

# Superior Panel Technology

## FiberLite Fiber-Optic Backlighting Kit Installation Instructions

*The recommended dimmer for the LEDs is the Superior Panel Dimmer #SPTPWMLEDS.*

The FiberLite fiber-optic ribbon (FLR) can be used to backlight the lettering on reverse engraved panels or as flood light to illuminate the nomenclature for switches and breakers. The advantage of fiber-optic technology is that the lamps are very thin, long lasting, no electromagnetic feedback from inverters and they utilize long life, low current LEDs for light sources.

### Items included in the FiberLite Backlighting Kit:

- 3"x 8" FiberLite fiber-optic panel
- 3" x 8" diffuser panel with double-sided tape on both sides (This improves the evenness of light)
- 3 qty LED light sources
- Resistor of appropriate size based on voltage for 3 LEDs wired in series
- Teflon tubing to protect the loose fibers
- 6 Crimp connectors that go over the Teflon tubing to hold it in place
- Funnel inserts:
  - 2 quantity #1 ex-large ID inserts that will accommodate 1.7" of fiber-optic ribbon
  - 2 quantity #2 large ID inserts that will accommodate 1" of fiber-optic ribbon
  - 2 quantity #3 medium ID inserts that accommodate .6" of fiber-optic ribbon
- 4 Aluminum ferrules that go over the plastic funnel inserts (this gives you one spare)
- 3/8" and 3/32" heat shrink tubing
- Installation instructions

Optional: Items you will need to obtain from a craft store: Black Liquitex Acrylic paint (tube), small artist's brush

**When having your reverse engraved panels made for this kit, use a bold, plain-type font such as Dino. Below are suggested steps for backlighting reverse engraved panels. Read all instructions before proceeding.**

### 1. SIZING THE RIBBON

The width of the ribbon should be sized 1/16" larger than the outside height of the lettering allowing 1/32" overlap above and below lettering. The length should be 3/8" longer than the measurement from the first and last letter in the line of text to be backlit. This allows for the brighter spots of light at the beginning and end of the ribbon to extend 3/16" past the lettering. When needing a length that exceeds the 8" length of one ribbon provided, two ribbons can be used by either having the tails meet in the middle or by having the other ends meet in the middle. Make sure the meeting spot is 3/16" away from any letters as it will produce a brighter spot of light. (Fig. 1) (DO NOT CUT THE ACTUAL LENGTH UNTIL STEP 7.)



Figure 1 (tail placement options)

### 2. CUTTING THE RIBBON WIDTH

Cut the ribbon on a glass surface with an X-acto knife with a new blade. Tape the sheet of fiber-optics down so it does not move and the tails are hanging off edge of table. Measure and mark the widths you want and then pull off one fiber at each cut mark. This will give you a cutting guide that the X-acto knife will follow. Use light pressure with 3-4 passes to gradually cut through the layers. The light pressure will help you stay in the guide. Use a metal edge ruler if you are uneasy about going off track. Try not to sever any other fibers. (Fig. 2)



Figure 2

### 3. SIZING AND CUTTING THE DIFFUSER PANEL

After cutting the widths you need, align and press the cut ribbons back together with white side up. (Fig. 3) The adhesive on the edges will help

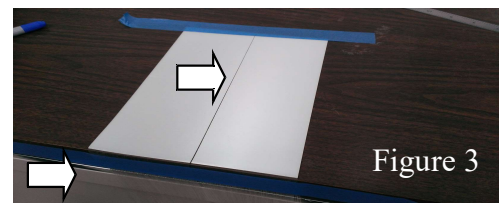


Figure 3

hold them in alignment. The separation seen in Figure 3 is exaggerated just to show you where it is cut. Push them close together, white side up. The fiber tails can then be taped to the table to hold ribbons in place. Place tails closest to you. Cut diffuser panel with an X-acto knife so it is slightly oversized in width.

#### 4. APPLYING THE DIFFUSER PANEL

Apply the diffuser panel by removing half of the release liner on one side. Align it as shown by carefully placing it flush with edge of the loose fiber tails. (Fig. 4) Gradually remove release liner while you squeegee to the opposite end. Be sure to remove any tape holding down the fibers before you get to it, so you don't sandwich your tape between the fibers and diffuser. Then, it's best to squeegee from center out to remove all air bubbles. (Fig. 5)

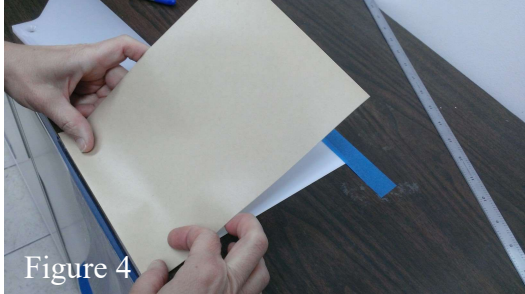


Figure 4



Figure 5

#### 5. CUTTING APART THE DIFFUSER LINED RIBBONS

After the diffuser layer is applied, you can then flip the panel over so you see the cut lines of the individual ribbons. Use a glass work surface and a very sharp X-acto knife and follow these lines to cut through the diffuser. Again, use light pressure and several passes with the knife to cut through diffuser. Stay in the lines and don't sever any adjoining fibers. (Fig. 6)



Figure 6

#### 6. POSITIONING THE PLACARD(S)

Now, before applying the ribbons to the placards, using painters tape, temporarily tape the placard to the panel. Apply tape to the outside perimeter of the placard to mark its exact placement. Remove the placard once its footprint is marked.

