND DISINFECTING. RISK OF ELECTRIC SHOCK RESULTING IN DEATH OR INJURY IS POSSIBLE IF THE ELECTRICAL POWER IS NOT DISCONNECTED PRIOR TO CLEANING THE UNIT.**

NOTICE Clean and disinfect after every patient according to CDC and OSHA requirements for non-critical devices.

6.1 Cleaning and Disinfecting

1. The support system can be cleaned with any cleaning agent, which is used for external cleaning of electrical equipment, according to instructions given by the manufacturer of the cleaning solution. Do not use cleaning agents that are not permitted for use with plastics, i.e., ammonia, acetone, salty acids (HCl), etc.

2. Do not allow excessive moisture or liquids to come in direct contact with the unit.

3. Avoid spraying optical components.

4. Do not allow cleaning agents or liquids to enter the power input.

5. Use any disinfectant agents which are commonly applied while disinfecting surfaces of electric medical equipment. Such disinfectant agents are usually in the form of sprays or damp cloths.

6. Follow the instructions given by the manufacturer of the disinfectant solution.

6.2 Cleaning the Microscope Optics

The exposed lens surfaces of the microscope system should only be cleaned when necessary to remove dust, fingerprints and other smudges. Handling optics increases their chances of getting dirty or damaged. Extreme care should be taken to avoid scratching the coated surfaces of the lenses. You should not touch any exposed lens surfaces as oil and debris from your hands can stain or damage optical coatings.

Use a low-lint soft cloth wetted with isopropyl alcohol in a circular motion starting in the center and working out towards the edge of the lens. Clean edges with a low-lint cotton-tipped swab.

7.1 Troubleshooting

Table 7-1 (below) lists some symptoms, possible causes and solutions.

Table 7-1 Troubleshooting Guide

Symptoms	Solutions
No power to the system	Ensure that the AC power cord is properly connected.
	Verify building circuit breaker is not tripped, or that another device works in the same outlet.
	Check the system's fuses. If necessary, replace. Replace both fuses if either is blown.
System arms are hard to rotate right to left	The spring arm tension adjustment knob is adjusted too tight.
Vertical movement is difficult	Adjust counterbalance per Section 5.3.
Vertical position of arms/ microscope doesn't stay in position when released	Adjust counterbalance per Section 5.3.
System arms drift horizontally on their own	Apply slight tension to the spring arm tension adjustment. If still drifting, ensure wall, floor mount, or ceiling mount is installed level and plumb. If floorstand arms are still drifting, move to a different location on the floor and ensure column screws are tight.
Floorstand seems unstable	Ensure that both weights are installed in the base (under the plastic cover)
Floorstand is difficult to roll	Ensure that all the casters are unlocked.
LED light source does not turn on	Remove horizontal arm, spring arm, or 45 degree arm, and extension arm covers. Check for damaged or pinched cable.
	Ensure filter lever is located at one of the three correct positions.
	Remove horizontal or 45 °arm cover, check to ensure that the LED power cord is securely plugged into one of the plugs on the multiple socket outlet located in the horizontal or 45° arm.
For all other issues not covered above	Call Global Surgical Technical Services See Section 8.2 for contact information.

8.1 Warranty Information

Global Surgical Corporation warranty information is located at:
http://www.globalsurgical.com/warranty.html

90-Day Money-back Guarantee on Microscopes and Accessories.
The microscope and microscope accessories you purchase will be unconditionally guaranteed and risk-free. You may return a product to Global in good condition for any reason within 90 days of invoice and receive a full product refund. Custom microscope parts are excluded from this policy. This money-back guarantee applies to the U.S. and Canada only.

Microscope Limited Lifetime Warranty
Your microscope will include an unprecedented lifetime warranty, including parts and labor, for all optical and support components. Please refer to detailed Limited Lifetime Warranty below.

Upgradeable
We will continue to do our best to design our microscopes to be modular and upgradeable, thus greatly minimizing the possibility of obsolescence.

