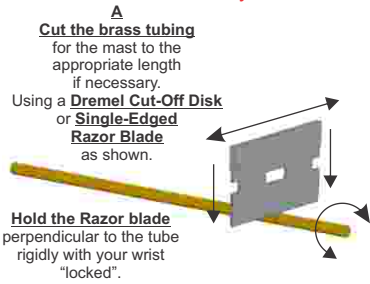


### Step 1 - Prepare the Mast

#### Practice

this technique on scrap tubing as necessary.



**A**  
**Cut the brass tubing** for the mast to the appropriate length if necessary. Using a **Dremel Cut-Off Disk** or **Single-Edged Razor Blade** as shown.

**Hold the Razor blade** perpendicular to the tube rigidly with your wrist "locked".

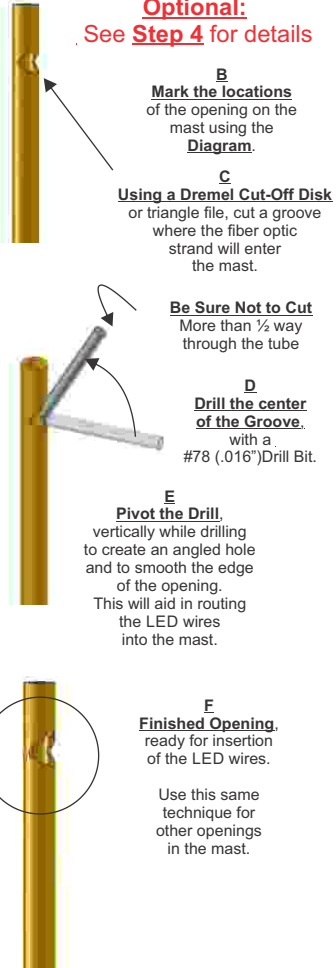
**While pressing down** with light pressure to begin with, roll the tubing with the razor blade back and forth on a **hard surface**.

**After a few rolls**, the tubing should snap off cleanly.

**The end of the tubing** may need to be opened using a #78 drill bit.

#### Optional:

See **Step 4** for details



**B**  
**Mark the locations** of the opening on the mast using the **Diagram**.

**C**  
**Using a Dremel Cut-Off Disk** or triangle file, cut a groove where the fiber optic strand will enter the mast.

**Be Sure Not to Cut** More than 1/2 way through the tube

**D**  
**Drill the center of the Groove** with a #78 (.016") Drill Bit.

**E**  
**Pivot the Drill**, vertically while drilling to create an angled hole and to smooth the edge of the opening. This will aid in routing the LED wires into the mast.

**F**  
**Finished Opening**, ready for insertion of the LED wires.

Use this same technique for other openings in the mast.

### Step 2 - Assemble the Parts

#### Tools You May Need:

1/32" Drill Bit  
#78 Drill Bit  
Needle Files  
Single Edge Razor Blade  
Dremel Tool  
White Glue

**We recommend you use Duro brand Super Glue to assemble the parts.**

#### Clean and Deburr all Parts

before beginning assembly. Some parts may need to be opened with a 1/32" drill bit.

#### Before Applying Glue

Test fit all parts by sliding them in place in their correct order in the mast.

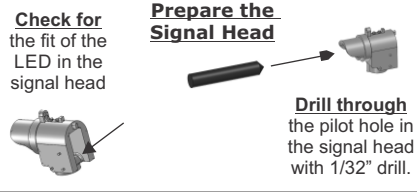
#### Mark the locations

of the parts on the mast using the N Scale **Diagram** provided.

#### Painting

We suggest painting the completed signal after assembly

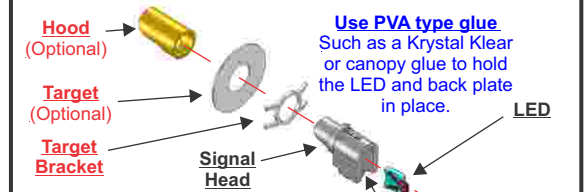
**Use small amount of modeling clay or similar to mask signal head lens opening for painting.** (See page 2)



