

## ALIGNMENT KITS AND TOOLS

### Features

- Simplifies alignment of laser to fiber couplers
- Video/DVD instructions explains the process step by step
- Reduces your assembly time
- Completely reusable
- Inexpensive
- Polarization tool gets alignment right the first time
- Torque screwdriver ensures parts are tightened correctly

### Product Description

OZ Optics' alignment kits simplify the task of coupling lasers or laser diodes to either singlemode or polarization maintaining (PM) fibers. Key to successful alignment of any coupler is the initial task of getting the focused light to strike the core of the singlemode or PM fiber. At visible wavelengths the fiber core is as small as 3 microns in size, a very small target to find. The alignment kits make the task easier by first using a multimode fiber with a 50 micron core as the output fiber. The larger core size makes for a relatively easy target to find. Then by observing the output pattern from the multimode fiber one can improve the alignment so the light is striking very close to the center of the fiber. Once this alignment is optimized, one removes the multimode fiber and replaces it with the singlemode or PM fiber. If done correctly, it should only take minor adjustments to successfully couple light into the singlemode or PM fiber. A video or DVD clearly shows how to align laser and laser diode to fiber couplers using these kits in a clear, step-by-step fashion.

Alignment kits are available for both receptacle style and pigtail style laser to fiber couplers. In pigtail style kits, the multimode fiber is pigtailed with a lens matching the dimensions of your coupler, and a centering lens is included to precisely center the coupler housing with the laser beam. The fibers in receptacle style kits come with the matching connector for your coupler, including our line of adjustable focus couplers. For adjustable focus couplers the connector is preset to the nominal best focus point, thus avoiding the need to adjust both focus and tilt.

In laser diode to fiber couplers two lenses are used. The first lens collimates the light from the laser diode, while the second couples the collimated beam into the fiber. Laser diode to fiber coupler alignment kits also include an alignment wrench to adjust the collimating lens position with respect to the laser diode. The coupler optics can then be aligned using the provided multimode fiber. These steps are all explained on our instructional video.

Perhaps the most difficult task is to align the polarization axis of lasers to the polarization axis of PM fibers. The polarization alignment tool makes this adjustment in seconds. The tool consists of a connector that fits the receptacle on the laser to fiber coupler. Inside the connector is a polarizer, aligned 90 degrees to the key on the connector. The operator simply inserts the tool into the coupler, and monitors the strength of the output light while rotating the laser to fiber coupler. When the light through the tool is blocked as much as possible, the key on the connector is correctly aligned with the key on coupler. The operator then simply connects his PM fiber to the coupler and aligns it for



**Laser To Fiber Alignment Kits**



**Polarization Alignment Tool**



**Torque Screwdriver**

maximum coupling efficiency. The fiber is then correctly aligned to give the maximum polarization extinction ratio performance.

One concern of users of lasers to fiber couplers is how much to tighten the tilt screws and locking screws. These screws must be tightened enough to ensure the optics remain stable, but must not be tightened too much as one could risk damage to the screws and/or coupler. To address this concern, a torque screwdriver is available. One initially adjusts the tilt screws to optimize coupling, then tightens the locking screws with the torque screwdriver. The screwdriver will only tighten the screws to 1 inch-pound of torque, and then stops. The operator then performs fine adjustment of the locking screws with a conventional screwdriver to again optimize the coupling efficiency. This method ensures the locking screws are properly tightened.

## Ordering Information for Standard Parts

Alignment Kits For Receptacle Style Laser To Fiber Couplers		
Bar Code	Part Number	Description
30071	START-03-DVD-IRVIS	Alignment kit for laser to fiber couplers with FC receptacles (compatible with flat, super and ultra polished FC connectors). The kit includes a multimode patchcord and an instructional DVD. Use for 400 nm to 1600 nm applications.
31444	START-03-DVD-UVVIS	Alignment kit for laser to fiber couplers with FC receptacles (compatible with flat, super and ultra polished FC connectors). The kit includes a multimode patchcord and an instructional DVD. Use for 180 nm to 700 nm applications.
20750	START-03AF-DVD-IRVIS	Alignment kit for laser to fiber couplers with FC/AFC connector receptacles. The kit includes a multimode patchcord and an instructional DVD. Use for 400 nm to 1600 nm applications.
31495	START-03AF-DVD-UVVIS	Alignment kit for laser to fiber couplers with FC/AFC connector receptacles. The kit includes a multimode patchcord and an instructional DVD. Use for 180 nm to 700 nm applications.
30635	START-0A3A-DVD-IRVIS	Alignment kit for laser to fiber couplers with adjustable focus FC/APC connector receptacles. The kit includes a multimode patchcord and an instructional DVD. Use for 400 nm to 1600 nm applications.
31190	START-0A3A-DVD-UVVIS	Alignment kit for laser to fiber couplers with adjustable focus FC/APC connector receptacles. The kit includes a multimode patchcord and an instructional DVD. Use for 180 nm to 700 nm applications.

