Installing a Steering Column or Dash-Mounted Overdrive Kickdown Switch

I've always loved the Borg-Warner overdrive units such as the one installed in my 1951 Hudson Club Coupe. In fact, I have two other vehicles with the same system in the drivetrain: A 1950 Studebaker truck, and a 1953 Nash-Healey LeMans Coupe.

I have always found the kickdown, or downshift function on the Hornet and Studebaker to be less than desirable. With the kickdown switch mounted underneath the gas pedal, the only way to force a downshift out of overdrive is with a full-throttle, balls-to-the-wall stomp on the gas. Sometimes this is exactly what I want, such as when passing another vehicle.

On other (frequent) occasions, I may be just cruising along a city street at a leisurely 30-40 mph, and feel that the overdrive gear is just a bit too much for comfortable acceleration. It seems overkill to have to go full blast on the throttle just to effect a simple downshift to the lower gear. Besides, these full-throttle downshifts just can't be gentle on these old drivetrains.

My Nash-Healey came from the factory with the perfect solution: The kickdown switch, instead of being mounted under the gas pedal, is incorporated into what would normally be the horn button (the horn is actuated by a separate horn ring). When you want to downshift, just tap the horn button in the center of the steering wheel and the overdrive drops right down into conventional gearing!

This much more desirable arrangement got me to thinking about how I could create a similar setup on my Hornet.

After much pondering, I decided to mount a spring loaded momentary "bat handle" switch right on the steering column, as an auxiliary optional kickdown switch (the original gas pedal mounted switch would remain in place and functional as well).

My plan was to fabricate a housing for the new switch, and mount it onto the back side of the turn signal housing, on the right side (gear shift lever side) of the column.

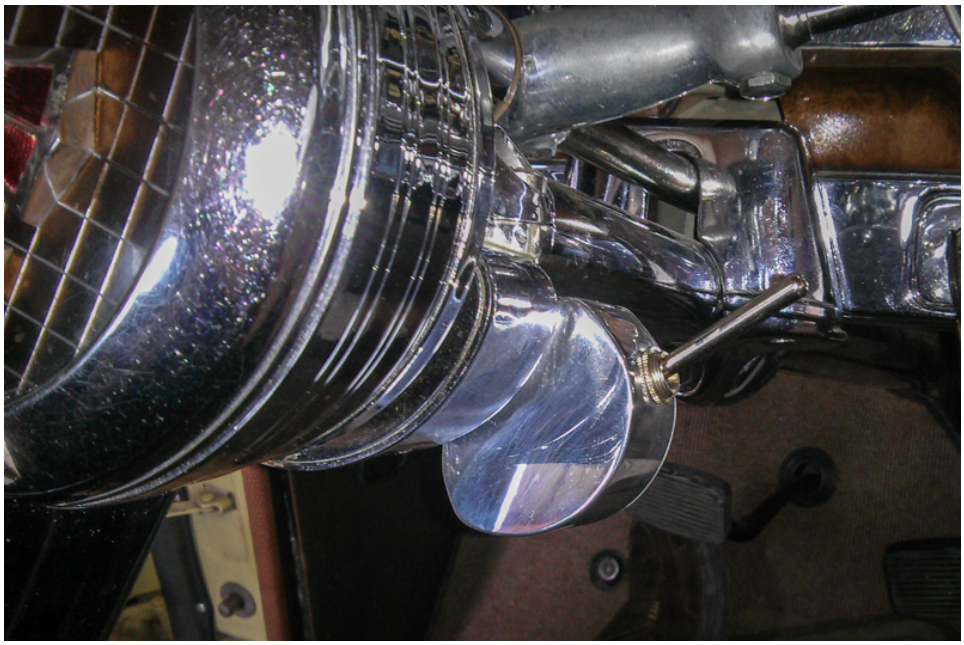
The switch housing began as a round wafer sliced off a 2" diameter aluminum rod stock, using a lathe:

This hunk of aluminum then went to the milling machine, where a recess in the back side was milled, and the piece itself was cut to a suitable shape to mate with the turn signal housing:

A cover was fabricated for the back side:

Then the entire piece went to the polishing wheel for a mirror finish, and was finally attached to the back of the turn signal housing with a couple of machine screws:

Finally, the whole assembly was mounted back on the steering column, and the single wire from that switch (further discussion below) runs along with the turn signal wires in the stock chrome housing underneath the column:



ELECTRICAL THEORY

In the original factory configuration, pressing on the gas pedal's kickdown switch basically breaks the ground connection to the overdrive solenoid (via the solenoid relay mounted on the firewall). During normal overdrive operation, the overdrive solenoid receives constant power and is continually attempting to activate the overdrive gear anytime the vehicle speed is over 30 mph or so (thanks to the ground connection provided from the overdrive governor). Therefore, breaking the ground connection disables the solenoid and allows the gearing to drop back to direct drive.

