SURFACE VEHICLE RECOMMENDED PRACTICE

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(R) Mechanical and Hybrid Automotive Adaptive Driver Controls

RATIONALE

A revision is necessary to stay current with new technologies as well as changes in the Automotive and Adaptive Driver Control Devices.

FOREWORD

For people with physical disabilities to be able to operate a personally licensed vehicle, it is often necessary for vehicle modifiers to add or modify primary vehicle controls using automotive adaptive products, where primary controls are defined by 3.4.1 and include those controls needed to control vehicle directional movement and safe operation of the vehicle, including but not limited to steering, transmission, engine control, braking, lighting, directional indication.

The purpose of this document is to provide criteria and methods to evaluate manual primary control system design, installation, operation, maintenance, and performance in personally licensed passenger vehicles such as such as sedans, crossovers, SUVs, MPVs, light trucks, and van-type vehicles. Therefore, this SAE Recommended Practice establishes uniform procedures for assuring the manufactured quality, installed utility, and service performance of certain automotive adaptive products, other than those provided by the original equipment manufacturer (OEM), intended to provide driving capability to persons with physical disabilities. These devices function as adaptive appliances to compensate for lost or reduced performance in the arms or legs, or both, of the driver. Some of the primary control adaptive devices are designed to transfer foot functions to the hands, hand functions to the feet, or vehicle-control functions from one side of the body to the other.

This document is specifically concerned with those mechanical and electrical products that are intended by the manufacturer to be installed within the occupant space of the vehicle, be operated by a vehicle driver with a physical disability, be added to, or substituted for, the vehicle control pedals, wheels, levers, knobs, and switches, allow normal operation of vehicle primary controls, by a driver who does not have a physical disability without reconversion or special training, rely on the operator as the only source of activating force, and allow normal operation of driver-side airbags or be installed utilizing 49 CFR Part 595, especially where knee-bolster supplementary airbags are part of the OEM vehicle.

This document excludes adaptive products that require the removal or alteration of a vehicle component normally mounted outside the occupant space (e.g., on the fire wall, chassis, or engine). It also excludes secondary controls as defined by 3.4.2.

The primary adaptive controls covered by this recommended practice will usually be installed in a passenger vehicle such as sedans, crossovers, SUVs, MPVs, light trucks, and van-type vehicles. In Electric, Plug-in Hybrid, and Hybrid vehicles, the emerging trend of single pedal accelerator/braking function and other driver assistive technology integration is not detailed. Specific hand controls manufacturers should take this into consideration when developing vehicle applications.

This document may be used as a basis for product evaluation conducted by private and governmental officials engaged in the provision of such equipment for eligible beneficiaries, as well as by manufacturers of the subject equipment.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

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1. SCOPE

This SAE Recommended Practice establishes uniform procedures for assuring the manufactured quality, installed utility, and service performance of manual automotive adaptive products, other than those provided by the OEM, intended to provide driving capability for persons with physical disabilities. These devices function as adaptive appliances to compensate for lost or reduced performance in the drivers' arms or legs, or both. Some of the devices are designed to transfer foot functions to the hands, hand functions to the feet, or functions from one side of the body to the other.

This document applies only to primary controls as defined in 3.4.1 and in the Foreword. In particular, this document is specifically concerned with those mechanical and hybrid products that are intended by the manufacturer of the adaptive product to:

- Be installed within the occupant space of the vehicle
- Be operated by a vehicle driver with a physical disability
- Be added to, or substituted for, the OEM vehicle pedals, steering wheels, levers, knobs, and switches
- Allow normal operation of vehicle primary controls by a driver who does not have a physical disability, without reconversion or special training
- Rely on the vehicle operator as the only source of activating force
- Allow normal operation of driver-side airbags or be installed utilizing 49 CFR Part 595, especially where knee-bolster airbags are part of the OEM's vehicle

This document specifically excludes any automotive adaptive product that does not satisfy these criteria, or which, to be installed in the vehicle, requires the removal or alteration of a vehicle component that is normally mounted outside the occupant space (on the fire wall, chassis, or engine). Also excluded are secondary controls (see 3.4.2).

This document applies primarily to adaptive controls installed in passenger vehicles, including sedans, crossovers, SUVs, MPVs, light trucks, and van-type vehicles. In most cases, the vehicle will be equipped with OEM controls such as power steering, power brakes, and an automatic transmission.