Microscope Limited Lifetime Warranty
Except as set forth in this Limited Lifetime Warranty, Global Surgical Corporation (the "Company") hereby warrants that each microscope product manufactured and sold by the company ("Product") shall be free from defects in materials and workmanship under normal use and service for the life of the product. This warranty is non-transferable and is valid only with respect to the original purchase of the product. The Company's obligation under this warranty shall be limited to repairing or replacing at the Company's facility and at the Company's expense, any parts of components that are demonstrated to be defective. The purchaser shall be responsible for shipment of the product to and from the Company's facility at 3610 Tree Court Industrial Boulevard, St. Louis, Missouri, 63122, Attention: Technical Service, or such other facility as the Company may otherwise designate. Under certain circumstances which are pre-approved by the Company, necessary repairs may be made at the purchaser's facility.

A return authorization is required before returning any product for warranty service by calling 1-800-861-3610. The customer is responsible for all shipping expenses. Global Surgical suggests using a method that will allow you to track the package in the event it does not arrive. Global also recommends you insure the package.

This warranty shall not be applicable to: (I) any electrically-driven products sold by the Company, (II) any products which are not manufactured by the Company which may be attached to the product, such as video equipment, camera equipment, recording devices, monitors, printers (III) any components which are consumable or are required to be replaced or disposed of in connection with normal use of the product, such as lamps, fiber optic cables, rubber eyecups and drapes, or (IV) any product which was purchased prior to April 27, 1994.

This warranty shall be void and of no effect: (I) if the product is damaged due to misuse, use in a manner other than pursuant to the instructions for the use of Product, abuse, physical mishandling or natural causes such as flood, fire, earthquake, or other perils, as determined by the Company, or (II) if any repairs or replacements are made by persons not authorized by the Company to perform such services.

The warranties set forth herein are in lieu of any and all other warranties, expressed or implied, including, without limitation, warranties of merchantability and fitness for a particular purpose. Purchaser's rights thereunder are granted in lieu of any other rights purchaser may have and purchaser hereby waives all other rights, warranties, remedies or guarantees whatsoever with respect to the product. The Company shall not be liable for any third parties with respect to the product or its performance. Further, the Company shall not be liable for, and purchaser hereby releases the Company from any direct, or indirect, consequential, special, and incidental or punitive damages with respect to the product. In no event shall the Company be liable for any breach of warranty or other claim in an amount exceeding the purchase price of the product.

Warranty for Microscope products not included in the Limited Lifetime Warranty:
Electrical and electronic components, except for the LED lightsource, have a one-year warranty. The LED lightsource has a three-year warranty.

Consumables such as fiber optic cables, eyecups etc., have a one-year warranty. Light bulbs have a warranty equal to that given by the manufacturer.

This warranty applies to the U.S. and Canada only.

For international warranty information: Email: international@globalsurgical.com
Phone: 1-636-861-3388, Fax: 1-636-861-2969

8.2 Technical Services Department

When contacting our Technical Services Department, you will be served by highly knowledgeable representatives in an efficient manner. If service is required at your location, a skilled technician or sales representive will be dispatched within 24 hours.

If you have questions that are not covered in this manual, please call the Global Surgical Technical Services Department as listed below:

Toll Free Number:	1-800-861-3610
Technical Services Representatives:	1-636-861-3388
Fax Number:	1-636-861-5284
Email:	techservice@globalsurgical.com

The staffing hours for the Global Surgical Technical Services Department are Monday through Friday from 8:00 a.m. to 5:00 p.m. Central Standard Time.

Internet Access

The Global Surgical Technical Services website has information about additional products and services and can be reached by using the online at: http://www.globalsurgical.com.

Service Information

In the event of any malfunction, you should immediately contact the Global Surgical Technical Services Department for assistance. A **Customer Identification Number and Customer Order Number** will be needed when contacting the Technical Services Department. These numbers are printed on your invoice. To save time in the event service is needed, record these numbers in the spaces provided in the front of this manual.

A **Return Material Authorization (RMA) number** must be obtained from the Global Surgical Technical Services Department prior to returning a product for repair. The following information must accompany all returned units:

1. Your name, address, and telephone number
2. The RMA number
3. A description of the problem

Ship or return the product to:

Global Surgical Corporation
3610 Tree Court Industrial Blvd.
St. Louis, MO 63122
Attention: Technical Services Department

