

SECOND GENERATION CAMARO “HIDE AWAY” (HIDDEN) WINDSHIELD WIPER SYSTEM CONVERSION

BY: BRENT BRUNNER

An option on all Second Generation Camaro models from 1970 thru 1976 was the addition of, what is referred to by Chevrolet as, “Hide Away Wipers” or RPO C08. For an additional \$20.00, in 1970 your car could have a factory “shaved” look of special windshield wipers that, when in the off position, stored themselves out of sight below the back edge of the hood. It can be assumed that this option was for appearance only, though it may have had a functional value such as aerodynamics or less chance for freezing etc. In line only after some other popular options, like automatic transmissions, power steering, power brakes and an AM radio, a good percentage of the total numbers of Camaros sold had this option. In 1977 this option became standard by comparison, the Hide Away Wipers were the only wiper available on Trans Am and Firebirds from 1970 on.

If a Camaro was NOT ordered with Hide Away Wipers, the standard wipers “parked” above the hood line of the car. One can easily determine which wiper system is on a car by observing a couple of differences both above and under the hood:

Standard System

Silver wiper arms held the blades

The drivers arm was identical to the passenger arm in construction

The motor used to drive these wipers was rectangular in shape and protruded from the firewall a good distance

Hide Away System

Wiper arms were coated with a special type of flat black finish

The driver’s side arm was articulated (jointed) and had an “extra” rod which connected the arm, near the blade, to the cowl of the car causing the blade to swing while it swept the windshield

The motor used to power the hide away system was round or “barrel” shaped on the bottom and had a separate washer pump which attached to its top.

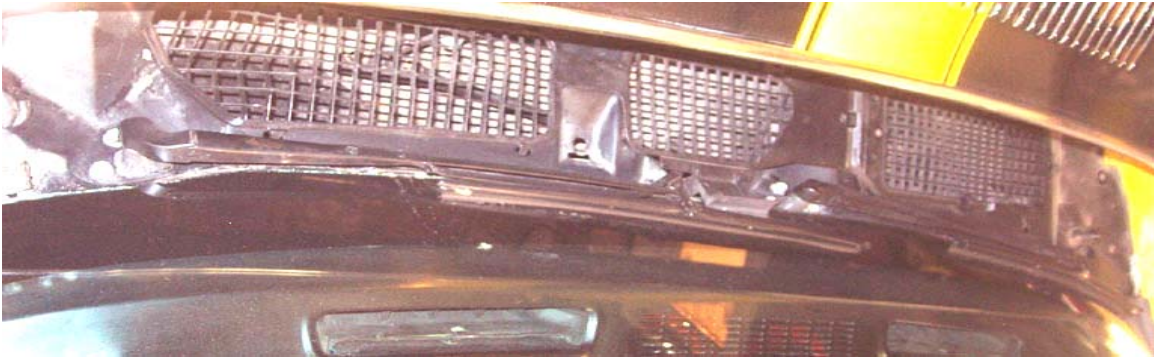
This system also had additional electronics which caused the motor to stop in a position where the wiper arms were below the back of the hood line.

Since the hide away wipers were part of popular option packages, the hidden system has become the favorite of those who are restoring a Second Generation Camaro. This article will focus on the conversion of a standard system to the hide away system. While this conversion IS possible, one must have ALL of the following parts to have the proper function of a hidden system:

Part	Source	Cost (approx.)
Hidden style motor (barrel)	Remanned units are available at AutoZone or Advance. Salvage Yards or used from other cars	\$65.00 Remanned w/o core
Firewall "adapter" Plate	Available USED only, from a car that had a hidden system originally	Negotiated
Wiper linkage (Transmission)	Available Used from another car	Negotiated
Wiper Switch	Your car may have come with a Switch that will work OR can be slightly Modified and made to work	Some are currently being sold for more than \$50!
Wiper Arms	Decreasingly, available from a car That had a hidden system	Negotiated

This photo shows an example of a **firewall adapter plate** necessary for the standard to hide away conversion. (Pardon the condition as it is not restored)





This photo shows the completed, proper position of a hide away system on a 1970 Camaro. Note the linkage inside the cowl UNDER the cowl screen as it will be important later.

A Couple of Notes on the Parts List

If you find yourself in need of all of the components on the above list, you may be best served by finding a junked car with the complete wiper system in tact. Many salvage yards still have components. The other source for these parts remains swap meets, whether in person or online. The adapter plate is merely a piece of stamped sheet metal. Some have claimed that it is not an absolute necessity to have this piece, however; it not only makes the system complete, but also assures that the motor is securely attached to the firewall. Some of the components on the above list are becoming, increasingly scarce and therefore expensive!

