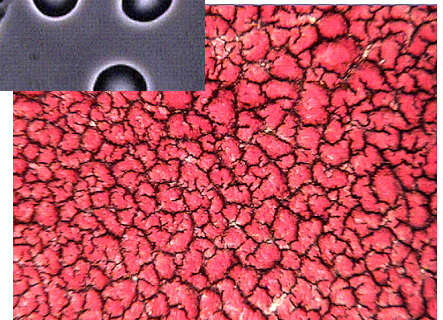
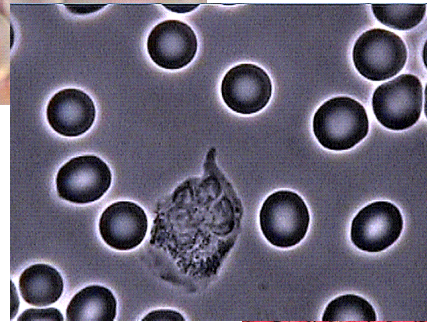
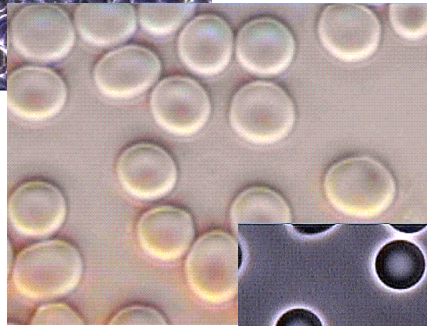
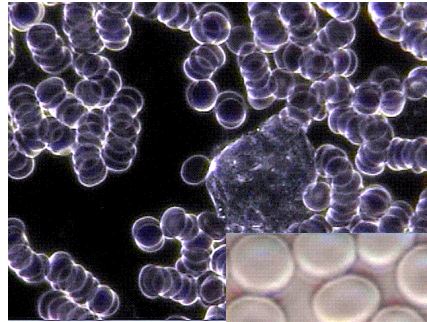


**BIOMEDX**

# Fiberoptic Video Microscope System



OPERATING  
INSTRUCTION  
MANUAL

VIDEO  
TUTORIALS

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## FIBEROPTIC MICROSCOPE SYSTEM

### *Instruction Manual*

This instruction manual and the associated CD-Rom video files is for the Biomedx Fiberoptic Microscope Systems. To ensure safety, obtain maximum performance and to familiarize yourself fully with the use of this microscope, we recommend that you study this manual thoroughly and view the video files before operating the microscope. Retain this instruction manual and CD disc in an easily accessible place near the work desk for future reference.

Rule #1 to get the most from your microscope:  
READ THE MANUAL

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CD-Rom Video files - Front Pocket  
Miscellaneous product notes (if any) - Back Pocket

## SAFETY PRECAUTIONS

1. After the equipment has been used in an observation of a specimen that is accompanied with a potential of infection, clean the parts coming in contact with the specimen to prevent infection.
  - Moving the microscope is accompanied with the risk of dropping the specimen. Be sure to remove the specimen before moving the microscope.
  - In case the specimen is damaged by erroneous operation, promptly take infection prevention measures.
  - The microscope can become unstable if its height is increased by accessories mounted on it. In this case, take anti-topping measures to prevent the specimen from being dropped should the microscope topple over.
2. To avoid potential shock hazard and fire, always turn the Fiberoptic Lightsource “off” and disconnect the power cord from the AC receptacle at the rear of the light house assembly before replacing the bulb. Allow the bulb to cool before touching it.
3. Install the microscope on a sturdy, level table.
4. The air vents on the underside of the lightsource should never be blocked by placing the unit on a flexible surface such as a carpet, as this could result in overheating and cause a fire.
5. Always use a grounded power cord for the lightsource and connect the power cord correctly and ensure that the grounding terminal of the lightsource power cord and that of the wall outlet are properly connected.
6. When installing the Fiberoptic Lightsource, route the power cord away from the underside of the box. Should the power cord come in contact with the hot base, the power cord could melt and cause electric shock.
7. Never turn the power switch “on” while any metallic object is inserted into the air vents of the lightsource box as this will result in electrical shock, personal injury and equipment damage.
8. When the microscope is not in use or when it is malfunctioning, disconnect the power cord from the lightsource, the video camera, monitor and computer (if connected) from the AC receptacle or from the wall outlet. There is no “on/off” switch for the video camera so disconnecting the camera’s power supply main AC power cord from the AC receptacle or wall outlet is how it is turned “off”.
9. Do not look directly into the lightsource fiberoptic porthole while the unit is “on” . The light intensity can be painfully bright if you directly look at the light. Likewise, always look into the microscope objectives with light intensity lowered and bring light up to satisfactory level for the specimen being viewed.



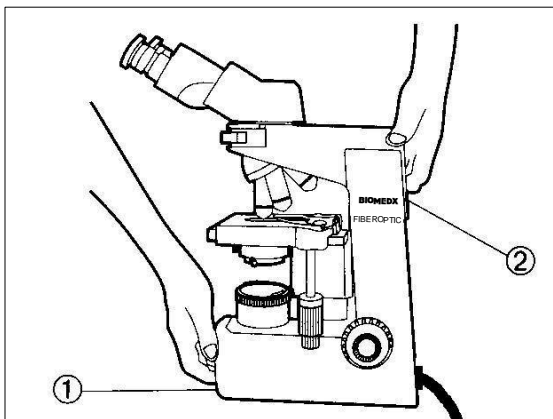
## GETTING READY

A microscope is a precision instrument. Handle it with care and avoid subjecting it to sudden or severe impact.

Do not use the microscope where it is subjected to direct sunlight, high temperature and humidity, dust or vibrations.

The tension of the coarse focus adjustment knob should only be adjusted by means of the tension adjustment ring.

Heat from the 150 watt quartz halogen lightsource is led away by a fan directed out from under the unit and also through natural convection. Consequently, leave an enough space under the lightsource for heat to escape and don't block the front or rear of the unit. Ensure that the room is well ventilated.



When moving the microscope, carefully carry it with one hand under the base ① and the other hand holding at the recessed handle on the rear of the arm ② as shown in the illustration on the left.

Take care to not squish or kink the fiber optic cable when moving or placing into a travel case.

**\*Damage to the microscope will occur if you hold it by the stage, X-axis/Y-axis knob, binocular section of the observation tube, etc. Also make sure that eyepieces, specimen, filters, etc. do not fall off.**

**\*Sliding the microscope on the surface of the table may damage or tear off the rubber feet and/or scratch the table top surface.**

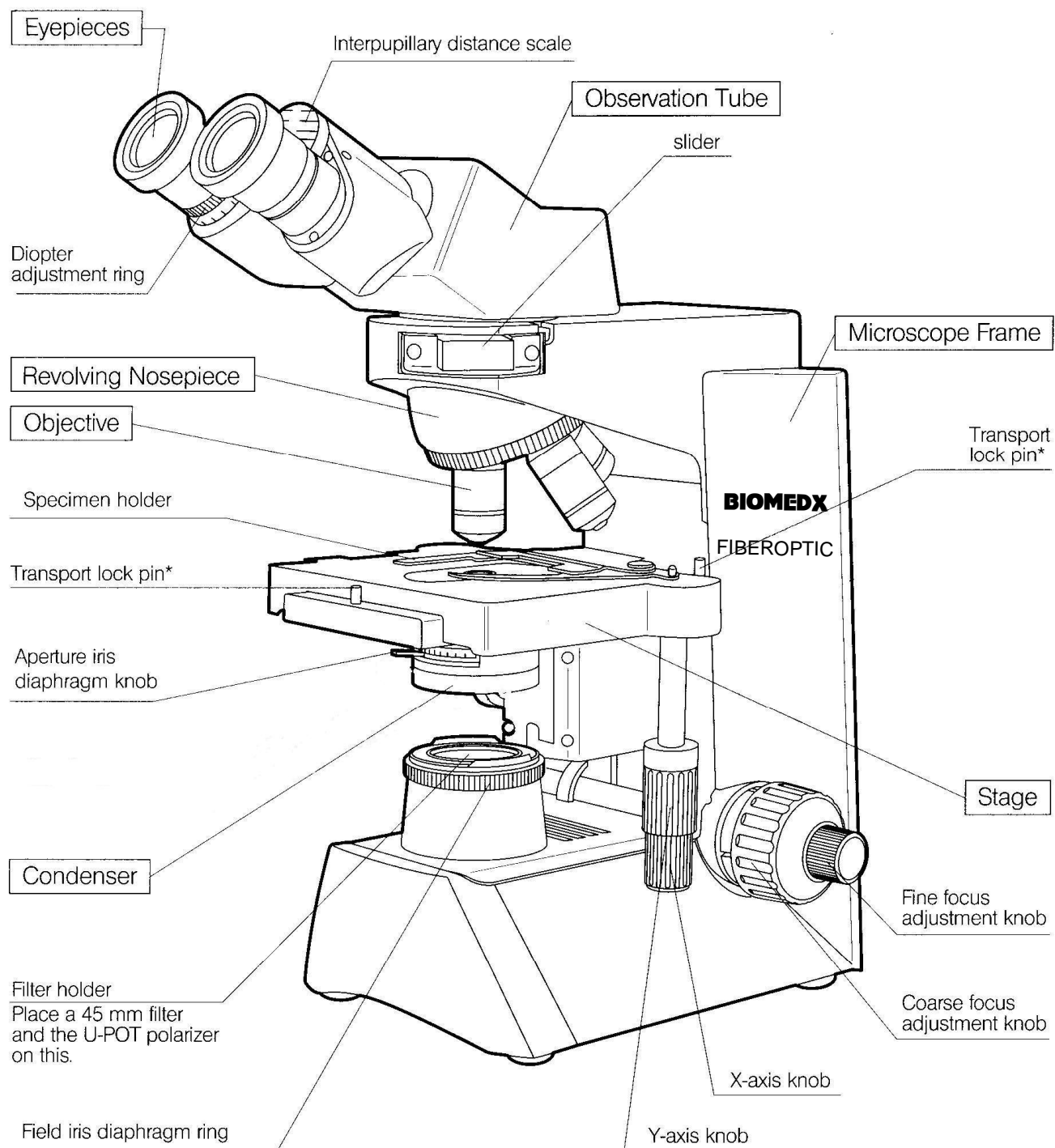
## Maintenance and Storage

Clean all glass components by wiping gently with gauze or lens paper slightly moistened with something like Sparkle glass cleaner ([www.glasscleaner.com](http://www.glasscleaner.com)) and do the same to remove fingerprints or oil smudges.

Do not attempt to use organic solvents to clean the non-optical components of the microscope. You can use Sparkle glass cleaner or a neutral detergent.

Do not disassemble any part of the microscope as malfunction or damage may occur. When storing the microscope, put it in a locker or case or keep a dust cover on it.

## PART NAMES/OVERVIEW



\* When the microscope ships the stage has two transport pins to lock the stage in place and those must be removed prior to operation. Pull up vertically on the rubber pin to release it.

## MICROSCOPE ASSEMBLY

When you get your microscope you will find that the various parts are packed in different boxes. You will find it advantageous to take everything out of the boxes and lay them on a clean work surface so you can then begin the identification process and assembly.

You may be very excited to get your new microscope up and running and if you are mechanically inclined, you may find yourself jumping right into the parts and pieces of the scope and begin to assemble. It will be advantageous to read these instructions before beginning. You should also review the CD-Rom video files as you will refer to the techniques on the video files to gain proper microscope adjustment tips.

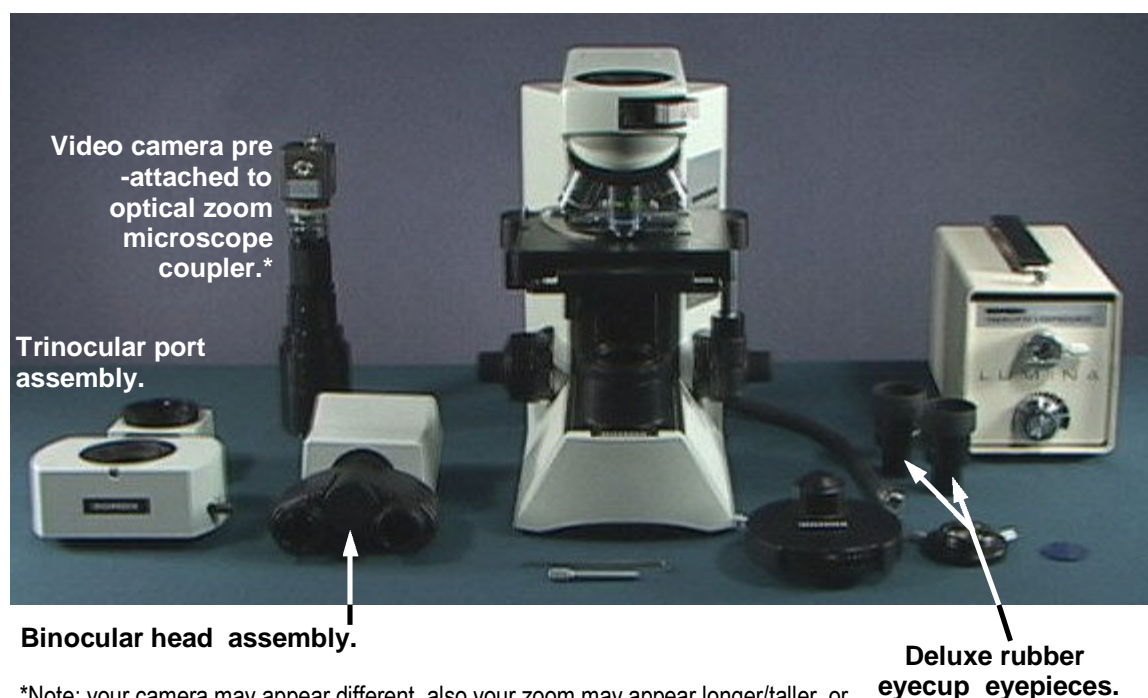
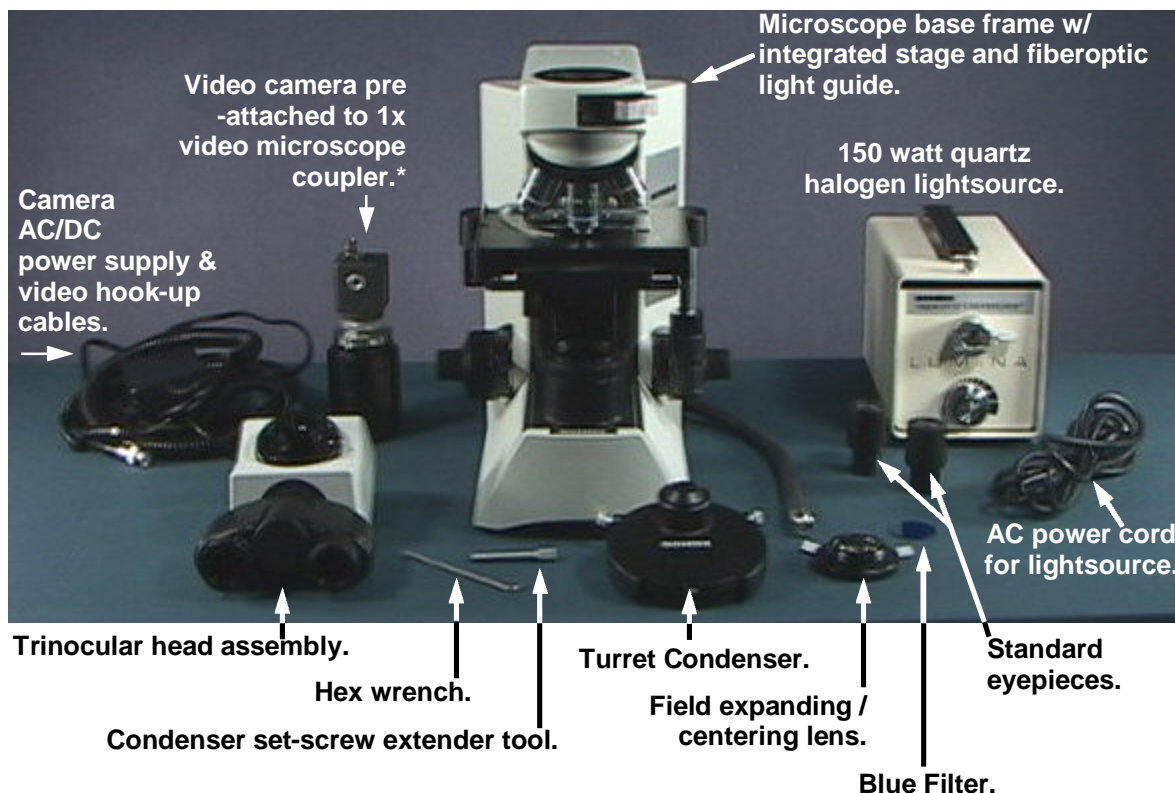
### Video Files on the CD-Rom Disc

1. Microscope Review
2. Turret Condenser Set-up
3. Adjusting a Phase Contrast Condenser
4. Adjusting a Darkfield Condenser
5. Using an Oil Objective
6. Getting a Blood Sample

These are .wmv Windows Media files which can be viewed using Microsoft Windows Media Player on your computer. Placing the disc in your CD drive you can view the files in Window's Explorer and view the video by double clicking the file. (Apple users can use Windows Media Player for the Macintosh. For the free download go to [microsoft.com](http://microsoft.com) and search for Windows Media Player Macintosh to get directed to the download page.)

Depending on your chosen configuration, you may have parts and pieces that differ somewhat from what is shown in this manual. You may have some components and not others though in all respects the basic nature of the assembly of parts does not differ.

When you lay everything out on your workspace you will see something like the pictures below differing only in the items that were selected in your particular configuration. You will note the absence of separate microscope objectives as these have already been mounted on the microscope's nosepiece turret. Biomedx pre-assembles, pre-checks and pre-adjusts everything prior to shipping to you and we simply leave the objectives in place.



\*Note: your camera may appear different, also your zoom may appear longer/taller, or different depending upon model, or you might have a video coupler with the Biomedx optical assembly with an HD camcorder.



**Screw  
w/hex  
head.**

The first thing you will want to do is mount the eyepiece head assembly onto the base frame.

You will need to loosen the hex screw on the top side of the frame with the hex wrench and then seat the head into proper position. Examine the bottom of the head and the top of the frame for an idea of how it fits by just sliding in from one side and then setting it down into place. Tighten the screw hand tight but not so tight as to strip the threads.

Shown to the left is the trinocular head assembly.



You may have a binocular head assembly and a trinocular port. In this case you must mount the trinocular port first.

When the trinocular port is installed you can then mount the binocular head.

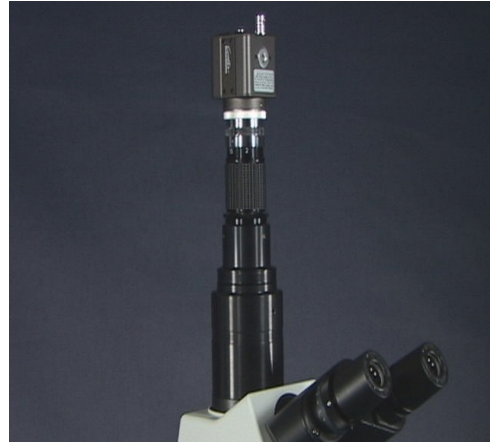


**Screw  
w/hex  
head.**

Note that there is another hex screw in front of the trinocular port assembly and this must be loosened with the hex wrench and then the binocular head can be seated. When seated, hand tighten the set screw with the wrench to hold the head securely in place.

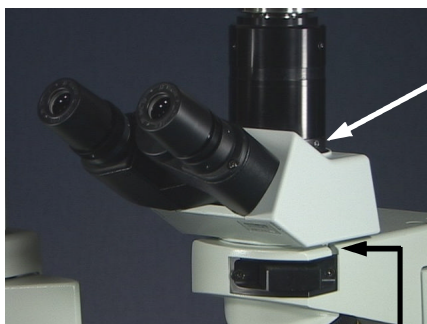


There are covers on the eyepiece lens shafts which must be removed and then the eyepiece oculars can be slipped into place.



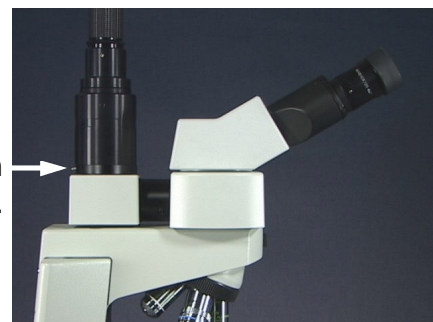
Whatever video camera you may be using gets screwed onto the video coupler appropriate for that camera and this assembly gets attached to the microscope in the same manner as the head assemblies were attached. There is a hex screw which must be loosened and then the video coupler with camera can be seated in place.

Note that in most cases, any video coupler and camera combination has typically been preassembled and set up prior to shipping. It is best to always leave the camera and coupler arrangement as one assembly if removing & transporting system.



Hex screw on binocular head.

Hex screw that holds head assembly onto base of microscope.



Hex screw on trinocular port.



If you have a standard definition video camera (as shown here), the top of the video camera has the receptacles which must receive the appropriate jacks from the 3-wire end of the wire harness which is part of the universal 110-220VAC to 12V DC power supply. These three receptacles are labeled VIDEO, S-VIDEO and 12VDC. There is no connection to the 4 pin square receptacle labeled LENS.