This document is not intended to be used for secondary controls as defined in 3.4.2, even though many of the design and operating principles in this document are applicable to these controls.

2. REFERENCES

2.1 Applicable Documents

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

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 J2588 Remote Steering Control Systems

SAE J2603 Recommended Practice for Powered Gas Brake Control Systems

2.1.2 ASTM Publications

Available from the ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org

ASTM B117 Method of Salt Spray (Fog) Testing

2.1.3 AWS Publications

Available from American Welding Society, 8669 NW 36 Street, #130, Miami, FL 33166-6672, Tel: 1-800-443-9353 or 305-443-9353, www.aws.org.

AWS D1.1 Structural Welding Code

AWS D1.3 Structural Welding Code – Sheet Steel

AWS D10.7 Recommended Practice for Gas-Shielded Arc Welding of Aluminum and Aluminum Alloy Pipe

2.1.4 Code of Federal Regulations (CFR) Publications

Available from United States Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401, Tel: 202-512-1800, www.gpo.gov.

49 CFR Part 571 Federal Motor Vehicle Safety Standards

49 CFR Part 595 Make Inoperative Exemptions

2.1.5 NHTSA Publications

Available from National Highway Traffic Safety Administration, 1200 New Jersey Avenue, SE, Washington, DC 20590, Tel: 1-888-327-4236, https://www.nhtsa.gov/.

FMVSS 101 Controls and Displays

FMVSS 111 Rear Visibility

FMVSS 105 Hydraulic Brake Systems

FMVSS 107 Reflecting Surfaces

FMVSS 124 Accelerator Control Systems

FMVSS 201 Occupant Protection in Interior Impact

FMVSS 203 Impact Protection for the Driver from the Steering Control System

FMVSS 204 Steering Control Rearward Displacement

FMVSS 208 Occupant Crash Protection

FMVSS 302 Flammability of Interior Materials

3. DEFINITIONS

3.1 AUTOMOTIVE ADAPTIVE PRODUCT

A piece of equipment designed to enable a person with a physical disability to operate an automotive vehicle.

3.2 COMMON HAND TOOL

Handheld devices, available for purchase in consumer stores, which are used to perform common mechanical and electrical repairs.

3.3 CONTROL HANDLE

The point of contact on the adaptive product where input motions of the operator are applied.

3.4 CONTROLS: PRIMARY AND SECONDARY

3.4.1 PRIMARY CONTROLS

Those controls, operated by the driver, which directly affect the direction and rate of the moving vehicle, including the steering, brake, and accelerator controls.

3.4.2 SECONDARY CONTROLS

Those controls not related to vehicle movement, operable by the driver or passenger, that regulate the environment of the vehicle, including heater/air conditioner, window regulator, vent, sun visor, seat positioner, radio, door lock, cigarette lighter, courtesy light, and any controls associated with wheelchair lifts, door openers, wheelchair securement, occupant restraints, etc.

3.4.2.1 MODE A

Those controls which are operated by the driver while the vehicle is in operating mode. They must be accessible to the driver for which they were intended while being able to maintain control of the vehicle steering, brake, and accelerator functions. Included in this group are: cruise control “set,” headlight beam selector, horn, turn signals, and windshield washer/momentary wipe.

3.4.2.2 MODE B

Those controls operable by the driver while maintaining control of the vehicle brake function with the vehicle not in motion, as in the case of vehicle start-up or restart necessitated by engine stall. Included in this group are: gear selector and ignition/starter.

3.4.2.3 MODE C

Those controls which are accessible by the driver when the vehicle is stationary, either temporarily or parked. Included in this group are: cruise control “on” and “off”; door locks; hazard flashers; heater, vent, and air conditioner (HVAC) controls; mirrors; parking brake; power seat; rear accessories (defogger, wiper/washer); windshield wipers; and window regulator.

3.5 DRIVER’S SPACE

The volume inside the vehicle occupied by the vehicle operator and containing all primary and accessory controls.

3.6 FOOT STEERING CONTROL

A system enabling the driver to control the steering of a vehicle with one or both feet.

3.6.1 FOOT STEERING CONTROL - ELECTRONIC AND ELECTROMECHANICAL

An Electronic or Electromechanical device that integrates into the OEM steering column to allow individuals without use of their arms and hands to steer with a parallel wheel accessed by the foot. Electronic and Electromechanical Foot Steering devices due to installation complexity are covered in SAE J2588.