Alignment Kits For Pigtail Style Laser To Fiber Couplers		
Bar Code	Part Number	Description
31580	START-01/4-DVD-IRVIS	Alignment kit for pigtail style laser to fiber couplers with lens assemblies with 4 mm OD housings. The kit includes a MM patchcord and an instructional DVD. For 400-1600 nm applications.
29755	START-01/8-DVD-IRVIS	Alignment kit for pigtail style laser to fiber couplers with lens assemblies with 8 mm OD housings. The kit includes a MM patchcord and an instructional DVD. For 400-1600 nm applications.
28987	START-01/12-DVD-IRVIS	Alignment kit for pigtail style laser to fiber couplers with lens assemblies with 12 mm OD housings. The kit includes a MM patchcord and an instructional DVD. For 400-1600 nm applications.

Laser Diode To Fiber Coupler Alignment Kits		
Bar Code	Part Number	Description
33171	ALIGN-03-DVD-IRVIS	Alignment kit for laser diode to fiber couplers with FC receptacles. The kit includes a collimating wrench, multimode fiber assembly, instruction manual and an instructional DVD.
36222	ALIGN-03A-DVD-IRVIS	Alignment kit for laser diode to fiber couplers with FC/APC receptacles. The kit includes a collimating wrench, multimode fiber assembly, instruction manual and an instructional DVD.
37597	ALIGN-01/4-DVD-IRVIS	Alignment kit for pigtail style laser diode to fiber couplers using lenses with 4 mm OD housings. The kit includes a collimating wrench, multimode fiber assembly, instruction manual and an instructional DVD.
36769	ALIGN-01/8-DVD-IRVIS	Alignment kit for pigtail style laser diode to fiber couplers using lenses with 8 mm OD housings. The kit includes a collimating wrench, multimode fiber assembly, instruction manual and an instructional DVD.

Polarization Alignment Tools, Torque Screwdriver And Videos		
Bar Code	Part Number	Description
13517	POL-ALIGN-400/700	Polarization Alignment Jig for FC style receptacles with polarizer for visible wavelength inside, aligned 90° to the keyway
21177	POL-ALIGN-800/1600	Polarization Alignment Jig for FC style receptacles with polarizer for infrared wavelengths inside, aligned 90° to the keyway
21092	TORQUE-WRENCH-1-0.050BD	Handheld torque wrench set to 1 in/lb, with a 0.050" ball driver on the output
1977	VIDEO-01-NTSC	Instructional Video, NTSC Format
1978	VIDEO-01-PAL	Instructional Video, PAL Format
18477	DVD-01	Instructional DVD

## Ordering Example For Standard Parts

A research lab has just bought an OZ Optics receptacle laser to PM fiber coupler with an FC/AFC connector on it, for use at 532 nm. The user needs the tools to align the coupler and fiber to his laser.

Bar Code	Part Number	Description
20750	START-03AF-DVD-IRVIS	Alignment kit for laser to fiber couplers with FC/AFC connector receptacles. The kit includes a multimode patchcord and a instructional DVD. Use for 400 nm to 1600 nm applications.
13517	POL-ALIGN-400/700	Polarization Alignment Jig for FC style receptacles with polarizer for visible wavelength inside, aligned 90° to the keyway
21092	TORQUE-WRENCH-1-0.050BD	Handheld torque wrench set to 1 in/lb, with a 0.050" ball driver on the output

## Ordering Information for Custom Parts

OZ Optics welcomes the opportunity to provide custom designed products to meet your application needs. As with most manufacturers, customized products do take additional effort so please expect some differences in the pricing compared to our standard parts list. In particular, we will need additional time to prepare a comprehensive quotation, and lead times will be longer than normal. These points will be carefully explained in your quotation, so your decision will be as well informed as possible. We strongly recommend buying our standard products.