VIDEO is a standard composite video output . The output jack on the camera seen here is a BNC female connector. The wire in the wire harness has an RCA style male connector with an RCA female to BNC male adapter. (RCA style jacks are also referred to as phono plugs). The VIDEO output is the same type of output you get from a VCR or camcorder. This output can be directed to the input of an appropriate RCA/phono plug input jack on a standard TV, a TV/VCR combination unit, or a TV-PVR (TV-personal video recorder) computer input box.

S-VIDEO is a higher quality output and can be directed to TVs, laboratory monitors, TV-PVRs, large screen TVs, TV projectors, or any other device that can accept the signal. This is the preferred output to use and if you are using a standard TV or TV/VCR you should attempt to locate a unit that can accept this type of input.

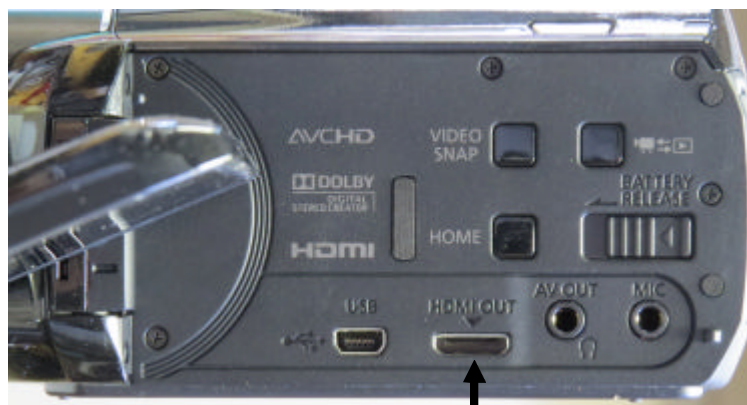
**PWR** When the power jack is plugged in and the AC cord from the power supply on the other side is plugged into a proper AC outlet, the green LED light labeled PWR will light.



If you have a high definition - HD - camcorder you will find the HDMI jack on the camera (usually mini-HD connector) under an appropriately labeled cover. Plug the mini-HD connector side of this cable the camera.

Typically the USB connection is used for downloading captured images from the memory disk in the camcorder to your computer for saving and printing any images or video that you have taken.

You will need to plug the power cord for the camcorder into the unit as well as to your AC outlet.

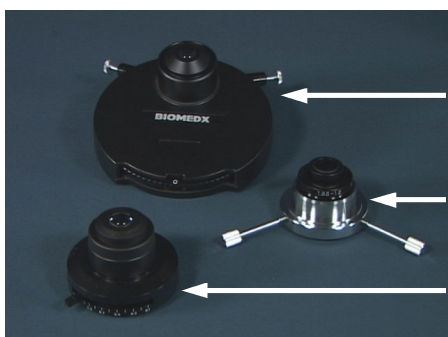


Power plugs in under flap on this model here.

HDMI cable here to HDTV in



You will likely have one of the following types of condensers which will need to be correctly mounted under the stage.



Universal style turret condenser.

Darkfield condenser.

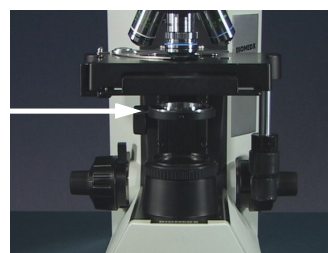
Brightfield condenser.

Raise the stage up by rotating the focus control knob.

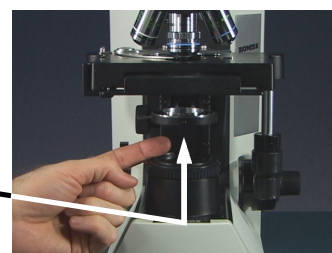
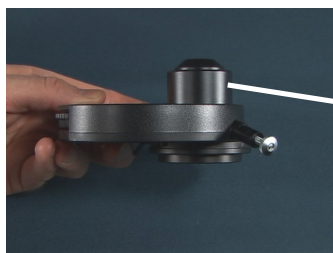
Locate the condenser adjusting knob and rotate that assembly down.



Lightly loosen the set-screw.

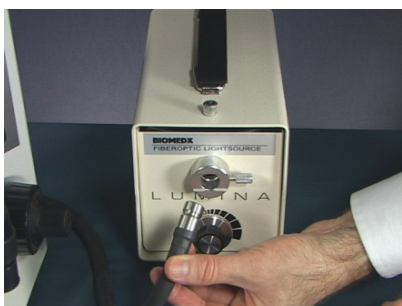


With the condenser positioned as shown (any type) it will fit underneath the condenser holder assembly and slip up into place.

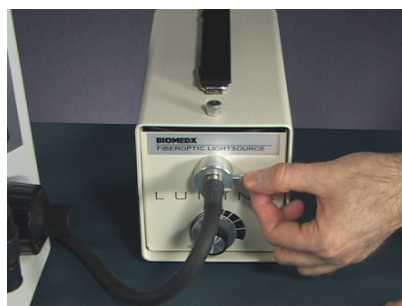


Make sure the condenser is seated all the way up ▲ into its holder and then lightly tighten the set-screw to hold the condenser in place. Use the set-screw extension tool to reach the set-screw more easily when using the turret condenser.

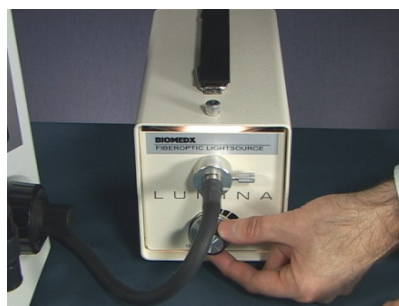
Proper position for the condenser under the specimen slide is all the way up and nearly touching the bottom of the slide.



Plug the fiberoptic cable from the back of the microscope base into the lamp house. You may have to loosen the set-screw first in order to get the cable all the way into the hole.



Lightly tighten the set screw holding the cable in place.

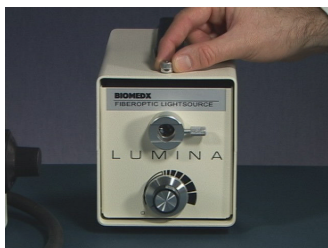


Plug the AC power cord into the back of the lamp house and the plug into a properly grounded AC outlet. The microscope light and intensity is controlled by the on/off switch on the front of the lightsource unit.

Your Fiberoptic Lightsource likely has an EJA lamp installed which is a high intensity lamp rated at 40 hours life expectancy when run at maximum intensity. This is the preferred lamp for oil darkfield application. You might also have a spare EKE lamp. This lamp is rated at 200 hours life if run continually at maximum intensity. For all of the work with live blood analysis using phase contrast and occasional darkfield, the EKE lamp is fine. For mostly darkfield applications, you can stick with EJA lamps. Both lamps are very bright and will continue to operate well past their rated life expectancy if they are not operated continually at constant brightness.

## Changing the Lamp

The time will come when the lamp will burn out. If you change the lamp in the middle of a session when the scope is being used, the lamp can be very hot. Use caution.



Loosen the screw on top of the lightsource.



The front door will drop down.



Raise the lamp extracting arm to bring the lamp out of its retaining clip.



Remove the lamp from the socket and replace. Lower the extracting arm back in place and then gently push the new lamp into position under the retaining clip.

## Lightsource Fuse Replacement

The fuse in the 120v N. American unit is located in a pull-out drawer incorporated into the power cord receptacle. There are two compartments. The fuse goes into the forward compartment, the back one is for storing a replacement. Replace with 5x20 3.15 Amp Fast Acting Fuse. The 220v model has a circuit breaker.

Only use EJA or EKE lamps.



Following the assembly procedure your microscope should look very close to one of the two units shown here.



Hook your camera up to a monitor, plug in the power and you're ready to go!

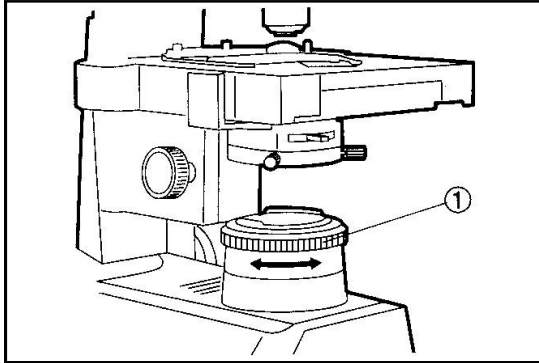


The standard definition video camera can be plugged into a monitor that has a composite or s-video input (the s-video is preferred). An HD camcorder should be plugged into an HDTV display via the HDMI connection.

If you have not yet done so, now is the time to view the CD-Rom video files which will discuss the finer points of set-up, adjustment and operation.

The pages to follow cover some more technical points, miscellaneous application notes, adjusting your camera and monitor for the best view, illustrations of some sample wiring diagrams, and getting your video image to a computer or computer monitor.

## TECHNICAL NOTES



### Field Iris Diaphragm

For bright field applications, using the field iris diaphragm ring ①, adjust the diameter of the field iris for objective power to the extent that it just circumscribes the field of view. When the field iris diaphragm is stopped down to circumscribe the field of view, it will exclude extraneous light and improve image contrast within the field of view.

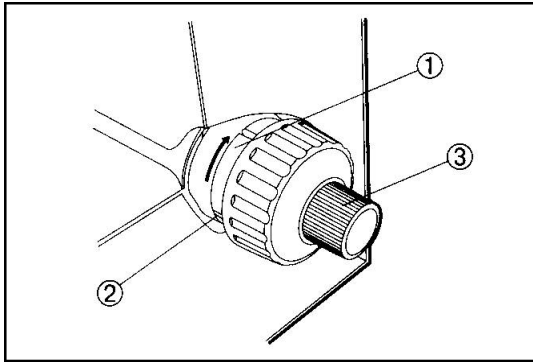
**\*When using the 100X objective, the field iris diaphragm image will not be visible within the field of view. Accordingly, stop down the diaphragm to its smallest diameter.**

### Slider

The slider is used for filter sets. Typically a blue filter can be used for low light brightfield applications where a low light level will produce a more yellow light. The blue filter will bring the eyepiece view back to daylight color. The video cameras will self adjust for any color temperature.

The slider is also used to accommodate an optional transmitted light analyzer. By preparing a transmitted light polarizer and polarizing light condenser, simple polarized light observation becomes possible for gout testing and crystal urinalysis.

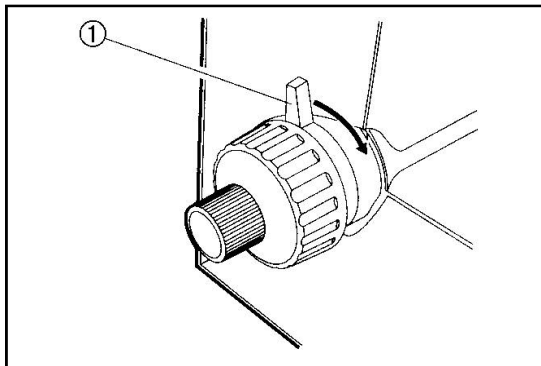
## Adjusting the Coarse Adjustment Knob Tension



The coarse adjustment knob tension is pre-adjusted for easy use. However, if desired, one can change the tension using the tension adjustment ring ①. Applying a large flat-bladed screwdriver to any of the grooves ② on the circumference of the ring, turning the ring clockwise (in the direction of the arrow) increases tension, and vice versa.

The tension is too low if the stage drops by itself of focus is quickly lost after adjustment with the fine adjustment knob ③. In this case, turn the ring in the direction of the arrow to increase tension.

## Pre-focusing Lever



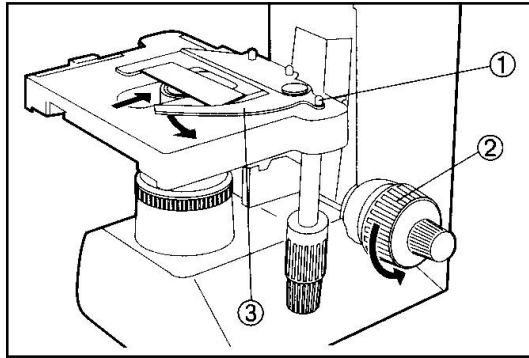
The pre-focusing lever ensures that the objective does not come in contact with the specimen and simplifies focusing.

After focusing on the specimen with the coarse adjustment knob, turn this lever ① clockwise (in the direction of the arrow) and lock; the upper limit on coarse adjustment movement is set at the locked position.

Focusing using the fine adjustment knob is not affected by the pre-focusing dial. Accordingly, after using the coarse adjustment knob to lower the stage for changing specimens or applying immersion oil, refocusing is easily accomplished by rotating the coarse adjustment to reach the pre-focusing position, then making fine adjustments with the fine adjustment knob.

**\*When not required, leave the pre-focusing dial unlocked.**

## Placing the Specimen



**\*Releasing the curved finger with great force or suddenly releasing your grip on the curved finger knob ① while releasing the curved finger will crack or damage the slide glass. Always place the specimen with great care.**

### Observation with Specimen Holder for Single Specimen Slide

1. Turn the coarse adjustment knob ② counterclockwise (in the direction of the arrow) to lower the stage.
2. Open the spring-loaded curved finger ③ on the specimen holder and place the specimen slide into the specimen holder from the front.
3. After placing the slide as far as it will go, gently release the curved finger ③.

### Observation with Specimen Holder for Two Specimen Slides

1. Place the first specimen slide as described in steps 1 and 2 above, then place the second specimen slide so that it contacts the first specimen slide.
2. Gently release the curved finger ③.

### Observation by Placing the Specimen Slide with One Hand

Place the specimen slide at the front of the stage, then slide the specimen slide on the stage surface to slowly and gradually open the curved finger in the direction of the arrow. Insert the specimen slide into the specimen holder until it is fully and properly seated in the specimen holder.

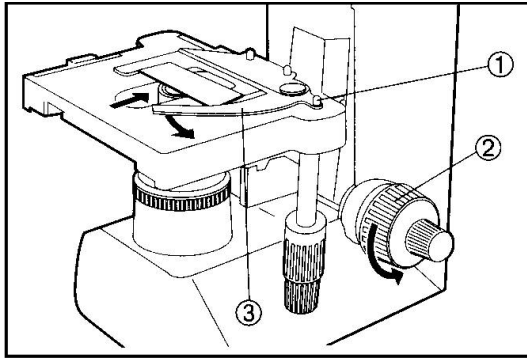
#### Cover Glass

Use cover glasses of 0.17 mm thickness (#1) in order to allow the objectives to exhibit their full performances.

#### Specimen Slide

Use specimen slides of 0.9 to 1.4 mm thickness. Using thicker specimen slides may result in inaccurate imaging of the field iris diaphragm image on the specimen.

## Moving the Specimen

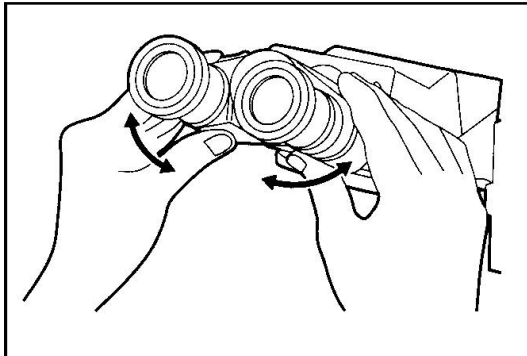


Turn the upper knob which is the Y-axis knob ① to move the specimen in the vertical direction, and turn the lower knob which is the X-axis knob ② to move it in the horizontal direction.

**\*Do not use the specimen holder or stage to move the specimen for this will damage the rotating mechanisms of the knobs.**

**\*When the stage and specimen holder are stopped by the prefocusing dial, the tension of the X-axis/Y-axis knobs increases. In this case, do not attempt to turn the knobs to move the stage beyond the stopped position.**

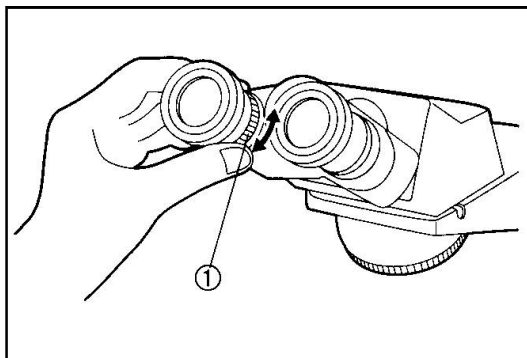
## Adjusting the Interpupillar Distance



While looking through the eyepieces, adjust for binocular vision until the left and right fields of view coincide completely. The index dot indicates the interpupillary distance.

Note your interpupillary distance so that it can be quickly duplicated.

## Adjusting the Diopter

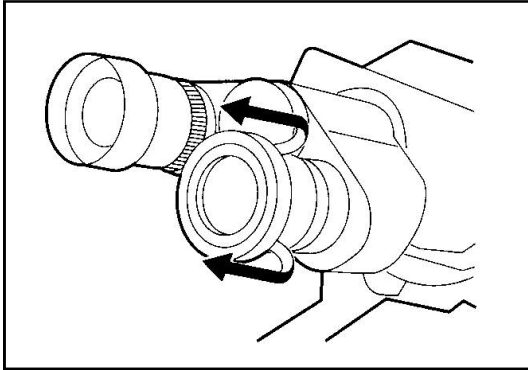


1. Looking through the right eyepiece with your right eye, rotate the coarse and fine adjustment knobs to bring the specimen into focus.

2. Looking through the left eyepiece with your left eye, turn the diopter adjustment ring ① to focus on the specimen.



## Using the Eye Shades (Deluxe Eyepiece)



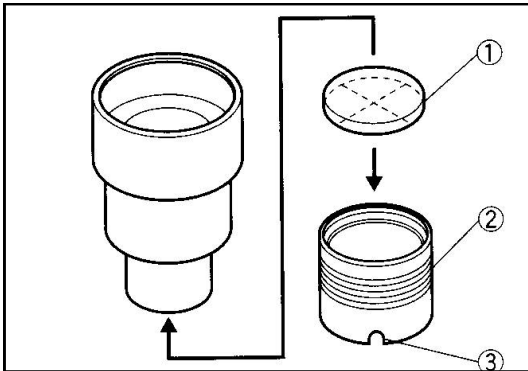
### When Wearing Eyeglasses

Use with the eye shades in the normal, folded-down position. This will prevent the eyeglasses from contacting and scratching the eyepieces..

### When Not Wearing Eyeglasses

Extend the folded eye shades in the direction of the arrow for efficient use of the eyeshades by preventing extraneous light from entering between the eyepieces and eyes.

## Using the Eyepiece Micrometer Disk (Optional)



Prepare one eyepiece micrometer disk (diameter 20.4 mm, thickness 1 mm) and two 20.4-RH reticle holders (available as 2-piece set). The field number becomes 19.6 when the reticle holders are used.

If your eye is poor in eyesight and cannot focus the micrometer, use eyeglasses to correct your vision.

1. Remove both eyepieces.
2. Hold the micrometer disk ① with the side with indications facing down and place it into a reticle holder ②.

**\*Be careful not to leave dirt on the micrometer disk, as it will be noticeable during observation.**

3. Screw the reticle holder ② containing the micrometer disk into the bottom of an eyepiece. Be sure to screw in all the way by hooking your nail into the notch ③ on the holder at the end.
4. Screw the other reticle holder, alone, into the other eyepiece in order to align the field number.
5. Attach the eyepieces again.



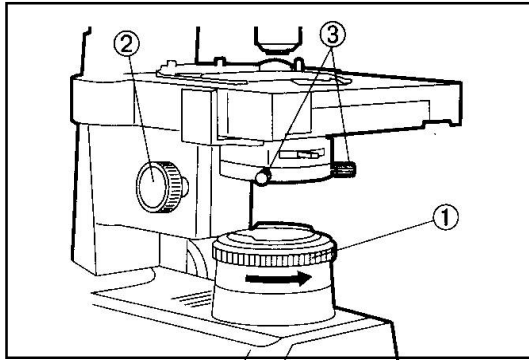


Fig. 1

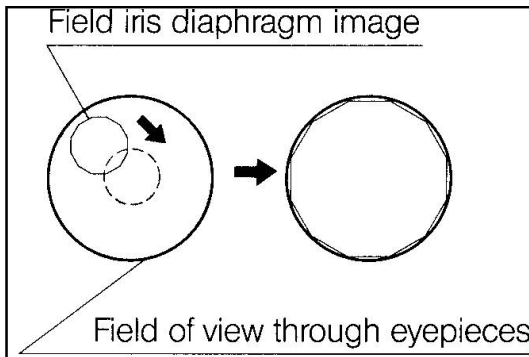


Fig. 2

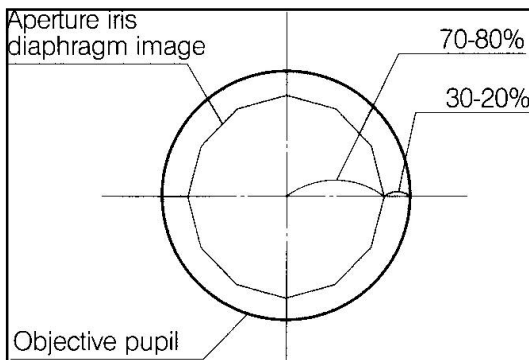


Fig. 3

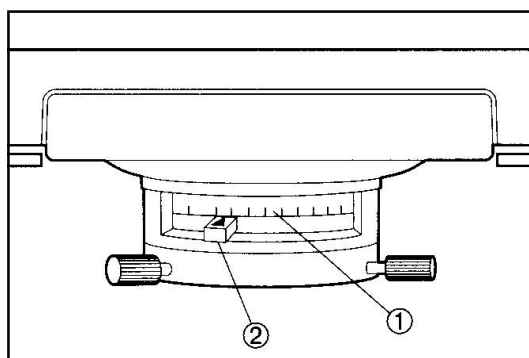


Fig. 4

### Centering the Field Iris Diaphragm (Brightfield apps)

1. With the 10X objective engaged and the specimen brought into focus, turn the field iris diaphragm ring ① counterclockwise to stop down the diaphragm to near its minimum size.
2. Turn the condenser height adjustment knob ② to bring the field iris diaphragm image into focus.
3. Rotate the two auxiliary lens (field expanding lens) centering knobs ③ to adjust so that the field iris diaphragm image is centered in the eyepiece field of view. (Figs. 1 & 2)
4. To check centration, open the field iris diaphragm until its image touches the perimeter of the field of view. If the image is not precisely inscribed in the field of view, center again. (Fig. 2)
5. When used for actual observation, open the field iris diaphragm until its image is slightly larger than the field of view.

