

**VEHICLE SPEED MONITOR**



**APEXS, INC.**  
Applied Expert Systems, Inc.

# **V**EHICLE **S**PEED **M**ONITOR **VSM V-COUNT II**

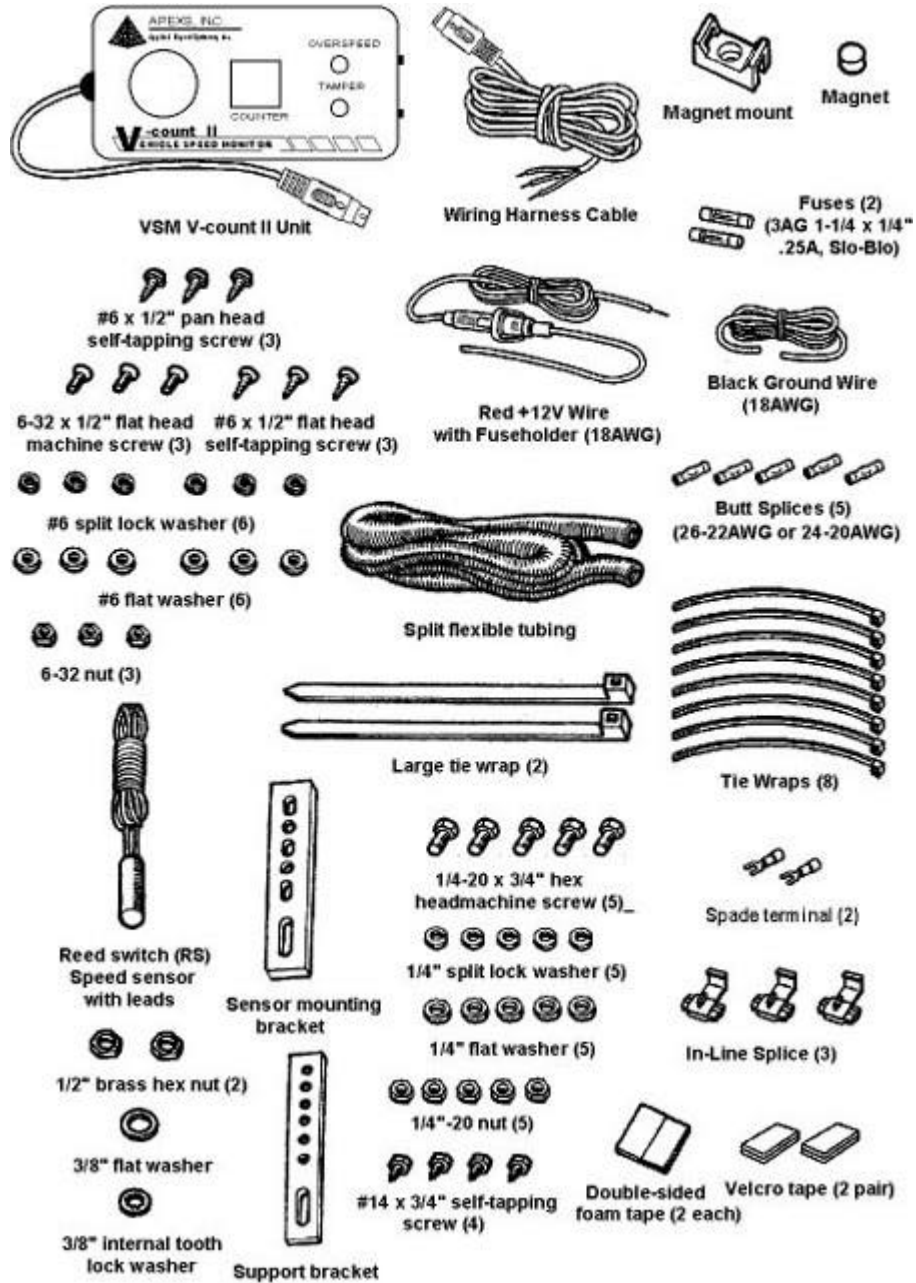


**REED SWITCH (RS)  
INSTALLATION GUIDE**

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VSM V-COUNT Vehicle Speed Sensor (VSS) Installation Guide

VSM V-COUNT II are registered trademark of APEXS, Inc.

