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Align-O-Tron

Instructions

For

Aligning Motion Picture Xenon Lamphouses

Manufactured by:
Mueller's Atomics
PO Box 280
Port Gamble, WA 98364
www.muellersatomics.com

Operators Manual
Align-O-Tron
Xenon Lamphouse alignment kit
REV 22203

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Safety Precautions



This laser product uses a class I 5mW visible red laser. This is roughly equivalent to a professional laser pointer. While not dangerous enough to burn your skin or cause instant retina damage, it can still damage your eyes. Proper Eye Protection should be worn at all times. Extreme care should be taken when using this product. Be very aware that lamphouse alignment involves using mirrors and other reflective surfaces that will reflect the beam.

Avoid direct exposure to the beam. DO NOT stare into the beam.

Xenon lamphouses contain very high voltage power systems. Turn off or disconnect all power to the lamphouse before beginning work. Be aware that there are usually multiple supply points. Xenon lamps pose an extreme explosion hazard. Follow all safety precautions from the Xenon bulb manufacturer. Allow the Xenon Lamp to cool properly before removing. Follow safety instructions provided by your lamphouse manufacturer for the proper removal and storage of the Xenon lamp.

Introduction

This manual contains guidelines for the use of the Align-O-Tron Xenon lamphouse alignment kit. The materials covered include:

- Description
- Kit contents
- Suggested accessories
- Basic Lamphouse alignment

Description

The Align-O-Tron is a 5mW visible red laser mounted in a cylinder that fits into a standard motion picture projector lens mount. The laser is mounted centrally in the cylinder and calibrated such that the laser points perfectly straight. On the rear of the cylinder is a standard DC power input jack and an ON/OFF toggle switch.

Included in the kit from Mueller's Atomics:

- One Align-O-Tron laser
- One 4.5vDC 300mA "wall wart" power supply
- One tapered plug with center hole fitted for misc. reflectors



Figure 1

Suggested accessories

Most of the following items can be found locally

- Foam filled carrying case
- 4" lens adaptor
- 2" round mirrors
- Eye protection. While there are specific goggles to protect your eyes from different lasers, they have the side effect of making the laser almost impossible to see. #3 green welding (or "brazing") goggles will dim the light enough to greatly reduce the risk, while still allowing you to see the laser beam. However, #3 welding goggles do NOT eliminate the risk.
- Warning signs to display while using the Align-O-Tron (a printable sign can be found in Appendix A)
- "Smoke in a can" for finding the beam mid-air
- SMPTE RP-40 test film
- Mini-flashlight such as a 2-AA size Maglight
- "Pin-hole" aperture plates for any necessary projectors

