



## PHOENIX SPEEDOMETER INSTALLATION INSTRUCTIONS



NVU Phoenix platform speedometers offer features found in complete clusters, OE instrument systems and data loggers, all in a standalone unit. While all of the features listed in this manual are available, they are not all required to be used. You can use your speedometer simply as a way to monitor your speed or as a performance meter, its up to you. Some of the advanced features of the Phoenix platform speedometers:

OLED high resolution display

Drive-a mile self calibration

Integration with OE and aftermarket speed signal and PCM outputs

GPS input compatible

Overspeed warning output (AMP Plug models)

MPH/KPH speed toggle

Performance meter 0-60, 1/8 and 1/4 mile times/speed capture

#### Installation:

NVU Phoenix speedometers are offered in Perimeter lit (incandescent bulb) or backlit (LED backlighting) depending on the series. They are identified by the back, if bulb sockets are installed, you have perimeter incandescent, if the holes are plugged, you have an LED backlit unit.

#### Connections:

Speedometers are offered in either a studded or AMP plug connection. All of the wires on the AMP plug may be used depending on the application, check further in the manual for more details.

#### Terms when using the booklet:

Scroll: Pressing and releasing of the remote button to move through menu options.

Short push: Briefly holding the remote button and releasing it

Long Push: Holding in the remote button for 1 sec. or until a menu display changes.

With all of the features packed into NVU Phoenix platform speedometers, we had to divide them up into different menus. Your speedometer has a main "RUN" menu, and a "SETUP" menu. The RUN menu utilizes the features used during normal operation. The SETUP menu stores all of the items that are set-up during the installation process. (Items can be changed any time after if desired) and are separate to prevent inadvertently changing them during normal use.

During installation please contact NVU for questions/concerns, our qualified tech staff can help get you going.



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# AUTOCAL (DRIVE-A MILE SELF-CALIBRATION) QUICK SET-UP

**Check that your digital input filter is set to the proper input setting** (see more later in manual if needed) all NVU speedometers are shipped with the input set on HIGH (suitable for most applications) with 16,000 PPM

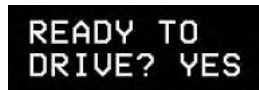
Enter the setup menu by holding in the remote button and turning on the key (start vehicle)



Scroll to auto calibrate (3<sup>RD</sup> ITEM)



Hold button until screen displays ready to drive? YES



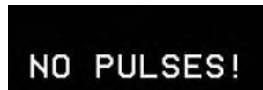
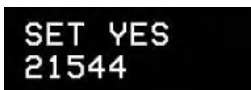
Hold in button until display shows counting 0



Drive exactly one mile(or KM), speed does not affect accuracy. You may or may not see action on the speedometer before or during calibration. Display will show counting with the digits below increasing. This is the speedometer counting the number of pulses it is receiving from the signal source. If the display does not count, check your signal source or input filter, the speedometer is not reading a signal



At the end of the mile (vehicle can be moving or stationary) Hold the button in until SET YES appears



If **NO PULSES is displayed**, a signal was not read by the speedometer. Check your input filter selection and speed signal.

Hold in button until SAVED! Appears



The speedometer is now calibrated. Pressing the button will take you through the rest of the setup menu features. To resume normal operation turn off the key (vehicle) and restart.

## INSTALLATION BASICS:

- Use a minimum of 20 gauge insulated, stranded wire, all connections should be connected with a crimp connection or solder and heat shrink.
- Keep speed signal wire(s) away from potential “noise” sources like ignition wires, tach signal wires, fan motors, pumps etc.
- Studded speedometers use #8 studs, use applicable eye terminals for wiring.
- Use a maximum of 1A fuse for the entire cluster, this is usually already in your fuse block

Commonize wiring, ground power and lights can be common on all gauges and “daisy chained”

## SPEEDOMETER OPERATION MENUS

With all of the features packed into NVU Phoenix platform Speedometers, we have divided them into different menus. Your speedometer has a main “RUN” Menu, and a “SETUP” menu. The RUN menu utilizes the features used during normal operation. The SETUP menu stores all of the items that are setup During the installation process. Items can be changed any time after, if desired, And are separate to prevent inadvertently changing them during normal use.

### RUN Menu Functions

Features can be accessed in the run menu during normal operation with the key on. To scroll to the various displays in the OLED screen, use a short push or tap of the remote button.

**MAIN ODOMETER:** Displays total distance travelled in miles or kilometers depending on the model. This display does not show tenths.



**TRIP METER:** Displays current trip distance

Press and hold the button and the odometer will reset to 0. This display will show tenths and will not have any zeros in front of the distance travelled.



## RUN MENU-CONTINUED

**SERVICE**– This is used to see when your next service interval is due (Oil Change, Tire Rotation...) The interval is set in the SETUP MENU in the next section. This screen is to display the interval remaining.



SERVICE  
003000

When the service interval has been reached, the SERVICE REQUIRED warning will display at vehicle startup. The interval can be reset in the SETUP menu.



SERVICE  
REQUIRED

**MPH :** This will display your current Miles Per Hour you are traveling



122 MPH

**KPH:** This will display the current Kilometers per Hour you are traveling



100 KPH

**Peak SPEED:** This will display the highest speed achieved since last reset. Press and hold the button and the odometer will reset to 0.



100 PEAK  
MPH

**Performance Timers-** (where applicable) Displays 1/4 and 1/8 mile time and trap speed as well as 0-60 time. Enter the performance mode you wish to measure, Hold the button until the dialog to start is displayed, enter yes to start no to reset. Start driving. (Professional driver only on a closed course)  
Note: this feature is available on select models only, check product features documentation

## SETUP MENU

The setup menu contains menus used for functions not used during normal operation. These features are in this sub-menu to avoid inadvertently changing them during normal operation.

While the vehicle is off press and hold the button. Turn the vehicle on. The odometer will display "SETUP MENU" Short pushes on the button will scroll through these, long hold of the button will select the item. . To exit the SETUP menu turn off the vehicle and restart. You may operate the speedometer in setup mode if required the speedometer will operate to make fine tuning easier.



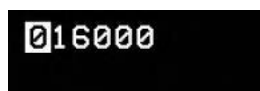
**SERVICE RESET** (Push and hold button to enter) This is used to reset service interval if you have saved any (Oil Changes, Tire Rotations, Tune Ups...) You can Set service intervals later in this menu (Service Set section). Short push to scroll, long push to select



**MANUAL CALIBRATE:** (Push and hold button to enter) Manual calibration of the speedometer is used to manually enter the pulse setting. You must know the pulse setting of the speed signal to use this feature. Common uses are on OE (pre-configured) senders, GM PCMs GPS senders. Note: using this method will usually get you close enough and fine tuning or auto calibration may be required. Although many speed senders are standard output, various gear ratios and tire sizes will change the pulse settings depending on the vehicle build. The speedometer will accept between 2,000-250,000 PPM. See next page for a chart with common pulse settings.



to enter the manual calibration mode, hold the button until the current pulse setting is shown. NVU ships all speedometer with a 16,000 PPM setting. If the number shown is not 16,000 the speedometer has already been auto-calibrated by the end user. If the pulse count shows zero, the previous autocal attempts resulted in not receiving a speed signal, check you sender and input filter.



Continued, next page:

**MANUAL CALIBRATE, CONTINUED:**

The current pluses will be shown, with the first number highlighted. To change that number short push scrolling will increase the digit. Stop on the number required and hold the button to select the next number and follow the same sequence until all numbers are correct and your are on the last digit to the right



The final dialog box will display asking to set. Select Y to accept, N to cancel. Hold the button on Y and the setting will be saved. The speedometer is now manually calibrated.



**AUTO CALIBRATE**

This feature allows the speedometer to automatically calibrate the speedometer by driving a measured mile (or kilometer). See quick setup earlier in this manual for instructions.

**INPUT FILTER:**

The digital filter in the speedometer is used to properly read the signal from virtually any pulsed source. Enter the filter by holding the button. Scroll to the filter selection desired, refer to the chart below. Select L, M or H (Low, Medium, High). Hold the button to select FILTER, set yes or no, hold to select, saved! Will display to indicate a successful session. You can change this at any time to adjust as needed or to experiment for the best results for your application.



