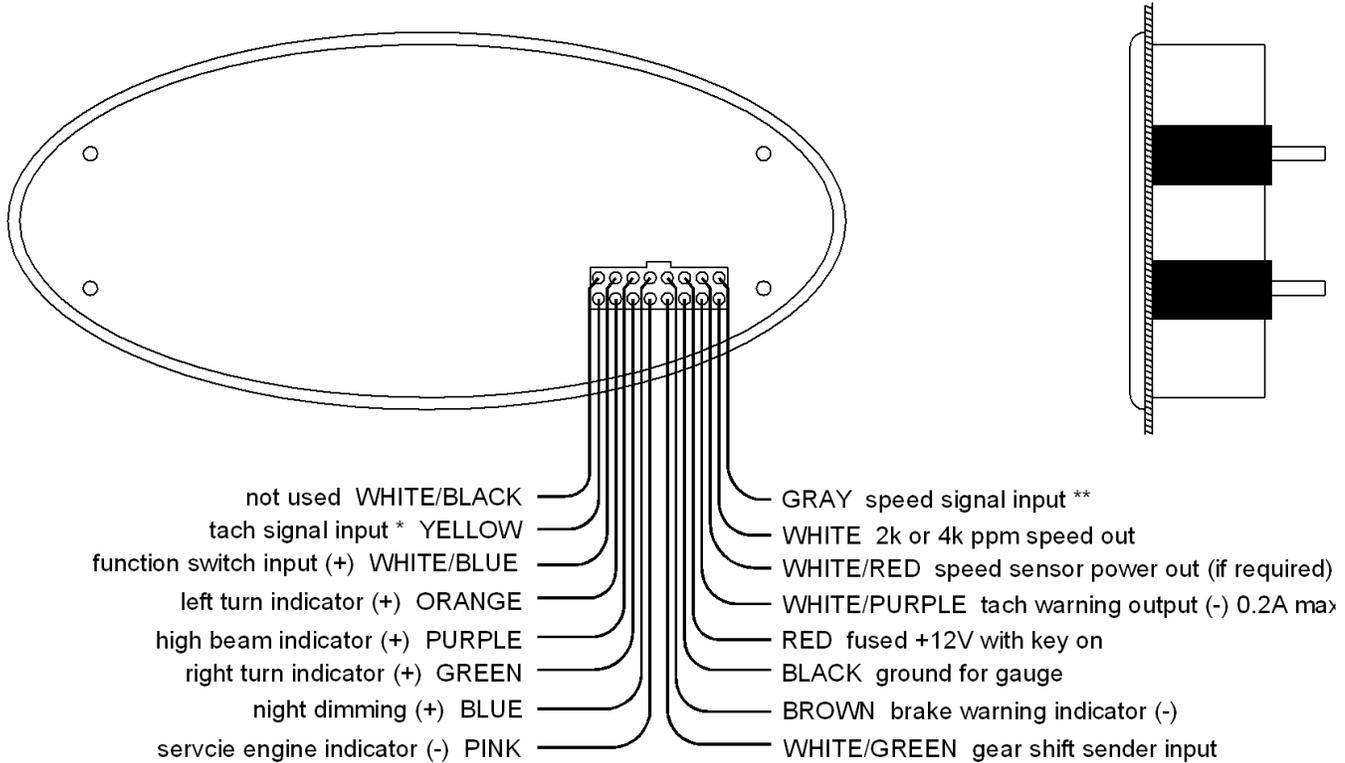




ION-01-6 PERFORMANCE SPEEDOMETER/TACHOMETER COMBO



* *tach signal wire should be routed away from other signal wires.*

** *failure to calibrate the speedomter may cause your odometer mileage to increase very rapidly.*

MOUNTING:

It should be inserted into the opening from the front and the L-clamps will be installed from the back. Tighten the nuts on the L-clamps so that the gauge is secure.