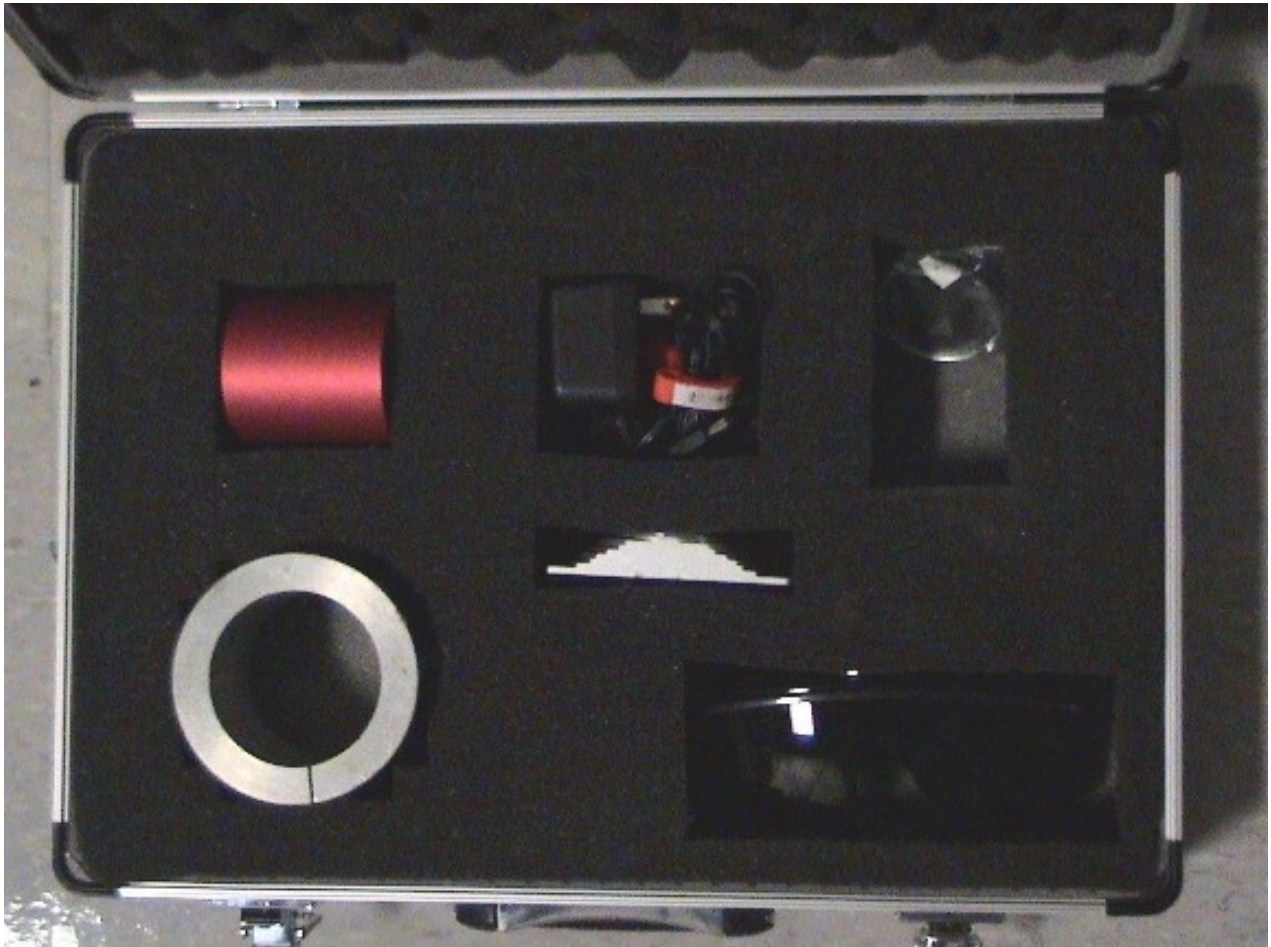


Figure 2

Optical Path Alignment

Lamphouse manufacturers include in their operator's (or installer's) manual basic instructions for how to adjust the optical path for maximum performance. Many manuals include a picture very similar to figure 3 or have written instructions that describe figure 3.

The instructions were more or less as follows:

- Affix a centering plug to the rear of the reflector
- Mount a dummy lens in the lens mount
- Attach a string from the center of the centering plug through the hole in the dummy lens
- Attach weight to the end of the string
- Align all items in the optical path with the string starting from the lens and working back

