



NEW VINTAGE USA
DETROIT

THE ORIGINAL PERIOD-STYLED AND THEMED INSTRUMENTS

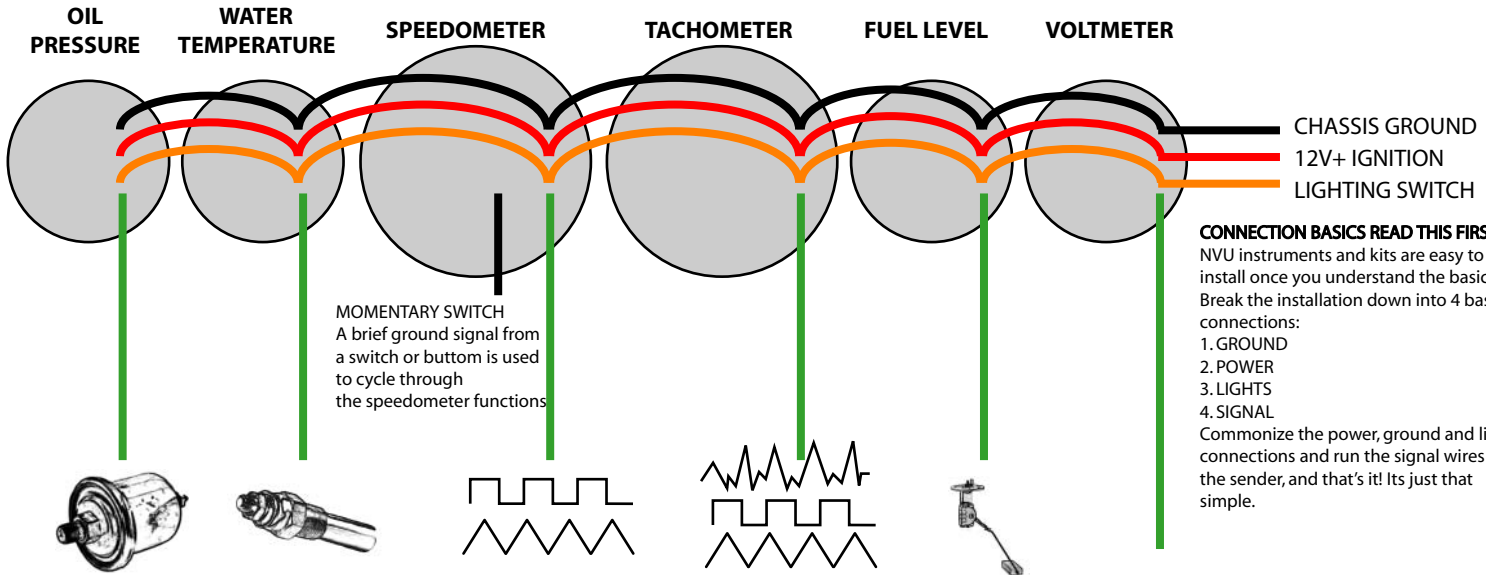
NEWVINTAGEUSA.COM | MADE IN DETROIT

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TECHNICAL DATA

TECHNICAL DATA INSTALLATION BASICS



CONNECTION BASICS READ THIS FIRST!
 NVU instruments and kits are easy to install once you understand the basics. Break the installation down into 4 basic connections:
 1. GROUND
 2. POWER
 3. LIGHTS
 4. SIGNAL
 Commonize the power, ground and light connections and run the signal wires from the sender, and that's it! Its just that simple.

OIL PRESSURE SENDER
 Typically matched for the gauge and included in a kit or package. This unit installs in a pressurized port on the engine, intake or head. Generally 1/8"-27, adapter bushings are available for various thread sizes. The ground is typically through the threads. For a hood ground, do not use a sealant. If a sealant is required, keep it at the top of the threads to the lower portion can bite into the material. Some Pressure senders have two connections, one is for the sender (G) and one is for a low-pressure warning (WK) G is not a ground.

TEMPERATURE SENDER
 Typically matched for the gauge and included in a kit or package. This unit installs in a location where it can be in contact with coolant, usually in the intake or head. Generally 1/8"-27, adapter bushings are available for various thread sizes. The ground is typically through the threads, but occasionally has a separate wire. For a hood ground, do not use a sealant. If a sealant is required, keep it at the top of the threads to the lower portion can bite into the material.

ELECTRONIC SPEEDOMETER
 NVU programmable speedometers, like all speedos that are electronic require a pulsed signal. Typically a square wave (top) or AC sine wave (lower) is needed so that the unit can count the pulses. To program, the speedometer counts the number of pulses in a mile and self calibrates. Once set-up the unit counts the pulses per second and points the pointer to the appropriate angle and the odometer is alerted to maintain mileage. Its only math. The signal can come from a variety of sources, the only limitation is the input needs to be between 4000-150,000 per mile and have a strength of 5V. Voltage is the strength, the wave is the frequency.