#### 7. CUTTING RIBBONS TO LENGTH AND APPLYING TO PLACARD(S)

Cut the ribbons to the length. (See step 1). Remove the release liner from the diffuser side and adhere it to the back side of the reverse engraved panel. Remember to let the ribbon extend past the lettering by about  $\frac{3}{16}$ " to eliminate bright spots. Optional: Using a small artist brush, apply a coating of black Liquitex acrylic paint around the perimeter (edges) of the fiber-optic ribbon. This is done to prevent any light leakage around the perimeter of the placard. You can temporarily light up the fibers with an LED to make sure that you have blocked all the light after painting them. (USE CORRECT VOLTAGE of 3.9V or wire in series with the appropriate resistor, see Figs.12, 13, 18)

#### 8. INSTALLING THE TEFLON TUBING

Each fiber tail will need teflon tubing for fire resistance. If two tails meet in the middle (Fig. 1) they can be put in one tube. Cut the fiber tails a couple inches longer than needed. Then cut tubing a couple inches shorter than the tails. (Fiber optics are easier to thread if cut flush and tubing is cut at an angle.) Then place  $\frac{1}{4}$ " aluminum sleeve on the teflon tubing and thread tail(s) through tubing. Place tubing within a half inch of the backside of the placard and crimp sleeve GENTLY, just enough to keep the tubing from sliding off the fibers. (Fig. 7). Now you should have fibers extending out of the tubing. (On this end will be threaded a specific size funnel with a ferrule shown in step 9.) *(In the case where you need to trim the teflon tube that has already been installed over fibers, use a very sharp wire stripper to cut the teflon tubing. Klein Tools makes a nice one that is available from Home Depot. Start the cut of the tubing by placing the tubing in the 10-gauge wire size opening and twist the end of the tubing a couple of times. Then go down to the 12-gauge wire size and twist the tubing a couple of more times. While holding the stripper in one hand, you should be able to pull off the end of the tubing that you wish to remove. NOTE: Pull on the tubing end that is being removed rather than on the wire stripper, to keep from accidentally cutting any fibers. We suggest that you do a practice cut on the end of tubing that will be cut off.)*



Figure 7

## 9. PREPARING THE FIBER ENDS FOR LED ATTACHMENT(see Figs. 8-11)

(This step can be done either before or after applying the placard to your panel. The advantage of doing it before is that it is obviously easier to do the crimping when the placard is off the panel. The advantage of doing it after is that you can combine the fibers from 2-3 placards into one funnel/ferrule piece and therefore use one LED to illuminate them all. If you want to light more than one placard with one LED, continue to the next step to drill your panel hole and attach your placard(s) and then come back here to finish the fiber ends for LED attachment. If you are lighting your placard(s) with only one LED per, and want to prepare the fiber ends before attaching placard to your panel, continue on here.) The kit comes with a supply of plastic funnels with different inside diameters. **Use the smallest funnel that will accommodate the fibers.** (The width of FLR that they will accommodate is printed on the bag. You can have up to 1.75" width of fiber-optic ribbons going to one LED.)

Then, push an aluminum ferrule onto the appropriate funnel with the shoulder towards larger end of funnel. Thread the appropriate fibers through the large end of the funnel/ferrule connector. (See Figs. 8, 9) Make sure that all the fibers are protruding through the end of funnel/ferrule connector and that the funnel is tight up against the teflon tubing and then crimp **near the flanged end** of the aluminum ferrule (Fig. 9). **Special note: Over crimping is the number one problem DIY installers have with the installation!! Crimp just enough to keep the ferrule in place. Check it by slightly pulling the fibers as you hold on to the ferrule. It should not slip. If it slips, just crimp ever so slightly more and recheck.**

Trim the fibers flush with an X-acto knife (Fig 10). Then apply 3/8 heat shrink with as low heat as possible. (Fig 11)