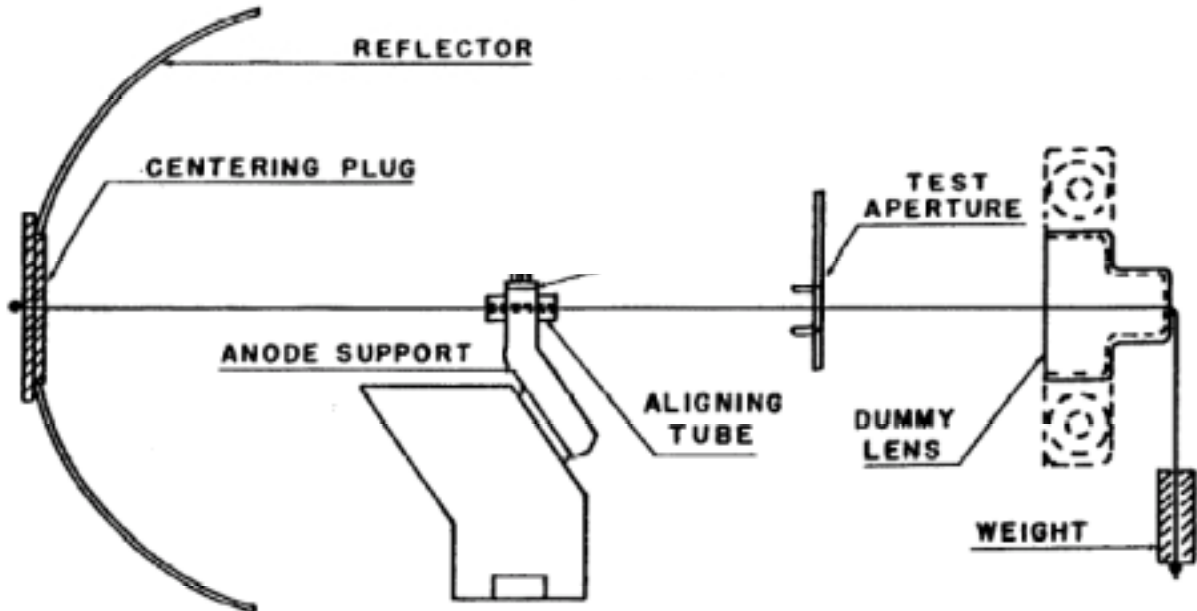


Figure 3

While this method works quite well, it usually leaves the whole system only "close". It also did not take into consideration whether or not everything was not only centered but perpendicular as well. After using the Align-O-Tron on previously string-aligned lamphouses you will discover just how far off the string method could be. The other flaw with the string system is that the projector could not be precisely aimed at the screen. Installing engineers merely shone Xenon light on screen without a lens installed and centered the bulls-eye by eyeballing. While also usually leaving "close" results, with the Align-O-Tron you can do better.

The pictures and instructions on this and the following pages were made with a Christie SLC series console with a Century MSA projector with a Simplex TU2000 turret. These instructions are meant to be a guide only, different lamphouses and projectors will obviously have different steps

Step 1: Observe current illumination level on screen

- Use a light meter if available
- Do not shine light without film through a lens for more than 15sec at a time

Step 2: Turn OFF power

- Allow the Xenon lamp to cool for at least 10min prior to shutting off power
- Turn off all circuit breakers that feed the lamphouse (usually more than one breaker)
- Use "lockout" locks and tags if available for the circuit breakers
- Turn off roof exhaust fan

Step 3: Remove Xenon Lamp

- Don protective clothing as instructed by lamphouse/bulb manufacturer
- Open/remove side door to lamphouse
- Remove the Xenon bulb as instructed by the lamphouse manufacturer and store properly
- Open/remove any remaining doors/covers

Step 4: Prepare for Alignment

- Rotate projector by hand to clear shutter
- Open changeover
- Open fire shutter (if equipped) and disable
- Remove lens from lens mount (use the flat lens mount in a turret, it's easier to realign later)
- Install Align-O-Tron laser in lens mount (use an adaptor if necessary)
- Plug in Align-O-Tron power supply and connect to unit but do not turn on
- Display safety signs to warn others (see Appendix A)
- Put on proper protective eyewear

Step 5: Turret / lens mount alignment

Method 1: most accurate

- Place a "pin-hole" aperture in the film gate. Be aware that "pin-hole" aperture plates directly from the projector manufacturers are not always accurate. It is best to have one made by a local precision machine shop.
- Turn on the laser
- Align the turret/lens mount such that the beam centers on the pinhole

- Double check the alignment by holding a mirror against the front or back of the aperture/gate (just make sure that the mirror is parallel with the aperture / perpendicular to the optical path). The mirror should bounce the beam back on to itself. If not, make the proper adjustments.

Method 2: somewhat accurate

- Remove the aperture plate
- Thread a piece of RP-40 in the film gate
- Shine a flashlight through the film and observe the vertical orientation. Center one frame of the RP40 as close to perfect as you can get, take your time, this matters A LOT.
- Place the tapered plug into the back of the reflector. If necessary use tape to secure the plug.
- Turn on the Laser
- Observe the cross pattern displayed on the plug or on the reflector (you may need a piece of paper to see the cross pattern if the alignment is really off, just hold up the paper in front of the reflector).
- Align the turret/lens mount such that the cross pattern clears up and loses most of its "dots" (see figure 4)