## Questionnaire

1. What model number laser to fiber coupler have you purchased from us?
2. Are you using singlemode, multimode, or polarization maintaining fiber?
3. What is the operating wavelength of your source?
4. What video format do you prefer?

### DESCRIPTION

#### Laser To Fiber Coupler Alignment Kit

##### Receptacle Code:

1/4 for pigtail style couplers with 4 mm OD lens housings  
1/8 for pigtail style couplers with 8 mm OD lens housings  
1/12 for pigtail style couplers with 12 mm OD lens housings  
3 for NTT-FC, Super NTT-FC, or Ultra NTT-FC  
3A for NTT-FC/APC  
3AF for NTT-FC/AFC  
A3A For Adjustable Focus NTT-FC/APC  
8 for AT&T-ST  
SC for SC  
SCA for Angled SC

### PART NUMBER

#### START-0X-V-W

##### Wavelength Range:

IRVIS for 400-1600 nm  
UVVIS for 180-700 nm

##### Video Type:

NTSC for NTSC (North American) Format  
PAL for PAL (European) Format  
DVD for DVD Video

### DESCRIPTION

#### Laser Diode To Fiber Coupler Alignment Kit

##### Receptacle Code:

1/4 for pigtail style couplers with 4 mm OD lens housings  
1/8 for pigtail style couplers with 8 mm OD lens housings  
3 for NTT-FC, Super NTT-FC, or Ultra NTT-FC  
3A for NTT-FC/APC  
3AF for NTT-FC/AFC  
A3A For Adjustable Focus NTT-FC/APC  
8 for AT&T-ST  
SC for SC  
SCA for Angled SC

### PART NUMBER

#### ALIGN-0X-V-W

##### Wavelength Range:

IRVIS for 400-1600 nm  
UVVIS for 180-700 nm

##### Video Type:

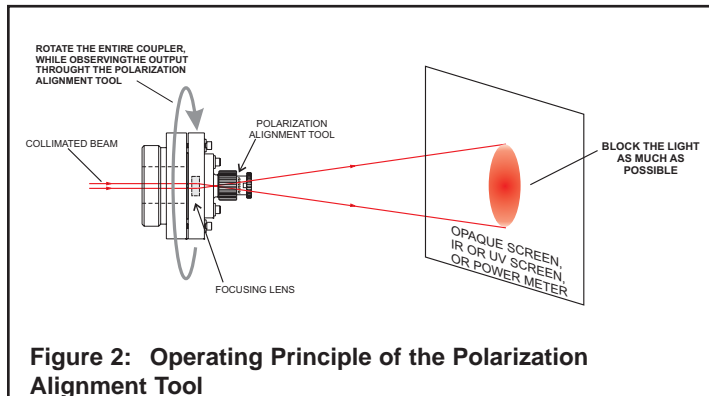
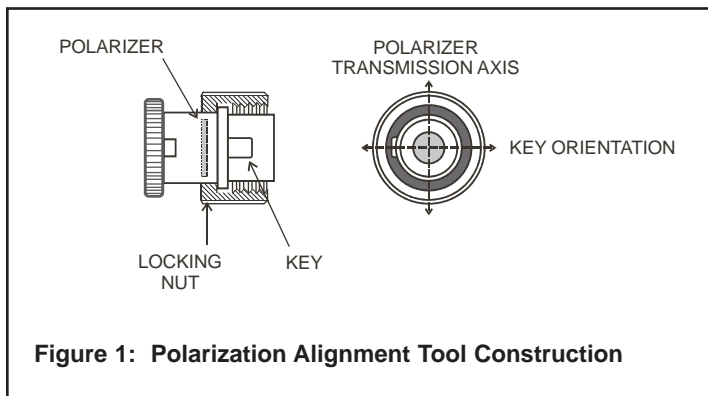
NTSC for NTSC (North American) Format  
PAL for PAL (European) Format  
DVD for DVD Video

