I have added another instrument, a new VC4000DAQ, shown to the right. This accelerometer replaces the VC3000DAQ which I've had for four years. It has many new features and attributes which were not available when the VC3000DAQ was manufactured and sold. This updated model includes numerous improvements and additional components.

The older model featured a dual-axis accelerometer and broadband data acquisition system. The newer VC4000DAQ incorporates a three-axis accelerometer, a built-in angular-rate gyroscope, a 360-degree magnetometer, GPS compatibility, and PC communication by USB, Bluetooth, SD card, and/or RS232 (serial) port, providing unlimited data acquisition and storage capabilities when linked to a PC.

One of the most significant aspects of this new machine is its accelerometer. The three-axis unit is selectable in either 2G or 6G mode, where the acceleration of gravity, 32.2 feet per second per second, is one G. This three-axis base provides continuous monitoring of all lineal acceleration to which it is being subjected. Although many may think of this unit only in terms of brake testing (braking is negative acceleration, or deceleration), it can also record acceleration as a function of time to demonstrate the performance capabilities of a vehicle. It can also be used to determine or demonstrate the handling characteristics of a vehicle—how many lateral Gs can this vehicle pull on a particular surface, site, or scene? Beyond the handling limit, when the vehicle starts to spin and/or yaw, this new unit also incorporates a gyroscope to measure and record angular rates; i.e., what is the rate of spin of the vehicle? The limitation of the built-in gyroscope is 90 degrees per second, which is sufficient for determining rate of spin for any critical speed yaw of any over-the-road vehicle operated at or near legal speeds. That rate would not be high enough to record post-crash rotation during an off-center collision, but this device was not created to be used in any and all types of crash testing. It does, however, have available external three-axis accelerometers and additional external angular-rate sensors to allow its use to document rotational and linear accelerations in low-speed crashes. How many Gs did that 4 mph impact produce? Set the gyroscope to record pitch, then stage the impact with exemplar vehicles and measure! You'll have all the data pertaining to that collision, in three linear components and one rotational.

Accuracy is often questioned. This unit measures acceleration to 0.001G and time to 0.01 second. From the acceleration and time, velocity and distance are evaluated by an onboard processor. The accuracies of the velocity and distance results from this unit have been demonstrated by testing to be within one percent for the measured and reported values of G and the calculated values of speed and distance. The sample rate is adjustable, up to 1000 Hertz. In other words, this unit can record the instantaneous values of the various data parameters (there can be others, because it readily accepts up to sixteen external input devices) up to one thousand times each second. Its predecessor only recorded at 100 Hz, which was quite good; 1000 Hz is overkill for most situations.

The new model also includes a magnetometer to provide continuous data on compass heading. When placing this unit on a vehicle, the location should allow for accurate compass headings to be measured and reported. If placed too close to an object which pulls the compass toward it, that will be the only aspect of the recorded data which will be invalidated by that placement. Another feature of this unit is a GPS interface up to 5 Hz. GPS has many useful features. There have been