Simple Mobile Protection

Safely ward off those evil spikes.

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I consider a "good" mobile radio installation one that is unobtrusive. With the variety of radios with detachable control panels, it's fairly easy to go mobile without having your car's interior resembling something like the space shuttle's cockpit.

As a further aid in achieving an unobtrusive installation, many vehicles include one or more blank DIN panels on the dashboard, sized perfectly for installation of many of the detachable control panels. I know of one instance where a ham was able to install an entire Kenwood TS-741 in place of such a panel, and when he completed the installation it looked like a factory original option.

I have one problem with unobtrusive installations, though:Unobtrusive means not noticeable, which means I can forget to shut my radio off when leaving my car. Even those "wheat grain" bulbs can kill a battery, given enough time.

The Ignition Key Control Solution

Because of my forgetful nature, I like it when everything turns off when I remove the ignition key. Achieving total key shutoff can be complicated since most manufacturers recommend connecting the radio's power cable directly to the battery. This is particularly important with 100-watt class radios, which use a lot of current. Also, many manufacturers recommend shutting your rig off when starting the car's engine. That's because radios can be intolerant of irregularities in their power source. The starting process can produce deep sags in the vehicle's supply voltage and high amplitude spikes, which could zap your radio.

To meet my first need (direct battery connection), I used a relay mounted in my engine compartment near the battery (Photo A). Use of a relay is a legitimate method of connecting power to a radio. The relay I used is one commonly used in mobile two-way radio installations. I got it, together with a fuse block, from a local two-way shop. It can handle 30 amps continuously and has an 80-ohm coil.

I've seen similar relays for sale at auto accessory shops as horn-relay replacements. The relay's contacts should be rated for at least 50% more current than the specified maximum current of your radio, and the relay should be a sealed type (no sparks).

The power control relay must be well secured to the vehicle. The relay and fuse block should be screw-anchored to the inside wheel-well cowling or some other suitable surface near the vehicle's battery. Locating a place can be a challenge in some feature-packed cars. A vehicle's engine compartment is no place for loose items. Also, check out what you might be drilling into before drilling.

Many vehicles use batteries with side connection lugs. I've seen some "interesting" wiring techniques done

Photo A. *Typical control relay and fuse block suitable for use with 100-watt mobile radios.*