SOURCE	TYPICAL PPM	SIGNAL TYPE	INPUT FILTER SET
GM PCM (ALL)	4,000	5-12V HALL EFFECT	5V=M, 12V=H
AFTERMARKET 3 WIRE	16,000	12V HALL EFFECT	H
AFTERMARKET 2 WIRE	8,000 OR 16,000	AC SINEWAVE	L
OE 2 WIRE (GM)	40,000	AC SINEWAVE	L
NV4500	108,000	AC SINEWAVE	L
TREMEC	16,000 OR 40,000	LOW AC SINEWAVE	L
GPS SENDER	8,000 OR 16,000	VARIES	5V=M, 12V=H

## SETUP MENU, CONTINUED

**OVERSPEED** Available on AMP-Plug and commercial Units only. The overspeed output can be used to trigger a relay that can operate a buzzer or lamp. Never connect the overspeed output directly to the device to be used, always connect with a relay or speedometer damage will result. The output on the overspeed is 12V+ less than .2 amp.

To set the overspeed enter the setup menu and scroll to overspeed. Hold in the button to enter the menu. The current overspeed setting will be displayed:



To change the overspeed setting, scroll to YES, then hold the button, the current warning level will be shown with the first digit highlighted. To change the digit, tap the button to increase the number. To move to the next number, hold the button until the next is highlighted. Proceed with the same procedure until all 3 digits are changed. On the last number hold until the display shows the speed and set? YES. The saved speed will be shown. If there is an error you can select NO or turn off the gauge and no changes will be made.



### SET ODOMETER:

The set odometer function is a one-time setting that the end user can change during the first 100 miles of operation. The user can set the mileage to the existing vehicle mileage to maintain a proper vehicle record. Once the mileage passed 100 miles, the feature will no longer be available. To enter the set odometer menu, scroll to set odometer and hold in the button. You will see one time set ? yes. Hold in the button.



000000 will be shown with the first digit highlighted. To change the digit, tap the button to increase the number. To move to the next number, hold the button until the next is highlighted. Proceed with the same procedure until all digits are changed. On the last number hold until the display shows the mileage set YES? Hold in the button and SAVED! Will appear. Turn off and restart the vehicle, mileage is now set.





## **SETUP MENU, CONTINUED**

### **PROGRAM VERSION NUMBER:**

This displays the current software version stored in the instrument. The version will vary based on the model you have. It is only required if you have an issue with your speedometer and this information will be useful when contacting NVU for service.

### **SPEEDOMETER TROUBLESHOOTING BASICS**

Speedometers are just like any other gauge in respect that it has the same 3 requirements, power, ground and a signal. Troubleshooting process is the same, start at the end of the system and work your way toward the gauge. As with all gauge systems there are 3 components: The gauge, the wire and the sender or signal source, all three need to be checked for the entire system to operate properly.

-Turn on the key, does the gauge power up?, NO>check power or gauge fault

-Turn on the lights, does the gauge light up? If not , check your ground.

### **-SPEEDOMETER WILL NOT CALIBRATE**

All speedometers require a speed signal to operate properly we first need to check the senders:

#### **HALL EFFECT CABLE OUTPUT REPLACEMENT STYLE:**

-Pull the plug from the back of the sender, check for power on the red wire, ground on the black -Pull the sender from the trans, turn on the key and spin the sender with a drill. Speedo operates check mechanical engagement issue with the transmission drive gear, check as needed. Speedo does not operate, check the sender wire using a test lamp

#### **HALL EFFECT SPEED SENDER TEST**

-The hall effect sender will alternate positive and negative pulsed when turning the sender slowly by hand. Use a test lamp or multi meter to check by probing the signal wire and the hot then the ground lead

#### **2 WIRE SPEED SENDER, AC SINE WAVE AND MAGNETIC PICKUP**

-Check that the ground lead is as short as possible

-Check for continuity between the sender and the gauge

-Pull the sender from the trans, turn on the key and spin the sender with a drill. Speedo operates> mechanical engagement issue with the transmission drive gear, check as needed.

Speedo does not operate, check the sender wire using a test lamp

#### **SPEED SENDER TEST 2 WIRE:**

-Set your multi meter on AC voltage, lowest setting or 20V. Probe the sender wire with the red lead, ground the back lead. Spin the tires; you should see between 8-18V on the signal wire. Low or no voltage is a bad or sender that will be going bad soon. This test can also be performed on the cable output style by removing and spinning with a drill to check for a mechanical issue (see above)

#### **NOTE ON FORD STYLE CABLE OUTPUT SENDERS**

Check that the drive gear is installed on the sender! The spin with a drill test should be made with the drive gear on and off to rule out an out-of-square drive on the gear

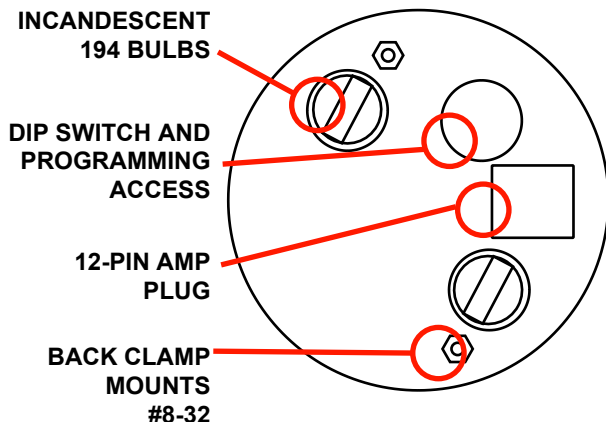
#### **PCM/ECU:**

Testing the signal is the same as above methods but it is also important to check the VSS on the transmission to ensure a signal is reaching the PCM first. Without that signal the PCM will not be able to send a signal to the speedometer.

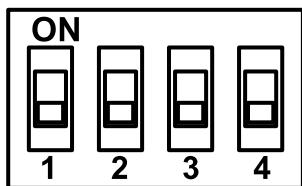
## THE BACK OF YOUR GAUGE

All NVU gauges with 12-pin AMP plugs have the same features on the rear. You will find the plug location, back clamp attachemnets, bulb locations (perimeter lit models only) and programming/DIP-switch settings.

**LIGHTING:** All perimeter lit incandescent gauges have standard 194 bulbs installed in a removable socket that is poweeded on the circuit board. To remove, ywist counter-clockwise and remove. Bulbs can be changed for different color or even LED bulbs. All LED backlit gauges have LED lighting incorporated onto the circuit board and is not changable. Do dim the IEDs you will require a LED dimmer. When wiring LED bulbs do not wire to the stock dimmer circuit as the bulbs will not dim or may not operate. You shouldl connetc to the parking lamp function for a constant supply of power.



The features are shown at right. To access the DIP switches, remove the rubber plug. All 3-3/8 and 4-3/8 gauges have the same layout.



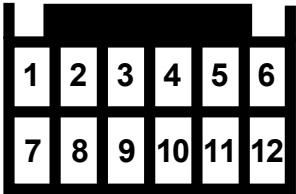
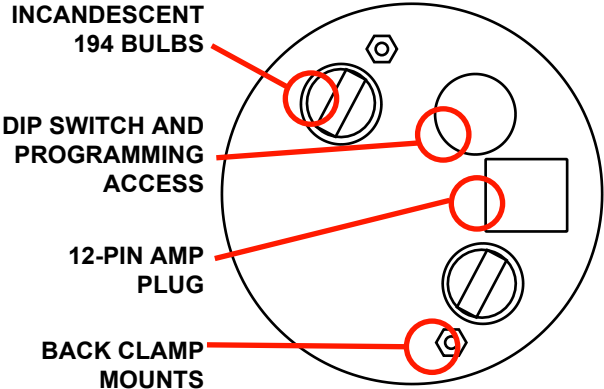
## PROGRAMMABLE FUEL GAUGE

All NVU Phoenix platform multifunction gauges feature stepper motor micorprocessor driven internals that feature programmable fuel level sender inputs. This allows for the setting to be changed at time of installation removing the need for a new sender or dropping the tank. Follow the chart below for proper DIP-switch settings for your fuel tank. Change the DIP switches with the power off. Use a pointed object like a pick or small screwdriver to change the settings. Ensure the switch is fully ON or OFF.