GAUGE SETUP AND CALIBRATION

The setup menus are entered by holding the function switch in while turning the key on. The menus are:

Main Menu	Sub Menu	Description
SPEED	AUTO	auto calibrate speed
	ADJ	adjust calibrate speed
	UNIT	select mph or kph units (MPH / KPH)
	OUTPUT	speed output selection (2K PPM / 4K PPM)
	SERVICE	miles to service setting
TACH	ENGINE	set engine cylinder setting
	WARN	set rpm shift warning point
	UPDATE	set rpm update rate for digital readout
	SIGNAL	select normal or low voltage tach signal (NORMAL / LO VLT)
INFO	MODEL	Gauge model number
	VER	Gauge revision code
	PPM	speed cal setting
GEAR		transmission gear display selection
	AUTO	automatic transmission with GSS-universal gear shift unit or no indicator
	MANUAL	program gear display for manual transmission
DONE		restart system with new settings

POWER

Connect the red wire from the main harness to fused accessory power from the ignition switch.

Never connect this to a battery charger alone. It needs to have a 12 volt battery connected to it. Battery chargers have an unregulated voltage output that will cause the system to not operate properly.

GROUND

The black wire is the main ground for display system. A poor ground connection can cause improper or erratic operation.

TURN SIGNAL & HIGH BEAM INDICATORS

The right turn, left turn, and high beam indicators are activated by 12 volts at their respective hook-up wires. The right turn signal wire is green, the left turn signal wire is orange, and the high beam wire is purple. These can be connected to the same wires that the indicator lights would be connected to. The display system wire colors may not match the wire colors in your electrical wire harness.

BRAKE & ENGINE INDICATORS

The brake and check engine indicators are activated by ground at their respective hook-up wires. The check engine wire is pink and the brake warning wire is brown.

SPEEDOMETER

Failure to calibrate the speedometer may cause your odometer mileage to increase very rapidly.

The gray wire connects to the vehicle speed sensor. For two wire pulse generators attached to a speedometer cable, attach one wire from the sensor to the speedometer ground and connect the other to the gray wire. If the signal is being shared by a cruise control or ECM, make sure they all use a common ground for the pulse generator.

For inductive pickup's, connect one terminal from the pickup to ground and connect the other terminal to the gray wire on the gauge.

For 3 wire Hall-effect sensors, refer to the installation instructions for the sensor to determine wire color code. Most 3 wire sensors use the following color code: RED – power, BLACK – ground, WHITE – speed signal. Connect the speed signal wire to the gray wire on the gauge, connect the speed power wire to the white w/red stripe, and connect the speed ground wire to the black wire.

For speed sensor integrated into a vehicle wiring harness, consult a service manual to determine the color code and location of the speedometer signal.

The speedometer is fully adjustable and calibration is discussed below.

TACHOMETER

The yellow wire connects to the vehicle tach signal. On point type and pointless distributors connect to the negative side of the coil. This will sometimes be labeled TACH or DIST. On distributorless ignition systems, connect to the tach output wire or to the negative wire of one of the coils. On MSD ignition systems connect to the tach output terminal.

For tach signals integrated into a vehicle wiring harness, consult a service manual to determine the color code and location of the tachometer signal.

The tachometer is adjustable from 1 to 15 cylinder signals and calibration is discussed below. Diesel engines will usually require a diesel tach adapter DSL-1 or DSL-2, available from Dakota Digital, Inc.

SHIFT LIGHT OUTPUT

The shift light output is a ground switch that turns on whenever the rpm exceeds the warning point. It can handle 0.25A, equivalent to a 3W 12V bulb. Connect a low current indicator as follows: One wire from the light will connect to 12 volts, the other wire will connect to the white/purple wire from the gauge.

If a large or high power light will be used, then a relay should be connected as follows: One of the coil wires should be connected to 12 volts and the other coil wire will connect to the white/purple from the gauge. The relay contacts will be used to switch power to the light. Any 12volt automotive relay can be used, such as Dakota Digital's RLY-1 30A relay.

