The techniques in this section include:

Non Explosive Rock Splitting

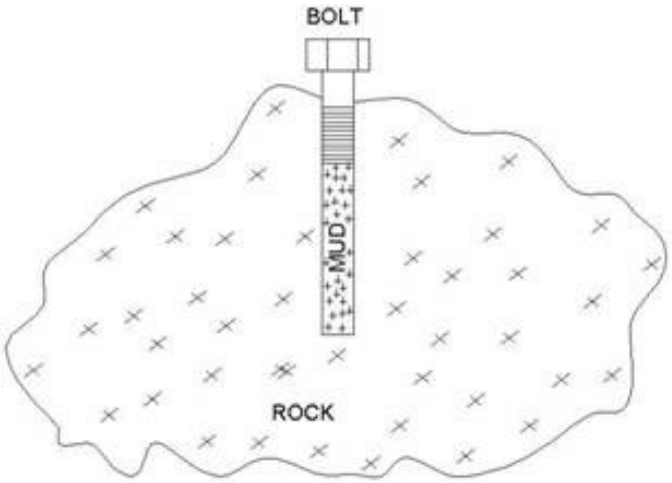
OK, so not every one of these relates to everyone, but once in awhile some of us need to split a rock or two when we don't happen to have any dynamite on us. So one evening when I was contemplating on how to modify some boulders in my life, I came up with a technique that can split rocks without the use of explosives.

I drilled a hole in about a 50 lb test rock, filled part of the hole with water, and inserted a bolt that just barely fit into the hole. The theory was that if I whaled on the end of the bolt with a hammer, the pressure of the water would split the rock: In reality, I got wet.

Giving up is not usually the first thing that occurs to me, so I replaced the water with mud, and this time I remembered to close my mouth before I struck the bolt.

The rock parted neatly.

One other thing that might be considered – which I did not try – would be to use something like modeling clay in lieu of water or mud



Petrochemical Replacement

The pyrolization of wood -- and perhaps other bio-materials -- could provide many of the compounds that currently bind us to the petroleum industry.

This would place access to of hydrocarbon compounds into the hands of people who didn't support oil wells or coal mines. It could also move the continued development and supply of hi-tech materials into a renewable and decentralized basis.

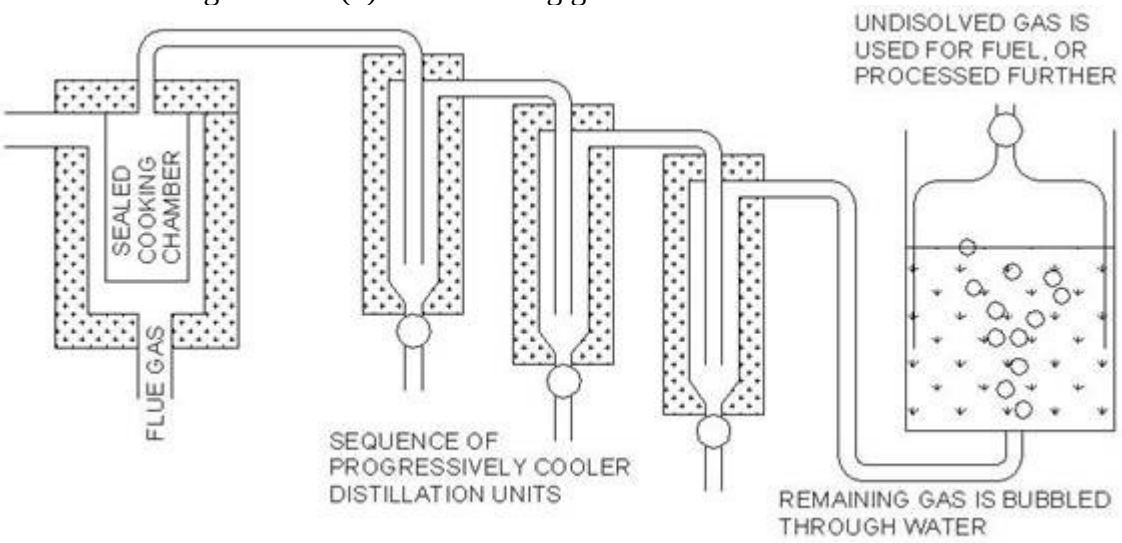
Such an operation would be a lot more complex than many of these projects. The program however, would both support and demand a technically competent community, and could supply key compounds for other communities. Among the simpler products one might expect would be motor fuels, solvents, lamp oils, lubricants, and preservatives for wood.