# 1. CONTENTS OF PACKAGE



## **2. INTRODUCTION**

The V-Count II is designed to allow straightforward installation. The specific details of installation vary by vehicle model and year. This manual provides general instructions sufficient to guide a professional installer or knowledgeable, experienced individual through a successful installation. Please read or at least skim the entire manual before beginning the installation. Read and understand each step thoroughly before starting that step. Your V-Count II includes a limited number of extra parts.

**WARNING:** *The magnet supplied with the V-Count II is extremely strong and will de-magnetize ATM cards, credit cards, etc., if brought in contact. It may also affect other sensitive electronic equipment.*

### **PROFESSIONAL VS. DO-IT-YOURSELF INSTALLATION**

APEXS, Inc. strongly recommends that the V-Count II be installed by ASE (Automotive Service Excellence) certified technicians or professional automotive mechanics. As with any installation of an automotive accessory, the installer must make a series of decisions, in this case decisions such as where and how the sensor and brackets are mounted, where holes are drilled, how wires are routed, where to locate unswitched +12V and ground and so on. A knowledgeable and experienced professional best makes these decisions. Poor decisions may damage your vehicle or cause accidents or injuries.

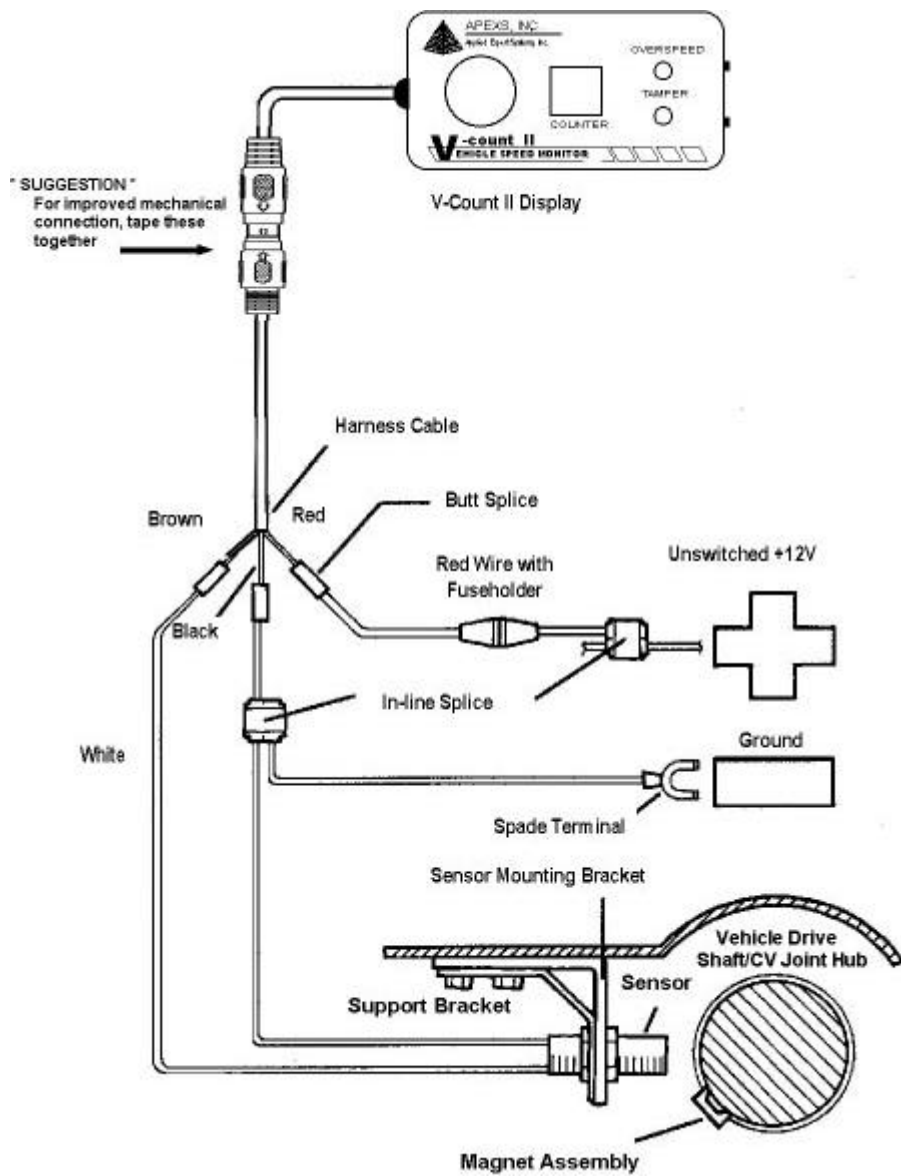
**WARNING:** *Working beneath your vehicle and installing the V-Count II may be hazardous. Improper installation may damage your vehicle and cause accidents and/or injuries. If you are uneasy about installing your unit please have a qualified professional complete the installation. APEXS, Inc. specifically disclaims any liability for injury or loss resulting from the installation or use of the V-Count II.*

