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***SAI™ BASIC LIGHT WITH
300 W TUNGSTEN - HALOGEN LAMP***

DESCRIPTION AND OPERATING INSTRUCTIONS

CAUTION: *This is a bright, intense light source. Read ALL of the instructions completely before operating and follow them carefully.*

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DESCRIPTION

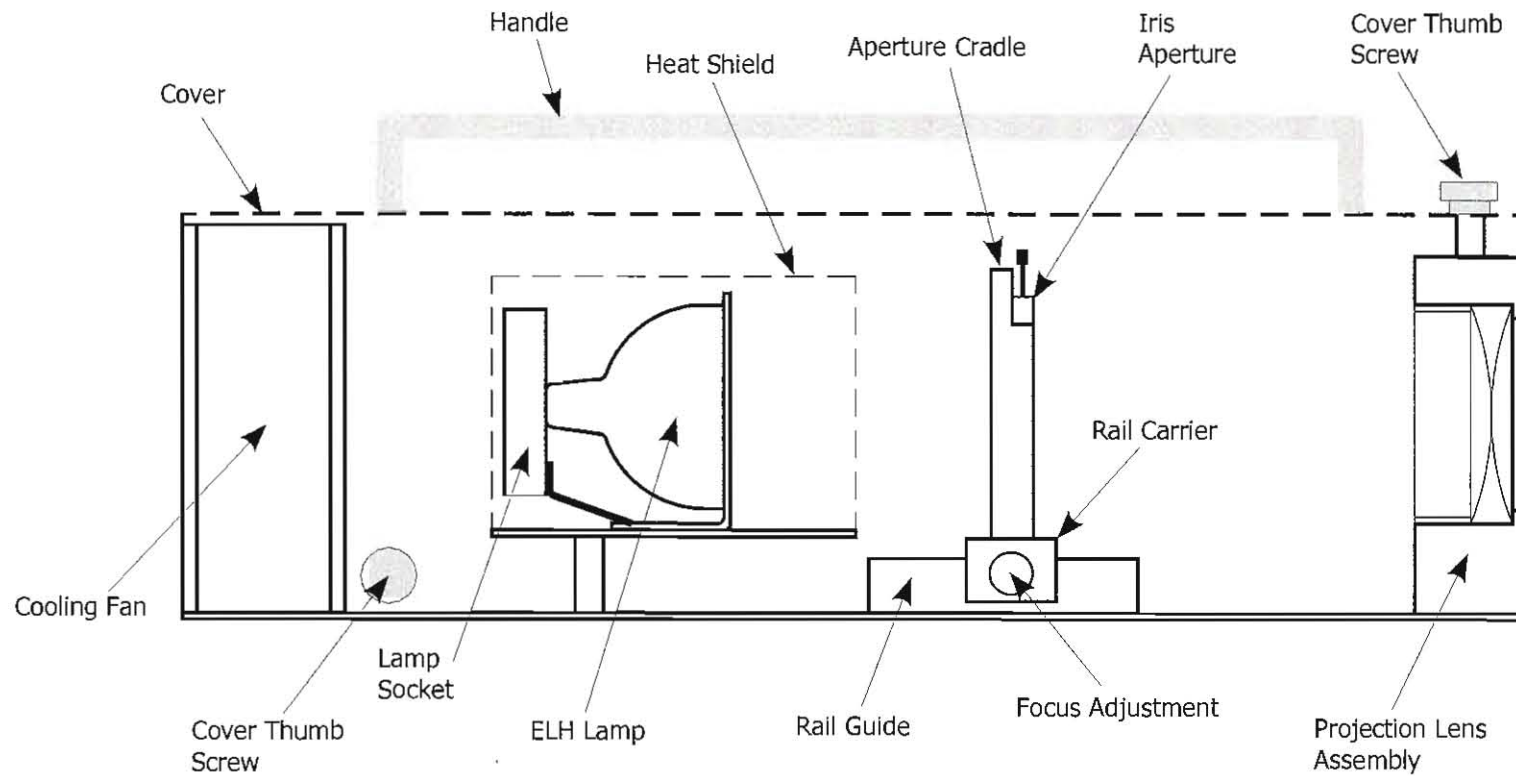
The SAI™ Basic Light has been developed as part of a system for visualizing complex airflows with neutrally-buoyant bubbles filled with helium. Like our Xenon Arc Light, it provides a beam of uniform intensity to illuminate the trajectories of the helium bubbles. The Basic Light accomplishes this at a fraction of the cost of the Xenon unit if velocity measurements are not required. Also, the smaller, compact design allows for more flexibility and quicker diagnosis of "large-scale" airflow patterns.