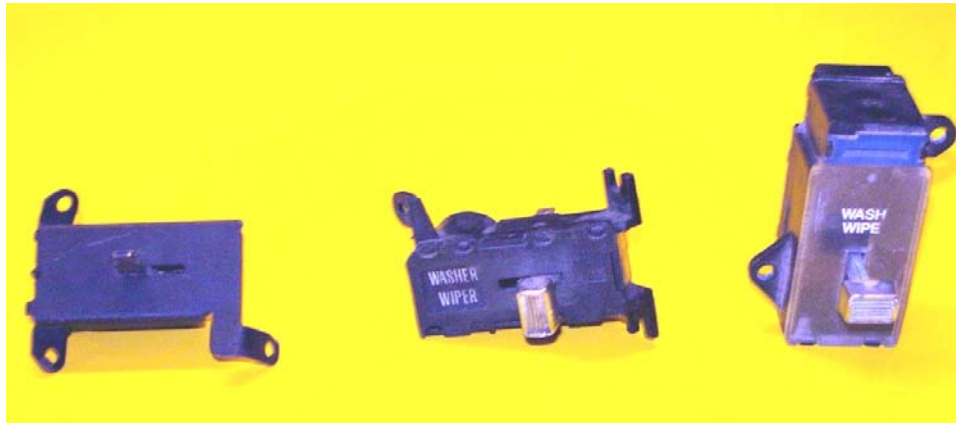
The Great Depressed Park Wiper Switch Debate

During the production of the Camaro from 1970 to 1977, GM used no less than 10 DIFFERENT wiper switches. Camaro restorers have come up with the idea that only switches which came with hidden systems would power hidden systems. Each wiper switch has a distinct number stamped into its back. Some common early numbers are 97, 98. Later production '73 thru '77 included a common switch number #176. The early switches were all black with no label as the label was affixed to the dash bezel. Later switches not only had lighting (either bulb OR fiber optic) but also the text "wiper/washer" on them as well. While it is beyond the scope of this article AND the author's current knowledge to instruct one on exactly how to make any old switch work, bench tests have proven that all types of switches can be made to work (some with limited functionality including the wipers ONLY running on the low position) by either mounting them upside down, reversing the face plate or accepting the fact that the direction in which the switch slides to turn the wipers to the low or high settings is reversed from what another "correct" switch may be. Do NOT be fooled into believing that only one number switch will work as it is NOT entirely true!! Many sellers of these

“special depressed park” switches try to sell them for \$50 or more. Unless one is working on a concours restoration . . . no switch is worth that kind of money.

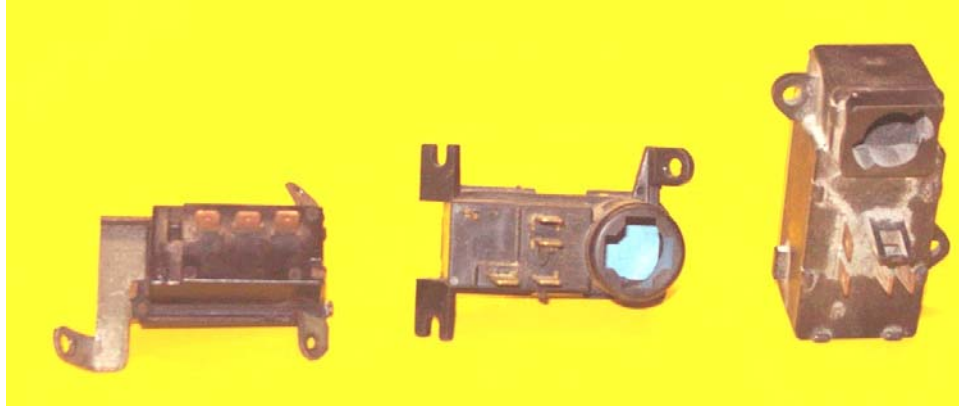
One additional note, the author has **NEVER WORKED OUT, AND DOES NOT PLAN TO WORK OUT WIRING OR REPAIR OF PULSE/DELAY WIPER SYSTEMS.**

The following photograph shows various, available wiper switches. From left to right they are: #98 from a 1970 “standard” system, #176 from a ’74-’79 system, on the right is a later model, vertical slide switch from an ’80 or ’81 Camaro.



The backs of the switches from left to right. The #98 (note the presence of ONLY 3 prongs, ground is provided to this switch through the METAL face plate. An additional note is that while this switch was NOT designed for use in a hide away system, it can be modified to work by removing the face plate (with 4 small metal tabs that attach it) and replacing it “upside down” tests indicate that this switch will work in a depressed system with this single modification) Next is the #176 Delco Remy with 4 prongs (the prong that is set apart from the others is the chassis ground as the faceplate is plastic) This switch is available in decent numbers and provides operation of all functions without modification. Finally on the right is the newer switch, again with 4 prongs. Because of the design of this switch and the mounting tabs, it CANNOT be easily modified to fit a pre’80 dash.

NOTE: Currently NONE of this switches are produced in the aftermarket which means the only sources are salvage yards, used parts from those who have more than they need AND. . .are you ready. . . ANY SECOND GENERATION TRANS AM (provided you have a face plate from a Camaro switch to switch onto the switch body!!! (This is a good tip as T/A or Firebird switches are more commonly found on E-bay than Camaro switches and all switches from ’70-’81 should work!)



