

Two 77646 Focusing Beam Probes used to focus output from 2 fiber bundles onto a Photomask.

- Facilitate the use of fiber bundles and liquid light guides
- Collimate output from a fiber optic
- Focus input or output of a fiber optic
- UV to NIR optics

These beam probes are very useful devices if you are using fiber bundles. They focus light into a bundle, or collimate the output from a bundle. They are inexpensive, compact, tubular lens housings which fit on the end of any fiber or liquid light guide with an 11 mm O.D. Oriel fiber bundles and Liquid Light Guides all have 11 mm ends; contact us for ferrules if your fiber optic has a smaller end.

**FOUR TYPES OF BEAM PROBES OFFERED**

We offer the following models of beam probes:

- Diffusing Beam Probes
- Collimating Beam Probes
- Focusing Beam Probes
- Imaging Beam Probes

**DIFFUSING BEAM PROBES**

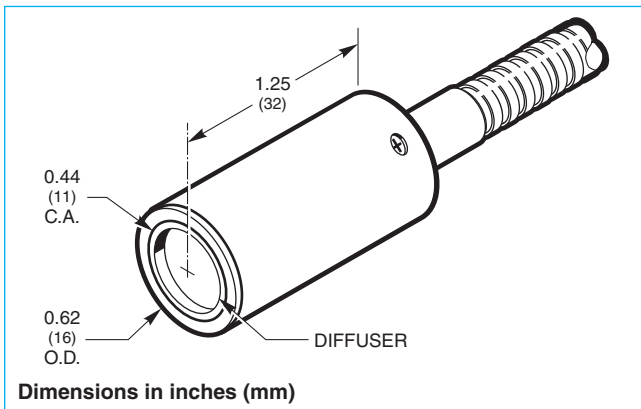


Fig. 1 Dimensional diagram of Diffusing Beam Probe.

These probes are useful for reducing errors due to alignment, beam shape and angle, when measuring narrow collimated beams, such as lasers. Two types of diffusers are available, a flashed opal glass which passes 400 to 2000 nm, and a UV diffuser which transmits from 200 to 2000 nm. These diffusers have the same optical properties as the models detailed on page 12-7.

**COLLIMATING BEAM PROBES**

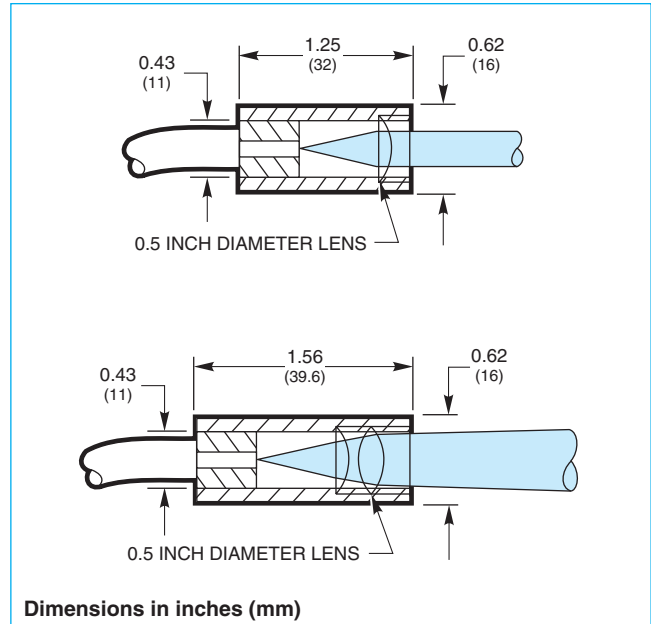


Fig. 2 Principle of operation of 77644 Fused Silica Collimating Beam Probe (top), and 77645 Glass Collimating Beam Probe (bottom).

These probes are primarily used to collimate the diverging output from a fiber. Move the fiber bundle away from the lens to produce a focused image, far from the probe. Use a focusing probe from the following page, for imaging at short distances.

The 77644 Probe has a fused silica, 19 mm effective focal length lens. It captures and collimates the output cone from fused silica bundles. The 77645 has a low F/# compound glass lens with an 11 mm effective focal length. It collimates the highly divergent output from glass bundles, and transmits over their useful spectral range.