The SAI™ Basic Light uses a General Electric ELH 300 watt tungsten-halogen lamp, generally available from many camera supply stores. Lamp life is rated at 35 hours. Power for the lamp and cooling fan is supplied directly through a grounded power cord with an in-line "ON-OFF" switch. The projection lens and a unique aperture assembly allow focusing of the light beam on any flow from 20" to infinity. Two apertures are included with the SAI™ Basic Light, an iris and an adjustable slit. The iris provides a circular beam spread that can vary from 2" – 25" in diameter at 6' while the slit provides a rectangular beam spread from 0" by 22" to 8" by 22" at the same distance.

Overall, the SAI™ Basic Light is extremely simple and rugged in design, easy to use and adjust, and quiet and cool in operation. The complete assembly with a detachable tripod support weighs only 6 lbs. This support consists of a grip action ball head and a small tripod base. If desired, the light and ball head can be removed from the small tripod base and mounted on a larger tripod instead.



sai[™] BASIC LIGHT WITH COVER OFF



GENERAL LAYOUT OF
 SAI™ BASIC LIGHT COMPONENTS

OPERATION

1. Screw the Grip Action Ball Head to the tripod base provided. Snug up the tripod base to the Head by hand until it is just tight.
2. Familiarize yourself with the features of the Grip Action Ball Head, which are given in the next section on pg 5. Once these are understood, mount the Basic Light to the top of the ball head. To do this, insert the quick release plate located on the bottom of the Basic Light into the top of the ball head until the locking lever clicks and closes. Make sure that the quick release plate is fully locked by pushing on the locking lever. Rotate the safety lever clockwise to keep the Basic Light secure.
3. As shipped, the Aperture Cradle, Rail Carrier and Slit Aperture are assembled, but packaged separately. This aperture assembly must be mounted onto the Rail Guide before the Basic Light can be used, see General Layout Figure, pg 2. To do this, remove the Cover Thumb Screws and lift off the Cover. Mount the aperture assembly onto the Rail Guide approximately midway and replace the Basic Light Cover.
4. Set up the light as desired for the tests and check the in-line power switch. It should be in the "Off" position. Now plug the power cord into any 115 Vac, 50/60Hz grounded outlet and turn the in-line power switch to "On".
5. Aim the light toward the general area to be visualized. Squeeze the grip handle and adjust the light into the final shooting position you desire. When in the proper position, release the grip handle and the light will be locked automatically in place. This is a BRIGHT, INTENSE LIGHT SOURCE. NEVER LOOK DIRECTLY INTO THE LIGHT BEAM.
6. Focus the beam as needed to minimize light spillage on the background, any window surfaces and "out of view" model parts. To insure safety, first SHUT THE LIGHT OFF and let it cool down for 6 to 8 minutes. Then remove the Cover Thumb Screws and lift off the Cover. In turn, loosen

the Focus Adjustment knob on the Rail Carrier. With this knob loosened, the Rail Carrier may be moved backward or forward on the Rail Guide for focusing and then re-tighten the knob to hold the whole assembly in place.

7. Set the Cover back in place and turn the light back on to check the focus. Backward movement brings the focus closer and forward movement, farther away.
8. Repeat Steps 6 and 7 until the desired focus is achieved. With a little experience, this can be done fairly quickly. AGAIN, as a good safety measure, be sure to shut off the light and let it cool before the cover is removed. Replace the Cover Thumb Screws when finished.
9. To remove the Basic Light from the ball head, release the safety lever and then hold the Basic Light Handle securely in one hand while operating the locking lever with the other.

GRIP ACTION BALL HEAD

Figures For The Ball Head Are On The Next Page -

INTRODUCTION

This photographic ball and socket head ideal for use with 35mm cameras with short or medium focal length lenses and action shots.

KEY FEATURES

- Unique lever for quick control of all the movements
- Quick release plate with secondary security
- Spirit level

SET UP (FIG. 1)

Assemble the head on the tripod using 3/8" female thread "A".

Insert a lever (e.g. screwdriver) in hole "B" and rotate to lock tight on tripod.

The top plate on Manfrotto tripods are equipped with three set screws "C" which clamp against the base of the head to ensure effective and secure locking.

REMOVE QUICK RELEASE PLATE FROM HEAD (fig. 2)

To remove plate "G" it is necessary to open the lever "H".

The lever "H" can not be opened whilst the safety lever "I" is in closed position.

To remove the safety catch, rotate safety lever "I" fully in the direction of the arrow and then rotate the lever "H" until peg "L" clicks up holding the open the lever "H".

