

# Fabrication of a Conductivity Sensor



EAS 199B – PSU Version



## Examples of Conductivity Sensors



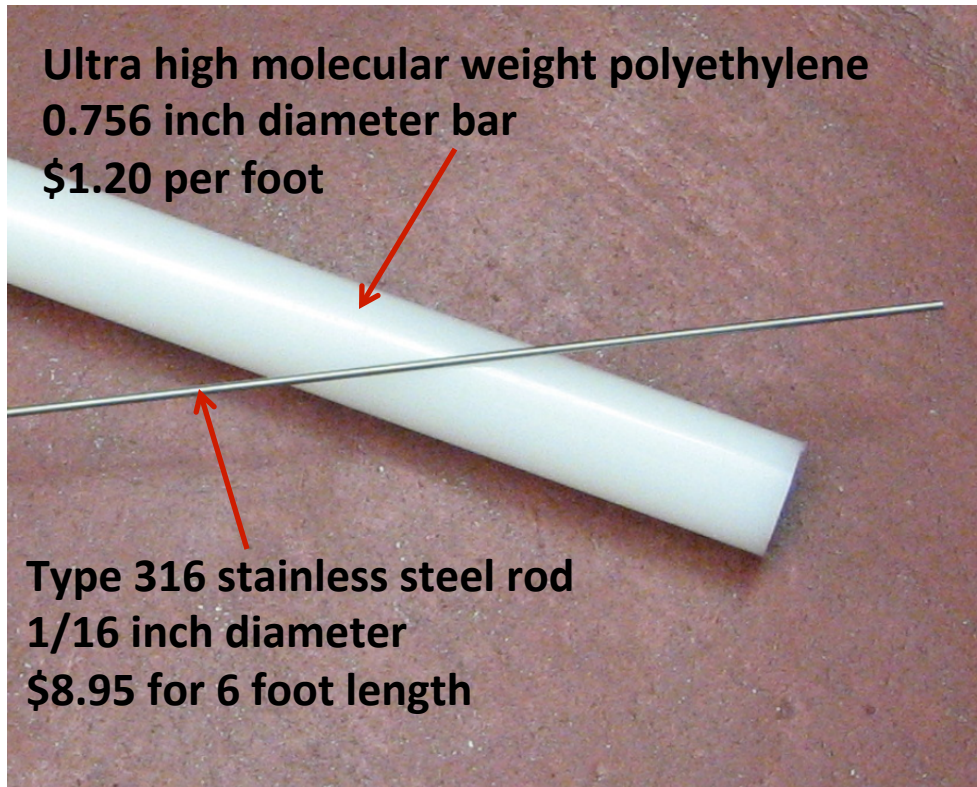
<http://www.sensorex.com>



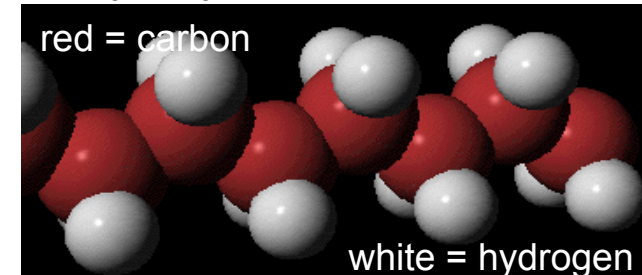
[www.globalw.com](http://www.globalw.com)



# Raw Materials



## Ultra High Molecular Weight Polyethylene



Chain molecules align more than for lower density polyethylene (packed together more tightly)



color:	<b>opaque white</b>	excellent electrical insulator
temp range:	<b>-22 to 180 F</b>	use indoors
softening temp:	<b>275 F</b>	machine with standard tooling
tensile strength:	<b>poor</b>	hardness: shore D60-D69
impact strength:	<b>good</b>	
low friction		

**Polyethylene:** This group of plastics encompasses a wide variety of grades with a wide range of properties. Low-density polyethylene is commonly used in shrink wrap applications. High-density is often used in pipe, shipping pallets and truck bed liners.