The next photo shows the prongs located on the back of the switch. The prong that is located “away” from the others is the “ground” prong as it is grounded directly to the chassis under the dash.

Restoration

The restoration of the components for a depressed wiper system is minimal. One may prefer to strip the paint from used parts. Any, good quality, satin black spray enamel paint is all that is necessary. Some restoration buffs swear by Krylon Satin Black. It is also important to lubricate the linkage or transmission that is fitted to the inside of the cowl. A spray white lithium lubricant is ideal for this purpose. Other than that, new wiper blade refills are a good idea. Make sure that you only replace the rubber part and never attempt to change the metal part of the blade itself as it will almost certainly create clearance problems with the hood.

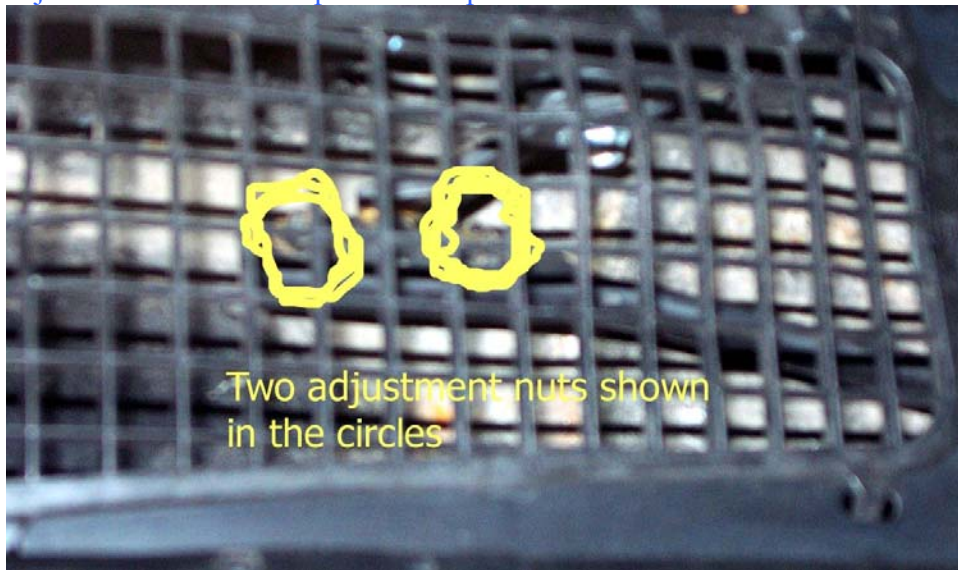
Mechanical connections

Once the individual components are restored to your satisfaction, it is time to connect the mechanical portions. The system can be easily installed in the following order.

1. Connect the adapter plate to the firewall of the car
2. Attach the wiper motor to the adapter plate using special wiper motor screws with star washers OR suitable replacement. At this time, make sure that the ground tab (located on one of the bolt holes on the motor) is properly grounded to the chassis of the vehicle.
3. Install the linkage or “transmission” with 6 bolts into the cowl of the car insuring that the splined shafts protrude through the appropriate openings.
4. Connect the keyed bolt on the “back” of the motor to the transmission. The motor should have a ½” washer nut and the linkage will only attach in 2 positions (the correct position and one that is 180 degrees out of the correct position)

5. Install the wiper arms over the splined shafts which protrude through the cowl. The arms are keyed to attach in a certain position. Additionally, on the driver's side, connect the arm linkage to a pin found at the base of the splined shaft on the transmission and slide the retaining clip onto the pin to "lock" the connecting rod in place.
6. Adjustments to the park and wipe travel of the arms is made via 2 nuts affixed to the transmission near the connection from the motor. Loosen the nuts and slide the linkage in the proper direction to make sure that the wiper park in the correct position AND wipe the whole area of the windshield but do not travel over the windshield reveal moldings!

The following photo shows the detail of the mechanical connections for the linkage inside the cowl, under the cowl screen (driver's side). The two nuts for adjustment of the "sweep" of the wipers can be observed under the screen.

