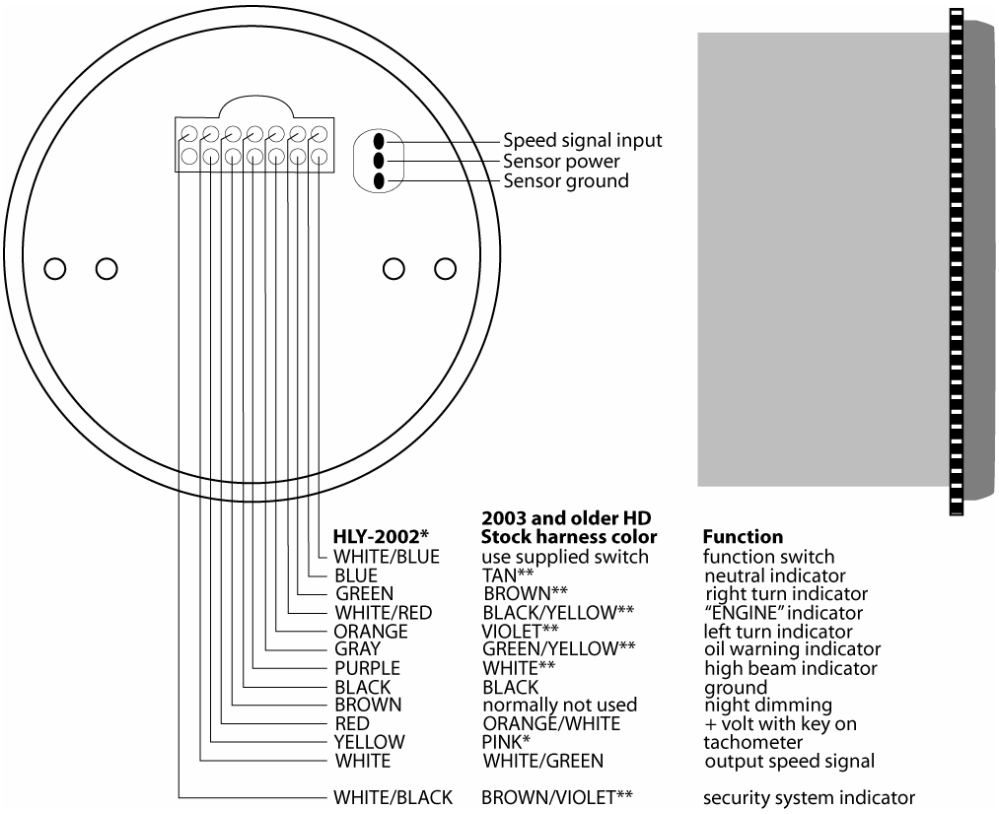
MODEL HLY-2002 rev A

TANK MOUNT SPEEDOMETER/TACHOMETER



HLY-2002*	2003 and older HD Stock harness color	Function
WHITE/BLUE	use supplied switch	function switch
BLUE	TAN**	neutral indicator
GREEN	BROWN**	right turn indicator
WHITE/RED	BLACK/YELLOW**	"ENGINE" indicator
ORANGE	VIOLET**	left turn indicator
GRAY	GREEN/YELLOW**	oil warning indicator
PURPLE	WHITE**	high beam indicator
BLACK	BLACK	ground
BROWN	normally not used	night dimming
RED	ORANGE/WHITE	+ volt with key on
YELLOW	PINK*	tachometer
WHITE	WHITE/GREEN	output speed signal
WHITE/BLACK	BROWN/VIOLET**	security system indicator

***To avoid damage to motorcycle**, please see Speedometer, Tachometer, and Status and Warning Indicators sections for details on locating VSS, Tachometer, and indicator wires for **most motorcycle applications**

For **2004+ HD utilizing the "Fat Bob" tank mount, please see our **HLY-2004**, it is designed as a direct plug-in gauge for these models. The Check Engine indicator will not function using this gauge on **2004+ HD** models due to the signal being fed through the 'data bus', however the HD diagnostic tool can still check and clear codes through the diagnostic connector. **2004+HD** Indicator wires match the above chart, but please read VSS and Tachometer sections for proper wiring.