NIGHT DIMMING

Your display system has a dimming feature that dims the display intensity. Normally the system is at full brightness for daytime viewing. When the blue wire has 12 volts the display intensity will be reduced. Connect this to a park light or tail light circuit, then whenever the headlights are on the display will dim. To have the system at full brightness all of the time, leave the blue wire disconnected.

SPEEDOMETER SETUP

Press and hold the switch while turning the key on and starting the engine. Once the engine is running, release the switch. When "SPEED" is displayed, press the switch again and then release it. The message display should switch between "AUTO", "ADJUST", "UNIT", "OUTPUT", and "SERVIC".

METRIC SELECTION

If you are setting the system up for metric displays, press the switch when "UNIT" is displayed. Press and release the switch until "KPH" is displayed. Press and hold the switch until "DONE" is displayed.

SPEED CALIBRATION

There are two methods for calibrating the speedometer, auto cal and adjust. Either one can be used. Auto cal requires that you have one measured mile marked out (km for metric). Adjust requires you to follow another vehicle going at a set speed or timing yourself over a mile to determine your speed.

Auto Cal

When "AUTO" is displayed press and release the switch. The speedometer will display "CL" and the message display will show zeroes. You should now begin driving the measured mile. The message display will count the number of pulses received from the sensor. The message display cannot be used to determine when a mile has been driven. Once you reach the end of your marked mile, press the switch again. The calibration is now done.

Adjust

When "ADJUST" is displayed press and release the switch. The system will restart with "ADJUST" on the message display. The speedometer will show the speed reading. Begin driving at a known speed. When the switch is pressed the speedometer reading will begin increasing until the switch is released. The next time the switch is pressed the reading will begin decreasing until it is released. When the speedometer is correct you can release the switch. The new calibration will be saved if no adjustments are made for 7-10 seconds.

SPEED OUTPUT

If a speed output signal is need for an ECM or cruise control, the white wire can be used. This can be programmed for a 2000 pulse per mile (2k ppm) or 4000 pulse per mile (4k ppm) signal. To check or change the setting, go to the SPEED setup menu and then select "OUTPUT".

Press and release the switch to change between 4K PPM and 2K PPM.
When you are done press and hold the switch until "DONE" is displayed.

MILES TO NEXT SERVICE SETUP

The service mileage is a countdown mile meter. The service mile display can be disabled or can be set to count down from 500 – 7500 miles. If the service mile is enabled and it gets to 0 miles it will display "SERVIC DUE". If the push button switch is pressed and held while "SERVIC DUE" is displayed, the service miles will be reset.

To change the service miles, enable, or disable the reading, go to the SPEED setup menu and then select "SERVIC".

The current setting will be displayed. "OFF" or a mileage from 500 – 7500.
Press and release the switch until the desired setting is displayed.
Press and hold the switch until "DONE" is displayed.

TACHOMETER SETUP

The gauge can be set to read from 1-15 cylinder ignition signals. It can also be set to read either 12 volt tach signals or 5 volt tach signals found on some engine computers. The digital tachometer update rate can be adjusted between slow, mid, and fast. The rpm warning/shift point can be adjusted from 2200 – 14800. The tachometer will read from 350 – 17,500 rpm. The tach will display x10 and show a decimal above 10,000 rpm, 11,500 rpm would read like 11.50 on the tach display.

Press and hold the switch while turning the key on. Release the switch. When “TACH” is displayed, press the switch again and then release it. The message display should switch between “ENGINE”, “WARN”, “UPDATE” and “SIGNAL”.

Engine cylinder setup

When “ENGINE” is displayed press and release the switch.

The current cylinder setting will be displayed.

Press and release the switch until the desired setting is displayed.

Press and hold the switch until “DONE” is displayed.

Rpm warning setup

When “WARN” is displayed press and release the switch.

The current warning point will be displayed.

Press and release the switch until the desired setting is displayed.

Press and hold the switch until “DONE” is displayed.

Display update setup

When “UPDATE” is displayed press and release the switch.