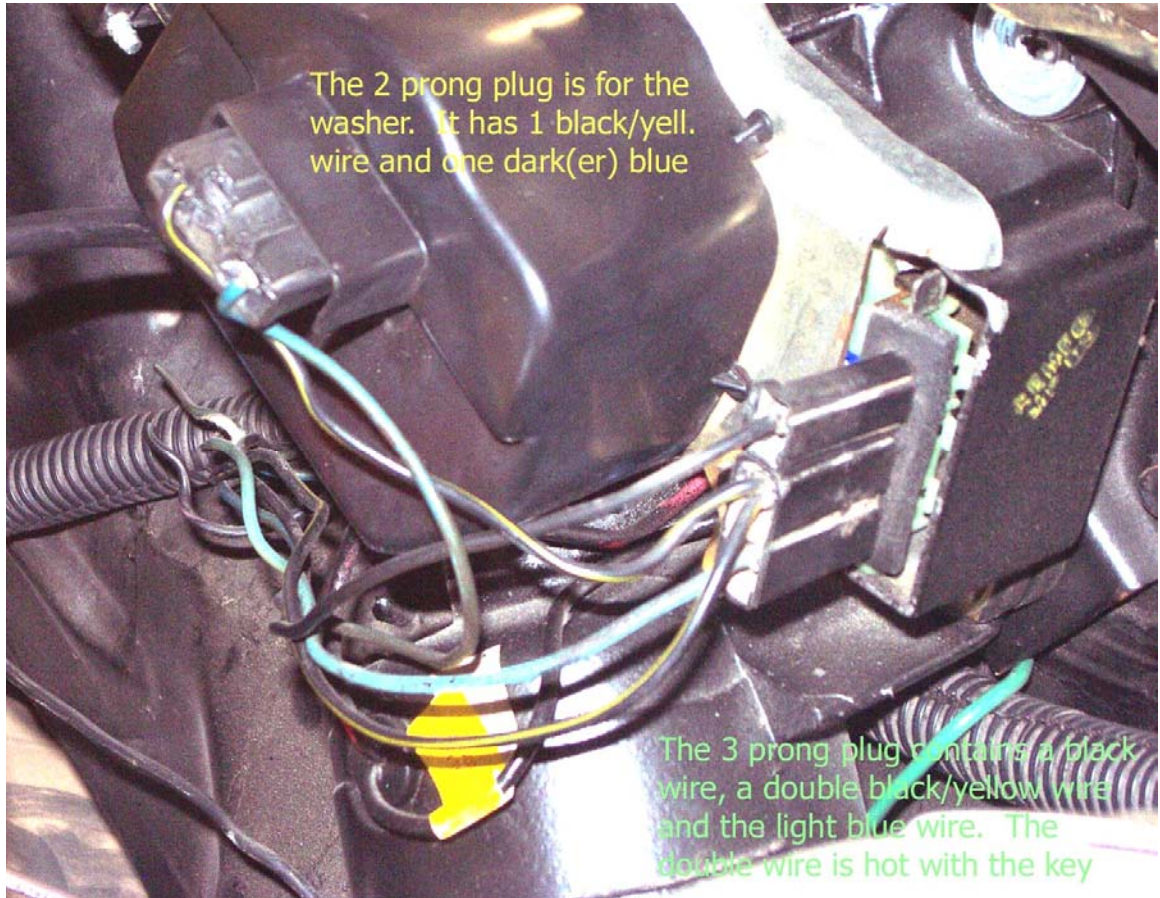


WIRING

All of the above information can be helpful BUT the most frequently asked and least understood aspect of the hidden system is the wiring. If your car came with a harness that was pretty much in tact, the job of wiring is made much easier. If, for some reason, some nimrod hacked the heck out of the under hood harness (a 3 lead female plug attached by a double wire to a 2 lead female plug) OR cut up or even off the plug that attaches to the switch (most commonly a 3 lead female plug with the same color wires as the under hood connector) then it is possible to either trace and recreate the original wiring OR make a homemade harness from three 36 inch pieces of wire.

The following photograph shows a '74 and up remanned wiper motor purchased at Autozone and wired with the factory harness (Note the colors of the various wires and the LOCATION of the terminals, which are on the upper right side of the washer assembly, older motors ('70-'73 have the terminals right above the

barrel shaped portion of the windings of the motor (see the motor shown in the bench test set up)) The wiring is further explained under the WIRING section of this article.

