This write up documents the installation of Autometer Sport Comp II gauges into a 1971 Camaro with original full factory instrumentation. The Autometer gauges completely replace the original factory instrumentation, complete with a new instrument bezel from Covans Classics. To note, many aspects of my Camaro are not original 1971, however care will be taken to explain the differences as the write up progresses. For instance, this Camaro has EFI with an overdrive transmission that already utilizes a factory vehicle speed sensor (VSS). The Autometer Sport Comp II speedometer is fully electronic and operates on the signal produced by the VSS, whereas customers with non-computer-controlled drivetrains will need to adapt a VSS into the system. In addition, my Camaro has a three gauge instrument cluster in the dashboard center A/C opening and populated with Autometer Z-series gauges. While my Z-series gauges are mostly mechanical, they do provide some pre-existing infrastructure that I take advantage of when replacing them with the Sport Comp II's.

Even though this write up is specifically for a 1970-78 Camaro, it is hoped that the instructions and tips given here will aid the owners of other types of vehicles in their installation.

Also, while Covans Classics offers complete instrument clusters with gauges included, I opted to do a custom package since the complete clusters and pre-drilled unpopulated clusters are designed to use only the 3-3/8" speedometer and tachometer. For this installation, I preferred the 5" versions and it resulted in some modifications being required to the Covans bezel (the details of which will be covered).

Lastly before we begin please note that this write up is not intended to replace the detailed instructions provided by Autometer with each gauge. Extreme care should be taken to follow Autometer's instructions exactly since these gauges are in fact sensitive electronic hardware and installation errors can result in product damage. Taking the time to do the installation correctly will produce first-pass success and results you can be proud of.

The gauges selected for my installation were the following:

Application	Part Number
SCII Electric Speedometer, 5"	3698
SCII In-Dash Tachometer, 5"	3699
SCII FSS Voltmeter	3691
SCII FSS Water Temp	3655
SCII FSS Oil Press	3621
SCII FSS Oil Temp	3656
SCII FSS Fuel Press	3663
SCII FSS Programmable Fuel Level	3610
SCII FSS Boost/Vac	3659

All gauges are full sweep electric. The three that are being mounted in the dashboard center A/C opening are replacing an existing set of Autometer Z-series gauges (Oil Pressure mechanical, Vacuum mechanical, and Water Temperature electric). As such, the infrastructure for the gauges was already mostly there. Though this write up will include the portions of the installation required if doing it from scratch.

Let's start with the three-gauge panel in the A/C duct. If you are not doing a setup like this, you can skip to the main instrument cluster. In order to mount the gauge panel, some brackets must be installed on the dashboard. In this case, some 1/8" thick, ½"wide steel-stock was used for brackets which were formed to mirror the internal contour of the dash pad behind the center A/C opening. The brackets were then attached to the dash pad via self-taping screws (be certain to select screws that are short enough to not poke through the front of the pad!). Since the brackets are being pulled forward when the gauges are installed, the screws are there simply to hold the brackets in place and maintain orientation during the gauge cluster installation. The gauge cluster fasteners will pull on the brackets which will generate the real holding power.

The gauge bezel was custom machined from ¼" aluminum. However, other materials will work too- hard plastic, nylon, even wood. With the brackets temporarily mounted on the dashboard, test fit the empty gauge bezel into the A/C opening and mark the holes on the brackets for match-drilling. Also mark the gauge mounting holes on the brackets since the sides of the brackets will need to be relieved in order to fit the gauges in. See the picture below for what the completed brackets look like.

Remove the brackets, drill the bezel mounting holes, and then reinstall the brackets. The mounting holes can either be drilled/tapped into the steel brackets, or they can be drilled through and a nut used on the backside. Temporarily install the gauges into the bezel with their back-side retainer rings and test fit the instrument cluster bezel into the A/C opening. Ensure that the gauges slide in easily past the brackets. Rework the brackets as required until the instrument cluster fits in easily. Permanently mount the brackets when finished.

Moving onto the wiring: Obviously the wiring depends on the type of gauges selected. In this case, vacuum, oil pressure, and fuel pressure were used. Since there were previously vacuum and oil pressure gauges there, I opted to take advantage of the existing hardware, such that the vacuum and oil pressure lines already penetrating the firewall were used to mount the electrical sensors. In the previous picture above, the oil pressure sensor can be seen attached to the –AN oil line previously used to support the mechanical oil pressure gauge (although mechanical oil pressure gauges are typically supplied with nylon tubing, I recommend using braided steel AN line for reliability purposes). The sensor was then anchored to the underside of the dash. This is one method of installing the sensor.