**Check for the fit** of the LED in the signal head

#### Prepare the Signal Head

**Drill through** the pilot hole in the signal head with 1/32" drill.



**Hood (Optional)**

**Target (Optional)**

**Target Bracket**

**Use PVA type glue** Such as a Krystal Klear or canopy glue to hold the LED and back plate in place.

**LED**

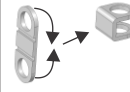
**Back Plate**

**Want to remove the LED?** See page 2

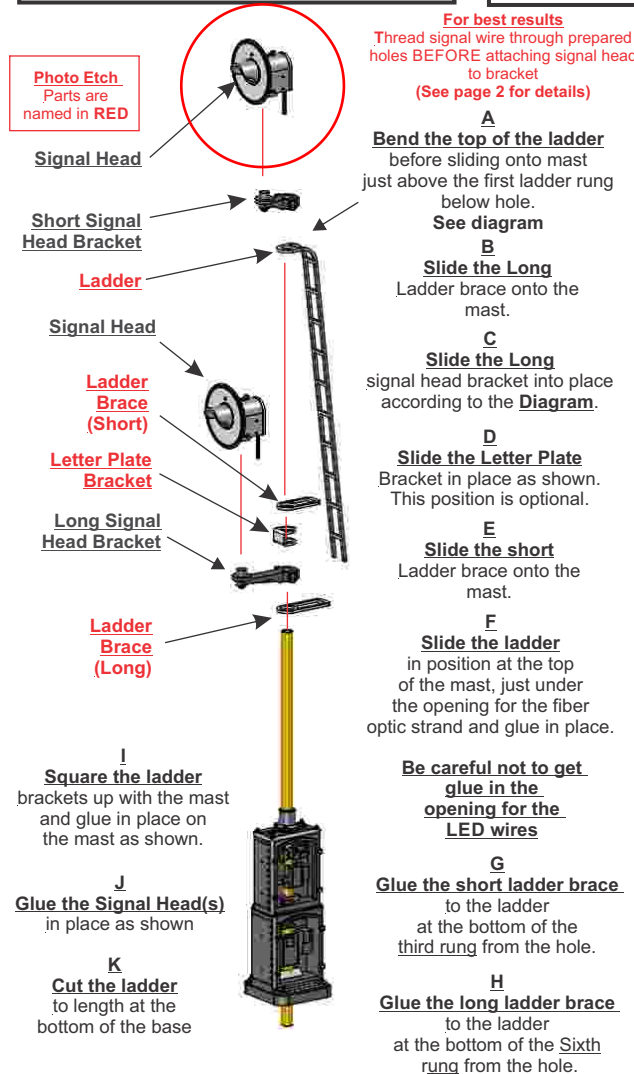
**Remove material** at bottom of LED cavity if necessary for LED fit.

**Assemble the Signal Head**

**Letter Plate Bracket Detail**



**Form the Hood** By rolling it around a 1/16" brass rod.



**For best results** Thread signal wire through prepared holes **BEFORE** attaching signal head to bracket (See page 2 for details)

**A**  
**Bend the top of the ladder** before sliding onto mast just above the first ladder rung below hole. See diagram

**B**  
**Slide the Long Ladder brace** onto the mast.

**C**  
**Slide the Long signal head bracket** into place according to the **Diagram**.

**D**  
**Slide the Letter Plate Bracket** in place as shown. This position is optional.

**E**  
**Slide the short Ladder brace** onto the mast.

**F**  
**Slide the ladder** in position at the top of the mast, just under the opening for the fiber optic strand and glue in place.

**Be careful not to get glue in the opening for the LED wires**

**G**  
**Glue the short ladder brace** to the ladder at the bottom of the **third rung** from the hole.

**H**  
**Glue the long ladder brace** to the ladder at the bottom of the **Sixth rung** from the hole.

**I**  
**Square the ladder brackets** up with the mast and glue in place on the mast as shown.

**J**  
**Glue the Signal Head(s)** in place as shown

**K**  
**Cut the ladder** to length at the bottom of the base

#### Install the Signal Head

**Orientation** of the Searchlight Signal Head



**Be careful not to get glue in the opening for the LED wire**

**Optional** orientation of the Signal Head



### Step 3 - Route the LED wire

**Thread the wire**  
into the prepared opening in the mast.

**For single signals**

Thread wire around and work into opening



**For double signals**

Thread top LED wire into top of mast.



**Thread**  
lower signal wire into prepared opening first. Gently push wire into opening until it protrudes from the bottom of the mast. Then thread top signal wire into top of mast. This should allow both signal wires to be inserted through the mast.

**LED wire**

Thread into opening as shown.

**Optional**

Fill the hood in the signal head with clear "glaze" window pane liquid.

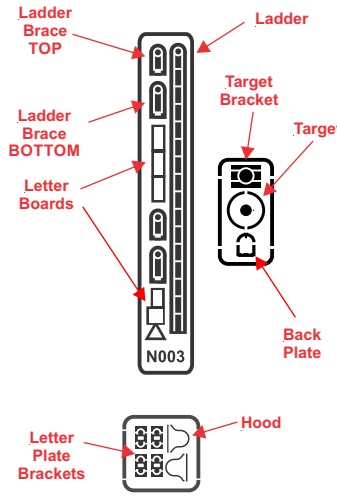


**Mask**  
opening with small amount of modeling clay or similar before painting

### Should you need to remove the LED:

If for any reason you should need to remove the LED from the signal head, soak the entire signal head in Acetone for about an hour. This will soften the PVA glue and allow you to push the LED out the back of the signal - never pull on the wires.

