



AEROSPACE RECOMMENDED PRACTICE

ARP6137™

Issued 2010-08
Reaffirmed 2020-09

Tire Pressure Monitoring Systems (TPMS) for Aircraft

RATIONALE

ARP6137 has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE

A tire pressure monitoring system (TPMS) is a means to electronically measure and report the current tire pressure. Some systems are capable of transmitting the information to the flight deck while other systems are for use on the ground by maintenance personnel (only).

This SAE Aerospace Recommended Practice (ARP) document is intended to establish overall component and system function guidelines and minimum performance levels for a TPMS. The system should visually indicate the tire inflation pressure status. These guidelines include, but are not limited to:

a) Design recommendations for system components, which:

1. monitor tire inflation, and,
2. are located in/on the tire/wheel assembly, landing gear axle, and/or aircraft avionics compartment.

b) Recommended performance and safety guidelines for a TPMS.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of the other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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 724-776-4970 (outside USA), www.sae.org.

AIR5699 A Guide for the Damaging Effects of Tire and Wheel Failures

ARP5265 Minimum Operational and Maintenance Responsibilities for Aircraft Tire Usage

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Full document details: [SAE ARP6137](http://www.sae.org/standards/content/ARP6137)

For more information on this standard, visit
<https://www.sae.org/standards/content/ARP6137>

Documents
Document Sharing Hub

ARP4101	Flight Deck Layout and Facilities
ARP4102/3	Flight Deck Tire Pressure Monitoring System (TPMS)
ARP4102/4	Flight Deck Alerting System (FAS)
ARP4105	Abbreviations, Acronyms, and Terms for Use on the Flight Deck
J2402	Road Vehicles – Symbols for Controls, Indicators, and Tell-Tales

2.1.2 ASTM Publications

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

B117	Standard Practice for Operating Salt Spray (Fog) Apparatus
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2.1.3 FAA Publications

Available from Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591, Tel: 866-835-5322, www.faa.gov.

AC 20-97B	High-Speed Tire Maintenance & Operational Practices
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2.1.4 ISO Publications

Available from International Organization for Standardization, 1, rue de Varembe, Case postale 56, CH-1211 Geneva 20, Switzerland, Tel: +41-22-749-01-11, www.iso.org.

ISO 3324-2	Aircraft Tyres and Rims – Part 2: Test Methods for Tyres
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2.1.5 RTCA Publications

Available from Radio technical Commission for Aeronautics Inc., 1828 L Street, NW, Suite 805, Washington, DC 20036, Tel: 202-833-9339, www.rtca.org.

RTCA/DO-178B	Software Considerations in Airborne Systems and Equipment Certification
RTCA/DO-254	Design Assurance Guidance for Airborne Electronic Hardware
RTCA/DO-160	Environmental Conditions and Test Procedures for Airborne Equipment

2.1.6 U.S. Government Publications

Available from the Document Automation and Production Service (DAPS), Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6257, <http://assist.daps.dla.mil/quicksearch/>.

MIL-STD-810G	Department of Defense Test Method Standard, Environmental Engineering Considerations and Laboratory Tests
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2.1.7 Other Publications

The Tire and Rim Association (TRA) Aircraft Tire Year Book & Other Publications

The European Tyre and Rim Technical Organisation (ETRTO) Standards Manual

3. INTRODUCTION

Proper aircraft tire inflation pressure maintenance has been found to be the most effective way to promote the safest operation of aircraft tires. In addition, benefits in tread life, casing life and tire costs also are achieved with proper tire inflation pressure maintenance. The goal would be to have a reliable TPMS which could take the place of the manual tire inflation pressure check so that direct maintenance actions would be done only when necessary, such as tire re-inflation. This would reduce maintenance costs and keep the tires properly inflated for best performance and safety. The TPMS should be developed to be used in meeting the AMM (Aircraft Maintenance Manual) daily tire pressure checks as recommended by the tire manufacturers in their care and maintenance manuals and the FAA in AC 20-97B.

In addition to improved maintenance practices, the TPMS can provide cockpit annunciations of tire health to the crew in the event of unsafe tire pressures, a flat tire or uneven tire pressures so that they can adjust their operations accordingly to minimize the aircraft threat level.

4. DEFINITIONS

4.1 Cold Inflation Pressure

Tire inflation pressure at the prevailing atmospheric temperature that does not include any tire inflation pressure build-up due to aircraft operation. Typically, this is the tire inflation pressure prior to the 1st flight of the day.

4.2 Functionality

Operation within the parameters as defined by the specification of the device under test.

4.3 Maximum Aircraft Weight

The value specified by the aircraft manufacturer as the maximum weight of the aircraft.

4.4 Minimum Threshold Pressure

The tire pressure at which the system is to be activated to indicate a tire pressure condition below minimum dispatch pressure on the applicable aircraft.

4.5 Tire Placard

A placard, permanently affixed to the aircraft. The placard displays, among other information, the aircraft manufacturer's recommended cold tire inflation pressure. If a tire placard is not provided, the information should be provided in the aircraft operating manuals.

4.6 Tire Pressure Monitoring System (TPMS)

TPMS is a means to remotely measure and report the current tire pressure. Some systems are capable of transmitting the information to the flight deck while other systems are for use on the ground by maintenance personnel (only).

4.7 Specified Service Pressure (SSP)

The "cold" pressure level within the completely installed wheel/tire assembly which is necessary for a tire to carry the aircraft load when configured and loaded to its maximum capacity.

4.8 Operational Service Pressure (OSP)

The actual pressure level of the tire/wheel assembly at any point during service whether at ambient or at elevated temperature due to rolling under load.

4.9 Flat Tire

A pneumatic tire with less than the specified inflation pressure for its load capacity, which causes the tire structure to be pinched between the rim flange and the ground (runway) surface.

4.10 Symbols and Abbreviations

AMM – Aircraft Maintenance Manual

ARP – Aerospace Recommended Practice

BIT - Built-in Test

CAS - Crew Alerting System

DUT – Device Under Test

EMC – Electromagnetic Compatibility

EMI – Electromagnetic Interference

HMI – Human Machine Interface

ISO – International Organization for Standardization

LRU – Line Replaceable Unit

MAP – Minimum Activation Pressure

OSP – Operational Service Pressure

RTCA – Radio Technical Commission for Aeronautics

SAE – Society of Automotive Engineers

SSP – Specified Service Pressure

TPIS – Tire Pressure Indicating System

TPMS – Tire Pressure Monitoring System

TPMU – Tire Pressure Monitoring Unit

TRA – The Tire and Rim Association

5. TECHNICAL REQUIREMENTS

Section 5.1 applies to device(s) that are mounted in/on the tire/wheel assembly environment or in other areas of the aircraft as defined by the airframer. This section describes characteristics of the expected environment that can impact the performance and reliability of such devices. For those components of the TPMS that are not mounted in/on the tire/wheel assembly environment, ARP4102/3 should apply. Section 5.1 of this document addresses those requirements that are not defined in ARP4102/3.

Section 5.2 applies to the complete TPMS. This section describes the performance responses and the operating environment for the system. It also specifies the characteristics of the human-machine interface to assure an understandable and clear communication.