ASSEMBLING CAMERA ON PLATE (fig. 3)

Fix the camera onto plate "G" by screwing home camera screw "M" into the camera's threaded hole **WITHOUT APPLYING FORCE**, using the ring "Q".

Before fully locking, align the camera with the "LENS" marking on the plate "G".



Please ensure you have securely locked the camera on to the release plate before use

MOUNTING THE CAMERA ON THE HEAD (fig. 4 and 5)

Push the ring "Q" so that it is flat against the plate "G"

Insert the camera plate "G" (fig. 4) with the appropriate back edge "Z" (see also fig. 3) against the locking lever "H" on top of the head until locking lever clicks and closes.



Respect the right position of the plate "G" described above to achieve a safe locking of the camera.

Rotate the safety lever "I" anticlockwise.



Make sure that plate "G" (fig. 5) is fully locked by pushing lever "H" and checking that the camera is fitted securely to the head.

REMOVE THE CAMERA FROM THE HEAD (fig. 6)



Whenever the camera needs to be removed from the head, release the safety lever "I" and then hold the camera securely in one hand while operating locking lever "H" with the other.

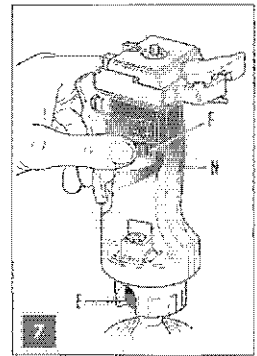
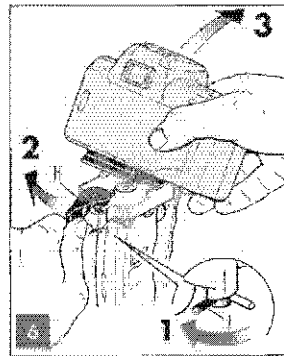
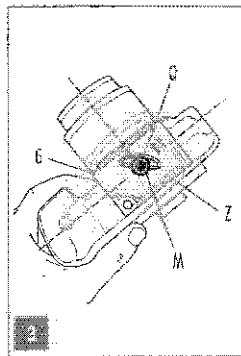
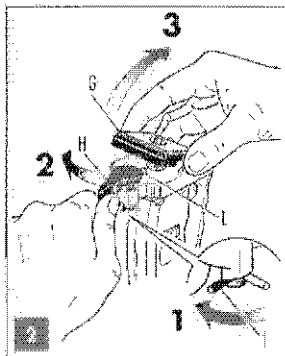
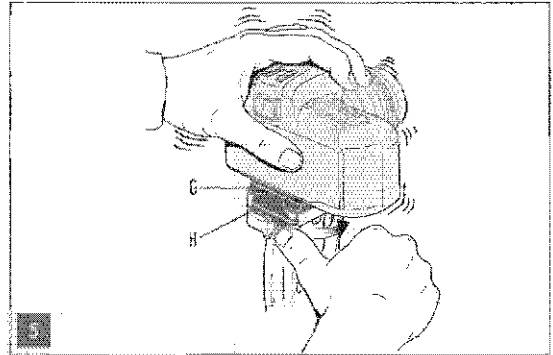
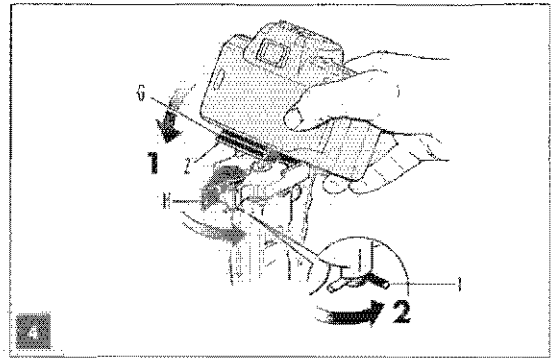
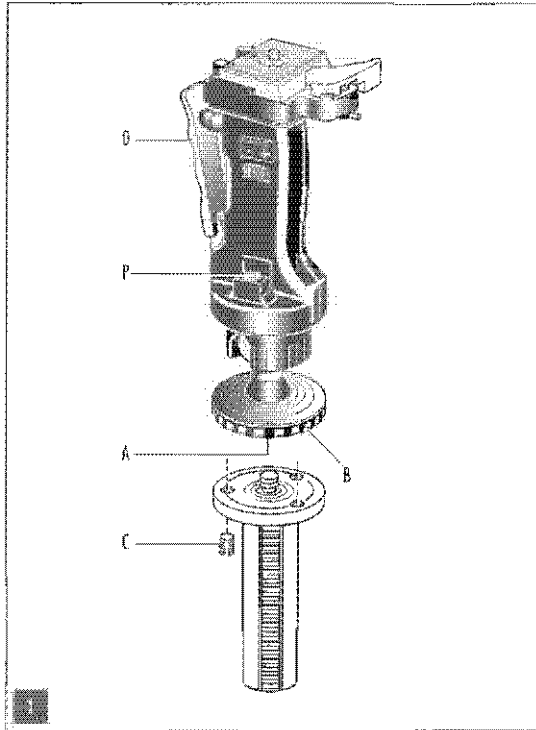
USE (FIG. 1 AND 7)