There have been times of emergency in Europe when vehicles have been fueled by wood smoke, driven out of sealed chambers that were heated by wood or coal fires.

A wide variety of nasty and beneficial compounds can be driven out of wood as it is slowly heated. The trick is to catch them and to sort them out.

The basic apparatus would consist of a sealed batch "cooker", which is followed by a series of progressively cooler still-segments, each with its own catch-vessel.

(1) Exhaust from a clean-burning flame passes through a thermal process chamber and heats a sealed vessel containing biomass (2). The resulting gasses exit



through an insulated tube (3), and pass through a series of sequentially cooler distillation modules (4). Each of these modules is maintained at a temperature range selected to distill a specific group of compounds. Finally, any remaining gasses are bubbled through water and stored in an inverted drum (5) to capture any true gasses, and make the entire operation a zero-emissions process.

The water through which the gas is bubbled would be processed to harvest dissolved compounds. The carbon left behind in the chamber (2) would be a clean solid fuel for cooking and heating, and would be well activated for filtering purposes.

Starting a car with a weak battery on a freezing morning

A friend had lent us his mountain cabin for the weekend, and after a day of play in a winter wonderland, and a delightful evening in front of a cozy fire, it was time to get up and drive back down the hill. It was early morning as my wife and I packed our weekend stuff and two small children into the car. When I went to start the car it groaned as the engine barely turned over twice, before refusing to do anything but click in response to further attempts. A battery that had no problem in seventy degree weather, had serious issues at a temperature of about twelve degrees.

We were stuck. The nearest gas station was little more than a convenience store, was at least a snow-packed mile away, and probably wouldn’t be open for at least another hour anyway. The only option we had was to pray – and that we did.

As I considered the issue of having to compress a sequence of six cylinders on a frost-weakened battery, and then of trying to muster enough strength to fire a good spark at the peak of each effort, an idea was given to me: I pulled five of the spark plugs.

This allowed the rotation of the engine to gain momentum during the low resistance of the five unloaded cylinders, and the now lightly loaded battery was able to muster an adequate spark when the sixth cylinder was compressed and fired. The car now began to chug on the single cylinder, adding

lubrication and warmth with each rotation. After almost a minute I added another spark plug, and the chugging began to gather enthusiasm. Soon the car was running normally, and we were on our way.

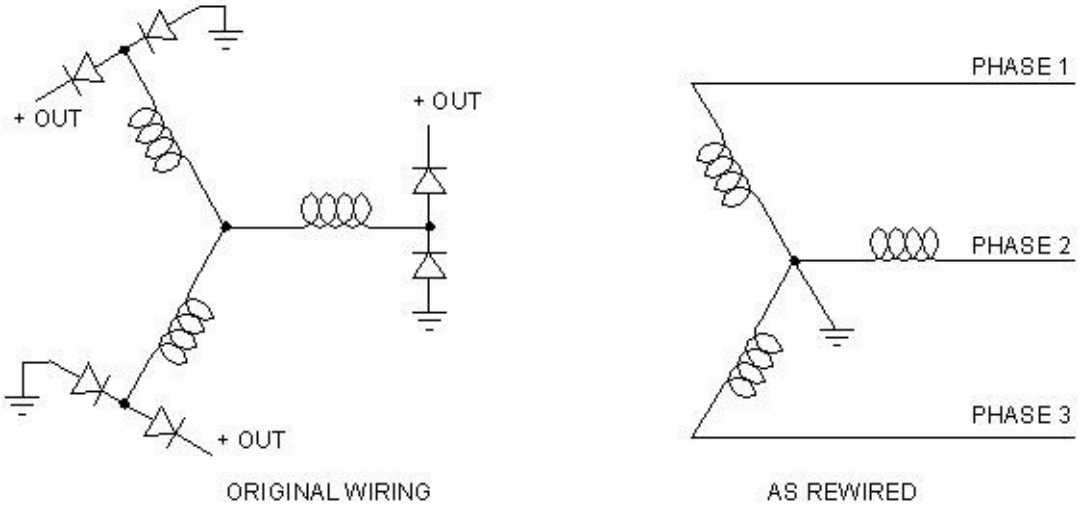
The *real* lesson in all this is not to limit yourself to your own intelligence, but to humbly call upon the God who created your brain.

Stepper Motor From Alternator

If you don't know what a stepper motor is, then you probably don't need one. These motors can be made to turn a few degrees at a time, and are used under computer control to position various objects.

I had an application where I wanted to move short pieces of 6" pipe under a cutting torch for the automated cutting of various features. I was able to get it to work from a couple small stepper motors I had lying around, but I really wanted a better margin of power and speed. I then begin to consider the possibilities of an automotive alternator.

