The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE STANDARD

SAE AS8091

Issued 1999-04

Adapter, Aircraft, Jacking Point, Design and Installation of

FSC 1730

NOTICE

This document has been taken directly from U.S. Military Specification MIL-STD-809B and contains only minor editorial and format changes required to bring it into conformance with the publishing requirements of SAE technical standards. The initial release of this document is intended to replace MIL-STD-809B. Any part numbers established by the original specification remain unchanged.

The original Military Specification was adopted as an SAE standard under the provisions of the SAE Technical Standards Board (TSB) Rules and Regulations (TSB 001) pertaining to accelerated adoption of government specifications and standards. TSB rules provide for (a) the publication of portions of unrevised government specifications and standards without consensus voting at the SAE Committee level, and (b) the use of the existing government specification or standard format.

Under Department of Defense policies and procedures, any qualification requirements and associated qualified products lists are mandatory for DOD contracts. Any requirement relating to qualified products lists (QPL's) has not been adopted by SAE and is not part of this SAE technical document.

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CONTENTS

CONTENTS

CONTENTS (Cont'd)

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1. SCOPE:

1.1 Purpose:

This standard provides requirements for design and installation of aircraft jacking point adapters, as identified by ASCC AIR STD 25/7 Aircraft Jacking Pads, to permit use of standard jacking equipment.

1.2 Classification:

Each adapter shall be classified by type and class.

1.2.1 Types: The design of the adapter shall be determined as to type by the loads imposed as follows:

Type I - Primary flight structure adapters for reactions of less than 10,000 pounds (4536 kg).

Type II - Primary flight structure adapters for reactions of 10,000 (4536 kg) to 112,000 pounds (50,803 kg).

Type III - Axle adapters for reactions of less than 10,000 pounds (4536 kg).

Type IV - Axle adapters for reactions of 10,000 (4536 kg) to 150,000 pounds (68,000 kg).

Type V - Axle or primary flight structure adapters for reactions of 150,000 (68,000 kg) to 300,000 pounds (136,080 kg).

1.2.2 Classes: All types of adapters shall be designed in accordance with one of the following classes;

Class 1 - Removable when the aircraft is flown.
Class 2 - Integral or permanently attached.

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2. REFERENCED DOCUMENTS:

2.1 Government Documents:

2.1.1 Specifications, standards and handbooks: Unless otherwise specified, the following specifications, standards and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this standard to the extent specified herein.

SPECIFICATIONS

MILITARY

MIL-F-7179	Finishes, Coatings and Sealants for protection of Aerospace Weapons System
MIL-W-7327	Weighing Kit, Electronic, Aircraft and Missile A/S 37M-1 and A/S 37M-2
MIL-S-7742	Screw Threads, Standard, Optimum Selected Series, General Specifications for
MIL-A-8863	Airplane Strength and Rigidity Ground Loads for Navy Procured Airplanes
MIL-S-26149	Jack, Hydraulic, Hand Weapon and Support Systems, General Specification for
MIL-P-26191	Pumping Unit, Hydraulic AF/M27M-1 and AF/M27M-2

STANDARDS

MILITARY

DOD-STD-100	Engineering Drawing Practices
MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD-875	Type Designation System for Aeronautical and Support Equipment
MIL-STD-889	Dissimilar Metals
MIL-STD-1568	Materials and Processes for Corrosion Prevention and Control in Aerospace Weapon Systems
MIL-STD-1587	Materials and Process Requirements for Air Force Weapon Systems
MS26566	Jack, Aircraft Landing Gear
MS33559	Adapter, Aircraft, Jacking Points, Design and Installation of
MS33589	Jack, Hydraulic, Tripod, Aircraft, Airframe

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MS33589	Jack, Hydraulic, Tripod, Aircraft, Airframe

2.1.2 Other Government Documents and Publications: The following other Government documents and publications form a part of this standard to the extent specified herein.

PUBLICATION

AIR STANDARDIZATION COORDINATING COMMITTEE

AIR STD 25/7 Aircraft Jacking Pads

NAVAL AIR SYSTEMS COMMAND

NAVAIR 19-70-46 Index and Application Tables for Aircraft Jacks

(Copies of specifications, standards and publications required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.3 Order of precedence:

In the event of a conflict between the text of this standard and the reference cited herein, the text of this standard shall take precedence.

2.4 Source of Documents:

2.4.1 Military standards, specifications, and associated documents: Copies of listed military standards, specifications, and associated documents listed in the Department of Defense Index of Specifications and Standards, are available from the Department of Defense Single Stock Point, Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120. Copies of industry association documents should be obtained from the sponsoring industry association. Copies of all other listed documents should be obtained from the contracting activity or as directed by the contracting officer.

3. DEFINITIONS:

3.1 Adapter:

The Word Adapter as used herein is the piece/part that is the interface between the aircraft and the jack(s). The adapter shall be designed for a satisfactory fit and positive accommodation to bring or settle the aircraft into a proper position.