Working with the ground side is nice, because it means only one wire is necessary to run from the column-mounted kickdown switch, with the other terminal of the switch merely grounded to the switch housing case (and hence the vehicle ground). This functions similar to the horn circuitry in most cars.

Unfortunately, almost all momentary spring-loaded switches such as the one I selected (sourced as a hot rod dash starter switch) have contacts which are normally OPEN, closing only when the switch is pressed. But the overdrive circuitry requires the ground circuit to be normally CLOSED. To accomplish this, a standard 5 pin automotive relay is used. In this way, the interruptible ground connection to the solenoid (through its relay) is connected through the normally CLOSED terminals of the relay (standard pins 87A and 30). Only when power and ground is applied to the relay (via the column mounted switch) do these contacts open the ground circuit.

My Hornet is a bit different than standard factory configuration since I have upgraded the electrical system to 12V to accommodate the air conditioning and other auxiliaries. This necessitated my replacing the original 6V dash-mounted solenoid relay with a standard, off-the-shelf, automotive relay (4 or 5 pin, the 5th pin isn't used for the solenoid function). I mention this so there is no confusion over the picture below, which shows the solenoid relay on the left (new relay mounted in the old original 6V relay case), and the new, identical relay for the column kickdown switch mounted just above and to the right of it (the far right relay is for the horn, again replacing the original 6V horn relay):

Of course, an owner could choose to install a similar switch anywhere in the interior, such as in or under the dash.. the wiring would be the same.

During normal kickdown operation using the gas pedal switch, a secondary function is performed: The distributor is momentarily grounded (via a connection from that kickdown switch to the distributor side of the coil.. the + connection for positive ground vehicles). This literally cuts the ignition to the engine for a split second, removing the engine thrust on the overdrive unit, and allowing the solenoid and gearing to slip back down to direct drive. Without this circuitry (such as with the column mounted switch as described so far above), the solenoid will not downshift until the foot is momentarily taken off the gas to remove engine thrust. I find this to not be objectionable, as typically when the column kickdown is used, the engine would be in a low power mode anyway.

To duplicate this function (momentary distributor grounding) in the column mounted switch circuitry requires use of a second relay, which basically closes the grounding connection to the distributor. The first relay actuates the second relay, which uses its normally OPEN pair of contacts (87 and 30) to close the circuit between pins 2 and 3 of the gas pedal kickdown switch.

Note: It IS important that the distributor cutout circuit I've discussed and depicted below be connected exactly as shown between pins 2/3 of the kickdown switch. This is necessary because the overdrive solenoid plays a role in this process as well, releasing the distributor ground as soon as the downshift is completed. You can't just directly ground the distributor with the switch, or the engine would quit running until you released the switch.

Wiring for this auxiliary kickdown switch is simpler than might first appear. At the end of this discussion I have included the original factory overdrive wiring schematic, with additions showing the appropriate wiring connections.

Here is a written description of the wiring required:

1) Cut the wire somewhere in the middle between pin 4 on the factory kickdown switch and pin 2 of the overdrive solenoid relay mounted on the firewall. Note, this will be the only wire which does run directly between the kickdown switch and the solenoid relay.

2) Using extended wires, connect one end of the wire cut above (doesn't matter which) to pin 87A of the new 5 pin relay. Connect the other end of the original cut wire (via an extension jumper) to pin 30 on the new relay. Note that THIS relay DOES need to be a 5 pin relay. It is pin 87A which is the 5th pin, and provides a Normally CLOSED circuit as required.