Table 9-1 Microscope Support System Specifications

SPECIFICATIONS		M A730 MICROSCOPE SUPPORT SYSTEM
Model		**Shipping Weight**
Floor Systems:	M A730F	187 lbs. (85kg)
	M A730FM	50 lbs. (23kg)
	M A730FMT	65 lbs. (29kg)
Ceiling Systems:	M A730C	30 lbs. (14kg) Required for M A730-C8, M A730-C9, M A730-C10
	M A730CMF	31 lbs. (14kg) Required for M A730-C8, M A730-C9, M A730-C10
	M A730-C8	15 lbs. (7kg)
	M A730-C9	21 lbs. (10kg)
	M A730-C10	27 lbs. (12kg)
Wall Systems:	M A730W	28 lbs. (13kg)
Arm System:	M A730-HA	40 lbs. (18kg)
	M A730-45A	50 lbs. (23kg)
Weight the supporting structure must hold:		500 pounds (227 kg)
Electrical Receptacle Requirements: Recommended, but not required, connection should be made to a dedicated circuit breaker, and for Ceiling Mount and High Wall Mount use a receptacle controlled with a wall switch.		115 VAC, 15 A, 50/60 Hz 230 VAC, 15 A, 50/60 Hz Standard: Duplex Outlet
Ceiling Mounting Surface:		
8’ (2.44 m) Mounting Surface		8’ (2.44 mm) high 2” x 8” (51 mm x 203 mm) or larger joists on 16” (406 mm) centers: **Use Model M A730-C8**
9’ (2.74 m) Mounting Surface		**Use Model M A730-C9** (Same as Model M A730-C8 except column is 12” (305 mm) longer)
10’ (3.05 m) Mounting Surface		**Use Model M A730-C10** (Same as Model M A730C8 except column is 24” (610 mm) longer)
Custom		Special construction by independent contractor must meet the above specifications. * If mounting to a ceiling that does not have wooden mounting surfaces, mount is considered “custom” and all hardware is to be supplied by contractor.
Wall Surfaces:		Standard: 2” x 4” (51 mm x 101 mm) wood studs on 16” (406 mm) centers. **If metal studs:** order wall mount board M W557-32. **If 24” (610 mm) centers:** wood or metal order special mounting board M 557 **Note:** Contractor to reinforce metal studded walls or particle walls. **OR:** Standard Concrete (Cinder) Block 8” x 16” (203 mm x 406 mm)

Table 9-2 A-Series Binocular Focal Lengths

Binocular Model	Focal Length
M A1020 Series Straight Binocular	125 mm
M A1021 Series 45° Inclined Binocular	160 mm
M A1022 Series 220° Inclinable Binocular	160 mm

Table 9-3 M A801-LED Storage and Operation Specifications

ITEM	SPECIFICATION
Light Source Type	Light Emitting Diode (LED)
Color Temperature	5500°K
LED Life	50,000 Hours (typical)
Brightness Control	Controls Light Output Range from 30%-100%
Power Consumption	25 Watts
Input Voltage	90-240 VAC, 50/60 Hz, 0.9A
Output Voltage	25-35 VDC,(Variable, Dependant on Brightness) Constant 0.70A
Mode of Operation	Continuous Operation
Water Resistant	Non-Protected Equipment, IPX0
Operation Environment: Temperature Relative Humidity Air Pressure	 +10° to +40°C (50° to 104°F) 0 to 95% 700 to 1060 kPa
Storage Environment: Temperature Relative Humidity Air Pressure	 -20° to +60°C (-4° to 140°F) 0 to 95% 700 to 1060 kPa
Dimensions	4.70 in (119 mm) W x 3.25 in (83 mm) H x 3.0 in (76 mm) D
Weight	1.65 lbs (74 kg 140g)
IEC 62471 Risk Group	0
Regulations / Standards	Conforms to AAMI Std ES60601-1 & IEC 60601-1-6 Certified to CSA Stds C22.2 #s 60601-1 & 60601-1-6 FCC 47CFR 15B 15.103 IEC 60601-2-57
Maximum Optical Radiation Output	118.2 Lx
Maximum Variation of Output	147 Lx
Spectral Irradiance	$3.7 \times 10^{-3} \frac{W}{M^2}$@ 400nm,$3.23 \times 10^{-3} \frac{W}{M^2}$@ 750nm,$3.32 \times 10^{-3} \frac{W}{M^2}$@ 1000nm