All movements are controlled by using the handle "D" (fig. 1).

By squeezing the handle "D" (as though you were clenching a fist), releases the mechanism allowing the head to follow the movements of your wrist. On releasing the handle "D", the head stops in the required position and is locked.

It is possible to adjust the movement friction on the ball "E" (fig. 7) by using the ring "F": rotate the ring towards the symbol "+" to increase the friction and towards the "-" symbol to decrease the friction (you can see the friction level by index "N").

The head is supplied with spirit level "P" for levelling. It can be extracted (e.g. with pliers) and inserted in the opposite side for using with left hand.



USE OF APERTURES

1. Both an adjustable slit and an iris diaphragm are included with this unit. The adjustable slit provides a rectangular beam or "slab" of light varying in width. This is particularly useful to look at 2-D airflows or to study 2-D sections of a complex 3-D airflow. On the other hand, the iris diaphragm provides a round beam varying in diameter. This is very helpful for examination of axisymmetric airflows or the overall examination of any airflow.
2. To adjust or change either aperture, SHUT THE LIGHT OFF for 6 to 8 minutes if it has been running and remove the Cover to the Basic Light as described in Step 3 under "Operation".
3. To change apertures, loosen the black thumb knob on the side of the Aperture Cradle and slide the aperture forward to remove it from the cradle. Put the "new" aperture back into the cradle and lightly re-tighten the black thumb knob to hold it in place.
4. To change the width of the slit in the slit aperture, remove it from the cradle and loosen the four 4-40 screws that hold the two leaves in place and reset as desired. The orientation of the slit may also be adjusted by the rotation of the aperture in the cradle before the black thumb knob is tightened.
5. To adjust the beam diameter of the iris diaphragm, simply move the chrome lever on the side of the Iris Aperture. The iris should be set in the cradle so that the opening on the side of the iris for the iris handle is aligned with the open notch of the cradle.

LAMP REPLACEMENT SEQUENCE

1. SHUT THE LIGHT OFF and UNPLUG the power cord to avoid any possibility of electrical shock. Then let the light cool down for 6 to 8 minutes.
2. Remove the Basic Light Cover as described in Step 3 under "Operation". Be certain that the light has had sufficient time to cool before going any farther. If time is limited, use the pair of cloth gloves provided.
3. Lift the Heat Shield off its base, pressing inward slightly on the sides of the Heat Shield and rotating about the front corners, see General Layout Figure, pg 2. If it is still hot, set it down on some suitable surface.
4. Unseat the blown ELH Lamp from the Lamp Socket by pulling the ejection lever on the right hand side of the lamp backward, slowly and firmly, as far as possible. CARE should be taken not to damage the thermal fuse near the ceramic base of the Lamp Socket. After the blown lamp is unseated, it is still restrained somewhat by the wire "ears" on either side.
5. Complete removal of the blown lamp by lifting it upward carefully. It may be saved awhile, if desired, for replacement practice.
6. RETURN THE EJECTION LEVER fully forward and replace the blown lamp with a new General Electric ELH 300W, 120V Lamp. *Do not touch the new lamp with bare hands since this will shorten the lamp life. Use either a tissue or the cloth gloves when handling the lamp.* Set the lamp into the Lamp Socket so that the wire ears hold it near the top of the socket. Now make sure its pins are horizontal and aligned with the socket. Continue to push the lamp straight down, again slowly and firmly, until it is completely seated and snaps into place.
7. Check the alignment of the lamp after replacement. The lamp should be centered on the circular opening at the front of the Lamp Socket, i.e.

the optical axis. Also check the coiled lamp filament to see that it is still intact.