ELECTRONIC TACHOMETERS
 NVU tachometers operate on a similar principal to the speedometers. As pulses come in, the pointer is directed to turn to the proper angle reading engine RPM. NVU tachometers have settings for 4-6-8 cylinder signals; this is set on the back of the tachometer. There is also additional filtering for noise reduction in the signal as NVU tachometers accept a signal from most any source or ignition system. Older coil pickup signal are considered high voltage (noisy, dirty) and CDI and PCM signals are low voltage and considered clean. See below for signal types and connections.

FUEL SENDER
 Fuel senders function in a similar method to pressure senders with a built-in rheostat and send a resistance to ground signal to the gauge measured in OHMS. There is a wide variety of fuel senders, OE and aftermarket, the fuel gauge must match the sender to operate properly or a NVU fuel level converter may be needed. Air core gauges have a set reading; stepper motor fuel gauges have several pre-programmed reading available. Universal kits have a universal, 240-33 fuel sender that adjusts from 6" to 18" tank depths. Just like any sender the body must be grounded.

VOLTMETERS
 Measure vehicle voltage. Air core gauges measure the voltage through the power lead. Stepper motor gauges pick up voltage readings through a signal wire on the back of the gauge.
OTHER VOLTMETERS TRANSDUCERS:
 A sender type that outputs voltage rather than resistance to ground. Gauges that read transducers are basically voltmeters with dials calibrated to the transducer output. Air-Fuel ratio gauges also operate on this principal.

SPEEDOMETER SIGNAL SOURCES (VSS) (VEHICLE SPEED SIGNAL)

In general, there are 3 sources for a speed signal, they all do the same thing but retrieve the information in different ways.

SCREW-ON SPEED SENDERS

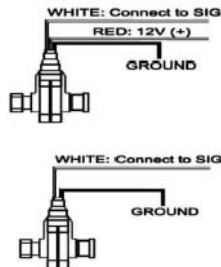
This type of sender replaces the original speedometer cable on the transmission. The original drive gear from the cable is placed on the end of the sender, inserted into the transmission and fastened. The sender is then driven to generate the proper signal and the speedo counts the pulses. There are 2 types.

HALL EFFECT SPEED SENDER

Sometimes called a 3-wire sender. This generates a square wave signal. The wires generally are power (RED) ground (BLACK) and signal (WHITE). Simply wire those connections and run the signal to the speedo, that's it.

SINE WAVE SPEED SENDER

Sometimes called a 2-wire or pulse generator. This generates a AC sine wave by being spun by the transmission just like the hall effect. It can generate its own voltage (8-18V AC) and the speedo counts the pulses peak-to-peak. The wires are interchangeable, one is ground, the other signal.



INTEGRATED SPEED SENDERS

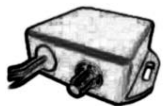
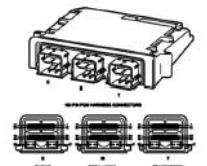
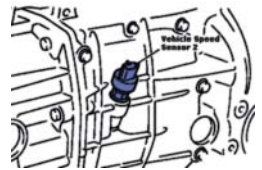
For the most part these are basically a Sine Wave signal generator just like the screw-on type but a pickup is installed to the transmission case or tail shaft and a reluctor ring (toothed ring) passes by the pickup. This type usually has 2 wires, a ground and signal, for the most part the wires are interchangeable. The signal can be picked up from the signal wire, just make sure it is not the ground wire or there will not be a signal, this can be checked with a multimeter for a closed circuit to ground. The signal generated must be 4-18V for the speedo to read it. This type of pickup is often used for the engine/vehicle computer/PCM. It is best practice if this is the case to leave the signal intact for the PCM and pick it up from an output on the PCM.

COMPUTER/PCM/ECM/CONTROLLER

NVU electronic speedometers can read most any signal from a vehicle PCM provided it has an output and the VSS is sending a signal to the PCM. No need for boxes or adapters. In general this signal is a square wave, or sine wave. The speedometer is programmed just like any other input.

GPS SENDER

The latest generation of GPS senders makes it easy to install and calibrate an electronic speedometer. These read data from the GPS satellites and produce the proper number of pulses for the speedometer to read. The signal is usually a hall effect and is easily adjustable.



INTEGRATING WITH COMPUTER CONTROLLED ENGINES

Whether you are installing a new LS from a 2010 Corvette or adding more gauge functions to your 93 Mustang, NVU instruments are easy to add on to these systems. Once you have the basics, you can plan your system to fit your needs.

