OUR KILL SWITCH INSTALLATION

This note describes how a kill switch was installed in the lower cowl of a multi-year 6-hp Evinrude outboard, based on instructions in Max Wawrzyniak's book, "Cheap Outboards" (pages 129-133). If you don't have access to this book, the link to his DUCKWORKS article (http://www.duckworksmagazine.com/05/columns/max/3/free.cfm) on the SUPPORT page will get you the important words and most of the pictures from the book. This is really a How-We-Did-It note, not a How-To article. I've included a few part numbers and photos to help anyone tackle installation of a kill switch in a similar race motor with a points and condenser ignition system.

The motor actually belongs to a brother who lives several states away. He built it from parts scrounged from outboard motor graveyards and the internet; not an uncommon feat these days. The basic parts came from 6-hp OMCs: powerhead - 1965, prop and tiller - 1966, carb - 1969, lower cover - 1971, steering bracket and mid & lower units - 1973, etc. I haven't asked him how much he has invested in the motor, but I'm pretty sure he's going to ask for it back when he finishes his Cocktail Class Racer.

Disclaimer: Neither my brother nor I have ever been employed in the Marine or Outboard Motor Repair Industries. He's a computer whiz and I'm a retired pencil pusher. Both of us like to build things. But he's much better at taking things apart and putting them back together so they work right. So we installed the kill switch in his basement. It wasn't difficult, but it did take us longer than the twenty minutes mentioned in Max's book.

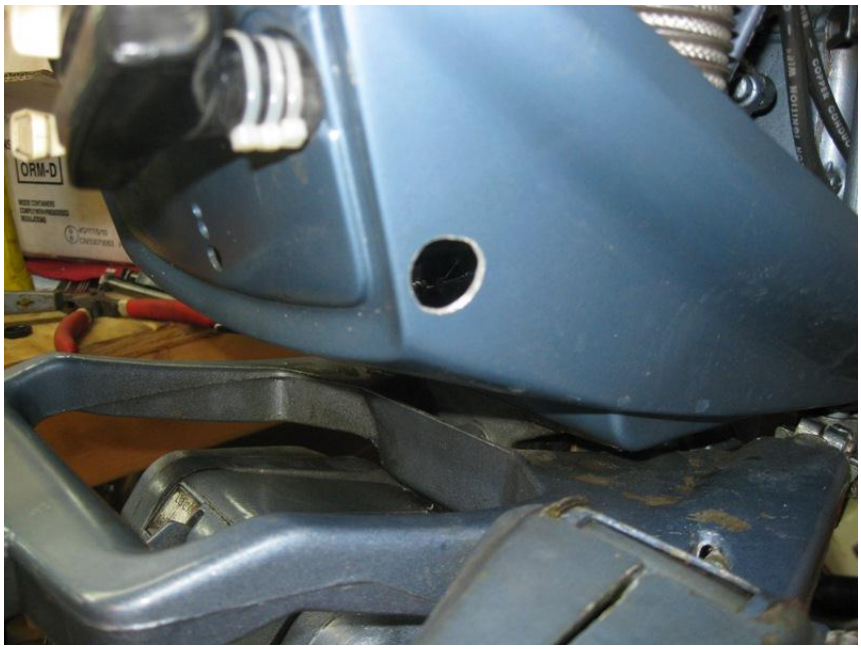
Tools we used, in addition to ordinary screwdrivers, wrenches, and sockets:

A while ago, my brother built a motor stand out of scrap wood that holds a small outboard at a convenient working height. A stand isn't mandatory, but it sure makes working access all around the motor much easier.

We used a drill and a few large bits to drill the kill-switch-mount hole in the lower cowl and a drill press with smaller bits to make the two holes needed in the bottom of the armature plate. No, you don't need a drill press. Just make sure you put a dent in the metal where the hole is supposed to go so your drill bit doesn't wander around. A round ('cringe') wood rasp was used to clean up the large hole for the kill switch.

A puller was used to pop the flywheel off to get access to the points underneath. And a torque wrench ensured the flywheel nut went back on tight enough.

We put blue painter's tape on the outside of the lower-front-port side of the outboard's lower cowl, so we could mark where we planned to put the kill switch, made our marks, then sat back and thought about it for a while. We double checked for anything inside the cowl that could interfere with or chafe the switch wiring. Also, some consideration was given to how the kill switch's lanyard might be pulled if the driver were ejected.



Hole for kill switch in an old, fantastically powerful, 6-hp Evinrude.

Neither of us wanted to experiment by jumping out of our race boat at speed to see if our location was optimum, so we didn't consider too long; too many variables. Then I told my brother to hurry up and drill the hole. That way, if the hole wasn't in the right place, it would be his fault. I did use a shop vac to suck up metal shavings as we drilled increasingly larger holes. Also, before drilling started, rags were stuffed around parts to keep stray shavings from lodging where we couldn't see them.