SENDER TYPE MAKE/YEAR	RANGE E – F	1	2	3	4
EARLY GM/FORD PRE-65	0-30	OFF	OFF	ON	OFF
GM 65-89	0-90	OFF	ON	OFF	OFF
GM 90S-UP	40-250	OFF	ON	ON	OFF
FORD 65-86	73-10	OFF	OFF	OFF	ON
FORD 87-UP	20-145	ON	ON	OFF	OFF
UNIVERSAL / SW	240-33	ON	OFF	OFF	OFF
CUSTOM/EARLY FORD	168-15	ON	OFF	ON	OFF

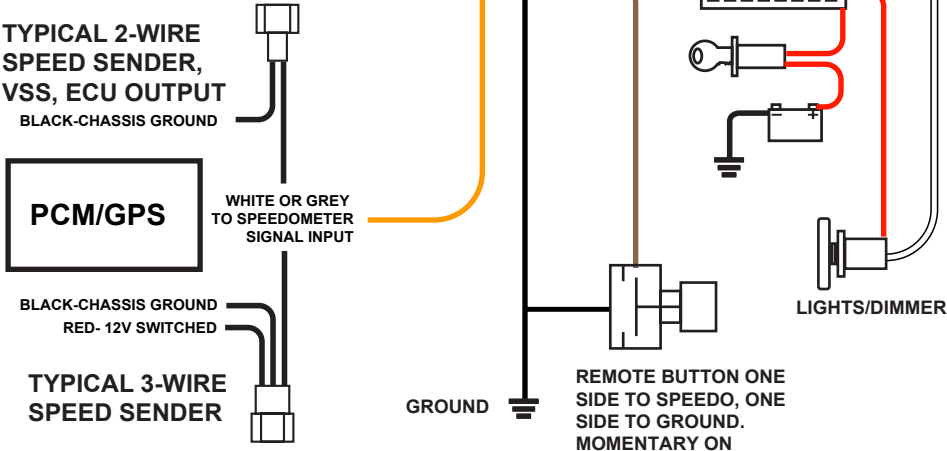
SPEEDOMETER WIRING/CONNECTIONS-AMP PLUG SPEEDO

Standalone speedometers with AMP plugs are incandescent perimeter, backlit or LED backlit. Incandescent bulbs will be in the access holes installed into the circuit board. DIP-switch settings are not required on speedometers. 3-3/8" and 4-3/8" are the same configuration.



12-PIN AMP PLUG  
PLUG #174045-2  
PIN #173681-1

PIN	COLOR	FUNCTION
1	RED	12V+ SWITCHED 1A
2	GR/YEL	NOT USED
3	ORANGE	SPEED SIGNAL
4	YELLOW	NOT USED
5	TAN	NOT USED
6	WHITE	LIGHTING
7	BLACK	GROUND
8	VIOLET	NOT USED
9	GREY	NOT USED
10	BLUE	NOT USED
11	GREEN	*AUX INPUT*
12	BROWN	REMOTE BUTTON



## QUAD GAUGE INSTALLATION/WIRING

Use at a minimum stranded wire with a thickness of 20ga

Keep wire, connectors, solder, heat shrink and zip ties available for installation

Tie common connections together such as power, ground, lighting

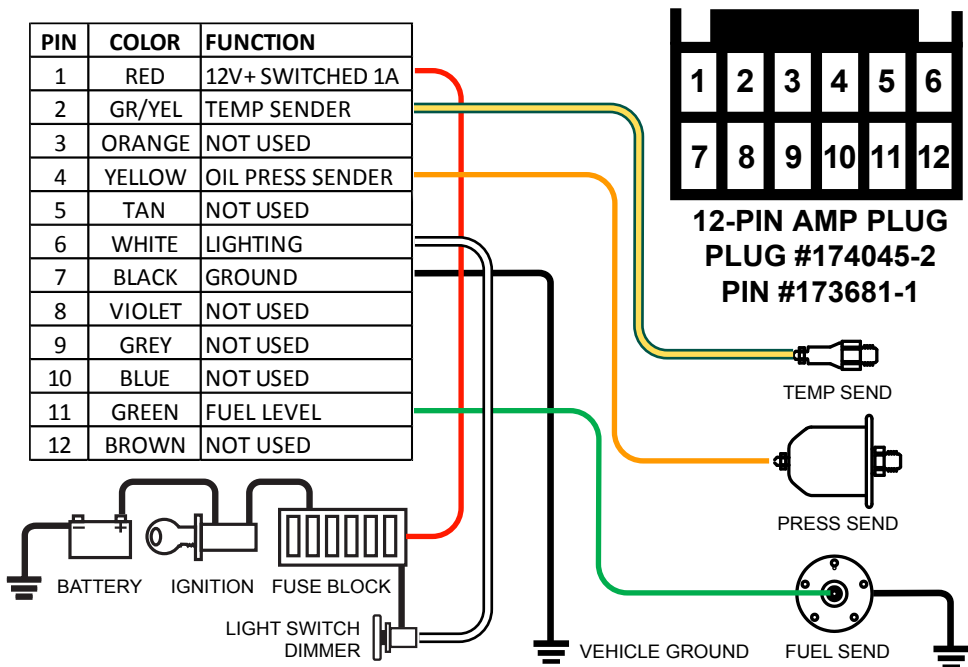
Use 1A fuse for up to 8 gauges

Properly ground your gauge kit to a chassis ground and check the main black and battery grounds

Senders require a ground connection, ensure this ground is clean

Sender threads: Senders that are grounded through the base should not use sealant on the threads, this will degrade the ground to the sender. If sealant is required, use it at the top of the threads so the bottom threads will bite into the base material

Sender threads: All senders have a 1/8-27 pipe thread. If a different size is required, bushings that can adapt to other sized can be used as well as elbows and extensions to aid in fitment.

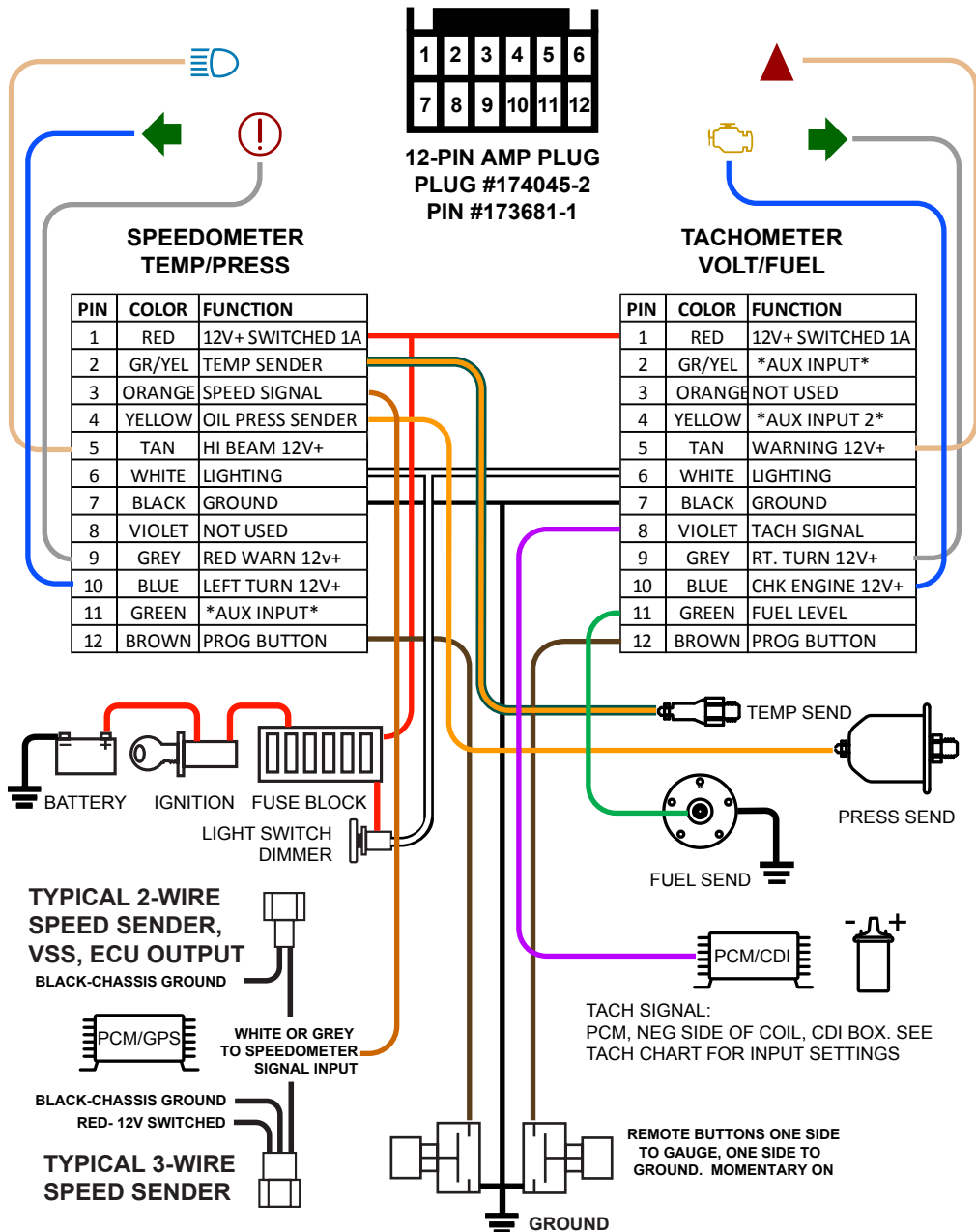


### 3-1 INSTRUMENTS WIRING DIAGRAM

Your 3-1 gauge kits have turn signals, hi beam and indicators at the bottom of the gauge. They are hidden when off and visible only when illuminated for a clean look. All indicators are triggered by 12V+. For a ground switch you will need to use a relay.

