

Step 1 - Prepare the Mast

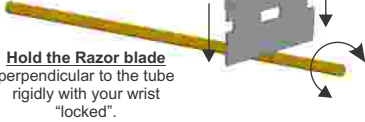
Practice

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

Clean and Debur 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 on the mast.

Mark the locations

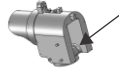
of the parts on the mast using the N Scale **Diagram** provided.

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)

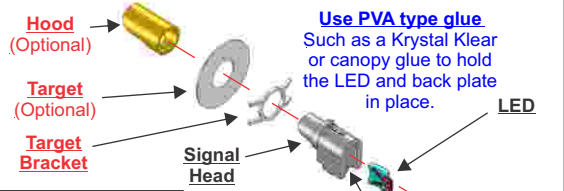
Check for the fit of the LED in the signal head



Prepare the Signal Head



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



Hood (Optional)

Target (Optional)

Target Bracket

Signal Head

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

LED

Want to remove the LED? See page 2

Back Plate

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

Fill the gap at the base of the back plate where the wires exit with White Glue to prevent light leak

Assemble the Signal Head

Photo Etch Parts are named in RED

Signal Head (Attach Signal Head AFTER Assembling the Mast)

Signal Head Bracket

Signal Head (In Place)

Signal Head Bracket

Number Plate Bracket

Number Plate

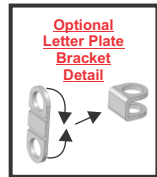
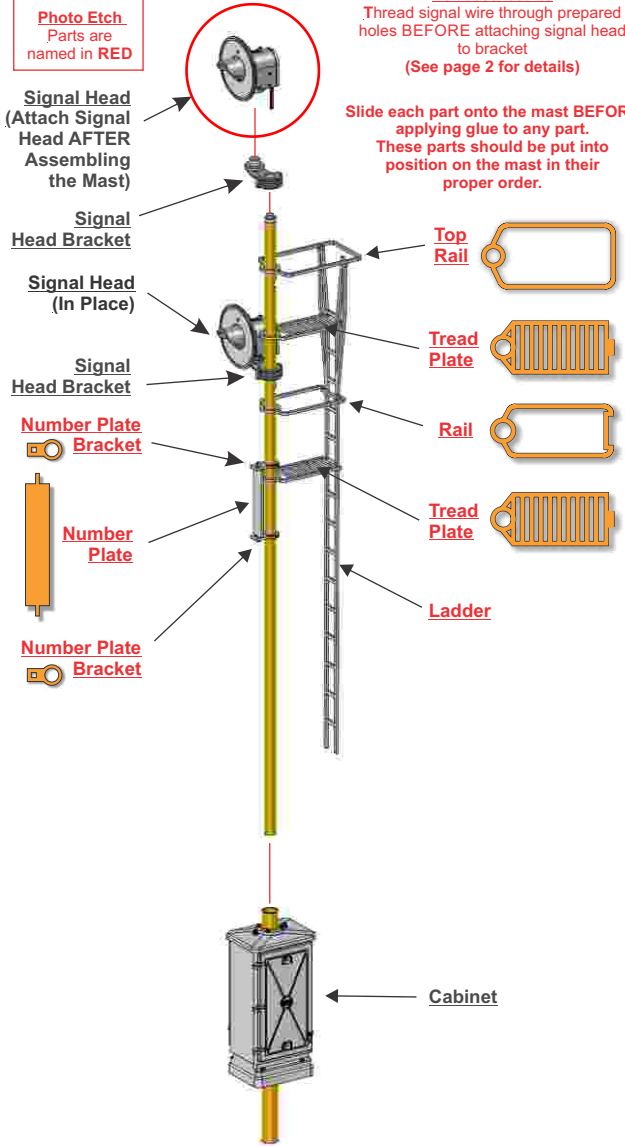
Number Plate Bracket

Number Plate

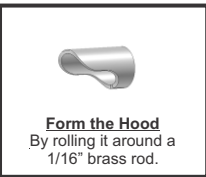
Number Plate Bracket

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

Slide each part onto the mast BEFORE applying glue to any part. These parts should be put into position on the mast in their proper order.



Optional Letter Plate Bracket Detail



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

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



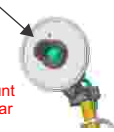
For double signals
Thread top LED wire into top of mast.



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. When this wire reaches the lower signal wire, continue to push it into the mast as you pull the lower signal wire from the bottom of the mast. This should allow both signal wires to be inserted through the mast.

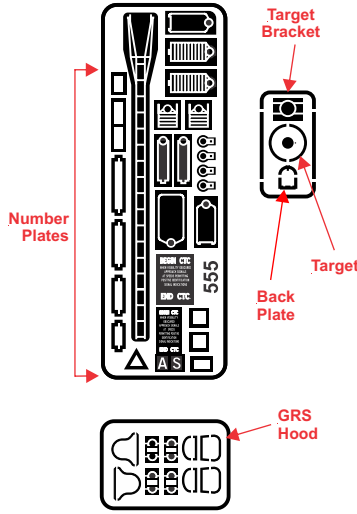
LED wire
Thread into opening as shown.

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



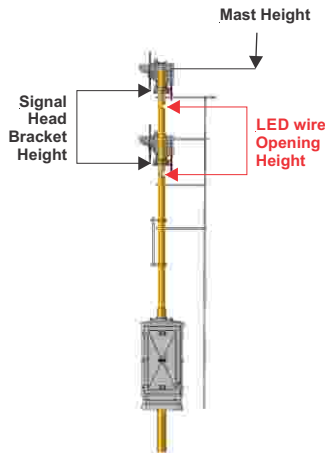
Mask
opening with small amount of modeling clay or similar before painting

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



Full Size for N Scale

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.

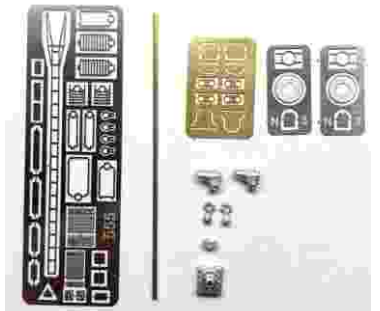
(Plain) White - Plain incandescent white light. Used in dwarf position light signals with frosted lenses.

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.

PARTS



CABINET MOUNT PARTS



POLE MOUNT PARTS

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.