

## **Modeling CP Style Signals**

### **Materials:**

<i>Detail Associates</i>	DA 2524 .010" x .030" brass strip	
<i>Oregon Rail Supply</i>	#102 Targets and Finials 3/pak #905 End Hole Grating 8/pak	
<i>Tomar Industries &amp; Alexander Scale Models</i>	#899 chemically milled brass signal ladder (2-12" lengths)  Junction relay boxes (A-3102 or various others)	
<i>Lite-On (OR other suitable LED's)</i>	LTL-14CHJ (T-1 size) red/green diffused LED's (Digi-Key #160-1058-ND)	
<i>Radio Shack</i>	Wire Wrap Wire - various colours (Red, White, and Blue - #278-501,2,3) Wire Wrap Tool - #276-1570	
<i>Integrated Signal Systems</i>	Dwarf signals (1TDF or 2TDF for US&S style) Plain bases (B125) (These items are lost wax brass)	
<i>Walther's</i>	936-3149 Conveyor kit (for signal bridges)	
<i>K&amp;S Brass Shapes</i>	3/32" brass tubing 1/8" brass tubing 1/8" sq. brass tubing and channel	Signal Masts Signal base Signal bridges
<i>Tichy Train Group</i>	#8001 Open Grate Platform with hand rails (safety tread for bridges) #8002 Safety Cage Ladder	Signal Bridges

### **Suppliers:**

Oregon Rail Supply (503) 543-6466  
PO Box 490  
Scappoose OR  
USA 97056

<[www.OREGONRAIL.COM](http://www.OREGONRAIL.COM)>

Digi-Key Corp 1-800-344-4539  
701 Brooks Ave. S.  
Thief River Falls, MN  
USA 56701-0677

<[WWW.DIGIKEY.COM](http://WWW.DIGIKEY.COM)>

Integrated Signal Systems  
PO Box 3337 1-352-688-5630  
Spring Hill, FL 34611

[www.integratedsignalsystems.com](http://www.integratedsignalsystems.com)

Tomar Products 1-877-697-9731  
9520 E. Napier Ave.  
Benton Harbor, MI  
USA 49022

<[www.tomarindustries.com](http://www.tomarindustries.com)>

Tichy Train Group 1-336-329-0220  
PO Box 220  
Alamance, NC  
USA 27201-0220

[www.tichytraingroup.com](http://www.tichytraingroup.com)

### **Directions:**

1. Cut brass tubing to desired lengths. For the base, cut about 1-1/4" long piece of the 1/8" tubing. (Standard heights were - 1 head - 16' ; 2 head - 21'6" ; 3 head - 27' - all above ground - add approximately 3' for soldering to base tube.)
2. Drill holes into masts for wire. Use a # 53 drill. If possible drill at an angle downwards. Top hole will be **scale** 3'2" from top. For 2 or 3 target mast, lower holes are 5'6" from hole top hole. Clean holes of all burrs to avoid any electrical short .
3. Solder base tubing (1/8") to mast tubing, using flux. Use little solder, and let it flow into seam to get a good bond.
4. Remove mast from relay box and file top smooth. Drill 3/32" hole through relay box and insert mast through relay box until relay base touches base tubing.
5. Cut a piece of the DA2524 flat strip about 3/4" long and bend around mast in the middle to form a 'V' with a rounded bottom. Pre-tin both mast and strip, then solder this to mast about a **scale** 1' above the top of the relay box.
6. Prepare the platforms (end hole grates). For top platform, remove 5 rungs. For lower platform of a 2 headed mast, remove 3 rungs. If modeling a 3 headed mast, lowest platform will be full length. Ream out hole with a 3/32" drill. Scrap pieces can be used for catch basin drains along roadways.
7. Insert lowest platform down mast from top. If signal is to have two targets, only install the lowest platform at this time, until the LED is installed.
8. Assemble LED's by cutting two pieces of the wire wrap wire about 18" long. Decide on a colour code to use. (I use red-white for top LED, and blue-white for lower LED. Red only LED's are red-red.) By using the 3 colours available, 6 combinations are possible! (Red-red; blue-blue; white-white; red-white; blue-white; red-blue.) Strip about 3/8" from one end only of each wire. If using the Radio Shack tool, shorten LED leads by about 1/2", as they are too long to permit the tool to reach the head of the LED. Wrap each wire on a lead of the LED (3/8" gives about 3 turns). Twist together **ONLY** about 3/4" of the leads right at the LED, leaving the remainder as single strands. My experience has shown that the single wires feed down the mast much easier than twisted

pairs! After twisting the wire, cut off the LED leads right at the point where the wire wrap ends. Solder (resin core solder) by just touching the iron to each lead to firmly attach the wire to the lead. Use care here, as too much heat will ruin the LED, and too much solder will short out the leads! Test the LED with a battery by touching the ends of the wire to each terminal of the battery (use a 1-1/2 volt cell, such as AA, C size, or watch type flat cell). Check for both colours if using a bi-colour LED by reversing polarity.