Fuel gauge setting:

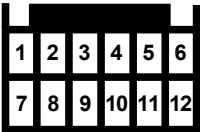
The dip switch on the tachometer behind the rubber plug is used to set the fuel range of the gauge. Use the fuel gauge chart for all gauges.



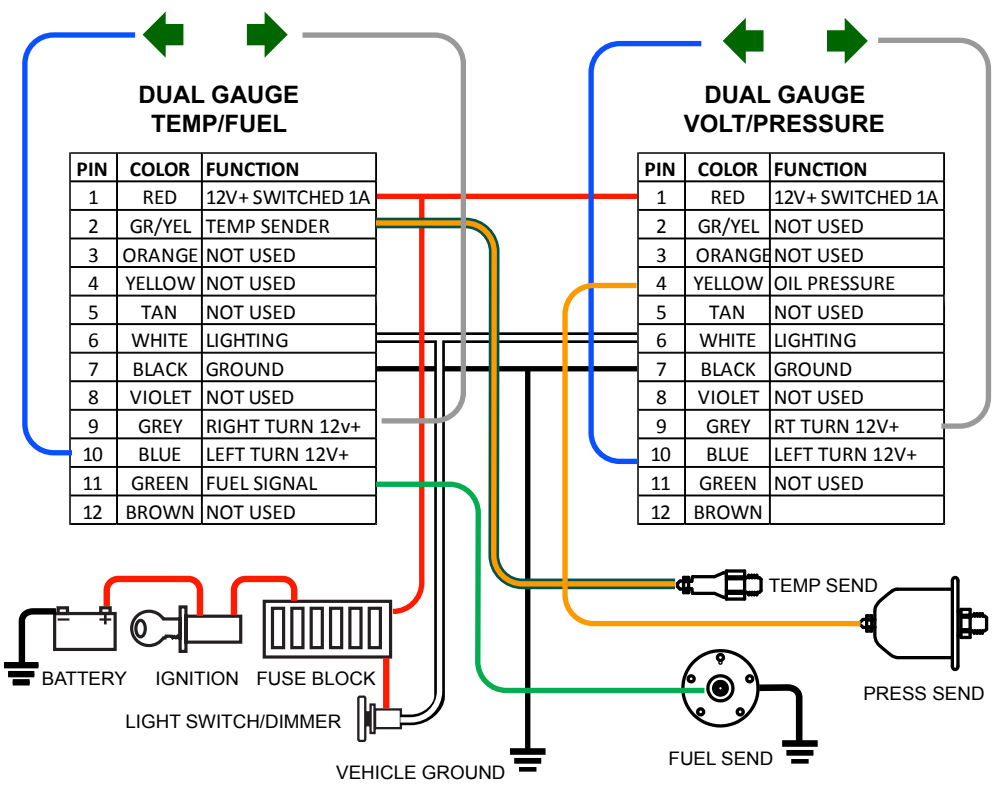
DUAL GAUGE WIRING

Your dual gauges have integrated turn signals on both sides. You can illuminate the appropriate arrow for your installation and position on the dash. THERE IS A TURN SIGNAL ARROW ON LEFT AND RIGHT SIDED OF THE GAUGE DIAL THAT IS HIDDEN WHEN OFF YOU MAY NOT SEE IT UNTIL ILLUMINATED.

The DIP-switch behind the rubber plug is used to set the fuel range of the gauge. Use the fuel gauge chart for all gauges.

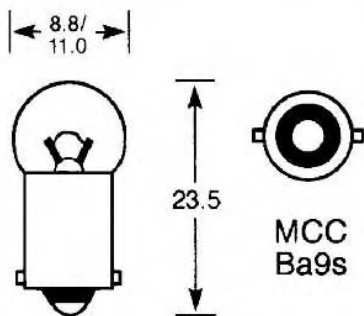
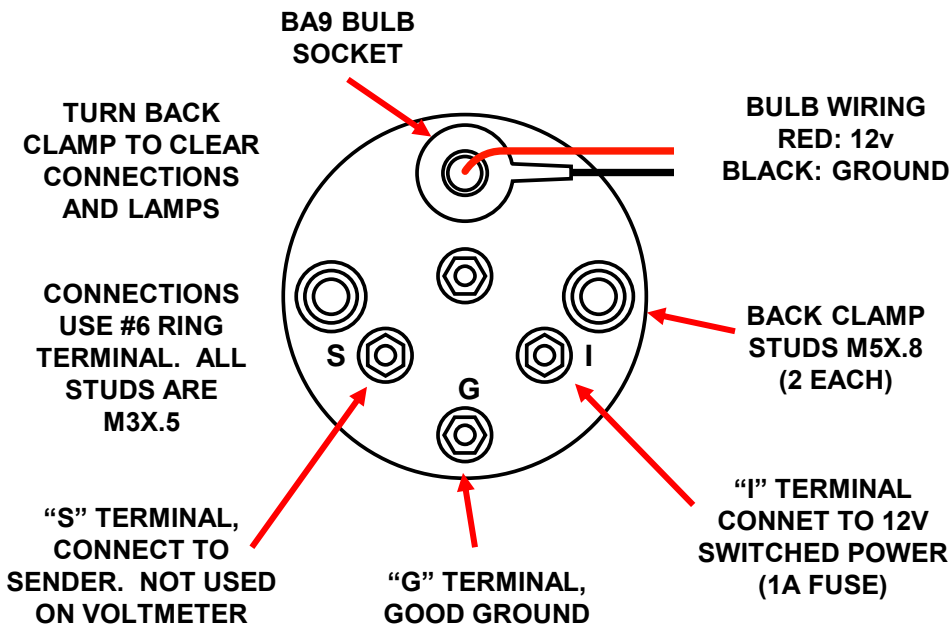


12-PIN AMP PLUG  
PLUG #174045-2  
PIN #173681-1



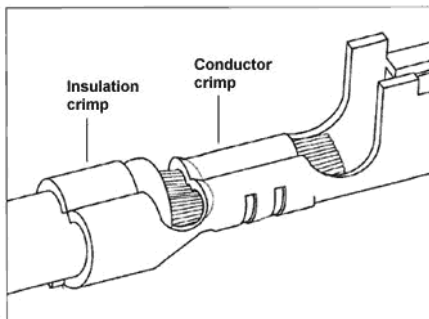
## 2-1/16" GAUGES-SHORT SWEEP AIRCORE

All NVU short sweep aircore gauges feature rugged movements, shielded metal cases and incandescent lighting. Dial lighting may be perimeter lit (around the dial) or backlit (through the dial). Studded connections require a #6 ring terminal. Always use the proper, matching senders for each gauge. NVU senders for pressure and temperature, factory or aftermarket fuel senders for fuel.



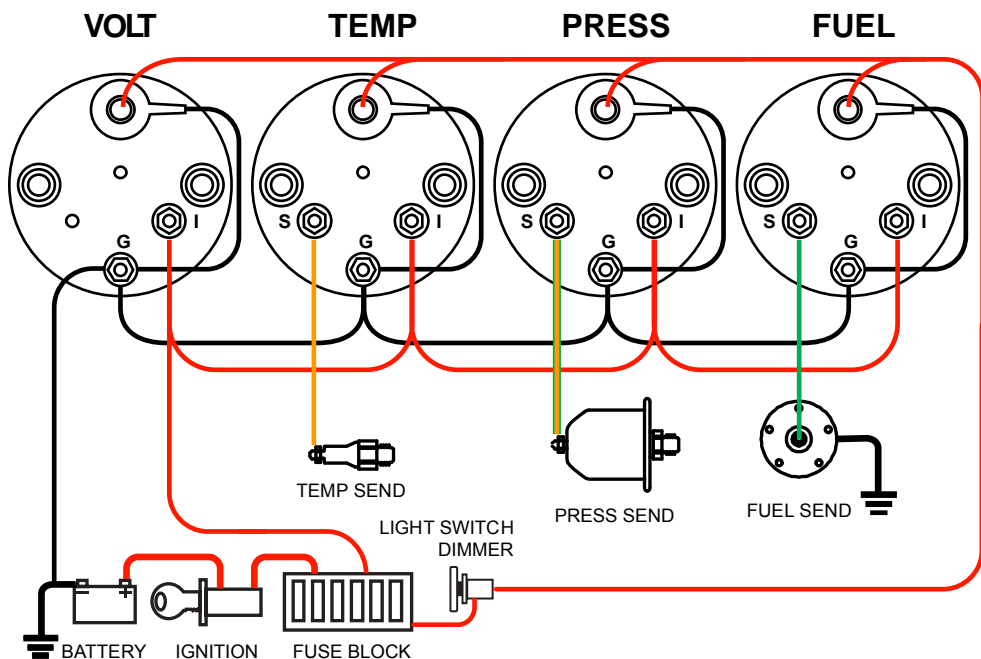
### BA 9 BULB

If you wish to convert to LED bulbs, simply replace with a BA9 base LED bulb. Choose a bulb that has a wide spread and is not wider than the socket opening. LED lights are different colors and may not light backlit dials the same way.