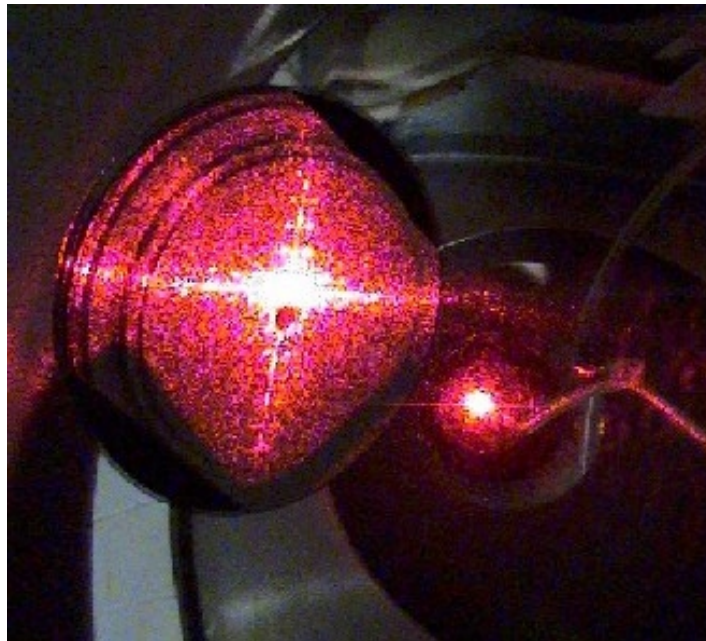


Figure 4

Notice the "dots" or hash marks along both the horizontal and vertical lines. The goal is to eliminate or at least greatly reduce those marks. Also notice the reflection in the reflector. With a properly aligned system that dot will appear dead center between the cathode and anode of the Xenon bulb from any viewing angle.

- Double check the alignment by holding a mirror against the front or back of the aperture/gate (just make sure that the mirror is parallel with the aperture / perpendicular to the optical path). The mirror should bounce the beam back on to itself. If not, make the proper adjustments.

Step 6: Rough Lamphouse Alignment

- Reference the lamphouse owner's manual for the correct "working distance" (the distance from the rear of the reflector to the film plane). Use a tape measure to double check
- Using a piece of paper taped over the inside of the snood, check that the laser beam is centered in the snood. It does not have to be 100% exact, just close. The snood cannot interrupt the light at all. With some lamphouses it may be necessary to add washers or shims to the mounting bolts of the lamphouse. It may also be necessary to adjust the mounting position of the projector on the base/console. This is best done with two people.

Step 7: Reflector Alignment

- If not already there place the tapered plug in the rear of the reflector and secure with tape if necessary. (Note: some reflectors will not match any of the rings on the tapered plug. If this is the case you will have to make your own or have one made.)
- Adjust the reflector mount such that the laser beam hits the center hole perfectly. Manufacturer's methods of reflector alignment vary a lot. It may be necessary to add washers or shims to accomplish your goal.



This is a Christie SLC-20 lamphouse. The two bolts pictured are for aligning the reflector tray. The taller is the adjustment screw with a locking nut. The shorter is a lockdown bolt.

Figure 5

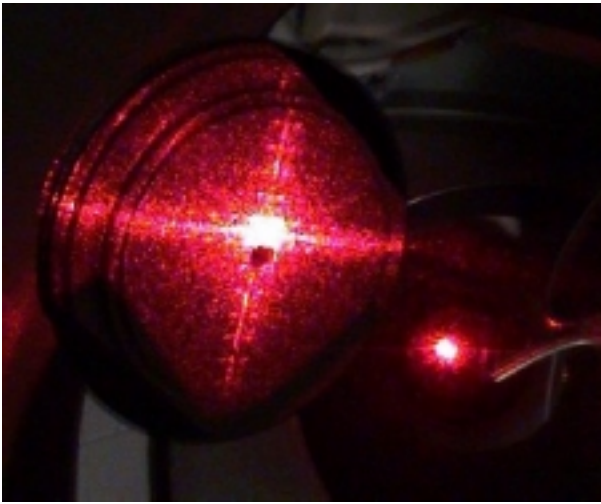


Figure 6 - Before

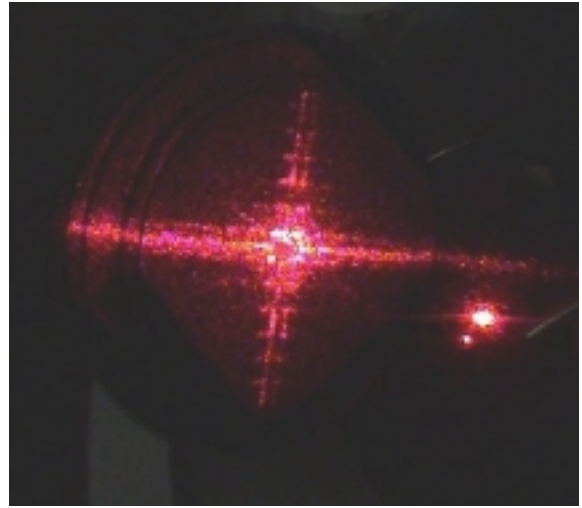


Figure 7 - After

Step 8: Reflector aiming

- Place a mirror over the back of the tapered plug and observe where the reflected beam lands (figures 8 & 9)