- Includes:
- LDPE (low density polyethylene)
  - UHMW (ultra high molecular weight)
  - HDPE (high density polyethylene)
  - VHMW (very high molecular weight)

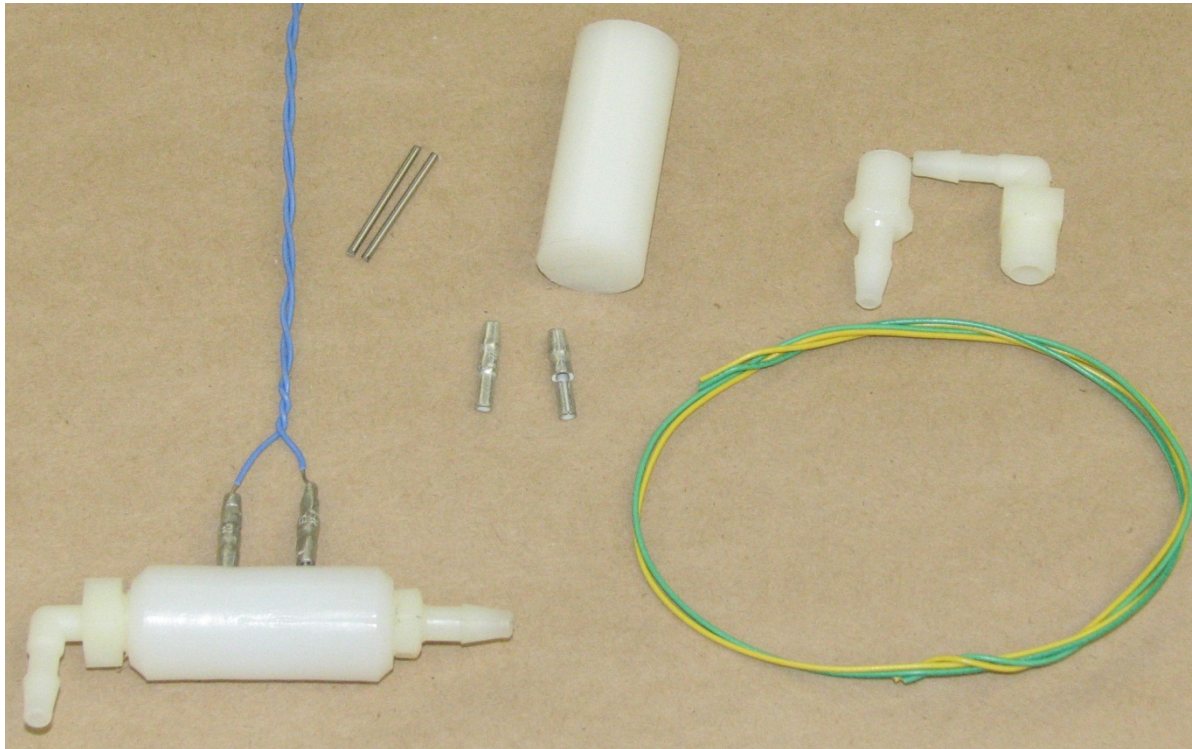
SOURCE: Phone order from **McMASTER-CARR®**

Also known as . . .  
**poor-man's teflon**





## Parts and Materials



UHMWPE rod - 3/4" diameter (cut to 1 3/4 inch long) - may be larger diameter

s/s round type 316 1/16" dia rod 72" long (2 pieces cut to 1 inch long)

22 gage solid wire (40 inches total)

crimp-on snap-plug terminal, non-insulated male, 22-18 AWG, .156" plug dia (2 pi

2 nylon barbed fittings - 3/16" tube ID, 1/8 NPT male (straight + 90 degree)