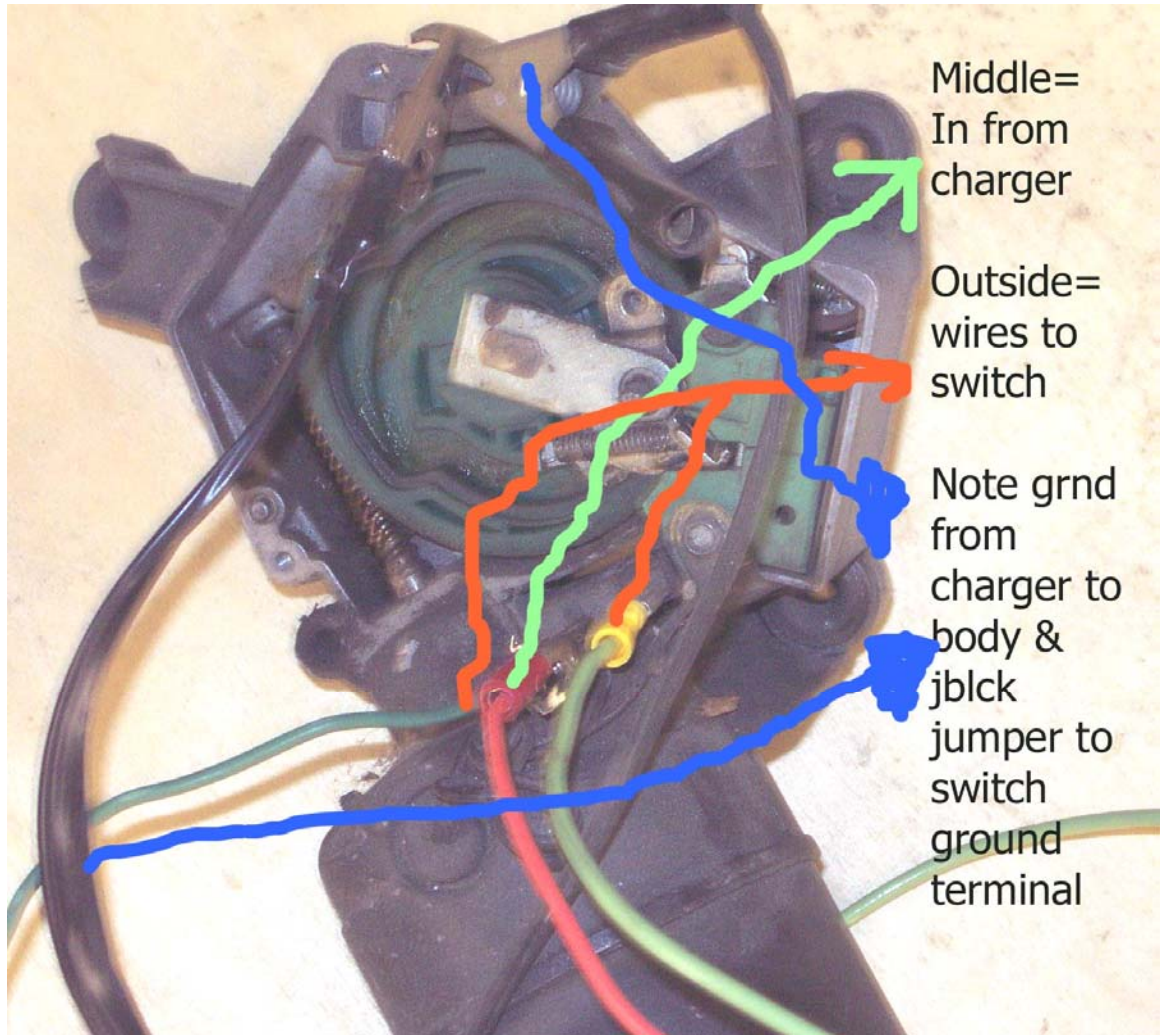


The following photographs show a bench test set up for the hidden wiper system which includes, the barrel motor, (from a '71) a #176 switch (most likely from a later '70's dash) all powered by a 12V battery charger on the 2 amp charge setting. This is one, easy way to determine if the electrical components of your system are fully operational **IF** all the parts are off of the car. Note the following: the positive connector from the charger is run through the orange jumper wire attached by an alligator clip to the MIDDLE terminal of the motor. The negative of the charger is connected directly to the metal body of the motor and ALSO is connected to the ground terminal of the switch through the black wire that has alligator clips on both ends (this is the same as chassis ground, the motor grounds through a bolt to the firewall and most switches (the ones with 4 prongs) ground through a wire to the chassis as well). The older switches (numbers like 98 and 97) have only 3 prongs on the back. In this case the faceplate of the switch is metal and serves as the ground for the unit. In most early cars with intact wiring harnesses, the ground for the early style 3 prong switches connects to a metal ring that also provides ground to the headlight switch.