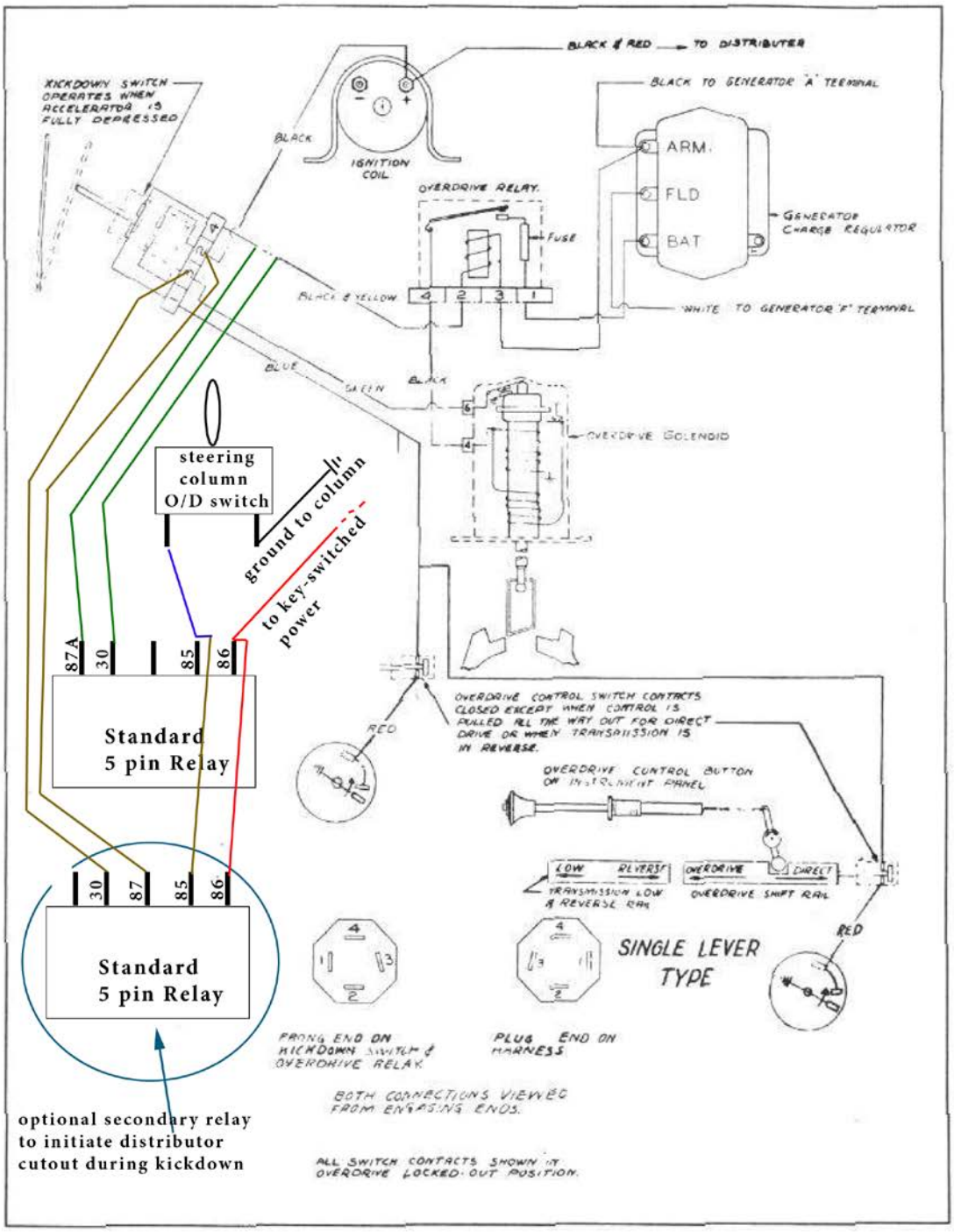
3) Find a source of ignition keyed power (active only when key is on) and connect to pin 86 of the new relay. One underhood power source for a standard 6V system would be pin 3 of the original overdrive relay, which gets power only when the generator is operating.

4) Connect one terminal of your new momentary-on kickdown switch to any good metal chassis ground. Connect the other terminal to pin 85 on your new relay.

To add the distributor cut-out function (optional, but a nice enhancement):

1) Mount a second 4 or 5 pin relay near the first one. Connect pins 85 and 86 respectively to the same sources as pins 85 and 86 on the first relay.

2) IN ADDITION to the wires already connected at the original foot operated kickdown switch (don't remove those), connect a wire from pin 2 on the kickdown switch to pin 87 on the second relay, and likewise a wire from pin 3 on the kickdown switch to pin 30 on the second relay. That's all there is to it! NOTE: for 6V systems, of course you'll need to source 6V relays (these are readily available, but may require a bit more searching)


BLACK & RED → TO DISTRIBUTER
BLACK TO GENERATOR 'A' TERMINAL
KICKDOWN SWITCH OPERATES WHEN ACCELERATOR IS FULLY DEPRESSED
BLACK
IGNITION COIL
OVERDRIVE RELAY.
FUSE
ARM.
FLD
BAT
GENERATOR CHARGE REGULATOR
BLACK & YELLOW
WHITE TO GENERATOR 'F' TERMINAL
BLUE
GREEN
BLACK
OVERDRIVE SOLENOID
steering column O/D switch
ground to column
to key-switched power
87A
30
85
86
Standard 5 pin Relay
RED
OVERDRIVE CONTROL SWITCH CONTACTS CLOSED EXCEPT WHEN CONTROL IS PULLED ALL THE WAY OUT FOR DIRECT DRIVE OR WHEN TRANSMISSION IS IN REVERSE.
OVERDRIVE CONTROL BUTTON ON INSTRUMENT PANEL
LOW
REVERSE
OVERDRIVE
DIRECT
TRANSMISSION LOW & REVERSE RAIL
OVERDRIVE SHIFT RAIL
RED
SINGLE LEVER TYPE
30
87
85
86
Standard 5 pin Relay
optional secondary relay to initiate distributor cutout during kickdown
PRONG END ON KICKDOWN SWITCH & OVERDRIVE RELAY.
PLUG END ON HARNESS
BOTH CONNECTIONS VIEWED FROM ENGAGING ENDS.
ALL SWITCH CONTACTS SHOWN IN OVERDRIVE LOCKED-OUT POSITION.