

# COLMIN1 Low Cost Laser Range Extender

Please note that the following product is not a precision optical device nor is it intended for precise optical applications. It is used for enhancement of optical laser displays by increasing their effective range.

Extends the range of all optical lasers 5 to 7 times by decreasing the beam divergence. This property results in a decrease in beam spot size by this factor. Most laser pointers have a beam divergence of approximately 1 milliradian (57/1000 of a degree). This divergence angle results in a spot size of 6 - 7 inches at 100 meters (328 feet) and over 65 inches at 1000 meters (3280 feet)!! *You may use a simple approximate formula for determining this un-collimated beam width in inches. Simply multiply the distance in feet by .02.*

The COLMIN1 Collimator now reduces these the spot sizes to about 1.5 inches at 100 meters and 10 inches at 1000 meters. This decrease in beam impact size greatly increase the effective range of the laser. The collimator is also made adjustable for long range optical experiments.

## Collimator Parts List

**NOTE the lenses are individually available at \$19.95 or both for \$35.00**

<b>LEN1</b>	15X(-25) DCV neg lens	Our Part Number: LE15-25
<b>LEN2</b>	24X75 DCX lens	Our Part Number: LE2475
<b>CAP1</b>	1 1/8" Plastic cap #A1-1/8	
<b>*LTUB1</b>	.835X.6X2" length of sked40 PVC tube	
<b>*ADJMALE</b>	1/2 sked 40 female slip to male thread-GENOVA 30405	
<b>*ADJFEMALE</b>	1/2 sked 40 female slip to female thread-GENOVA 30305	

*\* These parts are available through most hardware stores*

## Fabrication and Assembly

Fabricate the lens tube (LTUB1) lens tube from a .835" OD X .6 X 2" schedule 40 PVC tube. Note these are the nominal dimensions for 1/2" pvc tubing. Insert negative concave lens (LEN1) into the LTUB1 as shown on figure. Caution make sure lens is clean without finger prints!! Use a clean eraser on a pencil to position. This should be a smooth sliding fit into this tube. PVC tubing can vary in dimension and you may have to shim or actually hone out for proper fitting of this part.

Final assemble attaching lens (LEN2) to the ADJFEMALE fitting using the retaining action of the reworked plastic cap CAP1 as shown. Press in the lens tube completely into the ADJMALE fitting.

The laser fits inside the lens tube and can be secured by several ways. We use layers of electrical tape to shim up diameter for a tight fit.

***The ultimate trick now is to get the two lens separation distance approximately to 2" or where best collimation occurs at the mid-range of the threaded adjustment of the ADJMALE and ADFEMALE fittings.***

Once this is verified you may secure in place using a forgiving adhesive such as RTV silicon rubber etc.

Experiment by checking and resetting the collimation adjustment noting the objective of obtaining minimal beam divergence at far field. You may also require a expanded beam for night viewing etc.

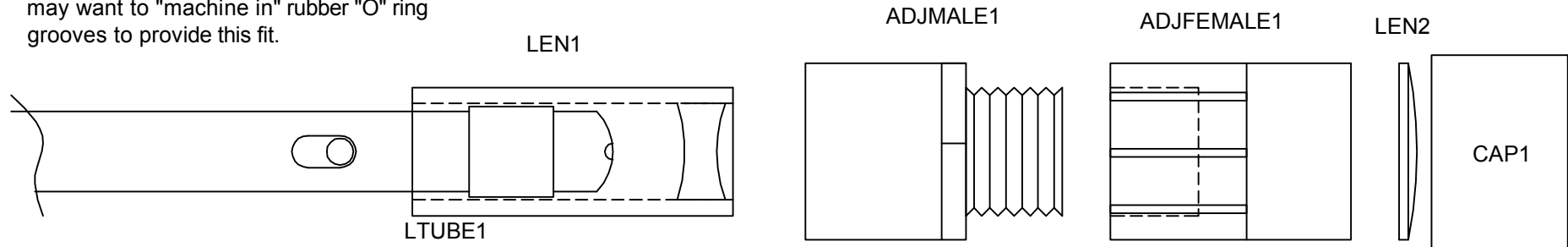
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# Low Cost Collimator Assembly - approx to scale

Laser may be shimmed for a tight secure fit into the lens tube. We used layers of electrical tape evenly and neatly wound. Experienced builders may want to "machine in" rubber "O" ring grooves to provide this fit.

**Caution!!**  
lenses must be clean  
and free of finger prints!!



Blowup showing inserted laser pointer

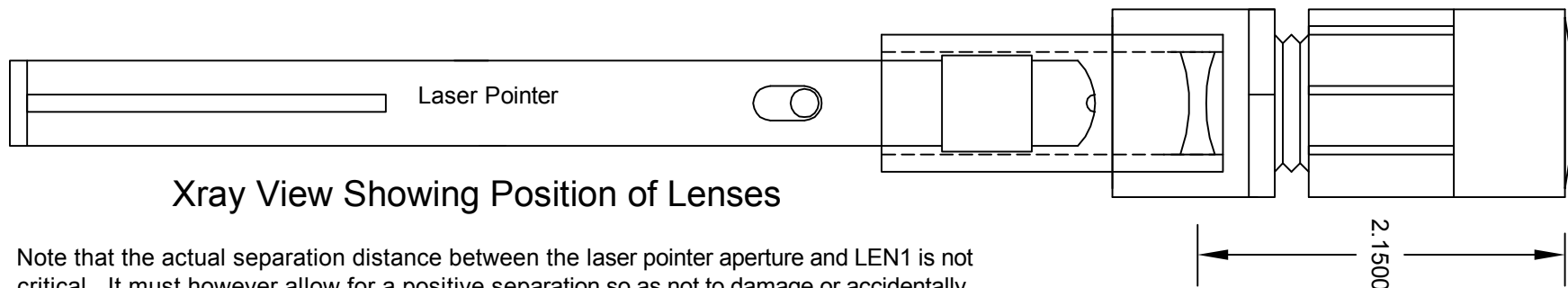
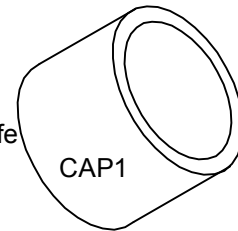
The objective is to get the proper separation distance between the two lenses to allow proper adjustment within the range of the threaded sections of the male and female pieces.

For far field target illuminating you may remove the adjustable section of the collimator. Spot width at 100 feet will be approx 12".

Beam spot with out collimator will be approx 12" at 500 feet. The collimator will reduce this width by a factor of 5-7.

Follow these steps to rework the lens cap CAP1

1. Slide the cap onto the ADJFEMALE1 plastic piece
2. Carefully cut away the center section using the walls of the ADJFEMALE1 using a sharp xacto knife or equivalent.
3. Remove the cap and replace with the lens now being secured in place by the cap ridges.



Xray View Showing Position of Lenses

Note that the actual separation distance between the laser pointer aperture and LEN1 is not critical. It must however allow for a positive separation so as not to damage or accidentally move this lens.

LEN1 lens is positioned as shown and may be eventually glued in once separation distance is verified.

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