### **GETTING READY**

Before installing your V-Count II:

You may need to raise the vehicle in order for you to work under it. Always use safety stands when working on or under any vehicle that is supported by only a jack. You may need the following tools or equivalent. Additional tools may be required depending on your specific installation.

- drill and drill bits, 1/8" to 5/16" (3 to 8mm)
- multimeter and/or test light
- hacksaw
- adjustable wrenches
- vise, metal forming tools
- crimp tools
- wire cutter, wire stripper
- various screwdrivers and pliers



### 3. PLANNING YOUR INSTALLATION

Figure 1 illustrates the installation of the V-Count II. The sensor, sensor magnet and associated brackets mount underneath your vehicle. The sensor leads run under the vehicle and into the vehicle cabin where they connect to the V-Count II display. The V-Count II display also requires unswitched +12V and ground connections to your vehicle's electrical system.

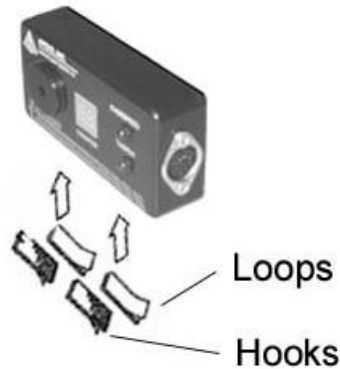
Before you begin the actual hands-on installation of your V-Count II, please plan out your installation by thinking through the following points. This will save you time, frustration, and parts.

- **Determine how and where you want to mount the V-Count II display within the vehicle cabin.**  
*NOTE: Safe driving requires that the driver's attention be focused on the road. Please install your V-Count II in a location that minimizes distractions to the driver.*
- **Find a single point in the vehicle cabin where you can bring together the leads of the harness cable, the sensor leads, and the +12V and ground wires.**
- **Determine how you will route the harness cable to the V-Count II display.**
- **Locate your fusebox and find a source of UNSWITCHED +12V NOT USED FOR SAFETY RELATED EQUIPMENT.**  
*NOTE: "Unswitched +12V" means +12V not switched off by the ignition key. The V-Count II consumes negligible power (nominally, 5mA) and will not run down your vehicle's battery.*
- **Locate a ground point to attach a ground wire spade terminal.**
- **Locate a feedthrough into the vehicle cabin through which you can bring the two sensor leads and the +12V and ground wires if your fusebox is in your engine compartment.**
- **IF YOU HAVE A FRONT WHEEL DRIVE VEHICLE, decide whether you will place the sensor magnet on either the left or right side in-board constant velocity (CV) joint hub.**
- **IF YOU HAVE A REAR WHEEL DRIVE VEHICLE, decide where on the driveshaft within 12" (30cm) of the transmission you will place the sensor magnet.**
- **Decide how you will attach the brackets so that the sensor is within 3/8" - 5/8" (10-16mm) of the magnet. How will you form the brackets to fit? What holes will you use or drill to mount the bracket? Do these holes pierce the vehicle floor? Where? (DO NOT USE FLUID RETAINING BOLTS AS MOUNTING POINTS.)**
- **Decide how you will route the wires from the sensor to a feedthru into the vehicle cabin.**

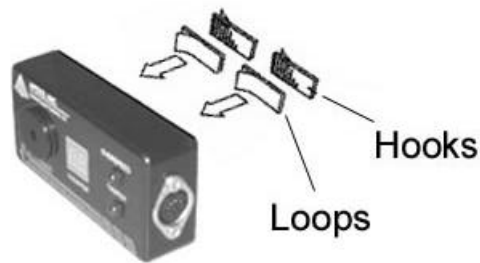
### Step 1: Mount the VSM V-COUNT Unit in the Vehicle

The following illustrations show possible mounting options for the unit.