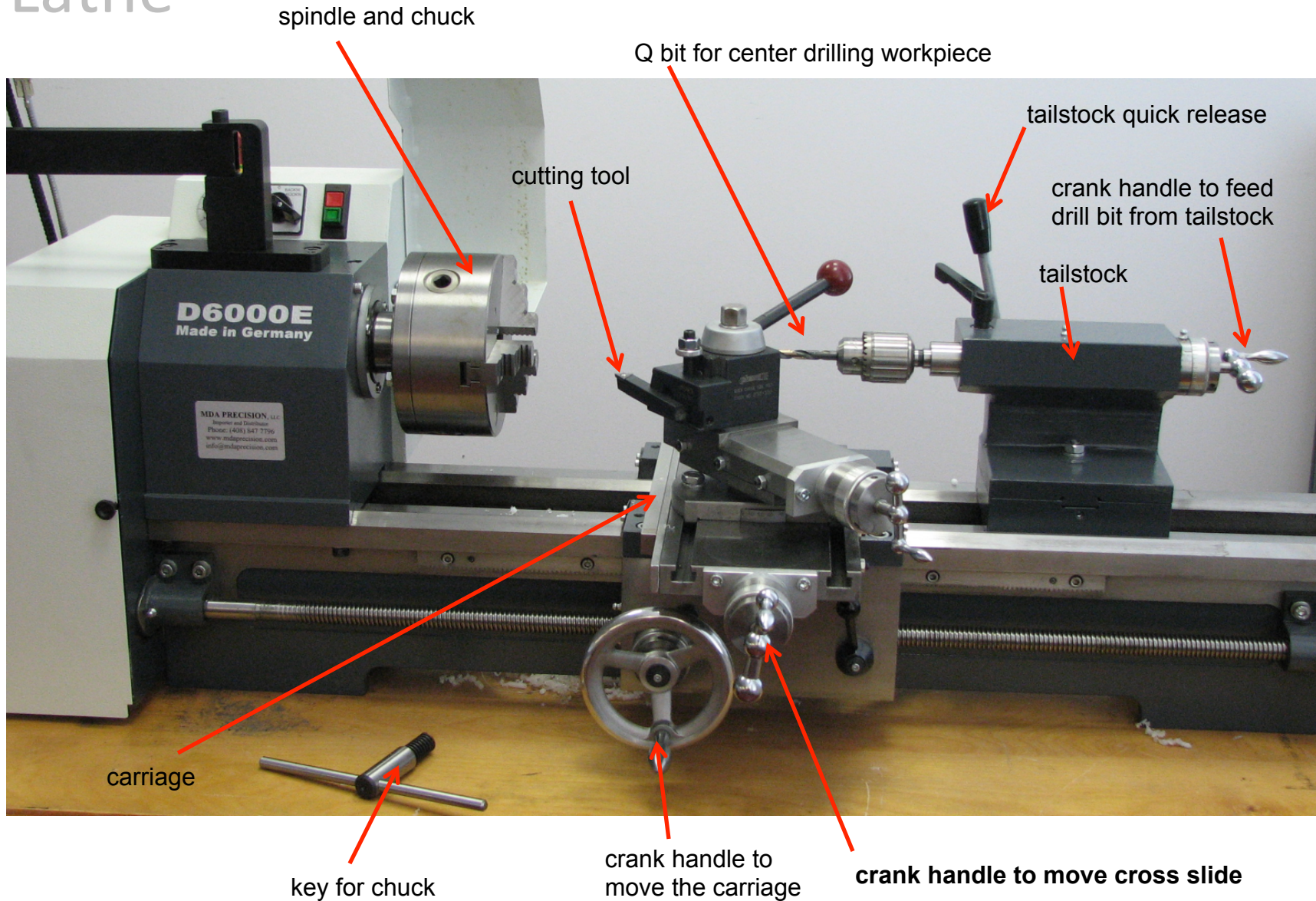
# Fabrication with Lathe

- Sensor body is a hollow cylinder
- Geometry is appropriate for lathe



# Lathe

You must become familiar with the operation and safety procedures of the tools before beginning the project.



# After cylinder is completed

- Tap ends for barbed fitting
- Drill holes and insert sensor probes
- Attach wire leads to the sensor probes