**Models With Shutters**

The 77652 and 77653 Beam Probes use the same collimating lenses as the 77644 and 77645 Probes, and operate in the same manner, but include a shutter between the bundle and the collimating lens. This allows you to cut off the beam and check the “radiometric zero.”

**TECH NOTE**

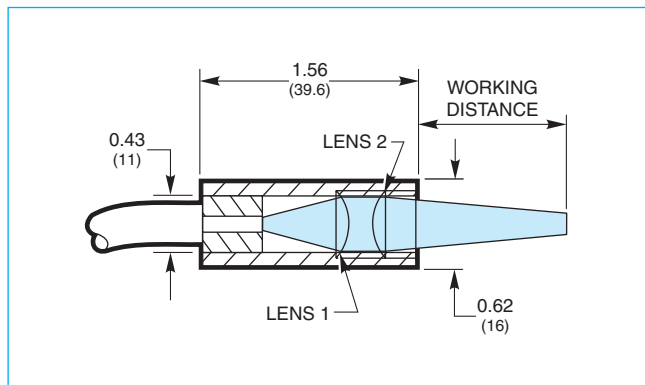
You cannot produce a well collimated beam from a large aperture fiber bundle. The smallest divergence angle, for a perfect optical system, is given by:

$$\theta = \text{Tan}^{-1} \frac{d}{f}$$

Where:

- $\theta$  = Full angle divergence
- $d$  = Fiber bundle diameter
- $f$  = Lens effective focal length

## FOCUSING PROBES FOR FUSED SILICA BUNDLES



**Fig. 3 Principle of operation of Fused Silica Focusing Beam Probes.**

These probes focus the output of our Fused Silica Fiber Bundles. Fig. 3 shows a working layout of the efficient optical system. The fiber bundle is placed one focal length from Lens 1, to produce a collimated beam. This collimated beam is focused one focal length from Lens 2. The working distance is 7 mm less than the focal length of Lens 2.

Lens 1 is a 19 mm focal length, F/1.7 fused silica lens, and is included with the probe. Choose lens 2 from Table 1, based on the image magnification and working distance required. The nominal magnification is defined as the ratio of the focal lengths of Lens 2 to Lens 1. With the 77575 Bundle which has a diameter of 1.6 mm, the choice of the 25 mm focal length lens, model 41220, results in a 2 mm diameter illuminated area.

We offer two models; the 77662 has a shutter which completely closes off the beam. The less expensive 77646 does not include a light shutter.

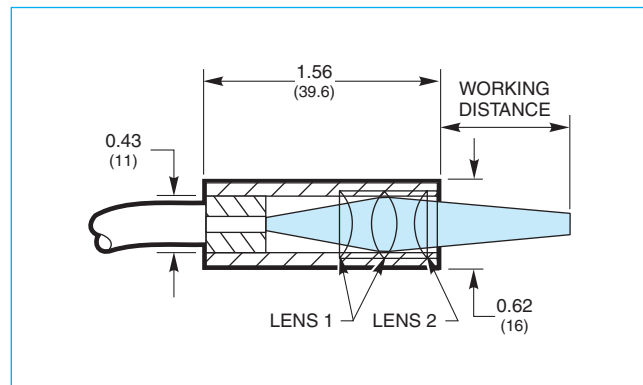
**Table 1 Lens 2 Options for 77646 and 77662 Focusing Beam Probes**

Lens Focal Length (mm)	Working Distance* (mm)	Magnification*	Output Beam** (F/#)	Model No.
19	12	1	1.7	41210
25	18	1.3	2.3	41220
38	31	2	3.4	41230
50	43	2.6	4.5	41240
75	68	3.9	6.8	41250

\* To change working distance and magnification, move the fiber bundle.

\*\* Assumes Lens 1 is filled by the beam from the fiber bundle.