Figure 8 - Off just a bit



Figure 9 - Off a lot
(Stong lamphouse)

- Make the necessary adjustments to the reflector mount so that the beam bounces back on itself
- Repeat steps 7 and 8 until the reflector is aligned properly



Figure 10 – After alignment

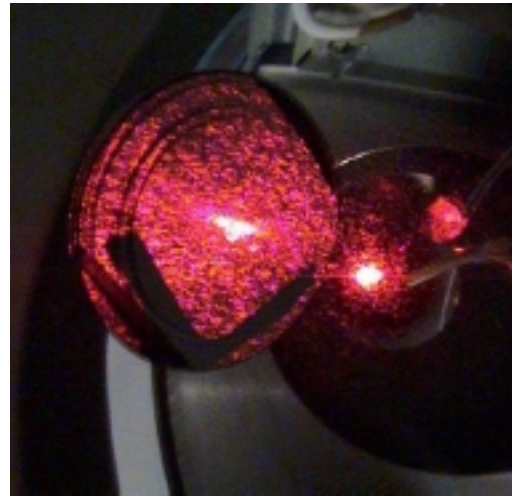


Figure 11 – After alignment
(Without RP-40)

In Figure 10 notice the ring caused by the reflector on the Align-O-Tron
In Figure 11 notice the scatter pattern caused by the laser beam bouncing back on itself repeatedly.

Step 9: Xenon bulb Alignment

- Place a piece of masking tape over the rear bulb support/connection to aid in centering said support. (Note: on some lamphouses such as the Strong Super-80 rear bulb connection alignment is not possible)
- Use the bulb alignment controls to center the laser dot in the rear bulb support

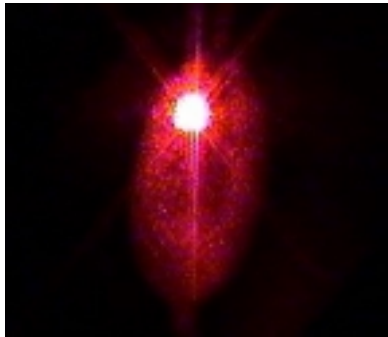


Figure 12 – Misaligned

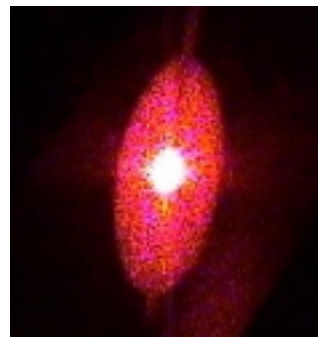


Figure 13 - Aligned

- Install Xenon bulb according to lamphouse/bulb manufacturers instructions
- Check where the laser beam hits the positive end of the Xenon bulb
- If necessary adjust the anode (positive end) support until the beam is centered on the end of the bulb



Figure 14 – bulb too low



Figure 15 – Right on

Step 10: Focusing bulb

Note: these are basic bulb focusing instructions. Consult your owner's manual for detailed instructions

- Remove the Align-O-Tron
- Double check all electrical connections
- Reinstall all covers and doors on the lamphouse and projector
- Restore all power to lamphouse and roof exhaust
- Turn on projector and Xenon lamp
- Open Douser and Changeover
- Observe “bulls-eye” on screen. It should be just about perfect. If not make adjustments as necessary. (It may not be perfect due to bulb manufacture error or a slight misalignment)
- Close Douser
- Switch to Scope lens (or install scope lens in the case of a non-turret projector)
- Focus bulb by moving bulb forward until all four corners start to get dark and then moving backwards until the corners are bright again and adjusting as necessary to get an evenly lit screen
- Reinstall the flat lens and focus lens with RP-40 then check bulb focus for both flat and scope.
- If it is necessary you may have to adjust the tilt or horizontal position of the projector base/console. This would be necessary if the lens mount were misaligned during the original installation.
- Make adjustments to the turret if necessary

DANGER