Another method would be to use the oil pressure port behind the intake manifold that's common to most small block Chevrolets. In which case, simply route the wiring and the supply line through a hole the fire wall using either an existing grommet or one supplied by Autometer in the gauge kit. Since I'm also using an oil temperature gauge, a tee fitting was used to accommodate the sensors of both gauges.

In like manner, the vacuum gauge, supplied with a GM style Manifold Air Pressure (MAP) sensor, was also mounted behind the dash board. See the pictures below for details.

The sensor mounting bracket was made out of a piece of sheet aluminum bent into an "L" shape. Holes were then drilled to mount the sensor.

The MAP sensor was then fastened to the bracket.

Finally, with some automotive grade double stick tape, the assembly was fastened to a bracket under the dashboard and the previously existing vacuum line was routed to it.

The MAP sensor may also be mounted inside the engine compartment. In which case like the oil pressure sensor, route a vacuum line to it from the engine and route the gauge wiring through a hole in the firewall using the grommet to protect the wires.

The fuel pressure gauge is the last one in this trio. The fuel rails on my EFI manifold provided a convenient location to mount the fuel pressure sensor. The left side fuel rail comes with a Schrader valve for a hand-held fuel pressure gauge. Unfortunately the hole in the rail was tapped with a 5/16-18 thread. So I removed this valve, re-drilled and tapped the hole for a 1/8-27 NPT and then installed the Autometer fuel pressure sensor directly into the fuel rail. The gauge wires were routed to the sensor through the hole in the firewall

In the case of a carburetor, an inline fuel fitting (with a 1/8-27 NPT hole for the sensor) will need to spliced into the pressurized side of the fuel pump (somewhere along the fuel line between the pump and the carburetor). After installing the sensor, the wires can be routed from the gauge, through the hole in the firewall, and over to the sensor.

One of the advantages of the Sport Comp II series gauges is the connectorized inputs. With all of the individual gauge harnesses routed to the three-gauge cluster in the A/C opening, it's now just a matter of routing +12V, ground, and dashboard illumination to the gauge cluster. One could directly attach each individual gauge harness to the above circuits. Or in my case, I spliced in an intermediate connector. Since the three gauges are running parallel on each of the three circuits, I opted to use an intermediate connector. The connector is simply an off-the-shelf 12-contact connector from the local electronics store.

Below is a picture of the completed intermediate harness (gauges to connector). The +12V lines from the gauges are soldered together at one contact, the main

ground lines are soldered together at one contact and the dashboard illumination lines are soldered together at one contact. The sensor wires are then installed individually.

Prior to starting this however, it's good a idea to generate a wire list with circuit vs pin number to ensure no miswires, and then follow up with an ohm-out of each circuit using a multimeter. This is particularly true since each of the gauges shares the same color wires and can become confused for one another when assembling the harness. The last thing one would want is a short circuit on initial power-up. A sample wire list is below.

Pin	Circuit	Color
1	+12V (parallel for all gauges)	Red
2	Illumination (parallel for all gauges)	White
3	Main Ground (parallel for all gauges)	Black
4	Vacuum 5V reference signal	Purple
5	Vacuum Signal Return	Gray
6	Vacuum Main Ground	Black
7	Oil Pressure 5V reference signal	Purple
8	Oil Pressure Signal Return	Gray
9	Oil Pressure Main ground	Black
10	Fuel Pressure 5V reference signal	Purple
11	Fuel Pressure Signal Return	Gray
12	Fuel Pressure Main ground	Black

The mating connector is hardwired into the vehicle with the corresponding circuits. It's also a good idea to tag the individual gauge harnesses since each connector is physically identical and can be accidentally inserted into the wrong gauge.