3.6.2 FOOT STEERING CONTROL - MANUAL/MECHANICAL

A mechanical device that integrates into the OEM steering column to allow individuals without use of their arms and hands to steer with a parallel wheel accessed by the foot.

3.7 HAND CONTROLS

3.7.1 HAND CONTROLS - ELECTRONIC

Any electrically controlled device that transfers operation of a control ordinarily actuated by foot to hand operation by the addition of actuators, motors, electrical controls, and/or other electrical systems. This is covered by SAE J2603.

3.7.2 HAND CONTROLS - MANUAL/MECHANICAL

Any mechanical device that transfers operation of a control ordinarily actuated by foot to hand operation by the addition of rods, levers, and/or other hardware. Includes, but is not limited to: push/rock, push/pull, push/right-angle, or push/twist.

3.7.3 HAND CONTROLS - HYBRID

A Manual/Mechanical hand control that uses electronics to integrate into the OEM drive-by-wire throttle system, instead of mechanically coupling to the OEM accelerator pedal. Includes, but is not limited to: push/rock, push/pull, push/right-angle, or push/twist.

3.8 INERTIAL MOVEMENT

A change of position of the vehicle operator that results from an acceleration or deceleration of the vehicle, including vehicle turning.

3.9 LEFT FOOT GAS PEDAL

3.9.1 LEFT FOOT GAS PEDAL - MANUAL/MECHANICAL

A mechanical device that allows left foot operation of the accelerator.

3.9.2 LEFT FOOT GAS PEDAL - HYBRID

An electronic device that allows isolated throttle control through the addition of an accelerator pedal left of the brake. This device integrates directly into the OEM drive-by-wire throttle system.

3.10 MANUAL CONTROL

A control that is purely mechanical in operation by the driver.

3.11 OCCUPANT SPACE

The volume inside the vehicle that is made available for use by the driver and any passengers.

3.12 ORIGINAL EQUIPMENT MANUFACTURER (OEM)

The original producer of the assembled vehicle and all specified vehicle parts and components.

3.13 PHYSICAL DISABILITY

The absence or reduction of a neuromuscular or orthopedic function of the human body.

3.14 POWER(ED)

Those systems which are operated by means of an energy source other than muscle power.

3.15 POWER ASSISTED

Those systems which are operated by means of an energy source in addition to muscle power and which remain operable when the assist is lost.

3.16 REAR VISIBILITY SYSTEM

Set of devices and/or components, which together detect by means of a single source and indirect vision to provide a visual image of the area directly behind a vehicle in a single location to the vehicle operator.

3.17 SHALL

A term used to denote “mandatory.”

3.18 SHOULD

A term used to denote “advisory.”

3.19 SINGLE PEDAL ACCELERATOR/BRAKING

A term that encompasses OEM emerging technology of using a single pedal to accelerate and decelerate to a stop, and/or keep the vehicle stopped, as typically found on Electric, Plug-in Hybrid, and Hybrid vehicles.

3.20 STEERING DEVICES

A device attached to the steering wheel, which allows rotation of the steering wheel with one hand. Such as:

a. Spinner Knob

b. Tri-Pin

c. Amputee Ring

d. Palmer Cuff

e. Steering Cuff

f. V or U Grip

3.21 UNIAXIAL MOTION

Movement along a straight line in either or both of two opposite directions.

3.22 UNIDIRECTIONAL

Revolving, functioning, moving, or responsive in a single direction.

3.23 VISIBLE DEFORMATION

A change in alignment, position, or shape that is apparent to a careful observer.

4. ABBREVIATIONS

ANSI	American National Standards Institute
ASTM	American Society of Testing and Materials
AWS	American Welding Society
CMVSS	Canadian Motor Vehicle Safety Standard (Transport Canada)
FMVSS	U.S. Federal Motor Vehicle Safety Standard (49 CFR Part 571 or Canadian equivalent)
NHTSA	National Highway Traffic Safety Administration, part of the Department of Transportation
OEM	original equipment manufacturer

5. REQUIREMENTS

The following criteria are considered essential for all primary control devices which attach to or substitute for the OEM control.

5.1 Documentation

5.1.1 Identification

Each hand control assembly shall bear a model number, a serial number, and the name and address of the manufacturer. Internet contact information is recommended. The identification shall be engraved directly onto a permanent structural member or placed on a permanently affixed label. The identification shall be visible without the removal of the installed hand control, and the shipping container shall bear the name and address of the manufacturer and product description.

