

FMVSS 201/202 Combined Head Restraint and Seat Back Test System Including Horizontal and Swinging Impactors



Purpose

Federal Motor Vehicle Safety Standard (FMVSS) 201 specifies the requirements for occupant protection in interior impacts and FMVSS 202 specifies requirements for head restraints to reduce the frequency and severity of neck injury in rear-end and other collisions. The equipment described will perform tests according to the FMVSS 201 and 202 specifications.

Description

Test equipment consists of a seat mounting test bed plate, A-frame loading stand with moveable crosshead, three dual electrohydraulic actuator loading frames, and three electropneumatic actuator loading frames to apply the prescribed loads. Although designed primarily for FMVSS 201/202 testing, it can also be used for the appropriate sections of European Regulation ECE-17.

The Instrumentation Panel and Seat location for each 201 test station is adjustable in the vertical, lateral, and fore/aft positions for proper location of test actuation. Two actuators are equipped with a linear position transducer for displacement measurement and an accumulator to propel the headform (SAE J826 manikin) fitted with two accelerometers into the seat head rest. The third 201 type station, also equipped with a linear position transducer and two accelerometers, is of the hinge mounted pendulum type and is used for rear seat head rest or instrumentation panel testing.

The Seat Reference Point (SRP) location for each 202 test station is adjustable in the vertical, lateral, and fore/aft positions for proper location of test actuation. The seat backform (SAE J826 manikin) is mounted on a load cell and actuator for application of the primary load. This actuator is also equipped with a linear position transducer for angular measurement of the load application arm. A second actuator is flange-mounted to the upper length of the loading arm and is equipped with a headform, load cell, and linear displacement transducer, also.

During testing, the loads and displacements of all cylinders in use are monitored. In addition, the angular displacements for the lower cylinder and rotating portion of the loading arm are also recorded. Through these measurements, the load vectors are resolved so that the moment about the SRP caused by the loading of the seat is known at any given time during the test.

TMSI

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System pressure is provided by a 3000 psi Nitrogen Supply Tank for 201 type tests and a 1500 psi Hydraulic Power Supply for 202 type tests, which is interlocked with the computer for full automatic control.

Computer, printer, and control electronics are housed in a vertical rack enclosure especially prepared for electronic instrumentation

Control System

All electronic control and data acquisition systems provided by **TMSI** are integrated completely for control by a single PC with Windows® based software for intuitive operation with minimal operator training.

TMSI MicroTeStation™ housed in 20.5 W x 72 H x 24 D inch instrument rack enclosure. Includes:

- An Intel Pentium® Based Microprocessor Industrial Computer
- Standard Hard Disk Drive
- Single 3.5 in. Floppy Disk Drive
- A Removable Disk Drive for Data Archival and Storage
- Random Access Memory
- SVGA Color Monitor
- Windows® 95/NT Operating System
- 16+ Chnl A/D, DIO On-board data acquisition/reduction system
- 6+ Chnl Anti Alias Filters
- Telephone Modem
- Color Printer

Data Acquisition/Control

Parallel full-time data acquisition/control processing is accomplished by MicroStar Data Acquisition Processors (DAP) which feature on-board CPU and memory as well as Analog to Digital and Digital to Analog converters. Closed-loop PID control is achieved on-board the DAP unit for full software tunability of hydraulic actuators in both load and position feedback control.

- MicroStar DAP Data Acquisition Processor to operate in parallel with the Pentium Based Microprocessor
- ComputerBoards CIO/DIO 24 SSR, Solid State Relays for sensing and controlling digital inputs and outputs

Software

SeatTEST™ is **TMSI's** data acquisition/reduction program to operate the on-site MicroTeStation in Windows 95/NT presentation, control tests according to FMVSS 201/202, reduce and present tabular and graphical reports, and archive tests results to hard, floppy disk, and removable disk.

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