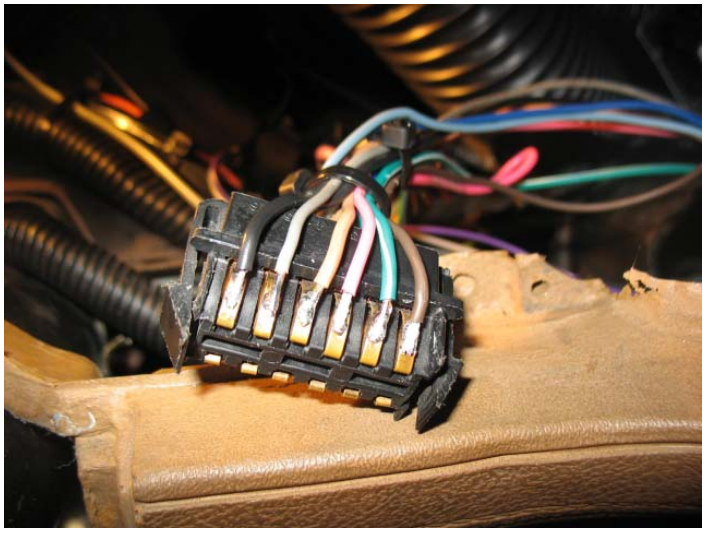
At this point, the three-gauge cluster installation can be completed. Obtain the three-gauge cluster, mate the connectors to the respective gauges and then install the bezel on the dash. Turn on the ignition and ensure that the gauges initialize per Autometer's instructions. Then turn on the dashboard lights and ensure that the gauges illuminate.

With the three gauge cluster complete, we can now move on to the main instrument cluster; this time, starting with the electrical. I selected the following gauges for the main instrument cluster:

Application	Part Number
SCII Electric Speedometer, 5"	3698
SCII In-Dash Tachometer, 5"	3699
SCII FSS Voltmeter	3691
SCII FSS Water Temp	3655
SCII FSS Oil Temp	3656
SCII FSS Programmable Fuel Level	3610

A good way to minimize the amount of effort on this conversion is to take advantage of as much of the factory wiring as possible. The factory instrument cluster already has fuel level, turn signals, and tachometer. Although it also has water temp, the Autometer water temp gauge operates on a 5 volt isolated return circuit (meaning that it does not use the main vehicle ground as a return like the factory gauge does). Therefore it's better to use the Autometer gauge harness rather than use the factory one in this case. As before, route the individual gauge wires through the hole in the firewall using the supplied grommet.

One approach to tapping into the factory wiring would be to cut off the factory instrument cluster mating connector and solder the connections directly into the harness. In my case, it was decided to avoid cutting the factory harness. Rather, a different approach was used. As it happens, the wires interfacing to the Autometer gauges can be soldered directly onto the contacts of factory connector. Be careful doing this since applying too much heat for too long can melt the plastic connector body. See the picture below.



After soldering, it's recommended to coat the terminals in a silicone sealer and then wrap the connector in electrical tape to prevent shorts.

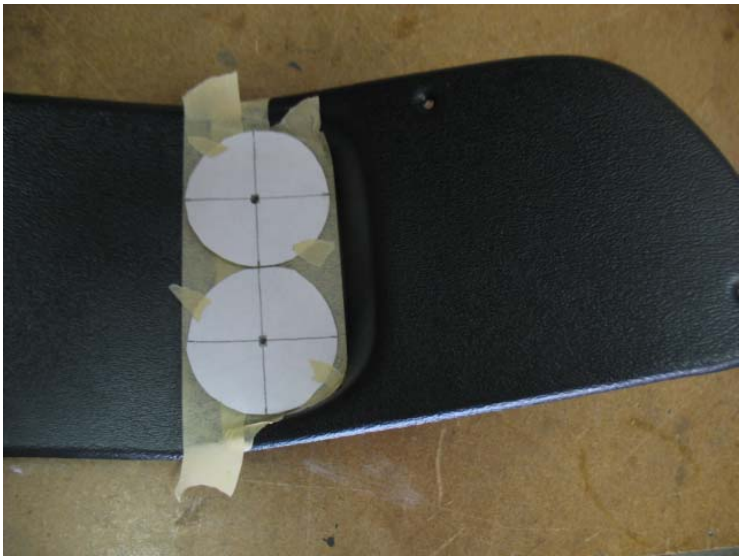
As with the three-gauge cluster, an intermediate connector may be soldered into the new Autometer harness. This makes it considerably easier to remove the instrument cluster by disconnecting only one connector. The wires soldered onto the factory connector are then routed to the intermediate connector. See picture below.