5.1.2 Quality Control

The manufacturer shall employ a quality control procedure sufficient to assure a product-to-product consistency in quality of purchased components, manufactured parts, and assemblies. Evidence of quality inspection, in the form of a seal, inspection stamp, tag, or other legible identification, shall be included with every product sold. The quality control plan shall be available upon request.

5.1.3 Warranty

The manufacturer shall provide a written statement of warranty with each product. The warranty shall state clearly the duration of the warranty period and the terms of the agreement that relate to repair, replacement, or refund of purchase price.

5.1.4 Compliance

All claims of product approval by private or governmental agencies shall be specific as to the approving agency and testing protocol. Documentation of such claims shall be made available upon request.

5.1.5 Installation Instructions

The manufacturer shall provide the appropriate documentation for installing the product and adjusting it for use. The manufacturer shall specify, when advertising or otherwise promoting the product, whether it can be installed by the purchaser or requires that it be installed by a trained agent of the manufacturer. The product shall have, at the time of shipment from the manufacturer, instructions or access directions to electronic instructions written in a language suitable for the level of technical skill required for a reliable installation. The installation instructions shall include information specific to the make, model, year, and type of vehicle for which it was designed, including any critical fastener torque requirements.

The instructions shall include reference to all needed tools and listing of all items required but not included for successful installation.

5.1.6 Operating Instructions

The manufacturer shall provide with the product access to instruction documentation for the end user, supplemented by drawings and photographs as necessary, describing the proper use and operation of the product. The instructions shall address at least the following:

a. General operating principles

b. Control movements and resulting vehicle response

c. Warnings and Cautions of user actions to be avoided and consequences

d. Signs of possible malfunctions

e. Actions to be taken in the event of product failure

f. Functional capabilities required of the intended user

5.1.7 Maintenance Procedures

The manufacturer shall provide with the product guidance for proper maintenance of the product. This shall be included with the operating instructions. Maintenance instructions should list if it is a requirement for the installer or trained/authorized service personnel or a requirement for the end user. The instructions shall include at least the following:

a. Lubrication points, lubricant type, and guidance of frequency of service based on operating environment and type of usage

b. Adjustment, calibration, alignment, and measurement of wear and at what intervals

c. Tools needed for maintenance

d. Parts' lists and correlated assembly diagrams

e. Electrical and hydraulic diagrams

f. Name and contact information for the manufacturer

g. Reference for online instructions or videos

5.2 Installation

5.2.1 Vehicle Alterations

The installation of the product shall not require alterations to the motor vehicle as delivered by the OEM which diminish its structural integrity.

5.2.2 Occupant Protection

Positioning of the product shall ensure the greatest possible retention of occupant protection features provided by the OEM, such as collapsible steering column assembly, knee bolsters, and air bags. It is preferable to modify the knee bolster rather than remove it. If one of these occupant protection features is to be removed according to the hand control manufacturer's instructions, appropriate use of the 49 CFR Part 595 shall be followed.

5.2.3 Fasteners

All mechanical fasteners for installation shall conform in type, strength, vibration, and corrosion resistance to the SAE fastener standard that applies to the vehicle component to which the adaptive device is attached and shall be designed or treated to resist loosening due to vibration.

5.2.4 Adjustable Pedals

When installing hand controls in a vehicle with adjustable pedals, the adjustability of the pedals shall be deactivated, and a permanent warning label attached at the point of disconnect. The location of the OEM brake and accelerator pedals shall be determined based on the needs of the vehicle's primary driver without a disability.

5.2.5 Adjustable Steering Columns

The installation manual shall state that the OEM adjustable steering column shall not interfere with the operations of the hand control. If the adjustability of the steering column could interfere with the hand control operation, it shall be FIXED in the appropriate position for the primary vehicle driver with a disability. A permanent warning label shall be applied at the point of disconnect.

5.2.6 Connections

All electrical and fluid connections to the vehicle shall conform in type, capacity, material, and environmental appropriateness to the SAE Standard that applies to the vehicle component to which the adaptive device is attached.

5.2.7 Hardware

All fasteners, terminals, couplings, lubricants, and materials required for installation shall be provided with the product at the time of shipment. A listing of all parts and components shall be included in the installation instructions.