GAUGE SETUP AND CALIBRATION

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

Main Menu	Sub Menu	Description
SPEED	AUTO	auto calibrate speed
	ADJ	adjust calibrate speed
	UNIT	select mph or kph units
		MPH
		KPH
	SERVICE	miles to service setting
TACH	ENGINE	set engine cylinder setting
	WARN	set rpm shift warning point
	SIGNAL	select normal or low voltage tach signal
		NORMAL
		LO VLT
GEAR		transmission gear display selection
	OFF	
	PROGRM	
INFO	MODEL	Gauge model number
	VER	Gauge revision code
	SP CAL	speed cal setting
VOLT	WARN	set low volt warning point
DONE		restart system with new settings

POWER

Connect the red wire from the main harness to 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.

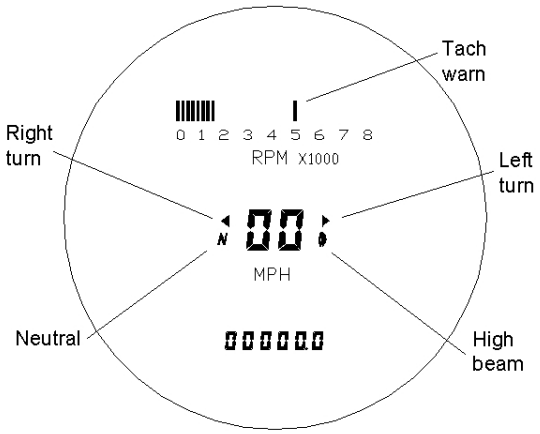
GROUND

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

STATUS AND WARNING 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, consult a service manual to determine the color code and location of any wires you cannot locate.

The neutral, low oil, and check engine indicators are activated by ground at their respective hook-up wires. The check engine wire is white/red, the low oil wire is gray, and the neutral wire is blue.



LOW VOLTAGE WARNING

When the voltage drops below the warning limit with the engine running, LO and your current voltage will be displayed. (default warning limit is 11.0V)

SECURITY SYSTEM INDICATOR

The security system indicator is a red light that is activated by 12 volts to the white/black wire. It will light up whether the gauge is powered or not.

SPEEDOMETER

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

The speed input connector plugs into the speed sensor to tell how fast you are traveling. On cable driven applications, the external sensor connects to the speedometer cable and provides the electric signal. The sensor is normally bolted directly to the bottom of the speedometer, but can also be remote mounted. The sensor has a 5/8" course thread fitting that accepts mid-80's and earlier cables directly. For newer cycles the speedometer cable will need to be replaced with one having the correct fitting.

With transmissions having the built-in electric sensor, a three-wire harness adapter connects the transmission speed sensor to the speedometer. This system will also accept most after-market inductive, Hall-effect, or ground switch sensors.

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 sensor signal wire to the pig-tail white wire, connect the sensor power wire to the pigtail red wire, and connect the sensor ground wire to the pigtail 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. **If the factory harness supplies +5V to the sensor, please utilize the factory connection in place of the white/red power wire.**

For 2004+ Harley and 2003 V-Rod applications make sure to simply "Tee" into the white wire on the speed sensor to make certain the ECM will still receive its proper VSS signal from the sensor. The bike's harness provides +5V power and ground to the sensor, so please leave all wires connected to the bike as from the factory.

2006+ Sportsters utilize a black/blue wire for the VSS signal in place of the white wire on most big-twin models.

The speedometer is fully adjustable and calibration is discussed in the **Speedometer Setup** section.

TACHOMETER

The tachometer is used by connecting the yellow wire from the main harness to the negative side of the coil or to an ignition module tach output. The tachometer is adjustable for 1 – 15 cylinder settings. The 1 cylinder setting is used for single-fire ignition systems without a buffered tach output.

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 bar displays rpm x1000 with a range of 350 – 8000 rpm.

For 2004+ Harley and 2003 V-Rod applications, the tachometer signal will come from the negative side of the ignition coil. Blue/Orange for the front cylinder, Yellow/Blue for the rear cylinder, connect the tachometer input to **only one** of these two wires, set the tachometer for a 1 cyl signal, see Tachometer Set-up for instructions.