TOP OF DASHBOARD (Horizontal Surfaces)



FACE OF DASHBOARD (Vertical Surfaces)

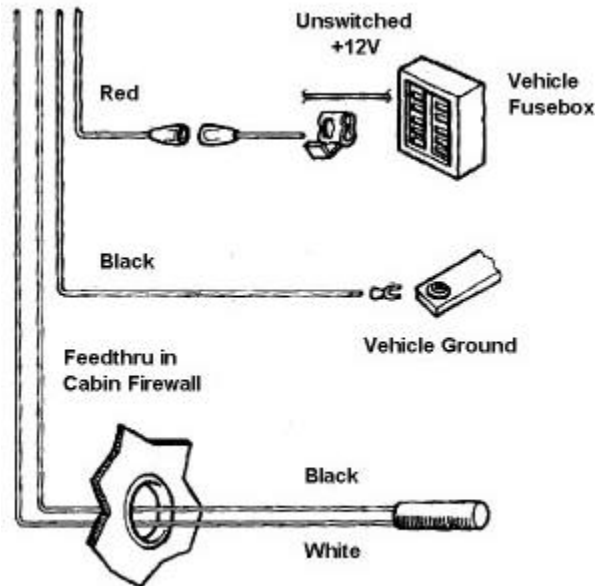


### Step 2. +12V Power and Ground Connections

Thinking ahead...In Step 5, you will bring the sensor leads, +12V wire, and ground wire to a single point of your choice under the dash and connect them to the display harness cable. Choose this single point now. The sensor leads must be led into the vehicle cabin. Usually you can use an existing feedthru in the firewall. If your fusebox is in the engine compartment then you may also need a feedthru to bring the +12V and ground wires through into the vehicle cabin.

The V-Count II requires an unswitched +12V connection to your vehicle and a ground connection to the vehicle chassis. These connections are often most easily made at your vehicle's fusebox. A direct connection in your fusebox is best – some vehicles have extra slots for accessories such as the V-Count II. You may need to buy the proper termination for use with your vehicle's fusebox - consult your dealer or local auto parts store. Attach the termination or connector to the end of the red +12V wire with fuseholder and insert into your fusebox. Otherwise select an unswitched wire exiting the fusebox that

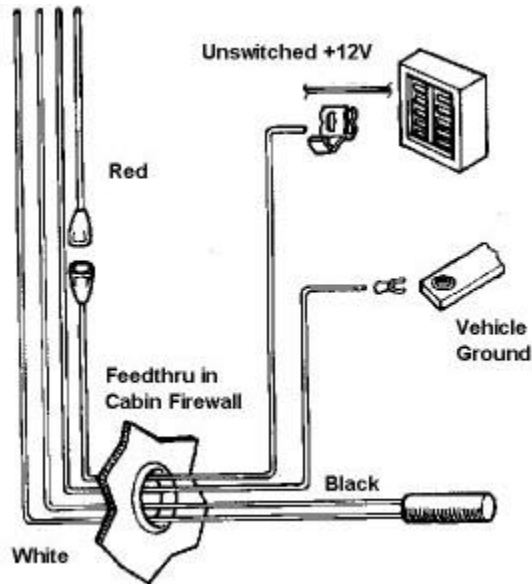
does not involve safety-related equipment, such as headlights, brakes and so on. Possible candidate wires may include the wires used for the cigarette lighter, dome light (before the switch), glove compartment light, clock, tailgate light and other convenience functions. The wire used should be 22-18AWG or have the same diameter as the red +12V wire with fuseholder. Use the in-line splice to make the connection to the red +12V wire with fuseholder. Trim off flush the stripped portion of the red wire. The fuseholder should be in the vehicle cabin.



