



SURFACE VEHICLE INFORMATION REPORT	J1733™	NOV2018
	Issued 1994-12 Revised 2018-11	
Superseding J1733 NOV2007		
(R) Sign Convention for Vehicle Crash Testing		

RATIONALE

The committee performed the recommended Five-Year Review of this Information Report and determined that a number of changes were necessary. The major changes are outlined below.

- Removed all references to BioSID.
- Replaced Figures 1, 2, 3, 4, 5, 6, 7, 9, and 10 with updated artwork.
- Added Angular Rate Sensor (ARS) and relevant ARS information and added ARS Figure 8.
- Added Table 2 for THOR-50M dummy manipulations for recorded sensor polarities.

1. SCOPE

In order to compare test results obtained from different crash test facilities, standardized coordinate systems need to be defined for crash test dummies, vehicle structures, and laboratory fixtures. In addition, recorded polarities for various transducer outputs need to be defined relative to positive directions of the appropriate coordinate systems. This SAE Information Report describes the standardized sign convention and recorded output polarities for various transducers used in crash testing.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

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2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J211 Instrumentation for Impact Test

SAE J670 Vehicle Dynamics Terminology

SAE J1594 Vehicle Aerodynamics Terminology

SAE J2052 Test Device Head Contact Duration Analysis

3. RIGHT-HANDED COORDINATE SYSTEM

A right-handed coordinate system consists of an ordered set of three mutually perpendicular axes (x , y , z) which have a common origin and whose positive directions point in the same directions as the ordered set of the thumb, forefinger, and middle finger of the right hand when positioned as shown in Figure 1. Note that this configuration of x , y , and z axes always define a right-handed coordinate system independent of the orientation of the hand in space. To assure consistent vector directions of moments and angular velocities and accelerations calculated by vector multiplications all coordinate systems used in vehicle testing will be "right-handed". Sections 4 and 5 will define standardized orientations of coordinate systems for the vehicle and dummy, respectively.

Positive angular motion and moment directions are determined by the right-handed screw rule. If any of the three positive axes is grasped with the right hand with the thumb extended in the positive direction, as shown in Figure 2 for the x -axis, then the curl of the fingers indicate the positive direction for angular motions and moments with respect to that axis.

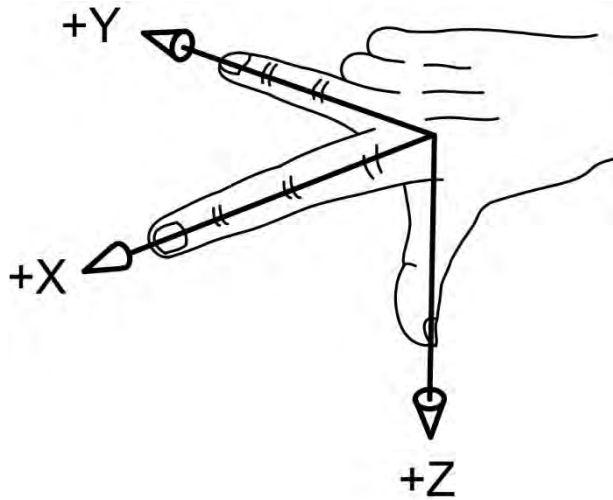


Figure 1 - The configuration of a right-handed coordinate system relative to the thumb, forefinger, and middle finger of the right hand

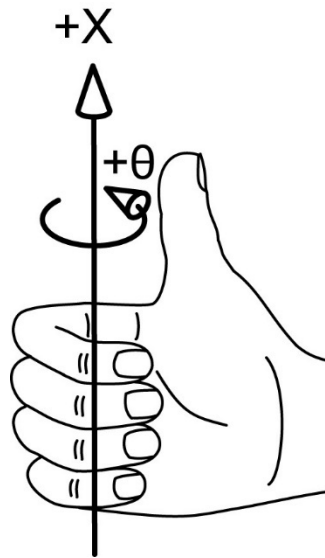


Figure 2 - Right-handed screw rule

A simple method to determine if a coordinate system is right-handed is to rotate the system 90 degrees about any of one of its positive axes using the right-handed screw rule. For a positive 90 degrees rotation about the +x-axis, the coordinate system is right-handed if the +y-axis rotates to the position previously occupied by the +z-axis. For a positive 90 degrees rotation about the +y-axis, the coordinate system is right-handed if the +z-axis rotates to the position previously occupied by the +x-axis. For a positive 90 degrees rotation about the +z-axis, the coordinate system is right-handed if the +x-axis rotates to the position previously occupied by the +y-axis.

4. VEHICLE COORDINATE SYSTEMS

Vehicle coordinate systems will be consistent with the orientations specified in SAE J670 and SAE J1594. These orientations are shown in Figures 3 and 4, respectively. For structures within the vehicle that have a principle axis of motion such as the steering wheel column, the vehicle coordinate system may be rotated about the y-axis such that the +x-axis or +z-axis is directed along the column axis.

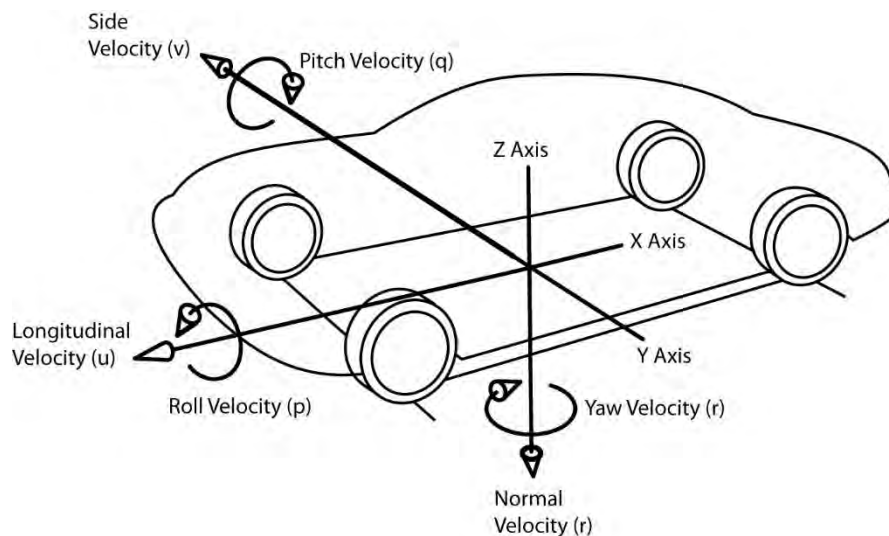


Figure 3 - Vehicle dynamics coordinate system - SAE J670