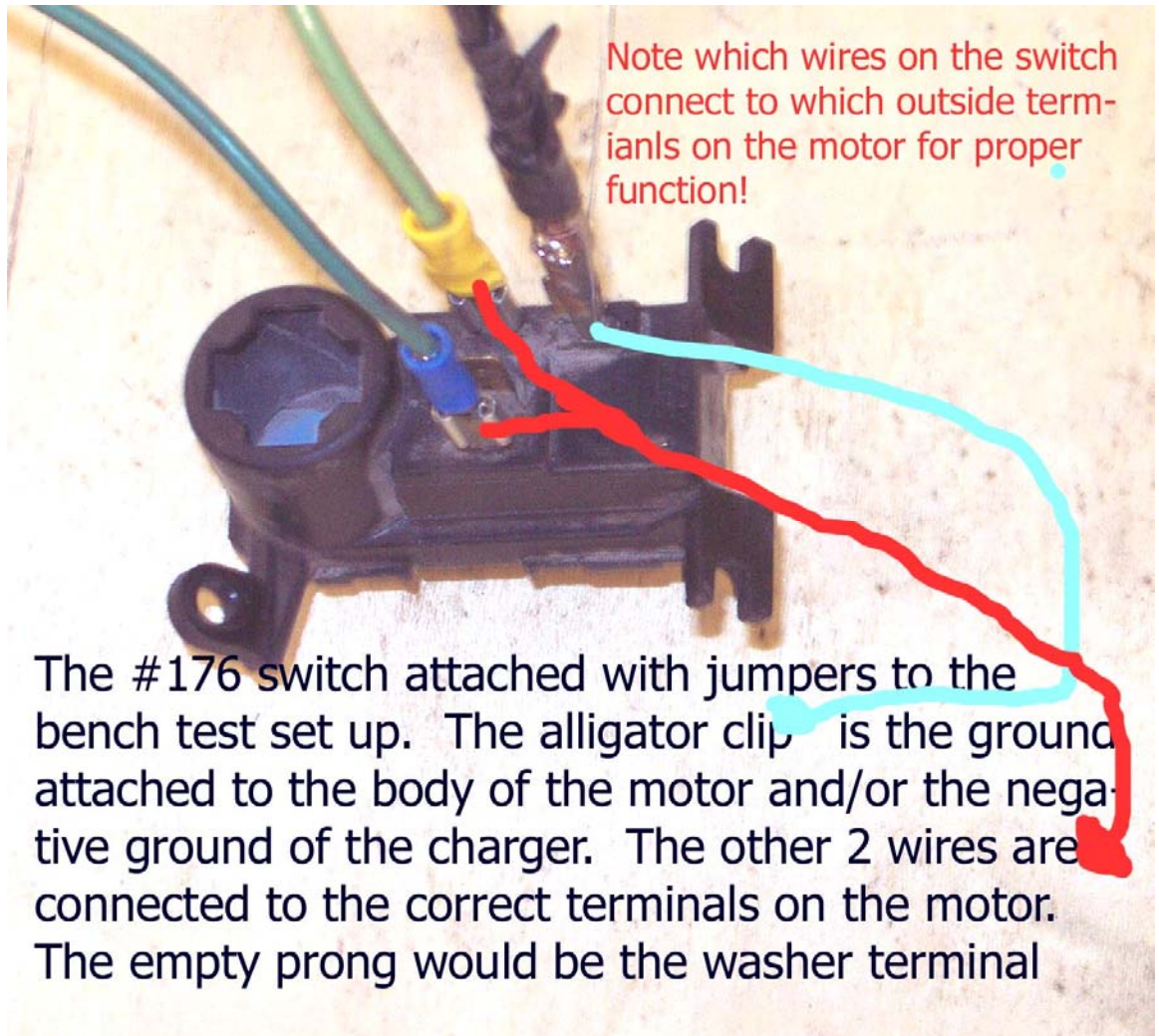
If you are unable to find the factory ground, or if it is non-existent 30 years later, you would be best served by creating a new ground lead and grounding directly to the chassis under the dash to assure that the connection is good.



The above photograph shows the bench test system used to determine the proper wire connection. The orange wire is connected with an alligator clip to the MIDDLE terminal on the '71 motor, this provides the power to the bench set up and represents the factory harness, double black/yellow stripe wire. The black led of the charger is connected to the body of the motor, this represents chassis ground. Another black jumper is shown from the body of the motor (with an alligator clip) to the ground terminal on the switch (this represents factory ground for the switch when it is mounted in the bezel) **NOT SHOWN is a jumper from the middle terminal (12V) to the washer as there is NO WASHER or WIRING shown for the reasons of simplicity!**



The above photograph shows more detail of the bench set up with all of the motor connections highlighted.



Shown here is a better detail of the wiring for the switch. The alligator clip on the upper right is the jumper from the body/negative charger clamp. Again this is #176 switch and the bench set up is fully functional!



One more picture of the bench set up to clarify wire colors/ connections.

Wire Colors and Routing.

Fortunately, the wire colors, both under the hood and under the dash were created by Fisher Body Works and remain the same color throughout all years of Second Generation Camaro production. All of the wires do run through the fuseblock which has a fused circuit for the wiper system.

Under hood wire harness (Refer to motor photo above for visual)

The connector that is found under the hood consists of the following wires in a 3 female connector plug joined by a double black wire with a yellow stripe to a 2 connector plug. The 3 prong plug is for the functions of the wiper motor itself it should only plug into the motor one way as there are cut-outs designed to allow tabs on the motor prongs to fit in one direction. The wire color should be the following:

- 1 double black wire with a yellow stripe connected also the 2 connector plug**
- 1 light blue wire**
- 1 black wire ALL ARE 18 GAUGE**

The 2 prong connector should contain the jumped wire from the 3 connector plug which is black with a yellow stripe and a single darker blue wire. This connects to the **WASHER PUMP**. In some of the later year cars, the washer pump is located in the holding tank for the washer fluid. In this case the under hood connectors will be slightly different, however; the wire colors should be the same.

Under Dash wire harness

The wires found under the dash for the wiper system contain a 3 prong female connector plug which is designed to plug into the back of the switch. It will contain 3 wires which should be **light blue, black , and dark blue. (note that these correspond to the colors found on the under hood connector)**

Basic Wire Testing

In order to ensure that the wiring that may exist in your car is good perform the following tests with a test light and or multimeter.