### Aperture Iris Diaphragm

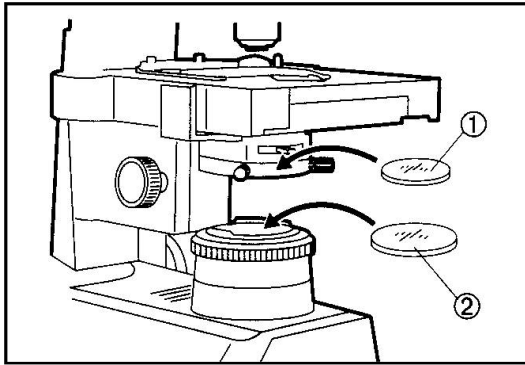
- The aperture iris diaphragm determines the numerical aperture of the illumination system. Matching the numerical aperture ① of the illumination system with that of the objective provides better image resolution and contrast, and also increases the depth of focus.
- Since the contrast of microscope specimens is ordinarily low, setting the condenser aperture iris diaphragm to between 70% and 80% of the NA of the objective in use is usually recommended. If necessary, adjust the ratio by removing the eyepieces and looking into the eyepiece sleeves while adjusting the aperture iris diaphragm knob ② until the image shown in Fig. 3 is seen. (Fig. 4)

**\*If the aperture iris diaphragm is set too small, image ghost may be observed.**

### Using the numerical aperture scale

Align the aperture iris diaphragm knob ② with the NA value ① on the scale. The scale value should correspond to the NA number engraved on the objective. Since the aperture iris diaphragm knob has a certain width, align the center line engraved on the knob with the scale indication. When using a 100X objective, turn the aperture iris diaphragm knob ② all the way to 0.9 on the scale. (Fig. 4)

## Using Filters



You can place a filter in the light path with either method:

Insert a filter with diameter of 32.5 mm ① in a brightfield condenser with a filter holder inserted below the condenser.

Insert one or more filters with a diameter of 45 mm ② on the light exit glass on the microscope base.

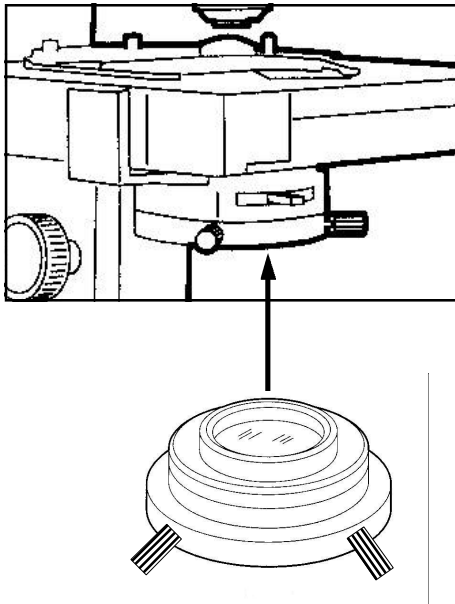
Common filters:

Polarizing filters,

Neutral density filters,

For some applications with phase contrast, a green filter resulting in a green wavelength of light will resolve to a higher degree.

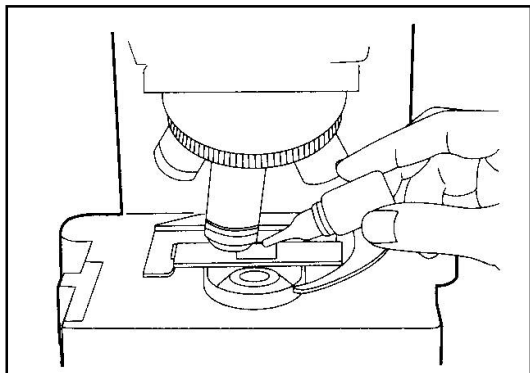
## Using the Low Magnification Field Expanding/Centering Lens



This lens was reviewed on the prior page for centering but it is also designed for providing illumination which covers the entire illumination field when using a 2X objective. This lens is normally pressed into place below a specified condenser, like the turret or brightfield condenser.

**This lens is designed exclusively for use in observation. As the aperture iris diaphragm cannot be seen and field iris diaphragm cannot be used when this lens is used, set both iris diaphragms to the fully open conditions.**

## Using Oil Immersion Objectives



**\*Be sure to use the provided Olympus immersion oil.**

1. Focus on the specimen by switching the objectives from the lowest power to highest power.
2. Before engaging the immersion objective in the light path, place a drop of immersion oil onto the specimen cover slip at the area to be observed.
3. Turn the revolving nosepiece to engage the immersion objective, then focus using the fine adjustment knob.

**\*Since air bubbles in the oil will affect the image quality, make sure that the oil is free of bubbles.**

- a. To check for bubbles, remove the eyepieces and fully open the field and aperture iris diaphragms, then look at the exit pupil of the objective inside the observation tube. (The pupil should appear round and bright)
- b. To remove bubbles, turn the revolving nosepiece to move the oil immersion objective back and forth a few times.

\*If the condenser engraving shows a numerical aperture (NA) of 1.0 or higher, the number applies only when oil is applied between the slide glass and the top surface of the condenser. When oil is not present, the NA is about 0.9.

4. After use, remove oil from the objective front lens by wiping with gauze slightly moistened with an ether (70%)/alcohol (30%) mixture, or Sparkle glass cleaner.

(If you use ether/alcohol mix, do not use on painted surfaces/labels, use caution as it is highly flammable, use in well ventilated room.)

### **Caution in use of the immersion oil**

**If immersion oil penetrates in your eye or attaches to your skin, apply the following treatment immediately.**

**Eye: Rinse with fresh water (for more than 15 minutes)**

**Skin: Wash with water and soap.**

**When the appearance of your eye or skin is altered or pain continues, immediately consult the doctor.**

## MISC. APPLICATION NOTES

Your Biomedx Fiberoptic unit is an Olympus CX41 microscope that has been modified and upgraded with a fiber optic light guide, an external high powered light source (like a 150 watt quartz halogen unit), and a special brass focus gear which offers more rugged travel options over the stock plastic that was prone to break during travel excursions.

The microscope employs a UIS (Universal Infinity System) optical design, and should be used only with the UIS eyepieces, objectives and condensers, etc. Less optimum performance may result if inappropriate accessories are used.

**TURRET CONDENSER:** The turret must be rotated into proper position to match your objective and desired mode of operation. The settings are “O” for brightfield, “D” for darkfield, “ph1” for 10x & 20x phase (not used unless you have a 10x or 20x phase objective), “PH2” for 40x phase, and “PH3” for 60x & 100x phase.

Make sure when installing the condenser assembly that you seat the condenser ALL THE WAY UP into its holder and then lightly tighten the set screw.

The turret condenser has been pre-adjusted for phase contrast using the objectives sent with your system. Once set, it typically never changes. See the CD -Rom video files for adjustment specifics.

**DARKFIELD CONDENSER:** If you have a darkfield condenser, this condenser requires that optical immersion oil be used to get any image. See video files.

**FIELD IRIS:** A field iris is built into the base of the microscope. This is for Koehler brightfield illumination. The field iris also comes in handy for properly adjusting darkfield condensers and when using the turret condenser in darkfield mode. Because the turret condenser does not do darkfield as efficiently as a dedicated darkfield condenser, we can use the field iris to shut out some of the incident light when in the darkfield mode. This will give a richer deep black field. Using oil on the condenser also helps with the darkfield when using the 40x objective along with varying the vertical position of the condenser under the specimen.

**OIL CAUTION:** Please **DO NOT use oil on the 40x objective** (if you have one) it is a dry objective. You will need to use oil on the 50x or 60x oil iris or 100x objectives (if you have them) and on the condenser for 50-100x mode. In phase contrast the 100x objective is great for research and for presentations (big screen TVs and to impress your friends and neighbors), while the 40x is great for a clinic when busy with many clients as no oil cleanup is needed. If you have a dedicated darkfield condenser and 50x, 60x, or 100x oil iris objectives, these all require oil.

**COLOR FILTERS:** A blue filter can be used for low light brightfield applications. In these cases, the microscope turret condenser is set for brightfield mode and the light often is turned all the way down. This will give a yellow tint to the light and the blue filter will bring it back to daylight color temperature. Cameras will adjust color

automatically for the TV monitor in auto mode so it is natural for the color to shift somewhat as you pan from one end of the slide to the other depending upon your specimen. Some cameras can be set to manual white balance to adjust for this. We often will pre-set the cameras when doing the pre-setup check to a white balance color temperature of 3100° Kelvin. This stops the camera's auto color setting from continually adjusting and changing the color slightly as you move around the specimen. With a lock at 3100°K and in phase contrast mode (with no blue filter), the lightsource would generally be in the 2 to 3 o'clock position and this will provide good color balance. If you turn the lightsource up past this point the image on the monitor will just be a bit more blue as the color temperature of the lamp goes beyond 3100°.

A green filter is often used with phase contrast in some situations. Theoretically, phase contrast gives a sharper image when a green filter is used. Many individuals prefer to do microscopic screening without a green filter as they feel the image is more appealing. However, note that with the extensive control available with the video cameras, you can use a green filter and tweak the camera settings to bring back just about the same image color that you may have had without a filter. This will potentially offer slightly higher image resolution and contrast with the filter and without the green tint in the image. You will have to experiment with your system if you choose to acquire a green filter.

**STANDARD DEFINITION VIDEO CAMERA SETTINGS:** (For more camera technical notes see the camera manual for your camera.) With the advent of HD, we do not often couple microscopes with standard definition video cameras any longer. If you have such a system, the standard definition video camera we use for scopes is a medical micro head 1/3" chip CCD color camera with digital signal processing and the highest resolution available in a single chip standard TV camera. It has been found to have excellent all around phase contrast as well as darkfield handling capacity.

You will find that you have an on-screen menu program available by pressing the "set" button on the camera. From here you can adjust gamma (lightness/darkness), phase (color), color level, auto adjustments, etc. If you were in phase contrast most of the time the settings might shift slightly, if in darkfield most of the time the settings may shift in the other direction. You can experiment with these settings for your particular monitor as you may find something that better suits your particular viewing monitor. Basically, the settings when sent from the factory will be close to the following:

#### Camera Main Menu

Lens: Manual

AGC: 10db

Shutter: Auto

White balance: 3100°

Back light: Off

Text display: Off

Sync mode: Int

Lens must be in "manual". AGC (automatic gain control) should not be much higher than 10db in most cases as some elements in your viewed image will wash out due to light intensity (white blood cells for instance when viewing living blood with a dedicated oil

darkfield condenser). Some people might turn this off which may increase signal to noise ratio very slightly (and the lens may also be set to video when in darkfield), however you will need to control the light intensity yourself as the camera will not adjust automatically. If you go to another mode of the microscope (phase or brightfield). For most this is more hassle than it is worth.

The shutter should stay in auto mode. White balance should stay in ATW which will track the white balance to whatever you are looking at or kept at 3100° range if you go back and forth from viewing two type of specimens in both phase/darkfield and then brightfield (in this case the “Lens” setting must be set to “manual”). Note that if you are viewing a stained or dry layer colored slide, the color may shift as you move around as this is the ATW adjusting for a shift in the image color. The AWC mode will allow you to lock in the white value by going to a white area on the screen and pressing set to lock it in, however this may alter the color in phase or darkfield. You can experiment but it might be best to just leave it with a set color temp of 3100°.

### Special Menu

Gamma: 14

Color Adjust: Phase: 0 Level: 0

Sharpness: Low or High (which looks best depends on monitor)

Contrast: Off

Brightness: 0

Flickerless: Off

The camera gamma, phase, level and brightness can be adjusted to suit your personal preference and monitor strength/weakness for optimum view in phase, darkfield or when doing a mix of both.

For FLAT PANEL LCD displays, it seems to give a better image when the gamma setting is turned down.

**VARYING IMAGE SIZE TO MONITOR:** This is done solely through the optical zoom assembly if you have one on your scope, otherwise it is a fixed image size variable only through switching objectives.

**MONITOR NOTE:** On some TV monitors with video recorders, the signal from the camera needs to be turned onto the TV screen by way of pressing “input” on the remote control, or by going down the channel selector from 4 - 3 - 2 -1 and then the line-in will come on, or by turning the TV off and then on again, or by going to the menu selection on the remote control and finding the right selection to turn on the line-in which the camera is plugged into. It is best to read the TV instructions if you are having a problem.

**REMEMBER TO ADJUST YOUR SPECIFIC MONITOR’S COLOR, CONTRAST AND BRIGHTNESS LEVELS FOR OPTIMUM IMAGE QUALITY.**

## **Sony Laboratory Monitor Guidelines**

(Standard Definition Cameras Only)

### **Sony CRT (Cathode Ray Tube) lab monitors.**

These have user adjustable controls WHICH MUST BE ADJUSTED to give you suitable viewing.

The adjustments may have been made prior to shipping, but if your monitor was drop shipped from the warehouse, you will need to do this.

Each monitor has its own slight variations in control but the listing below will give you a good starting point:

Contrast: 85 to 90

Brightness: -2 to 0

Chroma: 66

Phase: 0

Color Temp Should be set to USER < this is important

Driving the red, green and blue guns in the picture tube will give more brightness to the screen so you can adjust them up to values like:

Gain	R 60	Bias	R 27
	G 60		G 27
	B 40		

Tweak these settings up or down to your liking. The Sony CRT Lab monitors have been discontinued and replaced by Sony professional video flat panel monitors.

### **Sony flat panel LMD (Lab/Medical Deployment) professional lab monitors.**

These are usually good to go right out of the box and give excellent imaging that matches or exceeds the CRT screens but do have image loss issues when viewing on an angle due to their flat panel nature. Nevertheless with the discontinuation of the mid-priced CRT line, the flat panels are the future.

The Sony professional video monitors are designed and optimized specifically for video and are superior to computer based flat panel displays. About the only thing you might want to tweak on the monitor is to possibly increase the contrast a bit and maybe adjust the brightness setting depending upon your room lighting.

## THE OPTICAL ZOOM SYSTEMS

(For Standard Definition Cameras Only)

There are various ways to configure your optical zoom system. Shown to the right is a 3:1 zoom body. You might have a 7:1 zoom body which is double the size.

**Notes for 3:1 short zoom:** This zoom basically gives the ability to have a wider field of view up through what would be a view using a standard 1x video coupler. This works well for individuals that are using primarily a 100x oil objective for their viewing, or the darkfield 50x–100x setup.

However, many individuals desire to use their zoom with a 40x non-oil or 50 oil objectives and want the ability to zoom out as well as increase the image size on the monitor. The standard zoom body with the 2x TV extender added to the top of the zoom will accomplish this goal. Consider the 2x TV extender lens optional and not really necessary with 100x objectives unless you want very high video magnification.

There is also a 5mm coupler mounted on the camera which it will require in order to keep the zoom in focus with the eyepiece oculars as one focuses up and down throughout the zoom range.

**General Zoom Note:** With any objective being used, you are increasing magnification, but not resolution, therefore as you increase image size, you will also increase the fuzzy-ness of the image. This is normal. The advantage that optical zooming has over electronic digital zooming is the smoothness of the edges. Optical has a smoother look than digital.

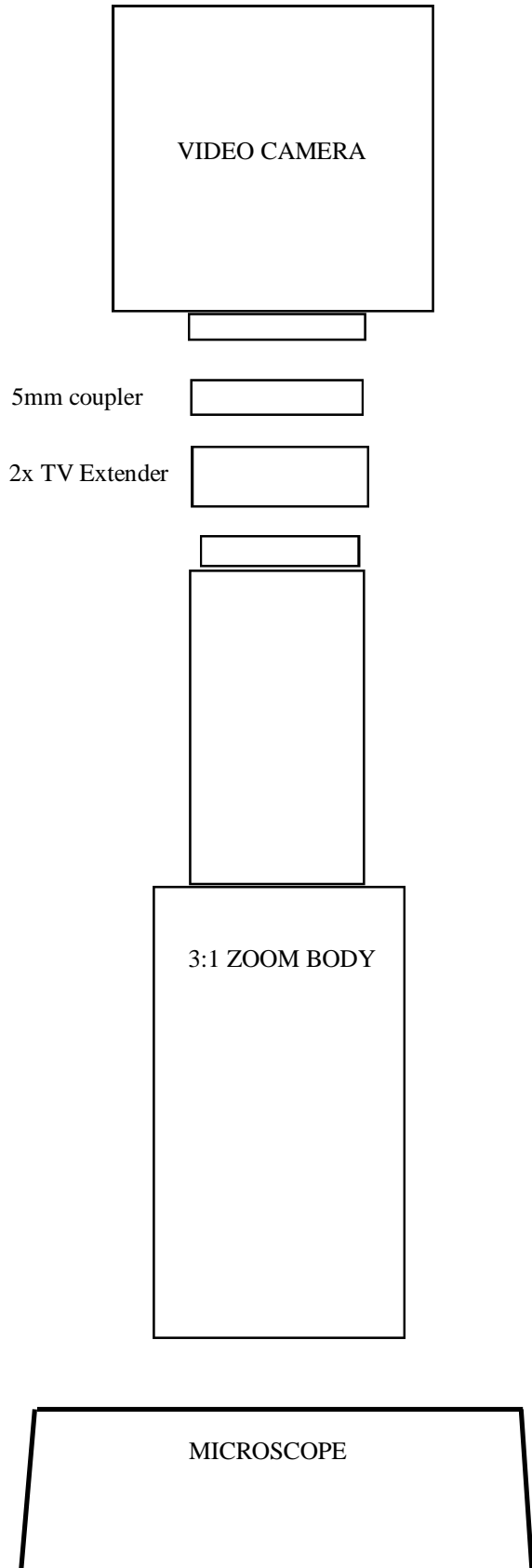
**Notes for 7:1 tall zoom:** A basic parfocal adjustment guide is in the rear pocket of this manual. Par focus means the ability to maintain focus through the zoom range while also being in focus in the eyepiece.

Your zoom system was pre-set prior to shipping.

**IMPORTANT:** The 7:1 zoom is designed for the full zoom range with low power objectives. It works well with the 2x objective and the 2x field expanding lens placed in the condenser.

The effective zoom range using a 40x objective is about 2.2 to 7 on the zoom barrel dial. When you move below 2 you will have field aberration going out from the middle—this is normal as it is beyond the capacity of the optics for the higher power objectives.

This zoom is the best choice for those individuals that want a wide field of view at low power with zoom capability, along with a higher zoom ability using higher power objectives.





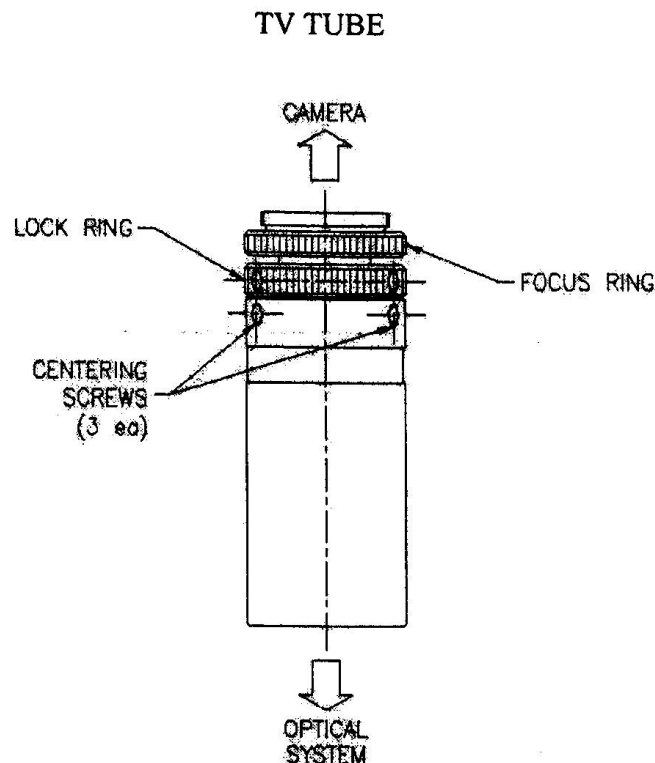
The 7x optical zoom system is precision set of optical lenses contained in various tube assemblies. The top most assembly is referred to as a .67x mini tube coupler that connects the lower zoom optics to the camera. The video camera screws onto this.