The 3-phase stator windings of the alternator are wound and connected as shown on the left here.



By throwing away a half-dozen diodes and rewiring the stator as shown on the right, you have a stepper motor.

By applying a voltage sequentially to each of the phases, and energizing the rotor by another voltage source, you can get this modified alternator to step in either direction.

The alternator I got a hold of gave me 21 steps per revolution, but by applying voltage to two phases at a time, I was able to get half-steps, for a total of 42 steps.

The stator windings have extremely low resistance, and at even 6 volts you may find yourself burning your alternator.

The simplest way I have found to regulate the current is to put an automotive lamp in series with your windings; you may need a head lamp to find one large enough. Begin by selecting one of about 4 to 6 amps, and go up or down from there according to your needs.

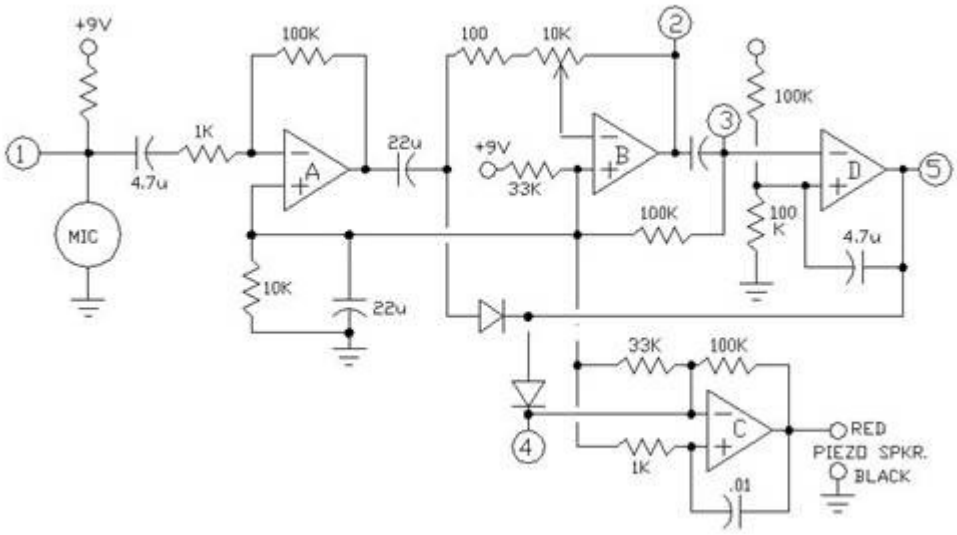
Another method, which I did not try, would be to use pulses at a frequency that would allow the inductive reactance to keep the current to acceptable levels.

Beyond these two suggestions, you should keep your voltage down.

In their intended automotive application, alternators are constantly cooled by a strong blast of air – not so in this application, so you may need a fan.

Dog Trainer / Replacement

This project was originally designed to train a neighbor's dog not to bark. Returning a small beep for each bark seems to distract the dog's attention. Give the mutt about an hour to wise up during his first lesson. The dog will still bark if he's being chased by an E.T. or a postman, but in most cases, the mindless endless noise is greatly reduced.



The circuit was built around a quad op amp (LM324). Sections A and B form an audio amplifier. The variable 10k pot controls the gain of the signals provided by the microphone.

Section D is a timing circuit which is triggered by the output of the amplifier. When triggered, pin 14 produces a negative-going pulse of about 1/2 second. This pulse enables the audio oscillator while blocking the signals from the microphone.

Section C, the oscillator, produces a tone which drives a piezo speaker.

The parts were picked up at a local Radio Shack ®.

The pulse at point 5 could drive a relay to move heavier objects, such as something to pound on your neighbor's wall when his stereo gets too loud (This circuit can potentially train other stupid things besides dogs).

A dog hears a soft sound and then barks. By connecting the above-mentioned relay to a recording of a dog barking (or of the action of a 12-gauge shotgun chambering a round), you could offer to replace your neighbor's dog. The duration of the pulse can be increased by increasing the 4.7uf capacitor.

By replacing the microphone with some other stimulus at point 1, this circuit could become a general-purpose burglar alarm.

I don't know what you could do with the oscillator. You might use it to modulate a low-power FM transmitter, so you could produce an alarm tone through a nearby FM receiver.

In spite of its versatility, this circuit is very gentle on battery drain, and can be powered by anything between about 5 and 12 volts. This makes it a good candidate for remote or camping alarm applications.