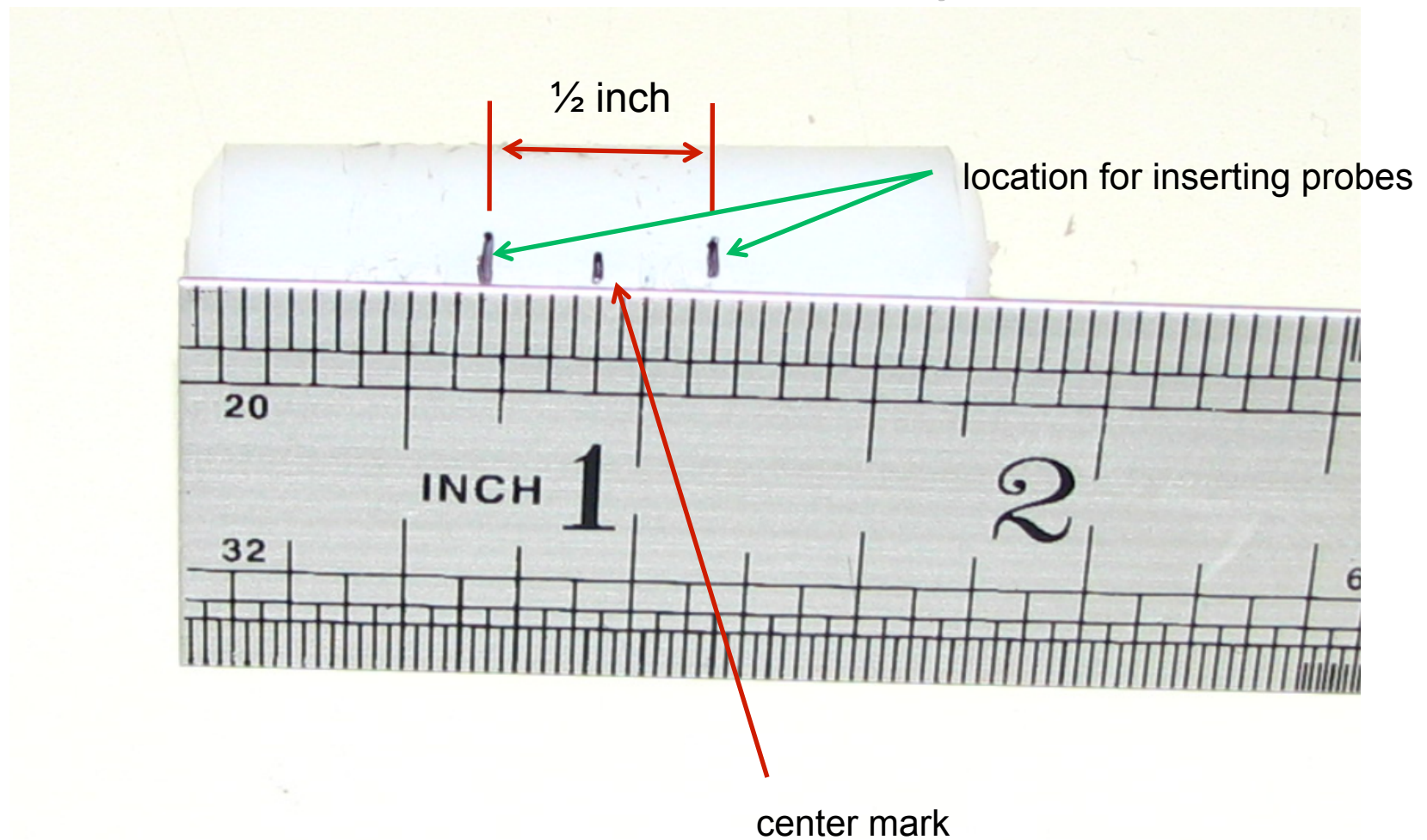


## Create Threads in Each End using 1/8 NPT Tap





## Mark Locations for Conductivity Probes





## Drill Holes for the Probes

- 1) Rest the ends of the workpiece on the parallels (different parallels may be used)
- 2) Use a #53 drill bit (0.059 inch diameter) so the 0.0625 inch SS rod will be press fit into the hole
- 3) Drill 0.625 inches deep (this is 1/8 of an inch shy of going all the way through)