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”, 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 unit “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 your self over a mile to determine your speed.

Auto Cal

When “AUTO” is displayed press and release the switch. The speedometer will display “SEt” 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.

PLEASE NOTE:

Common problems during calibration:

VSS wires should be isolated from the ignition system. Coils, plug wires, or tachometer signal wires routed near or with the VSS wire can cause many problems. If you are seeing **erratic speedometer operation**, **registering speed at a standstill**, or **speed changes with engine RPM**, please double-check your VSS wire and tachometer wire routing making sure the VSS wire is separated from any ignition system components.

If your **speedometer registers ‘00’** all the time, the unit is not receiving a VSS signal, please double-check your sensor wiring and mounting. The speedometer cannot be properly calibrated until you are registering a stable, but incorrect speedometer reading.

Please see **Speed sensor voltage checks** on the trouble-shooting page for assistance in checking your sensor.

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 2000 – 8000. The tachometer will read from 350 – 8000 rpm.

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.

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. The gauge can learn the positions based on speed and rpm. It will work with 3, 4, 5, or 6 speed transmissions.

To program the gear positions in, 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, "OFF" or "PROGRM". Press and release the switch to change the selection.

When "PROGRM" 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.

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 brown wire has 12 volts the display intensity will be reduced. Connect this to a toggle switch if you wish to use this feature. To have the system at full brightness all of the time, leave the brown wire disconnected.

FUNCTION SWITCH

The function switch on the side of the dash panel 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:

	SPEED MENU		
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 since last service (if programmed)
GEAR	>		current gear position (if programmed)
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
	TACH MENU		
HOURS	>	HR 0.0	re-settable hour meter
WARN	>	W 0000	current rpm warning or SHIFT if over set point
RPM	>	R 0000	rpm reading in alpha display
LO OIL	>		only visible if input is activated
VOLTS	>	V 00.0	displays voltage to gauge
S MENU	>		switch to speed menu
P MENU	>		switch to performance menu
	PERFORMANCE MENU		
HI RPM	>	H 0000	high rpm recall
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 RPM”. Press and release the switch until “60 TIM” is displayed. After a couple of seconds the display will show the current 0-60 time.

WIRING COLOR CODE FOR GAUGE:

	2003 and older HD	
HLY-2002*	**Stock harness color**	**Function**
RED	ORANGE/WHITE	+12 volt with key on
BLACK	BLACK	ground (connect directly to battery negative)
YELLOW	PINK*	tachometer signal
PURPLE	WHITE**	high beam indicator(+)
ORANGE	VIOLET**	left turn indicator(+)
GREEN	BROWN**	right turn indicator(+)
BLUE	TAN**	neutral indicator(-)
GRAY	GREEN/YELLOW**	oil warning indicator(-)
WHITE/RED	BLACK/YELLOW**	“ENGINE” indicator (-)
WHITE/BLUE	use supplied switch	function (trip select/reset) switch (ground 2nd wire on switch)
WHITE	WHITE/GREEN	output speed signal
BROWN	normally not used	night dimming
WHITE/BLACK	BROWN/VIOLET**	security system indicator