You will note that on the complete assembly that there are two silver controls. The top silver control has the zoom numbers listed—1 through 7. This adjusts your basic zoom in and out. The bottom silver control knob is for the focus at the maximum (7x) zoom position. This is factory pre-set. The only time it should be moved is when at 7x maximum zoom.

Parfocal adjustment means the zoom system will be in focus throughout the zoom range. This also is pre-adjusted at the factory. For reference this is how it is done:

1. Set the zoom to highest power and move the lower silver adjuster for image focus.
2. Set the zoom to low power. If image is not in focus, loosen the set screw in the Lock Ring (see diagram below) on the .67x mini tube coupler.
3. The camera focus position is pre-set so any adjustment should be minimal. Turn the Focusing Ring (while holding the camera to keep from turning) and this moves the camera up or down to achieve the best focus.
4. Recheck the focus at high power. If okay, the system is parfocal.
5. Tighten the set screw in the lock ring.

Centering the image. This is preset at the factory taking into consideration the various levels of magnification used and other optic centering concerns. In general, to center the image, zoom up and down while observing the image on the monitor. Locate a point or target in the image that does not move off axis during zoom. This is the optical axis of the image. Adjust the three centering screws (loosen one and tighten another) to move this target into the center of the monitor. Tighten the centering screws.



## HD CAMCORDER ZOOM

Zoom capability using an HD camcorder is contained within the optics and electronics of the camcorder itself.

When you receive your system set up for a camcorder, the video coupler attaching to the microscope (composed of 2 assemblies U-V112 and U-V312) along with the lens assembly you will be attaching your camcorder to (U-VCAM) is usually pre-assembled and need only be attached to the top of the head assembly.

It is onto this you screw your camera if not already received that way. The Canon HD cameras we typically recommend have a 37mm to 58mm filter size in front of the lens. The top of the U-VCAM depending on model is 37mm or 43mm and an adapter ring may be required (included with system when camera attached).

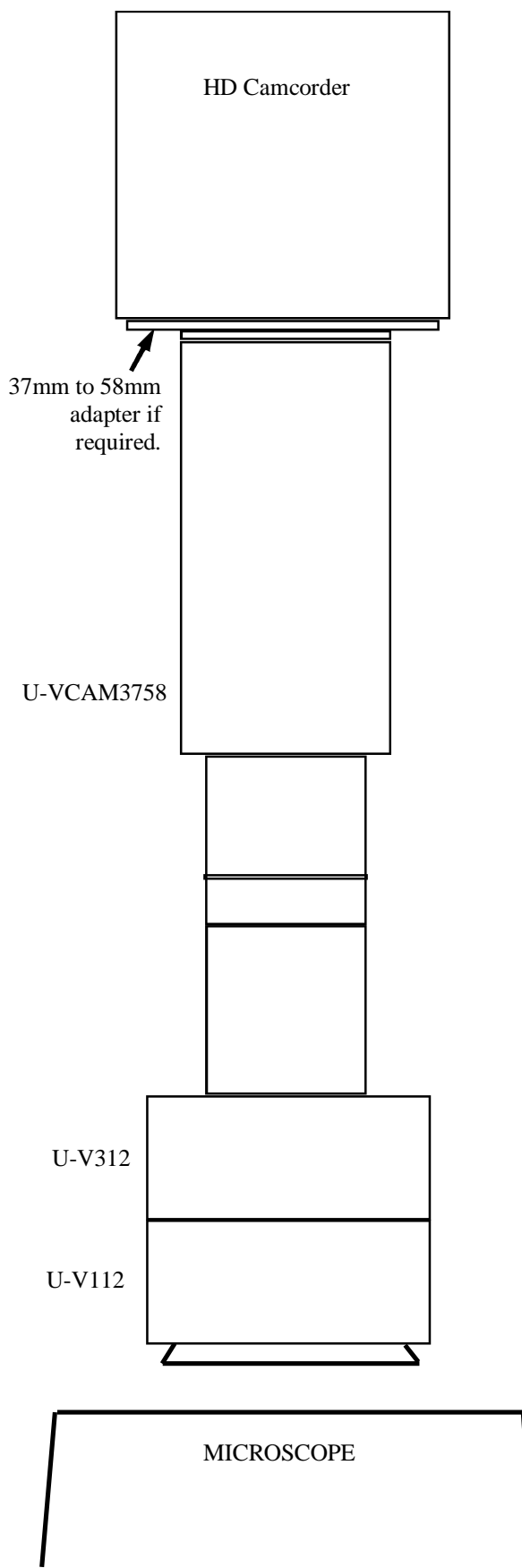
The U-VCAM has a very wide angle view when the camcorder is attached. So wide that when your camcorder zoom setting is zoomed all the way out, you will not see much except a round bit of light on your screen.

You will need to zoom in your camera to see an appropriate image.

Use the remote control for your camcorder to effectively zoom in and out on your screen.

You may need to get into your cameras menu system to adjust the zoom ranges setting both optical and electronic or digital to their maximum capability.

More specifics to camcorders are covered later in the manual.



**GETTING A SAMPLE ON SCREEN:** Here we will just run through some basic notes on getting a specimen of something like blood onto the TV monitor.

Use a lancet and poke the finger lightly. You want capillary blood. Let it come up out of the finger - you may need to gently press just below the lancet prick to start the blood coming (key word is gently).

Take a cover slip and lightly touch the SMALL drop of blood to the cover slip (do not touch the glass to the finger as that may smash and damage the blood sample). When the blood is on the cover slip, quickly place the cover slip onto the microscope slide which should already be cleaned and setting flat on your work surface or table. If the blood is thick or dehydrated, you may need to press the cover slip lightly to get the blood to disperse on the slide. You may LIGHTLY tap or press around the edges of the blood sample to get the blood to disperse nicely on the slide. GENTLY pressing will not damage the sample. Place the slide into the slide holder on the microscope stage.

**PHASE CONTRAST:** Turn the condenser assembly so the condenser is ALL THE WAY UP under the slide. (It should appear as if the condenser lens is almost touching the bottom of the slide). Turn the condenser to “ph2” (or “40” if you have an older style condenser) for using the 40x objective. Turn the 40x objective into place.

Turn the light source to about 2 o'clock on the light intensity dial.

Physically, with your unaided eye, look at your blood sample on the stage and move the slide around so you can physically see blood clearly being over the light coming up from the condenser.

Now, if you want the image to appear on the TV monitor while you bring it into focus, make sure that the prism assembly is pulled out on the side of the head assembly (if you have one on your system). This will direct light to the camera.

Start to rotate the focus knob and raise the stage. The microscope slide will be about a finger nail thickness away from the bottom of the 40x objective when you are focused on blood. As you rotate the focus knob, you will start to see shadows appear which means you are coming into focus. You may use the fine focus to bring the specimen into view.

**STAGE LOCK:** If the stage lock lever on the left focus knob is pulled forward, the stage may be locked at one level and focusing may not be possible. In this case, release the stage lock lever by pushing it upright.

**DARKFIELD:** Put a good size drop or two on the condenser. Put your slide into place and position it over the condenser in an area where you can physically see the blood on the slide. Rotate the condenser up to where the oil meets the bottom of the slide and the drop of oil flattens out a bit under the slide.

Now you can start with a 10x objective for a very wide field of view, and while looking into the eyepiece at the blood, bring it into focus. You may need to adjust the condenser up or down to vary the light intensity. Once you have blood in focus, shift the 10x out of place, put a drop or two of oil on the cover slip, and rotate the 50x oil iris objective into the oil, shift it back and forth a bit in the oil to sufficiently set the objective with oil. Open the iris on the objective, and while looking through the eyepiece, close the field iris down. This will show you how your darkfield condenser is either centered or not. With your field iris close down, while looking in the eyepiece the light should be centered, and if not, turn the silver centering screws on the darkfield condenser to center the light. Once this is set you can adjust the condenser vertically up and down to get maximum light output through the condenser. With the light centered and the field iris still closed down, vertically move the condenser up or down to the point where you get the brightest and most refined area of light right in the center of your field. Once you have this, open the field iris and you will have optimally adjusted your darkfield condenser.

Note that you also have an iris adjustment on your objectives which can further manipulate the light to give you your desired image. Also note that in darkfield mode, camera and monitor adjustments can be important factors in getting the best image.

**TIP:**

If you are using a turret condenser with a non-oil 40x objective in darkfield mode, you can actually oil the condenser (not the objective) and adjust the vertical height of the condenser under the slide for better light handling and consequent better darkfield view.

## PROBLEMS AND TROUBLESHOOTING

If an image does not come up on screen consider the following:

The field iris or condenser iris is closed. Open it up.

The phase contrast or darkfield condenser is dropped down vertically too far under the specimen. Rotate it up under the slide.

The dedicated darkfield condenser is too far off center. Take it off and look at the underside of the condenser while you physically move the centering screws and eyeball it to center. Put it back on and go through the adjustment routine.

The objective lens turret is not set in place.

The objective iris is closed.

The prism knob on the side of the trinocular head is not pulled out.

The camera power is not plugged in.

The camera video output is not connected to the monitor video input.

The monitor video/line input button or menu selection is not set properly.

Phase contrast appears weak, three dimensional, or faded:

First check to make sure the turret condenser is “set” into the appropriate indent.

Adjust the phase ring / annulus to center it with the objective.

Raise the condenser so the top condenser glass appears as if it is touching the bottom of the slide. If not and it is raised up as far as it will go, make sure the condenser is seated all the way “up” in its holder.

Darkfield image is not available when turning the turret condenser to DF:

Raise the condenser so the top condenser glass appears as if it is touching the bottom of the slide. If not and it is raised up as far as it will go, make sure the condenser is seated all the way “up” in its holder.

Fuzzy dots or dust particles appear in TV image:

*Dust is a bugger to get off—and this is an understatement.* In many cases dust particles may show up faintly and sometimes this will change as the zoom is changed. If the dust is not blaring and a complete distraction, consider this a normal consequence considering all of the optical elements in the zoom path and the level of adjustment and magnification we are desiring with our systems.

Biomedx returns to the manufacturers many video cameras and zoom systems which we consider unacceptable. Within the video camera industry, so many “dead” pixels are allowed to appear on any given video image to meet acceptable levels. We find this too lenient and are more stringent, and further, we apply the same level of consideration to dust oriented artifacts on video optics. This generally is not a consideration in darkfield mode but with zoom systems in phase contrast it is a different ballgame. Basically the center 30% of an image should be clean, with only a few dust “spots” off-center acceptable.

If you should take your standard definition camera off of your zoom system or take your lenses apart and then experience particles that were not there in the past, you can attempt to clean this off. Generally any dust showing up on the image will be dust on the glass covering the CCD chip of the video camera or on the zoom module top lens. To know which it is, loosen the zoom coupler and the camera while you have an image on the monitor, then while holding the camera still, rotate the zoom coupler and watch the video image. If the dust rotates, the dust is on the zoom lens, usually closest to the CCD chip. If the dust particle does not move, the dust is on the CCD chip cover glass.

First, attempt to blow off the offending particle with an air can. (NOTE: NEVER place the air nozzle on a lens and then pull the trigger as propellant can be discharge and coat the lens which will be a bigger problem. Lightly pull the air trigger first and then move the nozzle to the lens.) In darkfield mode you will never notice dust in the video path, but this is not so with phase contrast because of the gray background.

**BIG NOTE:** wiping any lens in the video path on a high powered microscope is fraught with peril. It is VERY EASY to make a small problem worse, and it can take quite a while of playing around, wiping the lens, blowing with air, vacuuming and such to try and get spots out of the final image. With that said, you can attempt to get particles of dust cleaned up by wiping the offending lens and CCD cover lightly with lint free lens tissue. If that did not work, put one or two drop of lens cleaning solution (from a camera store or you can try basic glass cleaner like "Sparkle" glass gleaner which is very good) on your tissue and clean lens. Humidity helps to keep down static electricity which can seem to charge the lens and attract dust.

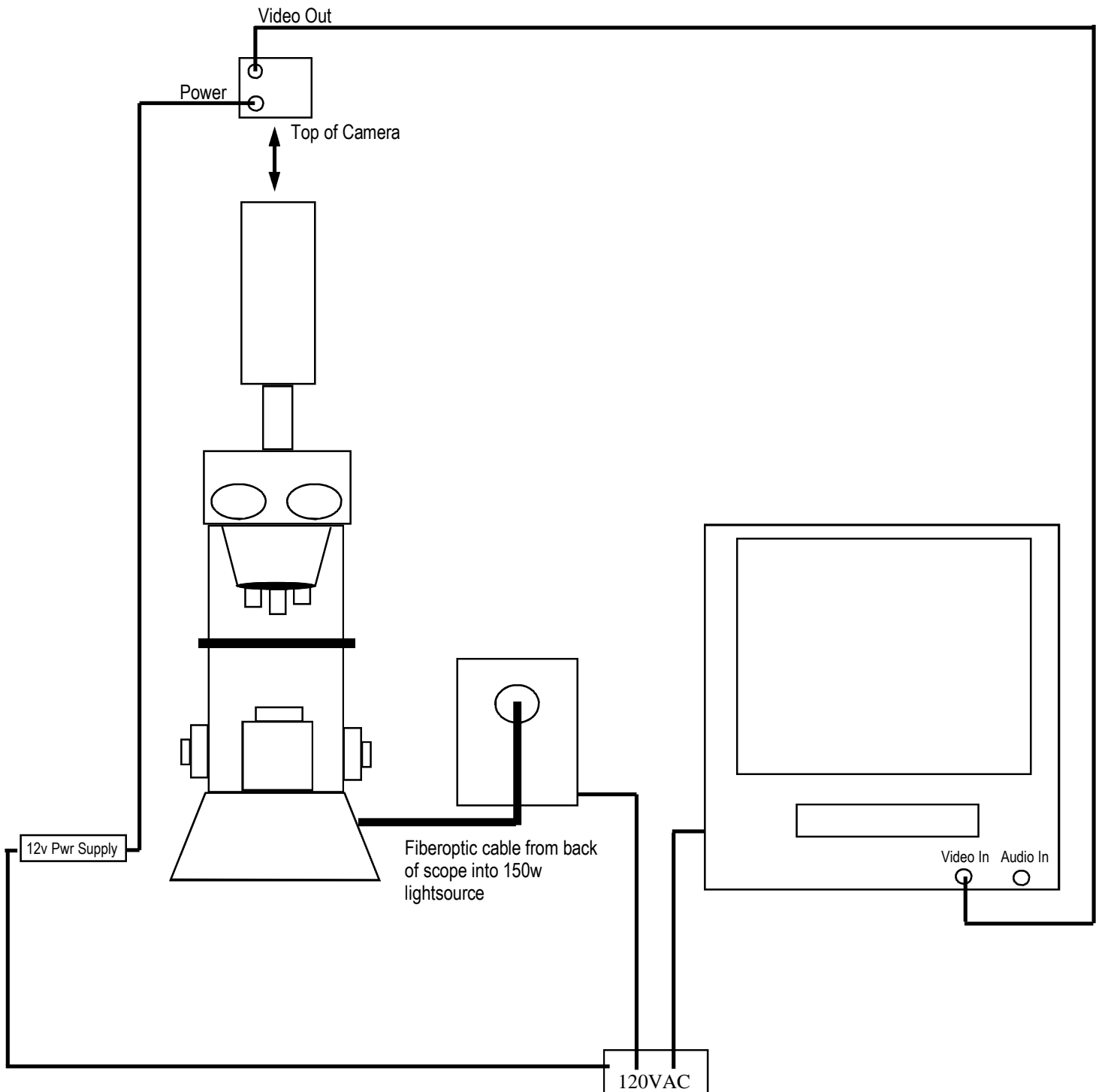
With HD camcorders, we have found in our testing that the Canon cameras had basically clean CCD or CMOS chips over others we tried, so we recommend these in particular.

If any spot might show up on the screen, it might be when there is no specimen being viewed and the camera is somewhat focusing on a bit of something somewhere in the optical path, usually the lens nearest or on the camcorder itself. When you focus on a specimen slide, the spot disappears as it no longer is in the focus field.

The wiring diagrams that follow show various ways to hook up the microscope to various video monitors, computers, and printers. Many variations exist depending on your particular equipment and needs. These are here to give you basic guidelines and ideas.

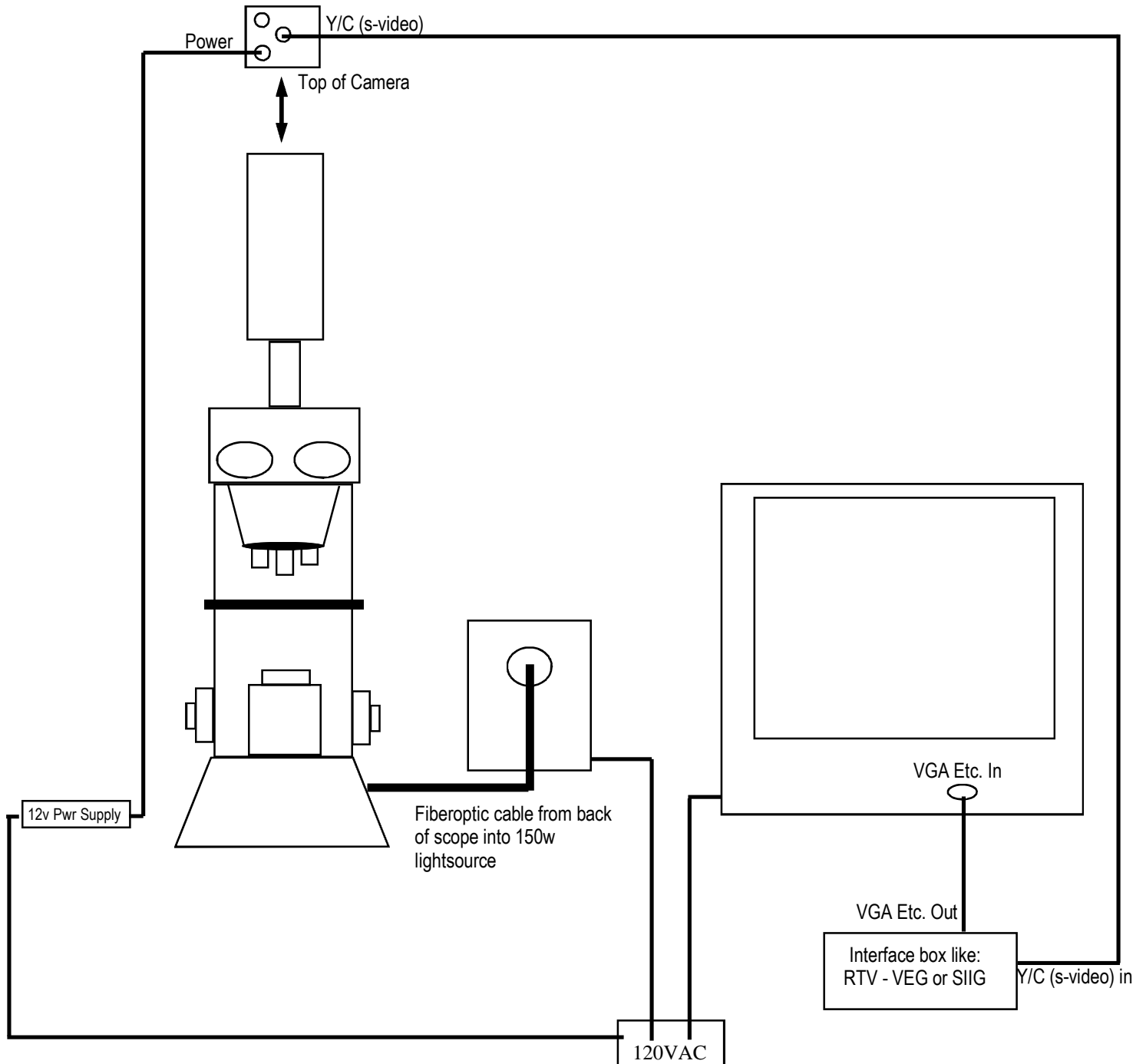
## Microscope Cable Hook-up with Basic TV/VCR

- Standard Definition Camera -  
(or when using standard video out on HD camcorder)