5.2.8 Adjustments

Adjustment of any component of the product to the intended user shall be clearly described in the installation instructions.

5.2.9 Conventional Use

Installation of the product to the vehicle shall permit unimpeded use of the OEM vehicle controls by a driver without a disability.

5.3 Design

5.3.1 Structural Materials

Materials used for fabrication of load-bearing components of the product shall be selected for application and manufactured according to standard engineering practice. All structural members of primary controls shall be designed to a factor of safety of at least 1.5X the expected maximum operating load.

5.3.2 Mounting

The product shall be designed to mount to the vehicle at a location that will reliably bear the service load and employ a means of attachment that will remain stable during the expected service life of the hand control.

5.3.3 Human Factors

The primary control design shall incorporate provisions for the following factors relating to drivers with disabilities:

a. Throttle and brake activations require distinctly different directions of operator input movement. It may be possible to activate the brake and throttle at the same time.

    1. Provide the ability to apply the brake without activating the throttle during normal and emergency operations.

    2. It is recommended that Push to activate the brake is the preferred operation method.

    3. Understanding that the Adaptive Device user community has unique needs, design considerations should strive to accommodate the greatest range of users from small females to large males. Specific limitations of the user range should be clearly identified in product literature.

b. Design outside of the preferred operation to accommodate driver specific needs or ability level shall be clearly identified in all support documentation and permanent labeling provided.

    1. Driver who needs or desires to rotate or twist an input in opposite of preferred method.

    2. Twisting or Rotation Input mechanisms to control non-braking functions.

    3. Integration with an OEM single pedal accelerator/brake operation.

c. The effects of forward or rearward inertial movement of the operator shall be considered when designing or customizing controls.

    1. Vehicle acceleration movements tendency to push the driver's body rearward dependent on the driver's level of trunk control.

    2. Vehicle deceleration movements tend to throw the driver's body forward dependent on the driver's level of trunk control.

d. Positioning and upper body restraint of the driver must ensure that passive inertial movement of nonparticipating body parts shall not impede the operation of the controls.

e. Location of the controls shall be considered to maximize the clearance for the transfer of the operator to and from the driver's station.

f. Hand controls used in vehicle rental situations shall be actuated with preferred operation (see 5.3.3 a. 2.) movements only.

It is the intent to minimize unintended activation of the brake and throttle at the same time, understanding that user error can occur.

5.3.4 Use by Drivers Without a Disability

The product shall be designed to ensure the unimpeded use of the vehicle by drivers who do not have a physical disability.

5.3.5 Neutral Balance

The product shall be designed such that its static mass cannot exert sufficient force to cause movement of the vehicle control to which it is attached.

5.3.6 Contact Hazards

The product shall be designed to assure that the operator is not exposed to:

a. Specular glare from a product component in the field of view while driving

b. Electrical shock or burn

c. Sharp edges, pinch points, or rough surfaces

d. Surfaces which may acquire injurious extremes of temperature

e. Components which become dirty or greasy in routine service

5.3.7 Maintainability

The product shall be designed to assure access to parts needing replacement, lubrication, or adjustment after installation. Any component designed for adjustment shall include a means for being securely locked in the adjusted position. Service maintenance shall be described in the maintenance instructions and be performed without disassembly using common hand tools. The service interval guidance shall be specified in the manual.

5.3.8 Flammability

Any nonmetallic materials used in the product shall be resistant to burning, complying with FMVSS 302.

5.3.9 Effect on Performance

The product shall be designed to assure that the location and positioning of the adaptive product shall not degrade the quality, handling characteristics, visibility, reliability, and efficiency of operation of the motor vehicle. The overall weight of the adaptive product and distribution of that weight during all stages of operation shall not degrade the normal function or performance quality and shall be within the designed carrying capacity of the motor vehicle.

Due to emerging technology, special diligence is required not to degrade any safety function when integrating with an OEM single pedal accelerator/brake and other driver assistive technology.

5.4 Selection of Components

The components of the adaptive product shall not degrade the quality nor interfere with the function of the existing product.

5.4.1 Electrical

All wiring, switches, and electrical connections shall conform to SAE Standards and Recommended Practices that apply to the vehicle component to which they are attached.

5.4.2 Fasteners

All fasteners shall conform to SAE Standards and Recommended Practices that apply to the vehicle component to which they are attached and shall be designed or treated to resist loosening due to vibration.

