

MILL LIGHT FOR RF-45

Project: Arrays of LED lights mounted around the quill. A hole slightly larger than the quill was made in a rectangular aluminum plate. LED's were mounted on the plate using double sided tape and hot glue. A spare 'wall wart' power supply was used to power the LED arrays.

Materials

Aluminum plate: 1/4" x 4.25" x 5.5" (size can vary – also can use steel)

Steel ring: 5/8" x 1/4" wall x 4.5" outside diameter (I used 4" steel pipe)

(2) 36 LED's – 1210 or Flux LED's (can vary)

(2) 9 LED's – 5050 or Hyper Flux LED's (can vary)

3 machine screws 1/8" x 1" (can vary)

AC to DC power supply: 13V, 1 amp (can use 10V – 15V)

Cost for LED's: \$30 (1/2010)

Tools

Drill press

Some method of making a 1.75" diameter hole. The hole diameter need not be precise.

Soldering iron and rosin core solder

Parts

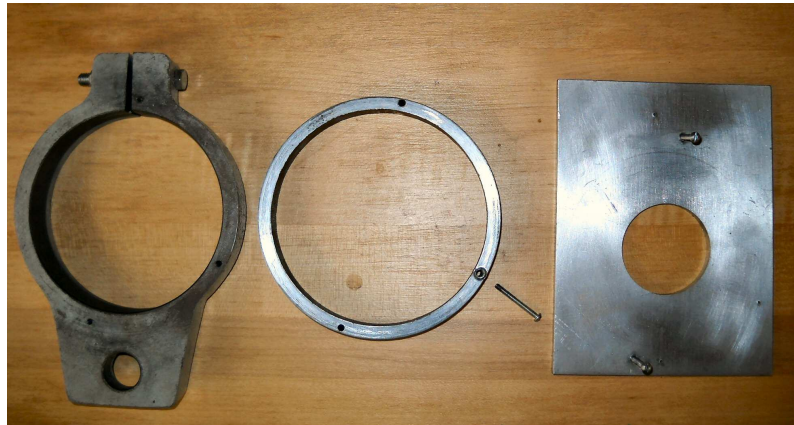
The leftmost ring is from the RF-45 and holds the quill stop. Three holes are drilled and tapped so it will hold the new light.

Note that the bolt at the top tightens this ring.

The holes for the spacer are placed so they

are in the R side of this

ring so they will not interfere with tightening the ring.



The middle ring is a spacer sliced from 4" pipe. The outside diameter was 4.5", which is a little bit too large although it did work.

The rightmost piece is the aluminum plate that holds the lights.

LED lights

This is a package of (2) 36 LED panels. The panels are shown front and back on the lower right. Above are two pieces of double sided 3M tape. The various connectors shown are for use with auto light sockets and can be discarded.

The next photo shows the final light. Double-sided tape is used to fasten the LED panels. The tape has to be cut away to make a channel for the wires or the panels will not lay flat.

One LED wire is ground (usually black) and one is hot. They cannot be reversed however if you hook it up wrong just switch the wires – it does not damage the LEDs.

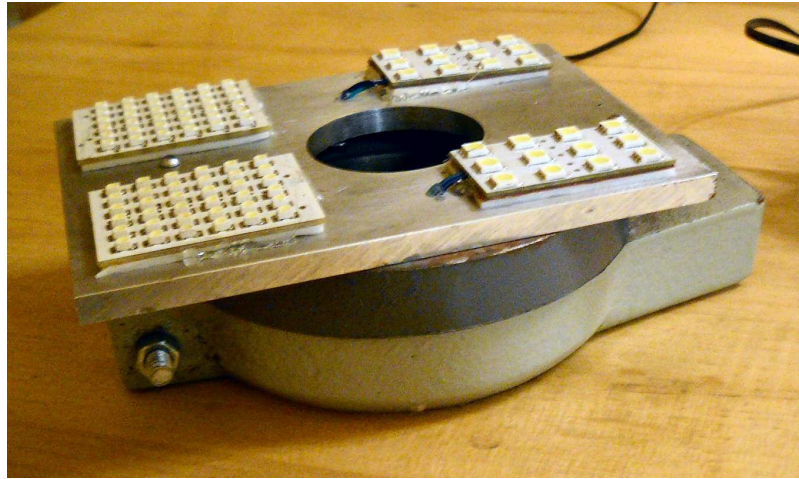
The wires are very tiny - 22 gauge or the metric equivalent – and need to be handled gingerly.



Make sure all hot leads are wired together with the hot lead from the power supply and the same for all the ground wires. Solder them, wrap in electrical tape, and then hot glue to keep them in place.

I used the 9 LED arrays on the front because they were smaller and the 36 LED arrays on the back. The 9 arrays are almost as bright as the 36 arrays – see below for a treatise on LED arrays and a discussion on modifying the design to meet your needs.

The side view shows the panel upside down; Aluminum plate with LED arrays; spacer ring; quill ring.



The spacer ring is where all the wires are connected. A hole was drilled through the side of the spacer ring for the power supply cord and hot glue secured the cord and sealed the hole.