Your computer-controlled vehicle requires inputs from the stock senders on the engine to monitor temperature, speed, pressure, etc to maintain peak power and efficiency. The senders incorporated into the factory PCM system must be maintained and left in place. NVU instruments, as most aftermarket gauges require matched senders for temperature and pressure to be installed in addition to the original senders. In general there are multiple ports for adding on the new senders on the engine and they will not interfere with PCM operation. Speedometers and tachometers can read from the factory sender or PCM output. Check your PCM wiring diagram for the proper outputs.

Why can't I just connect the gauges to the computer?

Passenger vehicles from 1994 and up use a diagnostic OBD2 port that uses J1979 as the communication protocol. While most information is available, it is not universal for all vehicles, thus creating a product that will only work on certain vehicles. The vehicle communicates internally on what is known as a CAN-BUS system. Commercial vehicles, marine, military and heavy truck all use a standard protocol, J1939 across the board as a mandate by SAE, and this makes instrumentation integration easy. Passenger cars have no such mandate and thus have several communication protocols, sometimes more than one in a single vehicle. This makes it virtually impossible to have a product with a wide range of applications; the product would function on only one specific vehicle. The other reason for not reading from the PCM is often OEMs output "dummy" information to the cluster. The vehicle temperature or pressures may be too high or too low, but still within a safe zone, so the gauge will show a "safe" reading instead of what is actually being read. These readings are often grossly dampened, sometimes by a few seconds. If you lose oil pressure suddenly a few second is all it takes to smoke an engine.

So how can I integrate the gauges into the system? If you break the installation down into the simplest parts, commonize the power, ground and lighting leads, then install senders. A typical installation on an LS powered vehicle only requires the installation of 2 senders, the oil pressure and water temperature. Vehicle speed and engine speed are read from the PCM, volts are picked up from any powered wire and fuel level from the stock (or aftermarket) sender. On many levels using a traditional analog instrument set is easier than splicing into a CAN system and will function well for many years to come.

TACHOMETER INPUT SIGNALS

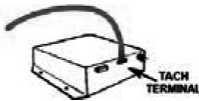
IGNITION COIL

High voltage signal, connect tach signal to the negative side of the coil.



CDI BOX

Low voltage signal. Connect to the signal output on the CDI box. (commonly called MSD box)

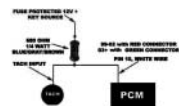
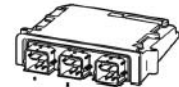


COMPUTER/PCM/ECM/CONTROLLER

Low voltage signal. Most PCMs output a 12V square wave. Some V8 engine PCMs output a 4-cylinder signal, some 8. You may not know until you connect and start the vehicle

Some PCM outputs are what is referred to as an open collector signal. This is a signal that is resistance and ground pulse. The tachometer will need a pull-up resistor to operate. The pull up resistor, once installed will give power to the signal in increase its strength, making it a hall effect signal.

To install a pull-up resistor, you will need a 680 up to 10K-ohm, 1/4-watt resistor start with 10K and work your way down. Solder one end of the resistor on a 12V switched power source; solder the other end to the tach signal. That's it.



For even more information including how-to videos, make sure to check out the tech info page on the NVU website www.newvintageusa.com

AIR CORE GAUGE OPERATION

Short sweep air core gauges function from resistance or voltage inputs. Very simple in theory, but if the components are out of spec slightly and not consistent from batch to batch, erratic, incorrect readings will result. The basics of a short sweep air core have a magnetic pole inside a winding that creates a field. The post rotates like a compass would in the presence of a magnetic field. As power to the coil is increased and decreased by the sender, the shaft rotates the pointer. A very simple, but precise way to read information. Air core gauges are generally very rugged and dependable due to their simple design.

Full sweep air core gauges like a speedometer or tachometer operate on a similar principal as stepper motor gauges. The movement has a dual winding, which enables the pointer shaft to rotate a greater distance. This is accomplished not by sender/voltage but by a microprocessor that interprets the input and outputs the appropriate voltage to the movement, pointing the pointer to the appropriate place on the dial.



SHORT SWEEP
AIR CORE



FULL SWEEP
STEPPER MOTOR

STEPPER MOTOR GAUGE OPERATION

Stepper motor gauges operate on the same principal as full sweep air core gauges. A digital or analog resistance or voltage signal is sent to the gauge and interpreted by a microprocessor. The processor then signals the motor to move the appropriate "steps" or degrees and point the pointer at the appropriate place on the dial. Stepper motor gauges often have a full sweep (270 degree) readouts for greater resolution of readings and can incorporate warnings, outputs and recall features due to the processing power of the stepper motor driver. The stepper motor does have limits on speed, which is only about 1/3 the reaction of an air core gauge but holds pointer position due to rapid changes in direction of the vehicle in a lateral direction especially at center position as the gauge will stay in its "step". More components adds to price but overall enhanced features makes it all worth it. Added delicate components does decrease the ruggedness of a gauge, NVU air core units pass 50G shock tests where NVU stepper gauges will pass 25G shock. While this might seem like a big difference, if your vehicle encounters a force of 25Gs the last thing you will be worried about is if your gauge is working. Overall a stepper gauge offers more features, flexibility and usually a higher end product.