The update setting will be displayed. (1=slow, 2=mid, 3=fast)

Press and release the switch until the desired setting is displayed.

Press and hold the switch until “DONE” is displayed.

Tach signal setup

When “SIGNAL” is displayed press and release the switch.

The setting will be displayed. (NORMAL or LO VOLT)

Press and release the switch until the desired setting is displayed.

Press and hold the switch until “DONE” is displayed.

GEAR INDICATOR SETUP

This gauge can optionally display the gear position for most automatic transmissions with the use of separately purchased Dakota Digital sender GSS-universal gear shift unit. For manual transmissions, the gauge can learn the positions based on speed and rpm.

For an automatic transmission, connect the WHITE/GREEN wire from the gauge to the GSS-universal gear shift unit “1st” terminal. Follow the instructions supplied with the GSS-universal gear shift unit for programming the gear positions.

For a manual transmission no additional wires are connected. Begin at a section of road where you can gradually shift through all of the gears. Press and hold the switch while turning the key on and starting the engine. Once the engine is running, release the switch. When “GEAR” is displayed, press the switch again and then release it.

The display will show the current selection, “AUTO” or “MANUAL”. Press and release the switch to change the selection.

When “MANUAL” is displayed, press and hold the switch to begin the gear programming. The message will show “LO RPM” if the engine rpm is below 1500, or “LO SPD” if the vehicle speed is below 5.

Begin driving in 1st gear. The display should show GEAR 1 and the “1” should be flashing. Drive at a steady speed then press and release the switch. The “1” should stop flashing for a few seconds and then switch to a flashing “2”.

Shift to 2nd gear and drive at a steady speed. Press and release the switch again.

Repeat this through each gear. When you are done, press and hold the switch until the display shows “DONE”.

Press and release the switch to restart the gauge in normal operation.

INFO MENU

The INFO menu is used to get the gauge model number, gauge revision code, and speed cal setting. This will normally only be used for diagnostic and troubleshooting.

FUNCTION SWITCH

The black push button switch supplied with the gauge should be wired with one side of the switch to the WHITE/BLUE wire and the other side of the switch to fused 12V power. This allows access to all of the mileage, rpm, and performance information. Pressing and releasing the function switch toggles through the different displays. The display sequence is as follows:

<u>SPEED MENU</u>			
ODOMTR	>	000000	odometer mileage
TRIP A	>	A 000.0	trip meter mileage A
TRIP B	>	B 000.0	trip meter mileage B
SERVIC	>	S 0000	miles left to next service
GEAR	>		current gear position
KPH	>	KPH 00	metric speed conversion (to mph if metric unit is selected)
T MENU	>		switch to tach menu
P MENU	>		switch to performance menu
<u>TACH MENU</u>			
HI RPM	>	H 0000	high rpm recall
HOURS	>	HR 0.0	re-settable hour meter
WARN	>	W 0000	current rpm warning or SHIFT if over set point
BRAKE	>		only if input is activated
ENGINE	>		only if input is activated
S MENU	>		switch to speed menu
P MENU	>		switch to performance menu
<u>PERFORMANCE MENU</u>			
HI SPD	>	HI 00	high speed recall
0-60 T	>	60 00.0	0-60mph time (0-100kph)
QUARTR	>	QT 00.0	quarter mile time
QT MPH	>	QT 00	quarter mile speed
S MENU	>		switch to speed menu
T MENU	>		switch to tach menu

Example: If the odometer mileage is currently displayed and you want to change to the 0-60 time, press and release the switch until "P MENU" is displayed. Wait until the display switches to "HI SPD". Press and release the switch until "60 TIM" is displayed. After a couple of seconds the display will show the current 0-60 time.

Troubleshooting guide.