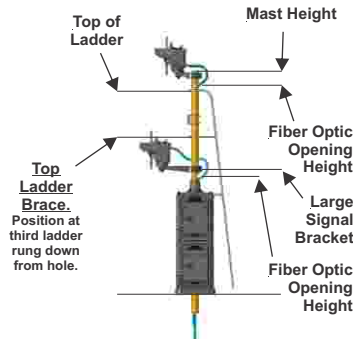
### Photo-Etch Details



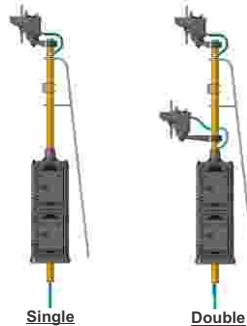
### Remove Parts

from the phot-etch fret by cutting through the tags holding the parts in place with a heavy knife blade on a hard surface.

### N Scale Diagram



### Build Options



### Painting / Finishing

#### From the Southern Pacific Standard Plans:

**Painting by Manufacturer:**

"Signals and all metal surfaces exposed to the weather shall have shop coat of red lead. Relay houses and instrument cases to have shop coat of red lead and two coats of aluminum paint on outside surface. Inside of houses and instrument cases to have shop coat of red lead between the steel and lining and after lining is installed the interior including all shelves and supports to be painted with aluminum paint."

**Painting by Railroad:**

"Inside of all signal masts must be swabbed with raw linseed oil and thoroughly set before installing.

All instrument cases and cable terminal boxes must have a spotting coat and a final coat of aluminum paint inside and out.

Signal face and hood to be painted dead black

All other metal surfaces must have spotting of primary paint where required and two coats of aluminum paint."

Letter Plates are to be given two coats of Dead Black paint. Face of letters and back of plate to be painted aluminum.

### A History of the Searchlight Signal

In late 1916 the invention of the doublet lens combination for daytime color light signals prompted the management of the Hall Signal Company to realize that even their most advanced Style "L" semaphore mechanism (the very last produced by any U.S. signal company), had been rendered obsolete. That dual lens device had been developed by Cornell University's Dr. William Churchill, while he was working at Corning Glass Works. He had recently finished developing color standards for railroad glassware, which Corning had patented on October 10, 1905. The doublet lens combination was fully patented by 1911.

Hall's response to this situation was to buy the 1918 filed patents from one Mr. Blake for his "Searchlight" signal. In reality, the searchlight signal was an updated and modernized variation of the old Hall enclosed disc signal. What Blake had done was to harness the standard railroad three position polarized vane relay, add a miniature spectacle and roundels, and couple that with a very efficient elliptical reflector and optical lens system. This revolutionary development, provided a signal with a visible indication of over a mile from the signal in broad daylight, when the signal was located on tangent track. The early color light signals were visible for only about half that distance (2,500 feet) while using about the same current consumption, then a major concern in "Primary Battery Territory." By 1925, the development of "High Transmission Colors" of railroad glassware by Churchill and Corning Glass improved this limited distance to an acceptably competitive 3,500 feet on tangent track.

Searchlight signals became popular because of their low maintenance (compared with semaphores), high visibility and low power-consumption, often a 4 watt, 3 volt bulb, that worked well in territory with battery powered signaling. However as time went on and grid supplied electric power became universal the rationale behind the searchlight began to fade. As labor costs rose the maintenance associated with the classic searchlight's moving parts began to outweigh the savings from its compact size and single bulb. By the end of the 1980s the searchlight had lost its position as the most popular signal style in North America.

Searchlight signals are typically mounted with a large circular background, with one or two railroads preferring a small target, such as the New York Central beginning in the late 1950s.

#### Searchlight Color Indications:

Green - Used to indicate "clear" or proceed.

Yellow - Used to warn the engineer of an impending stop or speed reduction for an occupied "block" ahead. Also used for low-speed movements.

Red - Used to indicate a full stop or other restrictive condition, or used as a "placeholder" light.

Blue - When on a signal doll arm, indicates intervening track between the signal and the track to which the signal applies.

Lunar White - Blue filtered light to eliminate all trace of yellow used to indicate a restricted proceed condition.

Amber - Used in position light systems as an all-purpose high visibility color, greatest fog penetration.

(Plain) White - Plain incandescent white light. Used in dwarf position light signals with frosted lenses.

Individual signal heads may be set to flash a color to create a different signal aspect. Signals in the United States typically flash only one head at a time, while signals in Canada may flash two heads at a time.