

**GHI CAT HELMET TEST SYSTEM**  
**For**  
**DOT, ECE-22, Hardhat, HIC, NOCSAE and SI Test Specifications**

***WHAT IS THE CAT HELMET TEST SYSTEM?***

The CAT Helmet Test System is an integrated, 4 channel Computer Aided Test system with the power to capture and analyze both single axis *and* triaxial sensor data from protective helmet tests. The CAT Helmet test system can perform automatic data analysis, and print out finished test reports. When Accelerometers or Load Cells are added to the system, all electronic tasks required for testing are present. The optional, integrated **Velocity Sensor** further enhances your test capability by providing impact and rebound velocity data from helmet impact tests.

***WHAT DOES IT DO?***

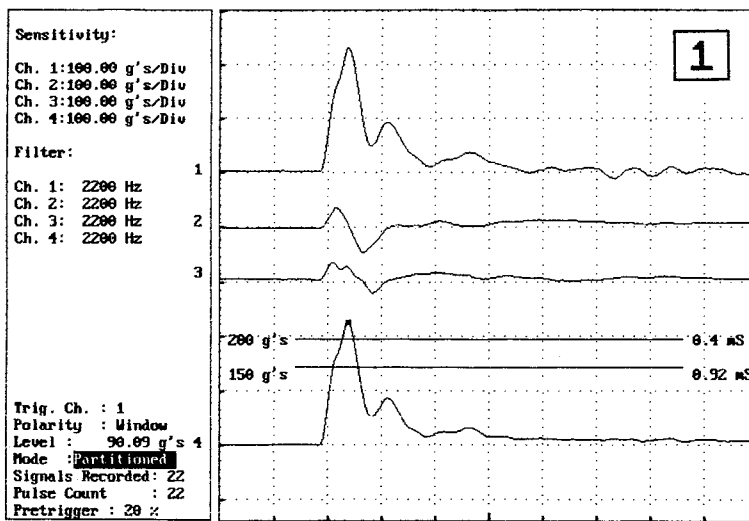
- Captures and analyzes data from Helmet Impact tests.
- Displays test waveforms & numerical data via computer monitor.
- Displays up to 5 test waveforms on screen, offset for easy viewing.
- Solves for the *triaxial resultant vector* if a triaxial sensor is used.
- Automatically determines 150g & 200g dwell time and peak amplitude.
- Solves for HIC and Severity Index.
- Velocity Sensor data displayed on screen with helmet test waveforms.
- Displacement calculation gives cushion material compression measurements.
- **X vs Y** plot for instrumented chin strap testing.
- Automatic modes simplify test procedures & improve repeatability.
- Prints professional documented report with waveforms.
- Prints numerical data in tabular format for multi-impact tests.
- Stores test data in 'as recorded' form for later processing & comparisons.
- High performance, fully integrated system insures test accuracy.

The GHI CAT Helmet Test System is based on the proven CAT data acquisition system. GHI's PC based hardware design includes many high performance features that make it ideal for Helmet Impact Testing. GHI's Helmet Test software is the product of over 15 years experience with Helmet test systems and standards, and is totally integrated with the CAT hardware. The optional Velocity Sensor is based on a proven design specified for over 20 years by corporations and various standards organizations. Together, they make up a powerful, proven, yet easy to use system that requires only a mechanical test stand and sensors to start testing. Even signal conditioning for ICP type accelerometers is included.

