SIMPLE NICHROME WIRE IGNITERS

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NAR #27085 ~ Tripoli # 696

Introduction

For much of their hobby's first decade, model rocketeers used "all-nichrome" igniters to get their motors going. Packs of rocket motors came with a length of nichrome wire which was cut, shaped to have a neat coil at its tip, and inserted into the motor.

Fancier igniters, such as the Estes "Astron" igniter and "Solar" igniter (now the standard), Centuri "Sure Shot," and Quest "TigerTail," came with time. These definitely have their advantages (more on this below). However, nichrome igniters have two a big benefits:

- They very inexpensive. (Commercial igniters such as the Estes Solar Igniter or Quest TigerTail cost $.60 each at retail.) The material for a nichrome igniter costs less than a dime.
- As long as you have the raw material on hand, you can make nichrome igniters yourself in less than a minute. The only tools you need are scissors and a paper clip.

Nichrome igniters (or raw wire) also hold up better in your range box. A healthy percentage of the Estes igniters emerge from the package with their fragile tips broken.

This booklet shows you how to make and use nichrome igniters. Follow the instructions carefully, and you'll have a huge supply of reliable igniters at a very low price per unit.

How Does It Work?

Nichrome igniters ignite the motor's fuel grain by direct heating. Nichrome (nickel-chromium alloy) wire is highly resistant to electrical current. When electricity flows through it, it grows hot. The little coil of nichrome you will be creating at the head of your igniters provides a concentrated source of heat.

Question and Answer

Q: How do nichrome igniters differ from commercial igniters?

A: Both Estes "Solar" type igniters and Quest "TigerTail" igniters are tipped with a small amount of pyrogen; a flammable material that is very sensitive to heat. The electrical current flowing through the igniter ignites the pyrogen, which in turn ignites the motor's fuel grain. While more "forgiving" of beginner's mistakes, pyrogen igniters are expensive and fragile.

Q: Can I use nichrome igniters with the launch system that came with me Estes or Quest starter set?

A: The answer is a *qualified* yes. The cheap made-in-a-sweatshop launch panels that come with modern starter sets were designed as an inexpensive, portable way to ignite "Solar" and TigerTail igniters. Their small batteries do not have a lot of "umph," but they *will* provide enough current to warm up a nichrome igniter enough to ignite a motor. However, you will need to press down the launch button for a longer time. This will drain your batteries very quickly and put an end to the day's activities.

It is highly recommended that you use nichrome igniters with a 12v system using a car battery or motorcycle battery. Almost every rocket club uses such systems.

Q: Can I use nichrome igniters to launch clustered motors?

A: Yes! However, you *must* use a 12v launch control system, and (as for all clustered motor ignition attempts) make sure your igniters are carefully installed and that microclips are clean and securely attached.

Q: Can I "dip" nichrome igniters for extra power and reliability?

A: The short answer is "yes," but I have not experimented with this sort of thing. Some thoughts on this can be found in the "elaborations" section.

Q: Can I use nichrome igniters with composite (e.g., Aerotech or Estes Blackstar) motors?

A: No! Composite fuels require high heat and pressure to ignite. This requires the use of special igniters with pyrogen heads . . . an "electric match." Rocketflite and Igniterman both produce kits for making pyrogen-tipped igniters and are highly recommended.

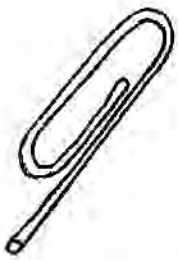
Q: Can I use nichrome igniters for all black powder motors?

A: Nichrome igniters will not work with certain large, "port burning" black powder motors. These motors are generally ignited at the top of the port that runs through the propellant grain. All of the examples I know of (FSI E60, F100; Rocketflite black powder motors) are out of production, but if you get your hands on one it is best to leave the job of igniting them to an electric match or a length of thermalite wick.

Making and Using Igniters

Tools You'll Need

- A pair of scissors..
- A small ruler or a good "eye" for measurements.
- A light-duty metal paper clip, with one leg unbent so it pokes out as shown in the diagram below.



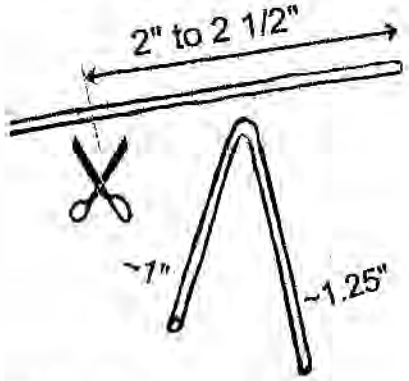
- A sheet Estes type "toilet paper" wadding or Quest style "crepe paper" wadding.
- Optional: A pill bottle to store igniters.

How to Wind an Igniter

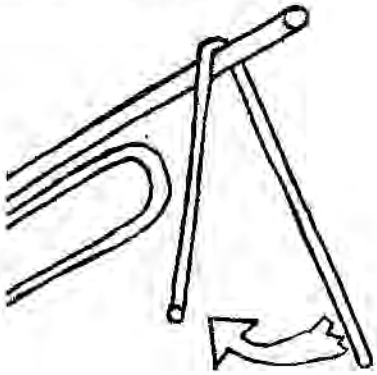
Here's how you make a nichrome igniter.

Ready?