Again, it's a good idea to generate a wire list to ensure that the connector is wired correctly. Here's a sample I generated for this application. It correlates the intermediate connector pin number to the factory connector pin number. It also correlates the wire colors to one another.

Autometer Color	Intermediate Connector Pin #	Circuit	Factory Connector Contact #	Factory Color	Comments
Red	1	+12V	3	Pink	
White	2	Illumination	5	Gray	
Black	3	Main Ground	6	Black	
Brown	4	Tach Signal	1	Brown	
Gray	5	VSS Speedo Input	N/A		Use VSS output from ECM harness
Purple	6	Fuel Level Signal	4	Tan	
Purple	7	Oil Temp 5V reference	N/A		
Gray	8	Oil Temp Return	N/A		
Purple	9	Water Temp 5V reference	N/A		
Gray	10	Water Temp Return	N/A		
Red	11	Volts	N/A		Use +12V on Pin #1

If you are using a pre-drilled and/or pre-populated Covans instrument bezel, much of the mechanical installation portion contained below will be inapplicable. You can skip directly to the gauge installation.

The first step is to start locating the 2 1/6" peripheral gauges. I created some 2 1/6" paper templates that have centerlines. These help locate the gauges and allow marking of the exact center for later drilling.



Once you're satisfied, mark the centers and drill one small pilot hole in each location (the pilot hole will help guide a hole saw if that's the tool you intend to

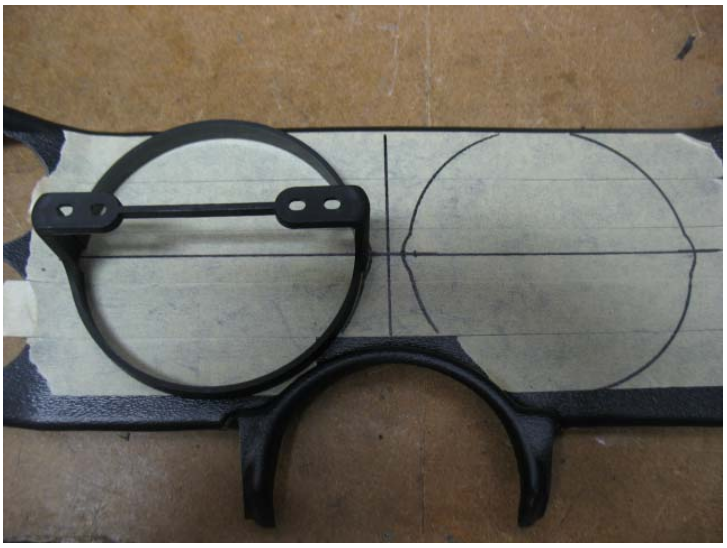
use). You can use a hole saw or a jigsaw, but whichever one you use, use a low speed setting to avoid melting or deforming the surrounding plastic.

Test fit the gauges to ensure proper fit.

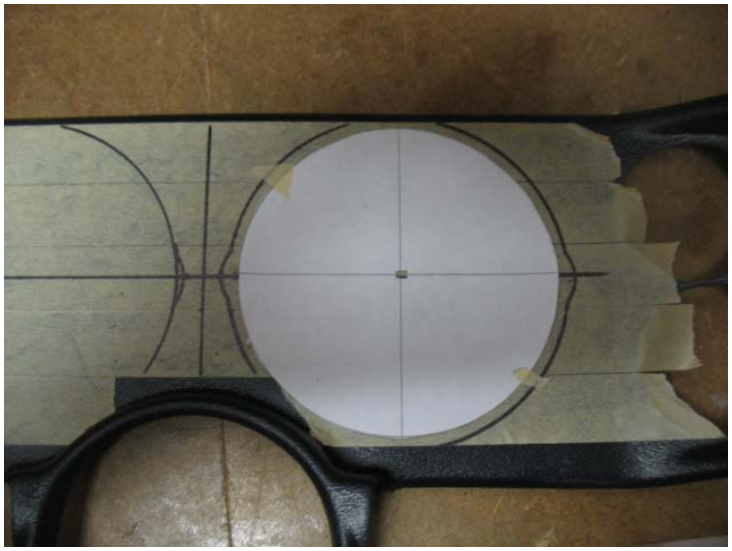
Repeat the process for the other side and your instrument cluster should now look like this:

Remove the gauges and locate the area for the headlamp switch and wiper switch. Drill out the hole for the head lamp switch retaining nut. Also, using a razor knife carefully cut away the rectangular opening for mounting the wiper switch.