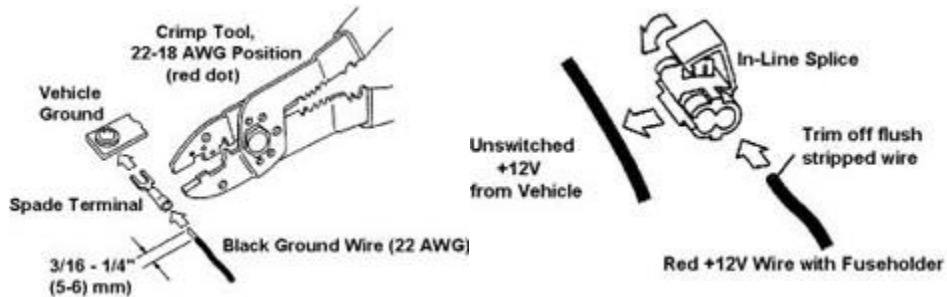
**Making Unswitched +12V and Ground Within the Vehicle Cabin**

A ground connection may be made by inserting the spade terminal under the head of a screw threaded into the vehicle chassis. Use a multimeter to verify the ground connection to vehicle chassis. The fusebox mounting screws are candidate connections. If a screw is not convenient, locate a ground wire that is 22-18AWG or has the same diameter as the black ground wire. Use an in-line splice to make the connection to the black ground wire.





**Making Unswitched +12V and Ground Outside Vehicle Cabin**



**Crimping the spade terminal**

**Splicing for Unswitched +12V**

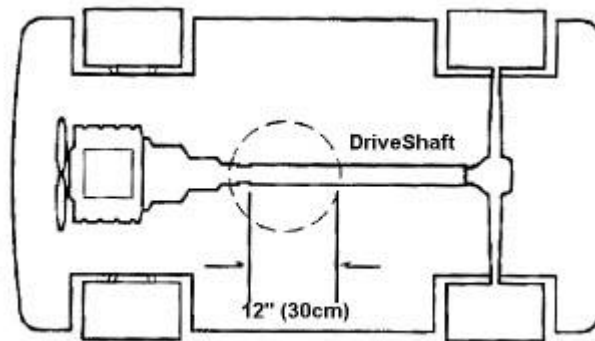
### **Step 3.SENSOR INSTALLATION**

The sensor installation requires mounting a magnet on the drive shaft of a rear wheel drive vehicle or on the in-board CV joint hub of a front wheel drive vehicle. The reed switch sensor is mounted on a bracket opposite to the magnet rotating on the drive shaft or in-board CV joint hub. The sensor detects the magnet as it passes. The gap between the magnet mount and sensor must be 3/8" - 5/8" (10-16mm). There should be a clearance zone of at least 3/4" (19mm) above the drive shaft or in-board CV joint hub where the magnet is mounted.

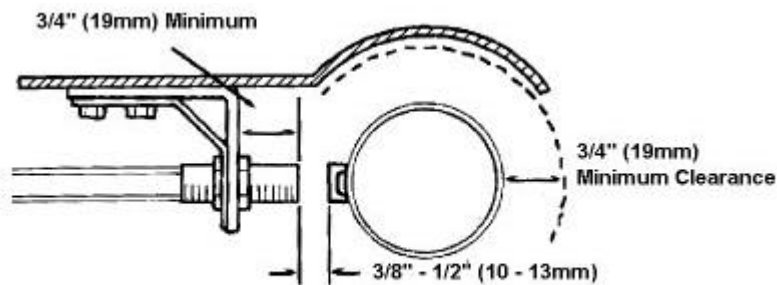
## REAR WHEEL DRIVE

*Note: Thinking ahead...In Step 5, you will bring the sensor leads, +12V wire, and ground wire to a single point of your choice under the dash and connect them to the display harness cable. Choose this single point now. The sensor leads must be led into the vehicle cabin. Usually you can use an existing feedthru in the firewall. If your fusebox is in the engine compartment then you may also need a feedthru to bring the +12V and ground wires through into the vehicle cabin.*