# Microscope Cable Hook-up with Computer Monitor

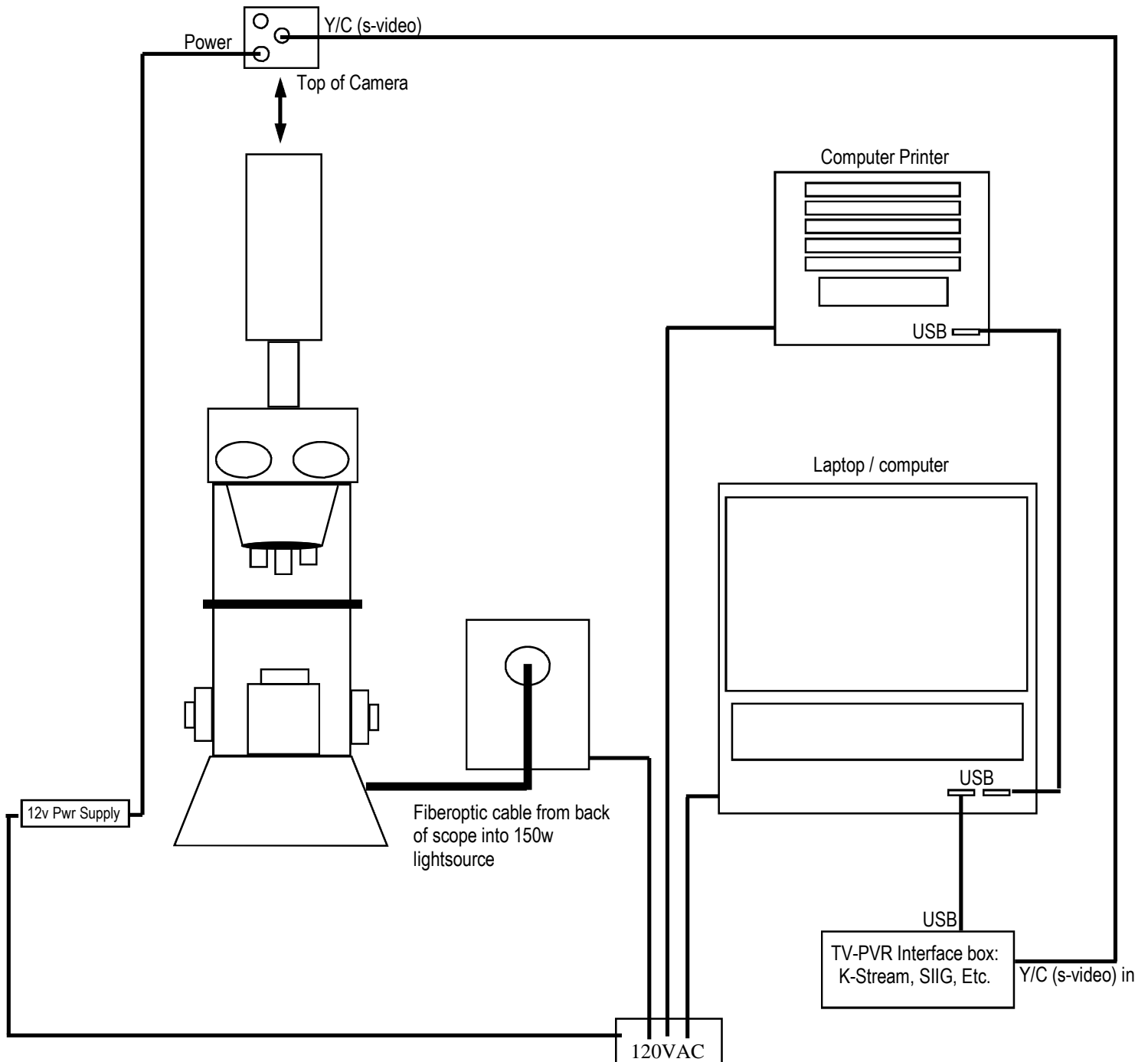
- Standard Definition Camera -  
(or when using standard video out on HD camcorder)





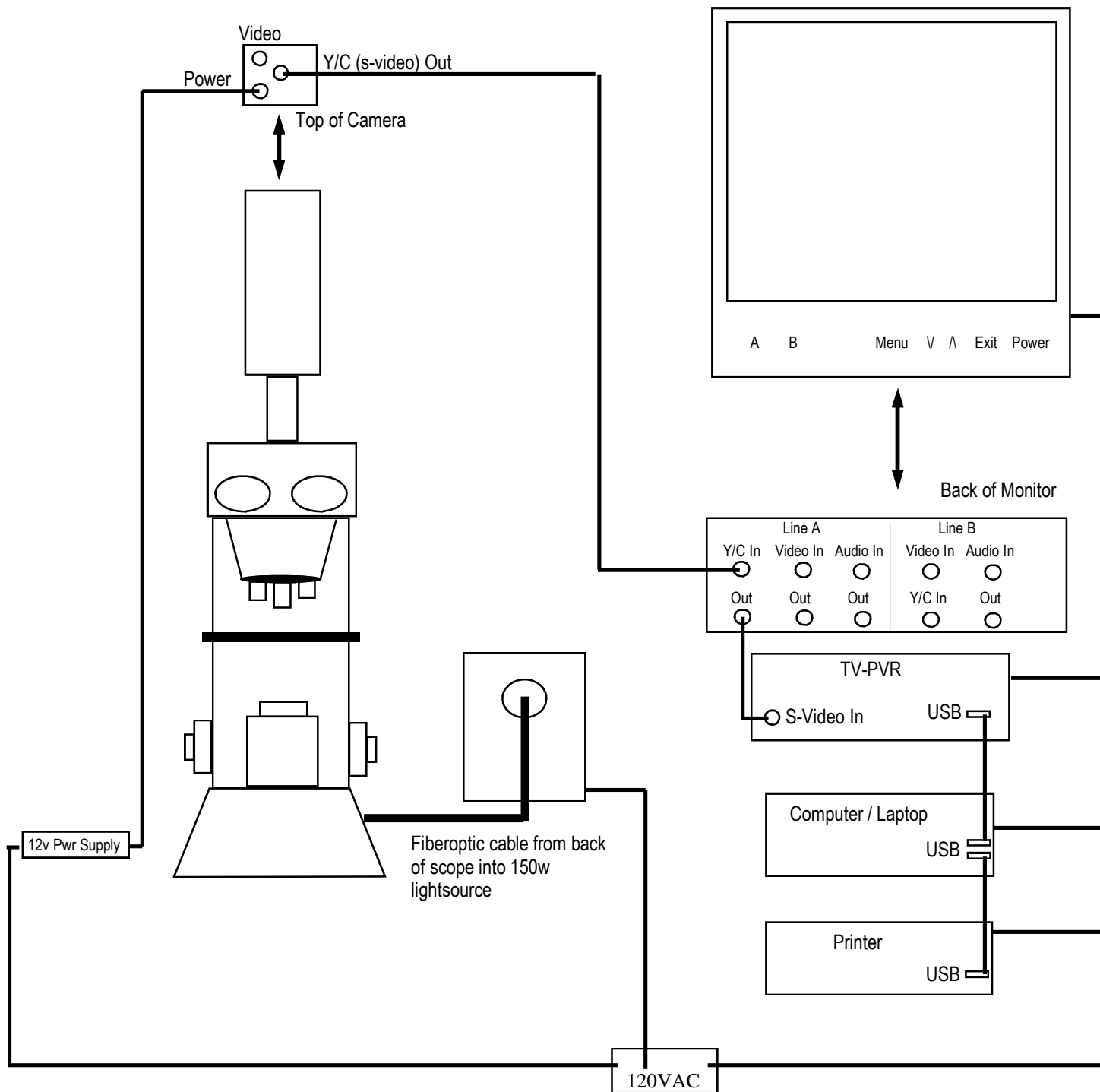
## Microscope Cable Hook-up with Laptop / Printer

- Standard Definition Camera -  
(or when using standard video out on HD camcorder)



# Microscope Cable Hook-up with Lab Monitor & Laptop / Printer—Example 1

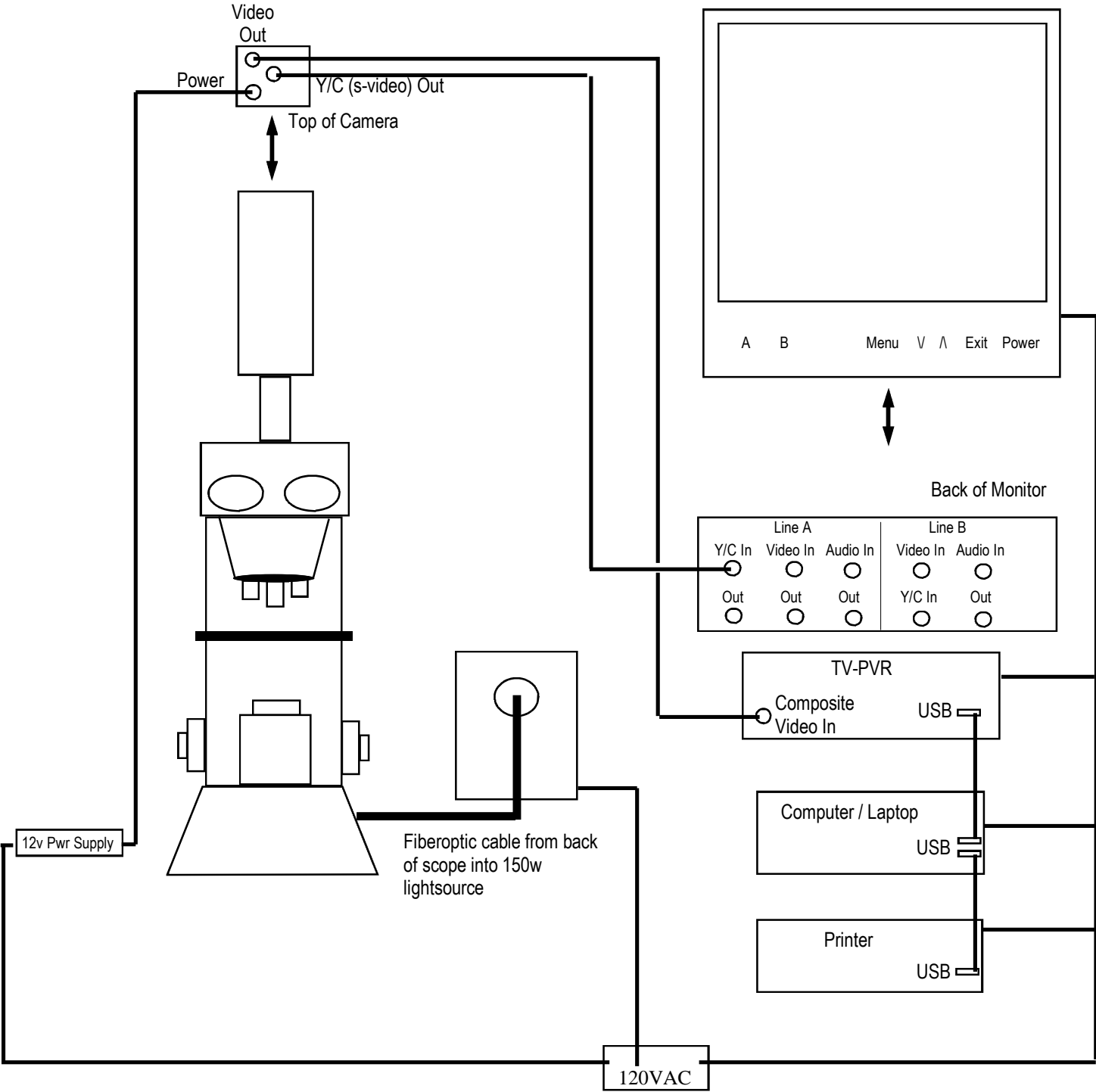
- Standard Definition Camera -  
(or when using standard video out on HD camcorder)



Microscope

Cable Hook-up

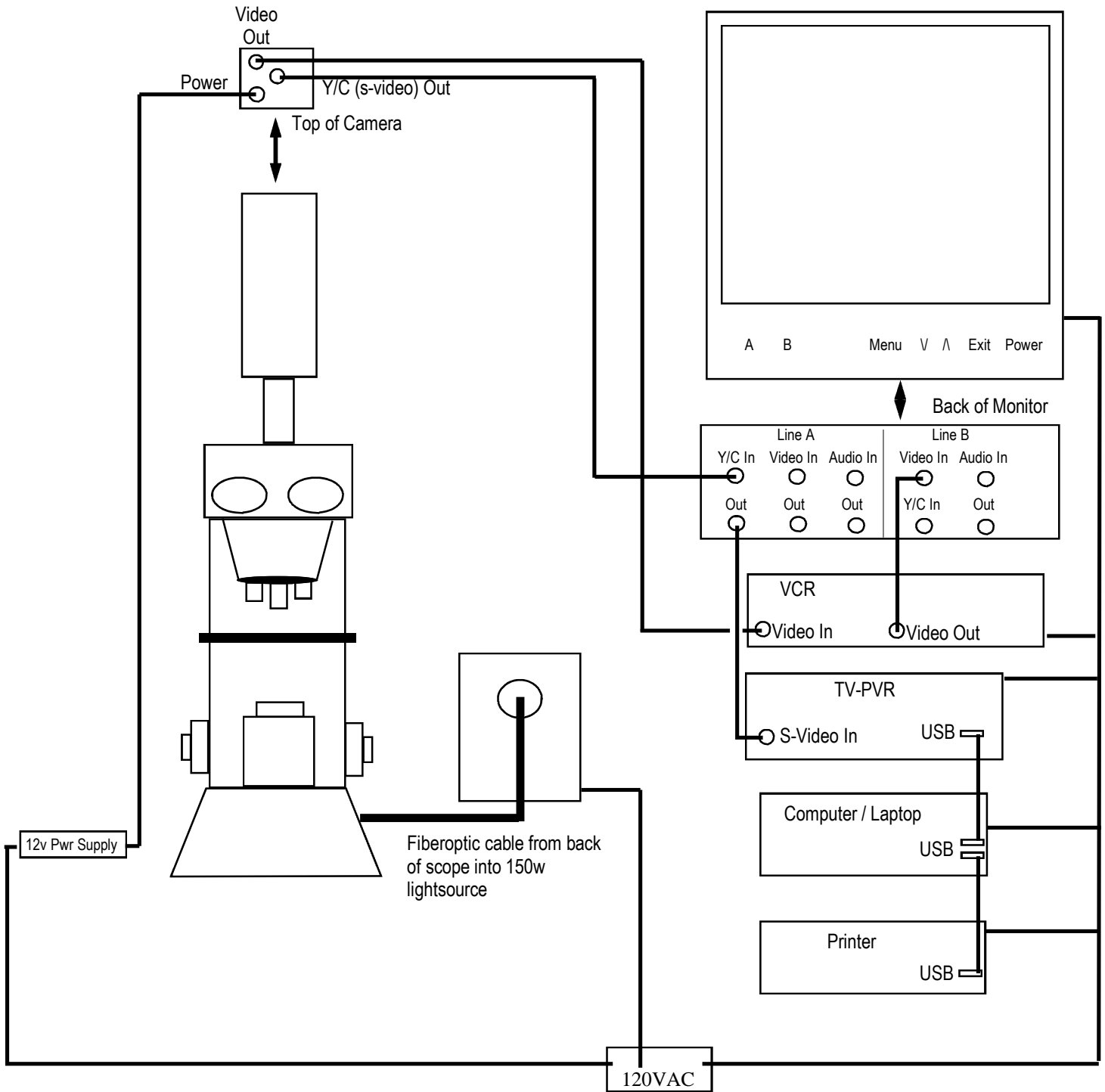
- Standard Definition Camera -  
(or when using standard video out on HD camcorder)



# Microscope

# Cable Hook-

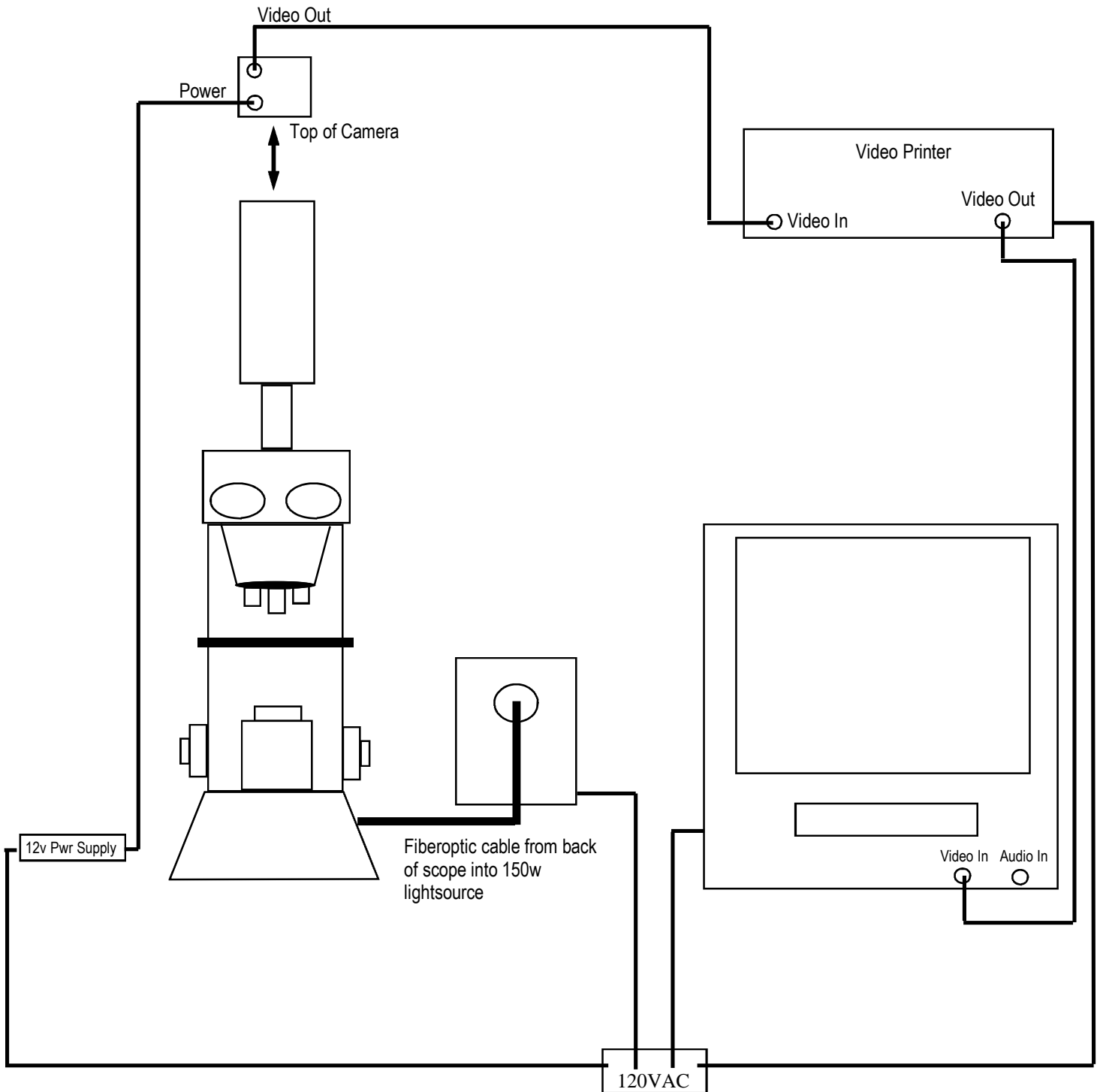
- Standard Definition Camera -  
(or when using standard video out on HD camcorder)



## Microscope

## Cable Hook-up

- Standard Definition Camera -  
(or when using standard video out on HD camcorder)

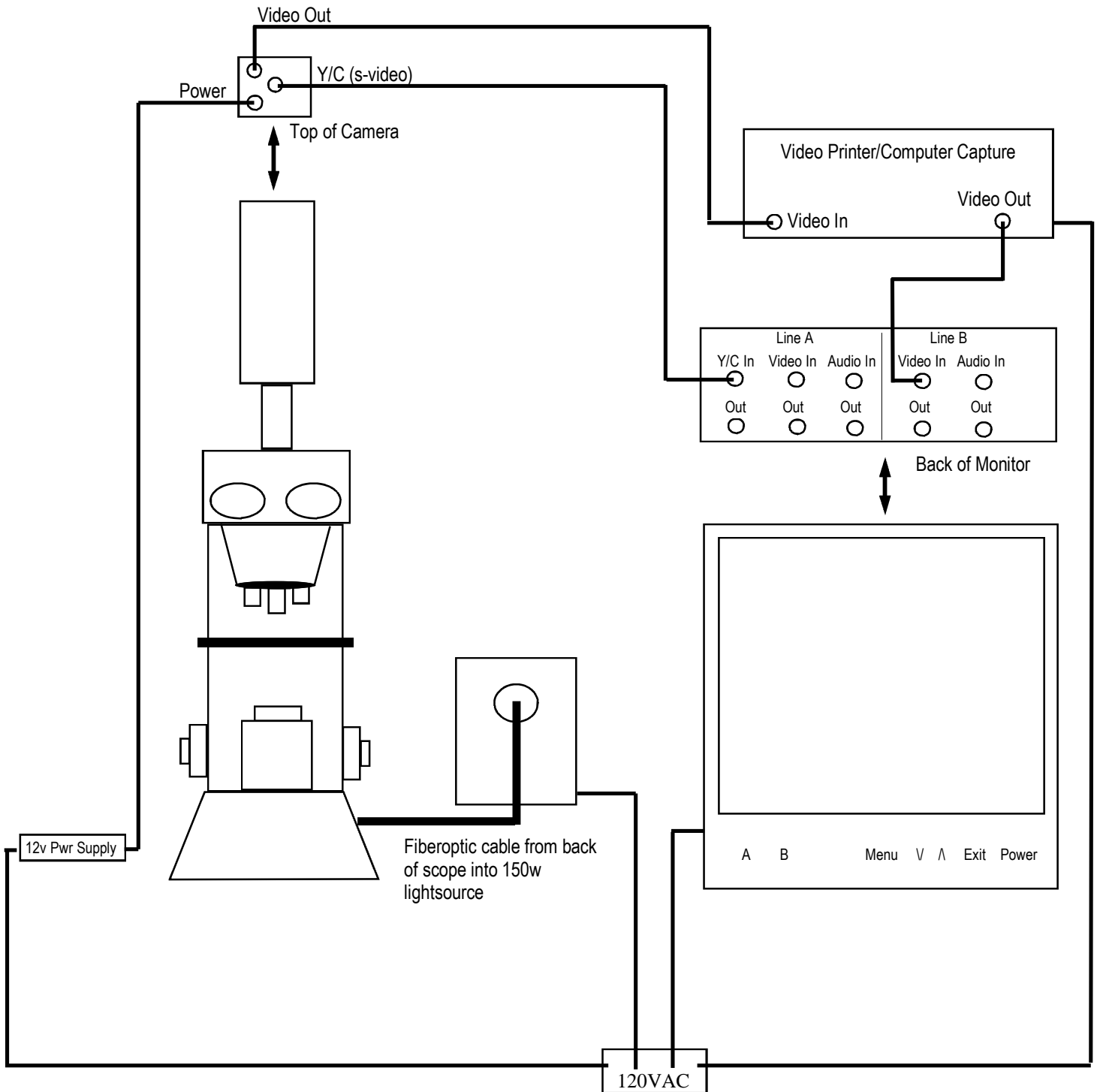


If you had a TV set with no VCR and wanted to hook up a video recorder to the above set-up, put it some where in the line between the camera Video Out and the monitor Video In. For example, go camera video out to recorder video in, recorder video out to printer video in, printer video out to monitor video in.