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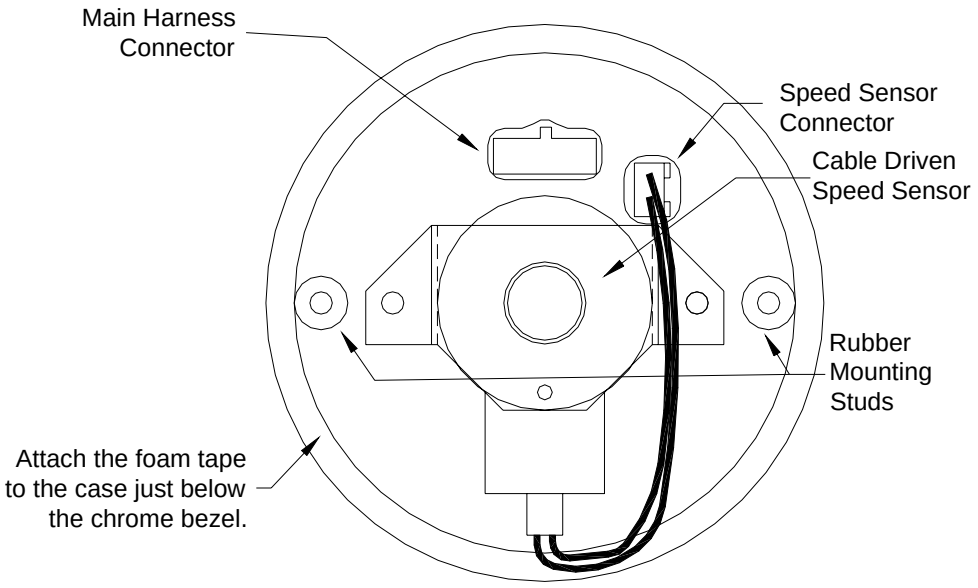
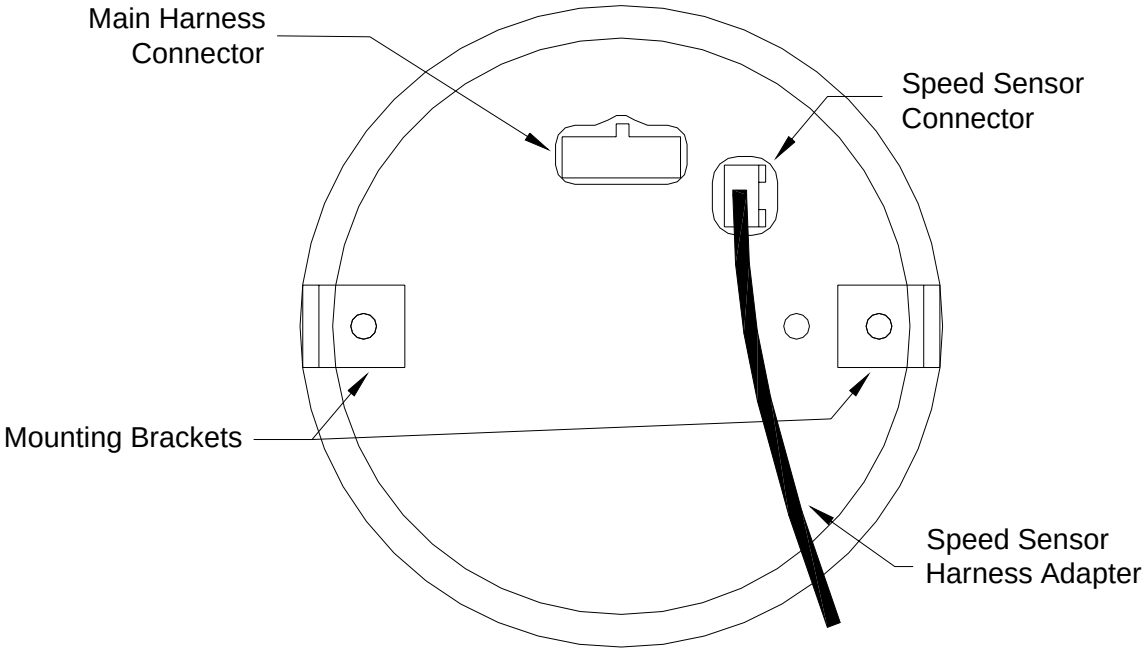
MOUNTING:

The base system is universal enough to fit in either a new-style, clip-in (1995 or newer) or into the older style, bolt-in. The rubber mounts with studs on both sides are used for the bolt-in style. The L-brackets are used for the clip in style.

Mounting hardware and speed sensor connection for the bolt-in system with a speedometer cable.



Mounting hardware and speed sensor connection for the clip-in system with an electric, transmission speed sensor.