### CONNECTIONS

Follow proper terminal crimping procedures for a good connection. A bad crimp is the number one cause of gauge issues and the most difficult to diagnose due to an intermittent problem.



## WIRING MULTIPLE GAUGES

Above is an example of wiring a grouping of gauges together. The number one thing to remember is to commonize the basic 3 connections (power, ground, lights) and then run the sender wires. To simplify things even further, you can jump the lamp ground to the gauge ground. Use a minimum of 20 gauge stranded automotive grade wire.

Wire the lighting to the stock dash lights unless you are using LED bulbs, then wire them to the parking lamp circuit. An LED dimmer will be required to dim LED lights.

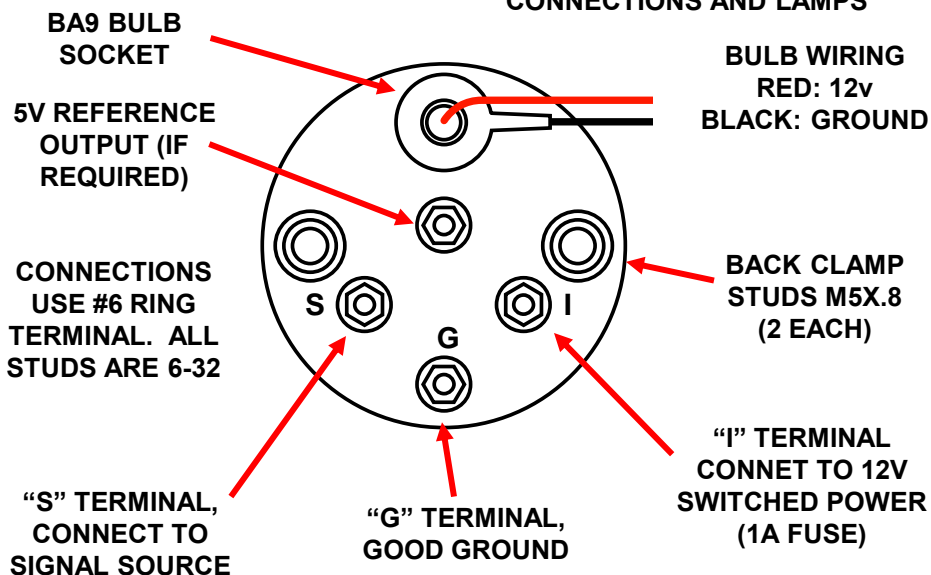
When installing, you must use the matching senders provided by NVU. OE senders for pressure and temperature will not operate the gauges properly. You may use an OE sender for fuel level when using a matching gauge. See chart next page for more information on OE sender ranges



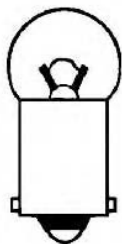
## PHOENIX 2-1/16" TRANSDUCER AND 0-5V GAUGES

All voltage input gauges operate on 0-5V or .5-4.5 depending on use. All transducer (pressure) gauges are .5-4.5V and all 0-5 input (AFR) are 0-5V input. All are linear input and sweep. The top stud is used for 5V reference power for transducers and other equipment that may require a reference voltage source. This gauge is a microcontroller controlled stepper motor type, this does not have RTZ function (return to zero). To rest pointer on zero turn the key on and off when at zero.

### TURN BACK CLAMP TO CLEAR CONNECTIONS AND LAMPS



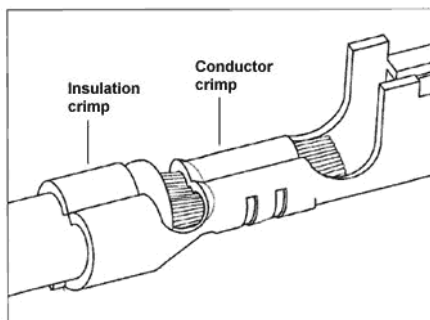
8.8/  
11.0



23.5



MCC  
Ba9s



### BA 9 BULB

If you wish to convert to LED bulbs, simply replace with a BA9 base LED bulb. Choose a bulb that has a wide spread and is not wider than the socket opening. LED lights are different colors and may not light backlit dials the same way.

### CONNECTIONS

Follow proper terminal crimping procedures for a good connection. A bad crimp is the number one cause of gauge issues and the most difficult to diagnose due to an intermittent problem.

## SENDERS AND SIGNALS

Senders are the part of the gauge system that send a signal to the gauge to be read, and then displayed on the dial face. There are 4 types of senders, resistance bases pressure, temperature and level (fuel), voltage input pressure transducers, and pulsed speed inputs.

**TEMPERATURE SENDERS** Signal type is resistance to ground. Resistance DECREASES as temperature rises. All NVU Phoenix temperature gauges use a High-Match temperature sender. The sender will read between 450-500 ohms at room temperature. Both low and high read gauges use the same sender.

**PRESSURE SENDERS** are resistance to ground signal. All NVU pressure senders are 240-33 ohm, 0-100 PSI regardless of the pressure range.

**PRESSURE TRANSDUCERS** Send a voltage signal to the gauge to be read. Typically a linear .5V-4.5V signal can be read by any transducer gauge. There are typically 3 wires to the transducer, signal, ground and 5V power (from the gauge or module).

**FUEL LEVEL SENDERS** are also resistance to ground. A float arm rotates on a rheostat in the fuel tank and changes the resistance as the float arm moves. This is also available in a tube type sender. The ranges can be various depending on the OE manufacturer. You ALWAYS need to match the fuel gauge to the sender. NVU offers a universal fit 240-33 ohm and 0-90 ohm unit for aftermarket applications. The senders are universal and mount from the top of the tank and have a universal 5-hole flange. These are not intended to replace the stock sender for the tank which was specially manufactured for that tank size/shape/orientation. Use a stock sender if at all possible to make things easier on yourself.

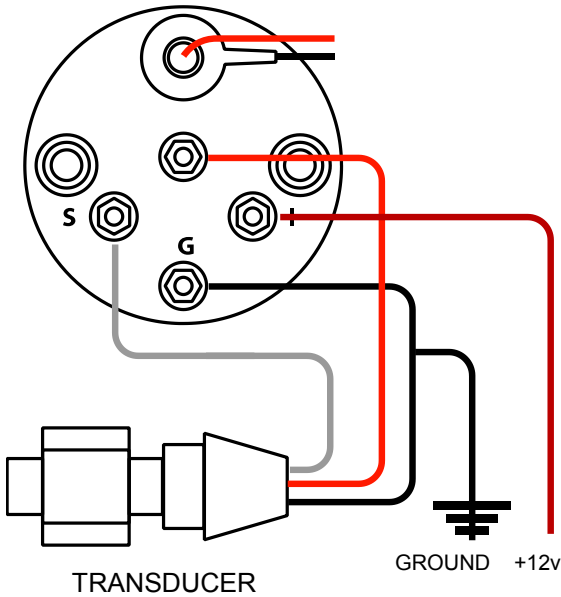
TYPE	SW/UNIV	GM LATE	GM EARLY	FORD EARLY	FORD LATE	GM MOD
YEARS	ALL	64/65-90S	PRE-64	64-87	88-UP	90S-UP
RANGE E/F	240-33	0-90	0-30	73-10	20-150	40-250

**TRANSDUCER GAUGES (.5-4.5V)**

Warning: do not cross wire or contact the 5V output with ground or 12V power!

The transducer requires power from the 5V stud, ground and the signal back to the “S” terminal.