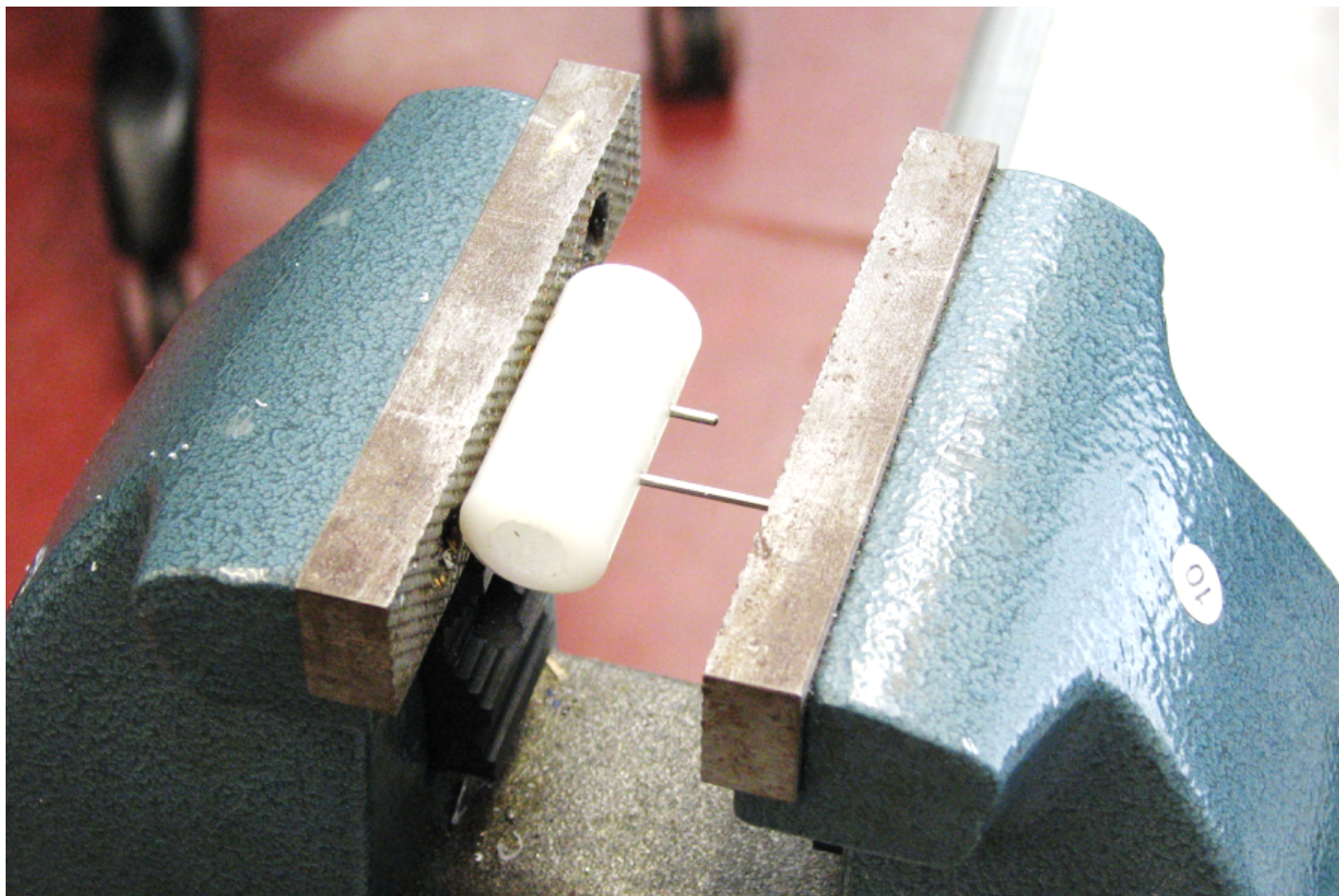
Cut 1/16 inch Stainless Steel Rod *(already done for you)*





## Press the Rods into the Holes

*This is a little tricky. Go slow and keep the rod in place with one hand while slowly tightening with the other.*