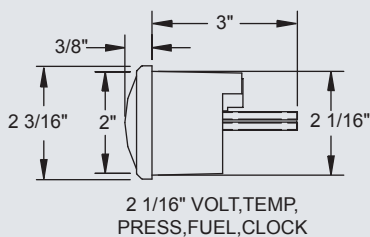
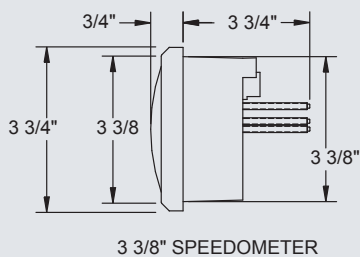
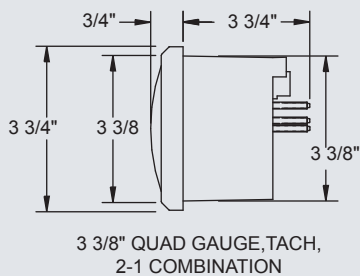
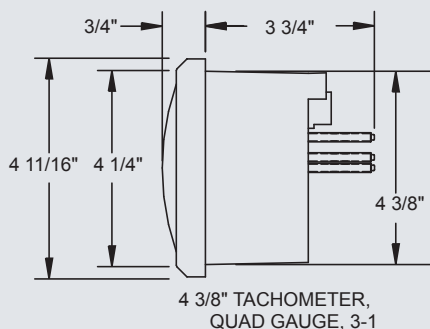
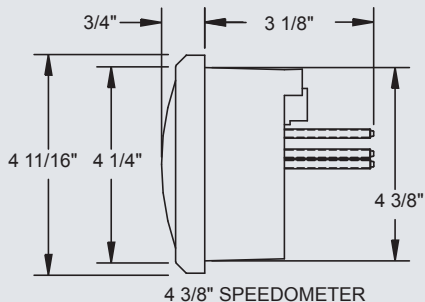
TRANSDUCERS VS SENDERS

A transducer is a sender type that outputs voltage rather than resistance to ground. Gauges that read transducers are basically voltmeters with dials calibrated to the transducer output. Air-Fuel ratio gauges also operate on this principal. Transducers are often used in high-pressure environments. A transducer generally requires power and a ground to function properly. The advantage of a transducer is the gauge (usually stepper motor) can be reprogrammed easily to function on a different signal. For example, a 150 PSI transducer can be used to read for pressure gauges in any range from 0-150 PSI.

Senders operate on resistance to ground. Either a rheostat or reactive conductive material is inside the unit that creates the proper readings. Senders are basically controlling the ground voltage to the gauge instead of the positive voltage as in a transducer.

We have found no function or quality difference between the two.

DIMENSIONS



WOODWARD SERIES 1920s-1950s
The original period styled instrument line. Bold deco-styled graphics, contoured pointer, bright inner ring capped by a domed glass lens and hand polished stainless steel bezel. Styled to look great in any vehicle from the 20s up to the 50s.



1940 SERIES 1940s-1960s
Military graphics used since the 1940s in aircraft now in your dash. Easy to read perimeter lighting with domed glass lenses and stainless bezels. Also available with our Bomber bezels for an even more authentic look.



1967 SERIES 60s and 70s
The 67 Series is the first true mid 60s musclecar inspired gauge available. Period look wraparound graphics with tall and skinny numbers look right at home in any musclecar dash. Looks great as a kit or adding on to what you have. Black dials, thin pointer, domed glass lens and stainless bezel for a high end look.



1969 SERIES 60s and 70s
Retro inspired mint green LED backlit full sweep gauges with stepper motor movements behind the scenes. Recall and warning incorporated into the gauge. Get the musclecar looks you want with the modern technology behind the scenes you need.



PERFORMANCE
Looking for an alternative to the race inspired gauges out there? The performance line features bold OE style graphics, easy to read with perimeter lighting, smoked chrome stainless bezels and flat glass lenses. Shock proof and watertight from the front. Designed for extreme duty and function as well as they look.



REDLINE
Need the high-end look for your ride? The Redline Series feature backlit LED white or amber lighting, paek recall and warnings, stepper motor movements. Bold performance graphics with spun metal surround look great day or night. Stainless bezel and flat glass lenses compliment the design. Great for a high end pro-touring build.



CUSTOM SHOP
Need something a little different? The NVU custom shop can make your dreams a reality. NVU is the ONLY instrumentation company that can offer customizable colors, graphics, integrated signals, lamps, etc. No one has more choices in pointers, bezels, lenses than NVU. If you can dream it we can build it.