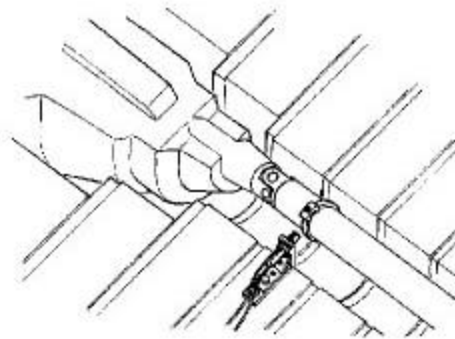
A typical rear wheel drive installation is shown. Select a location on the drive shaft within 12 inches (30cm) of the universal joint to account for vehicle suspension movement while driving. Install the magnet in its mount using the large tie wrap as shown. Loosely cinch the large tie wrap around the drive shaft, with the magnet mount oriented as shown, so you can adjust its final position after the sensor is installed. Do not cinch tight the tie wrap.



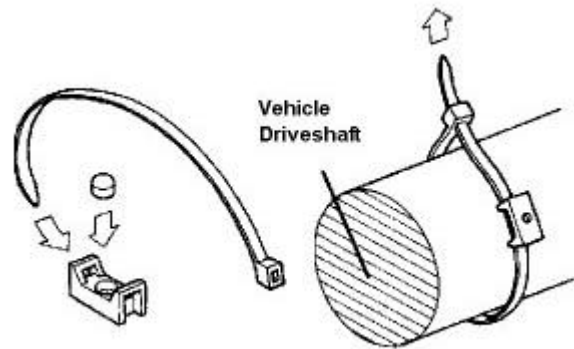
Positioning the Sensor (Rear Wheel Drive)



Determining Proper Clearances and Gap



Typical Installation (Rear Wheel Drive)



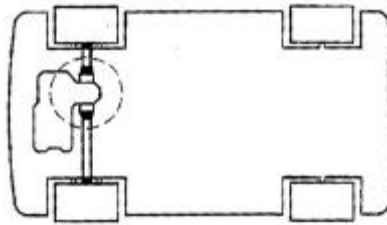
Installing the Magnet (Rear Wheel Drive)

## FRONT WHEEL DRIVE

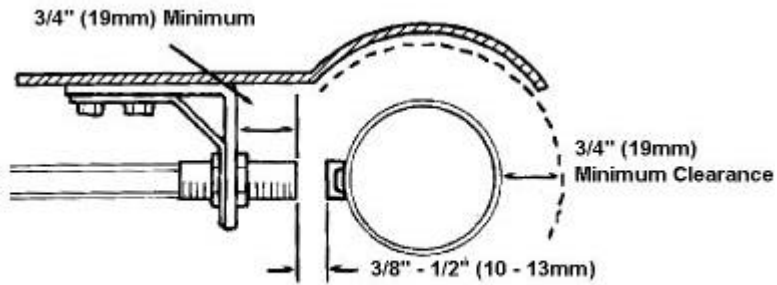
### NOTE:

*Thinking ahead...Choose the in-board CV joint hub you want to use by looking at how you can mount the sensor and how you will route the wires into vehicle cabin. Consider where feedthrus are and how you will make the connections.*

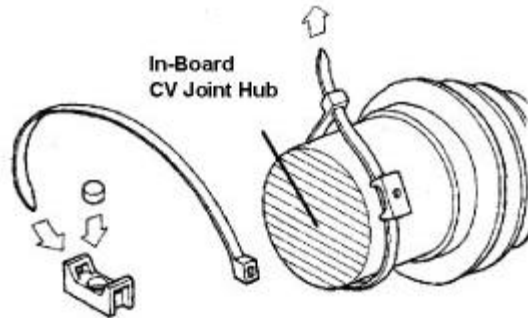
Select an in-board CV joint hub and install the magnet in its mount using the large tie wrap as shown. Loosely cinch the large tie wrap around the CV joint, with the magnet mount oriented as shown, so you can adjust its final position after the sensor is installed. Do not overlap boot. Do not cinch tie wrap. Choose mounting locations for the sensor mounting bracket and support bracket on the transaxle/engine assembly. Do not mount the bracket on the vehicle chassis because of engine torque. Do not use fluid retaining bolts to retain the brackets.