## IMAGING BEAM PROBE FOR GLASS BUNDLES



**Fig. 4 Principle of operation of 77651 Glass Imaging Beam Probe.**

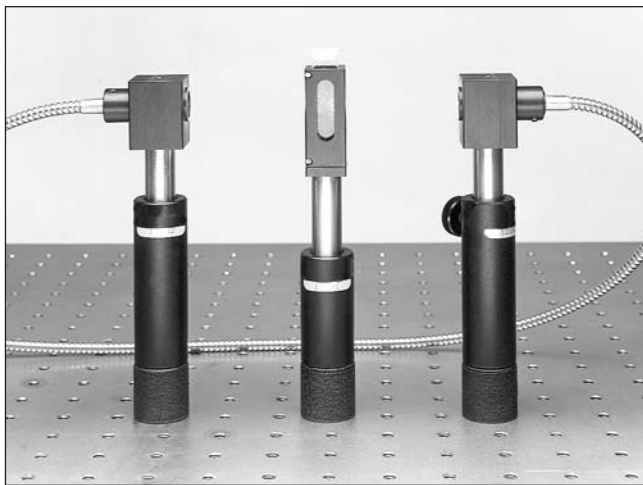
This probe uses a complex lens (Lens 1) to collect the light, and a second lens, Lens 2, to re-image the end of the fiber bundle one focal length away. You can re-image at 1:1, 2 mm from the end of the probe, with the 40230 Lens. Or, form a larger image at greater distances. At 100 mm from the probe the magnification is 12.5 and you can clearly see the individual fibers. Select Lens 2 from Table 2.

**Table 2 Lens 2 Options for 77651 Imaging Beam Probe**

Lens Focal Length (mm)	Working Distance* (mm)	Magnification*	Output Beam** (F/#)	Model No.
38	9	1.4	1.12	40230
75	12	1.7	1.4	40250

\* To change working distance and magnification, move the fiber bundle.

\*\* Assumes Lens 1 is filled by the beam from the fiber bundle.



Two 77646 Focusing Beam Probes used to “excite and probe” a sample.

### TECH NOTE

The collimating and focusing beam probes described on the previous pages are primarily used at the output of a fiber bundle (to collimate or focus/image the output of the fiber). To focus light **into** a fiber bundle, we recommend the 77799 or 77800 Fiber Optic Focusing Assemblies described on page 1-163. These assemblies have lenses with F/#s that match the input cone of glass or fused silica fibers.

### ORDERING INFORMATION

Probe Type	Optic Material	Without Shutter		With Shutter	
		Model No.	Price	Model No.	Price
Diffusing	Flashed Opal	77656			
Diffusing	UV	77657			
Collimating	Glass	77645		77653	
Collimating	Fused Silica	77644		77652	
Focusing	Fused Silica	77646		77662	
Imaging	Glass	77651			

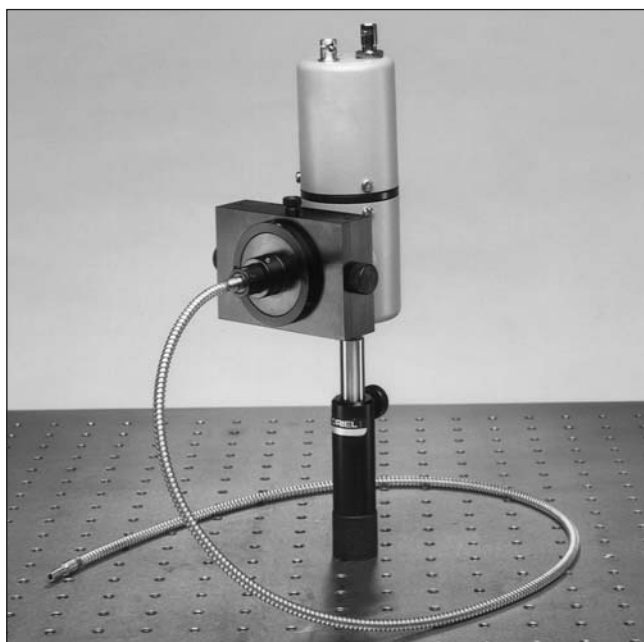
#### Lens 2 Options for Focusing Beam Probes

Lens Focal Length (mm)	Model No.	Price
19	41210	
25	41220	
38	41230	
50	41240	
75	41250	

#### Lens 2 Options for Imaging Beam Probes

Lens Focal Length (mm)	Model No.	Price
38	40230	
75	40250	

**See these catalog pages...**  
 The mounts on **page 18-8** hold these beam probes. The flanged holders simplify alignment; they couple directly to Oriel detectors, monochromators, light sources and other instruments with 1.5 Inch Series flange.