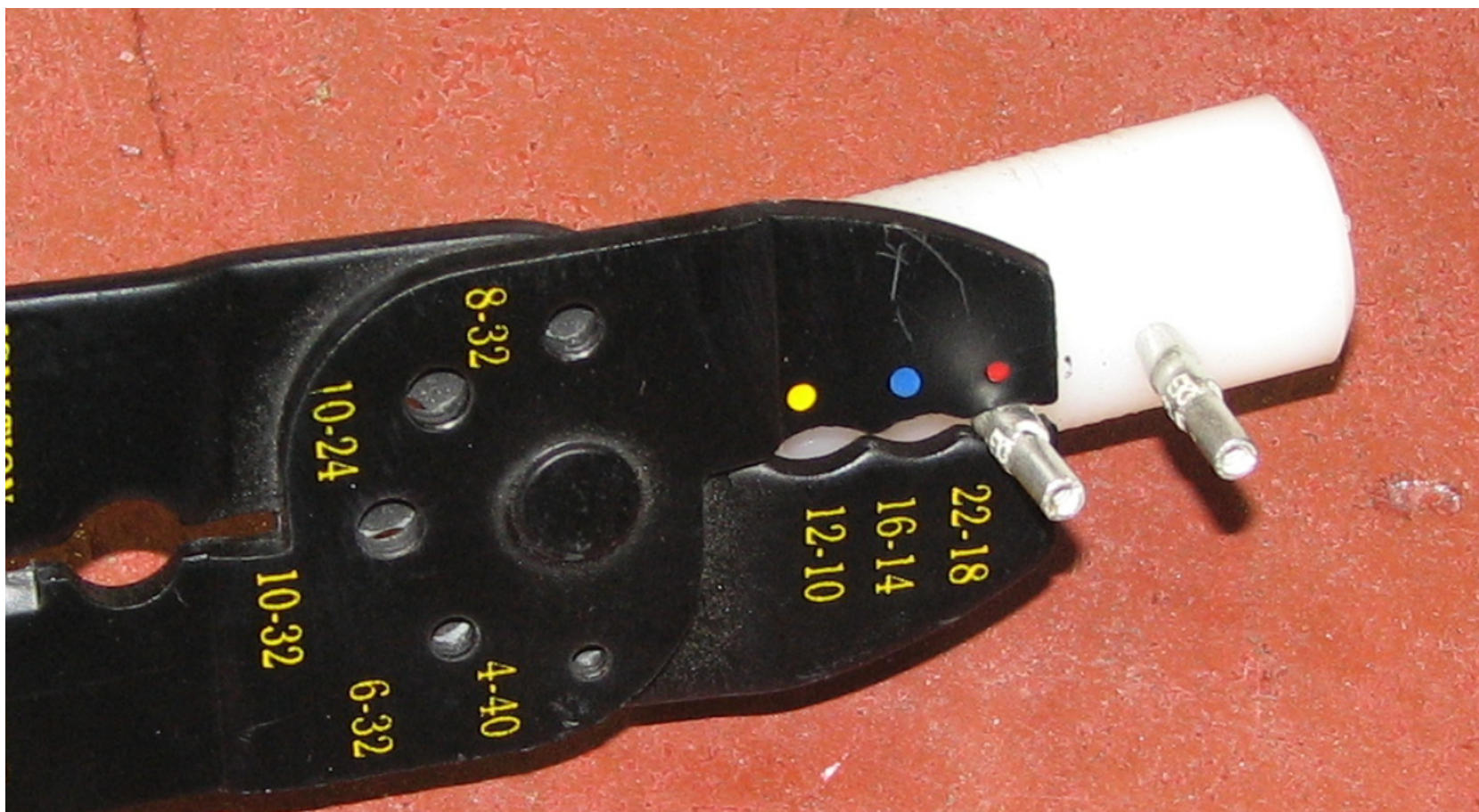
## Press Terminals onto SS Rods using Vise (or tap on with hammer)