Check the inner and outer geometry of your motor's flywheel and surrounds to be sure your chosen kill switch location will work. And don't drill an extra hole in your carburetor or powerhead, infernal combustion engines don't like that and they're expensive to fix.

Max's method to stop an engine using a kill switch requires that a wire be attached to the ungrounded screw of each set of ignition points, then the two wires are attached to different connectors on a normally-closed kill switch. When the clip/key is inserted onto the kill switch, the internal switch circuit between the two new wires is open (not connected), so the ignition circuit doesn't care if there are additional wires or not; the engine runs normally. When the clip/key is pulled off of the kill switch, the internal switch circuit goes to its normally-closed position, so the engine thinks there is a continuous wire electrically connecting both points sets together. Since the ignition system is designed to fire only one spark plug at a time, at least one of the two points sets is **always** grounded. Now the engine has both points sets grounded, meaning that no electrical energy will flow to the spark plugs. With no spark, the motor stops.

We had to figure out where to drill two holes in the armature plate (the round plate under the flywheel that the points and coils and other things are mounted on) to get the wires out the bottom so they could be connected to the kill switch. The armature plate rotates back and forth depending on throttle setting, so the wires have to miss motor

parts underneath the armature plate and they have to be kept away from the revolving part of flywheel inside the magneto. We figured there was about 1/4" of safe clearance area in the depressions where the points sets sit, just counterclockwise from each points set.

Small hole for kill wire at lower middle of armature plate.

Guess who drilled the holes, again. Use a vacuum to make triple sure you don't have any stray metal chips as you're drilling these holes. Your points will thank you for it.

After we drilled our two 5/32" holes in the armature plate, we stuffed small rubber grommets into the holes to keep the wires from rubbing their insulation against the metal holes and to hold the wires a bit from moving up and down in the slightly oversized holes. We sized the holes to fit small grommets used to mount radio control servos. And, yes, we had to use a small spritz of silicone spray help seat the grommets and to get the wires to pass into the resulting grommet holes. We scrounged grommets from decades-old R/C gear (and hope the rubber doesn't fail too soon). The following link shows something similar to what we used: http://www3.towerhobbies.com/cgi-bin/wti0001p?&I=LXH372&P=7. Grommets used to mount the bodies of small electric R/C helicopters might work, too. Depends on the wire size you use, the grommets you can find (if used) and any heat-shrink tubing or tape you might use to better match wire size to holes.

Kill wires attached to points sets and fed down through grommets in armature plate.

We routed the wire from the starboard side along with the spark plug wires underneath the armature plate, then joined it with the port-side wire and fed them both to the kill switch. We wrapped the two wires inside 3/8" diameter, slit-plastic wire loom (the stuff used to protect bundled wires passing around in a car's engine compartment), and used Self-Fusing Silicone Tape (NAPA # 784301, 1" x 20' black) to tie the loom's ends to the wires to keep it from sliding around. Hopefully, the loom and tape will keep the wires from vibrating themselves to pieces while the outboard is running.

Kill switch wiring enclosed in wire loom from below flywheel to switch.

We double checked all the carb linkages, took the motor outside, attached a fuel line, crossed our fingers and pulled the start cord. The motor actually ran. Thank goodness for talented brothers. What was even better was that the motor stopped immediately when we pulled the clip/key off the kill switch. Success!

Other stuff:

We used replacement OMC parts for a kill switch mounted in newer OMC control boxes, on their lower back side. The individual parts are kinda pricey, but we're confident the switch will be durable and trouble free. These are the numbers of the parts we used (we found some on e-bay): P/N 0585134 (cutoff switch), P/N 0328169 (nut for switch), P/N 0432230 (clip and lanyard). This switch needs a 5/8" mount hole.

Duckworks sells a SeaDog Universal Kill Switch, with nut and lanyard for about $10, see http://www.duckworksbbs.com/hardware/electrical/sd420488/index.htm. SeaDog makes another kill switch that is more expensive, as do several other manufacturers. We don't have any experience with these switches and are wondering what we will use for our other outboards. If we go the $10 switch route, I'll buy a spare or two to keep on hand.

We used crimp-on marine ring connectors to connect our kill switch wires to the points sets. Then we put on short lengths of heat-shrink tubing. We didn't shrink the tubing until the wires were passed through the grommets and bent down far enough to be missed by the flywheel. Using longer pieces of heat shrink than what is shown in the third picture above might help keep the wire in a low curve and away from the flywheel.

This was a long winded way of saying that a kill switch installation is reasonably inexpensive and easy, given access to a few tools. If you can't get a hold of a puller and a torque wrench, take your boat and motor to your local auto repair shop. If you're on good terms with the shop, they might pull the flywheel, then torque it down later, just to help a fellow race nut. And if they have children, maybe you can help them build a Cocktail Class Race Boat of their own.