8. Replace all of the other components, reversing the above procedures.

MAINTENANCE

1. Clean the front surface of the projection lens often to remove any dust and/or bubble film solution. Accumulation of deposits on the lens will cause diffusion of the light beam and result in poor illumination of the bubbles. Do this and all other maintenance ONLY when the light is UNPLUGGED and COOL.
2. Care must be taken when cleaning the lens since it is coated to provide maximum transmission of visible light. Simply wiping with water and lens tissue will remove most major deposits of bubble film solution. Commercial optical cleaning fluids and a soft haired brush may be used to remove any additional dust or deposits, if necessary. No detergents or ordinary glass cleaning solutions should be used because they will abrade the surface of the lens.
3. Occasionally, the projection lenses may become loose and make some noise. To reseat, first remove the Basic Light cover as described in Step 3 under "Operation" and slightly loosen the 6-32 set screw at the top of the Projection Lens Assembly with a 1/16" Allen wrench. Gently push forward then on the lens retaining ring until the lenses reseat and retighten the set screw.
4. Inspect all of the internal surfaces for deposits of bubble film solution and dust from time to time whenever the cover of the light is off. Examine the fan blades and adjoining surfaces, in particular, and clean as necessary with water and paper towels or Q-tips.
5. Every so often, wipe the outside surfaces with a damp cloth and dry with paper towels. Apply a light coat of WD-40 or similar product afterward.
6. Usually the iris diaphragm will not become stiff unless it is abused. If it does become stiff, try a graphite lubricant on the leaves.

SUGGESTIONS

1. Painting the background areas flat black will diffuse any stray light. This will improve the contrast of the bubbles and make them more visible. All model parts receiving direct illumination should be painted glossy black unless they reflect the light directly.
2. Aligning the light beam with the general direction of the flow or the bubble motion will help to increase the intensity of the bubble trace. That is, the two highlights of the bubble trace will thus travel over the same path for the most part and form a brighter trace.
3. If a beam pattern other than the rectangular or circular is required, a metal cutout of the appropriate shape can be made up and suitably attached to the adjustable slit in place of the leaves.
4. For applications where variation in the height of light is necessary, the light may be mounted directly on a larger camera tripod. Simply remove the Basic Light from the ball head and set it aside. Then disconnect the ball head from the tripod base. The Grip Action Ball Head comes with a female 3/8"-16 female thread. This thread will mount to most tripods. Mount the ball head to the tripod, and then remount the Basic Light to the ball head.
5. Maximum visibility of the flow is obtained by aiming the beam at a 90° angle from the direction of view. This keeps light from reflecting off the background of the object being studied or any clear plastic for viewing purposes in the foreground.
6. If the Basic Light is located in a wind tunnel downstream of the point where bubbles are implanted, it should be positioned somewhat above or below this point, or slightly off to either side. This will minimize any buildup of bubble film solution on the light.

7. Care should be taken not to bump or jar the lamp excessively because this can cause failure of the lamp. The lamp is especially **SUSCEPTIBLE TO SHOCK** right after it is turned off.

HAZARDS & PRECAUTIONS

1. As stated earlier, this is a **BRIGHT, INTENSE LIGHT SOURCE**. **NEVER** look directly at the operating lamp or into the light beam.
2. Also as stated earlier, always shut the light off and let it cool down for 6 to 8 minutes before the cover is removed.
3. Also as stated earlier, unplug the light whenever working inside the light except to focus the beam and/or change the aperture.
4. Do not operate the light with either the cover or the heat shield, or both, removed at any time. There are several hazards to avoid, including (i) the intensity of the light, (ii) the possibility that the lamp may shatter, (iii) the high temperature of certain inner surfaces, (iv) the electrical exposure of the lamp wiring and (v) the movement of the fan blades.
5. Care should be taken that the lamp is not focused on any material too near which is readily combustible since the lamp may ignite it. Care should also be taken to keep the air inlet area around the projection lens holder free from any obstruction that would block the incoming air.

SPECIFICATIONS

Circular Beam Spread: 2" - 25" Dia @ 6'

Iris Diaphragm Diameter: 2.5mm - 37.0mm

Rectangular Beam Spread: 0" x 22" - 8" x 22" @ 6'

Adjustable Slit Width: 0" - 7/16"

Focusing Range: 20" - Infinity

Projection Lens Focal Length (Each): 200mm

Lamp: General Electric ELH 300W, 120V

Cooling: Forced Convection

Average Bulb Life: 35 Hrs

Main Light Dimensions: 4" H x 4" W x 12" L

Overall Height: 15 1/4"

Stand: Grip Action Ball Head Mounted
On Tripod Base

Total Unit Weight: 6 Lbs

Input Voltage: 115Vac, 50/60Hz

Thermal Fuse: 286°F - 306°F

NOTES

Date: _____

Re: _____

***sai*TM Helium Bubble Generator**