- + 12V switched power
- G Ground
- S signal
- Blank top 5V reference output

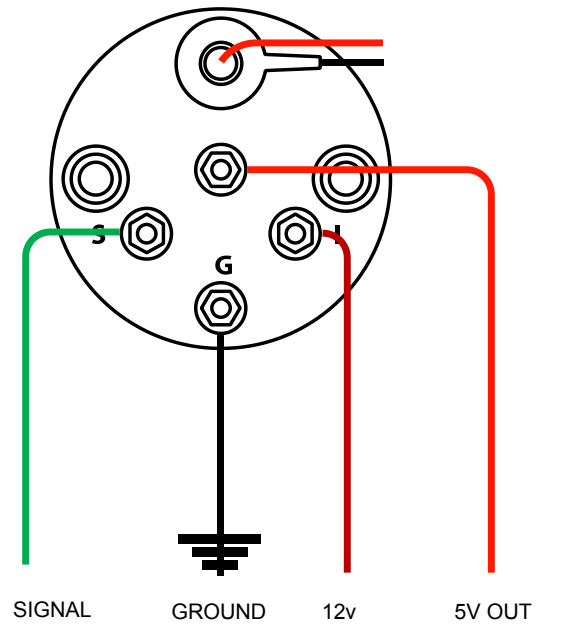


**0-5V INPUT GAUGES**

Warning: do not cross wire or contact the 5V output with ground or 12V power!

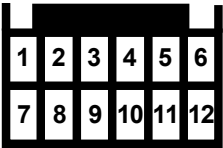
The transducer requires power from the 5V stud, ground and the signal back to the “S” terminal.

- + 12V switched power
- G Ground
- S signal
- Blank top 5V reference output (If required)



SPEEDO/TACH COMBINATION GAUGE

Standalone tachometers with AMP plugs are incandescent perimeter, backlit or LED backlit. Incandescent bulbs will be in the access holes installed into the circuit board. DIP-switch settings are not required on tachometers . 3-3/8" and 4-3/8" are the same configuration. The setup menus are the exactly the same as the standalone speedometer and tachometer, only the run and setup menus have been combined.



12-PIN AMP PLUG  
PLUG #174045-2  
PIN #173681-1

PIN	COLOR	FUNCTION
1	RED	12V+ SWITCHED 1A
2	GR/YEL	*AUX INPUT*
3	ORANGE	SPEED SIGNAL
4	YELLOW	*AUX INPUT 2*
5	TAN	NOT USED
6	WHITE	LIGHTING
7	BLACK	GROUND
8	VIOLET	TACH SIGNAL
9	GREY	NOT USED
10	BLUE	NOT USED
11	GREEN	NOT USED
12	BROWN	REMOTE BUTTON

TYPICAL 2-WIRE  
SPEED SENDER,  
VSS, ECU OUTPUT

BLACK-CHASSIS GROUND

WHITE OR GREY  
TO SPEEDOMETER  
SIGNAL INPUT

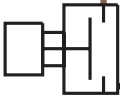


BLACK-CHASSIS GROUND  
RED- 12V SWITCHED

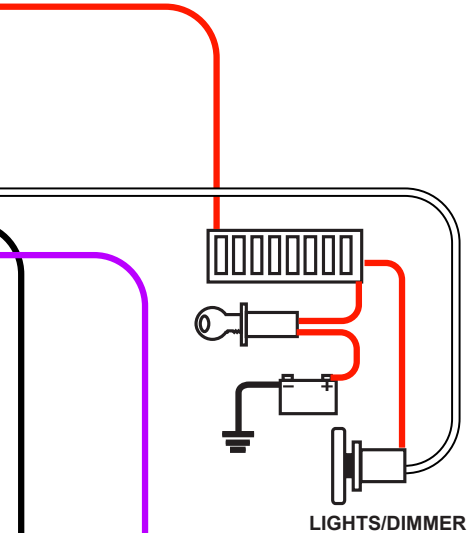
TYPICAL 3-WIRE  
SPEED SENDER



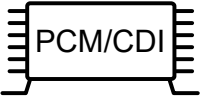
REMOTE BUTTON ONE SIDE TO  
SPEEDO, ONE SIDE TO GROUND.  
MOMENTARY ON



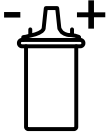
GROUND



TACH SIGNAL



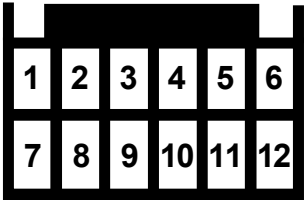
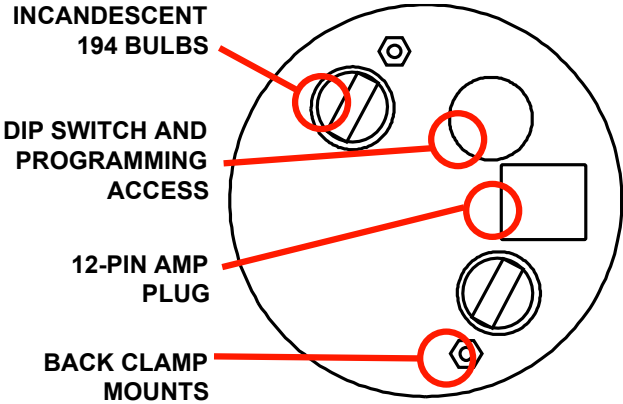
PCM/CDI MAY  
REQUIRE PULL UP  
RESISTOR (SEE  
LATER IN THIS  
BOOK)



IGNITION COIL,  
CONNECT TO  
NEGATIVE SIDE OF  
THE COIL

**PROGRAMMABLE TACHOMETER WIRING**

Standalone tachometers with AMP plugs are incandescent perimeter, backlit or LED backlit. Incandescent bulbs will be in the access holes installed into the circuit board. DIP-switch settings are not required on tachometers . 3-3/8" and 4-3/8" are the same configuration. Programming/button wiring is different for tachometers with and without OLED display screen.



**12-PIN AMP PLUG  
PLUG #174045-2  
PIN #173681-1**

PIN	COLOR	FUNCTION
1	RED	12V+ SWITCHED 1A
2	GR/YEL	*AUX INPUT*
3	ORANGE	NOT USED
4	YELLOW	*AUX INPUT 2*
5	TAN	NOT USED
6	WHITE	LIGHTING
7	BLACK	GROUND
8	VIOLET	TACH SIGNAL
9	GREY	NOT USED
10	BLUE	NOT USED
11	GREEN	NOT USED
12	BROWN*	REMOTE BUTTON*

**\* NOT USED ON TACHOMETER  
WITHOUT OLED DISPLAY**



PCM/CDI MAY  
REQUIRE PULL UP  
RESISTOR (SEE  
LATER IN THIS  
BOOK)

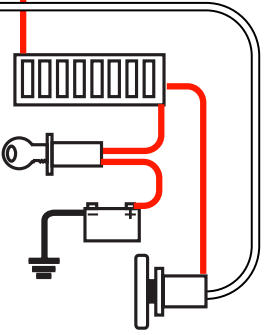


IGNITION COIL,  
CONNECT TO  
NEGATIVE SIDE OF  
THE COIL

GROUND



OLED MODELS ONLY:  
REMOTE BUTTON  
ONE SIDE TO GAUGE,  
ONE SIDE TO  
GROUND. MOMEN -  
TARY ON



**LIGHTS/DIMMER**

## TACHOMETER SIGNALS

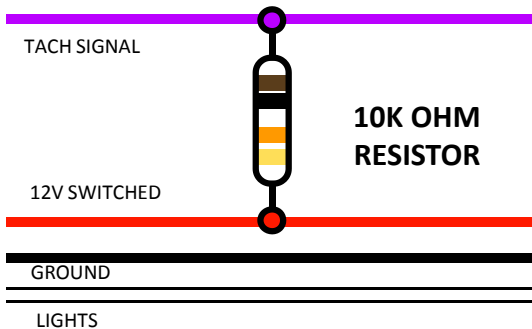
**IGNITION COIL** Even today the most common ignition source is the traditional coil. Use the negative side of the coil when using a distributor style with traditional points or electronic ignition. The signal is a high-voltage pulsed signal.

**COIL ON PLUG (COP)** Is essentially the same as a traditional coil with the exception of each cylinder having its own individually fired coil. This setup is used in conjunctions with PCMs. If you use the trigger on a COP the tachometer should be set to 1 cylinder (2PPR) operation.

**HEI/ INTEGRATED CDI DISTRIBUTOR** incorporates the coil and either points or electronic ignition all into the distributor. There is either a high voltage or 12V square wave signal TACH output labelled on the side of the tach.

**CDI/ELECTRONIC IGNITION/MSD BOX.** This type of ignition box provides a multiple spark to each cylinder to improve performance. The unit will have a tach output terminal that sends a 12V square wave signal. Do not connect your tachometer to the coil or it will react erratically with the multiple sparks per cylinder.

**GM PCM** have an open collector signal tach output, consult your PCM documentation for exact pin. You will need a 10K-ohm pullup resistor to change the open collector signal to a square wave (see diagram). This is installed to pull up the signal between the power and tach signal from the PCM. All GM PCMs output a 4 cylinder signal regardless of number of cylinders or if it is gas or diesel.