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**up**

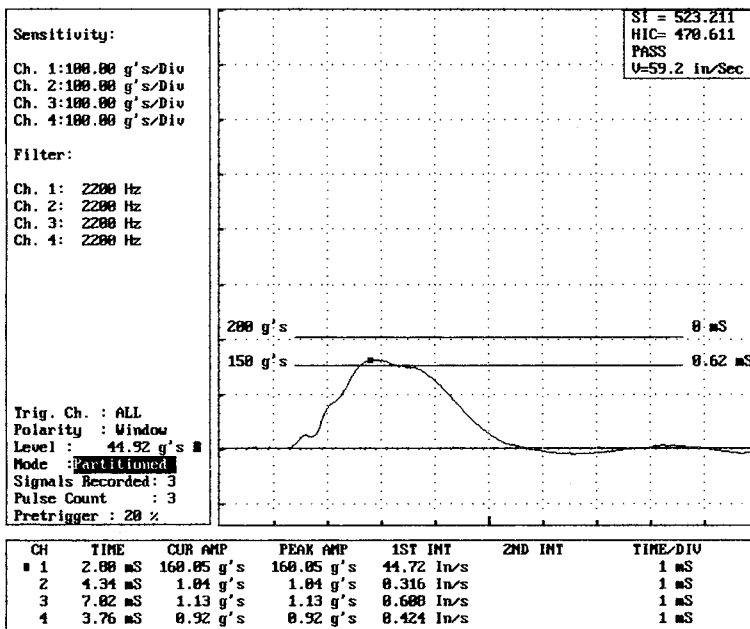
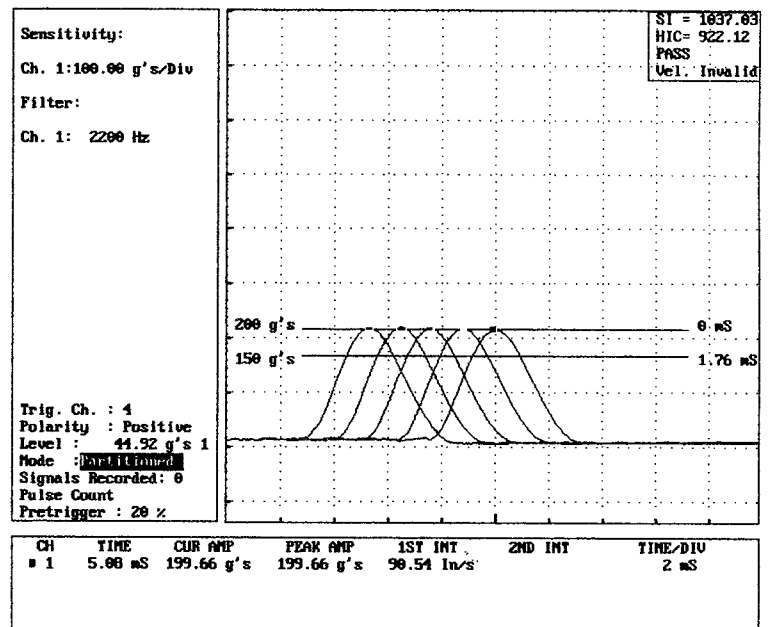
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**Figure 1.** This is an actual Test Report (reduced 50% like the plots below), with the 3 top waveforms from a Triaxial helmet drop test, and channel 4 plotted as the Resultant Vector as calculated by the CAT System. Numerical results are indicated as channel 'R'. The dwell times at 150g's & 200g's, and the Peak Amplitude appear on this plot also. All waveform test reports have 6 test identification headers at the top of the page, and 4 lines of comments at the bottom of the page, for full test documentation. Tabular data reports are also available from the CAT Helmet Test System, depending on the test standard used.

CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIV
1	4.76 ms	229.35 g's	229.48 g's	-138.77 In/s		2 ms
2	4.32 ms	39.66 g's	39.72 g's	-183.60 In/s		2 ms
3	4.16 ms	36.53 g's	36.65 g's	-180.31 In/s		2 ms
# R	4.76 ms	211.22 g's	211.31 g's	-120.50 In/s		2 ms

**Figure 2.** This plot shows the CAT Helmet Test System's sequential impact test capability, printed from a Waveform Test Report. Up to five (5) impacts from either Triaxial or Single axis accelerometers may be plotted on the same screen, offset as shown. Filter frequencies, in this case 2200HZ, are selected automatically by the Helmet Test Software depending on the type of helmet test, or they can be set by the user. Filtering can also be performed after the data has been captured by the system. Note that a "Pass/Fail" criteria was selected for this example test standard (DOT), with SI and HIC values displayed.



**Figure 3.** This plot shows a single channel impact Test waveform displayed along with the optional Optical Velocity Sensor activated. The Velocity data is displayed in the data block at the top right corner of this Test Report. Note also the filter frequencies selected for all 4 channels, and the Trigger parameters & test counters below the channel/filter data.