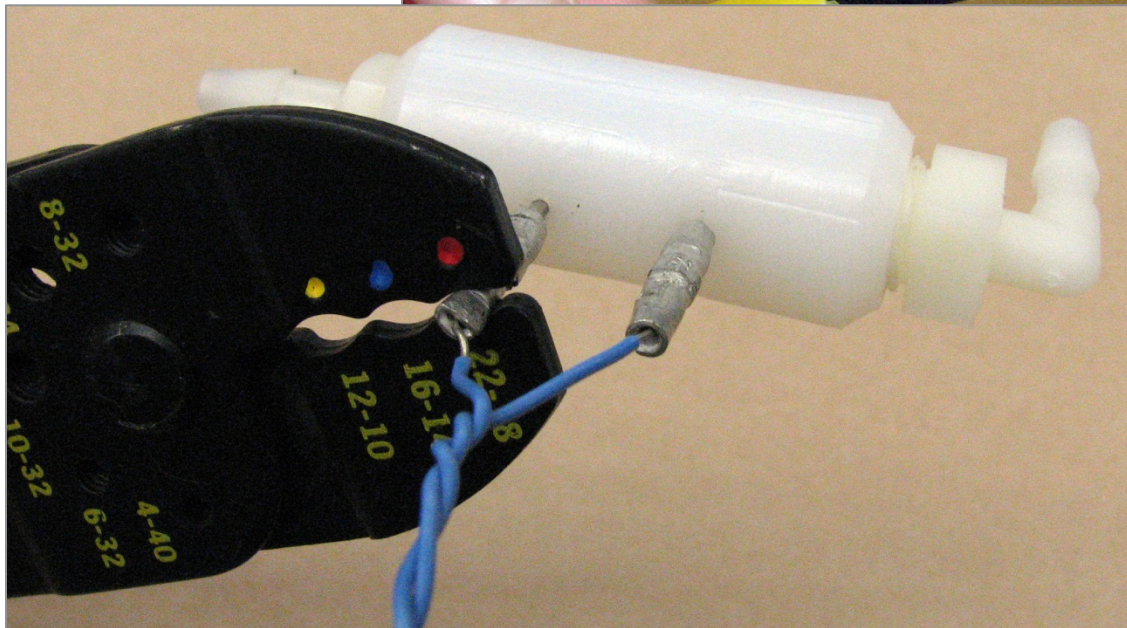
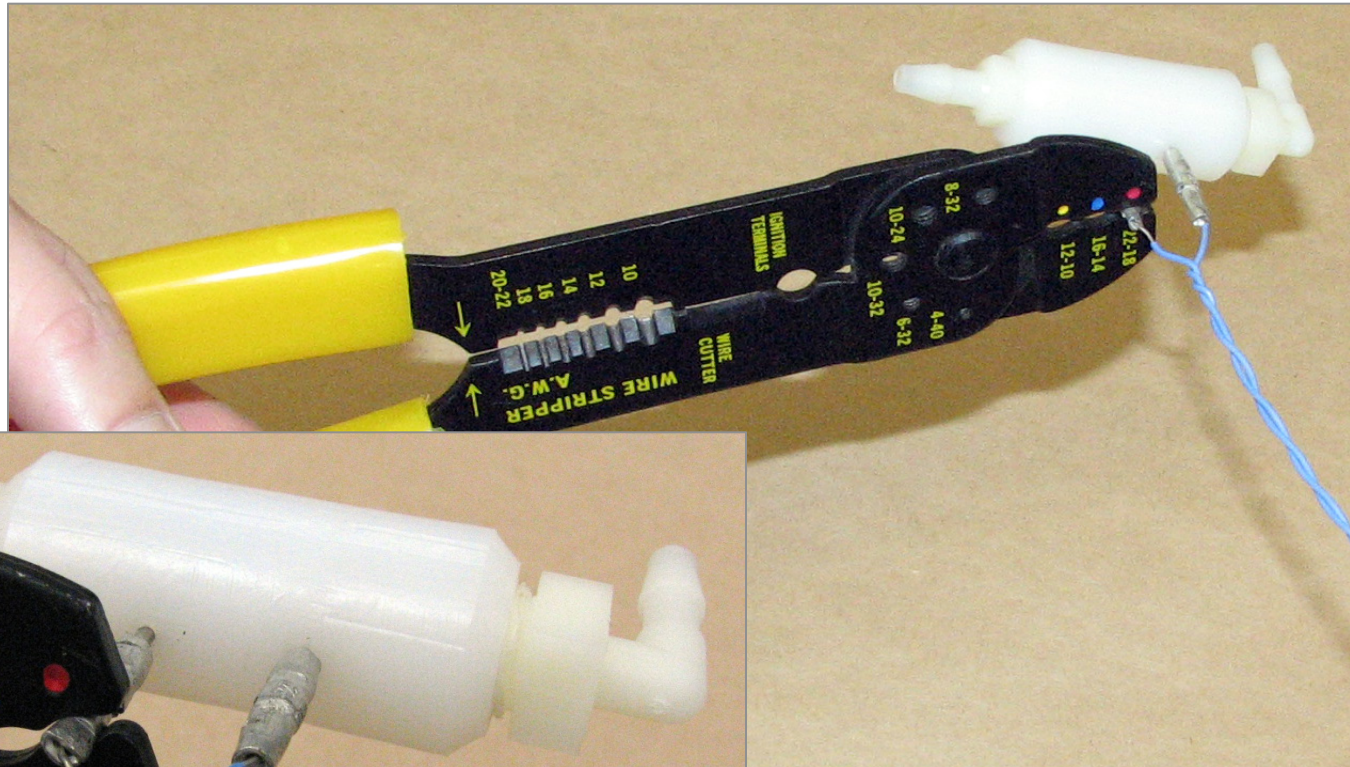
## Crimp Terminals onto Stainless Rods





# Crimp 20-inch Piece of 22-Gauge Wire onto Terminal

*Be sure to strip the ends of the wire before crimping 😊*







CONGRATULATIONS – You’ re Done!!!!