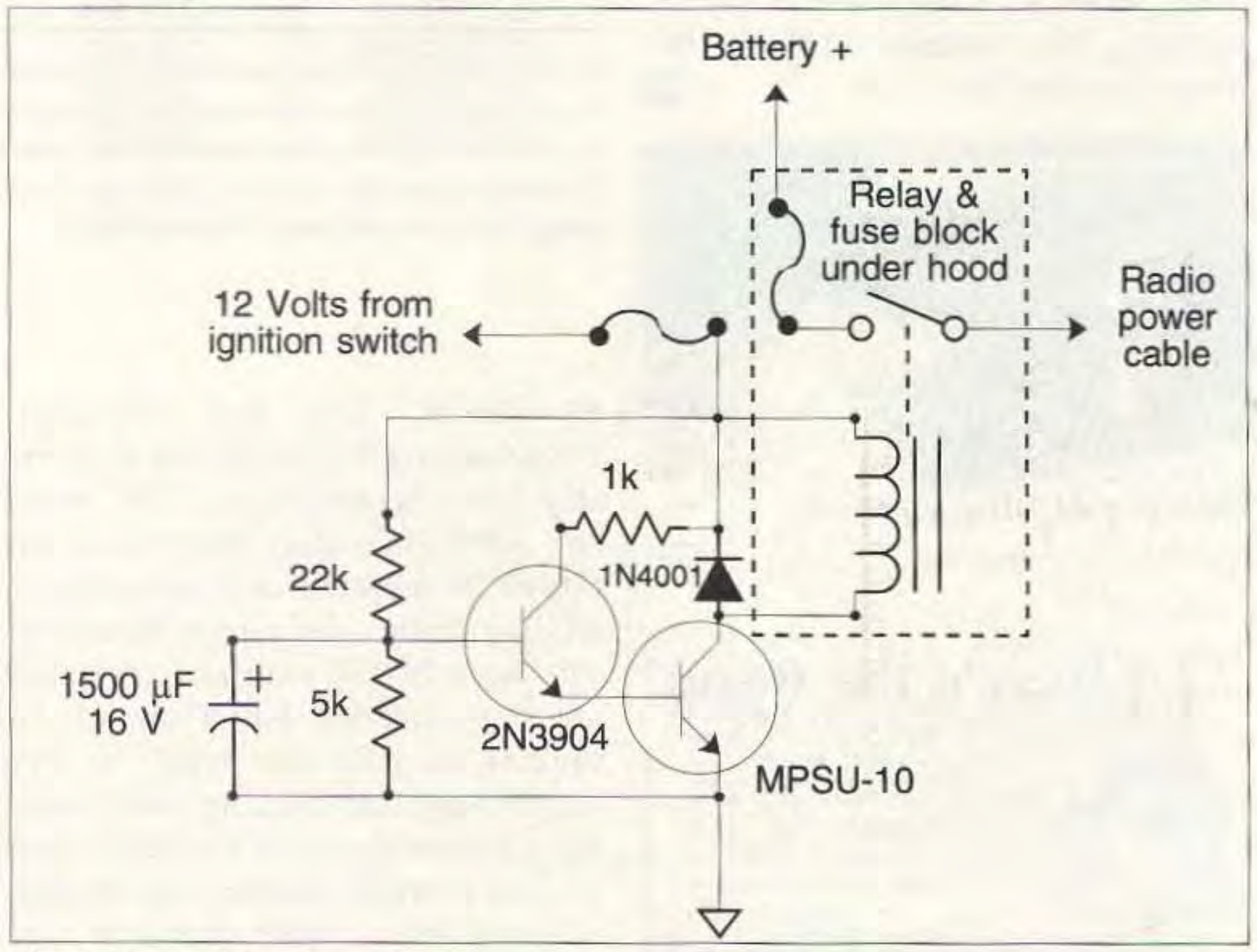

Fig. 1. *The on-delay timer circuit.*

when trying to connect a radio cable to this type of battery. Most auto accessory stores carry an adapter block for connecting auxiliary wires to such batteries; I recommend using one.

An On-Delay Circuit

A simple method of controlling the power relay circuit would be to tap into the car's accessory circuit, such as at the car radio's fuse. Most vehicles are wired so that the radio's power turns off when you're starting. While this works OK, I didn't like power coming on, dropping out, then coming back on again, so I decided to use a delay circuit that would keep the power relay from energizing for a few seconds after key-on.

After failing to make something simple using a 555 timer IC, I settled on the circuit shown in Fig. 1. I used two transistors I had available because I needed a combination of a relatively high RC time constant circuit that limited the base current, together with high current switching. You could probably substitute a single, high-gain Darlington-type device and get the same results.

Using the values shown, the circuit provides about 10 seconds delay before the relay pulls in. I built the circuit on a small piece of perf board, as shown in Photo B. The circuit layout is not critical, although it should be built to fit some type of enclosure that can be secured to the vehicle somewhere out of the way, like up under the dash.

I used a 1,500-µF capacitor as the basic time-delay element. It charges through a 22k-ohm resistor until the 2N3904 is forward biased and conducts, thereby switching the MPSU-10 on. If you want to change the time delay, substitute other capacitor values. Don't tinker too much with the resistor values as they were selected to produce the proper base-emitter current flow. Note that I used a 1k-ohm resistor in series with the 2N3904's collector. This resistor limits the MPSU-10's base-emitter current, and it also serves to keep the 2N3094's collector current within proper limits.

I mounted my entire assembly inside a small snap-tight plastic box and drilled holes for the wires. The only connections necessary are the source of key-switched +12 volts, ground, and the relay coil return.

***Photo B.** The on-delay timer construction details.*

Connecting to the Vehicle's Key Circuit

A convenient method I've used to pick up key-switched +12 volts is by using a modified "blade" type fuse (Photo C) and inserting it into an unused slot in the vehicle's fuse block. Most newer vehicles use this type of fuse, and I can usually find an unused spot in the fuse block that is key-switched.

"The judicious use of fuses is very important when doing automobile wiring (note the in-line fuse I use with my modified blade fuse)."

In the event there is no available slot for the fuse, you can substitute a modified fuse for an existing fuse, e.g. the radio fuse, but if you do I would recommend modifying a fuse that is rated correctly, not the 20-amp one I used. The judicious use of fuses is very important when doing automobile wiring (note the in-line fuse I use with my modified blade fuse). I used a 1-amp fuse in the line to my delay timer circuit and power control relay.

One note of caution if you decide to replace the broadcast radio's fuse: My newest car has a factory radio that's equipped with a password-protected theft-deterrent feature. If this radio is disconnected from battery power without defeating this protection scheme, the radio will become totally useless when reconnected. I'm told not even Delco can help if you turn this feature off. It would be wise to check with your dealer to find out if you may have such a radio prior to disconnecting it!

***Photo C.** Modified "blade-type" fuse useful in connecting to a car's key-switch circuit.*

While on the subject of fuses, if there's a rule to consider above all others, it's fuse everything! Don't underestimate the dangerous potentials of an automobile's electrical system because of its low voltage. A car's battery is a powerful energy store that can produce explosions, fire, and bodily harm, if not treated with respect.

Special consideration should always be given to vehicle wiring. From a general safety standpoint there should never be any loose wires. Wiring in an engine compartment should be routed to be clear of any potential hot spots, e.g. exhaust manifolds, etc. Locations near fans, pulleys, and belts, should also be avoided. After locating a safe path for running wires in the engine compartment, the wires should be tied down using cable ties.

The radio's controls should be located such that you do not have to take your eyes off the road to operate the radio.

Safe mobiling, everybody! 73