The next picture shows how it looks mounted on the mill. The 9 arrays are at the front and the light does not interfere with the quill stop knob. Note there is more room at the back than the front for the arrays.



The last picture shows the results. It was taken at night with the shop lights off and without a flash. The light is even, not too bluish, and has made a great difference.

Buying LED arrays:

Types

The LED panel arrays are designed for cars as replacements for overhead lights, vanity light, and glove compartment lights. They run on 12VDC and are voltage compensated so they can run on a wide range of power supplies. The one I used was 13VDC.

LED's come in at least four flavors:

Smallest – do not know
ID number 4 lumens
1210

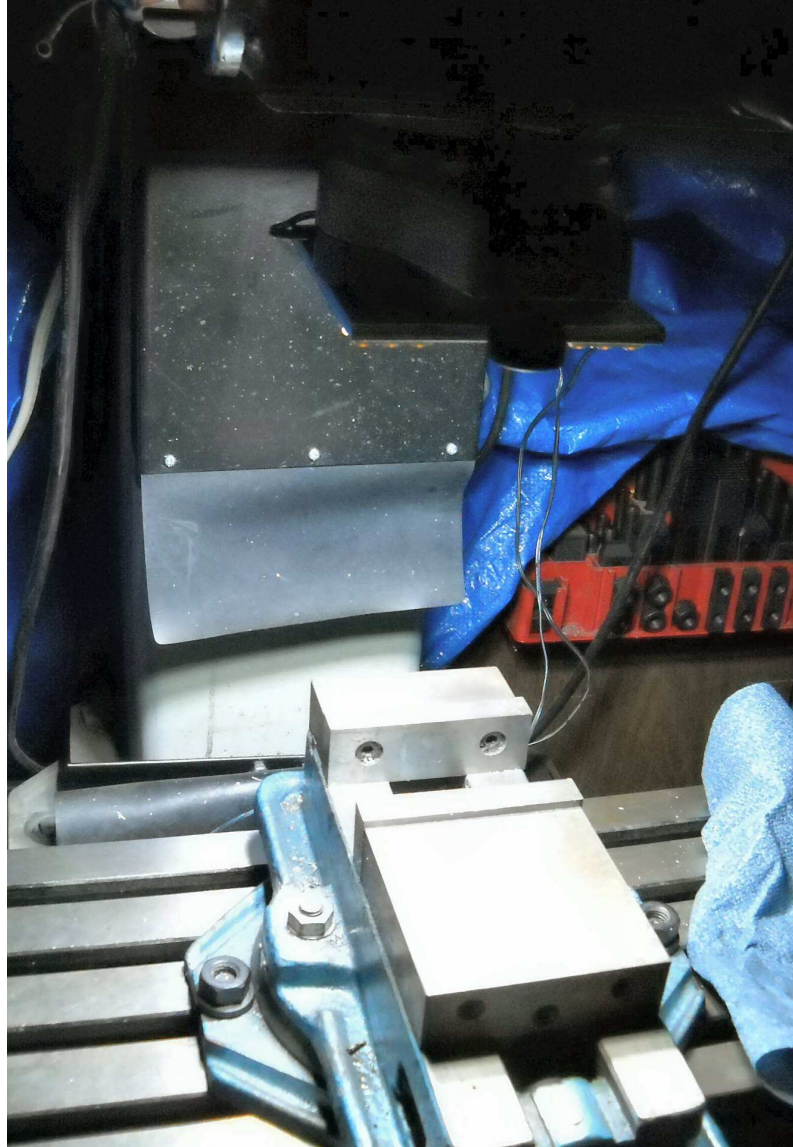
7 lumens

Flux

8 lumens

HyperFlux or 5050

20 lumens



The 36 arrays were 1210's and the 9 arrays were 5050's. Doing the math the 36 arrays produce 252 lumens and the 9 arrays produce 180 lumens. Since there are two of each, this light has a total of 864 lumens – roughly equivalent to a 60-Watt incandescent bulb. This does not seem like much however it is typically 8" to 18" from the work so it is more than adequate.

Colors

LED's also come in different colors. Daylight is 6,000 Kelvin and there are no LED's that match exactly. Warm White is usually 3,500 – 4,000 Kelvin and appears too yellowish for my taste. 'White' is usually 7,000 – 8,000 Kelvin and very blue. I used 'True White' which is 6,000 Kelvin.

Sources

Ebay Motors has many sellers. Search for 'LED panel.' The buyers I used were KAIZENMOTOR who ships from Emeryville, CA and ENKMALL who ships air from Hong Kong.

Designing your light

Start with the materials you have lying around the shop and, hopefully, a power supply in the range of 10VDC – 15 VDC and 600+ milliamps.

The plate holding the LED arrays is limited in the front by the quill stop knob however it is not limited on the sides and the rear.

Once you have the plate size, more or less, figure out the space available for the arrays and then start looking for arrays that meet your dimensional requirements. Arrays using the smaller LED's come with 12, 24, 36, and 48 LED's I only found the larger ones in 9 LED array panels.