1. The middle prong (which should be connected to the black/yellow stripe, double wire) should have power from the fuseblock while the key is in the ACC or RUN positions. If this wire is not hot, the system will not work. It may pay to first check the fuse in the fuseblock to insure that the fuse is good and making contact with both sides of the block.
2. Additionally, if you have the correct equipment (a multi meter capable of measuring resistance) it would be good to check the continuity of the individual wires for the system. Check that each of the wires (each individual color) show 0 resistance when you connect them to the prongs of the multimeter from the origination under the hood to the plug under the dash
3. Although the switches rarely go bad, you can check to insure that the switch that you possess is good by measuring resistance against the following chart. Begin by setting up the multimeter to measure resistance in ohms. This can be accomplished and verified by touching the probes together and getting a reading of 0. While you hold the black probe to the what can be referred to as the ground prong (this will be the prong that is connected to the black jumper in the above photo. In the car this is the terminal that grounds to the chassis)

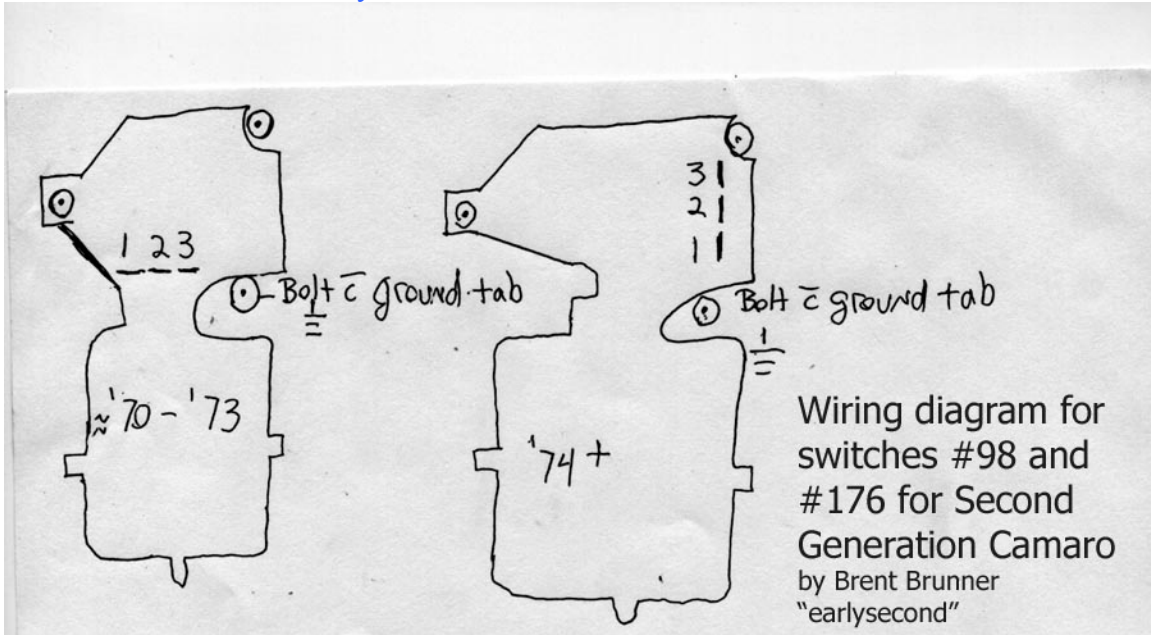
Wiper Switch Current Flow (for 4 prong switches ONLY)

Switch Setting	# of terminals that will return a 0 reading
OFF	None of the remaining 3 prongs will allow a 0 read
LOW	2 of the remaining prongs will allow a 0 reading (usually the two “outside” prongs)
HI	Only 1 prong will allow a 0 reading (again this should be an “outside” prong)
WASH	With the knob of the switch depressed and held, 2 prongs will allow a 0 reading. (the two prongs Should be located adjacent to one another)

Various wires and their connections to one of the 2 (early or late) style motors

The only difference in early and late motors is the location of the terminals. If you observe above, the motor mounted on the firewall (later style) of the car has the terminals located in a vertical line down the side. Compare/contrast that motor with the one in the bench test which is from a '70 Camaro where the terminals are located in a horizontal line just above the round or barrel part of the motor. The terminal order remains the same, however; it is merely rotated 90degrees counterclockwise. Therefore, **the right terminal on the old motor equals the top** terminal on the newer one. The middle terminal is the same (obviously) and **the left terminal on the old motor equals the bottom terminal on the newer one.**

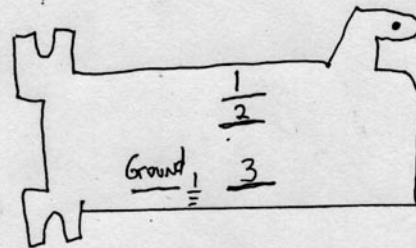
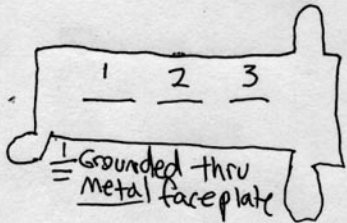
Below, find a diagram for the wiring of 2 of the switches shown in the photograph with BOTH the old and newer style motors:



All switches show BACK view

Switch # 98 (early Non hide)*

Switch # 176*



Switch term. #	TO: Motor term. #	Switch term #	TO: Motor term #
1	Washer	1	3
2	1	2	Washer
3	3	3	1

*This switch must be modified as described to work on a Hide Away System

*This switch is common & works Well

Changing the location of individual wires in a plug connector

Once the proper wire color is determined, and the continuity is checked, it may become necessary to change the terminal location in the plug connector. While you can change it under the hood it is easier to change the terminals in the under dash connector.