## Microscope

## Cable Hook-

- Standard Definition Camera -  
(or when using standard video out on HD camcorder)

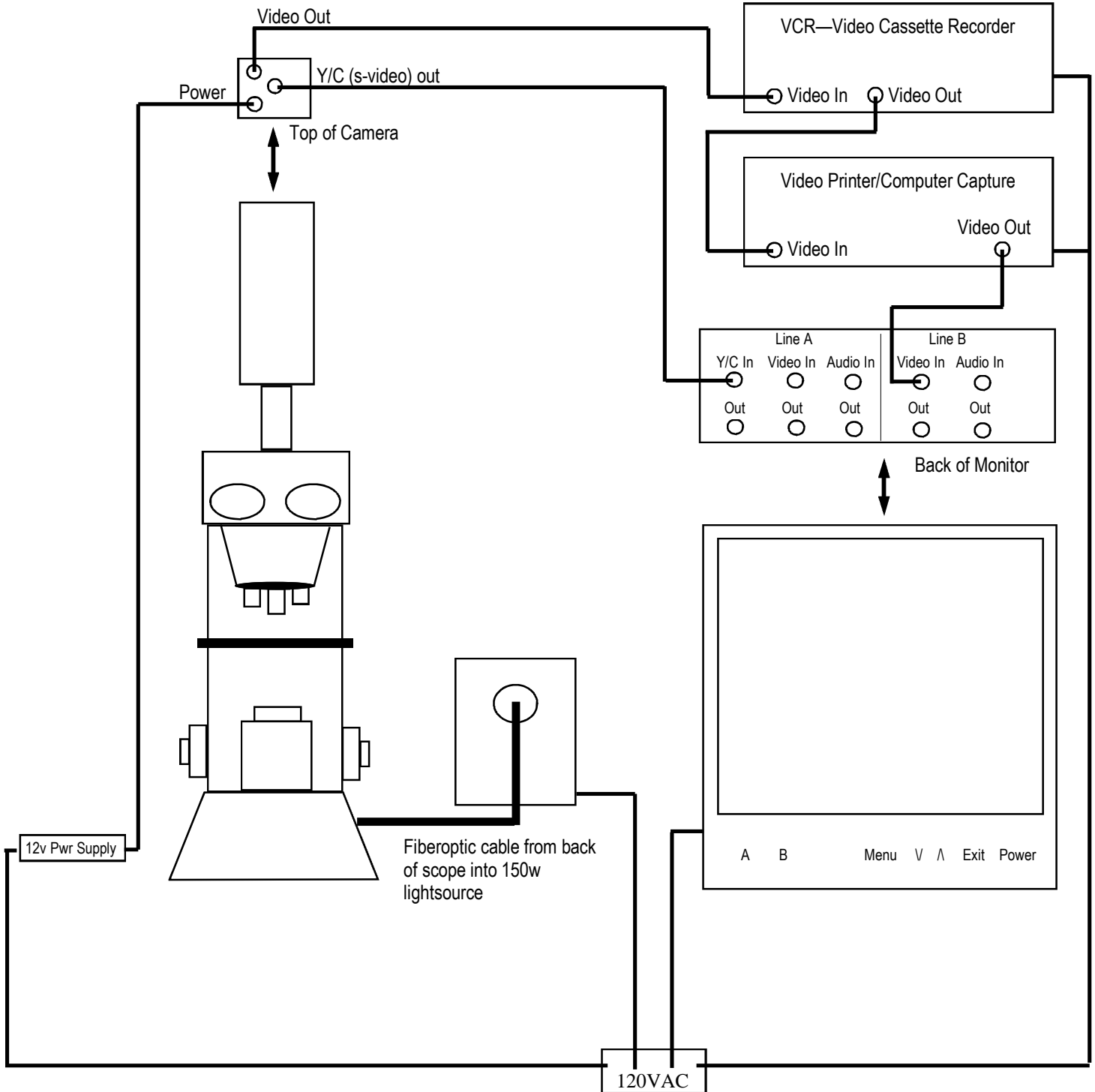


When you have the video printer and lab monitor, hook it up as shown above. Your standard viewing will be on Line A with the higher quality Y/C input. When you want to view the screen menu for the video printer, push the button for Line B which will switch you to view what is occurring with the printer. When generating a print from the printer, you can switch back to Line A and continue to scan with the scope.

## Microscope

## Cable Hook-up

- Standard Definition Camera -  
(or when using standard video out on HD camcorder)

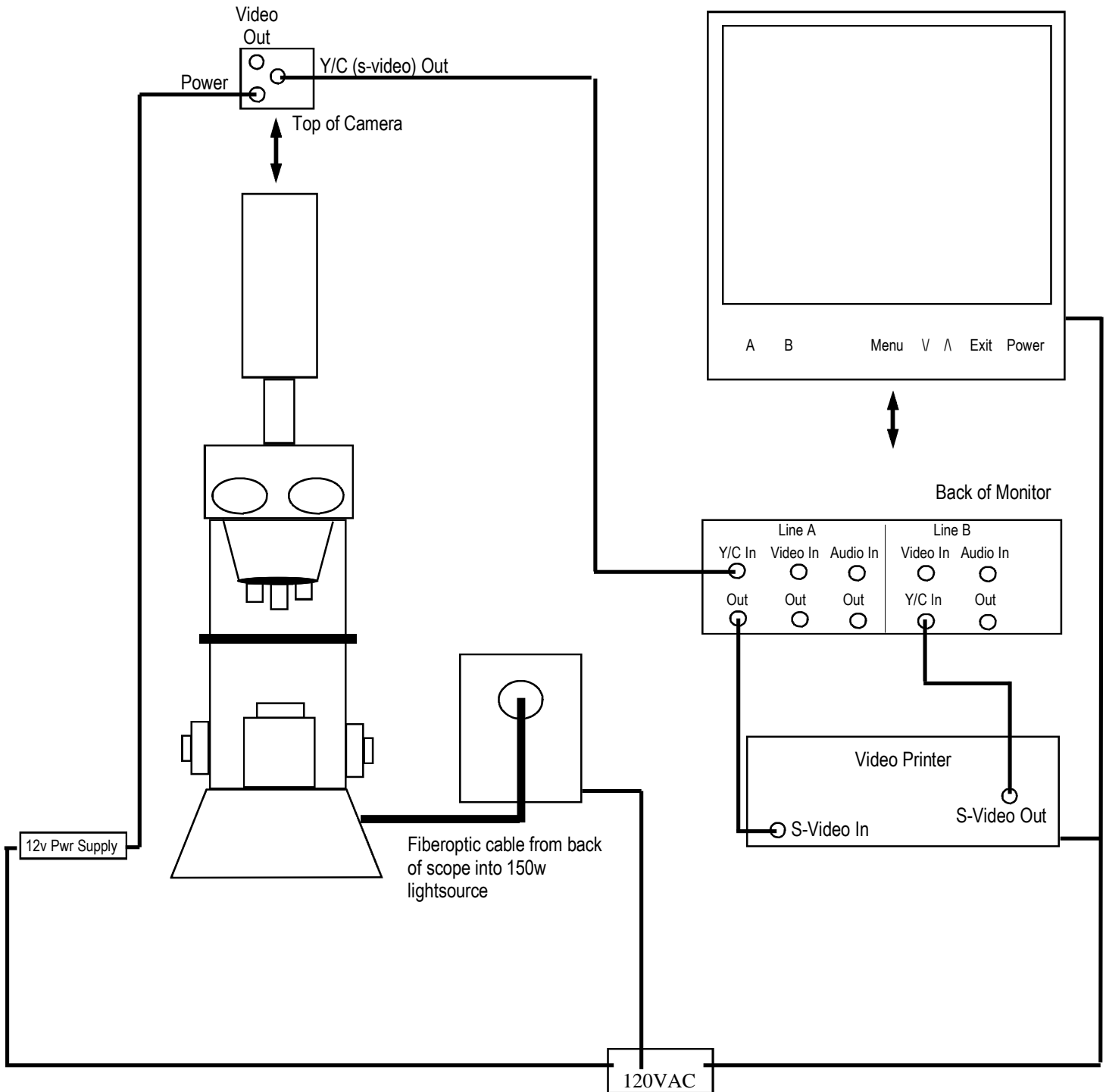


When you have a video printer, VCR and lab monitor, hook it up as shown above. Your standard viewing will be on Line A with the higher quality Y/C input. When you want to view the screen menu for the video printer or view what is on the VCR, push the button for Line B. When generating a print from the printer, you can switch back to Line A and continue to scan with the scope. The VCR and video printer will both need to be turned on to view them on the monitor. The VCR will also have to be turned on in order for any video signal to get to the printer. It is important that you have the VCR set on the correct input/output arrangement via your VCR remote control or menu selection to have the signal from the camera get through the VCR to the printer and monitor. If you get a microscope picture on your monitor on line A, and you don't have an image on line B, check that VCR and printer are turned on and the correct menu selection is set for both units. See the owners manual on those units for assistance.

## Microscope

## Cable Hook-

- Standard Definition Camera -  
(or when using standard video out on HD camcorder)

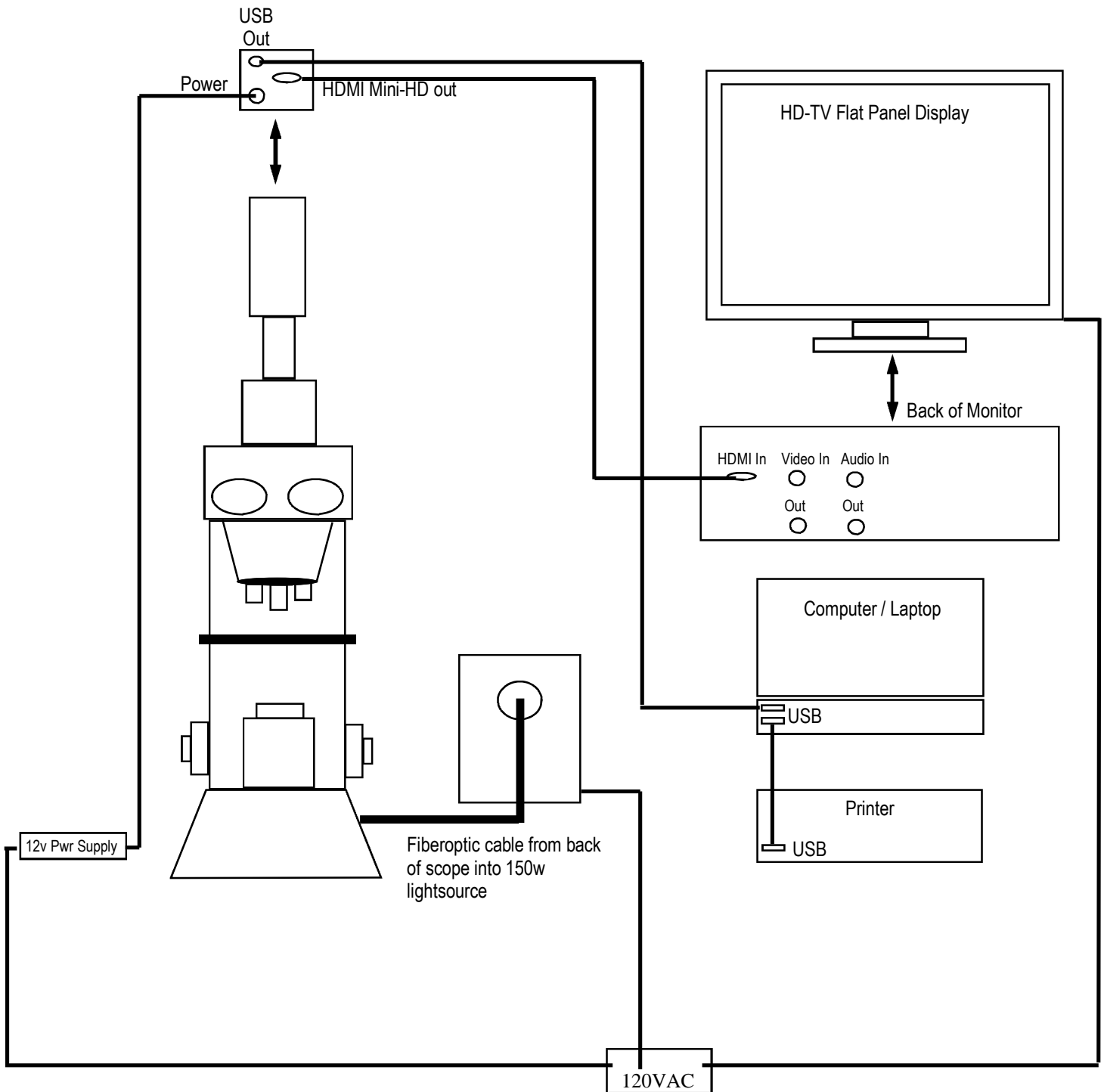


When you have video printer with s-video capability and a lab monitor, hook it up as shown above. Your standard viewing will be on Line A direct from the camera. When you want to view the screen menu for the video printer, push the button for Line B which will switch you to view what is occurring with the printer. When generating a print from the printer, you can switch back to Line A and continue to scan with the scope.



# Microscope Cable Hook-up with HD Camcorder, Screen, Computer, Printer

- High Definition Camcorder -



## **GETTING YOUR VIDEO CAMERA IMAGE TO A COMPUTER**

For watching your microscope image on a computer monitor with a standard definition video camera while going THROUGH a computer or for connection to a laptop, the easiest way to accomplish this is to use an external USB TV Tuner . These are small boxes or USB dongles that allow you to watch broadcast TV on your computer—but instead of watching television we will watch the microscope camera.

There are many of these devices on the market. The important thing when you go in search of a unit is to make sure that the specifications state that there is s-video input or composite input capability. We will be going from the s-video output of the microscope standard definition camera to the s-video input of the device.

If using a HD camcorder, you would need the proper AV connection wire to plug into your camera's side panel AV jack which has a composite video jack (yellow in color) and this would be plugged into the TV Tuner USB device. (For most people using HD camcorders, the primary view screen would be a HDTV and all video/image capture is done on the internal SD memory card. More about that on the next two pages.)

To see a selection of TV Tuner USB units available, go to any internet electronics provider and type in the search words "TV-PVR" "PC TV Tuner", "TV Tuner USB" etc. Search electronic retailers like tigerdirect.com (tigerdirect.ca in Canada), newegg.com, etc.

The latest one we have used which worked for some laptops was the Pinnacle PCTV HD Ultimate stick. The software to run the device is on a chip inside the unit and when the device is plugged into the USB port on a computer the software automatically loads and an icon appears on the screen. Double clicking on the icon brings up the program, then going to channel selection and selecting the s-video input (with the camera s-video output plugged into the unit) the microscope image comes up on screen. K-World, Aver and others have also worked.

For PAL cameras (used in many Euro countries and other areas) the above systems usually can be switched to that format. Most of these systems are for Microsoft Windows based computers, you will have to look for ones specific to Apple systems.

For APPLE computers check:

<http://www.elgato.com/>

Not sure of the video connections to the following, you'd have to check.

<http://www.welovemacs.com/vicacrfor4m.html>

<http://www.welovemacs.com/6201eytv.html>

<http://www.welovemacs.com/6211eyt2.html>

## **LARGE SCREEN DISPLAYS with standard definition cameras**

If you want to go to a large panel display, plasma as opposed to LCD would be a first choice due to wide viewing angle, fast refresh rate and deep blacks. Because many large plasma displays now only come in HD format and we are going from a standard definition signal to a high definition display the image may suffer depending on the internal scaling ability of the monitor. Some have ok scalability, some very poor. First you would like to use a 720p monitor. If using one of these or a 1080i or 1080p and the image looks fractal like, you could use an external video scaler. This is placed between the microscope camera and the high def display. (The s-video output from the camera goes into the scaler, and the HDMI output of the scaler goes to the plasma display). By referring to the menu of the scaler and selecting the maximum fine tuning adjustments for standard definition inputs, you will get the most optimum image capable for the display.

The most reasonable video scaler we have found to date is the DVDO Edge from Anchor Bay. See [www.anchorbaytech.com/dvdo\\_edge/](http://www.anchorbaytech.com/dvdo_edge/)

## **PRINTING MICROSCOPE PICS FROM YOUR COMPUTER:**

Photo printers abound in the marketplace from Canon, Sony, HP, Kodak and Epson. A few of these are ink based, some may be dye sublimation. We really like the dye sublimation printers, These models print 4x6 photo quality prints and uses a dye sublimation film pack that has the ink - cyan, magenta, yellow, black - on a roll of film. One film pack with paper is good for 50 prints that put out consistent quality on every print. Cost is about \$.25 per print.

Note on printing:

**For standard definition imaging**, the software that comes with the PCTV Tuner box that sits between the microscope camera and computer will allow you to easily capture images - either JPEG, or moving live action AVI type files. One would use the standard windows file explorer to create client folders where the images could be saved. Images from those folders can then be printed one at a time using the standard windows file and fax viewer or by using the software that comes with the printer. With this software images could be manipulated and printed. For example, one 4x6 print could contain 2, 4, 8, or more separate microscope images.

**For HD cameras**, you will likely be snapping pics with your camera's picture taking ability and then download those images to your computer through the USB connection. Once in your computer you can manipulate them any way you desire using software that came with your camera, computer or some third party. You can also just pull the SD memory card from your camcorder (if using a camcorder with this option) and plug it into a computer's card reader and print directly from there.

## GOING WIRELESS

With the HD camcorders, we typically use memory cards to temporarily store the pictures we have taken. One type of “wireless” memory card is from Eye-Fi. With this card installed in one of your memory card slots (slot B if using Canon dual slot memory camcorders) images that are taken with your camcorder can automatically be transferred through your network right to your computer so no USB cable hook-up is required. This is kind of nifty. Take a photo of an interesting specimen and it shows up in your computer within the Eye-Fi software so you can then do what you want with it.



Instructions for installation and use of these devices is within the manual for the particular Eye-Fi card you might have.

Note: If we shipped your microscope with a camcorder, you might have the Eye-Fi chip installed in the camera as an option. You will need to take this out of the camera and put it into the Eye-Fi USB reader and install the contained software on your computer. See the Eye-Fi chip instruction manual for details.

## BYPASSING THE COMPUTER WITH STANDARD DEF. CAMERAS

If you are gadget and computer phobic and would prefer to print directly to a printer from the video camera, you will need a dye sublimation video photo printer. Printers that print from the computer are called video digital printers, and those that can bypass the computer and print directly from the video are called video photo printers. Right now these take a standard video camera output. To date we have not seen any that take an HDMI output direct from a high def camcorder.

Expect to pay about \$1300-1400 for one of these depending upon specs.

## BYPASSING THE COMPUTER WITH HD CAMERAS

When you capture an image to a memory chip with an HD camera, that chip can be removed and plugged directly into many digital printers. You will be able to read what is on the chip as well as print photos without the need for a computer. Refer to the operating guide of your selected printer.

## Miniature DSP Color CCD Camera

SI-C400N / SI-C500N / SI-C500P

# OPERATING MANUAL

Standard Definition  
Video Camera

### For Customer Use :

Please record the model No. and the serial No. in the spaces provided below. These numbers located on the bottom of the camera.  
Keep this manual for future reference.

Model No. \_\_\_\_\_

Serial No. \_\_\_\_\_

Thank you for purchasing this color CCD camera. Before using this camera, please read this operating manual carefully to obtain the best result and keep this manual for future reference.

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## CAUTION

RISK OF ELECTRIC SHOCK  
DO NOT OPEN



**CAUTION :** TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE.  
REFER SERVICING TO QUALIFIED SERVICE PERSONAL.



This lightning flash with arrowhead symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

This exclamation point symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.



Due to design modification, data given in this instruction book are subject to possible change without prior notice.

**WARNING :**  
TO PREVENT THE RISK OF FIRE OR ELECTRIC SHOCK HAZARD, DO NOT EXPOSE THIS CAMERA TO RAIN OR MOISTURE.

### Information for USA

This device complies with Part 15 of the FCC rules. Changes or modifications not approved by Costar could void the user's authority to operate the equipment.

## PRECAUTIONS

### Operating

- Before using, make sure of power supply and connection of video output.  
Power supplied without voltage stabilization or the voltage maintained at  $12V \pm 10\%$  DC may cause damage.
- While operating, if any abnormal condition or a malfunction is observed, stop using the camera immediately and then call your local dealer.