Moving on to the 5” gauges, I used the gauge retaining brackets to simulate the outer bezel diameter of the gauges themselves (it’s very close). Placement of these is somewhat a matter of preference, but be sure to place them such that there is as much material remaining on either side as possible.



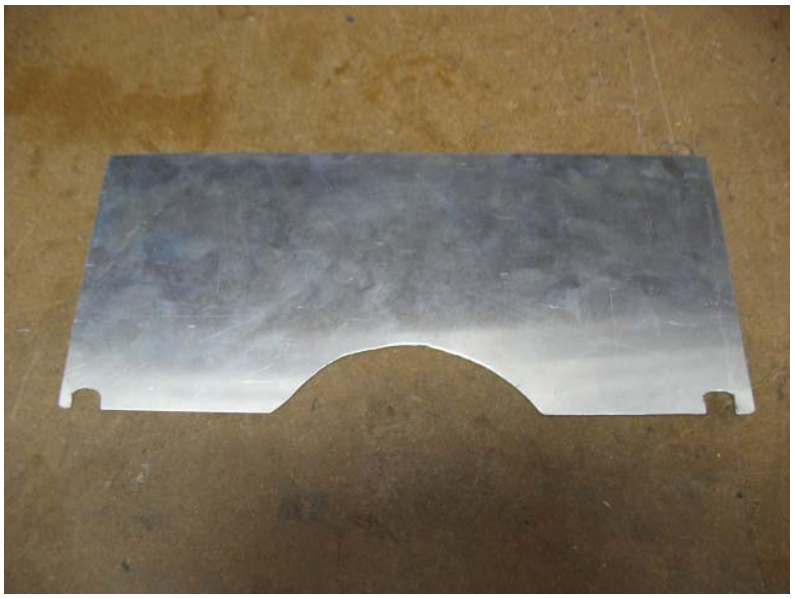
Then using the same paper template method, locate the exact centers of the holes.



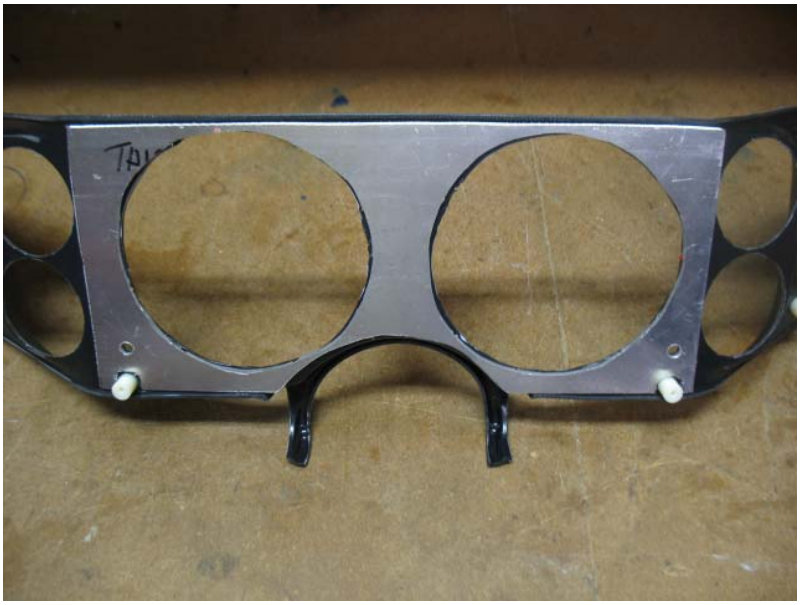
Now cut the holes. Again, a hole saw or a jigsaw can be used here. Once the holes are cut, test fit the gauges. The semi-completed Autometer/Covans instrument bezel should now look like this:

Clearly the 5” gauges leave very little material remaining. The bezel has been weakened too much to support the weight of the gauges and the stress of maneuvering the setup into the dash board. To remedy this, I made an aluminum backing plate. Here’s how.

I obtained a .050” thick piece of sheet aluminum. I wouldn’t recommend anything thinner than this, but slightly thicker is ok too. The plate was then cut into the general outline of the bezel (it only needs to support the center section since that is where the weak points are).