5.4.3 Compatibility

Any stock hardware or electrical components shall be equal or equivalent in size and type to those used on surrounding OEM applications in the vehicle. Materials, component parts, finishes, and service principles used on the adaptive product should be consistent with those used by the OEM.

5.5 Manufacturing Quality

5.5.1 Finishing of Fabricated Parts

The manufacturer shall remove all sharp-edge and jagged projections which might cause injury to the user, to safety system components, and/or damage to clothing. Finish of parts shall be appropriate for application environment with special consideration for extreme use environments.

5.5.2 Surface Finish

The manufacturer shall prepare all ferrous metal components to resist corrosion. Parts that are in a position to reflect sunlight or glare shall comply with FMVSS 107.

5.5.3 Weldments

The manufacturer shall assure that all welding which has been used to join metal components of the products conforms, as applicable, to AWS Codes D1.1 and D1.3 (steel) or D10.7 (aluminum).

5.5.4 Packaging

The manufacturer shall provide packaging for shipment to the purchaser or installer that will assure the protection of the product, and its associated documentation, against shipping hazards, including vibration, impact, and moisture.

5.6 Performance Requirements

5.6.1 Operation and Performance

The adaptive control product or system, when installed and maintained according to the manufacturer's instructions, shall perform its intended function under all conditions of service, including:

a. Vibratory, electrical, and chemical environments of the vehicle interior.

b. Long-term repetition of operating cycles.

c. Occasional overloads due to common driving occurrences.

   The driver controls are an integral part of the vehicle and are expected to remain functional throughout the vehicle service life. Adaptive controls shall perform as long and reliably as the OEM components of the vehicle to which they are originally attached.

   1. In routine use, the vehicle interior, where the controls are installed, will be subjected to temperature extremes, dirt, moisture, and vibration derived from the engine and the chassis' response to road conditions. This may cause components to become loosened, fatigued, or corroded.

   2. Occasionally, the controls will be subjected to momentary overloads induced by the driver (panic stops, sudden hard acceleration, sudden changes of direction, loss of power assist), and by the vehicle transmitted back to the controls (curb impacts, road irregularities, and blowouts). The product shall be expected to withstand such events with no resulting degradation of strength or performance.

d. Full range of automotive operating temperatures should be considered (refer to FMVSS 124).

5.6.2 Vibration Environment

The product, as installed according to the manufacturer's instructions, shall continue to perform its intended function, without loosening of fasteners or adjustable components, and without loss of electrical function when subjected to the vibration test in 6.4.1.

5.6.3 Electromechanical Environment

When subjected to the environmental test in 6.4.2, the product shall continue to function without exhibiting degradation or loss of surface finish, mechanical resistance of moving parts, loosening of mechanical fasteners, and corrosion or dysfunction of electrical component parts.

5.6.4 High-Cycle Degradation

After 250000 cycles of high-cycle test (see 6.4.3), the product shall continue to perform its intended function without signs of component deformation, mechanical loosening, wear, and loss of dimensional tolerance beyond the limits of adjustments and wear replacement items which are prescribed in the operating instructions by the manufacturer.

5.6.5 Service Overload

The product shall survive the service overload test described in 6.4.4. There shall be no visible deformation of the device or its mount after removal of the test load.

6. INSPECTION AND TESTING PROCEDURES

Each model configuration should be tested unless assembly is similar, and an engineering analysis can be performed based off of actual test results of the baseline tested model. Engineering analysis should contain original test report from baseline model tested.

6.1 Receiving Inspection

6.1.1 Packaging Integrity

Examine the product as shipped to determine that damage has not been caused to the package contents during shipping. Look for damage incurred by materials handling equipment, indirect forces such as dropping or vibration, and exposure to weather.

6.1.2 Packaging Documentation

Examine the shipping documents to determine that the product is identified by model and serial number, and manufacturer.

6.1.3 Verification of Contents

Open the shipping package and determine that the items contained in the package include:

a. The product, identified by model number, serial number, and manufacturer's name and address, and specification of the vehicle for which it was designed

b. Quality control verification

c. Warranty information

d. Compliance documentation as required

e. Installation instructions or method to access electronic instructions

f. Operating instructions or method to access electronic instructions

g. Maintenance instructions or method to access electronic instructions

h. Limitations

i. Notifications (such as hazards and warnings)