### Handling

- Do not disassemble the camera and never touch parts inside the camera.
- Do not drop the camera or subject it to shocks and vibrations to avoid possible damage.
- When attaching or removing the lens, handle with care in order that moisture and dust does not enter the camera.
- Do not shoot any source of bright light, if the object contains very bright areas, bright vertical or horizontal lines may appear on the screen. This is called "smear", a phenomenon which often occurs with solid-state pickups, and is not a malfunction.

### Installation and storage

- Do not point the camera at the sun. This could damage the camera whether it is operating or not.

- Do not install the camera where the temperature could exceed the allowable range.  
Be sure the ambient temperature is less than  $40^{\circ}\text{C}$  for long term continuous operation.
- Avoid installing in humid or dusty places.
- This could damage CCD and other components and cause malfunction.
- Avoid installing in places where there are strong magnetic fields and electric signals.
- Avoid installing in places where the camera would be subject to strong vibrations.
- Never expose the camera to rain and water.

### Cleaning

Turn the power off and wipe off the dirt with dry soft cloths. If it is extremely dirty, use furniture cleaning tissue. Do not use alcohols, petroleum distillates, liquid cleaners or sprays.

### Daily check

Make daily check for proper operation for surveillance use. In order to maintain normal operation, the output of camera should be checked by user everyday for a clear and focused picture.

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## FEATURES

### High sensitivity

- 410,000 pixels CCD with on-chip microlenses and low noise digital signal processing circuit provide maximum sensitivity down 0.3 lux (F1.2)

### High quality image

- High resolution, high sensitivity design for a horizontal resolution of 470 TV lines.
- High quality image is obtained by digital signal processing with optimization of control program and image correction algorithm.

### Back light compensation

When strong light entering the scene background such as from a spotlight or window, back light compensation function automatically adjust the video level so as to preserve visibility in important sections of the image.

### White balance

Three control modes of auto-tracking preset and manual white balance can be selected according to conditions.

### Iris function

Provide a drive output for video iris lens. Also built-in electronic shutter to allow 11 shutter speeds up to 1/50,000 sec. CCD iris function automatically set the brightness of the picture by changing the shutter speed of the camera according to the incident light when using a manual iris lens.

### Other versatile functions

- Text display function of up to 24 characters.
- Separated Y/C video signal output.
- Special menu functions for gamma, color adj., contrast, sharpness, preset
- Use either C or CS mount lenses.

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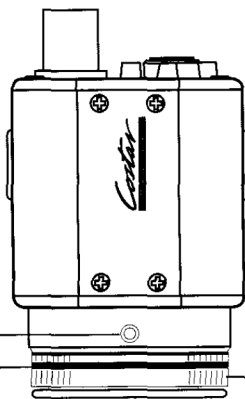
## NAME AND FUNCTIONS

### Lens mount

Mount for installing the lens. C-mount lens can be used when C-mount adapter is attached, and CS-mount lens can also be used when it is removed.

### Back-focus screw

A screw is provided to fix the lens mount. See page 20.



### Lens mount cap

Be sure to cap the lens mount when the lens is not mounted.

### C-mount adapter

To mount a C-mount lens. And remove to mount a CS-mount lens. Turn counterclockwise to remove it. Also refer to page 19.

### Tripod mounting base

Mounting base for installing the camera.

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## MENU SYSTEM

### GENERAL

The menu system can activate all the features and option of the camera.

The menus are superimposed on the image displayed on the screen. The commands can open other menus, toggle options, or change variable parameters.

### MENU OPERATION

Five rear panel Setup buttons are used to shift the cursor and select items from the menus.

- ▲ ① Setup Buttons  
▼ ②  
SET ③ ④ ⑤

- ① Up button: Shift the cursor upwards.  
② Down button: Shift the cursor downwards.  
③ Left button: Shift the cursor toward the left.  
④ Right button: Shift the cursor toward the right.  
⑤ Set button: To display the main menu or check the setting and proceed to the next item.

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### Power indicator

Lights up when the camera is powered.

### Video output connector

BNC connector that outputs a composite video signal.

### Setup buttons

When use setting up and adjusting the camera with reference to the on-screen menu. See page 7.

### S-VIDEO connector

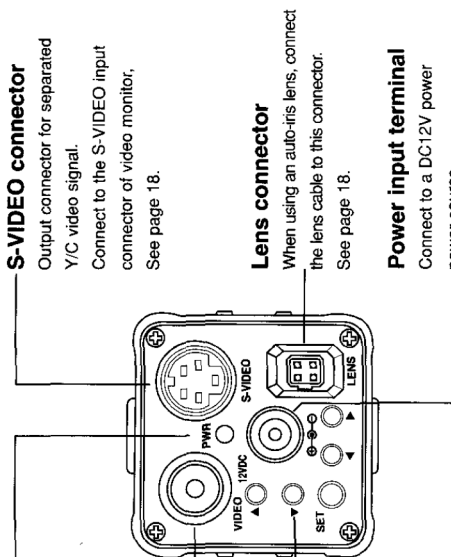
Output connector for separated Y/C video signal. Connect to the S-VIDEO input connector of video monitor. See page 18.

### Lens connector

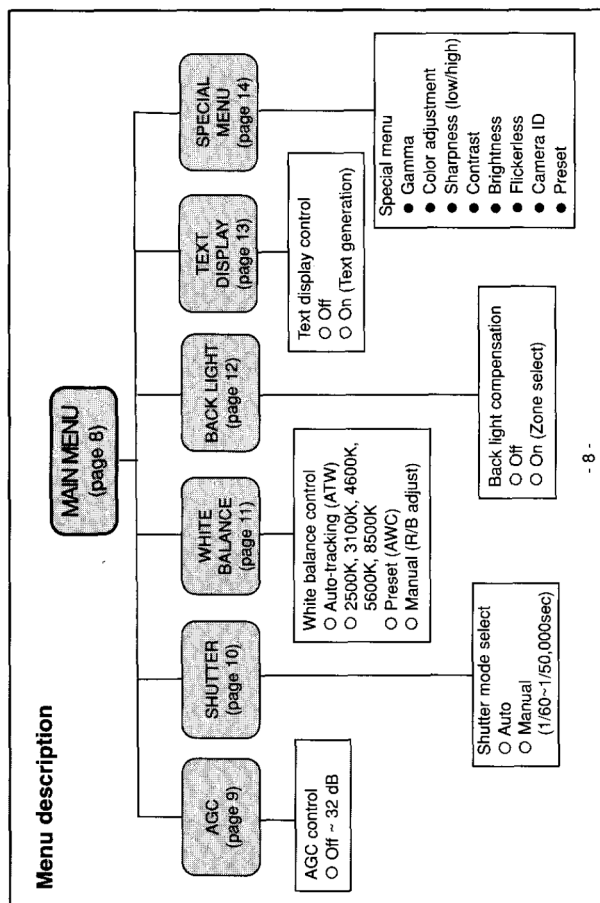
When using an auto-iris lens, connect the lens cable to this connector. See page 18.

### Power input terminal

Connect to a DC12V power source. (Be sure not to connect the power source until all other connections are completed.)



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- 8 -

### Right button (ascending sequence) :

OFF → 20dB → 40dB → 60dB → 80dB → 100dB → 120dB  
 → 140dB → 160dB → 180dB → 200dB → 220dB → 240dB  
 → 260dB → 280dB → 300dB → 320dB → OFF

### Left button (descending sequence) :

320dB → 300dB → 280dB → 260dB → 240dB → 220dB → 200dB  
 → 180dB → 160dB → 140dB → 120dB → 100dB → 80dB  
 → 60dB → 40dB → 20dB → OFF → 32dB

At the AGC on setting, camera's sensitivity is automatically increased to setting level when the ambient light drops.

### Electronic shutter control

- Press the Set Button to display the main menu.
- Position the cursor at SHUTTER, and press the left or right button to setting the Auto shutter.

MAIN MENU

Lens	: VIDEO	: ON	: MANUAL
AGC	: ON	: AUTO	: ATW
Shutter	: OFF	: OFF	: OFF
White Balance	: OFF	: OFF	: N/A
Back Light	: OFF	: OFF	: N/A
Text Display	: OFF	: OFF	: N/A
Sync Mode	: OFF	: OFF	: N/A
Special Menu	: OFF	: OFF	: N/A
End	: OFF	: OFF	: N/A

### AUTO Mode

When using the manual iris lens, the brightness of the picture image will be fixed by setting this auto mode, as the shutter speed is automatically varied according to the incident light.

**Note :** Outdoor illumination levels may exceed 150,000 lux, which is outside the range that can be controlled by the electronic shutter. For proper operation of electronic shutter, if illumination levels exceed 10,000 lux, use a auto-iris lens.

### MANUAL Mode

- Press the Set button to set the manual shutter speed when position the cursor at SHUTTER and shutter mode is manual.

MANUAL SHUTTER

→ Shutter Speed : 1/60  
 PAL Format Cameras: 1/50  
 Press SET to Main Menu

- Press the left or right direction button to select a shutter speed from 1/60 to 1/100,000 sec.

Right button (ascending sequence) :  
 1/60 → 1/100 → 1/120 → 1/250 → 1/500 → 1/1000  
 → 1/2000 → 1/4000 → 1/10000 → 1/30000 → 1/50000 → 1/60 sec

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### MAIN Menu

- Press the Set button to display the main menu on the monitor screen.
- Check the present settings at the main menu.

MAIN MENU

Lens	: VIDEO	: ON	: MANUAL
AGC	: ON	: AUTO	: ATW
Shutter	: OFF	: OFF	: OFF
White Balance	: OFF	: OFF	: N/A
Back Light	: OFF	: OFF	: N/A
Text Display	: OFF	: OFF	: N/A
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Special Menu	: OFF	: OFF	: N/A
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Shutter	: OFF	: OFF	: OFF
White Balance	: OFF	: OFF	: N/A
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Shutter	: OFF	: OFF	: OFF
White Balance	: OFF	: OFF	: N/A
Back Light	: OFF	: OFF	: N/A
Text Display	: OFF	: OFF	: N/A
Sync Mode	: OFF	: OFF	: N/A
Special Menu	: OFF	: OFF	: N/A
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AGC	: ON	: AUTO	: ATW
Shutter	: OFF	: OFF	: OFF
White Balance	: OFF	: OFF	: N/A
Back Light	: OFF	: OFF	: N/A
Text Display	: OFF	: OFF	: N/A
Sync Mode	: OFF	: OFF	: N/A
Special Menu	: OFF	: OFF	: N/A
End	: OFF	: OFF	: N/A

### MAIN Menu

- Press the Set button to display the main menu on the monitor screen.
- Check the present settings at the main menu.

MAIN MENU

Lens	: VIDEO	: ON	: MANUAL
AGC	: ON	: AUTO	: ATW
Shutter	: OFF	: OFF	: OFF
White Balance	: OFF	: OFF	: N/A
Back Light	: OFF	: OFF	: N/A
Text Display	: OFF	: OFF	: N/A
Sync Mode	: OFF	: OFF	: N/A
Special Menu	: OFF	: OFF	: N/A
End	: OFF	: OFF	: N/A

### MAIN Menu

- Press the Set button to display the main menu on the monitor screen.
- Check the present settings at the main menu.

MAIN MENU

Lens	: VIDEO	: ON	: MANUAL
AGC	: ON	: AUTO	: ATW
Shutter	: OFF	: OFF	: OFF
White Balance	: OFF	: OFF	: N/A
Back Light	: OFF	: OFF	: N/A
Text Display	: OFF	: OFF	: N/A
Sync Mode	: OFF	: OFF	: N/A
Special Menu	: OFF	: OFF	: N/A
End	: OFF	: OFF	: N/A

### MAIN Menu

- Press the Set button to display the main menu on the monitor screen.
- Check the present settings at the main menu.

MAIN MENU

Lens	: VIDEO	: ON	: MANUAL
AGC	: ON	: AUTO	: ATW
Shutter	: OFF	: OFF	: OFF
White Balance	: OFF	: OFF	: N/A
Back Light	: OFF	: OFF	: N/A
Text Display	: OFF	: OFF	: N/A
Sync Mode	: OFF	: OFF	: N/A
Special Menu	: OFF	: OFF	: N/A
End	: OFF	: OFF	: N/A

### MAIN Menu

- Press the Set button to display the main menu on the monitor screen.
- Check the present settings at the main menu.

MAIN MENU

Lens	: VIDEO	: ON	: MANUAL
AGC	: ON	: AUTO	: ATW
Shutter	: OFF	: OFF	: OFF
White Balance	: OFF	: OFF	: N/A
Back Light	: OFF	: OFF	: N/A
Text Display	: OFF	: OFF	: N/A
Sync Mode	: OFF	: OFF	: N/A
Special Menu	: OFF	: OFF	: N/A
End	: OFF	: OFF	: N/A

### MAIN Menu

- Press the Set button to display the main menu on the monitor screen.
- Check the present settings at the main menu.

MAIN MENU

Lens	: VIDEO	: ON	: MANUAL
AGC	: ON	: AUTO	: ATW
Shutter	: OFF	: OFF	: OFF
White Balance	: OFF	: OFF	: N/A
Back Light	: OFF	: OFF	: N/A
Text Display	: OFF	: OFF	: N/A
Sync Mode	: OFF	: OFF	: N/A
Special Menu	: OFF	: OFF	: N/A
End	: OFF	: OFF	: N/A

### MAIN Menu

- Press the Set button to display the main menu on the monitor screen.
- Check the present settings at the main menu.

MAIN MENU

Lens	: VIDEO	: ON	: MANUAL
AGC	: ON	: AUTO	: ATW
Shutter	: OFF	: OFF	: OFF
White Balance	: OFF	: OFF	: N/A
Back Light	: OFF	: OFF	: N/A
Text Display	: OFF	: OFF	: N/A
Sync Mode	: OFF	: OFF	: N/A
Special Menu	: OFF	: OFF	: N/A
End	: OFF	: OFF	: N/A

### MAIN Menu

- Press the Set button to display the main menu on the monitor screen.
- Check the present settings at the main menu.

MAIN MENU

Lens	: VIDEO	: ON	: MANUAL
AGC	: ON	: AUTO	: ATW
Shutter	: OFF	: OFF	: OFF
White Balance	: OFF	: OFF	: N/A
Back Light	: OFF	: OFF	: N/A
Text Display	: OFF	: OFF	: N/A
Sync Mode	: OFF	: OFF	: N/A
Special Menu	: OFF	: OFF	: N/A
End	: OFF	: OFF	: N/A

### MAIN Menu

- Press the Set button to display the main menu on the monitor screen.
- Check the present settings at the main menu.

MAIN MENU

Lens	: VIDEO	: ON	: MANUAL
AGC	: ON	: AUTO	: ATW
Shutter	: OFF	: OFF	: OFF
White Balance	: OFF	: OFF	: N/A
Back Light	: OFF	: OFF	: N/A
Text Display	: OFF	: OFF	: N/A
Sync Mode	: OFF	: OFF	: N/A
Special Menu	: OFF	: OFF	: N/A
End	: OFF	: OFF	: N/A

### MAIN Menu

- Press the Set button to display the main menu on the monitor screen.
- Check the present settings at the main menu.

MAIN MENU

Lens	: VIDEO	: ON	: MANUAL
AGC	: ON	: AUTO	: ATW
Shutter	: OFF	: OFF	: OFF
White Balance	: OFF	: OFF	: N/A
Back Light	: OFF	: OFF	: N/A
Text Display	: OFF	: OFF	: N/A
Sync Mode	: OFF	: OFF	: N/A
Special Menu</			

**Note :** In order to avoid failure of AWC mode setting, do not move the camera or the object until the message of "white balance completed" appear.

#### MANUAL (Manual white balance)

- 1) Press the Set button to setting Manual white balance when position the cursor at WHITE BALANCE and the mode is MANUAL.
- 2) Press the left, right, up, down direction buttons to control the Red/Blue gain.  
Gain level is indicate from 0 to 20.

MANUAL WHITE BALANCE	
→ Red 00	Blue 00
Press SET to Main Menu	

After setting, press the Set button to return to main menu.

#### Back light compensation

Strong light, such as from a spotlight or window, entering the scene background causes the lens iris to close, thereby possibly obscuring desired portions of the scene. Back light compensation functions.

- automatically adjust the video level so as to preserve visibility in important sections of the scene.
- 1) Press the Set button to display the main menu.
  - 2) Position the cursor at BACK LIGHT and press the left or right button to setting the back light on.
  - 3) Press the left or right button again, back light setting returns to off.

MAIN MENU	
Lens	: VIDEO
AGC	: ON
Shutter	: AUTO
White Balance	: ATW
Back Light	: ON
Text Display	: OFF
Sync Mode	: N/A
Special Menu	
End	

#### BLC ZONE SETTING

Backlight control use 6 sensing zones.  
The BLC zone setting is activated on the screen by left or right button to allow the most suitable area to be selected while observing the monitor.  
Press the Set button to select BLC zone when position the cursor at BACK LIGHT and back light mode is on.

BLC ZONE SET	
→ Zone Display	: OFF
Zone 1	: OFF
Zone 2	: OFF
Zone 3	: OFF
Zone 4	: OFF
Zone 5	: OFF
Zone 6	: ON
Press SET to View Zone	

Position the cursor at Zone display and press the set button to view zone.

Zone 1	Zone 2
off	off
Zone 5	Zone 6
off	off
Zone 3	Zone 4
off	off

Decide a BLC zone number for desired portions of the scene.

- 1) Press the Set button to display the BLC zone set.
- 2) Press the up, down direction buttons to move the cursor to desired BLC zone.
- 3) Press the left, right direction buttons to setting the sensing zone which want to preserve visibility in important section of the scene.

#### TEXT GENERATION

A maximum of 24 alphanumeric characters (1 line) can be displayed on the screen.

- 1) Press the Set button to text generation when position the cursor at TEXT INPUT.
- 2) Press the up and down direction button continuously to selecting characters.
- 3) Press the right direction button to move for next character selecting.

Text Set	
→ Text Input	Position set
End	

Supplied characters are as follows.  
ABCDEFGHIJKLMNOPQRSTUVWXYZ01234567890()  
<>+\* / . , (Blank)

#### TEXT LOCATION

- 1) Press the Set button for setting text location when position the cursor at Position Set.
  - 2) Press the left, right, up, down direction buttons to move the text location.
- After setting, press the Set button to return to main menu when position the cursor at End.

After setting, press the Set button to return to main menu.

#### Sync mode

Sync mode is only used Internal synchronization.

#### Special Menu

The special menu function allows to change the video output qualities to match the particular applications.

- 1) Press the Set button to display the main menu.
- 2) Position the cursor at SPECIAL MENU and press the Set button to display the special menu.

SPECIAL MENU	
→ Gamma	: LOW
Color Adj.	: OFF
Sharpness	: OFF
Contrast	: OFF
Brightness	: OFF
Flickerless	: OFF
Preset	: 000
Camera ID	: 000
END	

Special Menu

#### • COLOR ADJUSTMENT

- 1) Position the cursor at COLOR ADJ. and press the Set button for color adjustment.

SPECIAL MENU	
→ Gamma	: LOW
Color Adj.	: OFF
Sharpness	: OFF
Contrast	: OFF
Brightness	: OFF
Flickerless	: OFF
Preset	: 000
Camera ID	: 000
END	

- 2) Press the left, right, up, down direction buttons to control the color phase and level.

COLOR ADJUSTMENT	
→ Phase 00	Level 00
Press SET to Return	

After setting, press the Set button to return to special menu.

#### • GAMMA

- 1) Position the cursor at GAMMA and press the Set buttons to display the Gamma Adjustment.
- 2) Press the left or right buttons to obtain a best image on monitor display.

GAMMA ADJUSTMENT	
→ Level 14	gamma value
level	14: 0.45
00:	1
Press SET to Return	

Gamma level can be selected to maximum 32 steps according to required conditions.  
Default set of Gamma value is 0.45 when activating the Preset function in Special Menu or setting from factory.



### ● SHARPNESS

- 1) Position the cursor at SHARPNESS and press the left or right button for setting the sharpness HIGH.
- 2) Press the left or right button again, the sharpness setting returns to LOW.

SPECIAL MENU	
Gamma	
Color Adj.	: HIGH
Sharpness	: OFF
Contrast	: OFF
Brightness	: OFF
Flickerless	: OFF
Preset	: 000
Camera ID	: 000
END	

### ● CONTRAST

If strong illumination such as a spotlight or outdoor light is present in the background, causing the scene to be by setting the contrast compensation function, the dark areas are enhanced, and brightened the image.

- 1) Position the cursor at CONTRAST and press the left or right button for setting the contrast compensation function to ON.
- 2) Press the Set button again, the contrast compensation function returns to off.

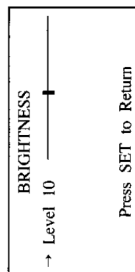
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### SPECIAL MENU

Gamma	
Color Adj.	: LOW
Sharpness	: ON
Contrast	: OFF
Brightness	: OFF
Flickerless	: OFF
Preset	: 000
Camera ID	: 000
END	

### ● BRIGHTNESS

- 1) Position the cursor at BRIGHTNESS and press the Set button for setting the brightness.
- 2) Press the left, right direction button for setting the brightness level.