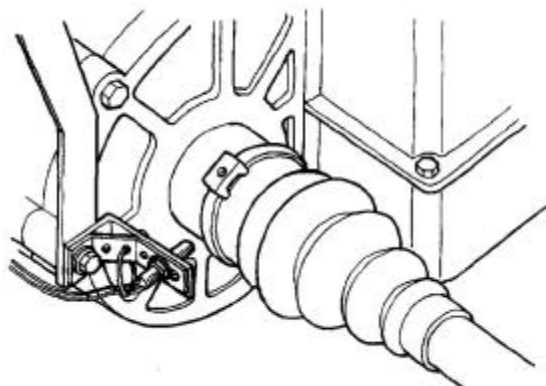
**Positioning the Sensor (Front Wheel Drive)**



**Determining Proper Clearances and Gap**



**Installing the Magnet (Front Wheel Drive)**



**Typical Installation (Front Wheel Drive, Engine Mount)**

#### **Step 4. SENSOR BRACKET INSTALLATION (CONTINUED)**

The instructions below describe an optimal sensor bracket assembly. Due to the variations in individual cars, you will need to adapt these instructions to fit the sensor bracket into whatever situation exists. As you do so, it is vital to insure that **THE SENSOR END PROTRUDES 3/4" (19mm) FROM THE SENSOR MOUNTING BRACKET**. In addition, the brackets must not protrude below other parts on the vehicle underbody.

#### **NOTE:**

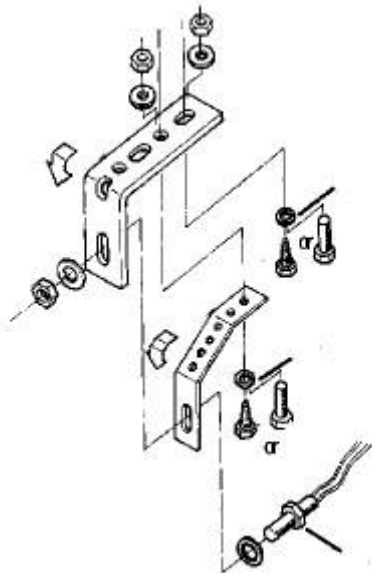
*At low speeds, excessive vehicle vibrations can cause erroneous readings.*

#### **REAR WHEEL DRIVE**

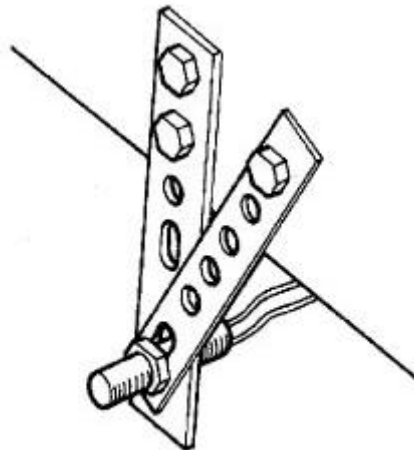
Choose mounting locations for the sensor mounting bracket and support bracket. The support bracket reinforces the sensor-mounting bracket against vibration. After installing the brackets for the proper gap between the sensor tip and the magnet mount, adjust the large tie wrap so that the magnet passes opposite the end of the sensor. Cinch tie wrap tight against drive shaft. Check the alignment of the magnet mount with end of sensor by spinning tires if possible.

#### **FRONT WHEEL DRIVE**

The support bracket reinforces the sensor-mounting bracket against vibration. After installing the brackets for the proper gap, adjust the large tie wrap so that the magnet passes opposite the end of the sensor. Cinch tie wrap tight against CV joint hub. Check the alignment of the magnet mount with end of sensor by spinning tires if possible.



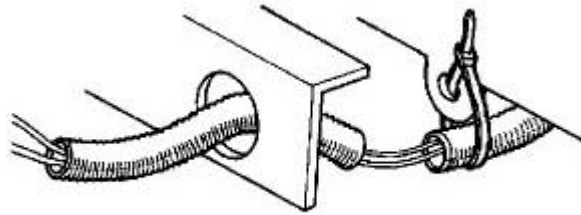
**Sensor Bracket Assembly**



**Wrong Way to Use Brackets**

### Step 5. WIRE ROUTING

Use the split flexible tubing to protect the sensor leads from sensor up into the vehicle cabin. Use the small tie wraps to hold the leads against the underbody of your vehicle. The tubing can be cut into pieces and used where the wires may rub against sharp points or edges and where the leads are tie wrapped to the underbody. Tubing can also be used where the leads are particularly exposed. If a vehicle wire bundle is readily accessible, route the sensor leads along this wire bundle. The sensor leads should be routed at least 12" (30 cm) away from spark plug wires, the coil, and the alternator. Loops, coils, and folds should be avoided in order to avoid creating unwanted interference that might result in erroneous readings.