Problem	Possible cause	Solution
Gauge will not light up	Red wire does not have power. Black wire is not getting a good ground. Gauge is damaged.	Connect to a location that has power. Connect ground to a different location. Return gauge for repair. (see instructions)
Gauge lights up, but speed will only show zero.	Gray wire is not connected properly. Speed sensor not grounded properly. Speed sensor is not being turned by transmission. Sensor is not sending a speed signal Gauge is not calibrated	Check connection from gray wire to speed signal wire. Move ground to different location, preferable close to the gauge ground. Check cable connection between sensor and transmission. Sensor can be tested by spinning the cable with a drill. Check for a damaged or malfunctioning speed sensor. Gauge must be recalibrated (see instructions).
Speed reading is erratic or jumps around.	Speed sensor wire is loose or broken. Cable is loose or broken. Poor ground connection.	Check all wire connections and inspect wire for breaks. Check cable between sensor and transmission. Check ground connection on speedometer and sensor.
Speed reading is incorrect.	Gauge is not calibrated correctly.	Gauge must be calibrated (see instructions).
Gauge lights up, but tach will only show zero.	Yellow wire is not connected properly. Ignition system not grounded properly. Gauge is not grounded properly. Tach signal type is not set correctly. Gauge is not calibrated	Check connection from yellow wire to tach signal wire. Check engine and ignition system grounds. Check gauge and engine grounds. Change the signal type as described in the Tach setup. Gauge must be recalibrated (see instructions).
Tach reading is erratic or jumps around.	Tach signal wire is loose or broken Poor ground connection. Update rate is too fast.	Check all wire connections and inspect wire for breaks Check ground connection on tachometer and engine. Reset display update speed slower.
Tach reading is incorrect.	Gauge is not calibrated correctly.	Gauge must be calibrated (see instructions).
Gauge will not dim.	Blue wire is not connected correctly.	Check wiring connections. Blue wire should have 12 volts with headlights on.
Gauge remains dim at all times.	Blue wire is getting power all of the time. Connect blue wire to location that only has power when the headlights are on.	
High beam, Left turn, or Right turn indicator does not work.	Loose or incorrect connection to indicator wire.	Check that the appropriate indicator wire has 0 volts when the indicator should be off and about 12 volts when the indicator should be on.
Brake warning or engine indicator does not work.	Loose or incorrect connection to indicator wire.	Check that the appropriate indicator wire has about 12 volts when the indicator should be off and about 0 volts when the indicator should be on.

SERVICE AND REPAIR

DAKOTA DIGITAL offers complete service and repair of its product line. In addition, technical consultation is available to help you work through any questions or problems you may be having installing one of our products. Please read through the Troubleshooting Guide. There, you will find the solution to most problems. **Should you ever need to send the unit back for repairs, please call our technical support line, (605) 332-6513, to request a Return Merchandise Authorization number.** Package the product in a good quality box along with plenty of packing material. Ship the product by UPS or insured Parcel Post. Be sure to include the RMA number on the package, and include a complete description of the problem with RMA number, your full name and address (street address preferred), and a telephone number where you can be reached during the day. Any returns for warranty work must include a copy of the dated sales receipt from your place of purchase. Send no money. We will bill you after repair.

Dakota Digital 24 Month Warranty

DAKOTA DIGITAL warrants to the ORIGINAL PURCHASER of this product that should it, under normal use and condition, be proven defective in material or workmanship within 24 MONTHS FROM THE DATE OF PURCHASE, such defect(s) will be repaired or replaced at Dakota Digital's option.

This warranty does not cover nor extend to damage to the vehicle's systems, and does not cover removal or reinstallation of the product. This Warranty does not apply to any product or part thereof which in the opinion of the Company has been damaged through alteration, improper installation, mishandling, misuse, neglect, or accident.

This Warranty is in lieu of all other expressed warranties or liabilities. Any implied warranties, including any implied warranty of merchantability, shall be limited to the duration of this written warranty. Any action for breach of any warranty hereunder, including any implied warranty of merchantability, must be brought within a period of 24 months from date of original purchase. No person or representative is authorized to assume, for Dakota Digital, any liability other than expressed herein in connection with the sale of this product.

⚠ WARNING: This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov



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