Table 1: Selection Guide For Pigtail Style Alignment Kits

If the lens code in your pigtail style coupler part name is one of the following...	... then select this style alignment kit
1.01GR 1.8GR 1.81GR 2.13GR 2.6GR 2.61GR 3.2GR 4.7GR 3.5AC 4.5AC 6AC 1.4AS 2AS 5AS	START-01/4-V-W
6.6GR 10AC 2.7AS 3.9AS 6.2AS 11AS 13.9AS 18AS 5BQ	START-01/8-V-W

## Application Note: Using the polarization alignment tool

The tool consists of a connector that fits the receptacle on the laser to fiber coupler. Inside the connector is a polarizer, aligned 90 degrees to the key on the connector. The operator simply inserts the tool into the coupler, and observes the strength of the output light while rotating the laser to fiber coupler. One can use a power meter, and infrared or visible light sensor, or simply one's eye if the light is visible. When the light through the tool is blocked as much as possible, the key on the connector is correctly aligned with the key on coupler. The operator then simply locks the laser head adapter in place onto the coupler, connects his PM fiber to the coupler and aligns it for maximum coupling efficiency. The fiber is then correctly aligned to give the maximum polarization extinction ratio performance.



## Frequently Asked Questions (FAQs)

- Q:** Do I have to purchase an alignment kit to use a laser to fiber coupler?
- A:** No, but it is strongly recommended. Experienced users of our laser to fiber couplers can often align our couplers within a few minutes even without one of our alignment kits. However the kit makes the alignment much quicker as it is very easy to couple light into a multimode fiber, because the core size is so much larger. After that, it is much easier to locate the correct tilt to couple light into singlemode fiber. In addition the video clearly shows how to align the coupler, and provides valuable tips on how to troubleshoot problems should coupling be a problem.
- Q:** I'm working with multimode fiber. Do I need an alignment kit?
- A:** No, but you may find the instructional video useful. It can be ordered separately.
- Q:** What are NTSC and PAL video formats? Which one should I choose?
- A:** There are two different video standards used worldwide. The NTSC format is used throughout North America and in Japan. The PAL format is used throughout Europe and most of Asia. Depending on your location you may need one or the other. To the best of our knowledge, the DVD should play on DVD players throughout the world. The DVD also has the advantage of being indexed, making it easy to select the step in the process you want to review.
- Q:** Are the alignment reusable? Can I use the same kit with different couplers?
- A:** The same alignment kit can be reused over and over again. You can use the same alignment kit with different couplers as long as the connector style on both couplers match and the wavelengths being used are in matching ranges.
- Q:** Why are there two sizes of kits for pigtail style couplers? How do I know which one to select?
- A:** For all OZ Optics couplers, we offer a variety of lenses to choose from, depending on your laser characteristics. Many of our lenses are less than 3 mm in diameter, and fit inside a 4 mm diameter housing. However some lenses — particularly those with long focal lengths to accommodate large beams — have diameters larger than this, and must go inside our larger housing, which is 8 mm in diameter. As a result we have two different alignment kits, to match the two lens housings. Table 1 below lists the alignment kit to select, based on the lens code for your laser to fiber coupler.
- Q:** What about the pigtail style laser diode to fiber alignment kits? How do I know which one to choose?
- A:** For laser diode to fiber couplers, the selection is more difficult, as the optics OZ selects for a laser diode to fiber coupler depend a great deal on the laser diode being used by you the customer. We best advise consulting with one of our sales representatives to select the best unit for your application.
- Q:** What is the power handling limit on the polarization alignment tools?
- A:** About 50mW for the standard models when used with a 1 mm diameter beam. Polarization alignment tools capable of higher power handling can be provided as a special order.
- Q:** I used the alignment tool but I still do not get a stable enough polarization. What is going on?
- A:** There are several possible reasons:
1. The laser you are using might be randomly polarized or have a poor output polarization. Check your laser.
  2. The fiber you are using might not be polarization maintaining fiber.
  3. The coupler might still be misaligned by a degree or two. This can happen when one is trying to get the very best degree of polarization, when only a very small error in the alignment can cause the polarization extinction ratio to drop. The alignment accuracy is limited both by the operator and the tolerance in the mechanical connector parts. Often the result can be improved by either reusing the polarization alignment tool more carefully, or by simply rotating the coupler with respect to the housing by one degree or so, either clockwise or counterclockwise.
  4. The laser to fiber coupler or the patchcord are damaged, and need to be repaired.