3.2 Socket:

The word socket as used herein is the piece/part that is the interface between the adapter and the aircraft jack. The socket shall mate with the adapter to transmit the load to the jack.

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3.3 Turn-Around Time:

As used in this standard, Turn-Around Time (TAT) is that time required to complete an action which initially requires the use of an adapter as designed and installed in accordance with this standard and MS33559. The action will normally be a maintenance task such as a repair or replacement. The procuring activity shall define the Turn-Around Time(s) to be determined.

4. GENERAL REQUIREMENTS:

4.1 Materials:

Materials shall be of the best quality, of the lightest practicable weight, suitable for the purpose intended and shall be approved by the procuring activity. Materials shall be selected in accordance with MIL-STD-1587 and in conjunction with MIL-STD-1568.

4.1.1 Metals: The adapter shall be fabricated of metal only. Metals shall be suitably treated to resist corrosion in fuels, salt fog, or other atmospheric conditions to which the adapter will be subjected when in storage or during normal service use.

4.1.1.1 Dissimilar metals: Unless suitably protected against electrolytic corrosion, dissimilar metals shall not be used in intimate contact with each other. Dissimilar metals are defined in and shall be in accordance with MIL-STD-889.

4.1.2 Protective finishes: Adapters shall be finished in accordance with MIL-F-7179.

4.2 Interchangeability:

All parts having the same manufacturer's part number shall be directly and completely interchangeable with each other in respect to installation and performance. Changes in manufacturer's part numbers shall be governed by the drawing number requirements of DOD-STD-100.

4.2.1 Drawings: Contractor's drawings or each new adapter design shall be submitted to the procuring activity for examination to determine compliance with requirements specified herein and in MS33559. Drawing shall be provided in accordance with DOD-STD-100 and to the level established by the procuring activity.

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4.2.2 Jacking diagram: The contractor shall submit a jacking diagram containing the following information to the procuring activity for approval:

a. A three-view drawing showing the location of all jack points on all three views.

b. The load on each adapter under all probable load conditions, including fully and partially loaded, weight empty and weight empty with engines removed.

c. The height of each adapter in the static position, and with the struts fully compressed, completely deflated, and tire flat.

d. The clearance space to be provided for jacks at aircraft main jacking points will be represented by a right pyramid having an equilateral triangular base, limiting edges at 25° to the vertical and a truncated top such that a circle of 3.000 inch (76.20mm) minimum diameter will fall within the truncated top.

4.3 Markings:

4.3.1 Location of adapters: Adapter locations on the aircraft shall be identified by stencilling letters 1-inch (25.4 mm) high reading (Jack Here) for Class 2 adapters and (Attach Jack Pad Here) for Class 1 adapters.

4.3.2 Identification of product: Class 1 adapters shall be durably and legibly marked in accordance with MIL-STD-130. The following information shall be contained:

Manufacturer's part number
Aircraft model number
Location on aircraft

When the size of the adapter precludes complete compliance with the foregoing requirement, the adapter shall carry the manufacturer's part number as a minimum requirement.

4.4 Workmanship:

Workmanship shall be in accordance with high-grade aircraft-quality manufacturing practice covering this type of equipment, and of a quality control necessary to produce adapters free from all defects that affect proper functioning in service. The adapters shall be installed in a thoroughly workmanlike manner and the completed installation shall present a clean appearance suitable to accept the jack(s).

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5. DETAILED REQUIREMENTS:

5.1 Design and installation:

5.1.1 Dimensions: The dimensions and design of the adapters shall be in accordance with MS33559.

5.2 Arrangement:

Adapters shall be arranged to preclude the possibility of the aircraft upsetting during any jacking operation, under all probable load conditions including fully and partially loaded, weight empty, and weight empty with engines removed. On aircraft having a total of more than three wing and fuselage jacking points manifold jacking shall be considered for the complete aircraft and the adapters shall be so arranged with respect to the aircraft center of gravity as to facilitate use of standard manifolding equipment in accordance with MIL-P-26191.

5.2.1 Jacks to be used: The jacks to be used in the design of jacking point adapter installations shall be in accordance with MS26566 and MS33589, and MIL-J-26149 except that the jacks to be used for carrier-based aircraft shall be as specified by the procuring activity per Technical Manual 19-70-46.

5.2.1.2 Government-Furnished Property: Standard suitable aircraft jacks from government inventory may be furnished by the procuring activity to verify the use of these jacks for the operational tests of 5.2.2 or any other test(s) which are pertinent to the use of jacks such as interchangeability or turn-around time.

5.2.1.3 Government-Loaded Property: The procuring activity may supply aircraft jacks for specific individual tests as required. These tests shall be scheduled and accomplished in accordance with the Test and Evaluation Master Plan (TEMP) and turn-around-time (TAT).