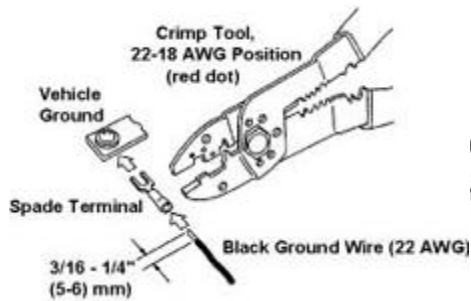
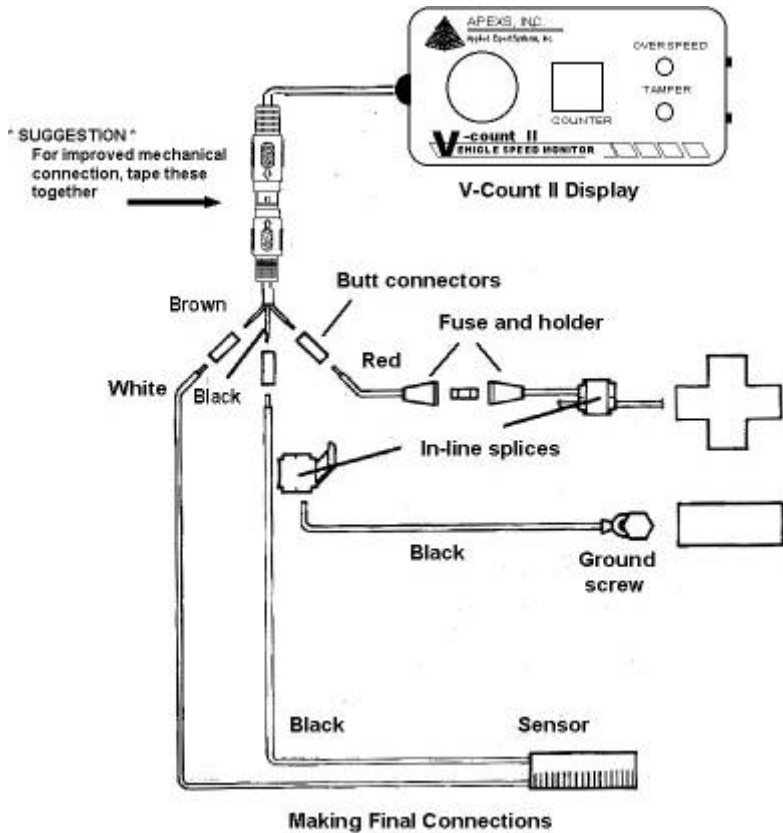


Protecting the Wires

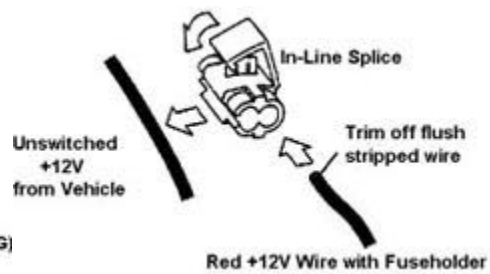
### Step 6. WIRE CONNECTIONS

Make final connections. Use the butt splices to connect the white sensor lead to harness cable white wire, the black sensor lead to harness cable black wire, and the red +12V wire w/ fuseholder to harness cable red wire. Stripped wire ends should be 3/16"- 1/4" (5-6 mm). Use an in-line splice to connect the black ground wire to the black sensor lead near the butt splice. Install fuse in fuseholder. Use a small tie wrap to secure and protect the connections under the dash.

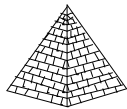
**Caution:** *If the connections are on the driver's side, make sure the wires cannot become entangled in the vehicle pedals or driver's feet.*



**Crimping the spade terminal**



**Splicing for Unswitched +12V**



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