9. Insert LED wires down the mast through their appropriate hole. If a multi-headed mast, insert lowest LED, then slide next platform over mast, then next higher LED. Repeat for 3 headed mast. Leave about 1/2" of wire/LED out of hole. For multi-headed masts, I've found it helps to leave about 2 or 3 inches of wire to pull down while inserting higher up LED's. That way, you can pull the lower one, which sometimes helps slide upper wires down the mast.
10. When all wire/LED's have been inserted, file a flat spot on the side of each signal target casting. These can be mounted on either side of the mast (See diagrams).
11. ACC each target to the mast. Top target was centered 11" from top of mast. Lower targets were centered 5'6" from target above.
12. Insert finial into top of mast with a drop of ACC.
13. Finish assembly of Relay box, by ACC'ing it to mast such that front of box is facing same direction as targets.
14. Ladder assembly. Bend a piece of DA2524 strip to a 3-sided rectangle (square 'U' shape), using the drawing as a template. This is the top piece of strapping around the ladder. Now bend each of the open ends inward about 45 degrees they should either just touch or be close.
15. Make up a jig on scrap wood by drawing lines at the angle of the ladder slope and horizontal. Measure and cut the ladder stock so that it is long enough to go from the top brace ('U' just bent) to the ground with the slope drawn. Remove the top 3 rungs, leaving only uprights. A Dremel cutoff wheel is good for this, while holding the ladder upright in pliers. Bend both uprights slightly outwards, using pliers. When done correctly the top of the uprights should be the same width as the 'U' bent previously.
16. Insert pins into the block of wood on either side of your lines you drew to act as braces for the ladder and strap brace. Solder the brace and ladder uprights together, one side at a time. For this soldering, I use paste flux.
17. Bend two pieces of DA 2524 strip now, each about 3/4" long. Bend one is about 1/32" from an end, and about 30 degrees. Bend two is in the opposite direction and about 1/8"-3/32" up from the first bend. Make two identical pieces.
18. Pre-tin the two strips just bent. Tin the small bent end, and also roughly the distance up the long flat section which is equal to the distance from the first ladder rung to the brace soldered in step 15

19. Solder a brace to each side of the ladder, at the top ladder rung, and to the point where the ladder upright and brace previously soldered meet. Solder the rung point first, incase the top joint comes unsoldered. The brace flat side should be against the ladder.
20. Trim excess brace stock and ladder upright stock flush with top brace. Use side cutters and file or Dremel cutoff disk.
21. Clean off any residue flux from solder joints
22. Test fit ladder assembly to mast assembly, checking that ladder brace, platform grate(s), and top ladder brace all touch at proper locations. Trim top ladder brace if necessary so that the two arms just touch the mast. When satisfied with fit, ACC ladder assembly to mast assembly, using minimal glue.
23. Add a number board to mast just below upper signal target. Use a piece of 6" scale styrene for this. Both vertical and horizontal boards have been observed. One suggestion is to number signals in a prototypical fashion, using block numbers
24. Clean up assembly and remove any flux residue. Paint assembly suitable colours. Generally mast/ relay box, and back of signal head was silver. Target faces are black. Ladders, platforms, and braces were painted black until the mid 1960's (iron construction), but nowadays are aluminum. Earlier photos (1930's-40's) show mast and ladders painted entirely black.
25. Drill a 1/8" (or 9/64" for easy removal if required) hole beside roadbed for signal installation. Be sure adequate clearance is given to location for cars and curves as necessary. (The NMRA track gauge is a good tool here.)
26. Insert wires through hole and separate into respective pairs under layout. Insert mast and trim ladder if too long. Scenic around base with earth covering. The immediate area around the signals was usually plain earth, clear of vegetation.
27. Strip about 3/4" of each lead under the layout. Using alligator jumper leads test each LED in turn to get proper connections to circuitry under layout. Use wire wrap tool to attach each lead to 22 gauge telephone hookup wire. Slip a piece of heat shrink tubing over bare wires and enjoy your working signals!

## Signal Bridges

1. For wire channel, use 1/8" square tubing (vertically) and 1/8" square channel (horizontally) with the open side down. Remove a bit of the inside face of the square tubing at the top of the tube, where it joins the channel. Cut both tubing and channel ends on 45-degree angles and solder together. Clean up joint so it is smooth and clean inside and out.
2. Cut 3/32" brass tubing for masts. ( 2 heads cut tubing scale 11'6" long) Solder short mast(s) to channel so as to be located over right side of desired track(s). Make sure each mast is at 90

degrees to channel! For bottom signal head wires, drill small hole through channel to accept wires.

3. Clean all flux from solder joints and assemble LED's and masts as stand alone units (separate from bridge structure). Feed wires down masts, into channel, then down square tubing. Easiest way I found to feed the wires was one at a time, leaving some slack in each one to pull along at times to help slide the other wires down.
4. When all wires are routed, check for continuity and working, then ACC a piece of 2 x 10 styrene strip over the bottom of the channel to seal up the wires.
5. Using Walther's Belt Conveyor kit (#933-3149), decide how you want your signal bridge to be. If using a double support unit and the uprights supplied in the kit, remove the bottom 2 sections. This will give it a prototypical height and still pass NMRA clearances. If building a cantilevered design, design it so that square tubing will fit down inside square vertical tower.
6. For ladders, I suggest using either Tichy Train Group Safety Cage Ladder or Central Valley Steps and Ladders. Also for safety tread material, I used a Tichy walkway.
7. Paint assembled unit either all black or silver with black targets and ladders. Check prototype photos of your railroad/era for colour scheme. During the steam era, signal bridges were made out of iron, and usually painted completely black. Starting in the mid-60's signal bridges were made out of aluminum and unpainted. Target faces are black for increased visibility of the signal.
8. Again check wiring, install on your layout, hookup signals, and enjoy your efforts! Just make sure you don't run a red signal!