5.2.2 Operations to be performed: A sufficient number of jacking point adapters in accordance with MS33559 shall be provided on the aircraft to permit the aircraft to be jacked up for any of the following purposes:

a. Removal, replacement and servicing of alighting gear, wholly or in part including replacement of wheel, float or ski alighting gear with another type for convertible aircraft.

b. Checking the operation of retractable gear.

c. Checking the operation of steerable landing gear.

d. Servicing or replacing tires and wheels by jacking each alighting gear separately without the necessity of removing the struts or any part of the alighting gear structure.

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d. Servicing or replacing tires and wheels by jacking each alighting gear separately without the necessity of removing the struts or any part of the alighting gear structure.

5.2.2 (Continued):

e. Adjustment, maintenance and replacement of brakes.

f. As a precautionary measure to prevent tipping of the aircraft during normal maintenance operations, including replacement of engines, propellers or other equipment or structural components.

g. Weighing the aircraft for determining location of center of gravity.

h. Positioning the aircraft for boresighting.

i. Placing the aircraft in jig position.

j. Turn-around time (TAT) for all pertinent repairs or replacements.

5.2.3 Accessibility: Adapters shall be designed for ease of installation on the aircraft and shall be readily accessible. When adapters are recessed or otherwise enclosed in such manner that the jacking point is accessible only through a restricted opening, the access opening shall be large enough to permit use of standard weighing cells in accordance with MIL-W-7327.

5.2.4 Orientation: Primary flight structure adapters shall be so located that there will be no interference between adjacent jacks or between a jack and any component of the aircraft, including movable components, such as control surfaces, doors, etc; in any position in their normal operation range, regardless of orientation of the jack.

5.2.5 Axle jack pads: Axle jacking point adapters shall be so located that the shock absorber strut will remain compressed to the normal static position throughout the jacking operation except for quadricycle gears.

5.2.5.1 Steerable alighting gear: Where adapters are provided on steerable alighting gear, the alighting gear shall be equipped with a means of preventing rotation around the vertical axis.

5.2.5.2 Flat tires: It shall be possible to jack each wheel, or set of wheels, with a single jack, even when a tire is flat.

5.2.5.2.1 Single or tandem wheels: The axle jacking point adapters, when located so that a flat tire will prevent the wheel from being jacked, may be extendible only if prior specific approval is obtained from the procuring activity. Sufficient clearance shall be provided between and around components to permit the use of one of the jacks specified in 5.2.1.

5.2.5.2.2 Dual wheels: For alighting gear with dual wheels, where design features prevent jacking of the wheels with a single jack when the tires are flat, the use of a jacking arrangement requiring the use of a special jack or adapter may be considered only if prior specific approval of the arrangement is obtained from the procuring activity.

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5.3 Angle of installation:

Eccentricities of loading shall be avoided in the design, position, or location of the adapters.

5.3.1 Axle adapters: Axle adapters shall be so installed that the axis of the adapter is vertical ±1 degree when the aircraft is in its normal static position.

5.3.2 Angular tolerances: The axis of the primary flight structure adapters shall be vertical within ±5 degrees, regardless of whether the longitudinal centerline of the aircraft is normally horizontal, vertical, or inclined, at any intermediate angular jacking attitude. Except for aircraft having a tail wheel type of landing gear, the axis of primary flight structure adapters shall be vertical ±1 degree when the aircraft is midway between the normal static position and the position at which the longitudinal axis of the aircraft is horizontal.

5.4 Class 1, Removable adapters:

Class 1 adapters shall be so designed that special tools will not be required for assembly, disassembly, or installation. Preferably, removable adapters shall be of single-piece or permanently assembled construction. The adapters shall be so installed that they will not work loose in service. They shall be built to withstand strains, jars, vibrations, and other conditions incident to storage, installation and service.

5.4.1 Stowage provisions: Provision shall be made to stow all Class 1 adapters within the aircraft. The adapters shall be fastened securely when stowed. If the adapters are stowed aboard the aircraft, their weight shall be included with the special equipment of the aircraft.

5.5 Class 2, Integral adapters:

Class 2 adapter shall be constructed in a manner to complement the basic load-carrying structure of the aircraft. Wherever possible, integral adapters shall form part of the primary flight structure of the aircraft.

5.5.1 Axle adapters: Axle adapters installed on main and nose alighting gear shall be integral with or permanently attached to the alighting gear, unless a deviation is specifically granted by the procuring activity.

5.6 Primary flight structure adapters:

Where primary flight structure adapters protrude beyond the aircraft skin on aircraft other than rotary-wing, liaison, or low-speed trainer aircraft, they shall be Class 1. Where primary flight structure adapters do not protrude beyond the aircraft skin or are installed on rotary-wing, liaison, or low-speed trainers, they may be Class 1 or Class 2. Whenever practicable, all Class 1 adapters of one type shall be interchangeable throughout for each model of aircraft. When interchangeability is not practicable, adapters shall be marked for identification of the intended location.

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Eccentricities of loading shall be avoided in the design, position, or location of the adapters.

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Class 2 adapter shall be constructed in a manner to complement the basic load-carrying structure of the aircraft. Wherever possible, integral adapters shall form part of the primary flight structure of the aircraft.

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