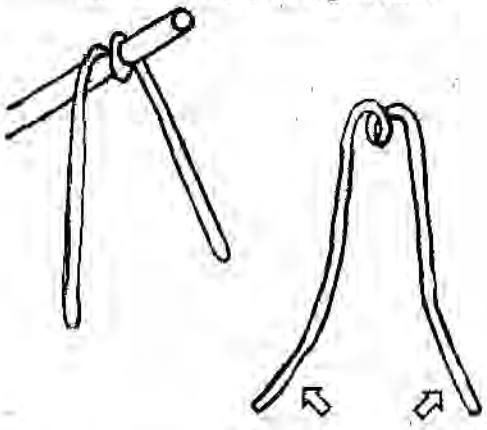
1. Unroll between two inches and two and a half inches (5 cm to 6 cm) of nichrome wire.
2. Straighten out the measured wire. Snip it free of the roll.
3. Gently fold the wire "about" in half. One leg should be about 1/4" (.5cm) longer than the other.



4. "Hang" the folded wire over the paper clip leg.



5. Grab the short end of the wire and paper clip with one thumb and forefinger, and the long end of the wire with the other.
6. Wrap the nichrome around the paper clip two and three quarter times. The result should look like the diagram below.



7. Use a fingernail to gently nudge the little wraps you created together. The wraps should be close enough to form a neat little coil, but not close enough to touch.
8. Gently shape the legs of the igniter as shown.
9. Slide the igniter off of the paper clip.

That's it! After practicing two or three times you'll be able to do this blindfolded.

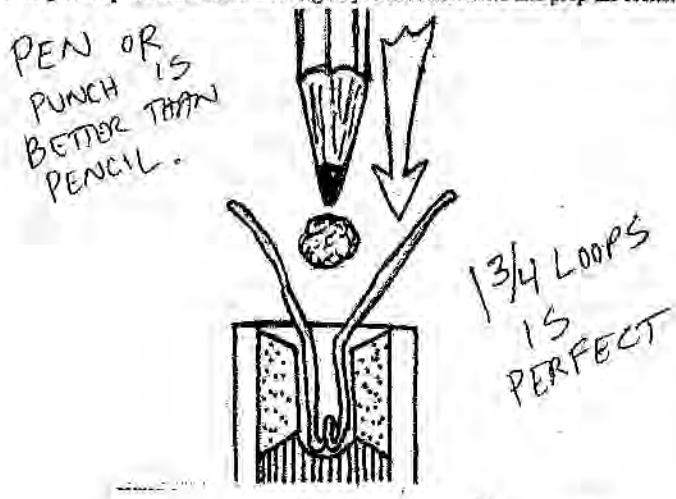
You can use the igniter immediately, store it on the paper clip, or store it in the pill box.

Using the Igniter

1. If you use a igniter that's been in storage, inspect it before use and straighten out any crossed leads or crushed coils.
2. Taking care not to cross the leads of the igniter, or crush the little coils at the head together, insert the igniter into the nozzle as shown. The coil must be in DIRECT CONTACT with the black propellant grain at the head of the nozzle.
3. Pinch off a corner of your sheet of tissue paper (or paper wadding) and roll it into a small, squishy ball a little bigger than a BB. Put it in the nozzle of the motor, between the spread leads of the igniter.
4. Use the paper clip or a pen or pencil tip to tamp in the tissue ball. Press in another tissue ball for motors with wide nozzles. Press down tightly!

The wadding must be in tight enough to prevent the weight of the microclips from pulling the igniter free. After tamping, you should be able to pick up the motor by one of the igniter leads. You may also experiment with using a igniter plug to hold the nichrome igniter in.

If desired, you may press a short strip of masking tape over the end of the motor casing to keep the leads from crossing as you load the motor and prep the rocket.



OK TO USE "PLUGS" WITH A SINGLE LAYER OF WADDING TO STOP MELTING.

Hooking up the igniter.

Attach the microclips just as you would with a commercial igniter. Remember to CLEAN your microclips with sandpaper, steel wool, or an emery board after each launch! This is especially important when hooking up clustered models. Clean clips mean less resistance in your launch circuit. Less current "wasted" in the circuit means more power reaches the igniter, resulting in faster and more reliable ignition.

Elaborations

Dope Dip

If you would like to do the work of winding igniters at home, so you can have a supply of igniters ready made at a launch, you may wish to "dip" the finished igniters. (This tip courtesy the "Idea Box" in Estes' Model Rocket News, Volume 3, Number 4, 1963!) You'll need a small bottle of model airplane "dope" paint (clear or any color), some tweezers, and a sheet of waxed paper. After winding the igniter, grip the end of one lead with the tweezers and dip the head (up to about 1/2" or 12mm) into the dope. Place the coated igniter on the sheet of waxed paper to dry.

The dry dope acts as an insulator, making it far less likely that the leads or coils will short out and reduce the efficiency of the igniter.

One sort of dope -- nitrate -- is highly flammable. This *might* add a slight pyrotechnic effect to an igniter dipped in it.

Pyrogen Dip

It is certainly possible to dip an igniter in a pyrogen solution, such as that provided in the excellent "Rocketflite" and "Igniterman" electric match kits. This would make the igniter "flame on" just as it begins to heat. The pyrogen does the job of igniting the fuel grain. Less "button down" time is required to get the motor going, slightly extending your battery life.

Pyrogen dipping would also make the igniter slightly more "forgiving," requiring a little less care in installation.

I have not experimented with pyrogen dips, so any work you conduct along the lines should be done with great care, in small batches, and conservatively. A tiny fraction of the pyrogen required to ignite a composite motor will ignite a black powder motor.

Legal Disclaimer

The nichrome wire I sell is intended to be used to create igniters for certified commercial model rocket motors used in model rockets that are built and flown in conformance to the Model Rocket Safety Code. It is not to be used for any other use, or by unsupervised children.

Because this is a "commodity" product assembled and used by you, I cannot be responsible for poor performance, property damage, injuries or accidents.

The use of trademarked names (e.g. "TigerTail") in this guide is for informational purposes only and are not intended as a challenge or commercial use of those names.