**CRANK TRIGGER** type generates an AC sinewave signal by using a magnetic sender to “count” the number of teeth. Your NVU tachometer may require bypassing of the internal filter call for more information. You will also need to calibrate the PPR (programmable models with OLED) (pulse per revolution) to the number of teeth or magnets on the flywheel

**ALTERNATOR “W” TERMINAL** also outputs an AC sinewave like the above crank trigger, a reference tachometer is the best way to determine the exact RPM, then the tach can be properly calibrated by setting the PPR (programmable models with OLED)

## INSTALLATION BASICS:

- Use a minimum of 20 gauge insulated, stranded wire, all connections should be connected with a crimp connection or solder and heat shrink.
  - Keep speed signal wire(s) away from potential “noise” sources like ignition wires, tach signal wires, fan motors, pumps etc.
  - Studded speedometers use #8 studs, use applicable eye terminals for wiring.
  - Use a maximum of 5A fuse for the entire cluster, this is usually already in your fuse block
- Commonize wiring, ground, power and lights can be common on all gauges and “daisy chained”

## OLED DISPLAY TACHOMETERS WITH ANALOG POINTERS

With all of the features packed into NVU Phoenix platform tachometers, we have divided them into different menus. Your tach has a main “RUN” Menu, and a “SETUP” menu. The RUN menu utilizes the features used during normal operation. The SETUP menu stores all of the items that are setup during the installation process. Items can be changed any time after, if desired, and are separate to prevent inadvertently changing them during normal use.

### RUN Menu Functions

Features can be accessed in the run menu during normal operation with the key on. To scroll to the various displays in the OLED screen, use a short push or tap of the remote button.

**BLANK SCREEN:** We have included a blank screen option to give the user an opportunity to not display any information.



**HOURLMETER:** Displays the total hours the vehicle has been running. This is not resettable. This function is useful to track servicing the vehicle especially when idling for long periods is common such as in commercial, fleet and emergency vehicles, or when a speedometer or odometer is not used in the vehicle.



## RUN MENU-CONTINUED

**SERVICE HOURS:** User resettable hourmeter to track engine use similar to a trip odometer. It is identified by the SH on the left side of the screen



This can be reset just like a trip odometer, while in this screen hold down the set button until zero is displayed. The hours will count up from there. This can be reset at any time and can also be used for tracking time to a destination as well as servicing the vehicle.



**PEAK RPM** is displayed on the following screen. This will store and allow the user to view the peak RPM achieved since the last reset.



This can be reset any time by holding in the programming button until all zeros are displayed. This may be reset at any time and the last peak RPM will be stored until reset.



**BOOT or SETUP MENU.** This area of the tachometer is used during set-up and any of the settings can be changed at any time. The items in the setup menu are “hidden” in this sub-menu to avoid inadvertently changing settings during normal use. To enter the setup menu, hold in the button while turning on the key (you do not have to start the vehicle if you do not want to). The setup menu screen will be displayed. To exit the setup menu, turn the key off, and restart normally.





## BOOT MENU, CONTINUED

**SET CYLINDERS** Allows the user to set the tachometer to accommodate different number of cylinders for their vehicle. See notes on connecting to GM PCMs for later in this manual if required. Tachometers ship from the factory pre-set for 8 cylinders, all set up for 4 stroke engines. Custom ranges and inputs are available for diesel and 2-stroke engines.

### SET CYLINDERS

To set the number of cylinders, hold in the button until the current setting is displayed. Scroll to the desired setting and hold until the confirmation message is visible. Select yes or no, and hold in the button until the setting is saved.



SET CYLINDERS    SET CYL. 8    SET 8 CYL? YES    8 CYL. SAVED

**INPUT FILTER.** Generally this setting does not require and adjustment. You may change the settings if you are having difficulty with noise in your signal or sharp spikes. To enter the filter mode, hold in the button until the settings are shown. There are 3 options low "L" medium "M" and high "H". You can experiment to see if the filters aid your signal. The changes can be made with the vehicle running so you can see the difference in settings.

To change the setting, scroll to L, M or H and hold in the button. Once you are at the desired setting, hold in the button until the confirmation message is displayed, and select Yes or NO, hold in the button to select. SAVED! will confirm the setting has been changed and now the filter is set.



INPUT FILTER    SET FILTER M    SET? YES? SAVED!

**SHIFT ALERT.** The shift alert is built-into the OLED display and will give the driver a warning of when to shift based on RPM. The alert is a 3 stage display, warning 1,000 and 500 RPM before the shift point, and the actual shift point. This can be used to pre-set shift points for optimal horsepower, mileage or to prevent over-revving the engine, it is up to the driver to decide how they would like it to be set up. The shift alert can also be disabled by setting to zero RPM.

## BOOT MENU, CONTINUED

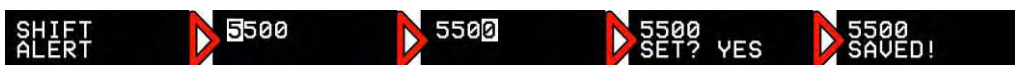
**SHIFT ALERT, CONTINUED.** To enter the shift alert menu, hold in the button while at the screen.

The current shift point will be displayed (0000 for no shift alert). Tap the button to change the first digit which will be highlighted. Each tap will advance the digit by one number.

Hold the button in to advance to the next digit and follow the same sequence until you have the desired setting.

At the last digit, once satisfied, hold in the button to enter the verification menu.

Select YES or NO and hold in the button. Once saved, the display will show the current shift setting and SAVED!



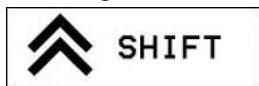
**HOW THE SHIFT ALERT DISPLAYS INFORMATION:** This is active all of the time when in any menu window during normal operation. For the setting above, 5,500 RPM, the display will indicate the engine is 1,000 RPM before the shift point with a single arrow on the screen:



500 RPM before the shift point 2 arrows will be displayed:



At the desired, set shift point, the screen will invert creating a highly visible sign that the engine is at the RPM designated to shift, the word SHIFT will display:



The arrows will operate in the inverse as RPM decreases. The shift point setting can be changed at any time desired, or disabled by setting the shift alert to all zeros (0000).

**PROGRAM VERSION.** This displays the current software version installed in the unit.

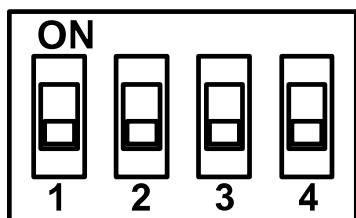


## PROGRAMMABLE TACHOMETERS WITHOUT OLED SCREEN

Programmable tachometers feature easy to set up operation and are ready to run on 4-cycle engines. With 1 (COP Coil On Plug), 4, 6 and 8 cylinder settings. Your tachometer can be pre-set to any pulse configuration (contact the factory for more details). Signals typically are from the negative side of the coil, CDI box or PCM (computer). You may require a pull-up resistor on GM PCMs, see later in this book. All tachometers are shipped from the factory set at 8 cylinder selection and signal filter off (most applications)

### CYLINDER SELECTION

Power down the unit, settings will not take effect until the power is cycled off. Remove the black cover on the back of the unit. The first 3 DIP switches are for setting the number of cylinders, the last one adjust the filtering (next segment). Follow the chart and select the proper settings for your application. 1 cylinder is used for COP (Coil On Plug) ignitions where a separate tachometer signal is not available. Use a small pointer object to change the switch settings if required. Check that the switch is fully engaged in the "ON" or "OFF" position. If cylinder setting is not available for your application, contact the factory and your setting can be custom programmed for a nominal charge.



**#4 SWITCH FOR FILTER  
SETTING (BELOW)**

	SWITCH		
CYL	1	2	3
1	ON	ON	ON
2	ON	ON	OFF
4	ON	OFF	ON
6	ON	OFF	OFF
8	OFF	ON	ON
10	OFF	ON	OFF
12	OFF	OFF	ON

### FILTER SETTINGS

Tachometers are shipped with the signal filter off (DIP-Switch #4 in the OFF position). This will be appropriate for most applications that use a 12V square wave or coil signal. To use on a lower power signal, with the power off, place switch #4 in the "ON" position.

For additional filtering options, contact the factory we can bypass the internal filter or adjust to suit your custom input.

## SENDERS AND SIGNALS

### SPEEDOMETER SIGNALS

All Phoenix speedometers will accept a speed signal from just about any speed signal sender or PCM output. Below is a brief description of each signal type followed by a chart for input DIP-Switch settings for optimum use. NOTE: if you have a speedometer that is functioning but may have erratic movement at certain speeds, experimentation with switching DIP-Switch 1 and 2 may help with stabilizing the pointer readout. This will not cause any damage when properly reading from a speed signal source.

