

Item	Material	Dimensions	Comments	Source
Signal mast	3/32" brass tubing	4 1/2" long		K&S 8162
Finial	1/8" plastic rod (or scrap sprue)		Turn on drill to fit into mast end and to have a decorative profile. Or buy any of Tomar's finials, example #6053	www.tomarindustries.com
Blade screw mount (old large screw mount) - obsolete	3/32" brass tubing	1/4" long	70mil diameter hole (#50 drill) - for 2-56 screw	Same as signal mast
Blade screw mount (new solid rod with smaller screw) - recommended version	5/32" brass rod	1/4" long	47mil diameter hole (#56 drill) for 0-80 screw	K&S 8128
Blade structure	.025" brass sheet	About 3/4" x 1 1/2" material.	It is easier to drill if the material is larger than needed. Cut to size after drilling holes for colored roundels.	K&S 8237
Signal lamp holder	5/32" brass tubing	1/4" long	3mm LED fits into tube without the flange falling in. Used a 0603 LED instead of 3mm LED. Use Micro Kristal Klear (by Microscale) to form a clear lens on the blade end of mount. Fill back end with light blocker putty (see below).	K&S 8165
Signal lamp mounting bracket	1/8" brass U channel	3/8" long		K&S C channel 815017
Signal lamp	0603 white LED (may substitute warm white) - Tony's Train Exchange Part number led0603w	4-5" leads built in		Tony's Trains (SKU led0603ww)
Signal lamp mount light blocker	Stick Tak (DAP Blue Stik) Adhesive Putty	As needed (tiny amount)	Fill back end of lamp mount after inserting LED. This holds the LED in place, allowing the wires to exit the back of the mount. Tony's Train Exchange has this.	Tony's Trains (SKU txstiktak)
Paint surface on light blocking putty on the lamp back side	Devcon 5 minute epoxy	As needed small amount)	Cover back of putty light blocker with epoxy to provide a surface for paint to adhere. Also used to glue the T-nut to the tortoise switch motor.	Ace Hardware
Colored spectacle glass	Gallery glass stained glass liquid	3 coats, less than 1 drop per coat	Red lens: Ruby red #16015 Yellow lens: Sunny Yellow #16004 Green lens: Kelly Green #16008	www.consumercrafts.com
Signal base instrument case	Alexander Scale Models A-3102		Cut off post on top and file top and bottom flush. Drill 3/32" hole through the case from the top through the bottom for the signal mast to pass through. Glue case bottom 3 3/4" from the top of mast tube.	www.alexanderscalemodels.com
Signal ladder stock	Tomar #899	3 1/2"		www.tomarindustries.com
Strip brass for ladder to mast holder	1/16" wide by 1/32" thick (31mil or thinner)	about 1" long cut to fit model	K&S Precision Sheet Metal #815020 (1/64" x 1/16" x 12" brass strip) - sold by Walthers under part #370-815020	K&S 815020
Actuating rod	.020 music wire or phosphor bronze wire	6" long	Tichy Train Group model #1103	www.tichytraingroup.com
Pushrod connectors	Great Planes part number GPMQ3871		Used to clamp actuator wire to tortoise throw rod.	Available on Amazon, www.towerhobbies.com
T-nut for tortoise pivot	#6-32 x 1/4", Everbilt: Home Depot model 802261			
Tortoise slow motion switch machine	Sold everywhere			

Item	Material	Dimensions	Comments	Source
Throw rod for Tortoise	1/4" strip brass. .016" to .030" range		Sold at Lowes or mail order from Walther's	K&S 8235 for 25mil
<b>Misc items:</b>				
2-56 black pan head or round head machine screw - for blade pivot	1/4" long			www.microfasteners.com, MSPPK0204
0-80 stainless pan head screw (painted black)	5/16" long		Paul Allard changed to 0-80 round head screw to hide the screw better.	www.microfasteners.com, MSPPS0005
#6 machine screw - pan head or round head - for tortoise arm pivot	1/4" to 3/8" long			local hardware store
Mounting base and screws for under table tortoise actuator mechanism	Miscellaneous pieces of wood and screws.			
<b>Electronics (optional):</b>				
Diode on interface board	Digikey, part number AM01ZV1CT-ND			www.digikey.com
DPDT Relay on interface board	Digikey, part number PB2646-ND			www.digikey.com
5 pin terminal block on interface board	Digikey, part number A98336-ND			www.digikey.com
Prototyping perf board (100 mil holes), 1/16" thick - many examples available	Radio shack 6x8", part number 2761396			www.radioshack.com
NCE Block Detector	NCE part number BD20			www.tonystrains.com
DCC Specialties Block Watcher Block Detector (optional)				www.tonystrains.com
JB Wheelsets wheels - 5.1K, 10K, 20K ohm				www.jbwheelsets.com
DC Wall Power Source - 9V, 1A	Digikey, part number 364-1263-ND			www.digikey.com
5.1K ohm, 805 form factor chip resistors	Digikey, part number A126379CT-ND			www.digikey.com
Conductive paint, 5 gram applicator syringe	Digikey, part number CP1-5S-ND			www.digikey.com
<b>Misc shop materials:</b>				
silver solder (high temperature)				
normal solder (low temperature)				
black paint for blade	Tru-Color Black (TCP-010)			
yellow paint for blade	Floquil TTX Yellow (out of production)			
silver paint for mast assembly	Floquil Old Silver (out of production)			
22-32 gauge hookup wire	32 gauge: 5240259 example, 30 gauge: 5240250 example, 22 gauge: min4812701 example			www.tonystrains.com
<b>Special tools:</b>				
mast hole for lamp wires to pass through at lamp holder	#68 drill starter hole, followed by #61 final hole			
Blade screw hole	#50 drill for 2-56 screw (3/64" or #56 drill for 0-80 screw)			
Blade screw hole tap	2-56 internal thread tap (or 0-80 tap)			
Blade hole for actuator wire	#72 drill (.025" for .020" wire)			
Blade roundel holes and pivot hole	3/32" drill			
Metal nibbling tool	For cutting excess blade material away	Micro Mark sells a nibbling cutter, Item # 81477		www.micromark.com
Computer printer with label paper	For making blade cutting mask pattern	Staples: Avery address labels, #5260		

Item	Material	Dimensions	Comments	Source
Small tubing cutter	KS 296 (sold by Walther's as 370-296) - down to 1/16" tubing - not recommended, poor design. Buy a roller cutter at a local hardware store.	Micro Mark #86849 with rollers instead of plastic friction block (down to 1/8" tubing)		<a href="http://www.micromark.com">www.micromark.com</a>
Small metal files				