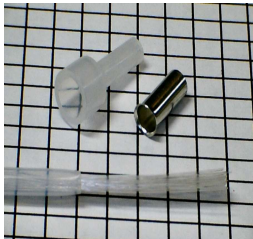


Figure 8



Figure 9

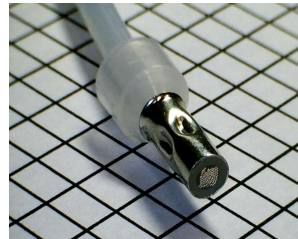


Figure 10

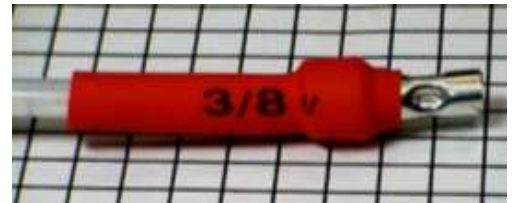


Figure 11

## 8. DRILLING THE HOLE/SLOT IN THE PANEL FOR THE FIBERS

You will need to cut a hole/slot in the panel so that you can pass the fibers to the back side of the aircraft panel. The size of hole you need depends on whether you will place the funnel/ferrule connector on before or after you attach the placard to your panel. Use caution drilling the hole, as you do not want to cut into anything on the backside of the panel and you want to cut it so that it is totally covered by the placard. Hold the placard up to the panel and determine where you need to drill the through hole for the fibers. To pass a completed placard with tubing and funnel, drill a 3/8" hole (best to do a small pilot hole and then use a step-bit (Uni-bit). Use a Dremel with an abrasive cutting blade to open the hole up to accommodate the full width of the ribbon. The hole should be inside the footprint so the placard completely covers it on assembly. Deburr the opening. See example below with the blue indicating approximate position of the cut out. (Fig. 12)



Figure 12

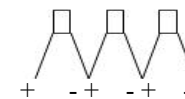
## 9. APPLYING PLACARD TO THE PANEL

Feed the prepped fiber tail through the access hole in the panel. Remove the remaining release liner to expose the adhesive and position the placard in the footprint made in step 6.

## 10. WIRING THE LEDs

The LEDs are rated for 3.9Vs and MUST be connected to a resistor as shown before applying power. The kit includes the proper resistor to be used with ALL three LEDs wired in series. LEDs wired in series also helps for even lighting. Wire all 3 LEDs provided with supplied resistor. (Figs. 13 and 14) The resistor goes on the red (+) wire. Polarity is not an issue with the resistor, but is with the LEDs. (Fig. 13, 14) The resistor must be attached to the red LED power input wire. See LED resistor chart Figure 18 for other combinations.

**13. ATTACHING LED.** Press the boot of the LED onto the funnel/ferrule. (Fig. 15)



+(positive) wires are red, - (negative) wires are black  
**Wire in series connecting the red and black wires**

Figure 13

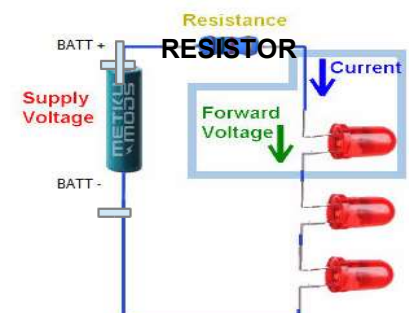




Figure 15

Below you will see an example of a reverse screen printed panel with the FiberLites on the backside ready for installation. (Figure 16, 17)

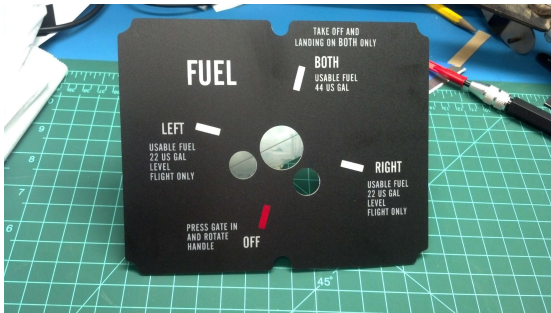


Figure 16

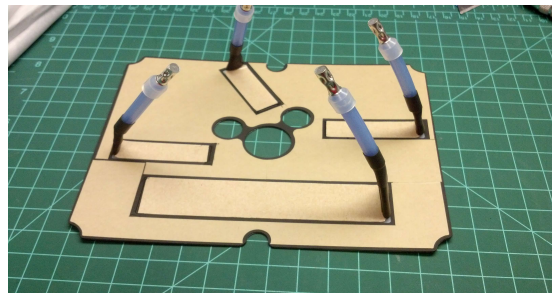


Figure 17

### Resistor Chart for SPT LEDs

This chart is only for SPT specially designed Ultra-bright LED's

Use 1 watt resistors

NO. OF LED'S	14V SYSTEM	28V SYSTEM
1	330	1K
2	220	820
3	82	680
4	Not applicable	560
5	Not applicable	390
6	Not applicable	220
7	Not applicable	68

Figure 18

Additional LEDs, resistors, connectors etc. can be ordered by contacting:

[support@sptpanel.com](mailto:support@sptpanel.com)

Please call SPT at 714-838-8946 if you need any help!