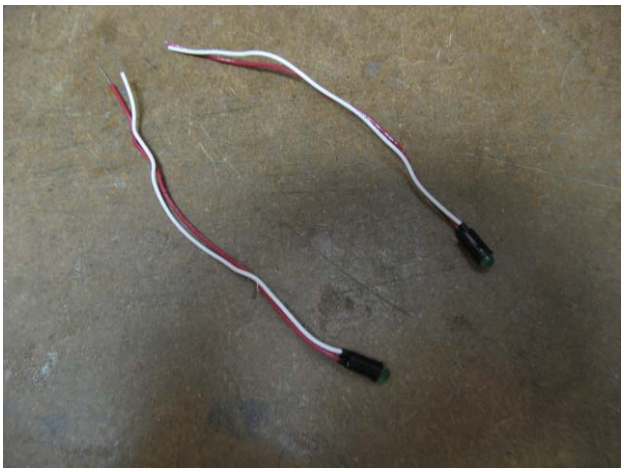


Once the backing plate fits properly against the bezel, mark the 5” gauge holes from the front. Remove the backing plate and then cut the holes with either the hole saw or the jig saw.



Now, the way I attached the bezel to the backing plate was to cover the entire mating surface with automotive grade double stick tape (after a thorough cleaning with isopropyl alcohol on both the backing plate and bezel). Set the backing plate on the workbench tape-side up, lay the bezel on top of it and press down hard across the entire area to ensure good adhesion. This backing plate will now provide some added rigidity to the bezel.

Once the backing plate is attached to the bezel, we can drill the holes for the turn signal lights. In this case, I purchased some LED's. Unfortunately the local electronics store only had 3V LEDs in the style I wanted, so I simply put a 5.1 kOhm resistor in series with the 12V power lead in order to make it suitable for a 12V input.



Locate the positions for your turn signals and drill the appropriate size hole for the lights you are using. Drill all the way through the instrument bezel and the aluminum backing plate. Then install the turn signal lights and complete the wiring per the following.

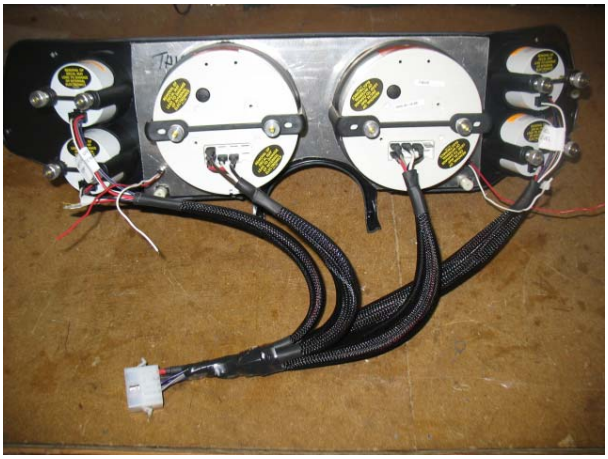
Below is the remainder of the wire list that documents the turn signal wiring from the factory connector to the intermediate connector.

Autometer Color	Intermediate Connector Pin #	Circuit	Factory Connector Contact #	Factory Color	Comments
Red	12	Turn Signal Left (+)	9	Light Blue	
White	13	Turn Signal Left (-)	N/A	Red/Black Stripe	Chassis ground
Red	14	Turn Signal Right (+)	11	Dark Blue	
White	15	Turn Signal Right (-)	N/A	Red/Black Stripe	Chassis ground

Once the backing plate installation is complete, we can permanently install the gauges per Autometer's instructions and then complete the wiring.

With the gauges installed, route the wiring harnesses neatly together such that they converge at the connector which will mate to the previously installed

connector on the dashboard. On the speedometer and tachometer, be sure to follow the wiring diagram that Autometer provides in their instructions. I also used some wire covering to help keep the harness neat and clean.



Populate the mating connector according to your wire list. At this point, it's recommended to take an ohm-meter and buzz out the wire harness with a point to point check. This will insure that you've populated the connector correctly and will prevent miswires resulting in possible damage to the hardware.

Once the wiring is verified to be correct, install the Covans instrument bezel cluster just as you would the factor instrument bezel. Be sure to make the electrical connection(s) prior installing the bezel though! Here's the finished product from my installation.

The last remaining things are to start the car and verify gauge operation as well as to calibrate the speedometer. If everything was installed correctly, you should have a beautiful, functional instrument cluster to enjoy!