30750 Sample Compartment with Fiber Bundle mounted to 70680 End-on PMT.

- Measure fluorescence, absorbance, scattering and turbidity of liquid samples
- Illuminate samples without alignment problems
- Hold up to three fiber bundles

If you're performing fluorescence, absorbance or other measurements on liquid samples, use the 30750 Sample Compartment, and eliminate the headaches of optical alignment. The 30750 holds up to three fiber bundles with focusing or collimating beam probes, and a 10 mm path cuvette. (The beam probes are described on page 8-25.) You can focus the output of a fiber bundle directly on the sample, and then collect the emission radiation with a second fiber or send it directly to a detector.

## FOUR PORTS

The 30750 has two ports that accept fiber bundles with beam probes, and two 1.5 Inch Series flanged ports (one male and one female). You can mount a third fiber optic with beam probe by using the 77803 (male) or 77873 (female) Flange Mounts. The fourth port lets you mate the Sample Compartment to detectors.

The 30750 also has a 1/4-20 tapped hole in the bottom, for rod mounting.

## ACCEPTS 10 mm PATH CUVETTES

Standard, 10 mm path length Spectrophotometer Cuvettes fit in the 30750 Sample Compartment. A light tight lid closes the opening. You may also use a 3 mm path length cuvette, model 13965, but you'll need the 13970 Adapter to hold it in the Sample Compartment. See page 12-9 for more cuvette options.

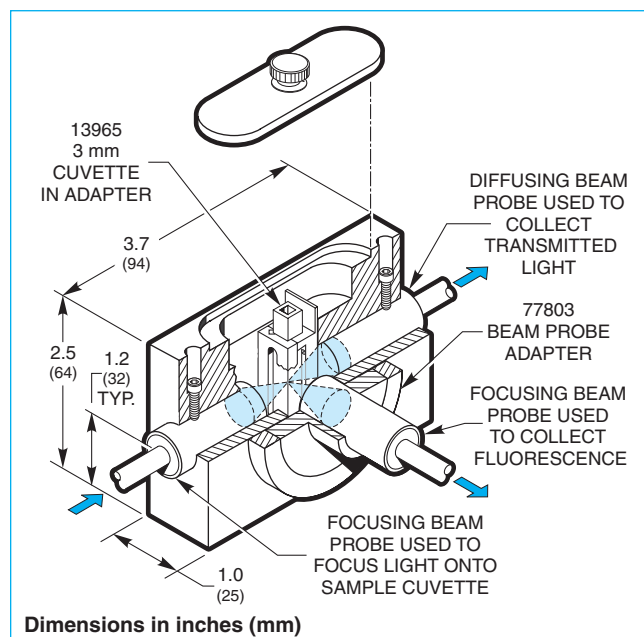


Fig. 1 30750 Sample Compartment with three beam probes.

## TECH NOTE

For absorbance measurements, use the two in-line beam probe channels. (Using beam probes with shutters allows you to check zero.) For fluorescence or scattering measurements, use three beam probes or collect the light directly with a photomultiplier or photodiode. The 70680 Side-on and 77265 End-on PMT housings fit on the male flange of the Sample Compartment. For spectral selection, you can use the 71260 Filter Holder (page 1-163) between the Sample Compartment and the PMT.

Our Beam Probes increase the usefulness of fiber bundles. These aluminum cylinders fit to the ends of 11 mm fiber bundles, and house focusing or collimating lenses. These beam probes are most useful when working with weak radiation, such as fluorescence or scattering. They are described on page 8-25.

## ORDERING INFORMATION

<b>30750</b>	Sample Compartment For Fiber Optics
<b>77803</b>	Beam Probe Flange With male 1.5 Inch Series Flange
<b>77873</b>	Beam Probe Flange With female 1.5 Inch Series Flange
<b>71260</b>	Filter Holder
<b>13970</b>	Adapter for 3 mm Cuvette

Cuvette Inside Dimensions (mm)	Material	Model No.	Price
10 x 10 x 45	Fused Silica	<b>13960</b>	
10 x 10 x 45	Glass	<b>13961</b>	
3 x 3 x 40	Fused Silica	<b>13965</b>	