Troubleshooting guide

Problem	Possible cause	Solution
Gauge will not light up	Red wire does not have power.	Connect to a location that has power.
	Black wire is not getting a good ground.	Connect ground to a different location.
	Gauge is damaged.	Return gauge for repair. (see instructions)
Gauge lights up, but speed will only show zero.	VSS wire is not connected properly.	Check connection from VSS wire to speed signal wire.
	Speed sensor not grounded properly.	Move ground to different location, preferable close to the speedometer ground.
	Speed sensor is not being turned by transmission.	Check cable connection between sensor and transmission. Sensor can be tested by spinning the cable with a drill.
	Sensor is not sending a speed signal.	Check for a damaged or malfunctioning speed sensor.
	Gauge is not calibrated	Gauge must be recalibrated (see instructions).
PLEASE – SET – SPEED	Speedometer not calibrated	Gauge must be calibrated to your vehicle (see instructions)
Speed reading is erratic or jumps around.	Speed sensor wire is loose or broken.	Check all wire connections and inspect wire for breaks.
	Cable is loose or broken.	Check cable between sensor and transmission.
	Poor ground connection.	Check ground connection on speedometer and sensor.
	Ignition Interference	Check for tachometer wires routed with VSS signal wires.
		Check for VSS signal wires routed near ignition coils
		Check for poor ignition system ground
		Use suppression spark plug wires
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.	Check connection from yellow wire to tach signal wire.
	Ignition system not grounded properly.	Check engine and ignition system grounds.
	Gauge is not grounded properly.	Check gauge and engine grounds.
	Tach signal type is not set correctly.	Change the tach signal type (see instructions).
	Gauge is not calibrated	Gauge must be recalibrated (see instructions).
Tach reading is erratic or jumps around.	Tach signal wire is loose or broken.	Check all wire connections and inspect wire for breaks.
	Poor ground connection.	Check ground connection on tachometer, engine, and ignition system.
	Update rate is too fast.	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 only 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 about 0 volts when the indicator should be off and about 12 volts when the indicator should be on.
Neutral, low oil, 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.
Turn signals do not cancel automatically.	Output speed signal to stock cancel is loose or not connected properly.	Check the connections on the solid white wire coming from the gauge.
	Speedometer is not calibrated.	Calibrate the speedometer.
	Speed sensor is not working.	If the speedometer always shows zero, check speed sensor voltages.
	Turn signal cancel module is not working.	Test turn signal module according to the bike's service manual.

Speed sensor voltage checks. All checks should be made with the sensor connected to the gauge and the key on. Checks should be done with a volt meter and not a test light.

3-wire sensor: Red wire should have 9-11 volts dc, slightly less than battery voltage.
Black wire should show ground, 0 volts dc at all times.
White wire should vary between 0 and 5 volts dc as the gear teeth pass by the sensor.

2-wire sensor: Measure the voltage between the two sensor wires. With the wheel spinning the voltage should be about 1-10 volts ac (make sure the meter is set to AC volts and not DC volts for this check).

WARRANTY

All DAKOTA DIGITAL instruments are warranted free of defects in material and workmanship for 2 years from the date of purchase. In the event of a problem with one of our products within the warranty period, DAKOTA DIGITAL will replace or repair the instrument at no charge. (The decision to repair or replace is solely that of DAKOTA DIGITAL. DAKOTA DIGITAL is not responsible for shipping costs of products returned under warranty or for labor charges for product installation and removal.) This warranty becomes invalid if the product is misused, altered or installed incorrectly.

For warranty coverage, you must first call to receive an RMA#. Ship the product transportation prepaid via UPS or insured Parcel Post. A copy of the original invoice or dated bill of sale along with a description of the defect is also required. Make sure that the RMA number is clearly visible on the outside of the package as well as inside on the paper work. **A note or letter must be included describing the problem.**

The above warranties, both expressed and implied, do not cover damages caused by improper installation, misuse, abuse, fire, unauthorized modifications, floods or acts of God, or reimbursement of customer or shop time. The extent of the warranty is limited only to the product and does not cover any loss or damage to vehicle, equipment, or non-DAKOTA DIGITAL products.

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 units. You can contact our technicians at 605-332-6513 or by email at dakotasupport@dakotadigital.com.

Should you ever need to send the unit back for repairs, please 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 your RMA#, a complete description of the problem, your full name and address (street address preferred), and a telephone number where you can be reached during the day.** A return authorization number (RMA#) for products being return for repair is required. Do not send any money. We will bill you for the repair charges.

Dakota Digital

4510 W. 61ST St. N.,Sioux Falls, SD 57107
Phone: (605) 332-6513 FAX: (605) 339-4106
www.dakotadigital.com
dakotasupport@dakotadigital.com