Table 9-4 A-Series Microscope Total Magnification Chart

			Turret Magnification Factor (X)						
			0.33	0.5	0.8	1.0	1.25	2.0	3.0
A-Series A3 Microscope				X		X		X	
A-Series A4 Microscope				X	X		X	X	
A-Series A6 Microscope			X	X	X		X	X	X
Binocular Focal Length (MM)	Objective Lens Focal Length (MM)	Eyepiece Mag (X)	Total Mag (X)	Total Mag (X)	Total Mag (X)	Total Mag (X)	Total Mag (X)	Total Mag (X)	Total Mag (X)
125	200	10	2.1	3.1	5.0	6.3	7.8	12.5	18.8
125	225	10	1.8	2.8	4.4	5.6	6.9	11.1	16.7
125	250	10	1.7	2.5	4.0	5.0	6.3	10.0	15.0
125	300	10	1.4	2.1	3.3	4.2	5.2	8.3	12.5
125	350*	10	1.2	1.8	2.9	3.6	4.5	7.1	10.7
160	200	10	2.6	4.0	6.4	8.0	10.0	16.0	24.0
160	225	10	2.3	3.6	5.7	7.1	8.9	14.2	21.3
160	250	10	2.1	3.2	5.1	6.4	8.0	12.8	19.2
160	300	10	1.8	2.7	4.3	5.3	6.7	10.7	16.0
160	350*	10	1.5	2.3	3.7	4.6	5.7	9.1	13.7
125	200	12.5	2.6	3.9	6.3	7.8	9.8	15.6	23.4
125	225	12.5	2.3	3.5	5.6	6.9	8.7	13.9	20.8
125	250	12.5	2.1	3.1	5.0	6.3	7.8	12.5	18.8
125	300	12.5	1.7	2.6	4.2	5.2	6.5	10.4	15.6
125	350	12.5	1.5	2.2	3.6	4.5	5.6	8.9	13.4
160	200	12.5	3.3	5.0	8.0	10.0	12.5	20.0	30.0
160	225	12.5	2.9	4.4	7.1	8.9	11.1	17.8	26.7
160	250	12.5	2.6	4.0	6.4	8.0	10.0	16.0	24.0
160	300	12.5	2.2	3.3	5.3	6.7	8.3	13.3	20.0
160	350	12.5	1.9	2.9	4.6	5.7	7.1	11.4	17.1

* Objective Lens Focal Length only available on M A1028ML - Multi-Focal Length Lens

9.4 Finding Total Magnification

The following formula is used to calculate the total magnification of the System:

$$\text{Total Magnification} = \left(\frac{\text{Binocular Focal Length}}{\text{Objective Focal Length}}\right) \times \left(\text{Eyepiece Magnification}\right) \times \left(\text{Magnification Factor}\right)$$

for example:

Binocular Focal Length	=125 mm
Objective Lens Focal Length	=250 mm
Eyepiece Magnification	=10X
Magnification Factor	=0.5

$$\text{Total Magnification} = \left(\frac{125\text{mm}}{250\text{mm}}\right) \times \left(10\text{X}\right) \times \left(0.5\right)$$

Therefore: Total Magnification = 2.5X

The focal length is printed on each objective lens and the eyepiece magnification is marked on each eyepiece. The magnification selection knob on the microscope shows the selected magnification factor. For the binocular, the model number is printed on the bottom of the dovetail mount and the focal length of each model number is shown in Table 9-2.

9.5 Effects of Changing Components

The following chart lists the effects of changing components to the microscope system. For further information, contact Global Surgical Technical Services Department.

Table 9-5 Effects of Changing Microscope Components

What is the effect of changing		Magnification	Field of View	Intensity of Illumination	Working Height
Binocular (Focal Length)	From 125 mm to 160 mm	Increases	Decreases	No Change	No Change
	From 160 mm to 125 mm	Decreases	Increases	No Change	No Change
Objective Lens (Focal Length)	From longer to shorter (i.e. 250 mm to 200 mm)	Increases	Decreases	Increases	Decreases
	From shorter to longer (i.e. 200 mm to 250 mm)	Decreases	Increases	Decreases	Increases
Magnification (Manual Change)	From higher to lower (i.e. 2X to 1X)	Decreases	Increases	No Change	No Change
	From lower to higher (i.e. 1X to 2X)	Increases	Decreases	No Change	No Change
Eyepiece (Power)	From higher to lower (i.e. 12.5X to 10X)	Decreases	Increases	No Change	No Change
	From lower to higher (i.e. 10X to 12.5X)	Increases	Decreases	No Change	No Change

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