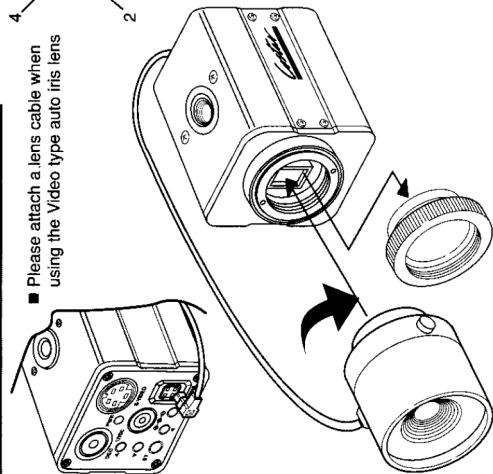
After setting, press the Set button to return to special menu.

## LENS INSTALLATION

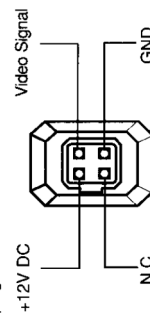
- Please attach a lens cable when using the Video type auto iris lens

Pin No.	Signal
1	GND
2	GND
3	Y (Luminance, 1Vp-p, 75Ω)
4	C (Chrominance, 0.286Vp-p, 75Ω)

Pin assignment : S-VIDEO connector (4-pin)



When using the VIDEO-type auto-iris lens, install the lens plug as follows. If the plug on the cable is of a different type, replace it with the provided 4-pin iris plug.



Video Camera Lens

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### ● FLICKERLESS

If the camera is used with 50 Hz fluorescent lighting, and there is flickering on the monitor. In this case, set the FLICKERLESS mode to ON. Otherwise it should be set to off.

- 1) Position the cursor at FLICKERLESS and press the left or right direction button for setting the flickerless on.
- 2) Press the left or right button again, the flickerless setting is return to off.

SPECIAL MENU	
Gamma	
Color Adj.	: LOW
Sharpness	: OFF
Contrast	: OFF
Brightness	: OFF
Flickerless	: OFF
Preset	: 000
Camera ID	: 000
END	

### ● PRESET

This function is useful when the camera is used frequently changed setup conditions.

- 1) Position the cursor at PRESET and press the set button to display the Preset menu.
- 2) Press the up or down direction button to selected the preset menu.

→	Set to FACTORY
	Set to USER
	Save to USER
	END
	Factory is selected

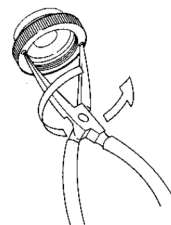
- 3) Position the cursor at FACTORY and press the set button to perform the Factory Setup.

Factory Set is provide the best image under the normal condition by factory setup. Also, user save function is useful when the camera is used the special setup by user.

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### Mounting a lens

- 1) Remove the lens mount cap from the camera.
  - 2) Attach or remove the C-mount adapter depending on the lens to be used.
    - If the adapter is attached so tightly that is difficult to remove, use long-nosed pliers to remove it. Insert the tips of the pliers into the holes with no threads, thus turn to remove.
- Or a screwdriver can also be used, as shown. Insert M3 screws into the holes so that the screwdriver has something to grip. (Store the C-mount adapter for possible future use.)



- 3) Attach the lens to the lens mount. Secure it so that it does not become loose.
- 4) If the lens has an auto-iris mechanism, connect the lens cable to the lens connector.

### ADJUSTING AUTO-IRIS LENSES

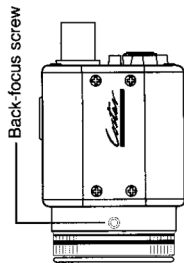
Make this adjustment after connecting the camera to a power source and a monitor.

- 1) Set AGC mode to OFF.
- 2) When using a Video type lens :
  - Adjust the level control on the lens to produce minimum smear and optimum pictures.
- 3) Set AGC mode to on
  - It is recommended that the AGC be used in the "ON" mode after adjusting the video level.

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### Back-focus adjustment

When a lens is mounted, adjustment of the back-focus may sometimes be required. Adjust the lens focus ring when the correct focus cannot be obtained.



### WITH A FIXED-FOCUS LENS

- 1) Fully open the aperture and set the focus ring to "∞" (infinity).  
In the case of an auto-iris lens only, shoot a comparatively dark object so that the aperture is fully open.
- 2) Loosen the two back-focus screw with a hex wrench, and turn the lens mount to focus.
- 3) After adjusting the back-focus, tighten the back-focus screw.

**Caution :** Do not forcibly turn the back-focus screw, as it will cause damage to the camera.

### WITH A ZOOM LENS

- 1) Fully open the aperture and set the lens to the maximum tele-photo position. Then turn the focus ring to focus.  
In the case of an auto-iris lens only, shoot a comparatively dark object so that aperture is fully open.
- 2) Set the lens to its maximum wide-angle position.
- 3) Loosen the two back-focus screw with a hex wrench, and turn the lens mount to focus.
- 4) After adjusting the back-focus, tighten the back-focus screw
- 5) Repeat step 1) ~ 3) until the difference between focusing position 1) and 2) becomes smallest.

**Caution :** Do not forcibly turn the back-focus screw, as it will cause damage to the camera.

## SPECIFICATIONS

<b>Signal system</b>	NTSC	<b>Shutter speed range</b>	1/60, 1/100, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000, 1/30000, 1/50000 second
<b>Pickup element</b>	SI-C400N : 1/2 CCD SI-C500N : 1/3 CCD	<b>White balance</b>	ATW, 2500K, 3100K, 4600K, 5600K, 8500K, AWC, and MANUAL
<b>Effective pixels</b>	768(H) x 494(V)	<b>White balance range</b>	2,400K ~ 10,000K
<b>Scanning area(mm)</b>	SI-C400N : 7.95(H) x 6.45(V) SI-C500N : 6.0(H) x 4.96(V)	<b>Backlight Compensation</b>	ON/OFF selectable (6 sensing zones)
<b>Scanning system</b>	2:1 interlace	<b>Text display</b>	24 alphanumeric characters (ON/OFF selectable)
<b>Scanning frequency</b>	Ver. : 59.94Hz PAL 15.625kHz Internal	<b>Special menu</b>	Gamma, Color adj., Sharpness, Contrast, Brightness, Flickerless and Preset
<b>Sync system</b>	Internal	<b>GAMMA</b>	Variable
<b>Video output</b>	Composite video signal (1Vp-p/75Ω, unbalanced) Separated Y/C signal (Y: 1Vp-p/75Ω, C: 0.286Vp-p/75Ω)	<b>Flickerless</b>	ON/OFF selectable
<b>Video S/N ratio</b>	50dB (AGC OFF)	<b>Lens Mount</b>	C/CS mount
<b>Hor. Resolution</b>	470 TV lines	<b>Camera mount</b>	1/4 Inch -20UNC (Top/ Bottom)
<b>AGC range</b>	0~32dB (16 Stage Variable)		
<b>Minimum illumination</b>	0.3lux (F1.2, 50IRE)		
<b>Electronic shutter</b>	OFF/AUTO/MANUAL		

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## SUPPLIED ACCESSORIES

Lens connector plug (E4-191J-100)	1
DC Jack Plug (MP-121M)	1
Lens mount cap	1
C-mount adapter	1
Operation manual	1
● The lens mount cap and C-mount adapter are attached when supplied.	

### Notes :

- Design and specifications are subject to change without notice.
- This color video camera is designed to output video signals conforming to the NTSC standard, so that it cannot be used with video recorder or color monitors which use color systems other than NTSC.

<b>Power Requirement</b>	DC12~DC13V
<b>Power consumption</b>	2.5 Watt
<b>Operating temperature</b>	-10°C to + 50°C (14°F to 122°F)
<b>Operating humidity</b>	less than 85% relative
<b>Storage temperature</b>	-20°C to + 60°C
<b>external dimensions</b>	41(W) x 41(H) x 51.6(D)mm 1.6(W) x 1.6(H) x 2.1(D)inch
<b>Weight</b>	140g (0.31 lbs)

**Notes :** If used continuously, be sure to operate less than 40°C for long term stable performance.

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## TIPS FOR HD CAMCORDERS

First, there is no getting around it, you should read your camcorder manual.

Since we are using the camcorder on a microscope, there will be a whole lot of things that are on your camera that you will likely never be using and you will be reading about those things in the manual—but nevertheless you should become familiar with the unit and read the manual anyway.

The single most important thing to remember is that camcorders have exposure controls which can be shutter or aperture priority. You might find that setting your camera to aperture priority mode works best with aperture about 5.6 to 8. Programmed AE mode is a default selection with most of the Canon cameras we use and that seems to work well. If you use shutter priority you may notice your viewing field will be darker on the top or bottom half of the screen vs. the other side. This is the electronic shutter attempting to shut down on some of the light entering the camera.

Here are some pointers on camera settings looking at a Canon system.

When your camera is on, your screen may look like this.



Here is the FUNC panel display.

Things you might change:

Choose WB - White Balance.  
Then choose Custom WB.  
Then Set WB.

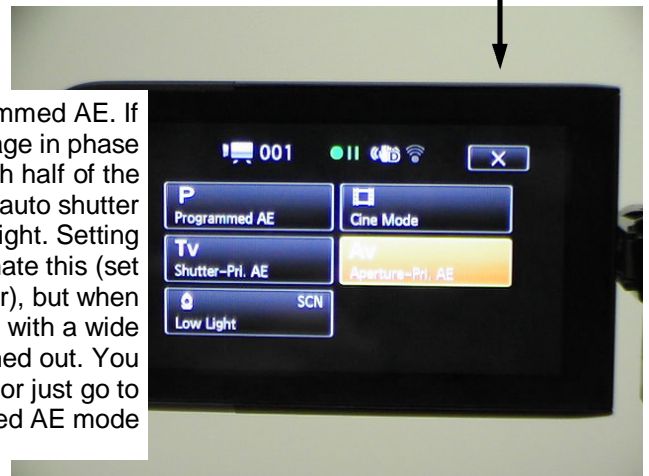
The easy way to do it is to go to a phase contrast live blood view and set the white balance from that screen. Another way is to switch to brightfield mode with no slide, have your light source set at about 11:00 position and then set WB.

The default is to leave it in auto mode.

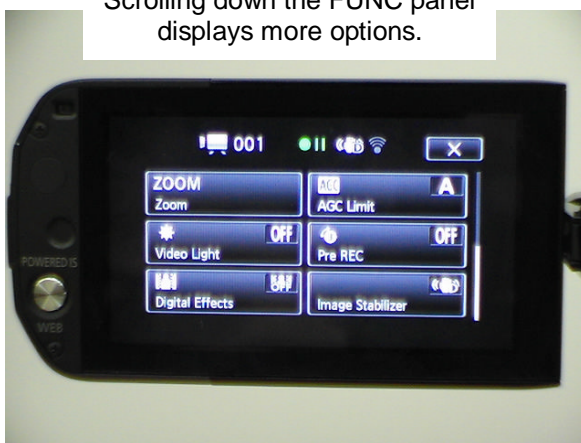


You MUST go to Rec. Program and another screen will appear.

You need to set the camera to Programmed AE. If you are viewing a live blood image in phase contrast and it appears as though half of the screen goes a bit dark, this is the auto shutter engaging. You need to turn down the light. Setting the mode to Aperture Priority will eliminate this (set the aperture to the lowest number), but when viewing a dry layer in bright field mode with a wide field view, the image will appear washed out. You could change the aperture setting or just go to Programmed AE mode



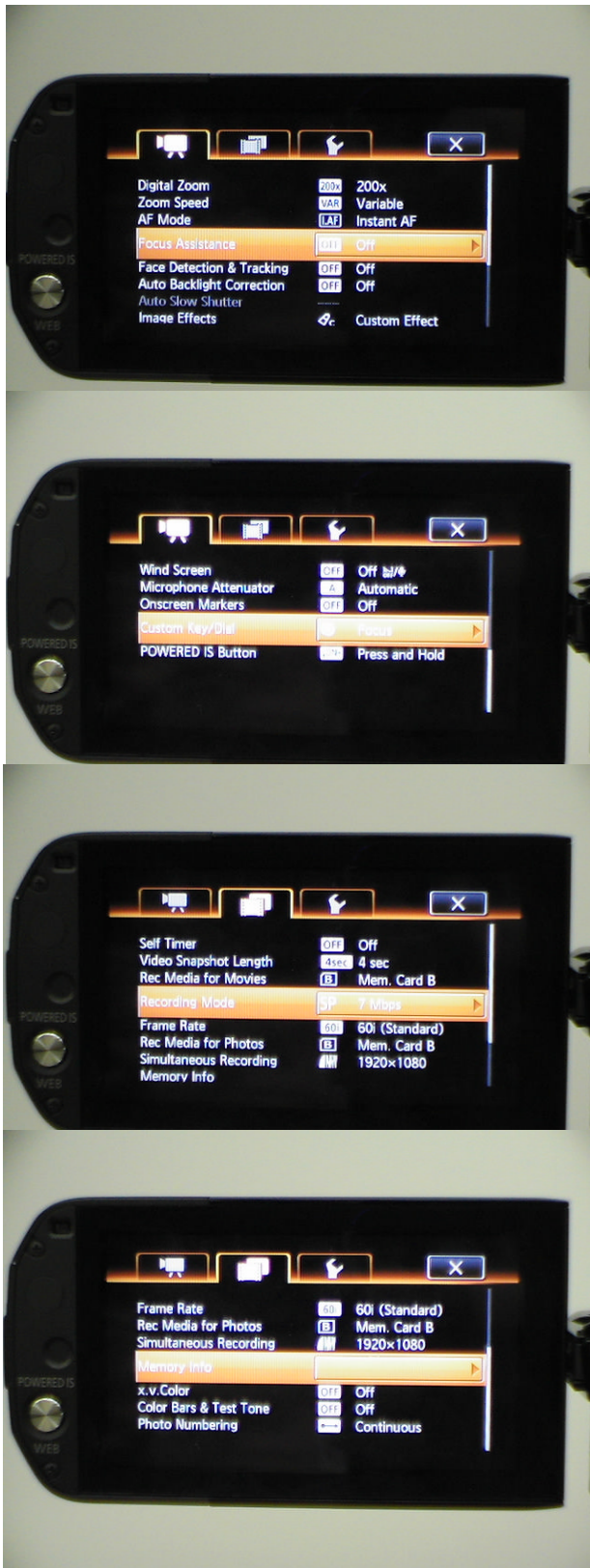
Scrolling down the FUNC panel displays more options.



There are items you will want to set in the MENU tab.



Here are the MENU screens (selected from the FUNC display).



Here are sample settings. Notice that many things are turned OFF as you will not be using these functions during microscope sessions.

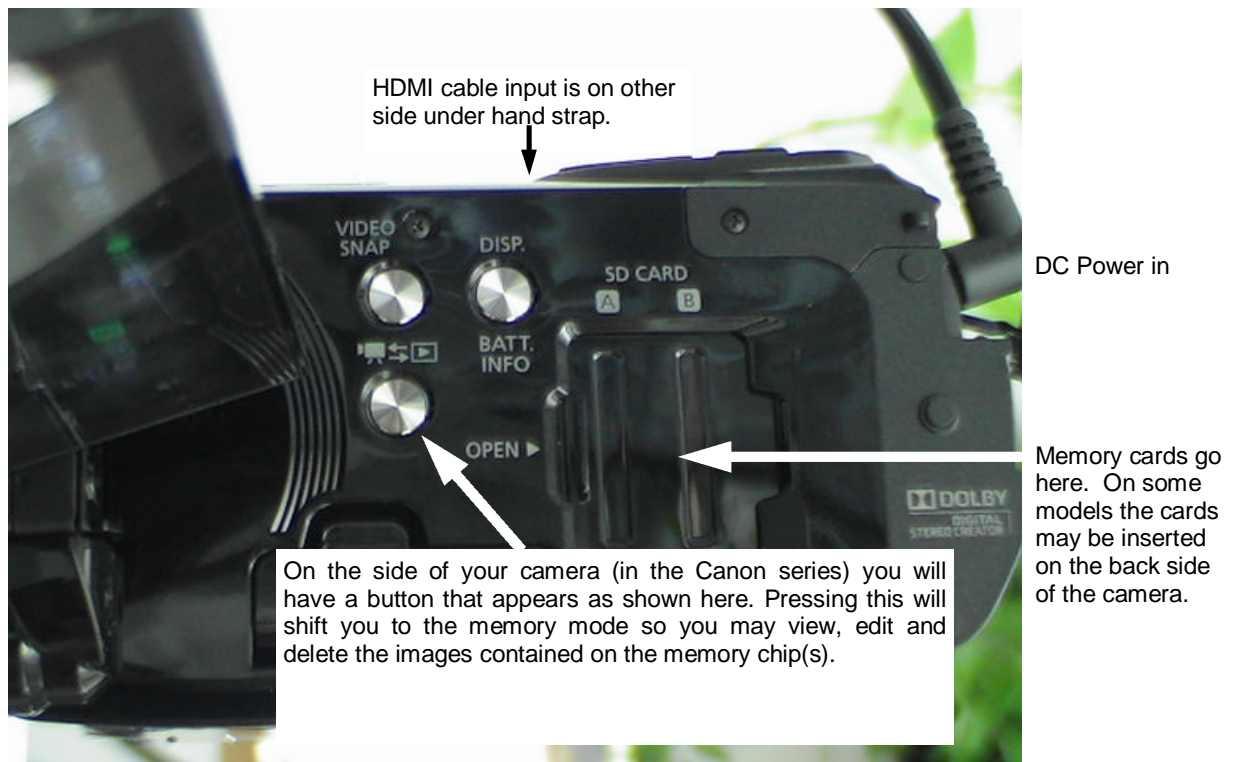
On the screen shown to the left, note “Image Effects” at the bottom. From here choosing Custom Effect will allow you to tweak the image on screen a bit in terms of contrast, brightness, color and sharpness.

Always remember that your HD display monitor will also have settings that you should get into and tweak for your most ideal display image.



It is important to read your camera manual so you know where to plug in the power cord, where to place the battery, how to insert and remove memory cards, where to plug in your HDMI cable, etc.

Shown here is one model.



There is usually a switch near the top, back or side of the camera with 3 positions like; Auto mode / Manual mode / Cinema mode. The manual mode is noted by the letter “M” on some models and would be the position for most flexibility with the microscope.

See next page for another model.

Here's another model as you'd see it sitting on your microscope. The memory chip slides into the bottom of the unit under the cover door.



This is an important button on this unit as pressing it brings you to a key mode selection panel on screen.



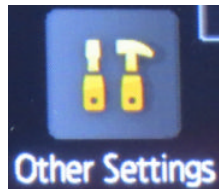
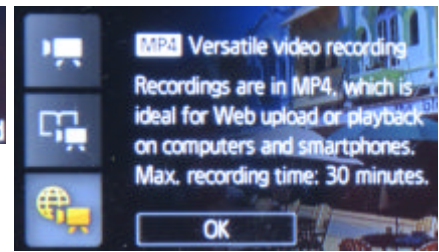
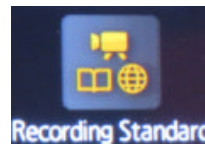
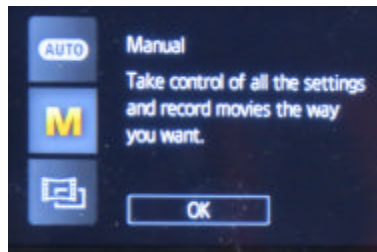
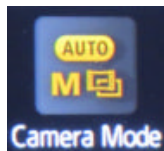
Main functions bring you to the screen to set white balance and other functions.

Camera mode is important as you will want to be in Manual Mode and set things up best for the scope.

Other setting is important to turn off things that are sometimes automatic which you don't want on.

The recording standard lets you set your recording mode, from very high quality AVCHD for TV and editing to MP4 which is good for most video recording as this format can easily be uploaded online for web viewing.

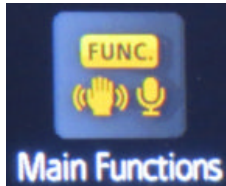




This is generally what the settings on your panels will look like in the Other Settings mode.



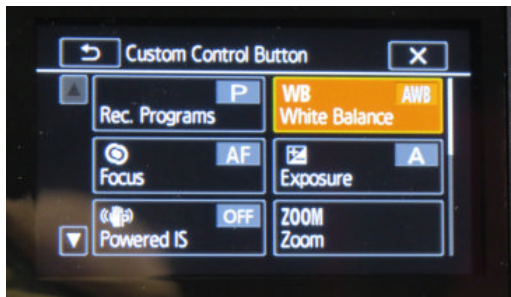




Here are two items in the main functions you will want to know about.



It is the top two on the screen, the Rec. Programs and WB white balance.



When you are looking at a specimen on the scope, the color temperature may not give the best rendering to the video screen. If viewing live blood for instance in phase contrast, and you have a view on screen with the light turned up about 60-70 %, you can go to white balance mode and go to manual set, and when pushing that option the camera will adjust the color balance. This is usually all it takes and it will also be good for locking in a good color for dry layer blood images as well.



For the Rec. Programs, it is best to have this set for Av which is Aperture priority mode and it things seem to work best with lower aperture settings.



Remember that your zoom control is on top of the camera which is on the opposite side of you when you are looking into your microscope. When you reach up with your right hand to the side of the camera your index finger will rest right on it.

You may also obtain a remote control and turn on the camera remote option in the other settings menu system and use the remote to zoom in and out on your image.