Individual leads in any GM plug style connector can be “swapped” for a different location within the plug. The procedure is fairly simple. With a flat bladed jeweler’s screwdriver or similar tool, insert the blade of the tool in between the brass terminal and the black plastic to depress a tab that holds the terminal in place in the plug. Once you depress the tab (which may take several tries on both the “top” and “bottom” of the plug) you will be able to gently pull the wire and connector free from the plug. Remove the wires that need to be switched, spring the tabs back up and re-insert them into the plug in the PROPER position according to your wire location needs.

Connecting the Wires

Once you have tested all of the wires and determined that they are functional and in the correct order within the plugs, it is time to connect all of the necessary wires. This should now be as simple as connecting the plugs to the terminals on the wiper motor under the hood and to the switch under the dash. If you choose to test the system WITHOUT the switch in the bezel, you must provide a chassis ground for the appropriate terminal on the switch. Once the switch is in place it SHOULD have proper grounding from the ground wire for the headlight switch. IF you have chosen to have the washer function of the system operational, make sure that you connect the washer plug (black wire with a yellow stripe and dark blue wire) to the washer pump.

TROUBLESHOOTING THE SYSTEM

PROBLEM

LIKELY CAUSE/CURE

Wipers run all the time the key is ON

Incorrect wire position in the plug
double check that the wires are in the correct position in the plug

Wiper motor does not turn on with switch
On HI or LOW and the key is on

The motor is not getting power or is bad. Double check that there is Current flowing to the middle prong Of the under hood plug when the key Is on RUN or ACC

The function of the switch is wrong
(ie the washer causes the wipers to Run on high speed)

Re-check the wiring to make sure that the proper color wires are connected to the right terminals

Switch in LOW or HI and only an

The position of the light blue and

Audible “click” is heard but motor
Does not run

blue wires is reversed and the
washer pump solenoid is being
Energized instead of the motor.

The wiper arms “park” above the
Rear of the hood line OR park in
The middle of the windshield

The transmission is not properly
adjusted, the linkage is attached 180
degrees from where it should be See
when item #6 under mechanical
connections above

Conclusion and Notes

While I have attempted to insure that this article is a complete guide to converting standard to hide away wipers, I am an amateur hobbyist. (probably much like yourself) Therefore, I can not be 100% certain that I have answered all of your questions or guarantee that once you have followed all of the instructions that you system will work perfectly. In many cases, we are working with 30+ year old electrical components which tend to show wear and age. It is my sincere hope that you were able to easily follow these directions and make your system fully functional. There are many variables in the equation including, several different motor styles and way too many different switches. If you have followed all of the instructions above and have a specific question AND are willing to be patient, take photos and correspond via email . . . I can attempt to help you out if you are stuck. IF time allows I will respond to all emails properly address to: Brent Brunner allnasman@atlanticbb.net . Please include “hide away wiper system” in the subject line. Make sure that you are able to receive mail from me if you want a reply!

I have taken the time to prepare this article to answer many questions, debates and troubleshooting sessions that I have had over the last year. Once my project car was nearly complete, the only remaining system that was not functional was the windshield wipers. I needed working wipers to pass PA state inspection. Although I had completed my restoration nearly, completely on my own, I was so stumped by the wiring of this system I consulted a professional who could not get it to work. In frustration, I sat on the floor in my garage one weekend determined to solve this electrical “puzzle” I used the above photographed bench test system (in the same way I have encouraged others to do) to figure out the proper wiring. I eventually triumphed, mostly via trial and error, and share my results with all those who have requested help.

On a final, personal note, from November of 2002 to the spring of 2004, I performed a frame off restoration of a 1970 Chevrolet Sport Coupe model Camaro. My website documents most of the process with pictures and text. The web address is: <http://webpages.charter.net/BBCamaro/>. Additionally, on my site, you can find a similar article to this one on the conversion of an "idiot light" cluster to full, factory gauges (RPO U14) Without the help and support of all of the 13K plus members of the Second Generation Camaro Owner's Group website (owned by MadMike M.) found at www.nastyz28.com (where I answer to the screen name "earlysecond") I could have NEVER completed my project. As always, if you find any technical errors in any of my articles. . . please contact me by email so that I can correct them to avoid future problems/questions.

Best of luck on YOUR project

Brent