**HALL EFFECT SENDER** This type of sender is identified by having 3 wires. The sender uses power and ground to create a square wave signal which is alternating positive and negative. The speedometer reads each alternating "pulse". These are commonly used on cable-output senders which replace the traditional cable on the transmission.

**AC SINE WAVE SENDER** Commonly referred to as a pulse generator. This unit is identified by 2 wires, one is a ground one is the signal. This type of sender also is commonly used to replace the cable on the transmission. This type creates an AC sine wave signal, which has 2 components: amplitude and frequency. The sender generates an AC voltage, typically between 8-18 volts which is the strength, or amplitude. The rate that the voltage alternates (AC like in your home) is the frequency, which is the "pluses" the speedometer reads.

**MAGNETIC PICKUP** This sender is the exact same as the AC sine wave pulse generator above but it is usually installed in the transmission at the factory. The sender or "pick-up" bolts into the transmission and a reluctor (toothed) ring spins below it. As each tooth passes a "pulse" of AC voltage is generated and is sent to the speedometer. This type of sender also must generate 8-18v to operate properly. There are also variants on this sender that mount on the axle or driveshaft but the principle is the same.

**PCM/COMPUTER** Very popular in the past decade, most OE and aftermarket PCMs will read the speed signal from the speed sender and output a speed signal (often called VSS or vehicle speed signal). It is usually a 5V square wave (hall effect) and sometimes an AC sine wave. The connection is the same, simply run the VSS signal to the speed sender input on the speedometer.

**GPS SENDER** This type reads the vehicle position and calculates speed, then a microprocessor directs the unit to send the appropriate number of pulses to the speedometer unit. The only thing to do when setting up this type of sender is to make sure the speedometer and GPS unit are in sync with the proper number of pulses. For example, your GPS unit outputs 8,000 PPM (Pulses Per Mile) you need to set the speedometer manually to 8,000 PPM so that they are both at the same setting.

## AUXILLARY INPUTS

Phoenix platform instruments feature add-on functions that can be displayed directly on the OLED screen as needed. This can be accomplished by adding an NVU pressure or temperature sender. Custom options are available, feel free to contact us for your needs.

How it works:

Every speedometer (standalone and 3-1) has one auxiliary input wire on the harness. Pin #11 on your AMP harness will be **GREEN**.

Every Tachometer (standalone and 3-1) and speedo/tach combo gauge has 2 auxiliary inputs. Each is on the AMP plug.

AUX1: PIN 2 **GREEN/YELLOW**

AUX 2: PIN 4 **YELLOW**

All 3 inputs have the same features and menu settings. There are 3 types of inputs standard and all are resistance to ground.

**1. TEMPERATURE.** All standard auxiliary inputs for temperature run from a standard NVU hi-match temperature sender part number 99320-04. You must use this sender to monitor any temp readings. This sender is separate from any other sender you are using to monitor any other setting on the gauge itself. (You cannot "split" a sender signal.). Custom ranges are available at additional cost-contact us for more details.

**2. PRESSURE** All standard axillary inputs for pressure operate from a standard NVU pressure sender 0-100 PSI, 240-33 ohm part number 90100-04. This range works well for anything that uses at least 40% of the scale. (no less than 40 PSI). If you need a different range, custom inputs are available, call us for more details.

Sender grounds: The above sender operate by varying the resistance to ground through the base of the sender (threads). If you are monitoring the temperature or pressure by attaching to a non-metal surface (plastic, rubber or insulated line) You will require a floating ground sender. This has an additional terminal for grounding the unit.

**3. SHIFTER NVU** shift inputs operate on resistance to ground. Please see part number 99440-04 shift input terminal for exact specifications for shift inputs. This terminal box accepts ground signals from various manufacturer's shift drivers and converts the signal to be compatible with any NVU Phoenix instrument with an OLED display.

## SETTING UP THE AUXILLARY INPUTS

Install sender as needed, run wire (20 ga min) to the appropriate input wire.  
To set up the functions using the OLED display screen, the vehicle does not need to be running.

Enter the SETUP menu by holding in the programming button while turning on the key.



Scroll to AUX INPUT SETUP or AUX 2 SETUP










Speedometers use AUX Input (Green wire) ONLY

Tachometers and speedo/tachs use AUX INPUT (Green/yellow) and AUX 2 (Yellow wire)

Customs and specialty instruments please check your wiring diagram.

Once you have entered the specified input setting, scroll to the desired reading you would like to display on the OLED screen.

AUX INPUT SELECTION	AUX 2 INPUT SELECTION	DISPLAY ON OLED SCREEN	SENDER USED
AUX INPUT NOT USED	AUX 2 NOT USED	NOT VISIBLE	
AUX INPUT OIL TEMP	AUX 2 OIL TEMP	 168 °F	TEMPERATURE 99320-04
AUX INPUT TRANS TEMP	AUX 2 TRANS TEMP	 167 °F	TEMPERATURE 99320-04
AUX INPUT WTR TEMP	AUX 2 WTR TEMP	 168 °F	TEMPERATURE 99320-04
AUX INPUT OIL PRESS	AUX 2 OIL PRESS	 45 PSI	PRESSURE 99100-04
AUX INPUT FUEL PRESS	AUX 2 FUEL PRESS	 45 PSI	PRESSURE 99100-04
AUX INPUT BOOST	AUX 2 BOOST	 46	PRESSURE 99100-04
AUX INPUT SHIFTER	AUX 2 SHIFTER		SHIFT DRIVER

## AUXILLARY INPUTS CONTINUED

Once you are on the desired function to be displayed, press and hold the programming button until the INPUT SET screen is displayed.



This can be changed at any time, just follow the preceeding setup process. You may now continue on to other programming features or you can restart the instrument. You must turn the power off and nd re-cycle the power before setting will take effect. You do not have to start the vehicle, just simply turn the key off and back on again.

## NORMAL OPERATION

The auxiliary inputs are designed to be just that, additional instrument features that you may or may not need to be viewing at all times. To view a particular input while using the instruments, tap the programming button to scroll to the display you would like to view. It will remain visible until the button is depressed again.

## MORE INFORMATION

The additional inputs are designed to measure temperature and pressure using NVU (or equivalent) senders. The temperature or pressure of virtually anything can be measured, for example Trans temp is shown on the display with a "T" this can be for anything you like, axles, trans, t-case, its up to you, so keep your mind open when it comes to the vitals you would like to watch.

## CUSTOM OPTIONS:

Need something special? Custom range? Custom display? We can do that for you. Just contact a factory rep for more details.

## **THANK YOU**

Thank you for choosing NVU products. We strive to provide the finest quality and designed products available on the market.

## **TECH SUPPORT**

DO NOT contact the retailer for tech/installation assistance. The retailer will not have the technical expertise to know the contents of the kit or the nuances of installing in your specific vehicle. We are here to help!

Contact NVU directly, our qualified installation technicians have the knowledge of the product and its installation to help you get going right away.

If you need technical assistance please feel free to call us at 248.850.5482 or email us at [service@newvintageusa.com](mailto:service@newvintageusa.com)

## **NVU 5-YEAR WARRANTY**

Service can be obtained during the normal warranty period by contacting New Vintage and obtaining a Return Authorization Number (RZA#). New Vintage will repair or replace any item found to be defective and return ship to no cost via ground or post office services. Other shipping/international services will be applied at additional cost. Buyer is responsible for shipping to New Vintage for warranty repair. Return shipping will be the responsibility of the customer if the product is found to be damaged or out of warranty. An RZA number must be obtained and proper return/warranty form accompanied with the product.

## **MISSING ITEMS/RETURNS**

Hey, we all make mistakes, no problem just give us a call if you believe that you are missing something in the box. DO NOT CONTACT THE RETAILER, as they will not have the complete packing list or the pertinent information to properly help you. We will take care of it for you.

Missing items/returns must be processed within 15 days of end user receiving the product. All returned must be shipped back to the place of purchase. Any return shipping costs to New Vintage are the responsibility of the purchaser. An RZA number must be obtained and proper return/warranty form accompanied with the product. A restocking fee not to exceed 10% may be applied to items that must be repackaged. Any item returned in a non-usable condition will be returned or charged to the customer.

Missing items must be reported within 15 days of receiving the product. Items found to be missing will be shipped via ground or postal service at no charge. Expedited/international shipping options are available at an additional charge. It is the policy of New Vintage to quickly replace any items that may be missing in a timely manner but not to overnight or expedite shipping in any way at no cost.



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